

# RF TEST REPORT

For

**Huizhou HuoYing Photoelectric Technology Co., Ltd.**

**Product Name: Projector**

**Test Model(s): P50**

**Report Reference No.** : DACE240819004RF002

**FCC ID** : 2BLCL-P50

**Applicant's Name** : Huizhou HuoYing Photoelectric Technology Co., Ltd.

**Address** : 2 F, Building 3,8 a, Yuen Fai Road, Chan Kong Street, Chung Kai high-tech development zone, Huizhou, China

**Testing Laboratory** : Shenzhen DACE Testing Technology Co., Ltd.

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

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

**Date of Receipt** : August 19, 2024

**Date of Test** : August 19, 2024 to September 24, 2024

**Data of Issue** : September 24, 2024

**Result** : Pass

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## Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	DACE240819004RF002	September 24, 2024

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

## 1.2 Summary of Test Result

Item	Method	Requirement	Result
Antenna requirement	/	47 CFR 15.203	Pass
Conducted Emission at AC power line	ANSI C63.10-2013 section 6.2	47 CFR 15.207(a)	Pass
Occupied Bandwidth	ANSI C63.10-2013, section 11.8	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	ANSI C63.10-2013, section 11.9.1	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	ANSI C63.10-2013, section 11.10	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	ANSI C63.10-2013 section 11.11	47 CFR 15.247(d), 15.209, 15.205	Pass
Band edge emissions (Radiated)	ANSI C63.10-2013 section 6.10	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	ANSI C63.10-2013 section 6.6.4	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	ANSI C63.10-2013 section 6.6.4	47 CFR 15.247(d), 15.209, 15.205	Pass

Note:1. N/A-- Not applicable to the this test clause.

2. The results of all conduction method tests include cable loss.

## 2 GENERAL INFORMATION

### 2.1 Client Information

**Applicant's Name** : Huizhou HuoYing Photoelectric Technology Co., Ltd.  
**Address** : 2 F, Building 3,8 a, Yuen Fai Road, Chan Kong Street, Chung Kai high-tech development zone, Huizhou, China

**Manufacturer** : Huizhou HuoYing Photoelectric Technology Co., Ltd.  
**Address** : 2 F, Building 3,8 a, Yuen Fai Road, Chan Kong Street, Chung Kai high-tech development zone, Huizhou, China

### 2.2 Description of Device (EUT)\*

Product Name:	Projector
Model/Type reference:	P50
Series Model:	P50+, H95S, H01, H02, H03, H04, H05, H06, H07, H08, H09, H26, H30, H35, H40, H45, Y01, Y02, Y03, Y04, Y05, Y06, Y07, Y08, Y09, Y26, Y30, Y35, Y40, Y45, HY26, HY30, HY35, HY40, HY45, HY50, HY200, HY350, HY400, HY450, S01, S02, S03, S04, S05, S06, S07, S08, S09, S26, S30, S35, S40, S45, M01, M02, M03, M04, M05, M06, M07, M08, M09, M26, M30, M35, M400, M450
Model difference:	There are many models of the product to meet the needs of different customers, ensuring that each customer's model is not duplicated and avoiding unnecessary disputes. The only difference between models is the model name, everything else is the same (such as PCB, BOM, etc.)
Trade Mark:	N/A
Power Supply:	AC120V 50/60Hz 55W
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	40
Modulation Type:	GFSK
Antenna Type:	FPC ANT
Antenna Gain:	1.88dBi
Hardware Version:	V1.3
Software Version:	V1.0

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



#### 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)
	BLE
Lowest channel	2402MHz
Middle channel	2440MHz
Highest channel	2480MHz
Remark:Only the data of the worst mode would be recorded in this report.	

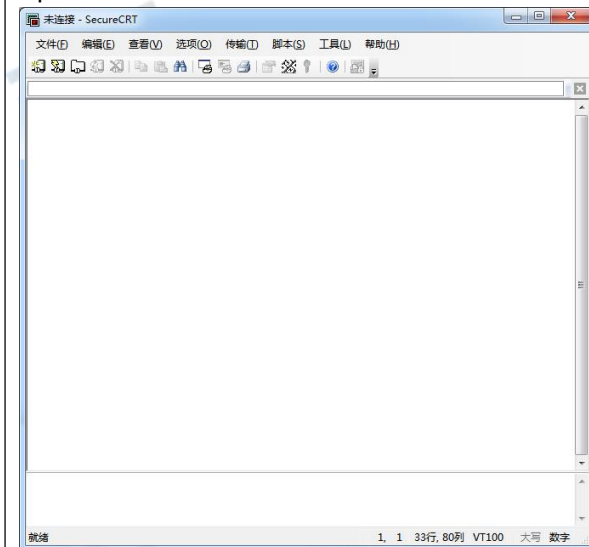
### 2.3 Description of Test Modes

No	Title	Description
TM1	TX mode	Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation at lowest, middle and highest channel.

#### Description

- ☐ Special software is used.
- ☐ Through engineering command into the engineering mode.  
engineering command: \*\*\*#3646633#\*\*
- ☒ Other method:

#### Special software+test command



### 2.4 Description of Support Units

The EUT was tested as an independent device.

### 2.5 Equipments Used During The Test

Conducted Emission at AC power line					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Cable	SCHWARZ BECK	/	/	2024-03-20	2025-03-19
Pulse Limiter	SCHWARZ BECK	VTSD 9561-F Pulse	561-G071	2023-12-12	2024-12-11

		limiter 10dB Attenuation			
50ΩCoaxial Switch	Anritsu	MP59B	M20531	/	/
Test Receiver	Rohde & Schwarz	ESPI TEST RECEIVER	1164.6607K03- 102109-MH	2024-06-12	2025-06-11
L.I.S.N	R&S	ESH3-Z5	831.5518.52	2023-12-12	2024-12-11
L.I.S.N	SCHWARZ BECK	NSLK 8126	05055	2024-06-14	2025-06-13
Pulse Limiter	CYBERTEK	EM5010A	/	2023-09-27	2024-09-26
EMI test software	EZ -EMC	EZ	V1.1.42	/	/

**Power Spectral Density****Emissions in non-restricted frequency bands****Occupied Bandwidth****Maximum Conducted Output Power**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Test Software	TACHOY	RTS-01	V1.0.0	/	/
RF Sensor Unit	TACHOY	TR1029-2	000001	/	/
Signal Generator	Keysight	N5181A	MY48180415	2023-11-09	2024-11-08
Signal Generator	Keysight	N5182A	MY50143455	2023-11-09	2024-11-08
Spectrum Analyzer	Keysight	N9020A	MY53420323	2023-12-12	2024-12-11

**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	/	/	/
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	2024-06-14	2026-06-13
Cable(LF)#2	Schwarzbeck	/	/	2024-02-19	2025-02-18
Cable(LF)#1	Schwarzbeck	/	/	2024-02-19	2025-02-18
Cable(HF)#2	Schwarzbeck	AK9515E	96250	2024-03-20	2025-03-19
Cable(HF)#1	Schwarzbeck	SYV-50-3-1	/	2024-03-20	2025-03-19
Power amplifier(LF)	Schwarzbeck	BBV9743	9743-151	2024-06-12	2025-06-11
Power amplifier(HF)	Schwarzbeck	BBV9718	9718-282	2024-06-12	2025-06-11
Spectrum Analyzer	R&S	FSP30	1321.3008K40- 101729-jR	2024-06-12	2025-06-11
Test Receiver	R&S	ESCI 3	1166.5950K03- 101431-Jq	2024-06-13	2025-06-12
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



## 2.6 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 $k=2$ .	

## 2.7 Identification of Testing Laboratory

Company Name:	Shenzhen DACE Testing Technology Co., Ltd.
Address:	102 Building H1 & 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 DACE Testing Technology Co., Ltd.
Address:	102 Building H1 & 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

## 2.8 Announcement

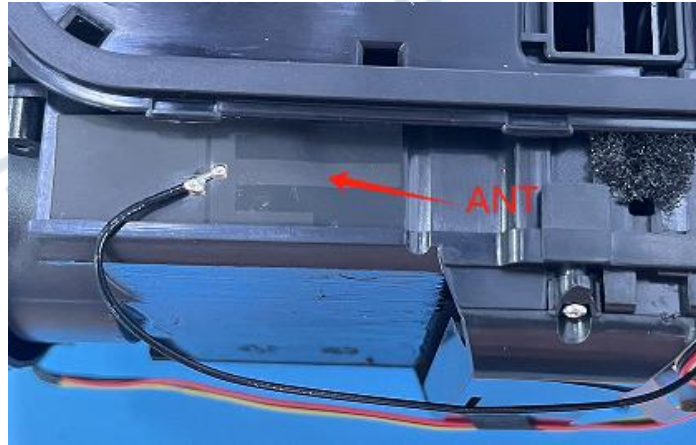
- (1) The test report reference to the report template version v0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) This document may not be altered or revised in any way unless done so by DACE 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 (information with "\*" provided by 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 Radio Spectrum Matter Test Results (RF)

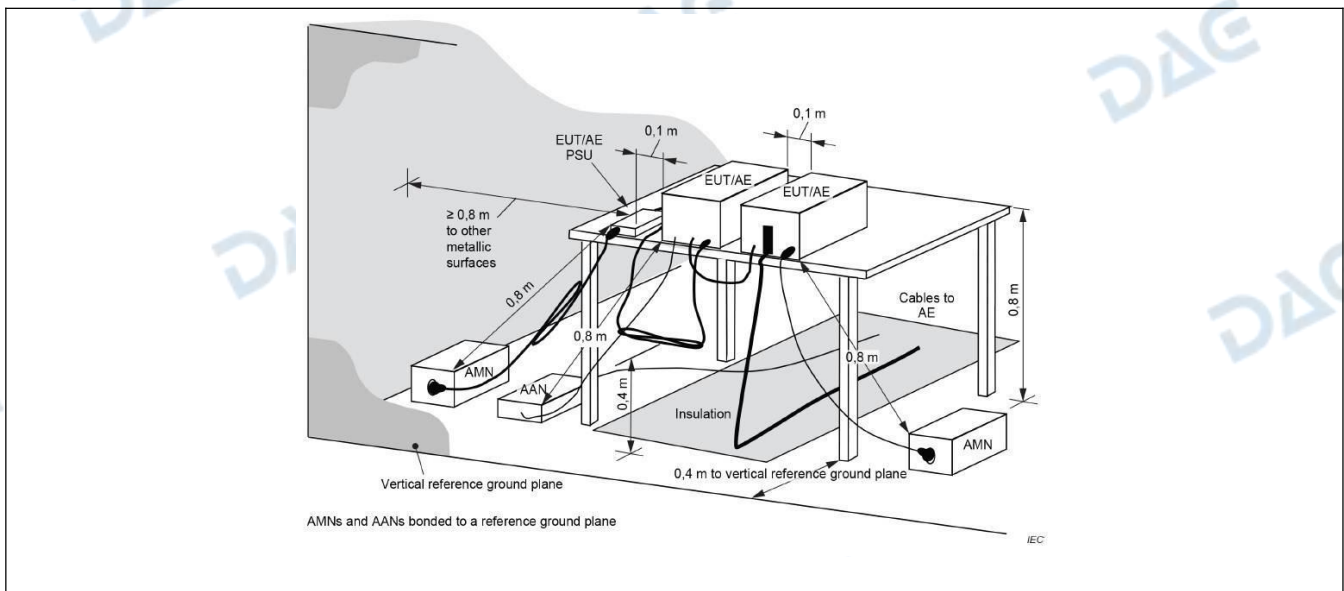
#### 4.1 Conducted Emission at AC power line

Test Requirement:	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 $\mu$ H/50 ohms line impedance stabilization network (LISN).		
Test Limit:	Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
		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 C63.10-2013 section 6.2		
Procedure:	Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices		

#### 4.1.1 E.U.T. Operation:

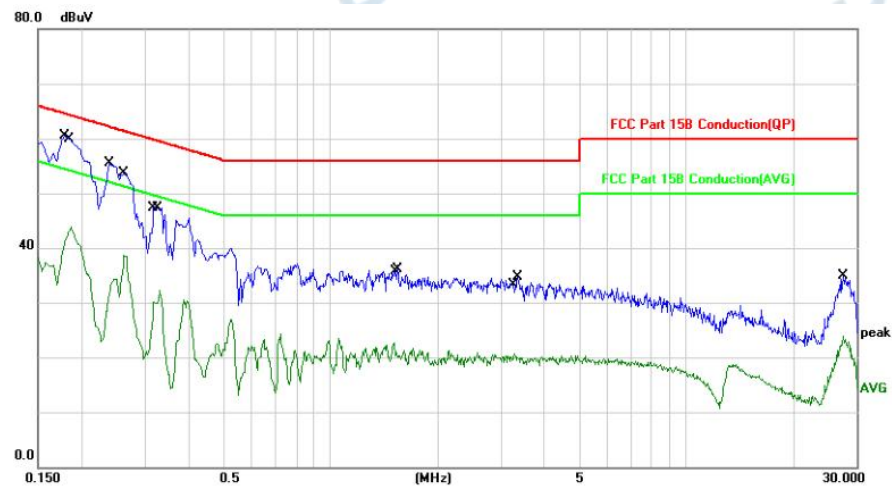
Operating Environment:					
Temperature:	23 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa
Pretest mode:		TM1			
Final test mode:		TM1			

#### 4.1.2 Test Setup Diagram:



#### 4.1.3 Test Data:

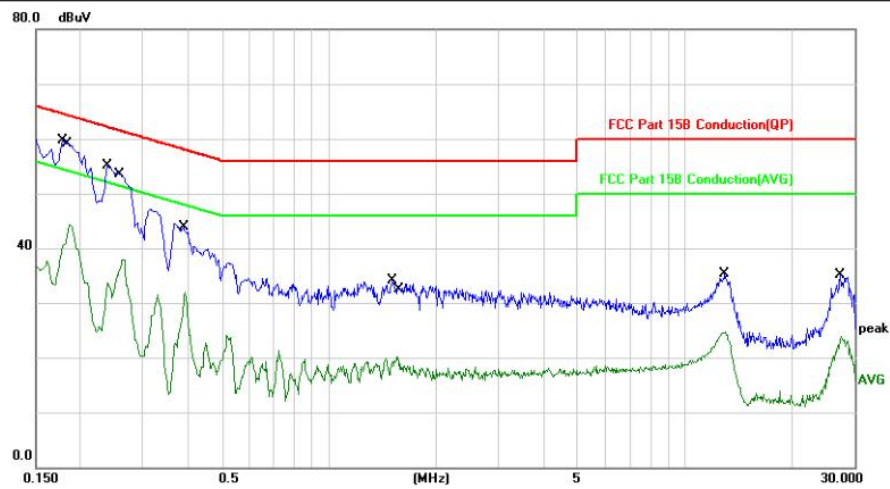
TM1 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1780	50.41	10.10	60.51	64.57	-4.06	QP	
2		0.1860	33.75	10.10	43.85	54.21	-10.36	AVG	
3		0.2380	45.33	10.09	55.42	62.16	-6.74	QP	
4		0.2620	28.51	10.09	38.60	51.36	-12.76	AVG	
5		0.3180	37.29	10.09	47.38	59.76	-12.38	QP	
6		0.3300	22.24	10.09	32.33	49.45	-17.12	AVG	
7		1.5060	12.66	10.04	22.70	46.00	-23.30	AVG	
8		1.5380	26.09	10.04	36.13	56.00	-19.87	QP	
9		3.2900	10.53	10.10	20.63	46.00	-25.37	AVG	
10		3.3460	24.52	10.11	34.63	56.00	-21.37	QP	
11		27.4580	23.98	10.97	34.95	60.00	-25.05	QP	
12		27.4580	12.93	10.97	23.90	50.00	-26.10	AVG	



TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1 *	0.1780	49.68	10.10	59.78	64.57	-4.79	QP	
2	0.1860	34.28	10.10	44.38	54.21	-9.83	AVG	
3	0.2380	44.94	10.09	55.03	62.16	-7.13	QP	
4	0.2620	27.86	10.09	37.95	51.36	-13.41	AVG	
5	0.3899	33.83	10.08	43.91	58.06	-14.15	QP	
6	0.3940	21.72	10.08	31.80	47.98	-16.18	AVG	
7	1.5060	24.13	10.04	34.17	56.00	-21.83	QP	
8	1.5540	10.02	10.03	20.05	46.00	-25.95	AVG	
9	12.9420	24.97	10.41	35.38	60.00	-24.62	QP	
10	13.0140	14.28	10.41	24.69	50.00	-25.31	AVG	
11	27.3060	24.08	10.96	35.04	60.00	-24.96	QP	
12	27.4180	12.89	10.97	23.86	50.00	-26.14	AVG	

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 = Measurement - Limit



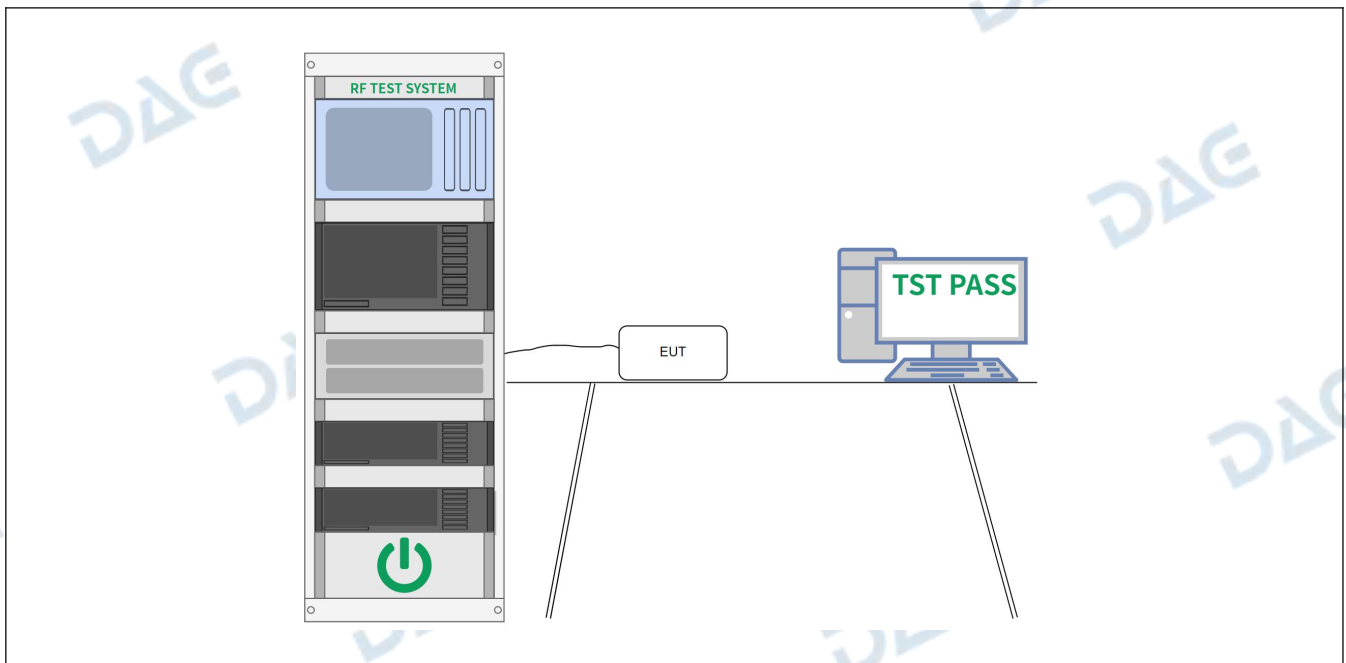
## 4.2 Occupied Bandwidth

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:	a) Set RBW = 100 kHz. b) Set the VBW $\geq [3 \times \text{RBW}]$ . 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.

### 4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa
Pretest 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

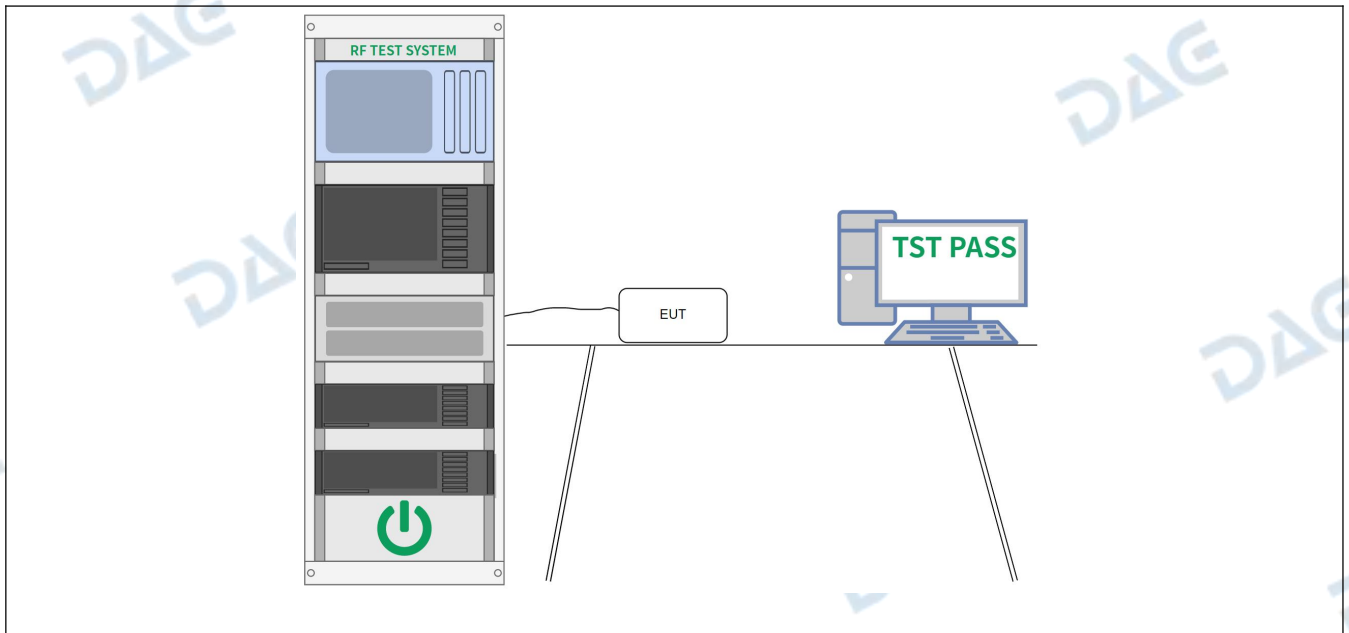
Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of 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 11.9.1
Procedure:	<p>ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power</p> <p>Note:</p> <p>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.</p> <p>Per ANSI C63.10-2013 Section 14.4.3.2.3, the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and NANT, the total number of antennas used.</p> <p>For correlated unequal antenna gain</p> $\text{Directional gain} = 10 \cdot \log[(10G_1/20 + 10G_2/20 + \dots + 10G_N/20)^2 / NANT] \text{ dBi}$ <p>For completely uncorrelated unequal antenna gain</p> $\text{Directional gain} = 10 \cdot \log[(10G_1/10 + 10G_2/10 + \dots + 10G_N/10) / NANT] \text{ dBi}$ <p>Sample Multiple antennas Calculation: Core 0 + Core 1 + ... Core i. = MIMO/CDD (i is the number of antennas)</p> <p>(#VALUE! mW + mW) = #VALUE! mW = dBm</p> <p>Sample e.i.r.p. Calculation:</p> <p>e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi)</p>

#### 4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

#### 4.3.2 Test Setup Diagram:

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#### 4.3.3 Test Data:

Please Refer to Appendix for Details.

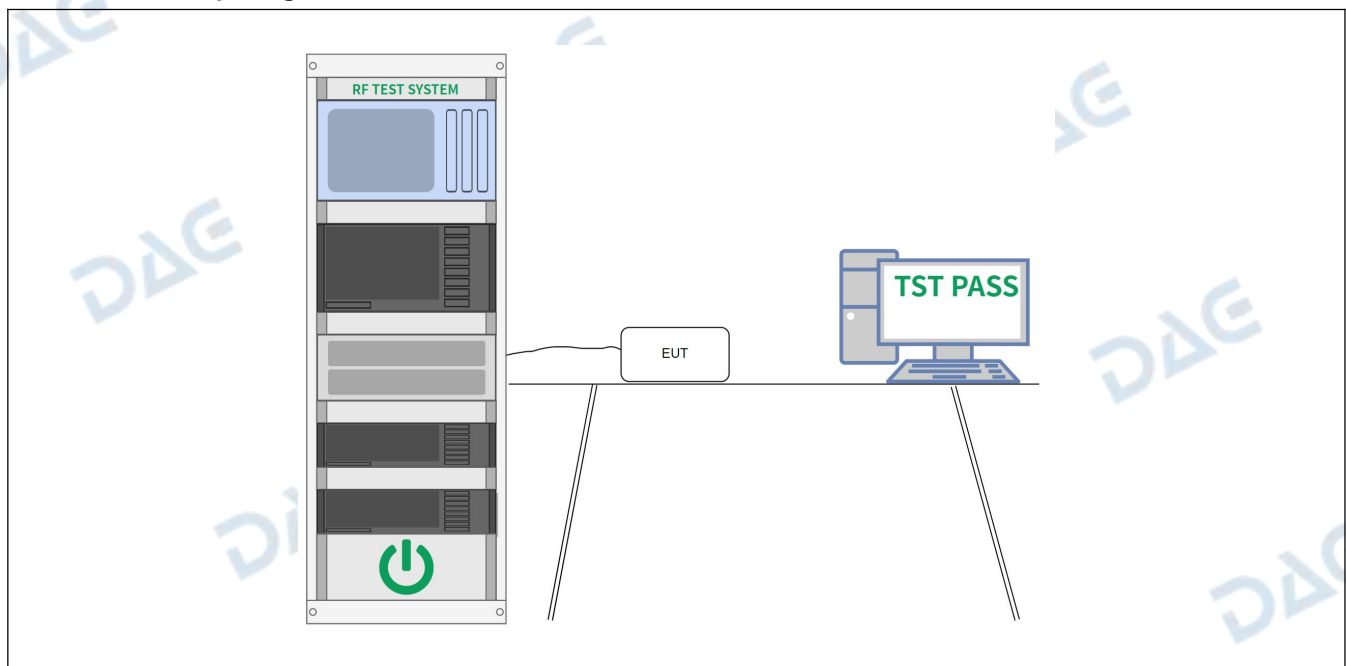
#### 4.4 Power Spectral Density

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:	23 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

##### 4.4.2 Test Setup Diagram:



##### 4.4.3 Test Data:

Please Refer to Appendix for Details.

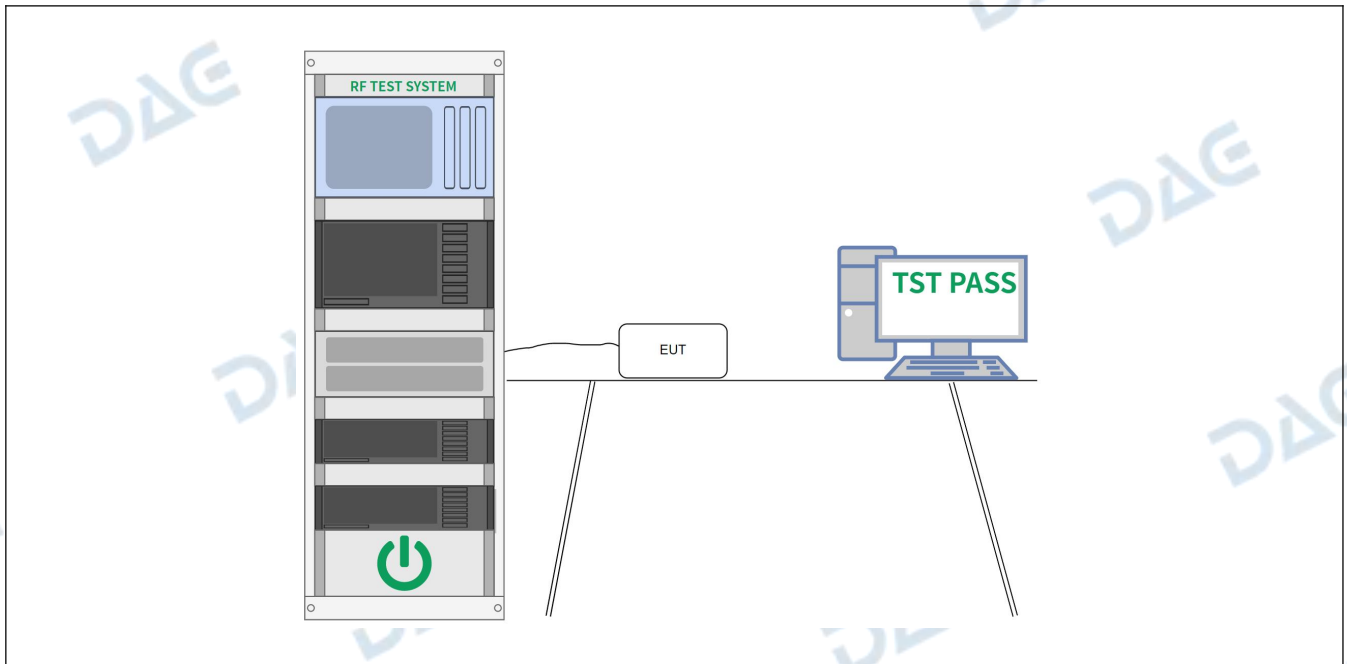
#### 4.5 Emissions in non-restricted frequency bands

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:	23 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

##### 4.5.2 Test Setup Diagram:



##### 4.5.3 Test Data:

Please Refer to Appendix for Details.



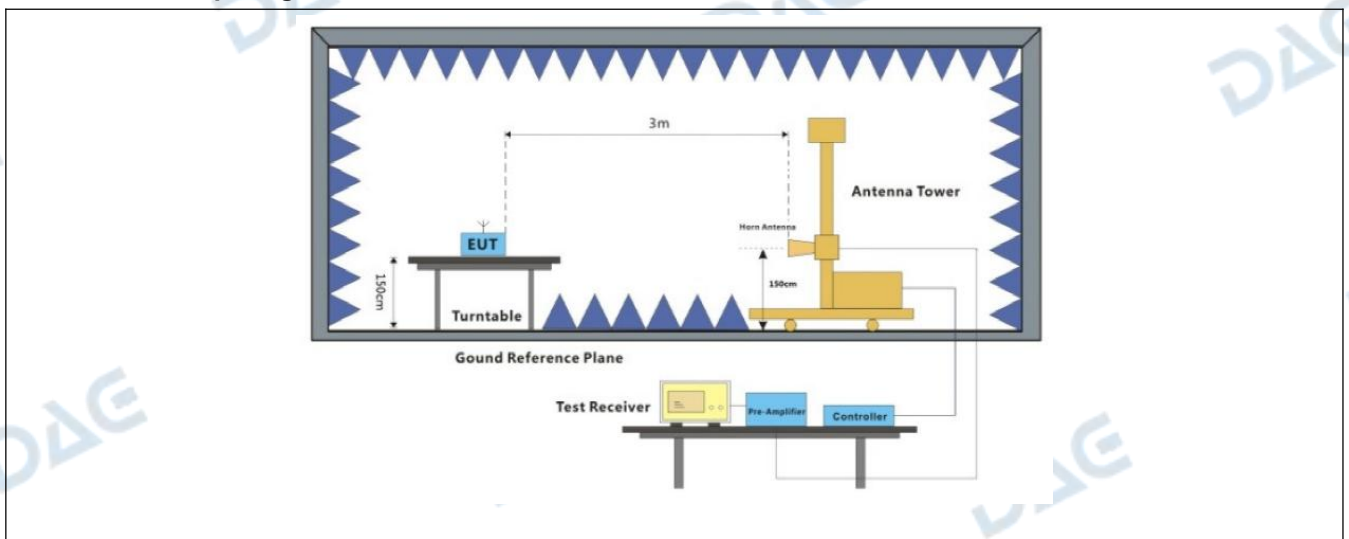
#### 4.6 Band edge emissions (Radiated)

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
<p>** 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.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>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.</p>			
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:

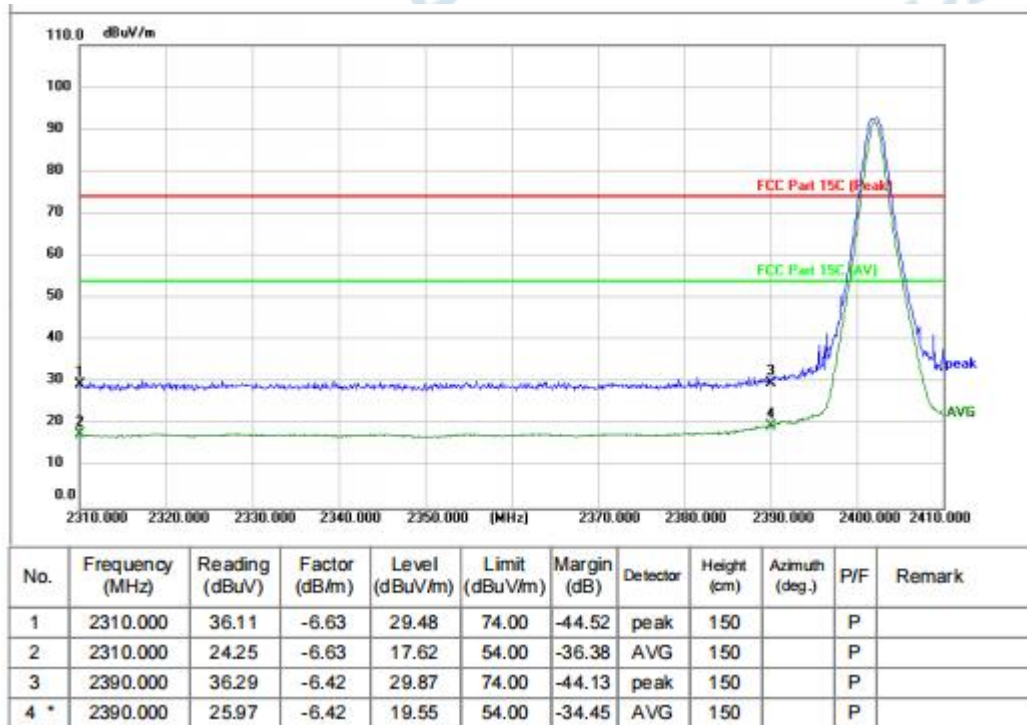
Operating Environment:				
Temperature:	23 °C	Humidity:	46 %	Atmospheric Pressure: 101 kPa
Pretest mode:	TM1			
Final test mode:	TM1			

##### 4.6.2 Test Setup Diagram:

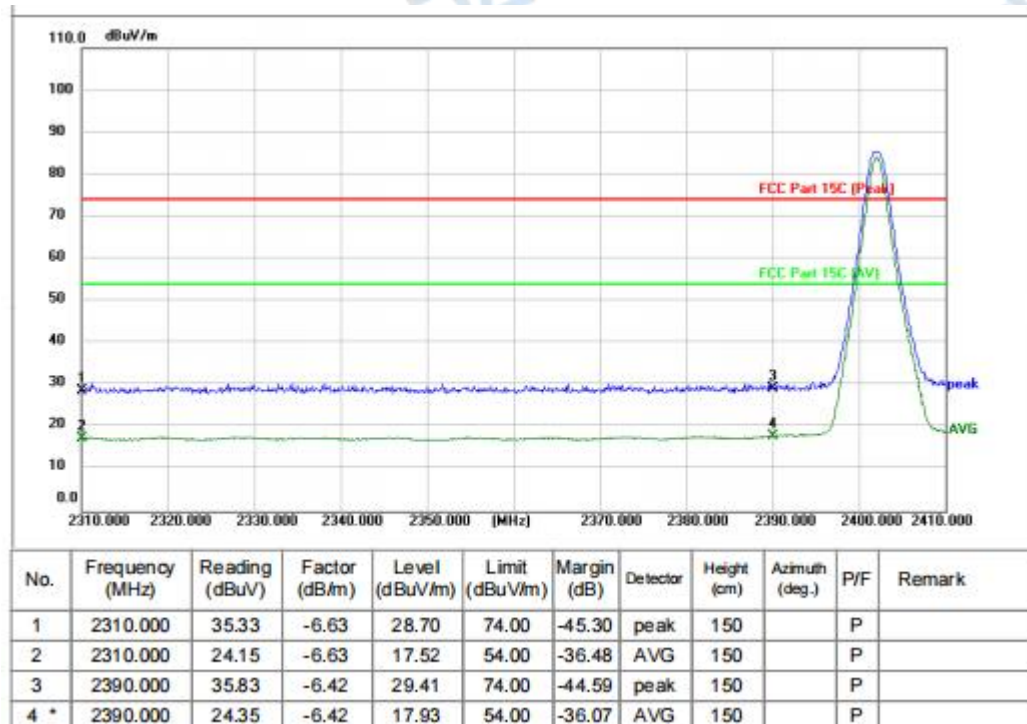


#### 4.6.3 Test Data:

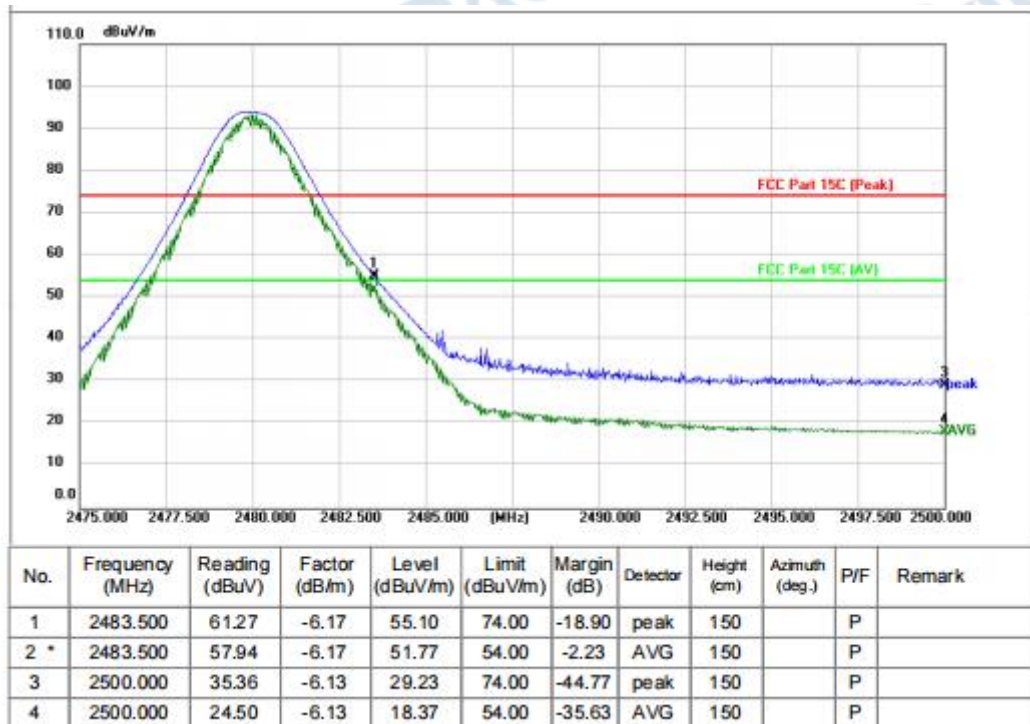
TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



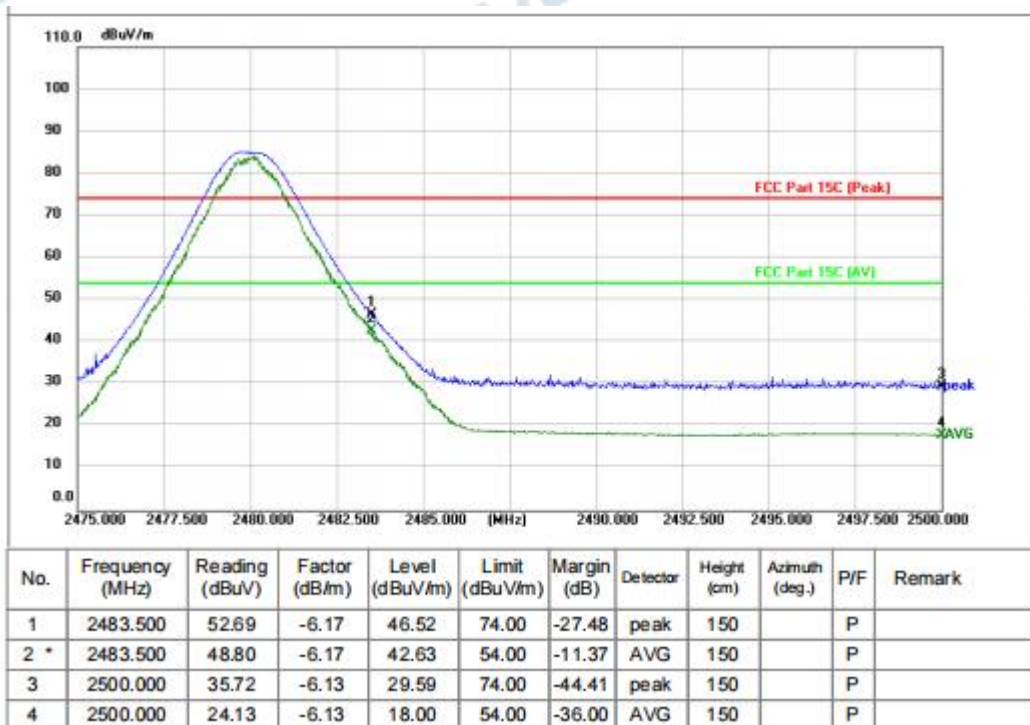
TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



1. Margin = Measurement Level - Limit ; Measurement Level=Test receiver reading + correction factor
- 2.The test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.



#### 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
<p>** 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.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>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.</p>			
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 &amp;</p>		

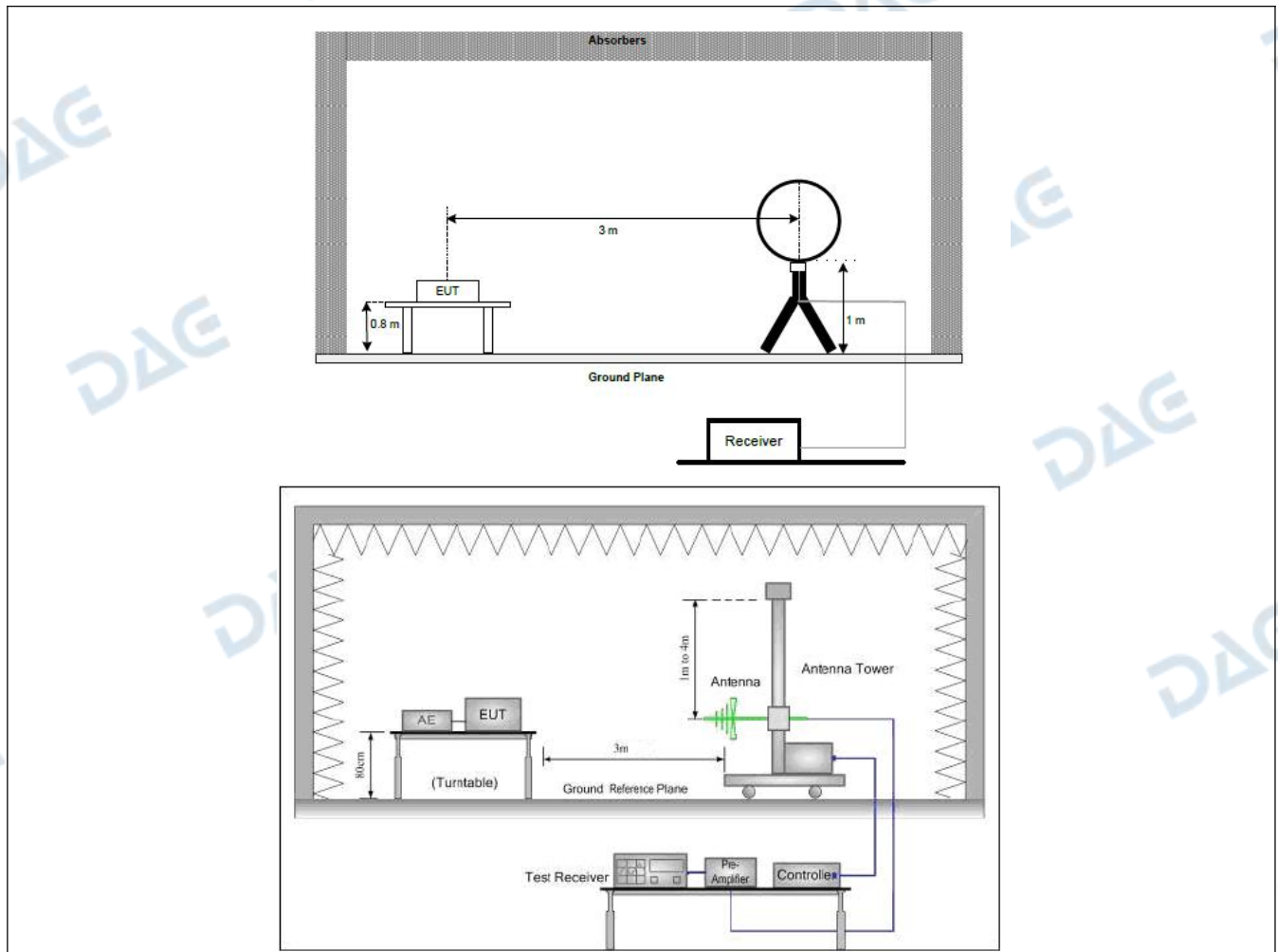
Preamplifier. The basic equation with a sample calculation is as follows:  
 Final Test Level = Receiver Reading + Antenna Factor + Cable Factor + C  
 Preamplifier Factor  
 3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz  
 was very low. The points marked on above plots are 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.

#### 4.7.1 E.U.T. Operation:

Operating Environment:

Temperature:	23 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

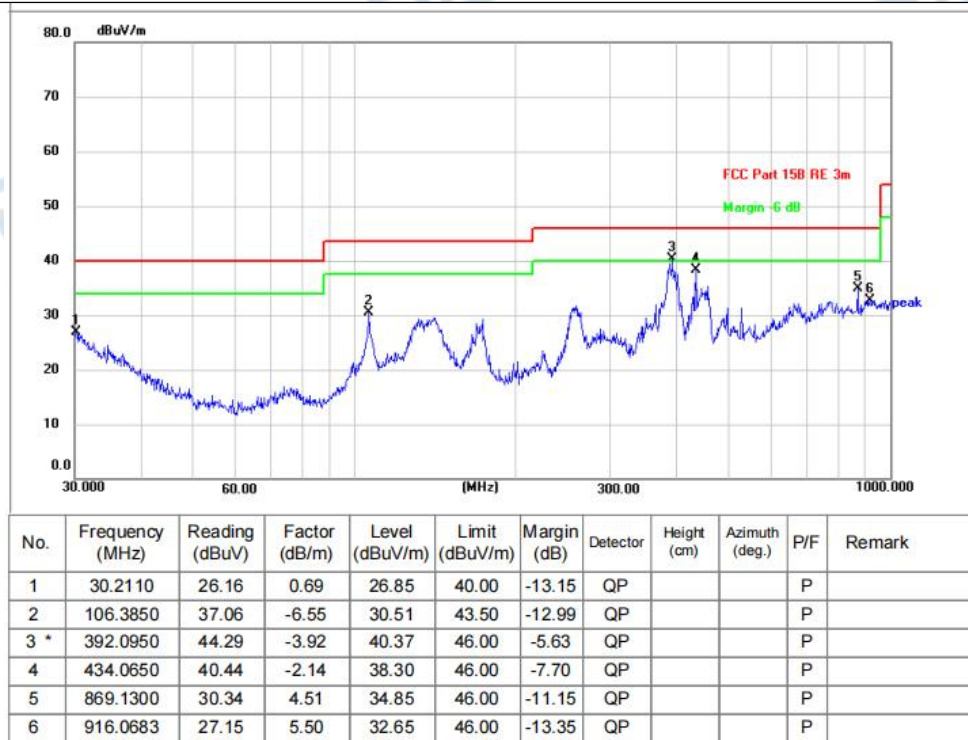
#### 4.7.2 Test Setup Diagram:



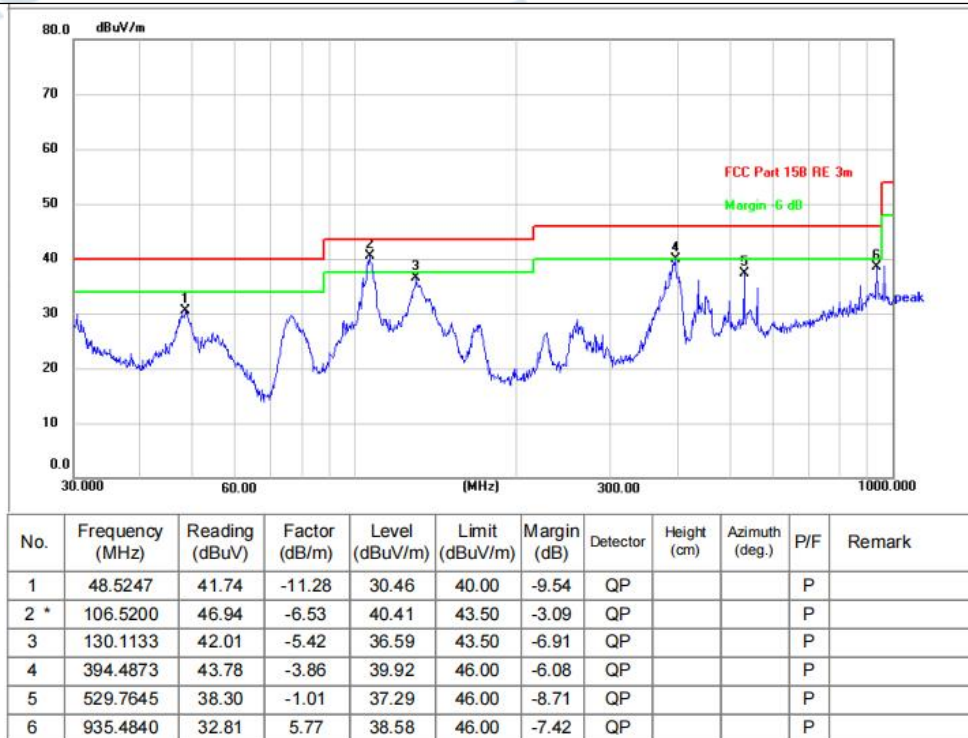


## 4.7.3 Test Data:

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.Margin= Measurement Level- Limit; Measurement Level=Test receiver reading + correction factor

2.The EMC test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.

#### 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
<p>** 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.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>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.</p>			
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 &amp;</p>		

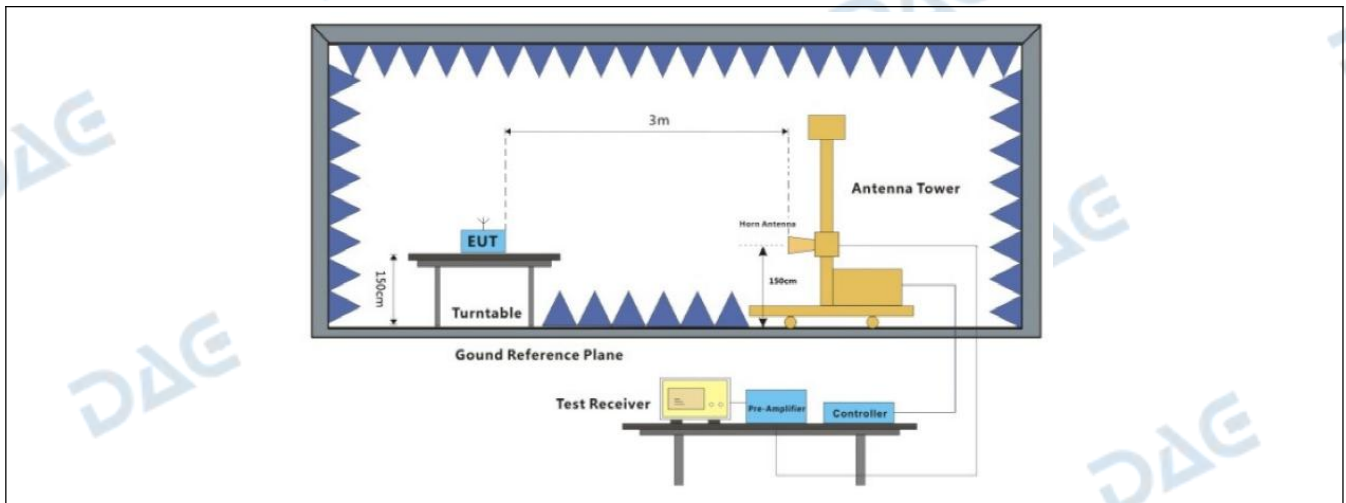
Preamplifier. The basic equation with a sample calculation is as follows:  
 Final Test Level = Receiver Reading + Antenna Factor + Cable Factor + Preamplifier Factor  
 3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest 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.

#### 4.8.1 E.U.T. Operation:

Operating Environment:

Temperature:	23 °C	Humidity:	46 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

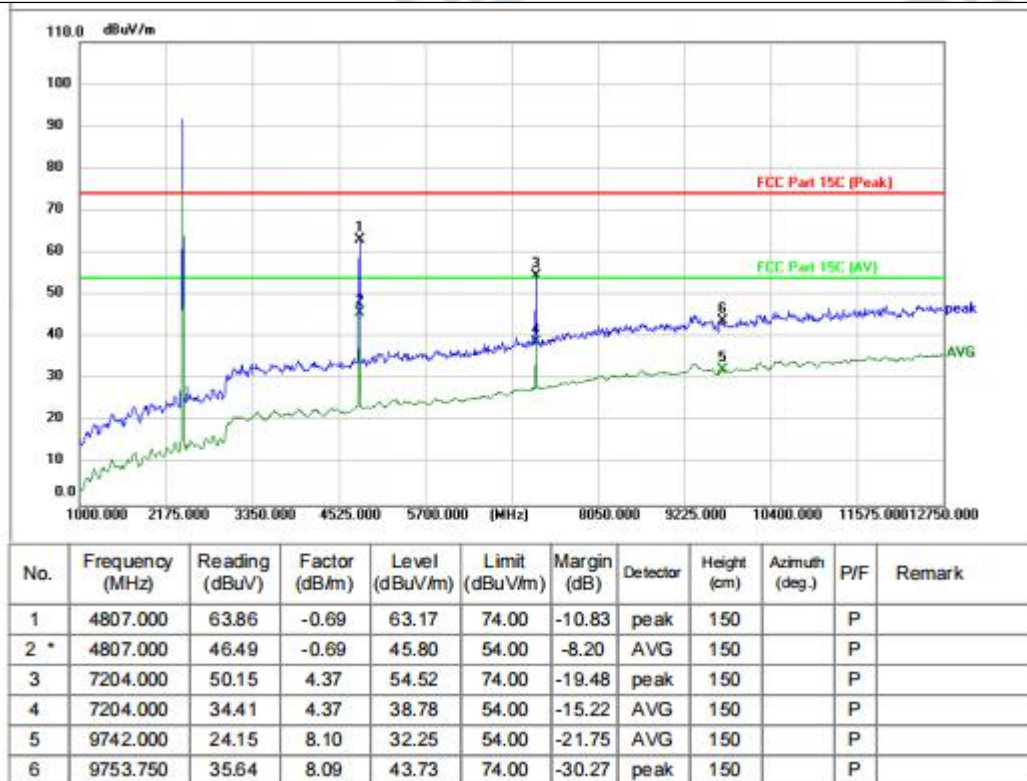
#### 4.8.2 Test Setup Diagram:



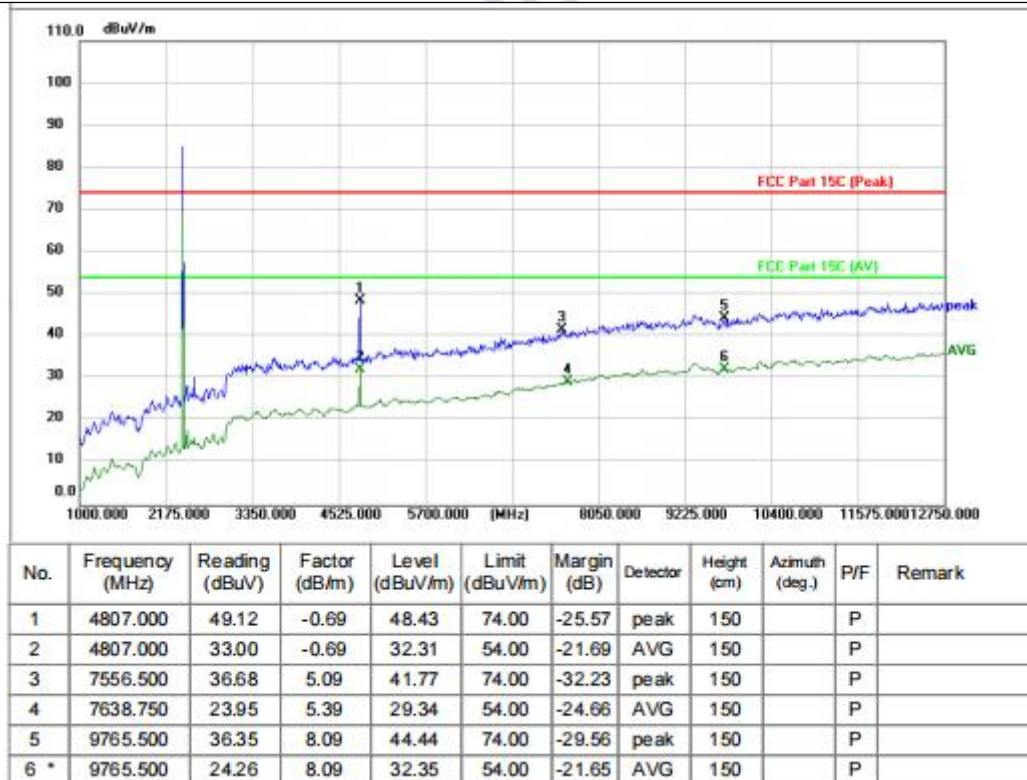


### 4.8.3 Test Data:

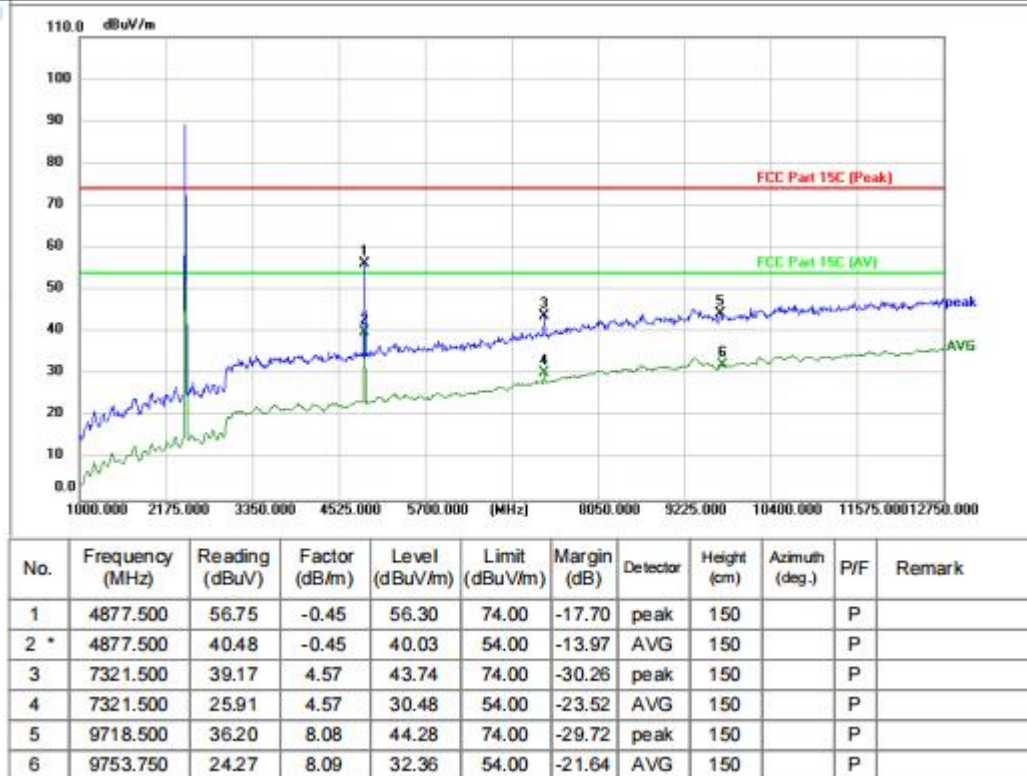
TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



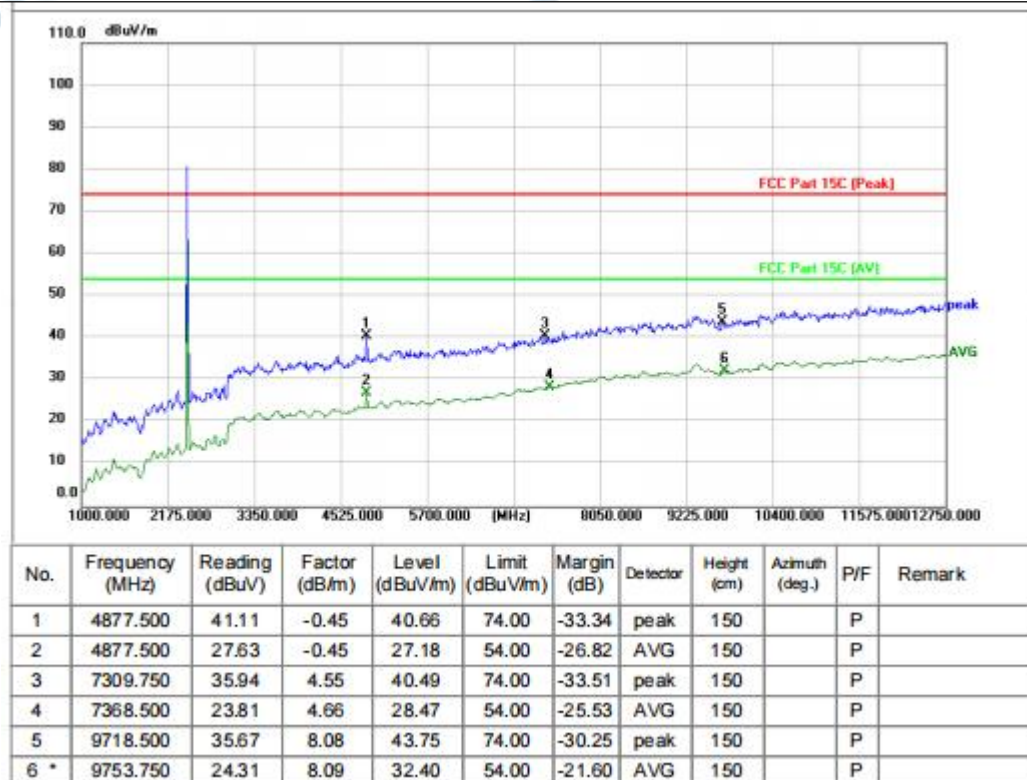
TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: M

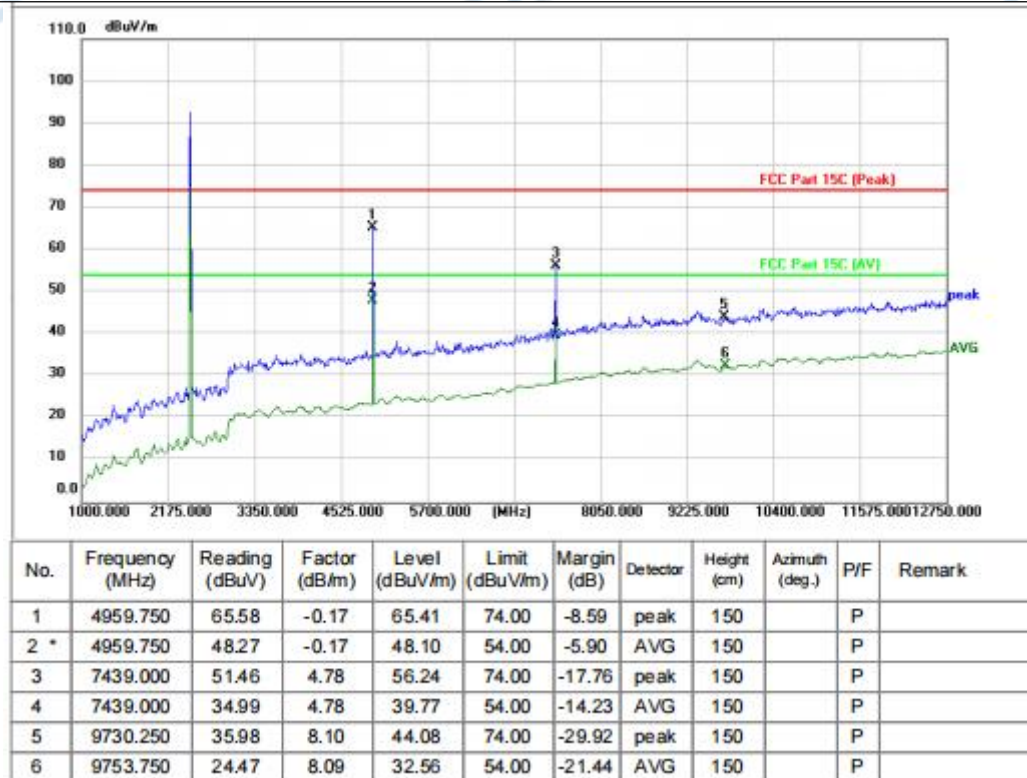


TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: M

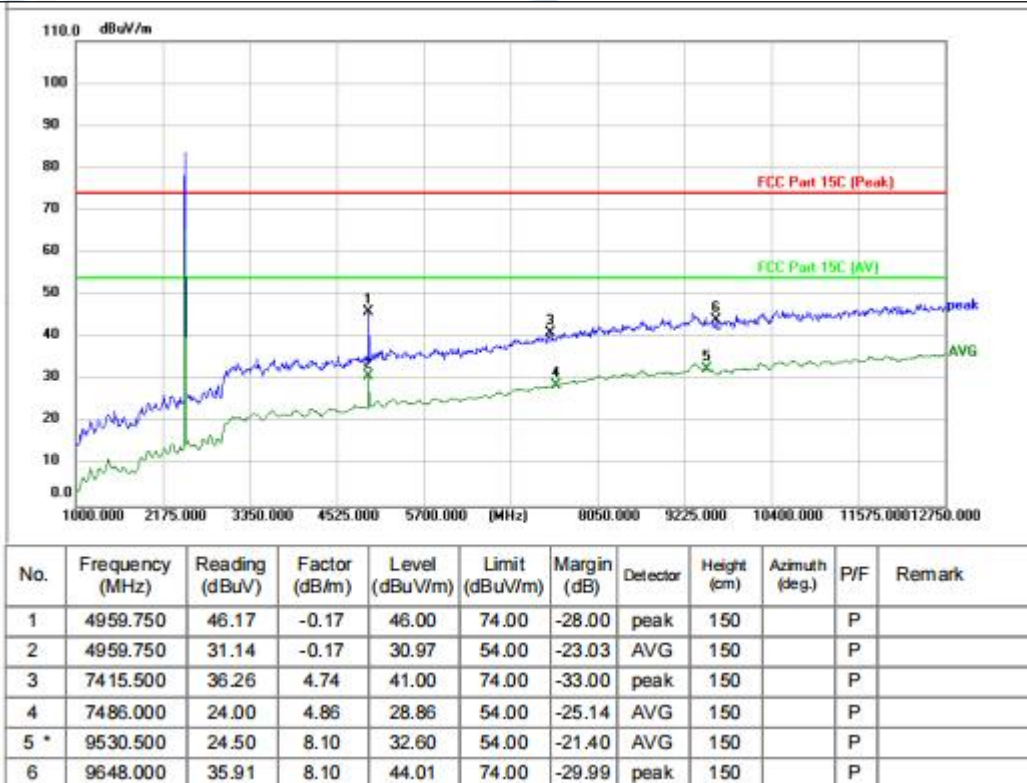




TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



Remark: 1.Margin= Level – Limit; Level=Test receiver reading + correction factor

2. The test software will only record the worst test angle and height, and only the worst case will be recorded in the test report.

## 5 TEST SETUP PHOTOS

Please Refer to DACE240819004RF001 for Details.

## 6 PHOTOS OF THE EUT

Please Refer to DACE240819004RF001 for Details.

# Appendix

## 1. -6dB Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	-6dB BW(kHz)	limit(kHz)	Result
NVNT	ANT1	1Mbps	2402.00	682.83	500	Pass
NVNT	ANT1	1Mbps	2440.00	685.33	500	Pass
NVNT	ANT1	1Mbps	2480.00	685.28	500	Pass

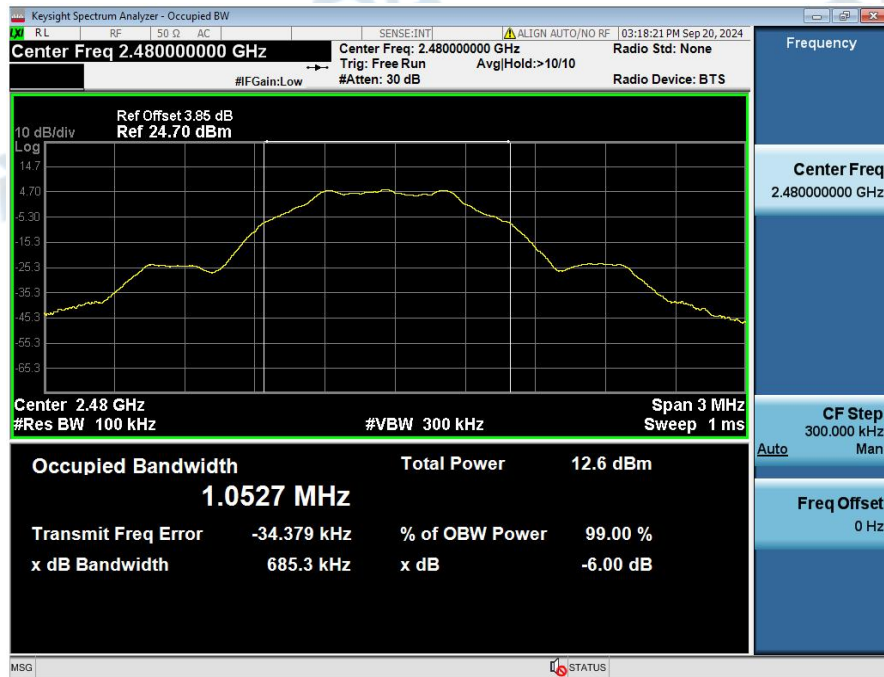
-6dB\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2402



-6dB\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2440



### -6dB\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2480

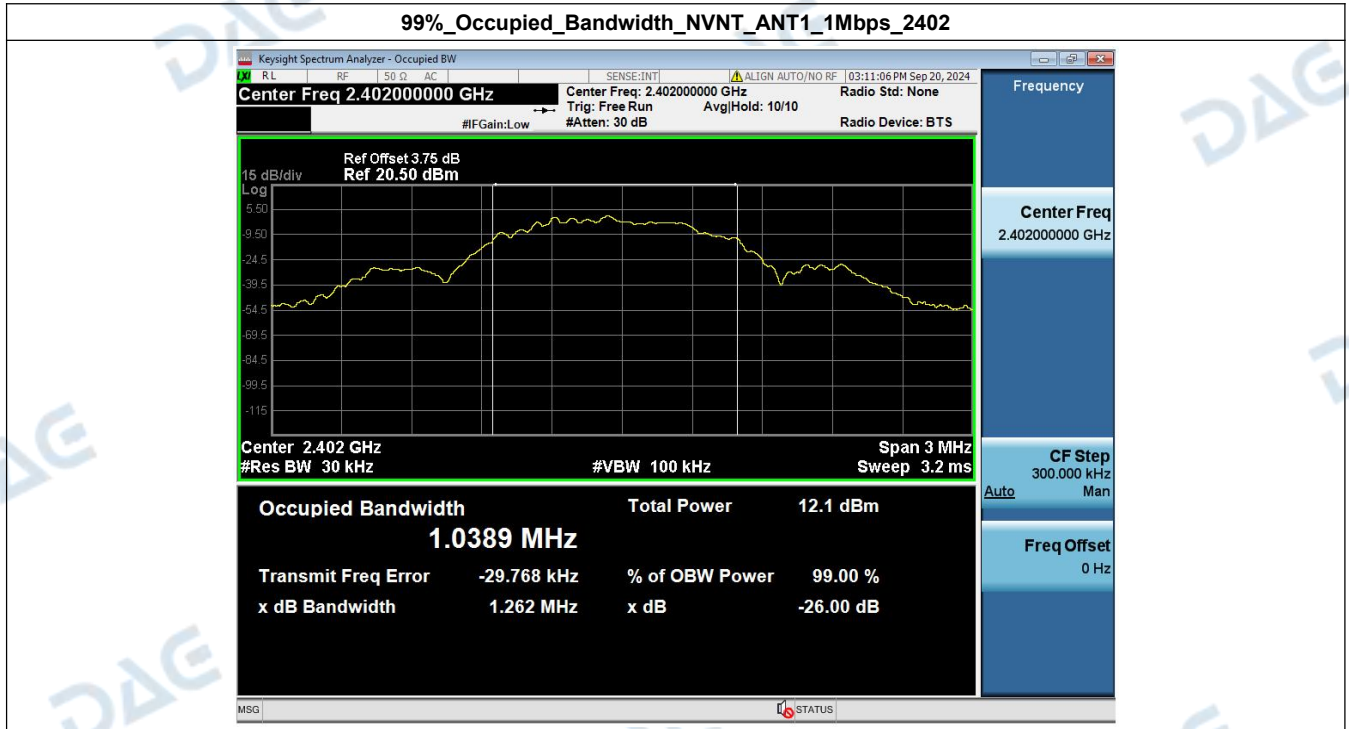




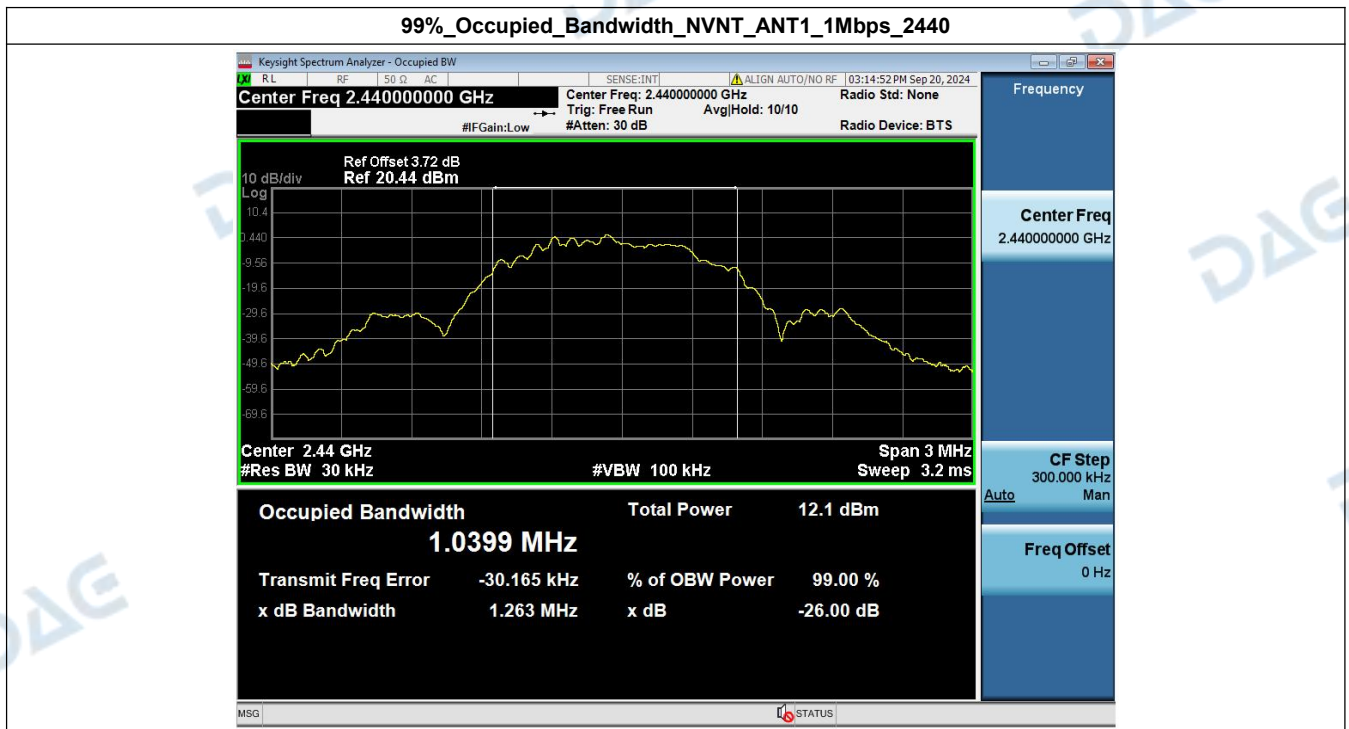
## 2. 99% Occupied Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	99% BW (MHz)
NVNT	ANT1	1Mbps	2402.00	1.039
NVNT	ANT1	1Mbps	2440.00	1.040
NVNT	ANT1	1Mbps	2480.00	1.038

99%\_Occupied\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2402



99%\_Occupied\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2440





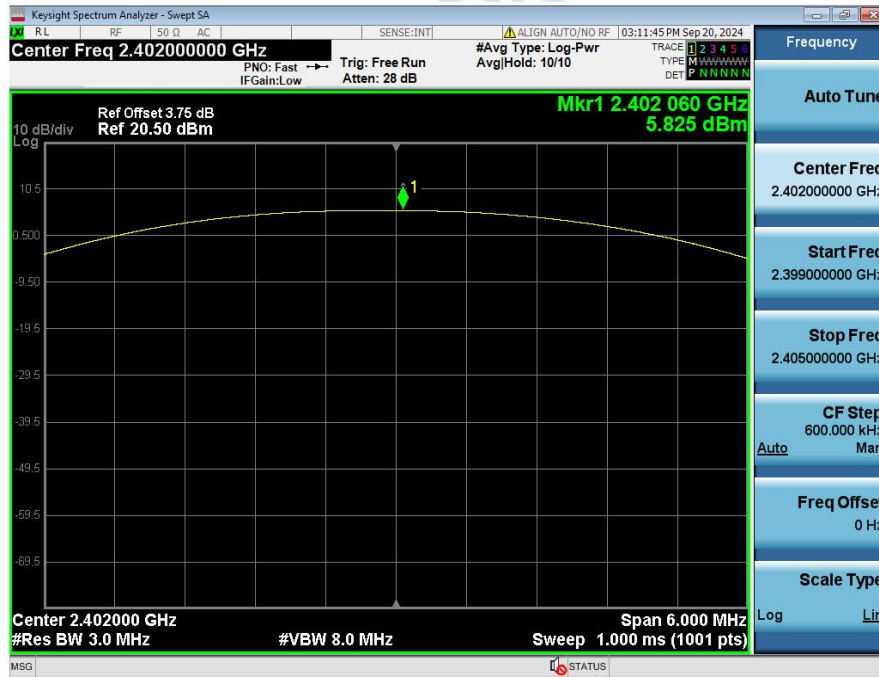
99%\_Occupied\_Bandwidth\_NVNT\_ANT1\_1Mbps\_2480



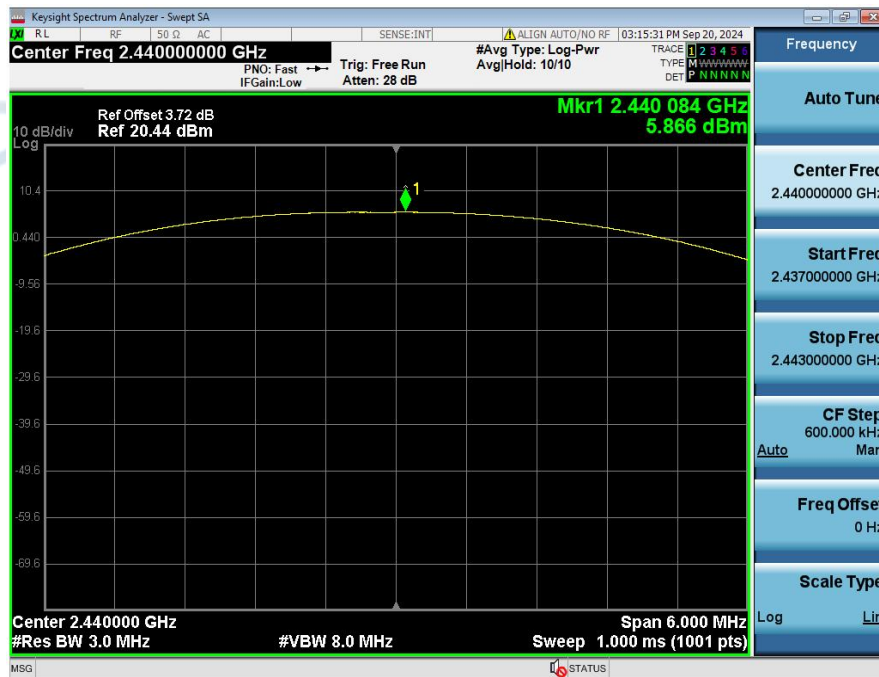
### 3. Peak Output Power

Condition	Antenna	Rate	Frequency (MHz)	Max. Conducted Power(dBm)	Max. Conducted Power(mW)	Limit(mW)	Result
NVNT	ANT1	1Mbps	2402.00	5.83	3.82	1000	Pass
NVNT	ANT1	1Mbps	2440.00	5.87	3.86	1000	Pass
NVNT	ANT1	1Mbps	2480.00	6.33	4.30	1000	Pass

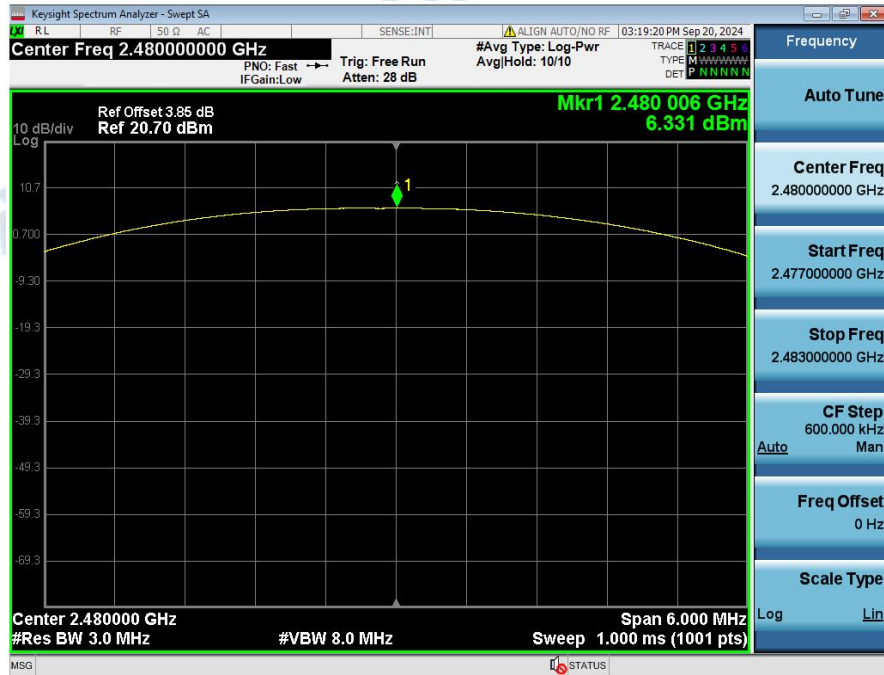
Peak\_Output\_Power\_NVNT\_ANT1\_1Mbps\_2402



Peak\_Output\_Power\_NVNT\_ANT1\_1Mbps\_2440



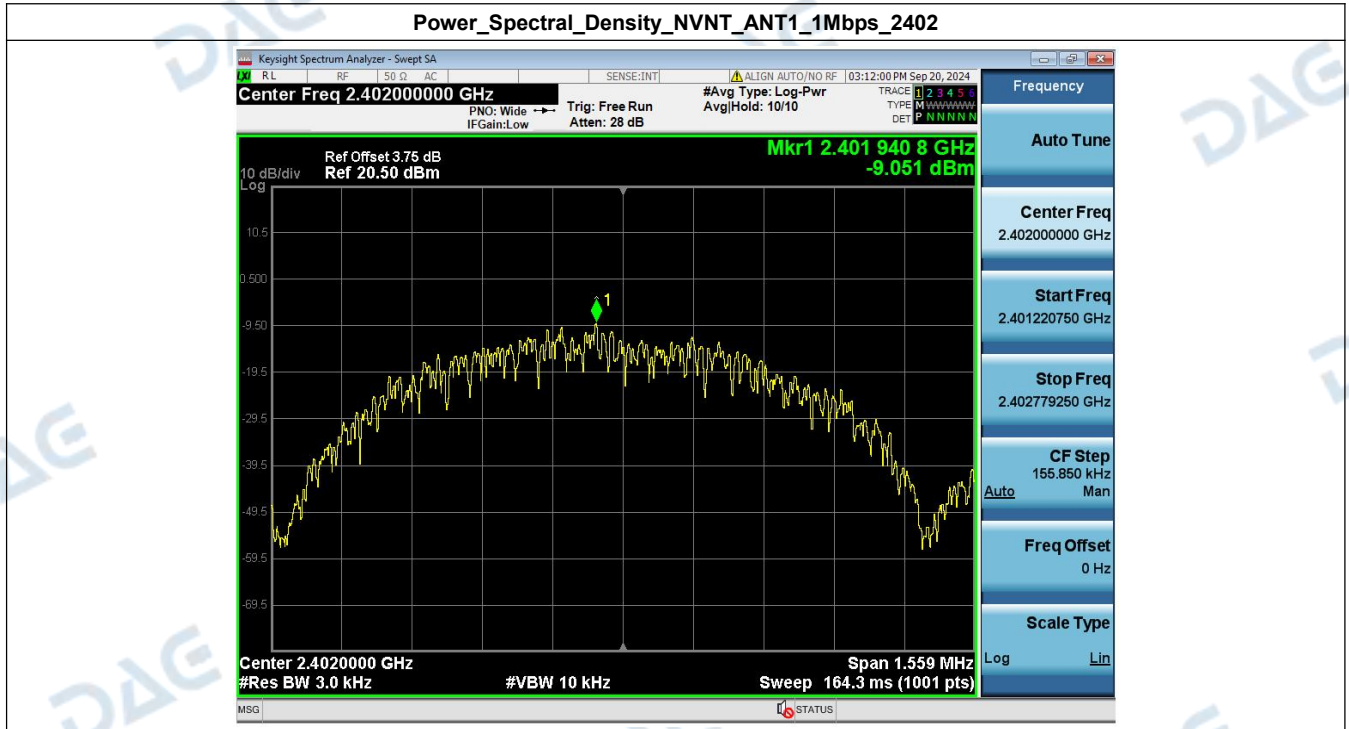
Peak\_Output\_Power\_NVNT\_ANT1\_1Mbps\_2480



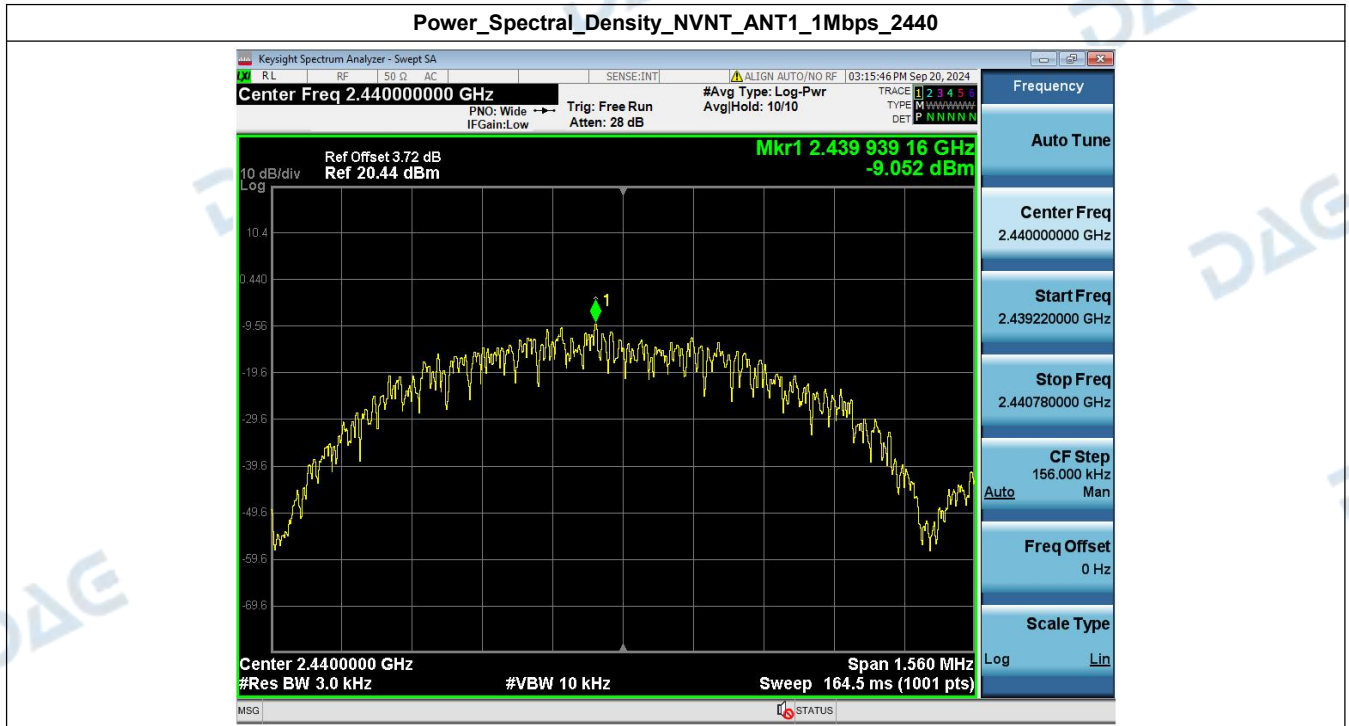
#### 4. Power Spectral Density

Condition	Antenna	Rate	Frequency (MHz)	Power Spectral Density(dBm)	Limit(dBm/3kHz)	Result
NVNT	ANT1	1Mbps	2402.00	-9.05	8	Pass
NVNT	ANT1	1Mbps	2440.00	-9.05	8	Pass
NVNT	ANT1	1Mbps	2480.00	-8.54	8	Pass

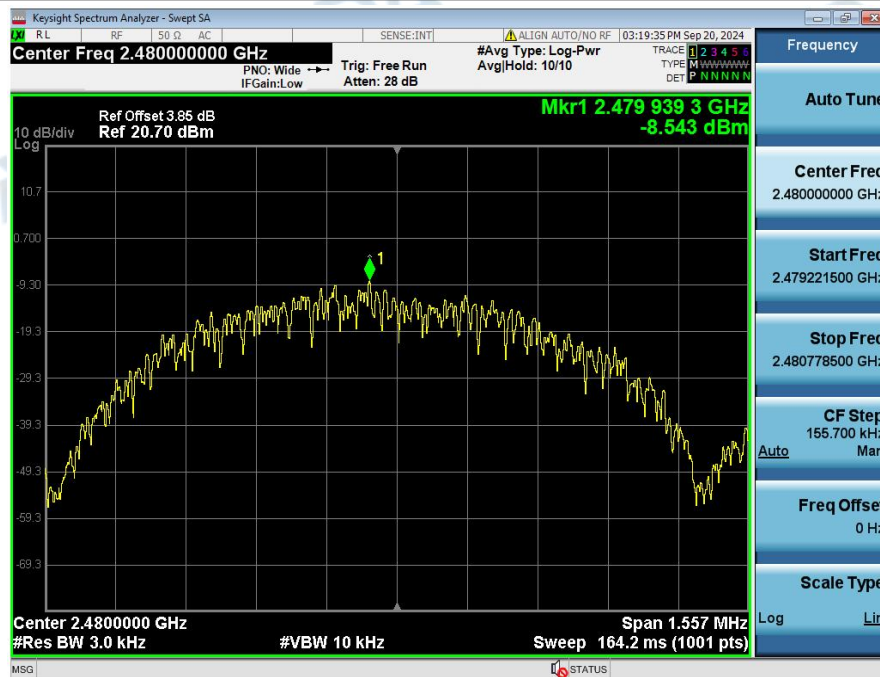
Power\_Spectral\_Density\_NVNT\_ANT1\_1Mbps\_2402



Power\_Spectral\_Density\_NVNT\_ANT1\_1Mbps\_2440



Power\_Spectral\_Density\_NVNT\_ANT1\_1Mbps\_2480

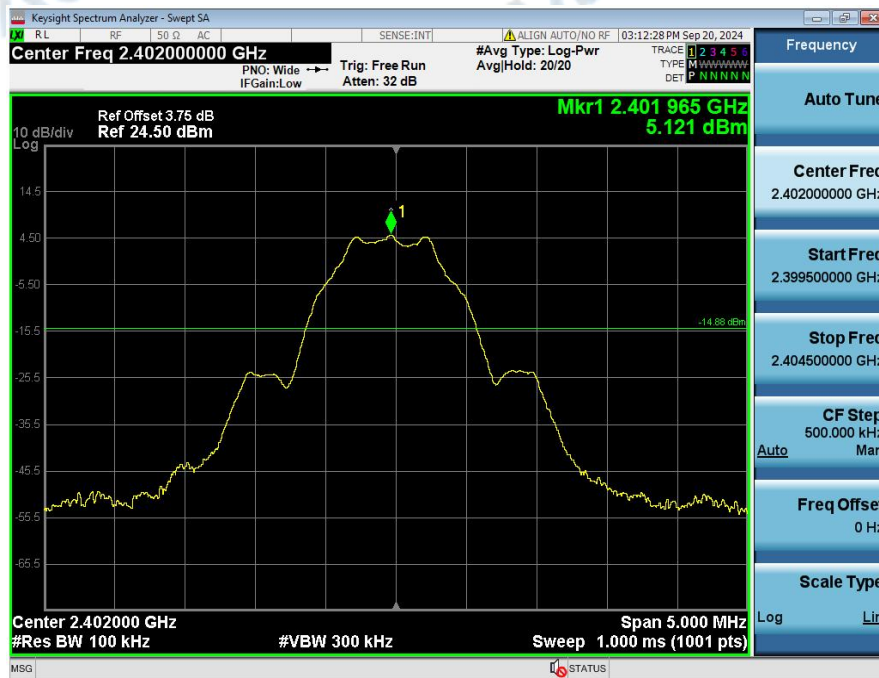




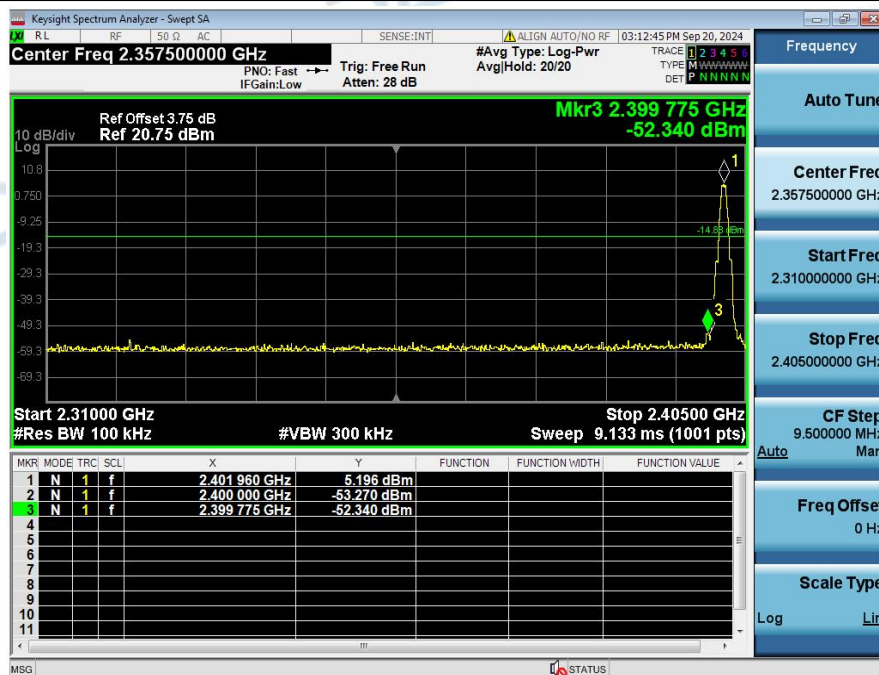
## 5. Bandedge

Condition	Antenna	Rate	TX_Frequency (MHz)	Max. Mark Frequency (MHz)	Spurious level(dBm)	limit(dBm)	Result
NVNT	ANT1	1Mbps	2402.00	2399.775	-52.340	-14.879	Pass
NVNT	ANT1	1Mbps	2480.00	2484.150	-55.408	-14.339	Pass

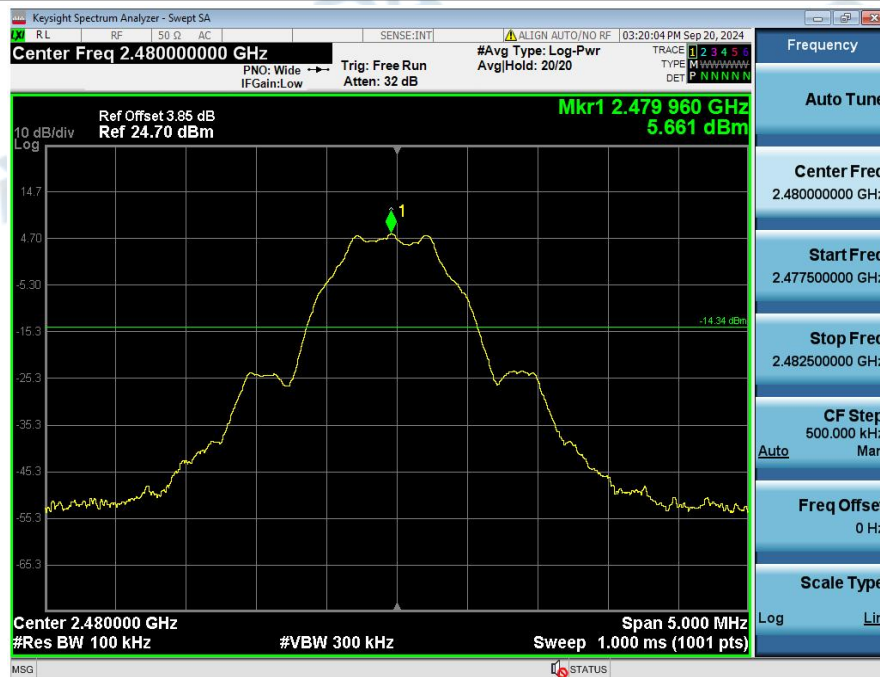
1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2402



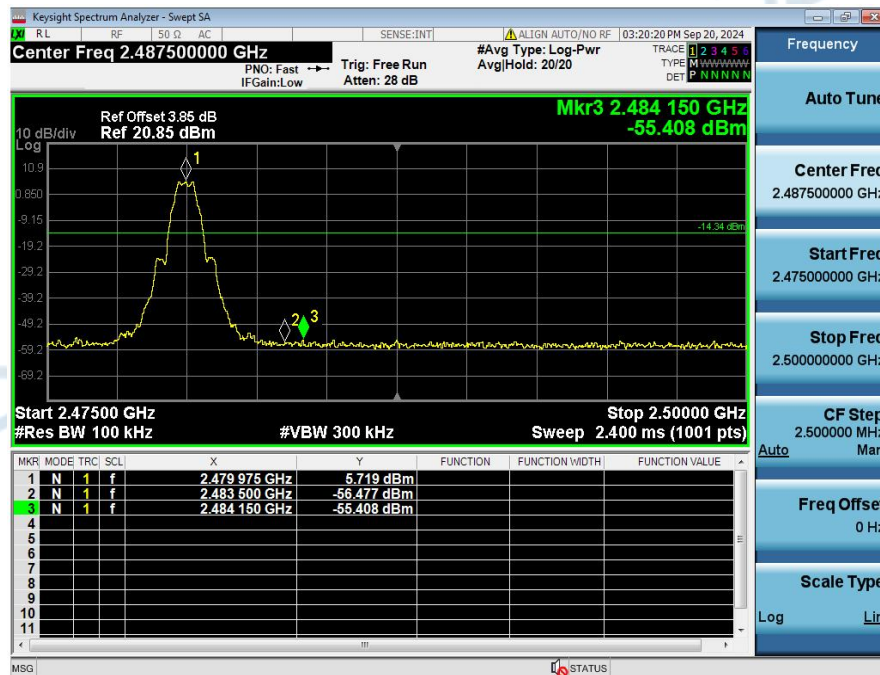
2\_Bandedge\_NVNT\_ANT1\_1Mbps\_2402



### 1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2480



### 2\_Bandedge\_NVNT\_ANT1\_1Mbps\_2480



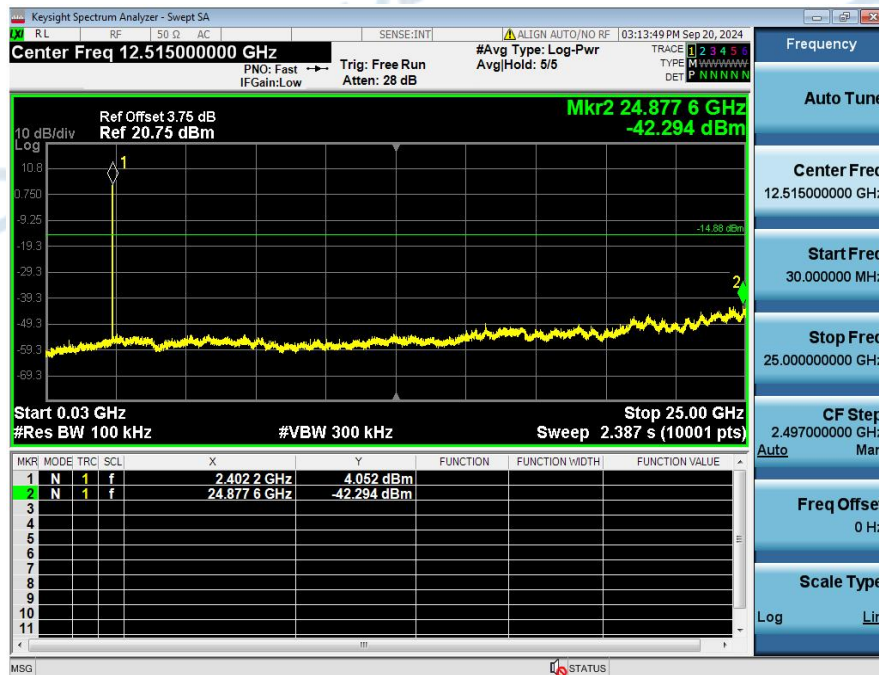
## 6. Spurious Emission

Condition	Antenna	Rate	TX_Frequency(MHz)	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1Mbps	2402.00	-42.294	-14.879	Pass
NVNT	ANT1	1Mbps	2440.00	-42.902	-14.857	Pass
NVNT	ANT1	1Mbps	2480.00	-42.662	-14.339	Pass

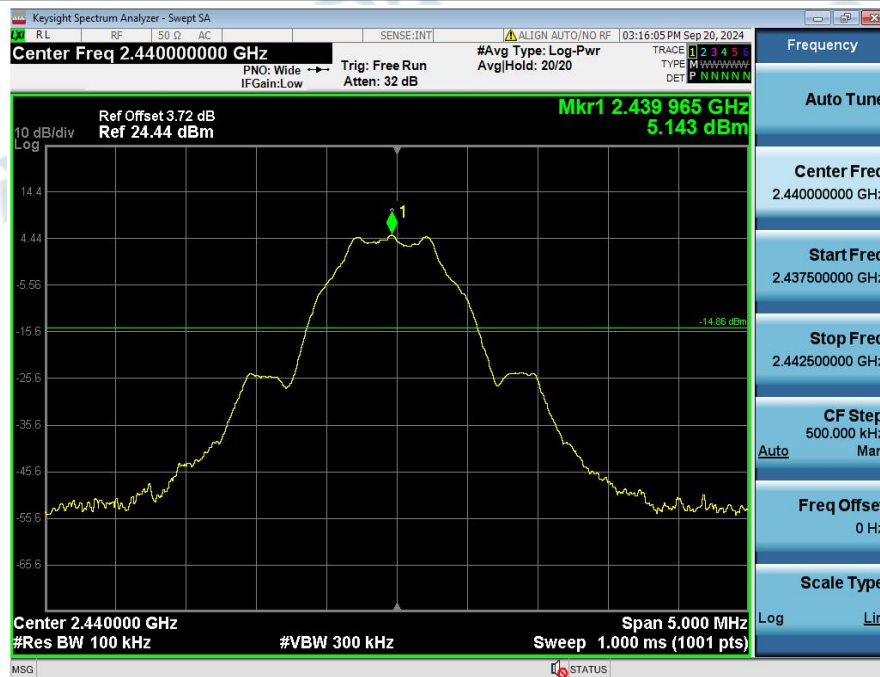
1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2402



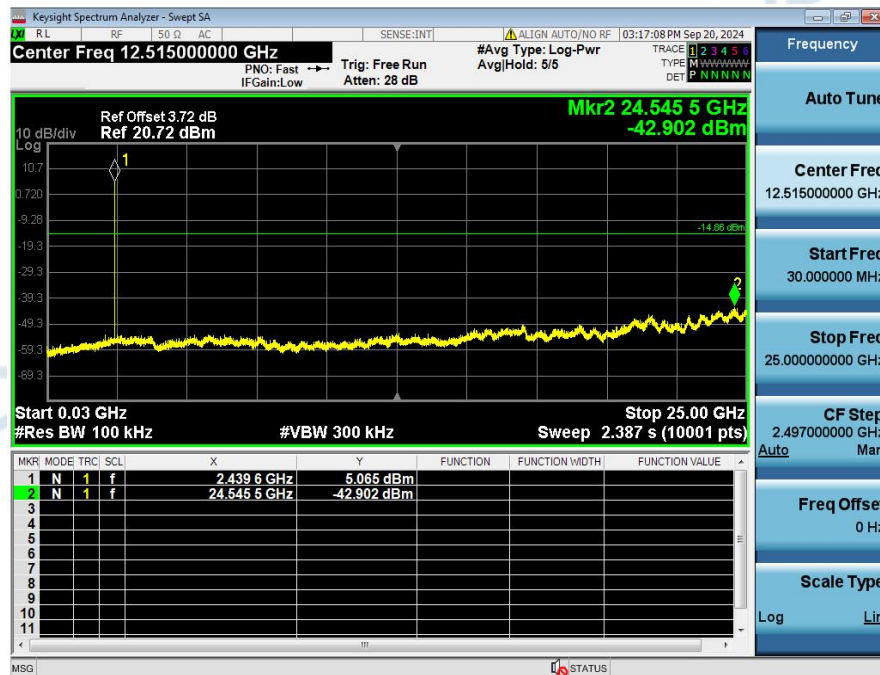
2\_Spurious\_Emission\_NVNT\_ANT1\_1Mbps\_2402



### 1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2440

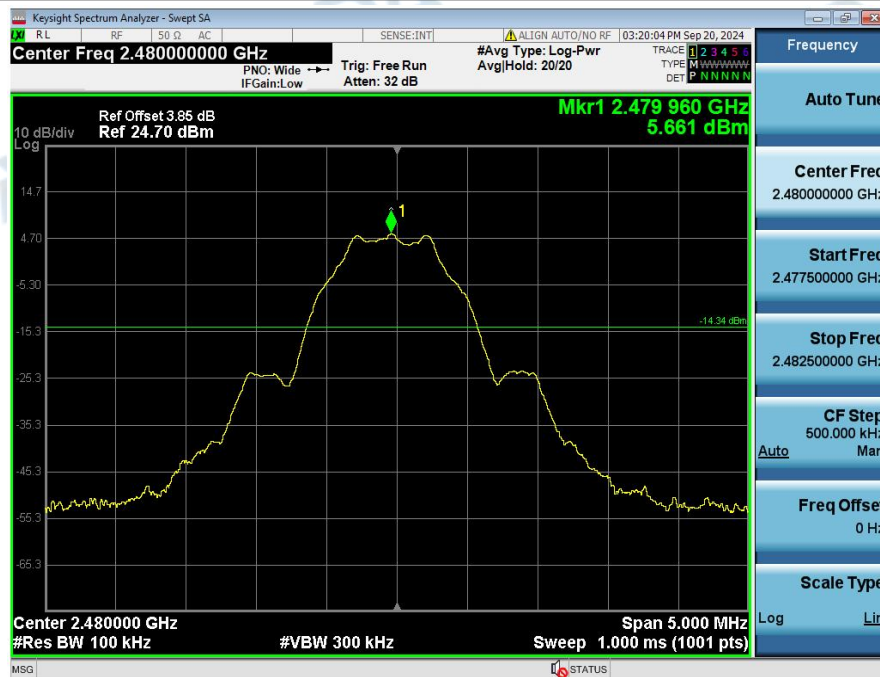


### 2\_Spurious\_Emission\_NVNT\_ANT1\_1Mbps\_2440

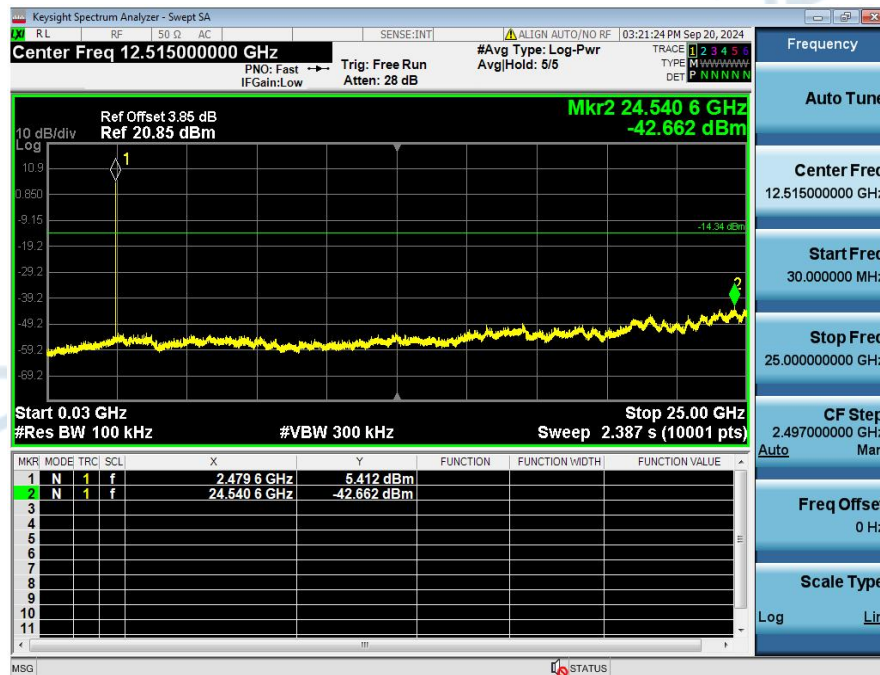




### 1\_Reference\_Level\_NVNT\_ANT1\_1Mbps\_2480



### 2\_Spurious\_Emission\_NVNT\_ANT1\_1Mbps\_2480



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