RF TEST REPORT

For

Waysion Technology (Xiamen) Co., Ltd
Product Name: Rugged In-vehicle tablet
Test Model(s).: V7S

Report Reference No.	:	**DACE240920014RL002**
FCC ID	:	**2ACHT-V7S**
Applicant's Name	:	Waysion Technology (Xiamen) Co., Ltd
Address	:	Room 702, No.33, Xixishanwei Road, Jimei Dist.,Xiamen Software Park III, Xiamen, China
Testing Laboratory	:	Shenzhen DACE Testing Technology Co., Ltd.
Address	:	102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Connunity, Shiyan Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Test Specification Standard	:	**47 CFR Part 15.247**
Date of Receipt	:	September 20, 2024
Date of Test	:	September 20, 2024 to September 29, 2024
Data of Issue	:	September 29, 2024
Result	:	**Pass**

Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	DACE240920014RL002	September 29, 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.

Compiled by:	Supervised by:	Approved by:
Keren Huang	Ben Tang	Machael Mo
Keren Huang / Test Engineer	Ben Tang / Project Engineer	Machael Mo / Manager
September 29, 2024	September 29, 2024	September 29, 2024

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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 C63.10-2020 section 6.2	47 CFR 15.207(a)	Pass
Occupied Bandwidth	47 CFR Part 15.247	ANSI C63.10-2020, section 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	ANSI C63.10-2020 section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	47 CFR Part 15.247	ANSI C63.10-2020, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	ANSI C63.10-2020 section 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d), 15.209, 15.205	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	ANSI C63.10-2020 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.247	ANSI C63.10-2020 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.247	ANSI C63.10-2020 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d), 15.209, 15.205	Pass

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name	:	Waysion Technology (Xiamen) Co., Ltd
Address	:	Room 702, No.33, Xixishanwei Road, Jimei Dist.,Xiamen Software Park III, Xiamen, China
Manufacturer	:	Shenzhen Saintway Technology Co.,Ltd
Address	:	RM 301, Zhixiang Building Industrial Zone, 71 Sec., Xingdong Community, Xin'an street, Bao'an Dis., Shenzhen

2.2 Description of Device (EUT)

Product Name:	Rugged In-vehicle tablet
Model/Type reference:	V7S
Series Model:	N/A
Trade Mark:	N/A
Power Supply:	DC 12V/2A from adapter Battery:DC3.7V 2000mAh
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	40
Modulation Type:	GFSK
Antenna Type:	Internal Antenna
Antenna Gain:	0dBi
Hardware Version:	V1.0
Software Version:	V1.0

(Remark:The Antenna Gain is supplied by the customer.DACE is not responsible for This data and the related calculations associated with it)

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.

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**
Power absorbing clamp	SCHWARZ BECK	MESS-ELEKTRONIK	/	2024-03-25	2025-03-24
Electric Network	SCHWARZ BECK	CAT5 8158	CAT5 8158#207	/	/
Cable	SCHWARZ BECK	/	/	2024-03-20	2025-03-19
Pulse Limiter	SCHWARZ BECK	VTSD 9561-F Pulse limiter 10dB Attenuation	561-G071	2023-12-12	2024-12-11
50ΩCoaxial Switch	Anritsu	MP59B	M20531	/	/
Test Receiver	Rohde & Schwarz	ESPI TEST RECEIVER	ID:1164.6607K 03-102109-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	/	2024-09-27	2025-09-26
EMI test software	EZ -EMC	EZ	V1.1.42	/	/

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

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Test Software	TACHOY	RTS-01	V1.0.0	/	/
Power divider	MIDEWEST	PWD-2533	SMA-79	2023-05-11	2026-05-10
RF Sensor Unit	Tachoy Information Technology(shenzhen) Co.,Ltd.	TR1029-2	000001	/	/
Wideband radio communication tester	R&S	CMW500	113410	2024-06-12	2025-06-11
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

Emissions in frequency bands (above 1GHz)
Band edge emissions (Radiated)
Emissions in frequency bands (below 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
Wideband radio communication tester	R&S	CMW500	113410	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)	±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 DACE Testing Technology Co., Ltd.
Address:	102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Connunity, Shiyan Subdistrict, 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 Connunity, Shiyan Subdistrict, 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.

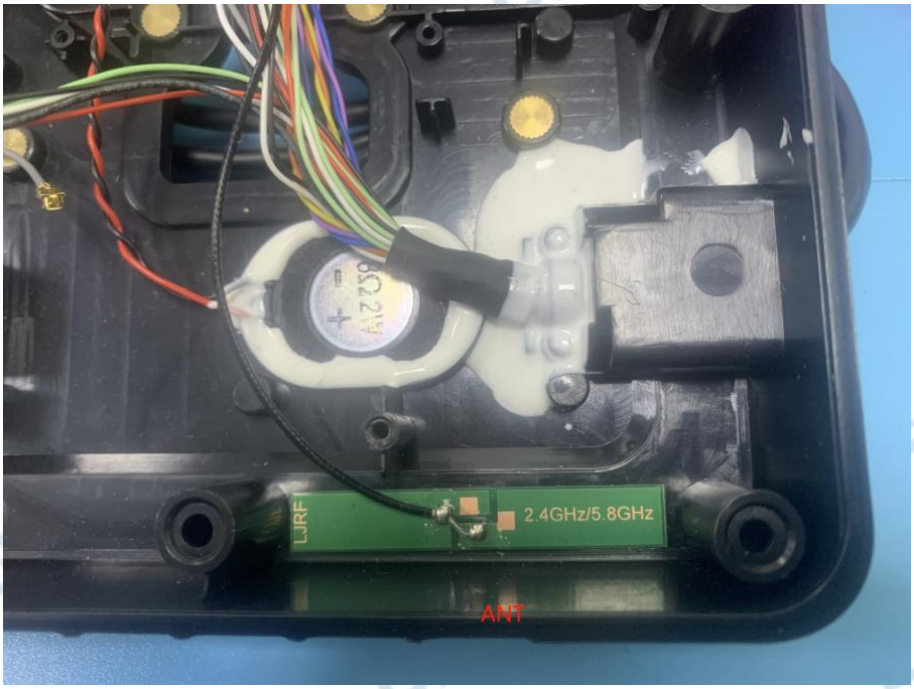
(6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

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.

3.1.1 Conclusion:



4 Radio Spectrum Matter Test Results (RF)

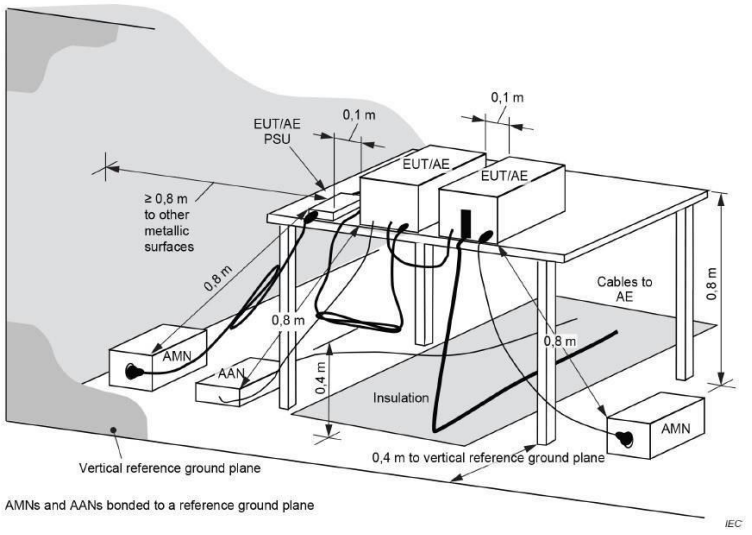
4.1 Conducted Emission at AC power line

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 μH/50 ohms line impedance stabilization network (LISN).
Test Limit:	Frequency of emission (MHz) / Conducted limit (dBμV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 *Decreases with the logarithm of the frequency.
Test Method:	ANSI C63.10-2020 section 6.2
Procedure:	Refer to ANSI C63.10-2020 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices

4.1.1 E.U.T. Operation:

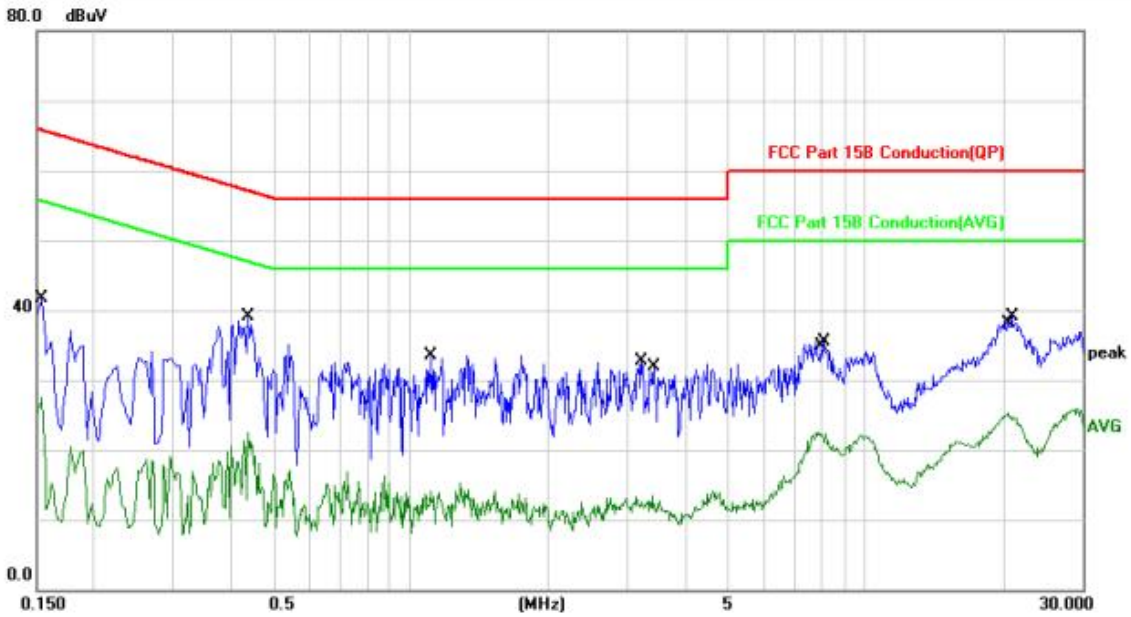
Operating Environment:					
Temperature:	22 °C	Humidity:	51 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.1.2 Test Setup Diagram:



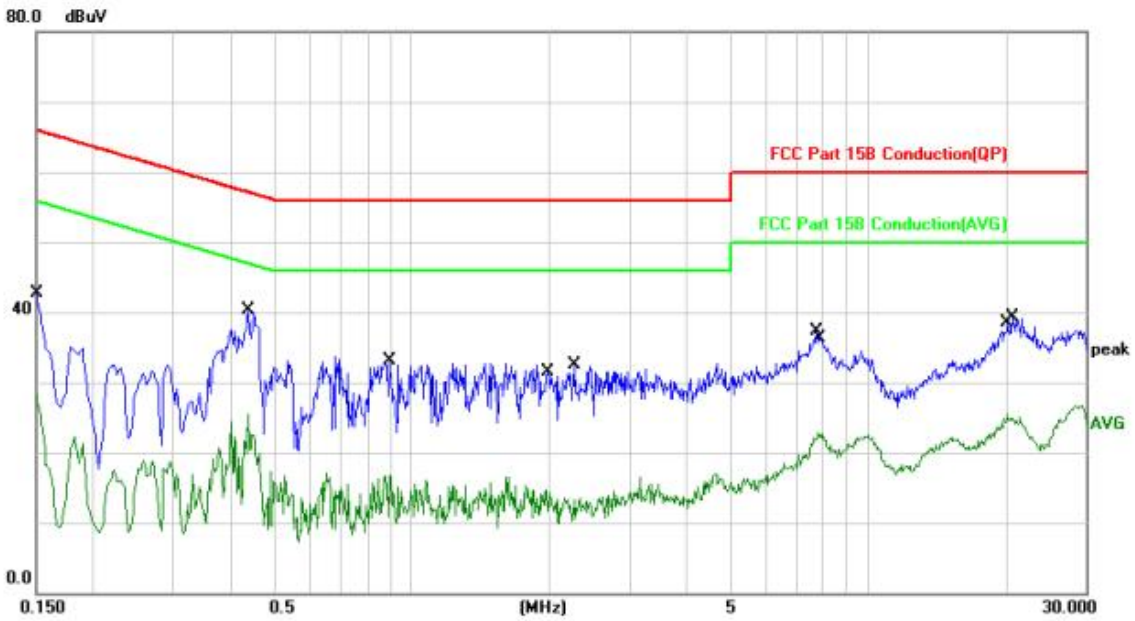
4.1.3 Test Data:

TM1 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: L
Power:AC120V60Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1539	31.59	10.10	41.69	65.78	-24.09	QP	
2		0.1539	17.35	10.10	27.45	55.78	-28.33	AVG	
3	*	0.4380	28.98	10.07	39.05	57.10	-18.05	QP	
4		0.4380	12.36	10.07	22.43	47.10	-24.67	AVG	
5		1.1019	4.11	10.08	14.19	46.00	-31.81	AVG	
6		1.1100	23.35	10.08	33.43	56.00	-22.57	QP	
7		3.2100	22.68	10.08	32.76	56.00	-23.24	QP	
8		3.3860	3.38	10.11	13.49	46.00	-32.51	AVG	
9		7.8700	12.24	10.27	22.51	50.00	-27.49	AVG	
10		8.0659	25.32	10.27	35.59	60.00	-24.41	QP	
11		20.6100	14.63	10.62	25.25	50.00	-24.75	AVG	
12		21.0180	28.49	10.63	39.12	60.00	-20.88	QP	

TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: L
Power:AC120V60Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	32.69	10.10	42.79	65.99	-23.20	QP	
2		0.1500	18.22	10.10	28.32	55.99	-27.67	AVG	
3	*	0.4380	30.28	10.07	40.35	57.10	-16.75	QP	
4		0.4380	15.49	10.07	25.56	47.10	-21.54	AVG	
5		0.8900	22.95	10.08	33.03	56.00	-22.97	QP	
6		0.9020	6.69	10.08	16.77	46.00	-29.23	AVG	
7		1.9700	4.71	9.99	14.70	46.00	-31.30	AVG	
8		2.2740	22.50	10.02	32.52	56.00	-23.48	QP	
9		7.7140	27.02	10.26	37.28	60.00	-22.72	QP	
10		7.7780	12.59	10.27	22.86	50.00	-27.14	AVG	
11		20.2300	14.85	10.60	25.45	50.00	-24.55	AVG	
12		20.7700	28.67	10.62	39.29	60.00	-20.71	QP	

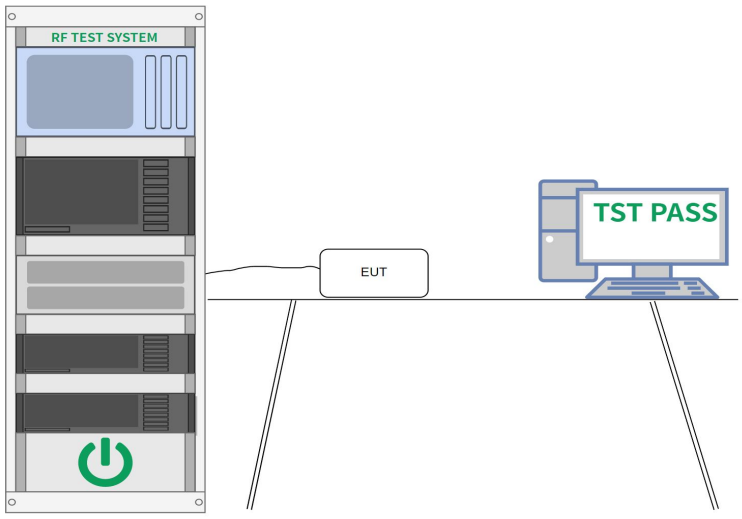
4.2 Occupied Bandwidth

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 C63.10-2020, section 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	11.8.1 Option 1 The steps for the first option are as follows: a) Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz. b) Set the VBW ≥ [3 × RBW]. c) Detector = peak. d) Trace mode = max-hold. e) Sweep = No faster than coupled (auto) time. f) Allow the trace to stabilize. g) Measure the maximum width of the emission by placing 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 “−6 dB down amplitude”. If a marker is below this “−6 dB down amplitude” value, then it shall be as close as possible to this value. 11.8.2 Option 2 The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22 °C	Humidity:	51 %	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.

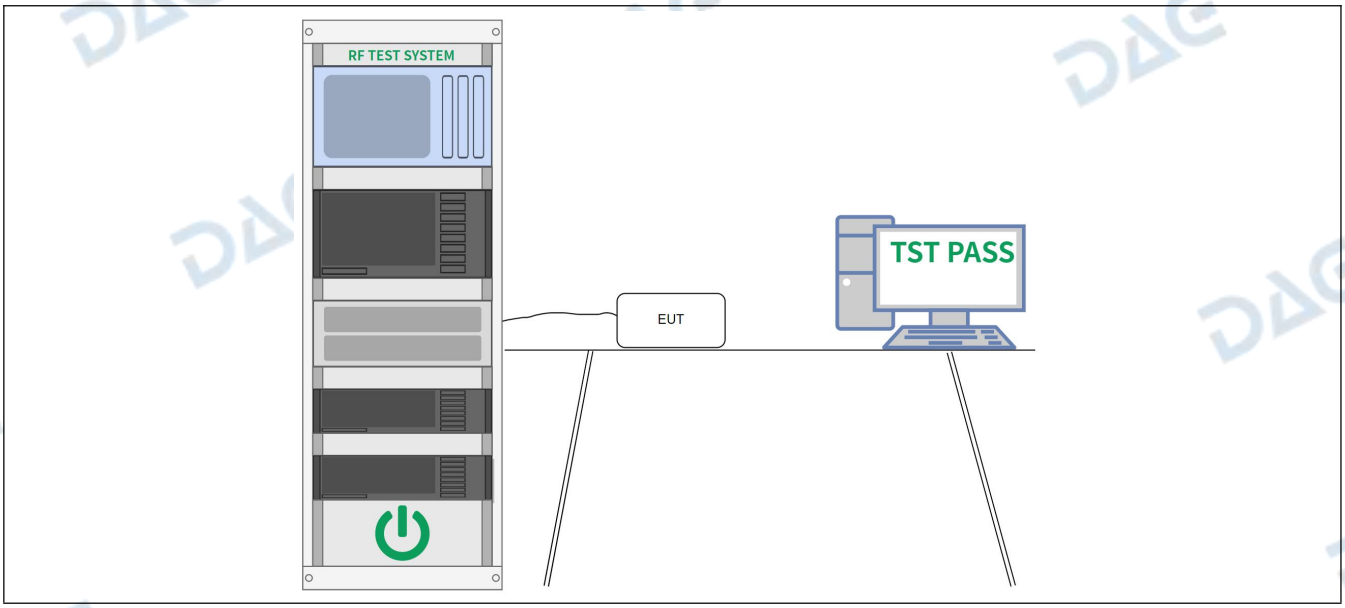
4.3 Maximum Conducted Output Power

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 C63.10-2020 section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2020, section 11.9.1 Maximum peak conducted output power Note: Per ANSI C63.10-2013, if there are two or more antnnas, the conducted powers at Core 0, Core 1,…, Core i were first measured separately, as shown in the section above(this product olny have one antenna). The measured values were then summed in linear power units then converted back to dBm. 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. For correlated unequal antenna gain Directional gain = 10*log[(10G1/20 + 10G2/20 + … + 10GN/20)2 / NANT] dBi For completely uncorrelated unequal antenna gain Directional gain = 10*log[(10G1/10 + 10G2/10 + … + 10GN/10)/ NANT] dBi Sample Multiple antennas Calculation: Core 0 + Core 1 +…Core i. = MIMO/CDD (i is the number of antennas) (#VALUE! mW + mW) = #VALUE! mW = dBm Sample e.i.r.p. Calculation: e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi)

4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22 °C	Humidity:	51 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.3.2 Test Setup Diagram:



4.3.3 Test Data:

Please Refer to Appendix for Details.

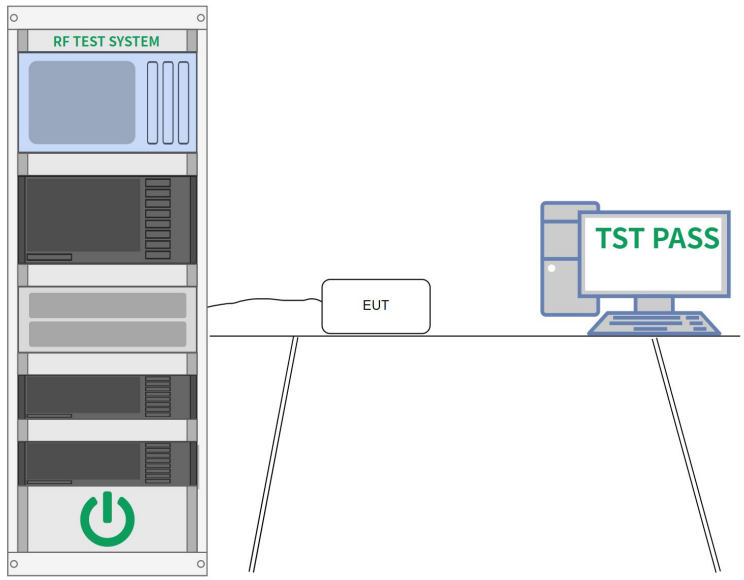
4.4 Power Spectral Density

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 C63.10-2020, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2020, section 11.10, Maximum power spectral density level in the fundamental emission

4.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22 °C	Humidity:	51 %	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.

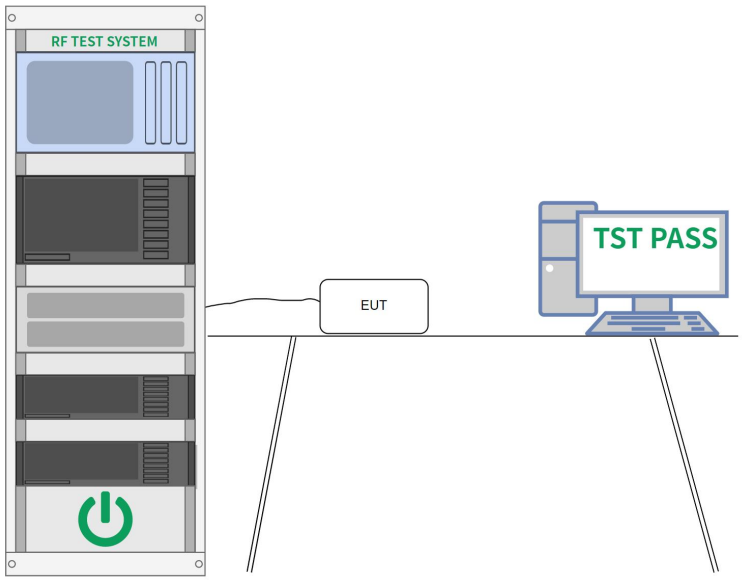
4.5 Emissions in non-restricted frequency bands

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 C63.10-2020 section 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2020 Section 11.11.1, Section 11.11.2, Section 11.11.3

4.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22 °C	Humidity:	51 %	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

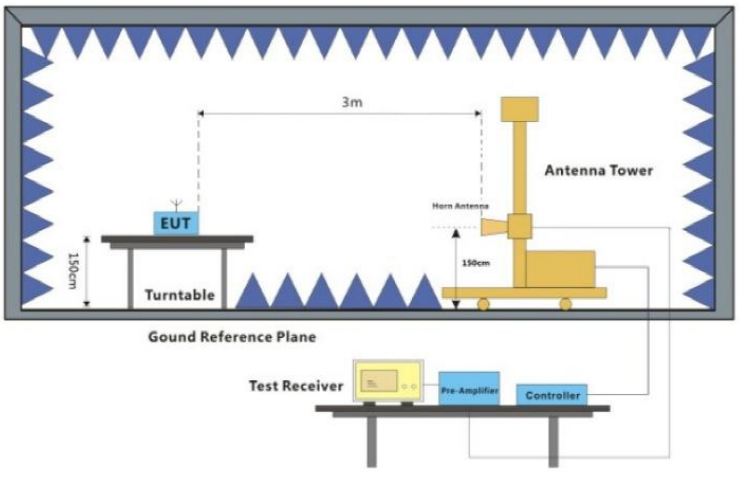
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Method:	ANSI C63.10-2020 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2020 section 6.10.5.2

4.6.1 E.U.T. Operation:

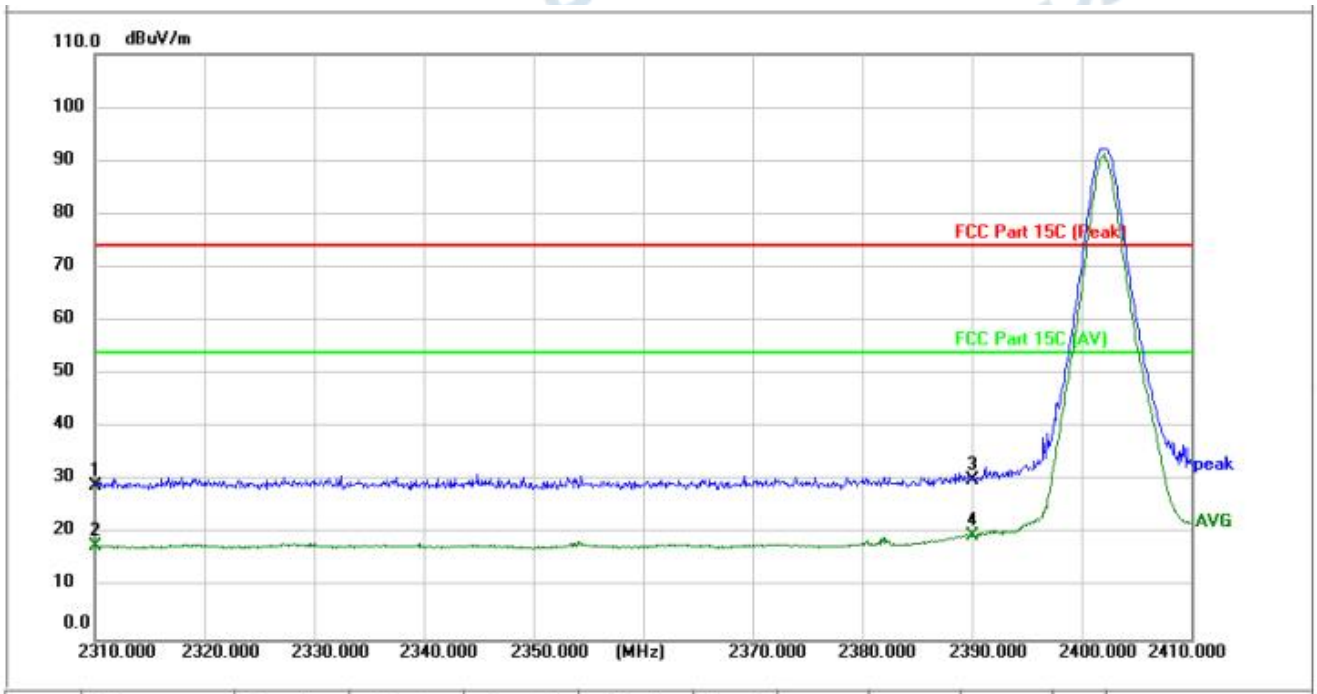
Operating Environment:					
Temperature:	22 °C	Humidity:	51 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.6.2 Test Setup Diagram:



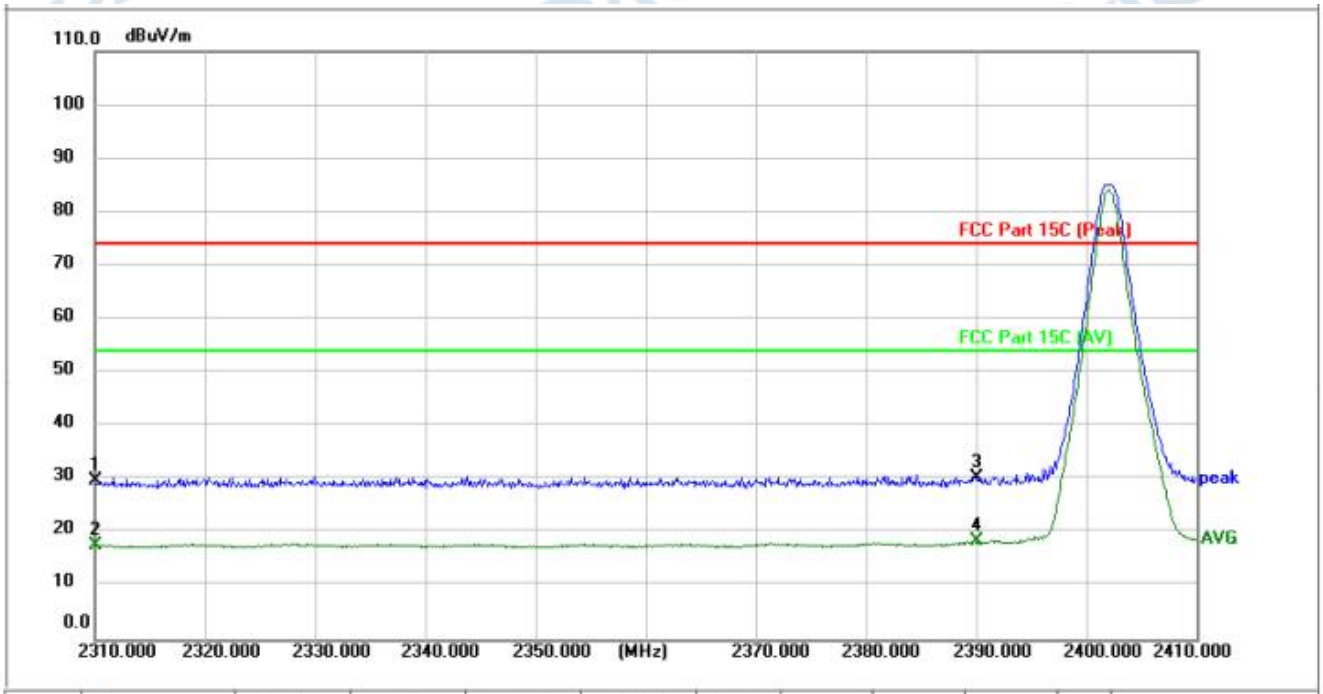
4.6.3 Test Data:

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



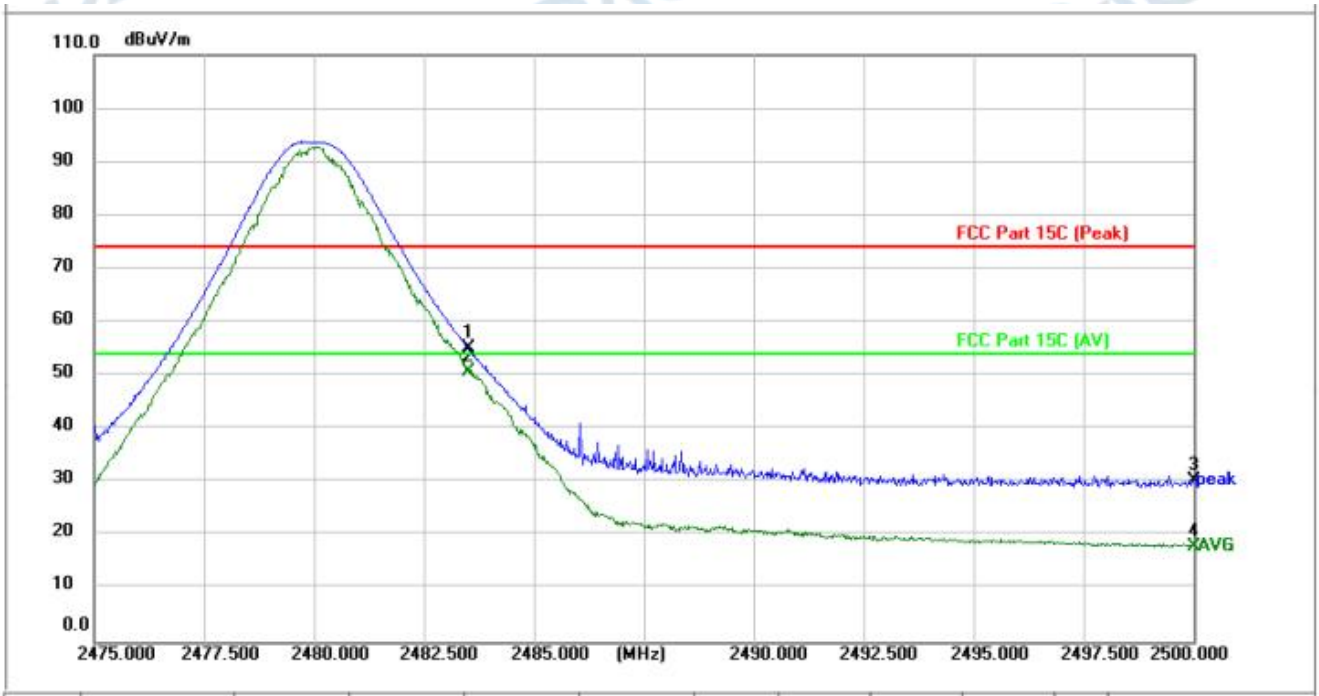
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	35.76	-6.63	29.13	74.00	-44.87	peak	149		P	
2	2310.000	24.27	-6.63	17.64	54.00	-36.36	AVG	149		P	
3	2390.000	36.51	-6.42	30.09	74.00	-43.91	peak	149		P	
4 *	2390.000	26.03	-6.42	19.61	54.00	-34.39	AVG	149		P	

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



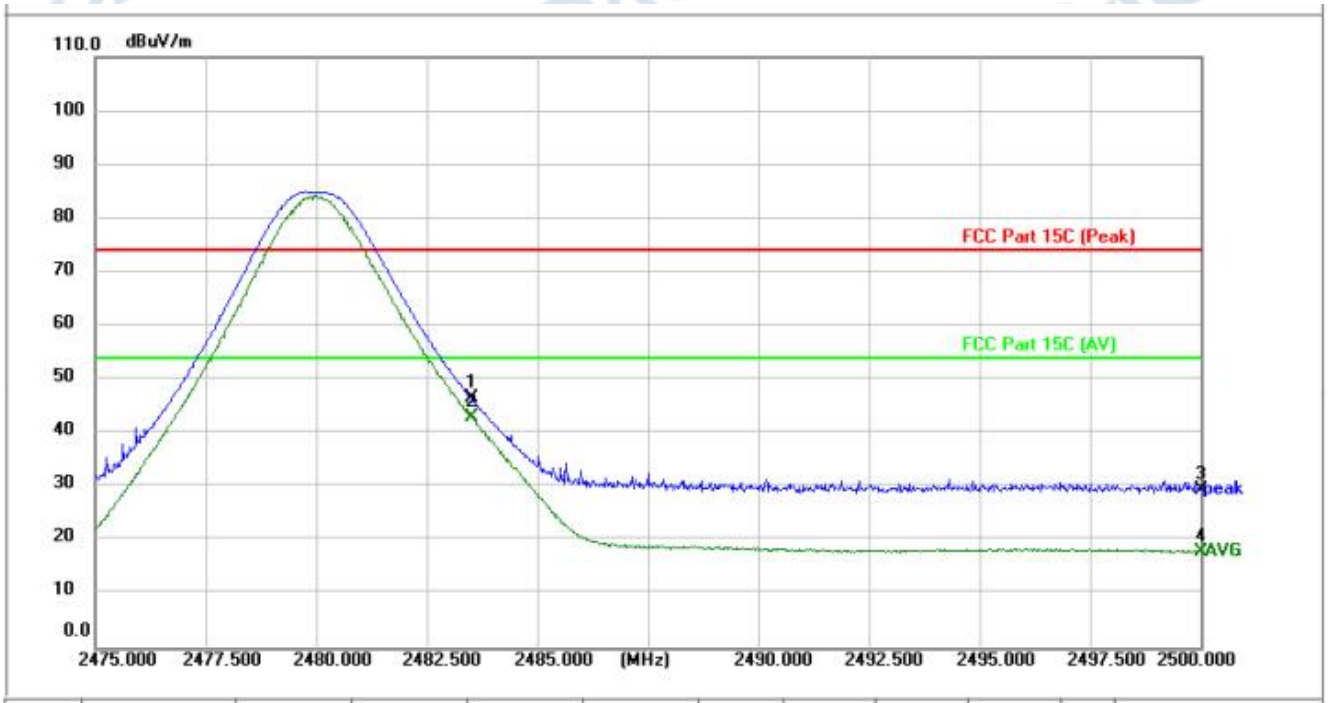
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	36.44	-6.63	29.81	74.00	-44.19	peak	149		P	
2	2310.000	24.42	-6.63	17.79	54.00	-36.21	AVG	149		P	
3	2390.000	36.94	-6.42	30.52	74.00	-43.48	peak	149		P	
4 *	2390.000	24.88	-6.42	18.46	54.00	-35.54	AVG	149		P	

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / 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	2483.500	61.35	-6.17	55.18	74.00	-18.82	peak	149		P	
2 *	2483.500	56.89	-6.17	50.72	54.00	-3.28	AVG	149		P	
3	2500.000	36.54	-6.13	30.41	74.00	-43.59	peak	149		P	
4	2500.000	24.27	-6.13	18.14	54.00	-35.86	AVG	149		P	

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / 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	2483.500	52.74	-6.17	46.57	74.00	-27.43	peak	149		P	
2 *	2483.500	49.34	-6.17	43.17	54.00	-10.83	AVG	149		P	
3	2500.000	35.60	-6.13	29.47	74.00	-44.53	peak	149		P	
4	2500.000	24.21	-6.13	18.08	54.00	-35.92	AVG	149		P	

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:	<table><tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr><tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr><tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr><tr><td>1.705-30.0</td><td>30</td><td>30</td></tr><tr><td>30-88</td><td>100 **</td><td>3</td></tr><tr><td>88-216</td><td>150 **</td><td>3</td></tr><tr><td>216-960</td><td>200 **</td><td>3</td></tr><tr><td>Above 960</td><td>500</td><td>3</td></tr></table> ** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
Test Method:	ANSI C63.10-2020 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	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. 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. 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. 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. 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. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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. h. Test the EUT in the lowest channel, the middle channel, the Highest channel. 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. j. Repeat above procedures until all frequencies measured was complete. Remark: 1) For emission below 1GHz, through pre-scan found the worst case is the lowest

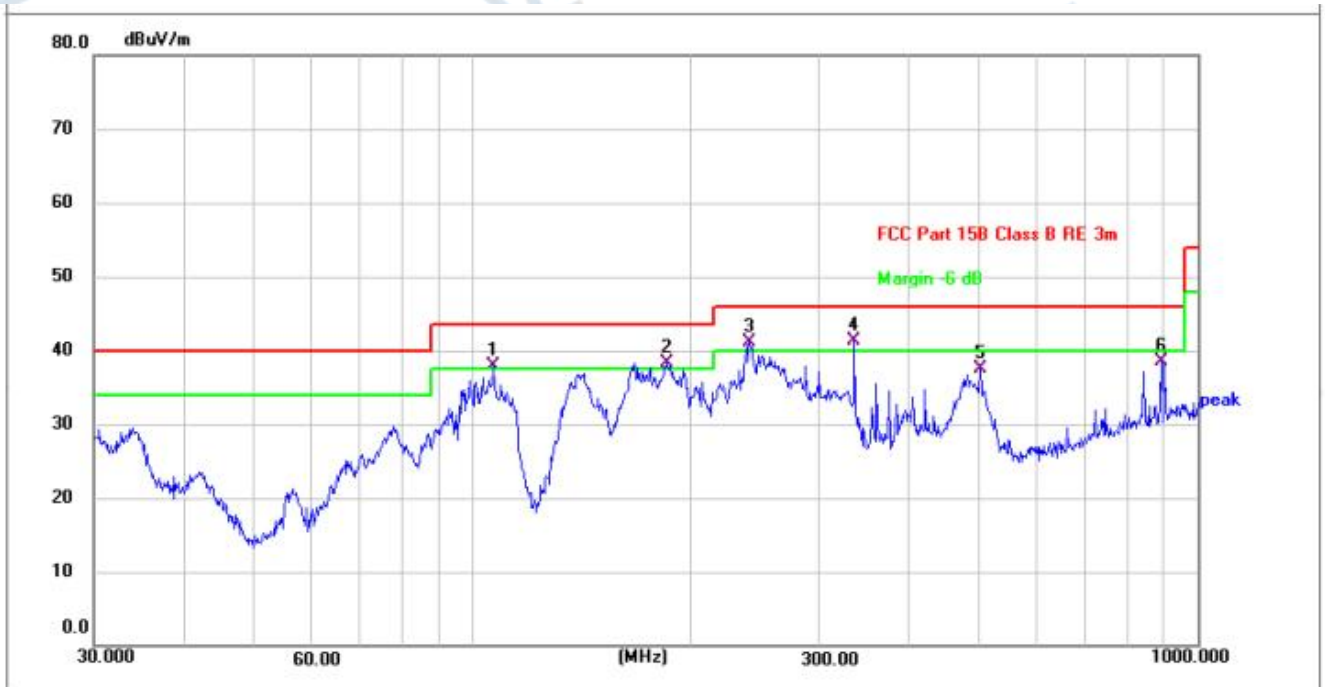
	channel. Only the worst case is recorded in the report. 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor 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:	22 °C	Humidity:	51 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

4.7.2 Test Data:

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / 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 !	106.7587	44.30	-6.48	37.82	43.50	-5.68	QP			P	
2 !	185.1378	46.64	-8.37	38.27	43.50	-5.23	QP			P	
3 !	240.8303	49.41	-8.24	41.17	46.00	-4.83	QP			P	
4 *	336.0351	46.40	-5.06	41.34	46.00	-4.66	QP			P	
5	501.1790	38.75	-1.17	37.58	46.00	-8.42	QP			P	
6	890.7277	33.65	4.92	38.57	46.00	-7.43	QP			P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / 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 !	35.3750	38.36	-2.82	35.54	40.00	-4.46	QP			P	
2 !	58.2030	48.11	-13.02	35.09	40.00	-4.91	QP			P	
3 *	103.0800	47.85	-7.29	40.56	43.50	-2.94	QP			P	
4 !	186.4408	47.50	-8.62	38.88	43.50	-4.62	QP			P	
5	296.1836	42.89	-5.75	37.14	46.00	-8.86	QP			P	
6	519.0650	38.04	-1.23	36.81	46.00	-9.19	QP			P	

4.8 Emissions in frequency bands (above 1GHz)

<table>
<tr><td>Test Requirement:</td><td>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)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4
KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Procedure:</td><td>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.
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.
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.
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.
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.
f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
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.
h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
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.
j. Repeat above procedures until all frequencies measured was complete.
Remark:
1) For emission below 1GHz, through pre-scan found the worst case is the lowest</td></tr>
</table>

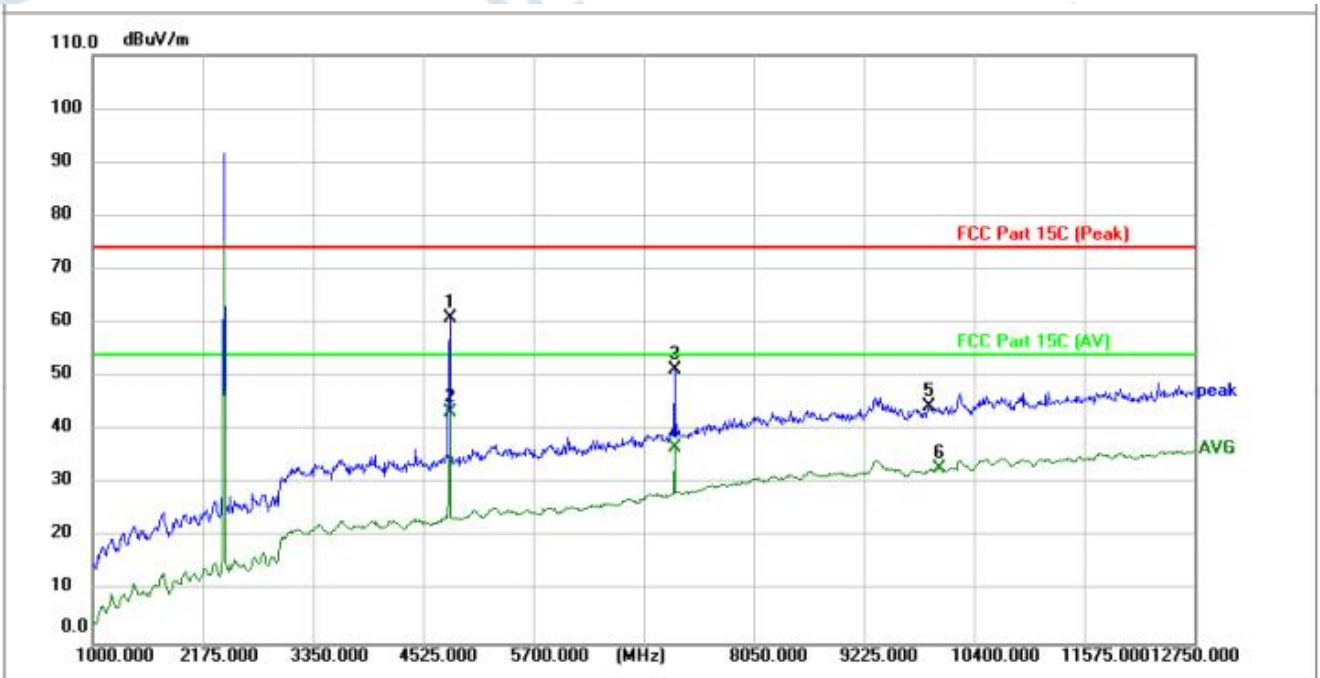
	channel. Only the worst case is recorded in the report. 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor 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:	22 °C	Humidity:	51 %	Atmospheric Pressure:	101 kPa
Pretest mode:	TM1				
Final test mode:	TM1				

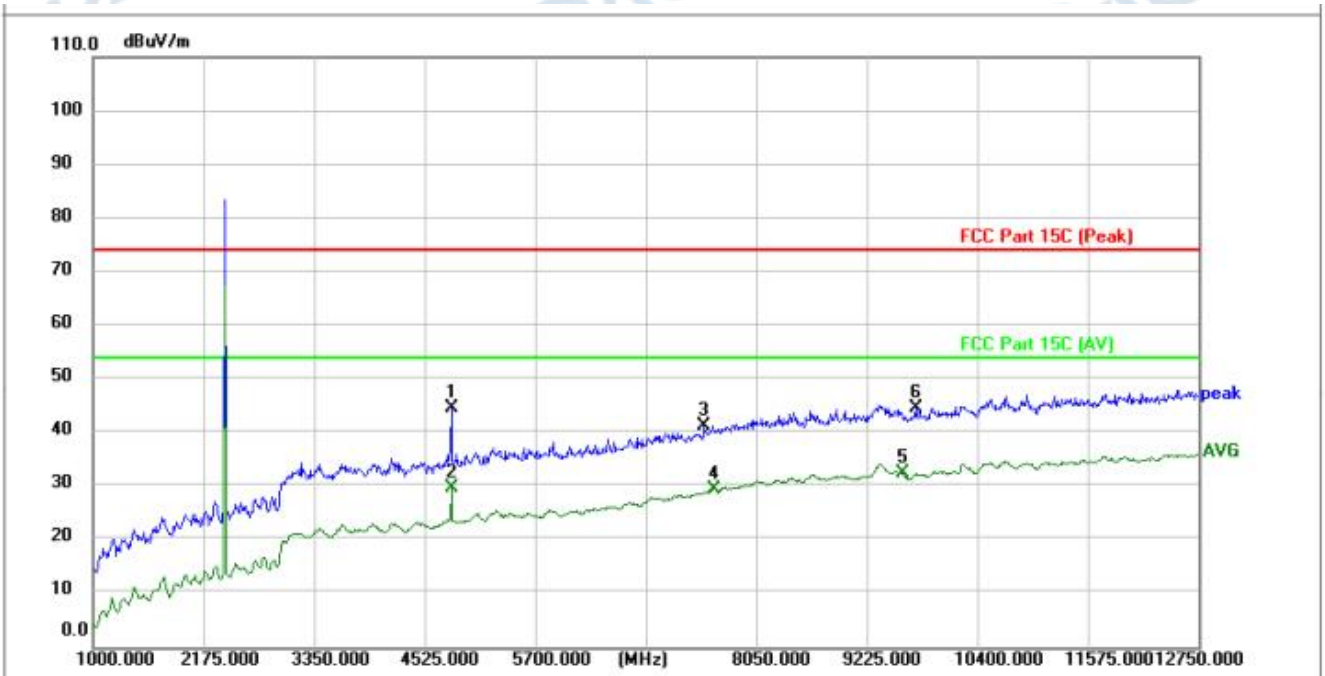
4.8.2 Test Data:

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



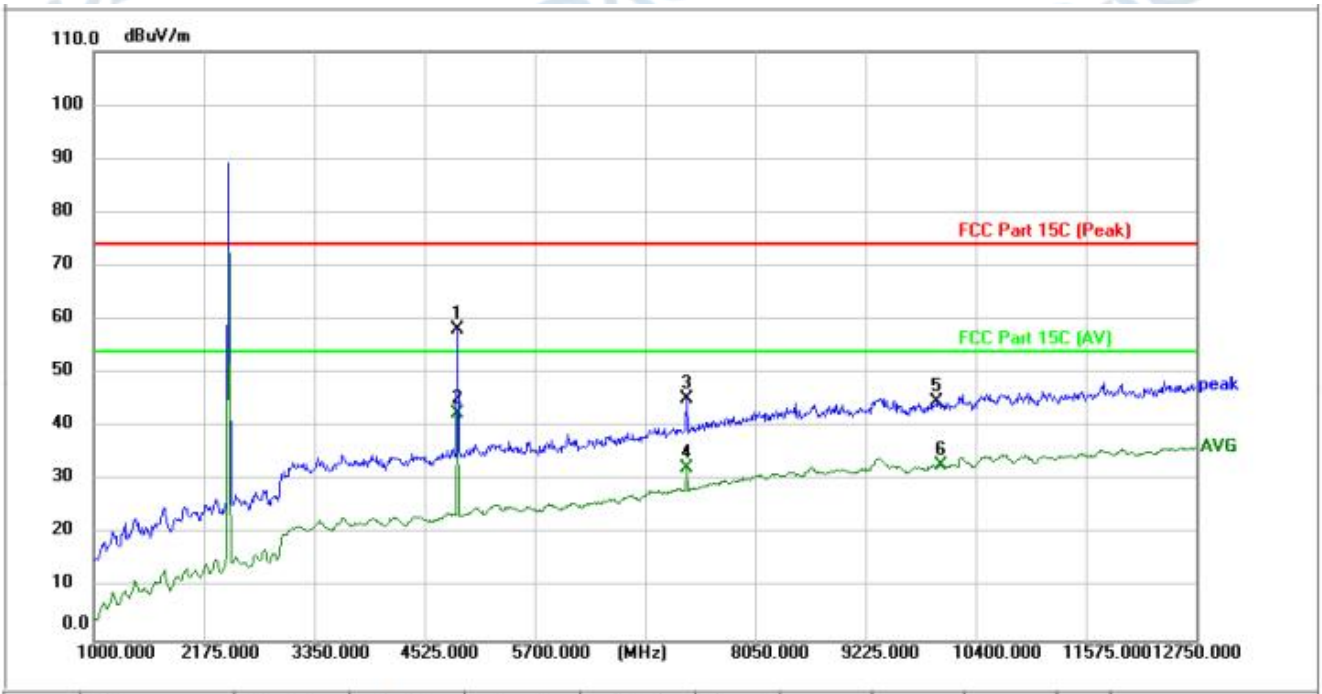
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4807.000	61.60	-0.69	60.91	74.00	-13.09	peak	149		P	
2 *	4807.000	43.97	-0.69	43.28	54.00	-10.72	AVG	149		P	
3	7204.000	47.02	4.37	51.39	74.00	-22.61	peak	149		P	
4	7204.000	32.40	4.37	36.77	54.00	-17.23	AVG	149		P	
5	9918.250	36.31	8.08	44.39	74.00	-29.61	peak	149		P	
6	10024.000	24.83	8.13	32.96	54.00	-21.04	AVG	149		P	

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



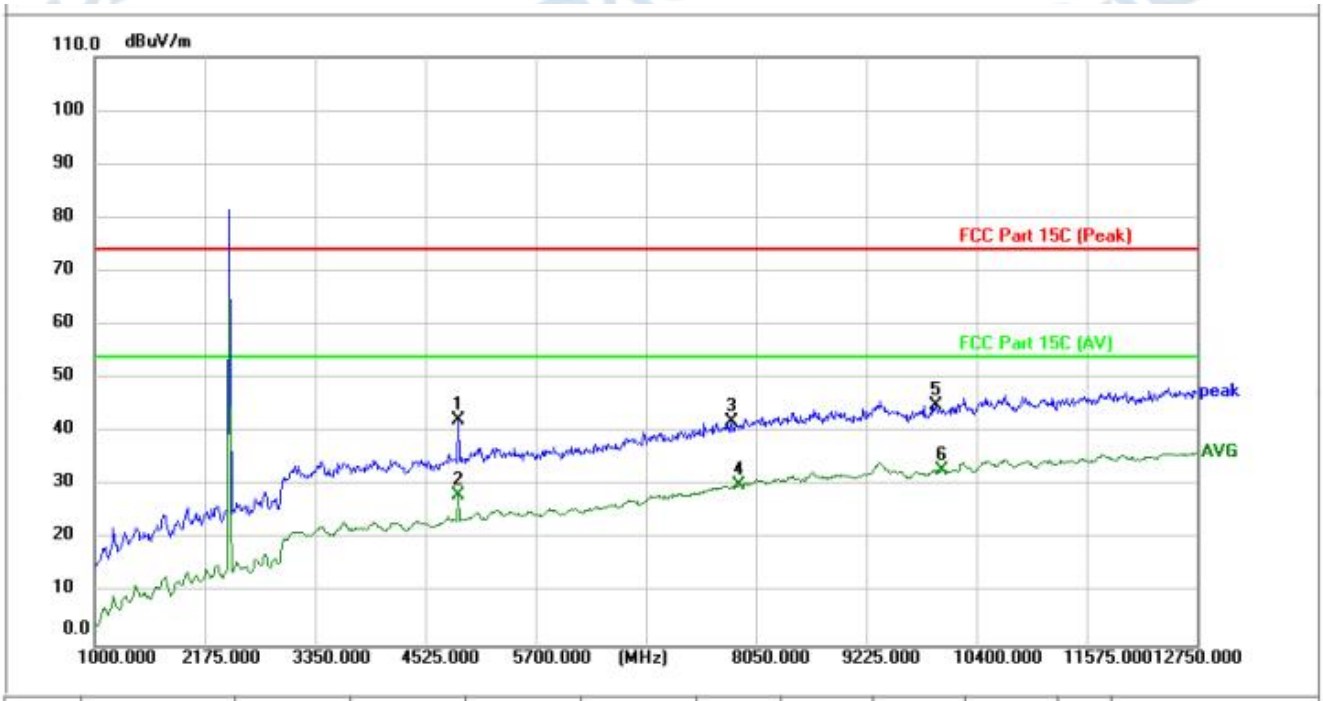
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4807.000	45.30	-0.69	44.61	74.00	-29.39	peak	149		P	
2	4807.000	30.46	-0.69	29.77	54.00	-24.23	AVG	149		P	
3	7497.750	36.45	4.89	41.34	74.00	-32.66	peak	149		P	
4	7603.500	24.44	5.26	29.70	54.00	-24.30	AVG	149		P	
5 *	9601.000	24.56	8.09	32.65	54.00	-21.35	AVG	149		P	
6	9742.000	36.65	8.10	44.75	74.00	-29.25	peak	149		P	

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



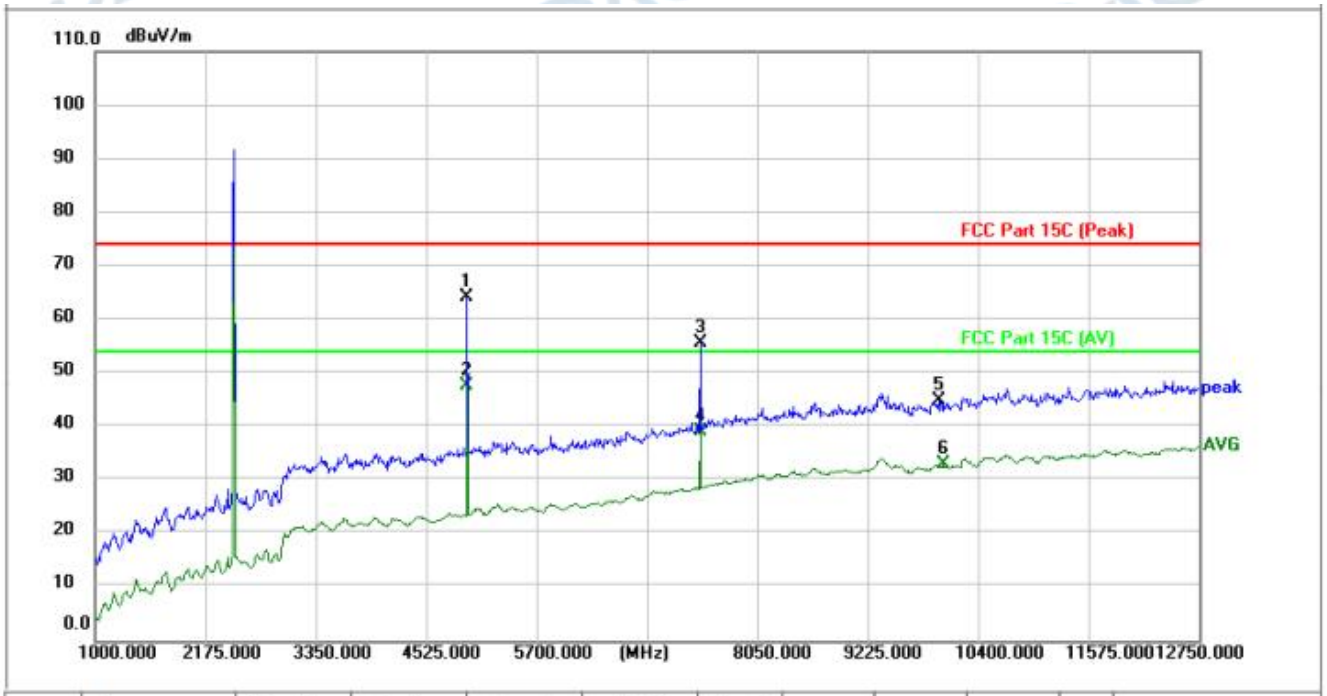
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4877.500	58.75	-0.45	58.30	74.00	-15.70	peak	149		P	
2 *	4877.500	42.88	-0.45	42.43	54.00	-11.57	AVG	149		P	
3	7321.500	40.58	4.57	45.15	74.00	-28.85	peak	149		P	
4	7321.500	27.74	4.57	32.31	54.00	-21.69	AVG	149		P	
5	9988.750	36.48	8.09	44.57	74.00	-29.43	peak	149		P	
6	10024.000	24.76	8.13	32.89	54.00	-21.11	AVG	149		P	

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



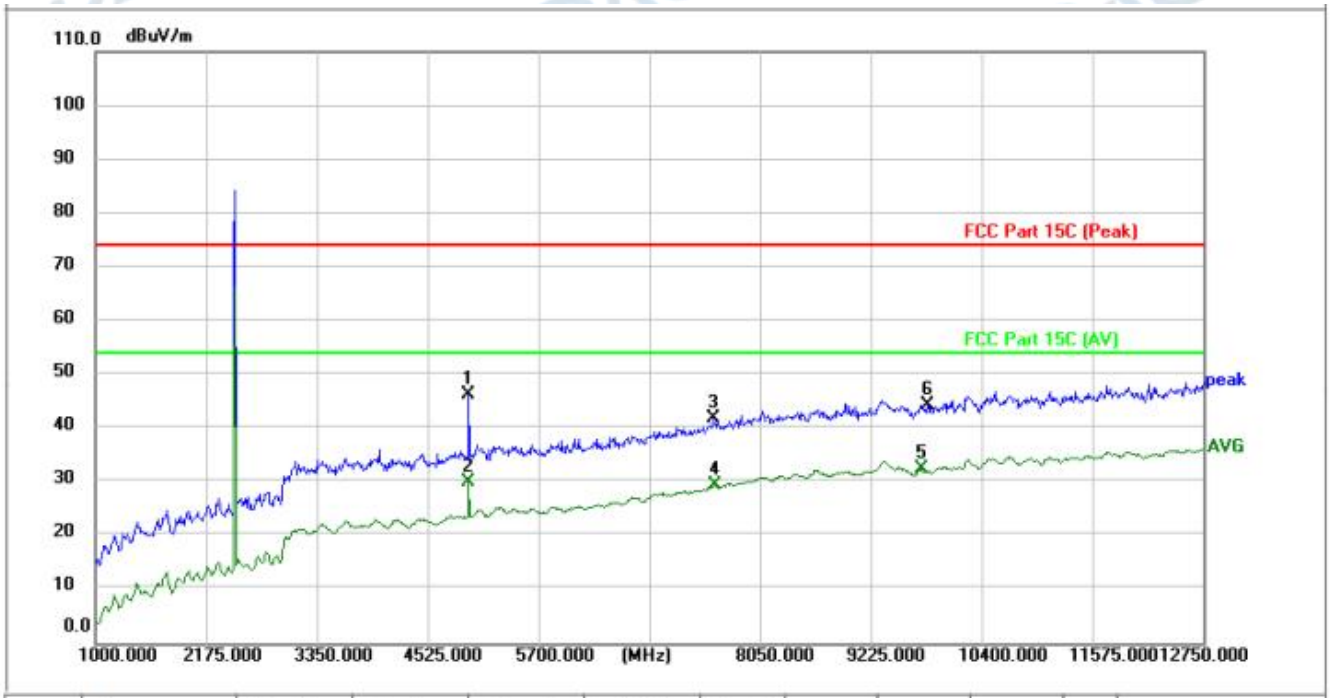
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4877.500	42.64	-0.45	42.19	74.00	-31.81	peak	149		P	
2	4877.500	28.53	-0.45	28.08	54.00	-25.92	AVG	149		P	
3	7791.500	36.01	5.93	41.94	74.00	-32.06	peak	149		P	
4	7873.750	23.81	6.23	30.04	54.00	-23.96	AVG	149		P	
5	9965.250	36.94	8.09	45.03	74.00	-28.97	peak	149		P	
6 *	10024.000	24.85	8.13	32.98	54.00	-21.02	AVG	149		P	

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / 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	4959.750	64.31	-0.17	64.14	74.00	-9.86	peak	149		P	
2 *	4959.750	47.77	-0.17	47.60	54.00	-6.40	AVG	149		P	
3	7439.000	50.84	4.78	55.62	74.00	-18.38	peak	149		P	
4	7439.000	34.37	4.78	39.15	54.00	-14.85	AVG	149		P	
5	9977.000	36.99	8.10	45.09	74.00	-28.91	peak	149		P	
6	10024.000	24.93	8.13	33.06	54.00	-20.94	AVG	149		P	

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / 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	4959.750	46.38	-0.17	46.21	74.00	-27.79	peak	149		P	
2	4959.750	30.30	-0.17	30.13	54.00	-23.87	AVG	149		P	
3	7556.500	36.72	5.09	41.81	74.00	-32.19	peak	149		P	
4	7568.250	24.34	5.13	29.47	54.00	-24.53	AVG	149		P	
5 *	9765.500	24.46	8.09	32.55	54.00	-21.45	AVG	149		P	
6	9824.250	36.34	8.08	44.42	74.00	-29.58	peak	149		P	

5 TEST SETUP PHOTOS

Reference to the Test setup file for details.

6 PHOTOS OF THE EUT

Reference to the external photos file and internal photos file for details.

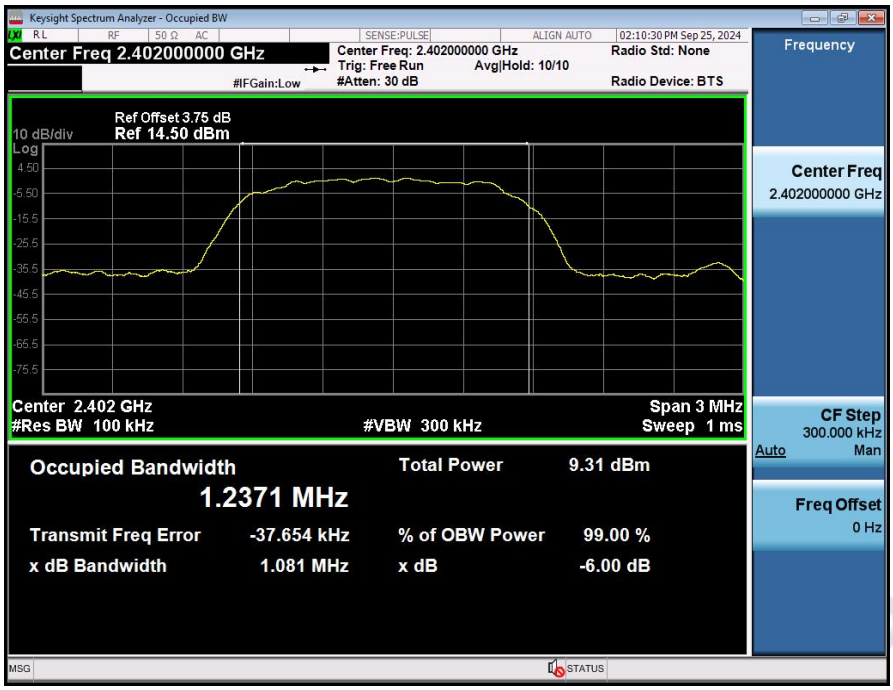
Appendix

HT240920003--V7S--BLE--FCC
FCC_BLE (Part15.247) Test Data

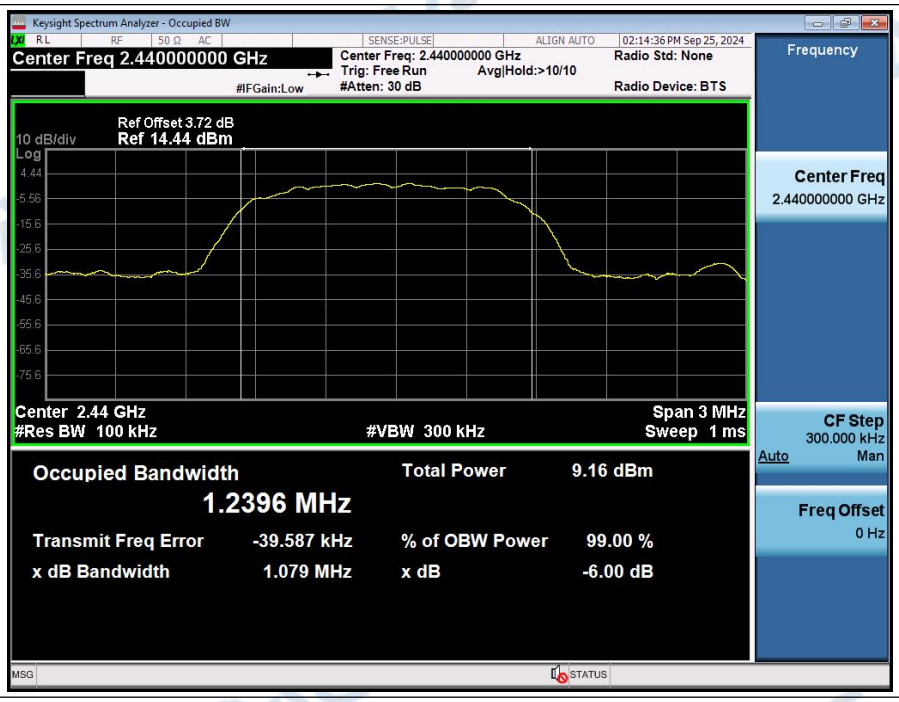
1. -6dB Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	-6dB BW(kHz)	limit(kHz)	Result
NVNT	ANT1	1Mbps	2402.00	1081.42	500	Pass
NVNT	ANT1	1Mbps	2440.00	1079.21	500	Pass
NVNT	ANT1	1Mbps	2480.00	1085.60	500	Pass

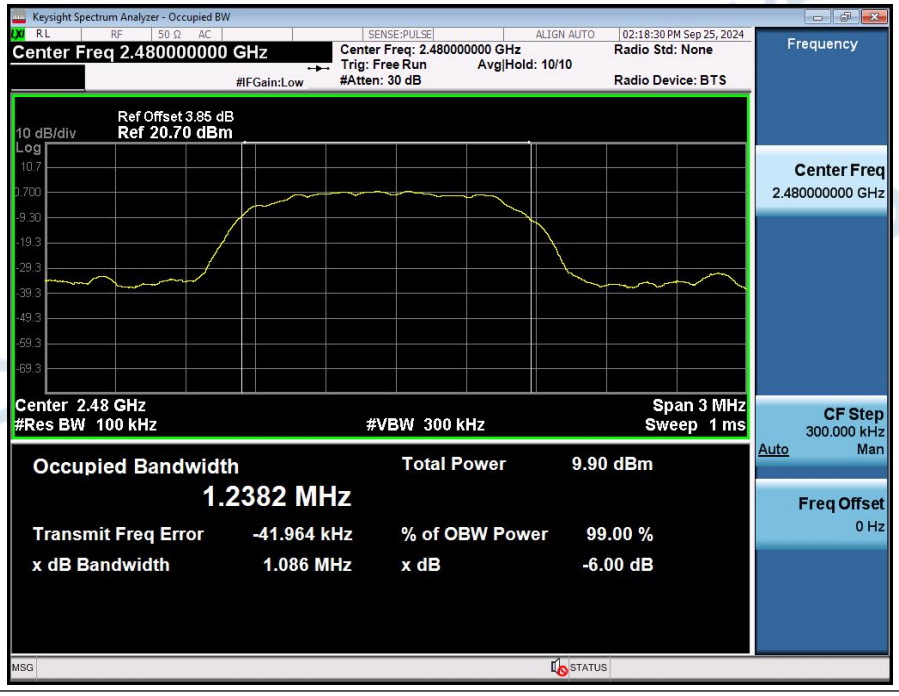
-6dB_Bandwidth_NVNT_ANT1_1Mbps_2402



-6dB_Bandwidth_NVNT_ANT1_1Mbps_2440



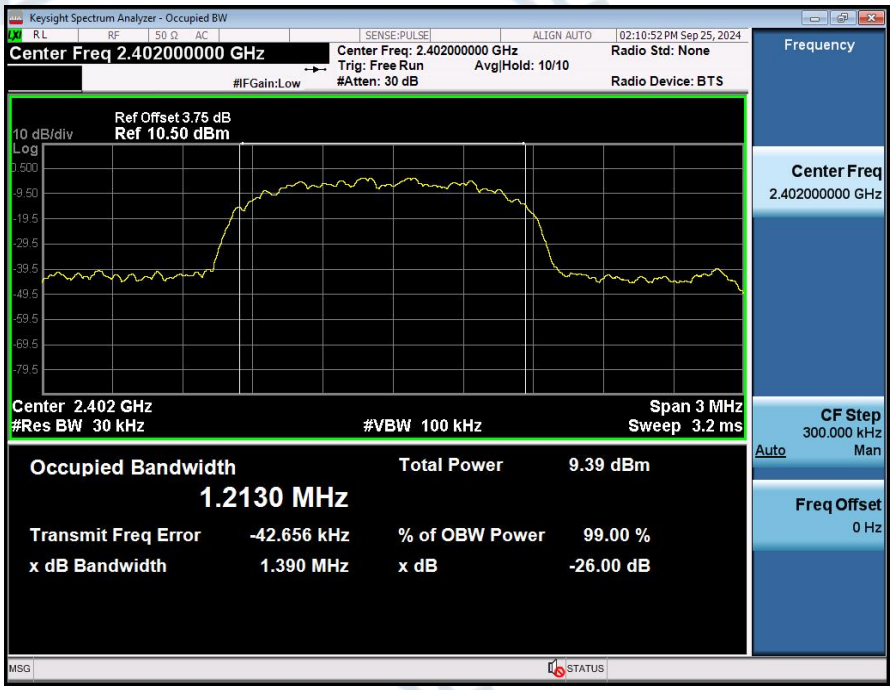
-6dB_Bandwidth_NVNT_ANT1_1Mbps_2480



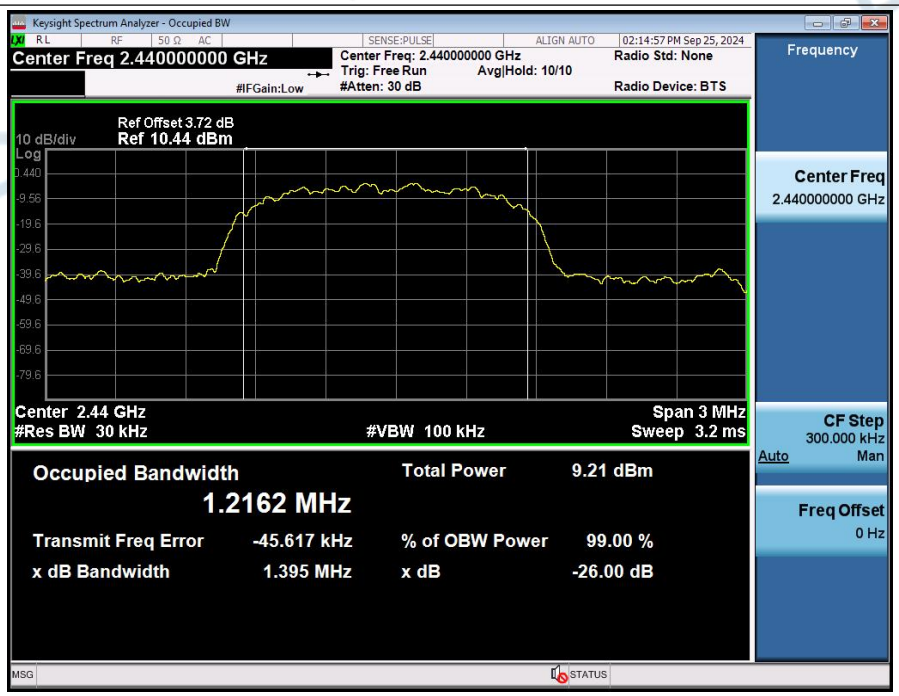
2. 99% Occupied Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	99%%BW(MHz)
NVNT	ANT1	1Mbps	2402.00	1.213
NVNT	ANT1	1Mbps	2440.00	1.216
NVNT	ANT1	1Mbps	2480.00	1.213

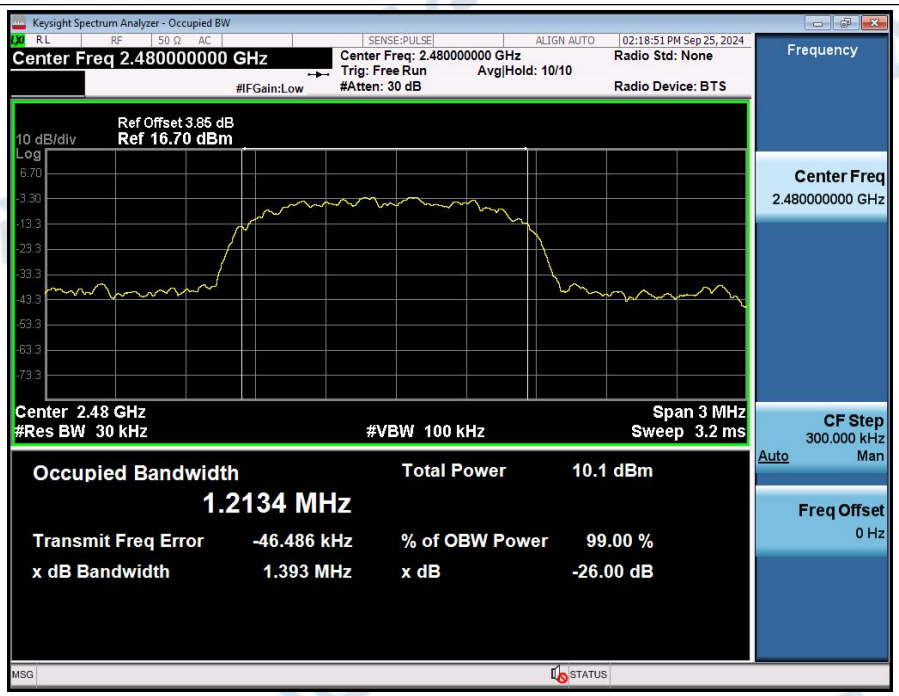
99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2402



99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2440



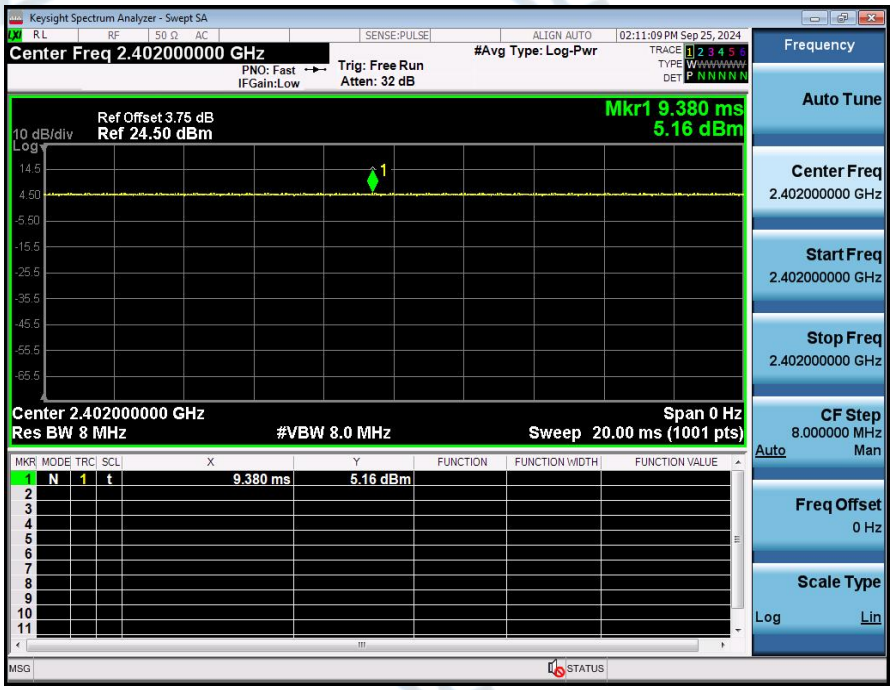
99%_Occupied_Bandwidth_NVNT_ANT1_1Mbps_2480



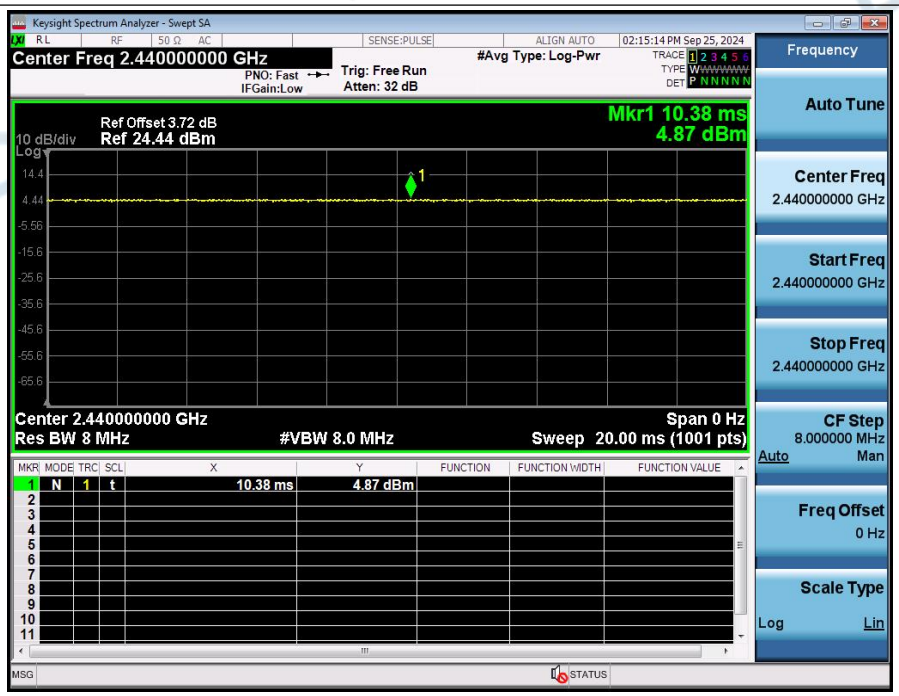
3. Duty Cycle

Condition	Antenna	Rate	Frequency (MHz)	Dutycycle(%)	Duty_factor
NVNT	ANT1	1Mbps	2402.00	100	0.00
NVNT	ANT1	1Mbps	2440.00	100	0.00
NVNT	ANT1	1Mbps	2480.00	100	0.00

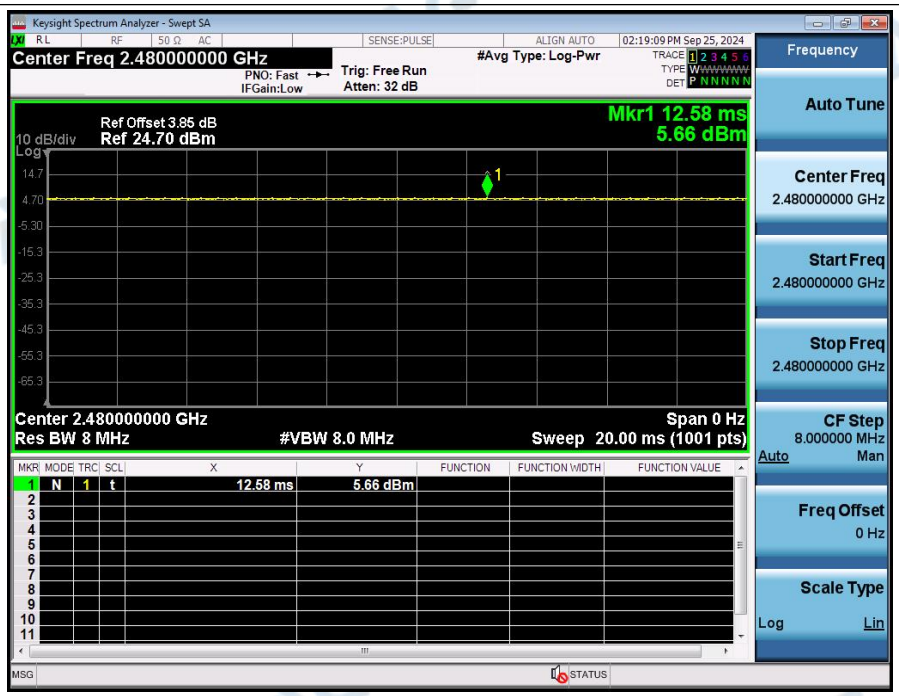
Duty_Cycle_NVNT_ANT1_1Mbps_2402



Duty_Cycle_NVNT_ANT1_1Mbps_2440



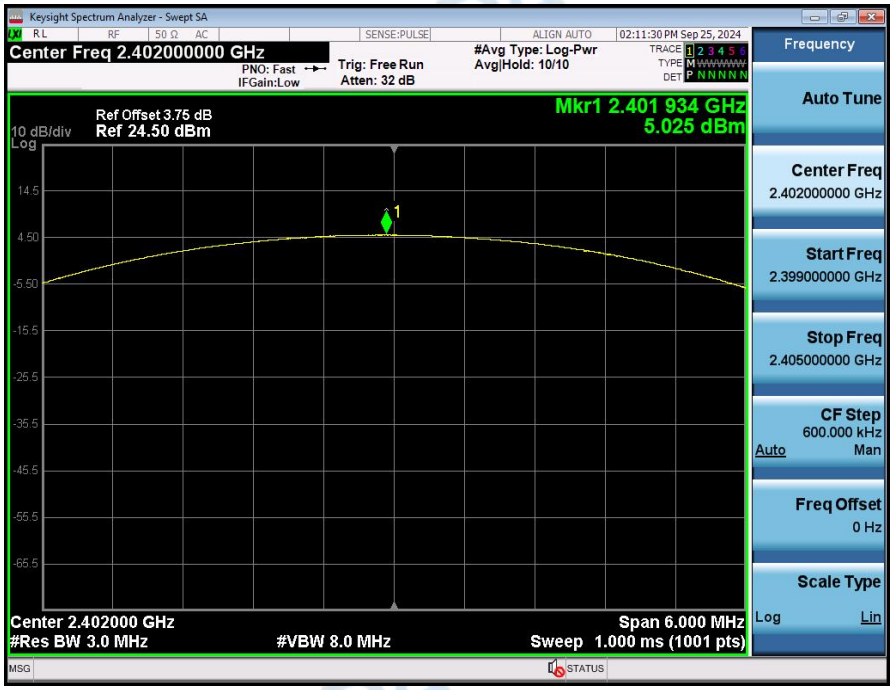
Duty_Cycle_NVNT_ANT1_1Mbps_2480



4. Peak Output Power

Condition	Antenna	Rate	Frequency (MHz)	Max. Conducted Power(dBm)	Max. Conducted Power(mW)	Limit(mW)	Result
NVNT	ANT1	1Mbps	2402.00	5.03	3.18	1000	Pass
NVNT	ANT1	1Mbps	2440.00	4.79	3.01	1000	Pass
NVNT	ANT1	1Mbps	2480.00	5.59	3.63	1000	Pass

Peak_Output_Power_NVNT_ANT1_1Mbps_2402



Peak_Output_Power_NVNT_ANT1_1Mbps_2440

Peak_Output_Power_NVNT_ANT1_1Mbps_2480

5. Power Spectral Density

Condition	Antenna	Rate	Frequency (MHz)	Power Spectral Density(dBm)	Limit(dBm/3kHz)	Result
NVNT	ANT1	1Mbps	2402.00	-13.32	8	Pass
NVNT	ANT1	1Mbps	2440.00	-13.29	8	Pass
NVNT	ANT1	1Mbps	2480.00	-12.66	8	Pass

Power_Spectral_Density_NVNT_ANT1_1Mbps_2402

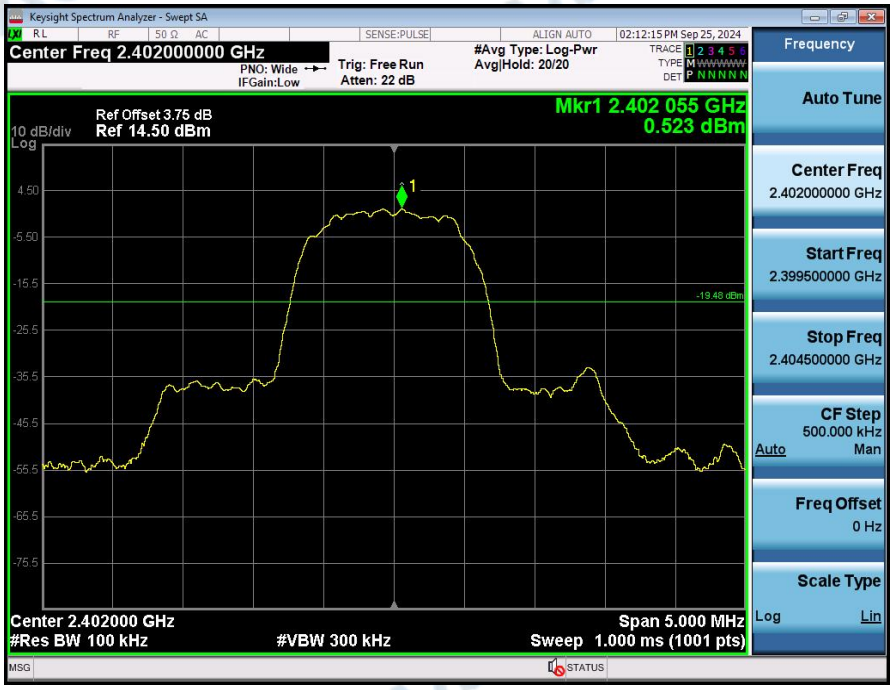
Power_Spectral_Density_NVNT_ANT1_1Mbps_2440

Power_Spectral_Density_NVNT_ANT1_1Mbps_2480

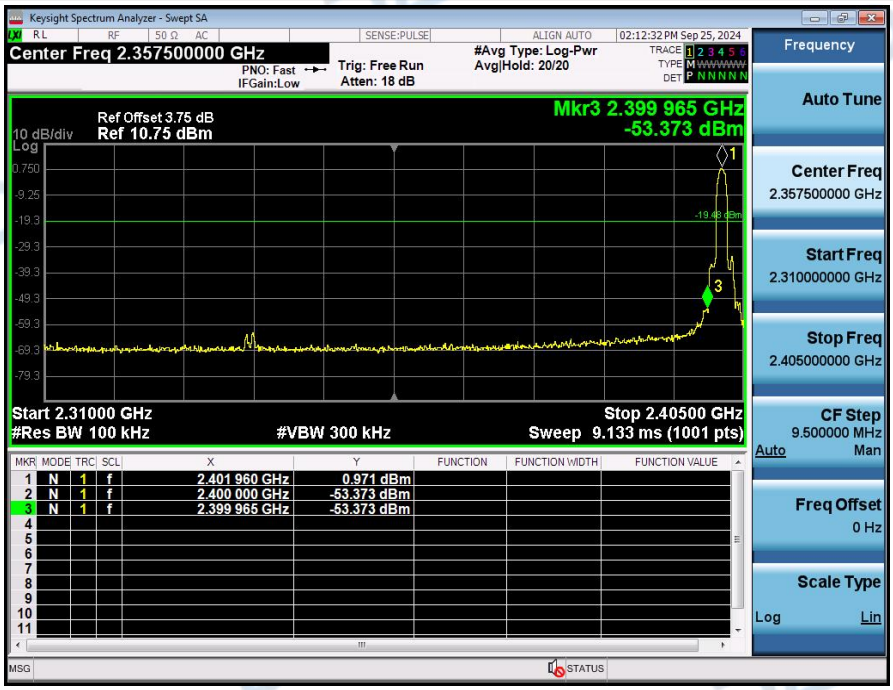
6. Bandedge

Condition	Antenna	Rate	TX_Frequency (MHz)	Max. Mark Frequency (MHz)	Spurious level(dBm)	limit(dBm)	Result
NVNT	ANT1	1Mbps	2402.00	2399.965	-53.373	-19.477	Pass
NVNT	ANT1	1Mbps	2480.00	2484.300	-57.147	-19.126	Pass

1_Reference_Level_NVNT_ANT1_1Mbps_2402

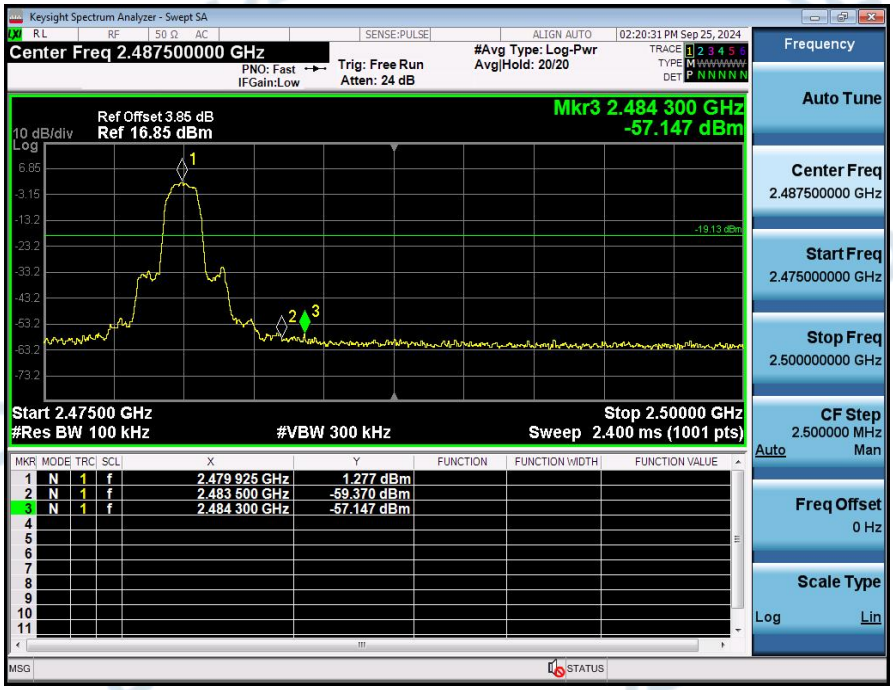


2_Bandedge_NVNT_ANT1_1Mbps_2402



1_Reference_Level_NVNT_ANT1_1Mbps_2480

2_Bandedge_NVNT_ANT1_1Mbps_2480

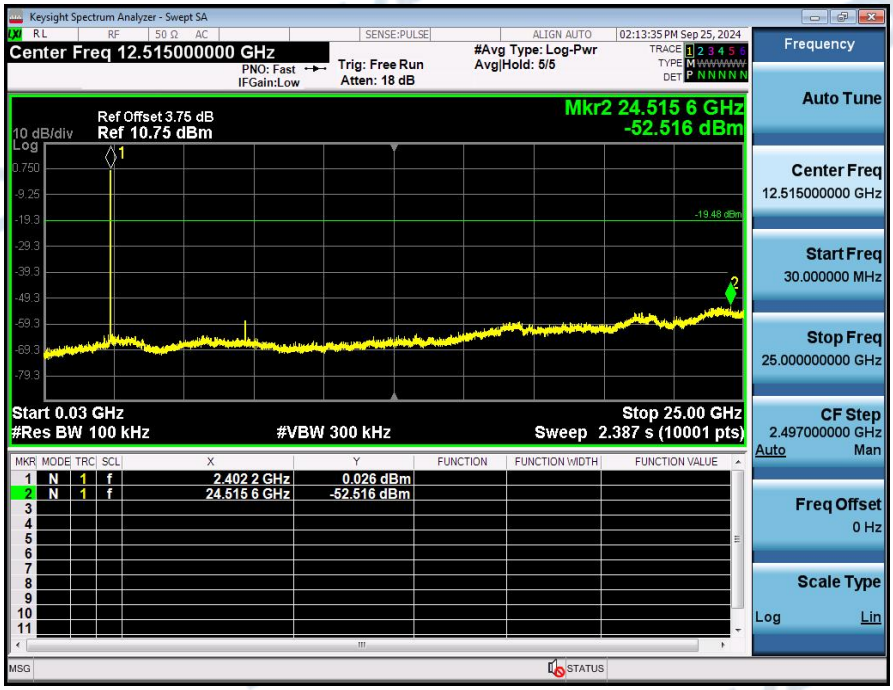


7. Spurious Emission

Condition	Antenna	Rate	TX_Frequency(MHz)	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1Mbps	2402.00	-52.516	-19.477	Pass
NVNT	ANT1	1Mbps	2440.00	-52.672	-19.503	Pass
NVNT	ANT1	1Mbps	2480.00	-46.497	-19.126	Pass

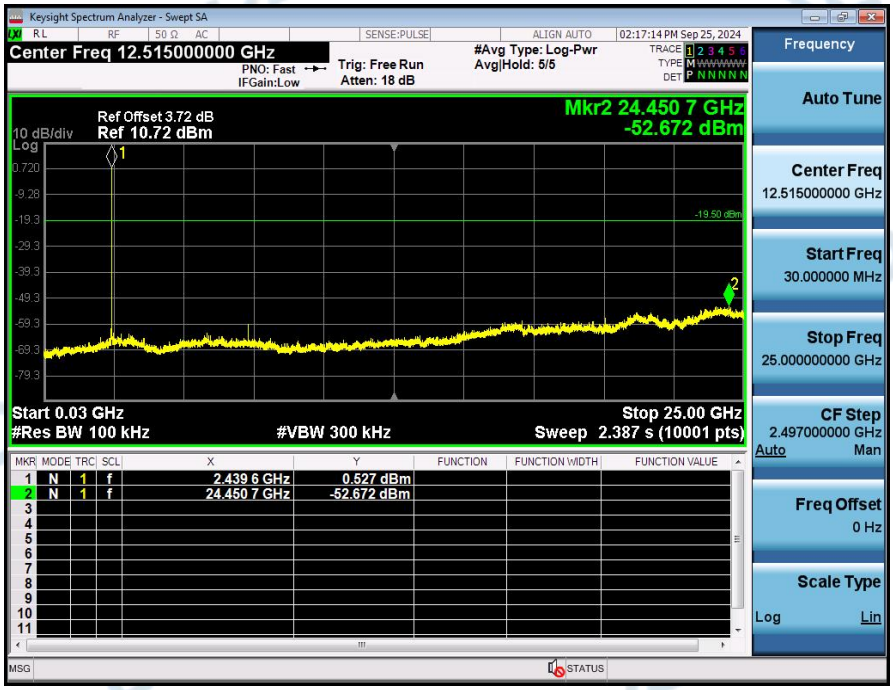
1_Reference_Level_NVNT_ANT1_1Mbps_2402

2_Spurious_Emission_NVNT_ANT1_1Mbps_2402



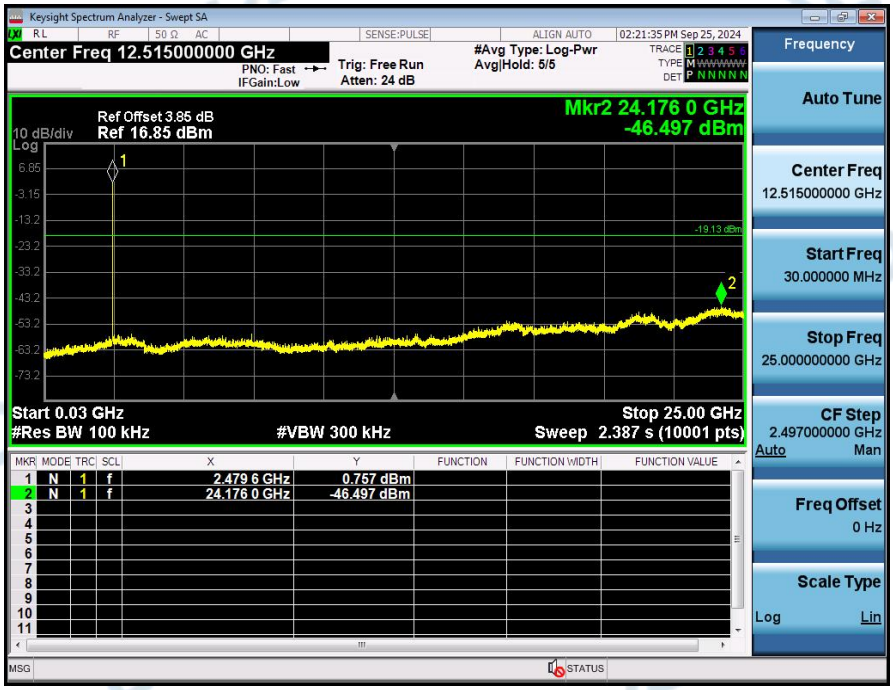
1_Reference_Level_NVNT_ANT1_1Mbps_2440

2_Spurious_Emission_NVNT_ANT1_1Mbps_2440



1_Reference_Level_NVNT_ANT1_1Mbps_2480

2_Spurious_Emission_NVNT_ANT1_1Mbps_2480



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