

FCC PART 15C TEST REPORT FOR CERTIFICATION

On Behalf of

Amino Communications Ltd.

STB

H200W; H200zzzzzzzz

(zzzzzzzz can be combination of A-Z,a-z,0-9,"-", "/", "blank" for marketing purpose)

FCC ID: XVG500107APBT

amino

Prepared for : Amino Communications Ltd.

1010 Cambourne Business Park Cambourne, Cambridge CB23
6DP

Prepared By : Audix Technology (Shenzhen) Co., Ltd.

No. 6, Kefeng Road, Science & Technology Park,
Nanshan District , Shenzhen, Guangdong, China

Tel: (0755) 26639496

Report Number : ACS-F24158

Date of Test : Jul.09~Sep.29, 2024

Date of Report : Oct.10, 2024

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Appendix A. Photograph of Test

Appendix B. Photo of the EUT

TEST REPORT

Applicant : Amino Communications Ltd.
Manufacturer : Amino Communications Ltd.
Product : STB
FCC ID : XVG500107APBT
(A) Model No. : H200W; H200zzzzzzzzz
(zzzzzzzz can be combination of
A-Z,a-z,0-9,"-", "/", "blank" for marketing purpose)
(B) Brand : amino
(C) Test Voltage : DC 12V Adapter Input AC 120V/60Hz

Tested for comply with:

FCC CFR47 Part 15 Subpart C

Test procedure used: ANSI C63.10:2020+Cor1:2023;
KDB 558074 D01v05r02

The device described above is tested by Audix Technology (Shenzhen) Co., Ltd. to confirm comply with all the FCC Part 15 Subpart C requirements. The test results are contained in this test report and Audix Technology (Shenzhen) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these tests. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements. This report contains data that are not covered by the NVLAP accreditation.

This Report is made under FCC Part 2.1074. No modifications were required during testing to bring this product into compliance.

This report applies to single evaluation of one sample of above mentioned product and shall not be reproduced in part without written approval of Audix Technology (Shenzhen) Co., Ltd.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U. S. Government.

Date of Test : Jul.09~Sep.29, 2024 Date of Report: Oct.10, 2024

Prepared by : Crush Liu Reviewed by : Thomas Chen
Crush Liu / Assistant Thomas Chen / Assistant Manager



1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT has been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	Standard	Results
Power Line Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.10:2020+COR1:2023	PASS
Radiated Emission Test	FCC Part 15: 15.209 FCC Part 15: 15.205 FCC Part 15: 15.247(d) ANSI C63.10:2020+COR1:2023	PASS
Conducted Spurious Emissions	FCC Part 15: 15.247(d) ANSI C63.10:2020+COR1:2023	PASS
Carrier Frequency Separation Test	FCC Part 15: 15.247(a)(1) ANSI C63.10:2020+COR1:2023	PASS
6dB Bandwidth Test	FCC Part 15: 15.247(a)(2) ANSI C63.10:2020+COR1:2023	PASS
Maximum Peak Output Power Test	FCC Part 15: 15.247(b)(1) ANSI C63.10:2020+COR1:2023	PASS
Band Edge Compliance Test	FCC Part 15: 15.247(d) ANSI C63.10:2020+COR1:2023	PASS
Power Spectral Density Test	FCC Part 15: 15.247(e) ANSI C63.10:2020+COR1:2023	PASS
Antenna requirement	FCC Part 15: 15.203	PASS
Note: Measurement uncertainty affection to the result is not considered, the EUT is technically compliant with standard requirements.		

2. GENERAL INFORMATION

2.1. Description of Equipment Under Test

Applicant	Amino Communications Ltd.
Applicant Address	1010 Cambourne Business Park Cambourne, Cambridge CB23 6DP
Manufacturer	Amino Communications Ltd.
Manufacturer Address	1010 Cambourne Business Park Cambourne, Cambridge CB23 6DP
Product	STB
Model No.	H200W; H200zzzzzzzz (zzzzzzzz can be combination of A-Z,a-z,0-9,“-”,“/”,“blank”for marketing purpose)
Test Model	H200W
Brand	amino
FCC ID	XVG500107APBT
Sample Type	Prototype production
Date of Receipt	Jun.24, 2024
Date of Test	Jul.09~Sep.29, 2024
Remark: This report only for BLE.	

2.2.Feature of Equipment Under Test

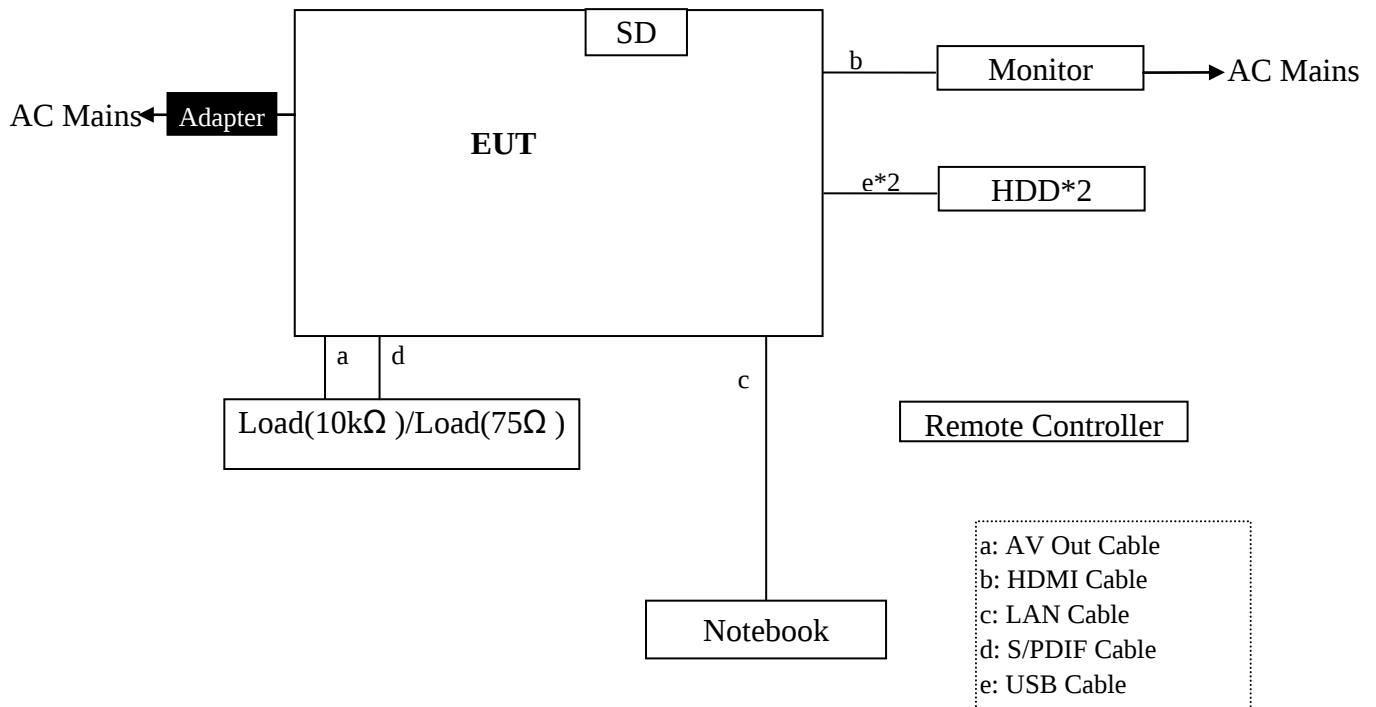
Product Feature & Specification		
Product	STB	
Model No.	H200W	
Power Source	☒ Commercial Power	AC 100-240V,50/60Hz ,0.5A
	☒ External Power Source	DC 12V 1A
	☐ Lithium battery	DC V, mAh
	☐ UM battery	DC V
Bluetooth		
Radio	BDR +EDR; BLE	
Frequency Range	2402-2480MHz	
Type of Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK	
Data Rate	1Mbps, 2Mbps, 3Mbps	
Quantity of Channels	79/40	
Channel Separation	1MHz/2MHz	
2.4GHz Wi-Fi		
Support Modes	802.11b/g/n20/ax20	
Frequency Range	2412-2462MHz	
Type of Modulation	802.11b(DSSS): CCK, QPSK, BPSK; 802.11g/n(OFDM): 64QAM,16QAM, QPSK, BPSK 802.11ax(OFDM): 64QAM,16QAM, QPSK, BPSK, 1024QAM	
Data Rate	802.11b: 1/2/5.5/11 Mbps; 802.11g: 6/9/12/18/24/36/48/54 Mbps; 802.11n: up to 300Mbps 802.11ax: up to 574Mbps	
Channel Separation	5MHz	
5GHz Wi-Fi		
Support Modes	802.11a/n20/n40/ac20/ac40/ac80 /ax20/ax40/ax80	
Frequency Range	5180-5240MHz, 5500-5700MHz, 5260-5320MHz, 5745-5825MHz	
Type of Modulation	802.11a/n (OFDM): QPSK, BPSK, 16QAM, 64QAM 802.11ac (OFDM): QPSK, BPSK, 16QAM, 64QAM,256QAM 802.11ax (OFDM): QPSK, BPSK, 16QAM, 64QAM,256QAM, 1024QAM	
Data Rate	802.11a: 6/9/12/18/24/36/48/54 Mbps; 802.11n: up to 300Mbps; 802.11ac: up to 867Mbps; 802.11ax: up to 1201Mbps	
Channel Separation	5MHz	
Antenna System		
Type of Antenna	Dipole Antenna	
Antenna Number	2 (ANT 0 and ANT 1)	
Operation Modes	SISO and MIMO mode supported	
Antenna Peak Gain	Bluetooth Peak Gain: 3dBi. WIFI 2.4G Band Peak Gain: Ant0:3dBi; Ant1:3.3dBi U-NII-1 Band Peak Gain: Ant0:3.1dBi; Ant1:2.8dBi U-NII-2A Band Peak Gain: Ant0:3.2dBi; Ant1:3.2dBi U-NII-2CBand Peak Gain: Ant0:3.4dBi; Ant1:3.4dBi U-NII-3 Band Peak Gain: Ant0:3dBi; Ant1:3dBi	

2.3. Tested Supporting System Details

No.	Description	ACS No.	Manufacturer	Model	Serial Number
1.	Monitor	---	BenQ	EW3270-T	---
		Power Cord: Unshielded, Detachable, 1.8m			
2.	---	AV Cable: Unshielded, Detachable, 1.5m			
3.	---	S/PDIF Cable: Unshielded, Detachable, 1.5m			
4.	SD Card: aigo / 2G				
5.	Notebook	N/A	ACER	ZOW	N/A
		Power Cord(3C): Unshielded, Detachable, 1.8m			
		Power Adapter: Manufacturer: Lite-On, M/N: PA-1900-32			
		Data Cable: Shielded, Undetectable, 4.0m(Bond one ferrite core)			
6.	HDD#1	ACS-EMC-HDD42	WD	WD Elements	WXA1A7396898
		Data Cable: Shielded, Detachable, 0.4m			
7.	HDD#2	ACS-EMC-HDD43	WD	WD Elements	WX31E63TU717
		Data Cable: Shielded, Detachable, 0.4m			

2.4. Block Diagram of connection between EUT and simulators

for power line conducted emission and radiated emission test:



for the other test items:



(EUT: STB)

2.5. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	1# Shielding Room(SE)	AUDIX	N/A	N/A	Nov.09,22	3Year
2.	3m Chamber(NSA)	AUDIX	N/A	N/A	Aug.11,22	3Year
3.	3m Chamber(SE)	AUDIX	N/A	N/A	Sep.16,22	3Year
4.	EMI Test Receiver	Rohde & Schwarz	ESCI	100842	Mar.16,24	1 Year
5.	Signal Analyzer	Rohde & Schwarz	FSV40	101608	Nov.07,23	1 Year
6.	L.I.S.N.#1	Rohde & Schwarz	ENV216	102160	Jun.19,24	1 Year
7.	RF Cable	Eastsheep	RG223	190424	Sep.15,23	1Year
8.	RF Cable	Eastsheep	RG223	190424	Sep.12,24	1Year
9.	Tri-log-Broadband Antenna	SCHWARZBECK	VULB 9168	429	Oct.10,23	1 Year
10.	NSA Cable	HUBER+SUHNER	CFD400NL-LW	No.3+190411	Sep.20,23	1 Year
11.	NSA Cable	HUBER+SUHNER	CFD400NL-LW	No.3+190411	Sep.13,24	1 Year
12.	Coaxial Switch	Anritsu	MP59B	6201397223	Mar.17,24	1 Year
13.	RF Cable	TIMES MICROWAVE	SFT205-NMSM-10.00M	689241	Aug.25,23	1 Year
14.	RF Cable	TIMES MICROWAVE	SFT205-NMSM-10.00M	689241	Aug.13,24	1 Year
15.	EMI Test Receiver	Rohde & Schwarz	ESR3	101931	Mar.17,24	1 Year
16.	Amplifier	EMCI	EMC0518A45SE	980965	Aug.25,23	1 Year
17.	Amplifier	EMCI	EMC0518A45SE	980965	Aug.13,24	1 Year
18.	Amplifier	KEYSIGHT	83017A	39500711	Mar.16,24	1 Year
19.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Mar.16,24	1 Year
20.	RF Cable	HUBER+SUHNER	SUCOFLEX-106	190423	Mar.16,24	1 Year
21.	Attenuator(10dB)	eastsheep	2W-SMA-JK-6G-10dB	No. 4	Sep.19,23	1 Year
22.	Attenuator(10dB)	eastsheep	2W-SMA-JK-6G-10dB	No. 4	Sep.15,24	1 Year
23.	Signal Analyzer	Rohde & Schwarz	FSV30	104050	Mar.17,24	1 Year
24.	Horn Antenna	ETC	MCTD 1209	DRH15F03006	Aug.23,23	1 Year
25.	Horn Antenna	ETC	MCTD 1209	DRH15F03006	Sep.08,24	1 Year

Note: N/A means Not applicable.

2.6. Test information

A special software (adb) was used to control EUT work in Continuous TX mode (GFSK modulation), and select test channel.

Tested mode, channel, and data rate information			
Mode	data rate (Mbps)	Channel	Frequency (MHz)
Tx Mode GFSK modulation	1,2	Low :CH 0	2402
	1,2	Middle: CH19	2440
	1,2	High: CH39	2480
Note: use the data rate which has the maximum power for the test.			

2.7. Test Facility
Site Description
Name of Firm

: Audix Technology (Shenzhen) Co., Ltd.
No. 6, Kefeng Road, Science & Technology Park,
Nanshan District , Shenzhen, Guangdong, China

EMC Lab.

: Certificated by ISED, Canada
Company Number: 5183A
CAB identifier: CN0034
Valid Date: Mar.31, 2025

: Accredited by NVLAP, USA
NVLAP Code: 200372-0
Valid Date: Mar.31, 2025

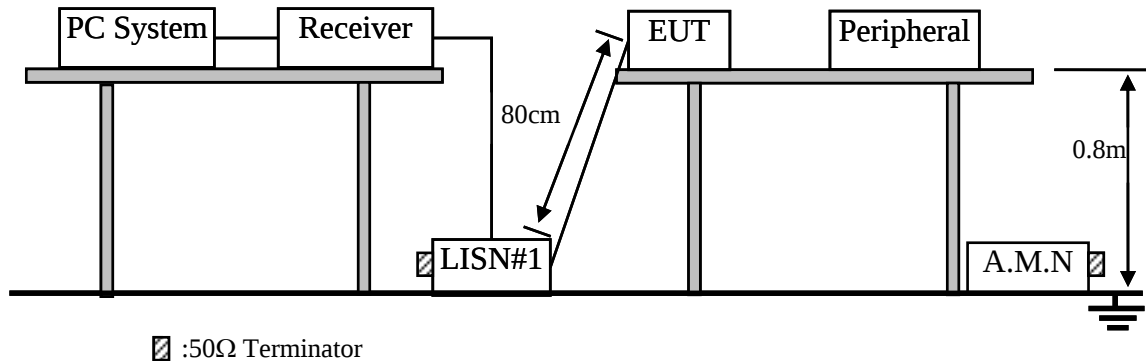
: Certificated by FCC, USA
Designation No: CN5022
Valid Date: Mar.31, 2025

2.8. Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Conduction emission test in No. 1 Conduction	$\pm 2.6\text{dB}(150\text{kHz to } 30\text{MHz})$
Uncertainty for Radiation Emission test in 3m chamber	$\pm 3.8\text{dB}(30\sim 200\text{MHz, Polarization: H})$
	$\pm 3.8\text{dB}(30\sim 200\text{MHz, Polarization: V})$
	$\pm 4.0\text{dB}(200\text{M}\sim 1\text{GHz, Polarization: H})$
	$\pm 4.0\text{dB}(200\text{M}\sim 1\text{GHz, Polarization: V})$
Uncertainty for Radiation Emission test in 3m chamber(1GHz-25GHz)	$\pm 4.0\text{dB}(1\sim 6\text{GHz, Distance: } 3\text{m})$
	$\pm 4.0\text{dB}(6\sim 25\text{GHz, Distance: } 3\text{m})$
Uncertainty for Radiated Spurious Emission test in RF chamber	$\pm 3.7\text{dB}(30\text{MHz}\sim 1000\text{MHz})$
	$\pm 3.3\text{dB}(1\sim 26.5\text{GHz})$
Uncertainty for Conduction Spurious emission test	$\pm 2.0\text{dB}$
Uncertainty for Output power test	$\pm 0.8\text{dB}$
Uncertainty for Bandwidth test	$\pm 83\text{kHz}$
Uncertainty for DC power test	$\pm 1\%$
Uncertainty for test site temperature and humidity	$\pm 0.6^{\circ}\text{C}$
	$\pm 3\%$

3. POWER LINE CONDUCTED EMISSION TEST

3.1. Block Diagram of Test Setup



3.2. Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limits shall apply at the transition frequencies.

3. Emission Level (dBμV) = Factor (L.I.S.N.) (dB) + Cable Loss (dB) + Reading (Receiver) (dBμV)

3.3. Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.3.1. STB (EUT)

Model No. : H200W

Serial No. : N/A

3.3.2. Support Equipment: As Tested Supporting System Details, in Section 2.3.

3.4.Operating Condition of EUT

- 3.4.1. Setup the EUT as shown as Section 3.1.
- 3.4.2. Turn on the power of EUT.
- 3.4.3. PC run test software to control EUT work in Tx mode.

3.5.Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power Via Adapter unit connected to the power mains through a line impedance stabilization network (L.I.S.N. #1). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10 on Conducted Emission Test.

The bandwidth of test receiver (R & S ESCI) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.6.Power Line Conducted Emission Test Results

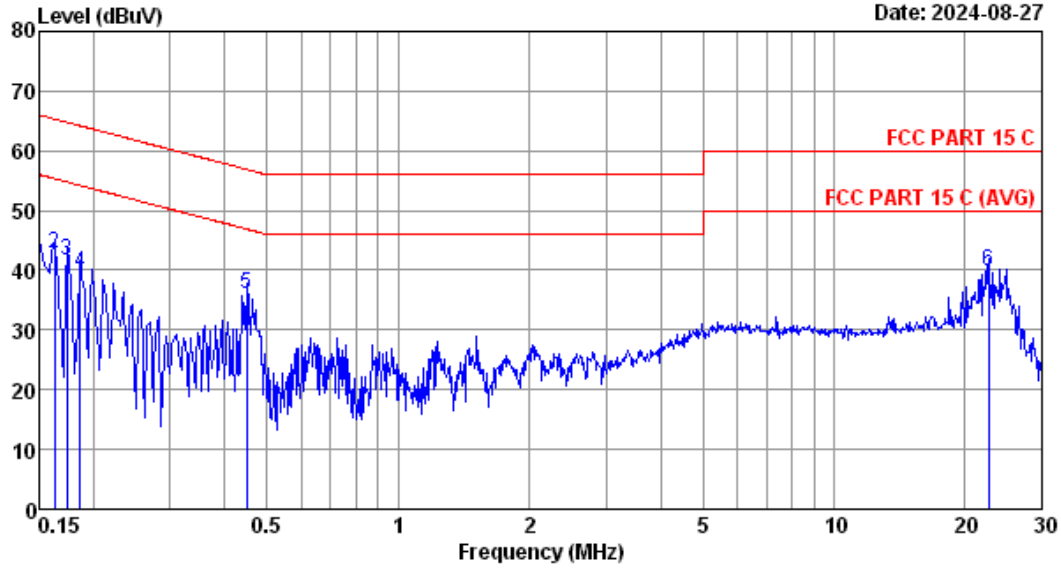
PASS. (All emissions not reported below are too low against the prescribed limits.)

1Mbps:

Data: 3

File: E:\1#CE\2024 Report Data\A\AMINO\A1Z2404182-RF.EM6 (10)

Date: 2024-08-27

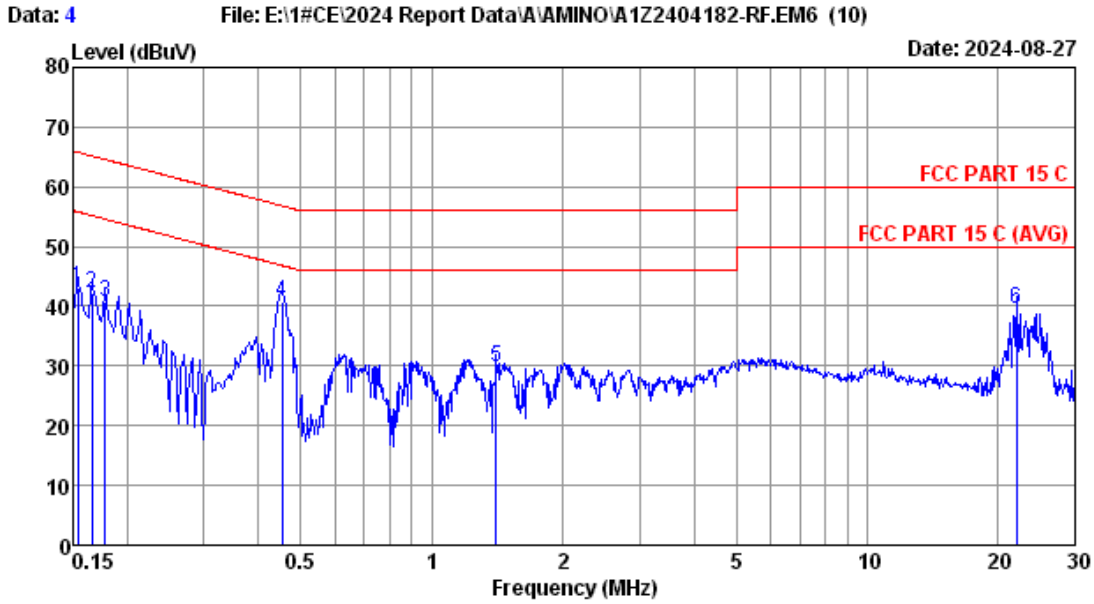


Site no :1# CE
Dis./Lisn :2024 ENV216-L
Limit :FCC PART 15 C
Env./Ins. :22.1°C/59%
Power Rating :
Test Mode :BLE1M TX Mode

Data No :3
Engineer :Hongjie

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.150	9.77	0.01	33.09	42.87	66.00	23.13	QP
2	0.162	9.77	0.01	33.13	42.91	65.34	22.43	QP
3	0.174	9.77	0.01	31.82	41.60	64.77	23.17	QP
4	0.186	9.76	0.01	29.91	39.68	64.20	24.52	QP
5	0.449	9.76	0.02	26.10	35.88	56.89	21.01	QP
6	22.655	9.88	0.13	29.85	39.86	60.00	20.14	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
2.If the average limit is met when using a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.



Site no :1# CE Data No :4
 Dis./Lisn :2024 ENV216-N
 Limit :FCC PART 15 C
 Env./Ins. :22.1°C/59% Engineer :Hongjie
 Power Rating :
 Test Mode :BLE1M TX Mode

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.154	9.76	0.01	33.22	42.99	65.78	22.79	QP
2	0.166	9.77	0.01	32.42	42.20	65.16	22.96	QP
3	0.178	9.77	0.01	30.91	40.69	64.59	23.90	QP
4	0.454	9.78	0.02	30.88	40.68	56.80	16.12	QP
5	1.403	9.80	0.03	20.06	29.89	56.00	26.11	QP
6	22.063	9.91	0.13	29.63	39.67	60.00	20.33	QP

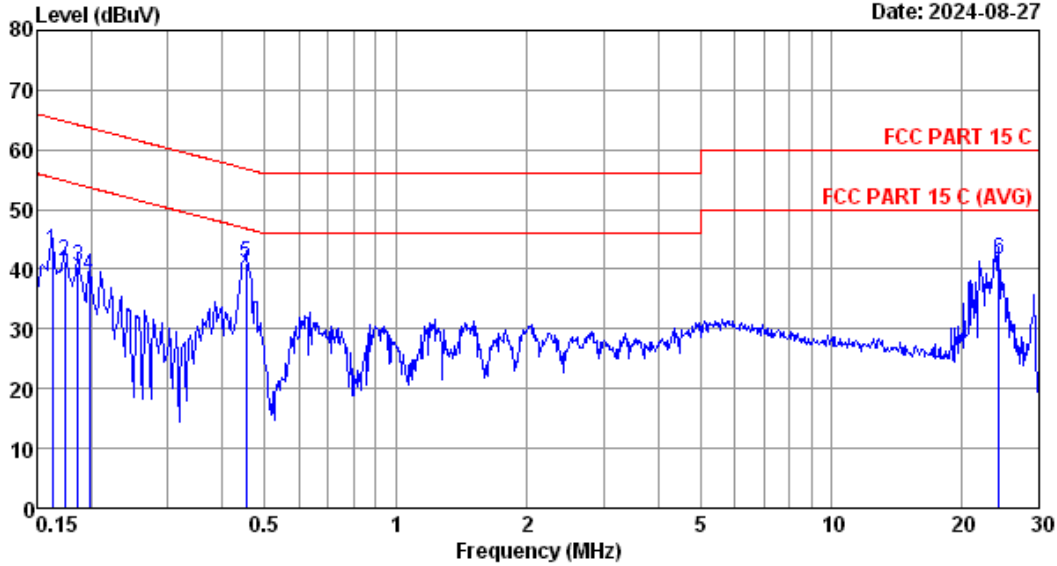
Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
 2.If the average limit is met when using a quasi-peak detector.
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

2Mbps:

Data: 5

File: E:\1#CE\2024 Report Data\A\AMINO\A1Z2404182-RF.EM6 (10)

Date: 2024-08-27

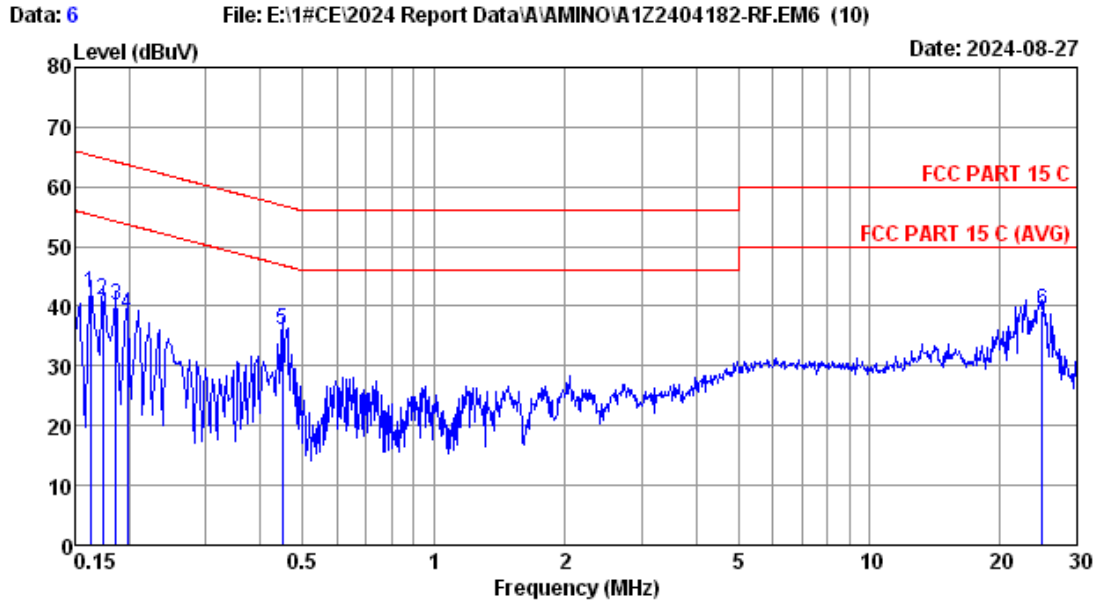


Site no :1# CE
Dis./Lisn :2024 ENV216-N
Limit :FCC PART 15 C
Env./Ins. :22.1°C/59%
Power Rating :
Test Mode :BLE2M TX Mode

Data No :5
Engineer :Hongjie

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.162	9.76	0.01	33.43	43.20	65.34	22.14	QP
2	0.174	9.77	0.01	31.42	41.20	64.77	23.57	QP
3	0.186	9.77	0.01	30.68	40.46	64.20	23.74	QP
4	0.198	9.78	0.01	29.09	38.88	63.71	24.83	QP
5	0.454	9.78	0.02	31.22	41.02	56.80	15.78	QP
6	24.271	9.91	0.14	31.56	41.61	60.00	18.39	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



Site no :1# CE Data No :6
 Dis./Lisn :2024 ENV216-L
 Limit :FCC PART 15 C
 Env./Ins. :22.1°C/59% Engineer :Hongjie
 Power Rating :
 Test Mode :BLE2M TX Mode

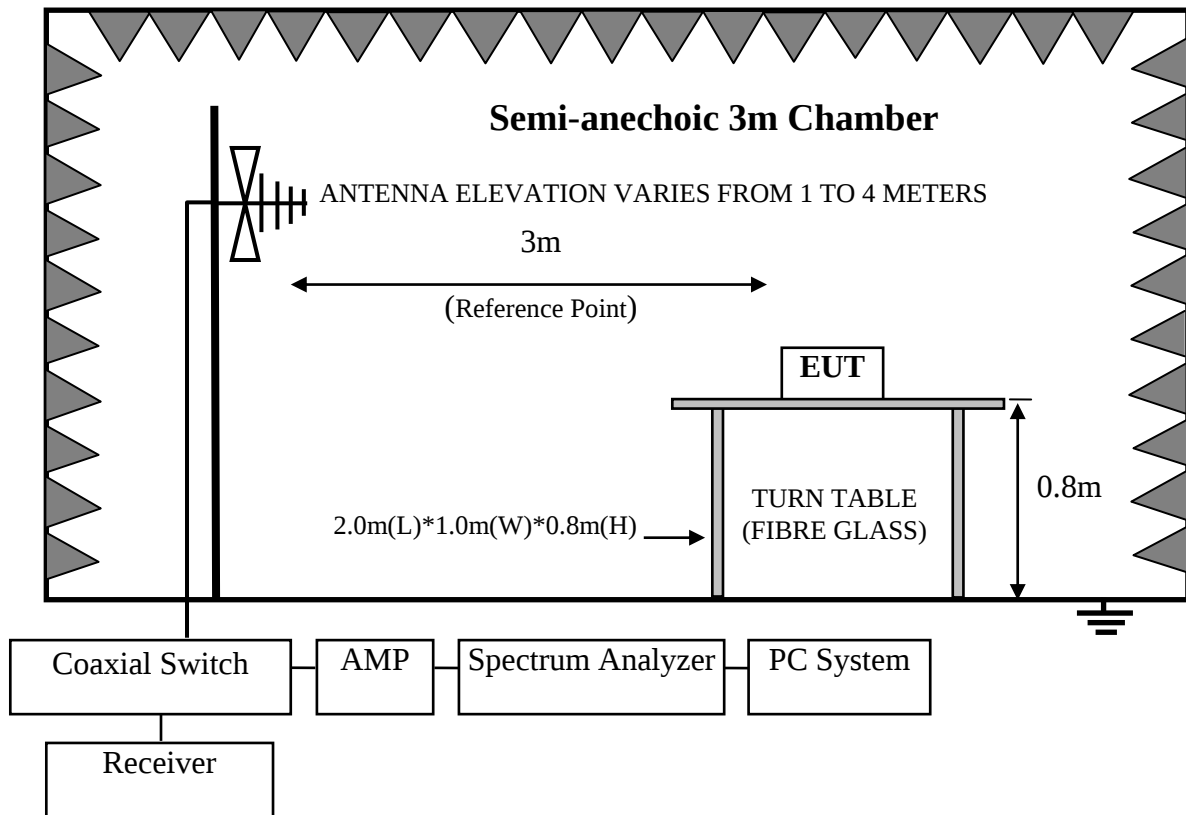
No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.162	9.77	0.01	32.40	42.18	65.34	23.16	QP
2	0.174	9.77	0.01	31.36	41.14	64.77	23.63	QP
3	0.186	9.76	0.01	30.36	40.13	64.20	24.07	QP
4	0.198	9.76	0.01	28.99	38.76	63.71	24.95	QP
5	0.449	9.76	0.02	26.22	36.00	56.89	20.89	QP
6	24.922	9.88	0.14	29.15	39.17	60.00	20.83	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
 2.If the average limit is met when using a quasi-peak detector.
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

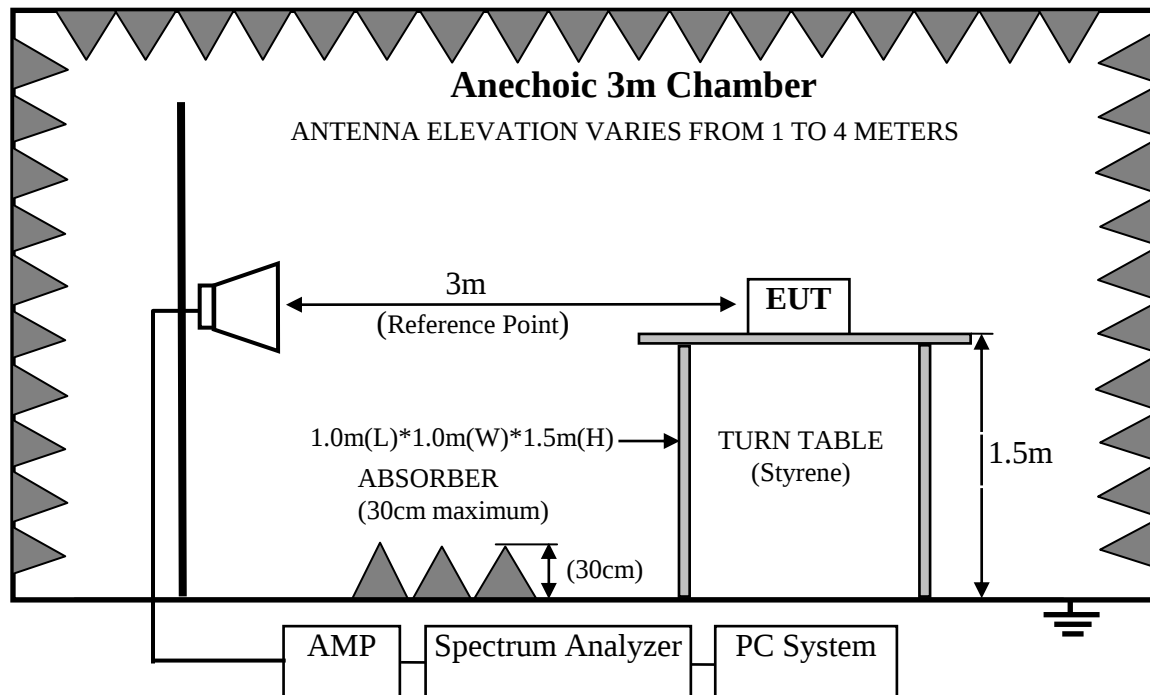
4. RADIATED EMISSION MEASUREMENT

4.1. Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range 1GHz-25GHz



4.2. Radiated Emission Limits Standard:

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000MHz	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

- Remark :
- (1) Emission Level ($\text{dB}\mu\text{V/m}$) = Reading (Receiver) ($\text{dB}\mu\text{V}$) + Antenna Factor (dB/m) + Cable Loss (dB)
 Emission Level ($\text{dB}\mu\text{V/m}$) = Reading (Spectrum) ($\text{dB}\mu\text{V}$) + Antenna Factor (dB/m) – Amp Factor (dB) + Cable Loss (dB)(above 1000MHz)
 - (2) The smaller limits shall apply at the cross point between two frequency bands.
 - (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.
 - (4) 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 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.3. EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.3.1. STB (EUT)

Model Number : H200W
 Serial Number : N/A

4.4. Operating Condition of EUT

- 4.4.1. Setup the EUT and simulator as shown as Section 4.1.
- 4.4.2. Turn on the power of all equipments.
- 4.4.3. Let EUT work in BLE Tx mode.

4.5. Test Procedure

Frequency below 30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 regulation.

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground for frequency 30MHz~1000MHz, 1.5 meter high above ground for frequency above 1GHz and put the absorbing with 2.4m(L)*2.4m(W)*0.3m(H) on the ground . The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it.EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna for frequency 30MHz~1000MHz, and the Horn antenna is used as receiving antenna for frequency above 1GHz. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10 on radiated emission Test.

This test was performed with EUT in X, Y, Z position, and the worse case was found reported in report.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's RBW is set at 1MHz and VBW is set at 3MHz for peak emissions measurement above 1GHz.

This device is pulse Modulated, a duty cycle factor was used to calculated average level based measured peak level.

The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

4.6. Radiated Emission Test Results

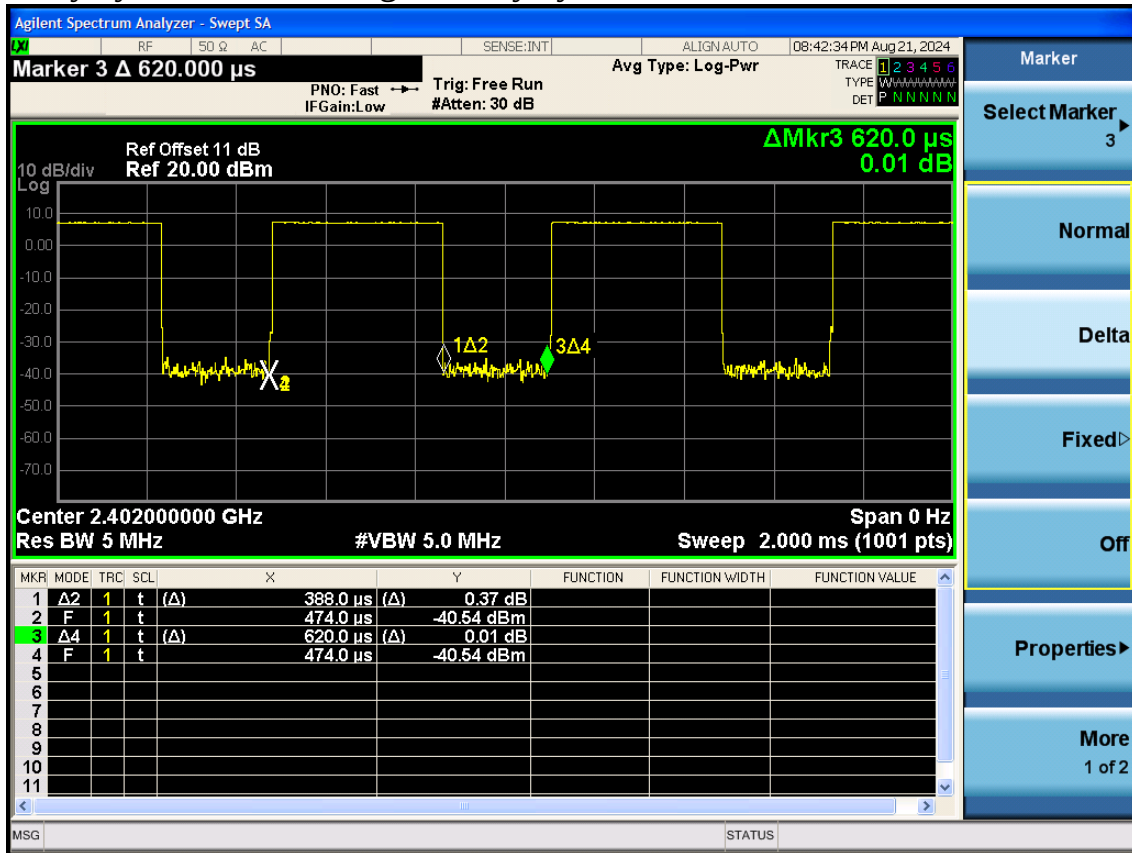
PASS.

All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.

Note: The duty cycle factor for calculate average level is 1Mbps -4.072dB for BLE, 2Mbps -9.487dB for BLE and average limit is 20dB below peak limit, so if peak measured level comply with average limit, the average level was deemed to comply with average limit.

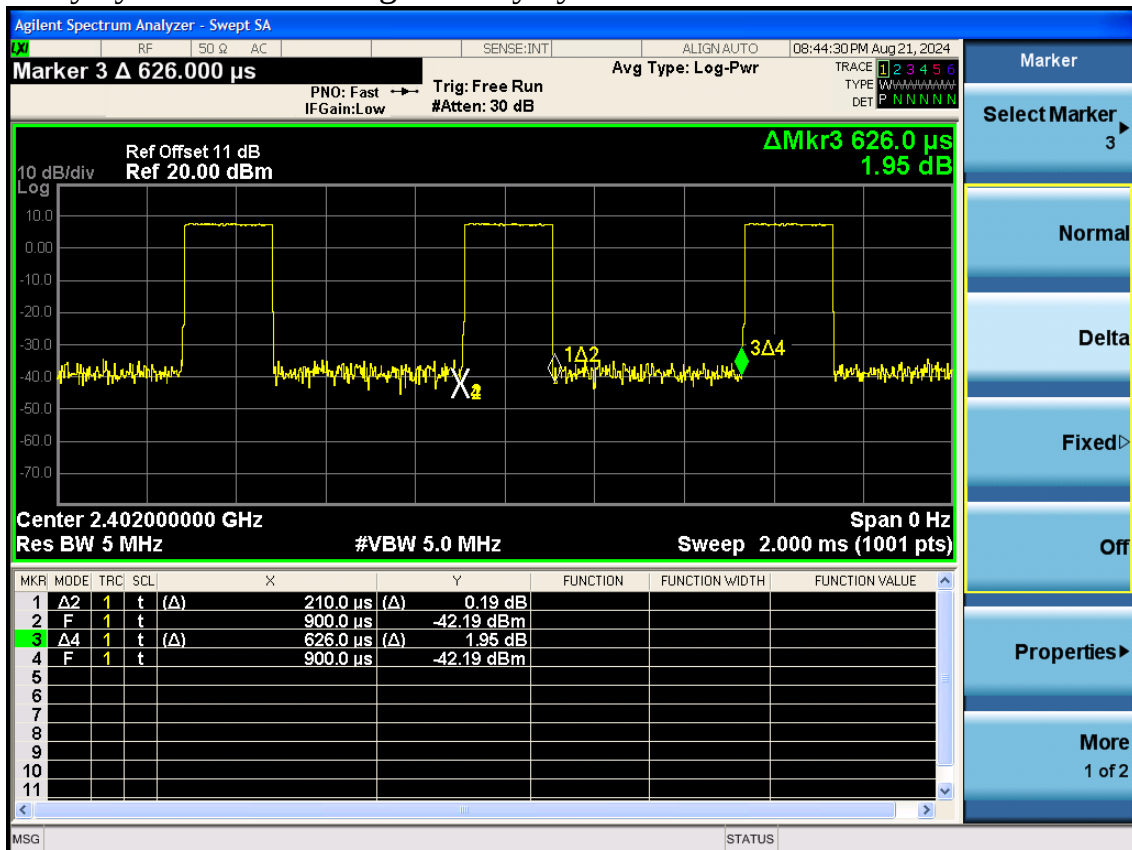
1Mbps:

Duty cycle factor = $20\log (1/\text{duty cycle}) = -4.072\text{dB}$

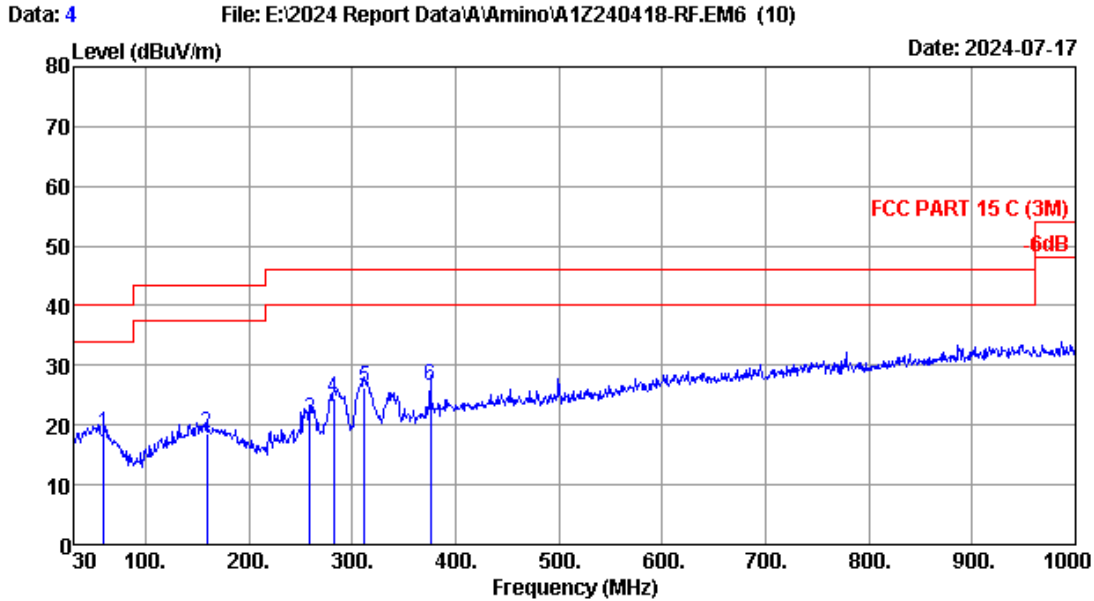


2Mbps:

Duty cycle factor = $20\log (1/\text{duty cycle}) = -9.487\text{dB}$



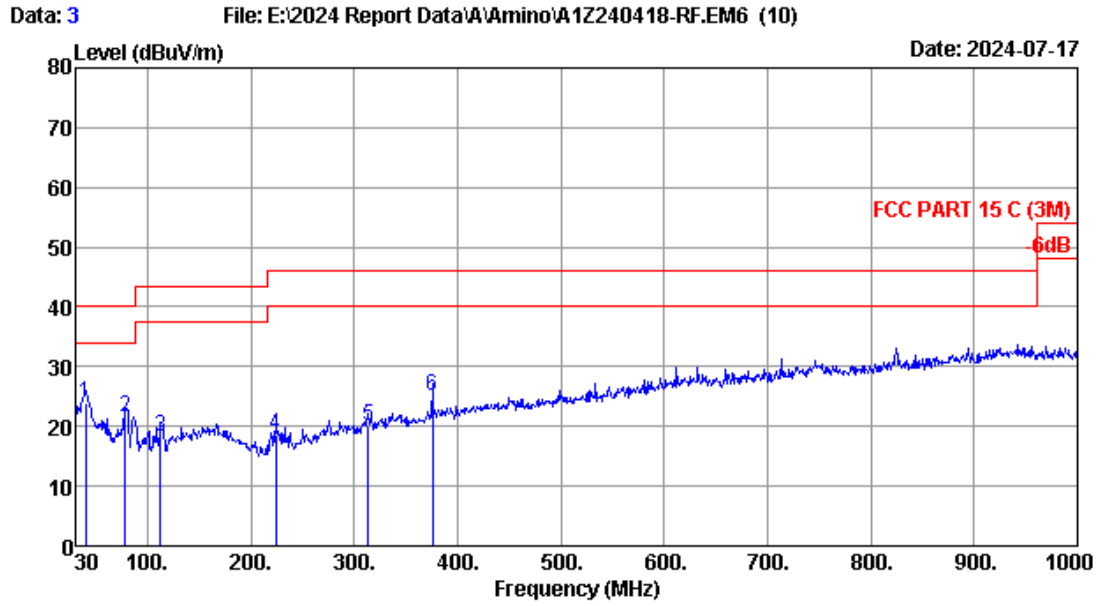
Frequency: 30MHz~1GHz
1Mbps:



Site no. : 3m Chamber Data no. : 4
Dis. / Ant. : 3m 2023 VULB 9168-429 Ant. pol. : HORIZONTAL
Limit : FCC PART 15 C (3M)
Env. / Ins. : 26.8°C/57% Engineer : Abel
EUT :
Power rating : AC 120V/60Hz
Test Mode : BLE1M TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	59.100	19.30	0.69	-1.42	18.57	40.00	21.43	QP
2	159.010	19.30	1.04	-1.77	18.57	43.50	24.93	QP
3	258.920	18.00	1.34	1.76	21.10	46.00	24.90	QP
4	282.200	19.04	1.39	3.99	24.42	46.00	21.58	QP
5	311.300	19.75	1.44	4.99	26.18	46.00	19.82	QP
6	375.320	21.21	1.58	3.65	26.44	46.00	19.56	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

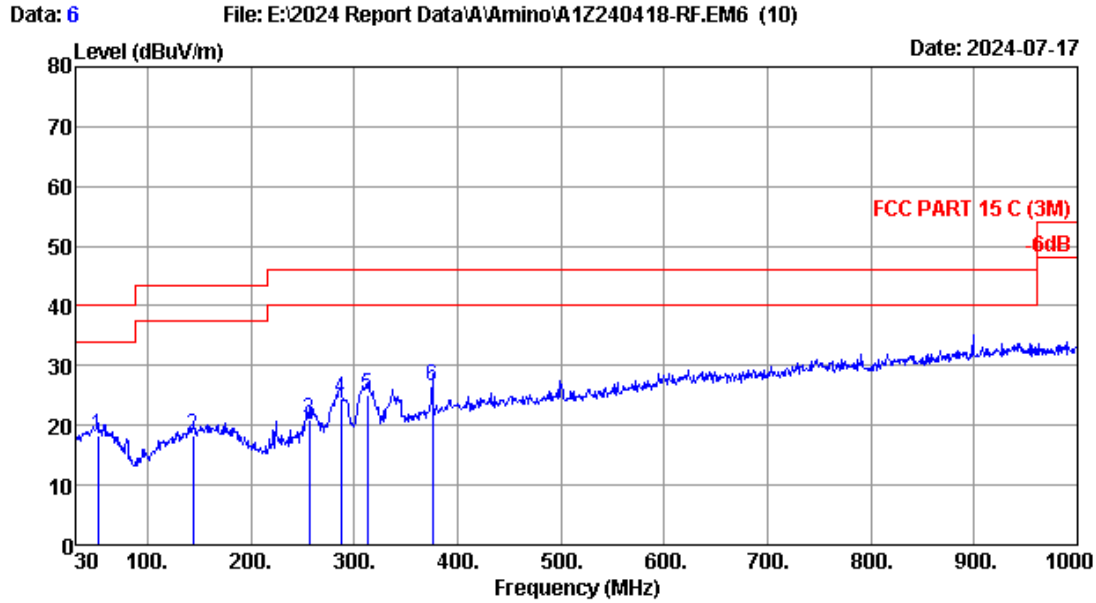


Site no. : 3m Chamber Data no. : 3
 Dis. / Ant. : 3m 2023 VULB 9168-429 Ant. pol. : VERTICAL
 Limit : FCC PART 15 C (3M)
 Env. / Ins. : 26.8°C/57% Engineer : Abel
 EUT :
 Power rating : AC 120V/60Hz
 Test Mode : BLE1M TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	39.700	19.27	0.57	4.15	23.99	40.00	16.01	QP
2	78.500	15.45	0.78	5.19	21.42	40.00	18.58	QP
3	112.450	16.75	0.91	0.64	18.30	43.50	25.20	QP
4	224.000	15.78	1.26	1.62	18.66	46.00	27.34	QP
5	313.240	19.83	1.45	-1.25	20.03	46.00	25.97	QP
6	375.320	21.21	1.58	2.38	25.17	46.00	20.83	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

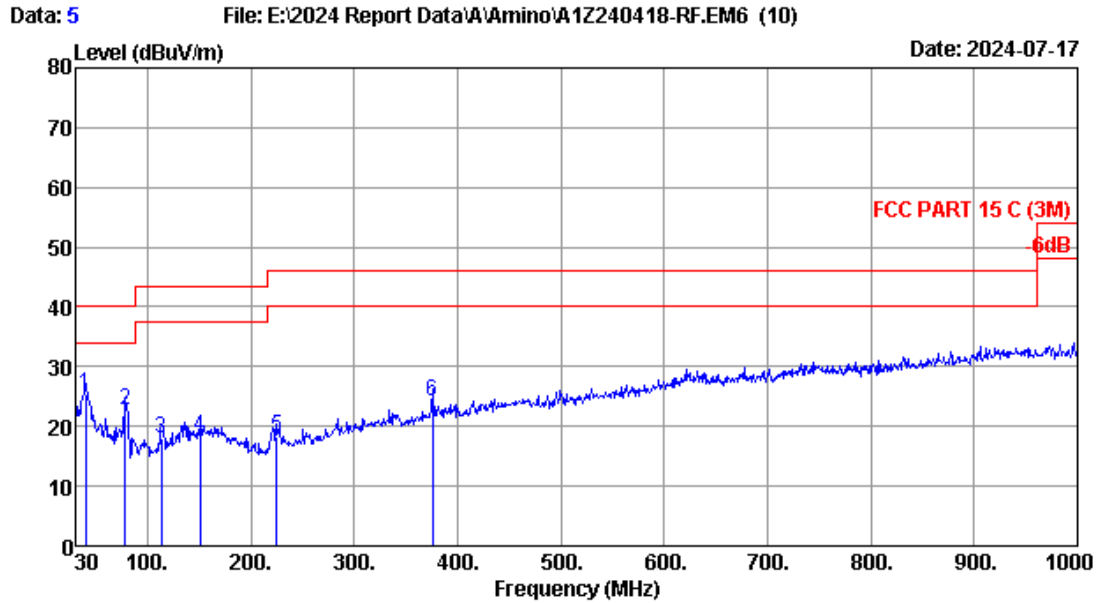
2Mbps:



Site no. : 3m Chamber Data no. : 6
 Dis. / Ant. : 3m 2023 VULB 9168-429 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15 C (3M)
 Env. / Ins. : 26.8°C/57% Engineer : Abel
 EUT :
 Power rating : AC 120V/60Hz
 Test Mode : BLE2M TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission			Remark
					Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	
1	51.340	19.73	0.66	-2.12	18.27	40.00	21.73	QP
2	143.490	19.25	1.00	-1.99	18.26	43.50	25.24	QP
3	256.010	18.00	1.34	1.76	21.10	46.00	24.90	QP
4	287.050	19.14	1.40	4.05	24.59	46.00	21.41	QP
5	312.270	19.79	1.45	3.85	25.09	46.00	20.91	QP
6	375.320	21.21	1.58	3.89	26.68	46.00	19.32	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

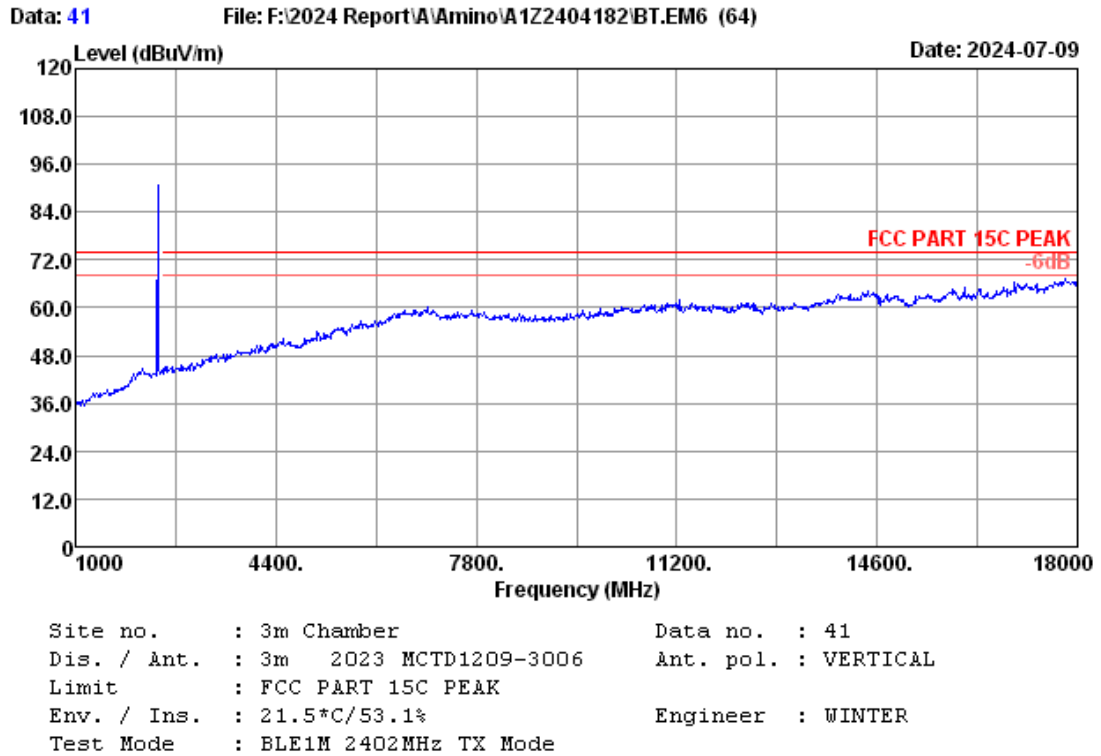


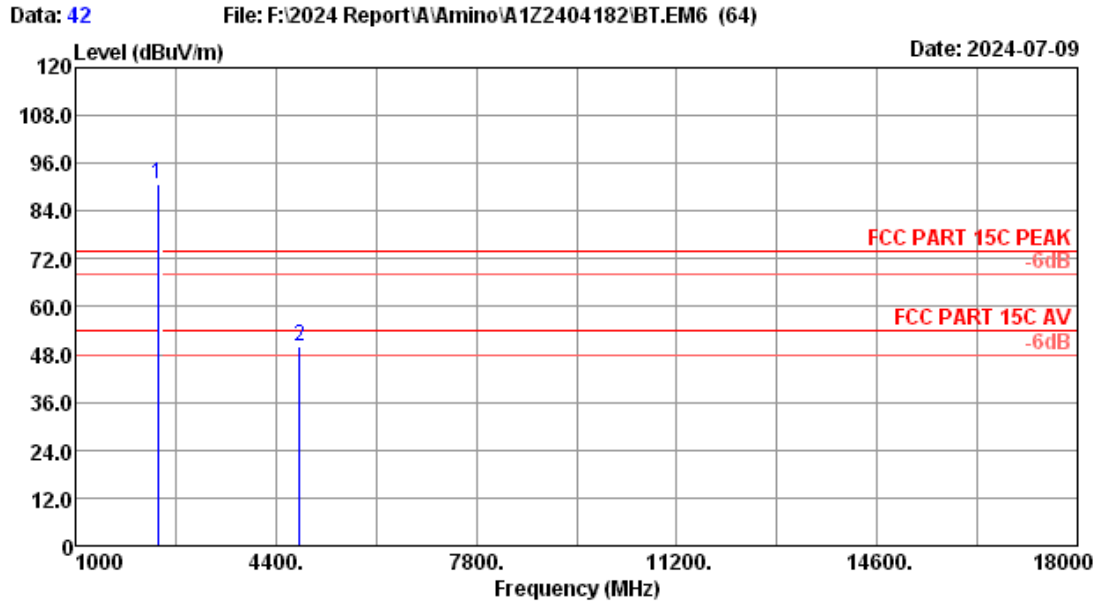
Site no. : 3m Chamber Data no. : 5
 Dis. / Ant. : 3m 2023 VULB 9168-429 Ant. pol. : VERTICAL
 Limit : FCC PART 15 C (3M)
 Env. / Ins. : 26.8°C/57% Engineer : Abel
 EUT :
 Power rating : AC 120V/60Hz
 Test Mode : BLE2M TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	39.700	19.27	0.57	5.40	25.24	40.00	14.76	QP
2	78.500	15.45	0.78	6.55	22.78	40.00	17.22	QP
3	113.420	16.80	0.91	0.36	18.07	43.50	25.43	QP
4	150.280	19.40	1.02	-2.09	18.33	43.50	25.17	QP
5	224.970	15.80	1.27	1.28	18.35	46.00	27.65	QP
6	375.320	21.21	1.58	1.45	24.24	46.00	21.76	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Frequency: 1GHz~18GHz
1Mbps:

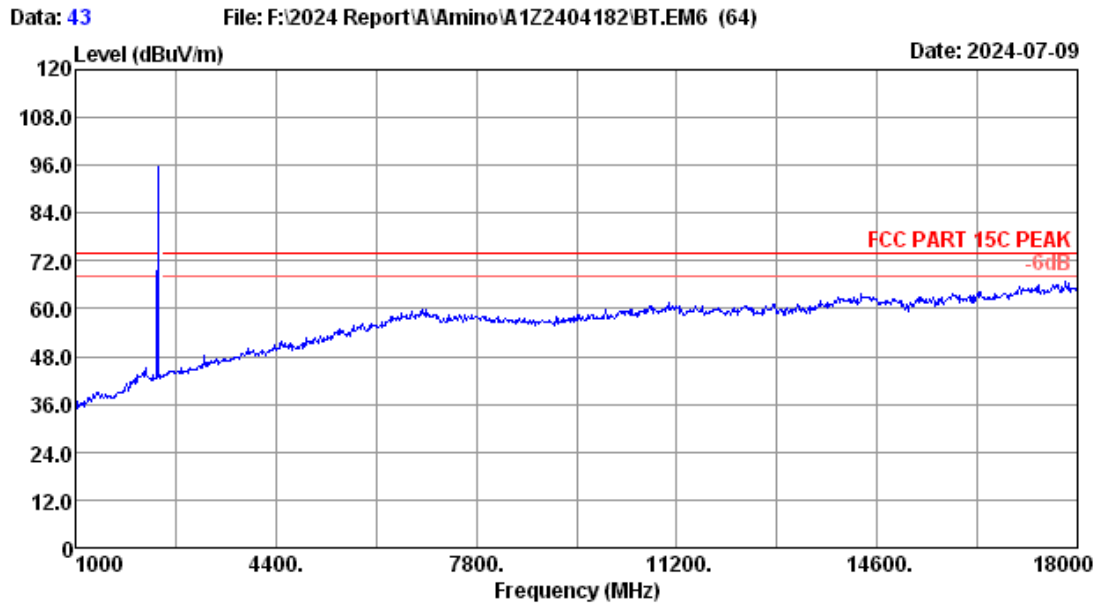




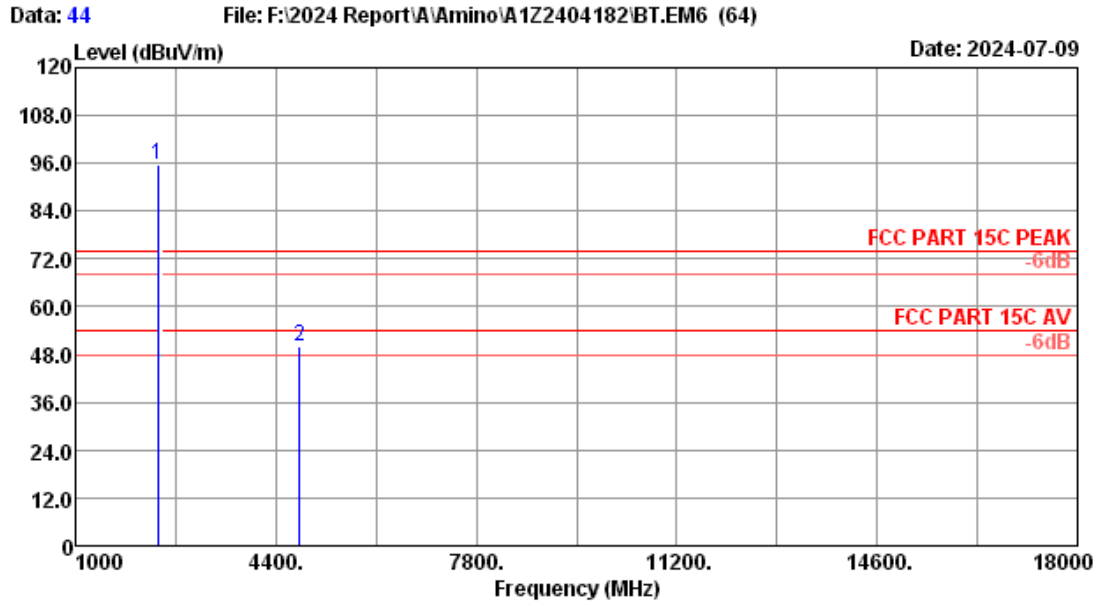
Site no. : 3m Chamber Data no. : 42
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2402MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.61	5.32	90.24	32.22	90.95	-----	-----	Peak
2	4804.00	31.20	7.41	42.59	31.08	50.12	74.00	23.88	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



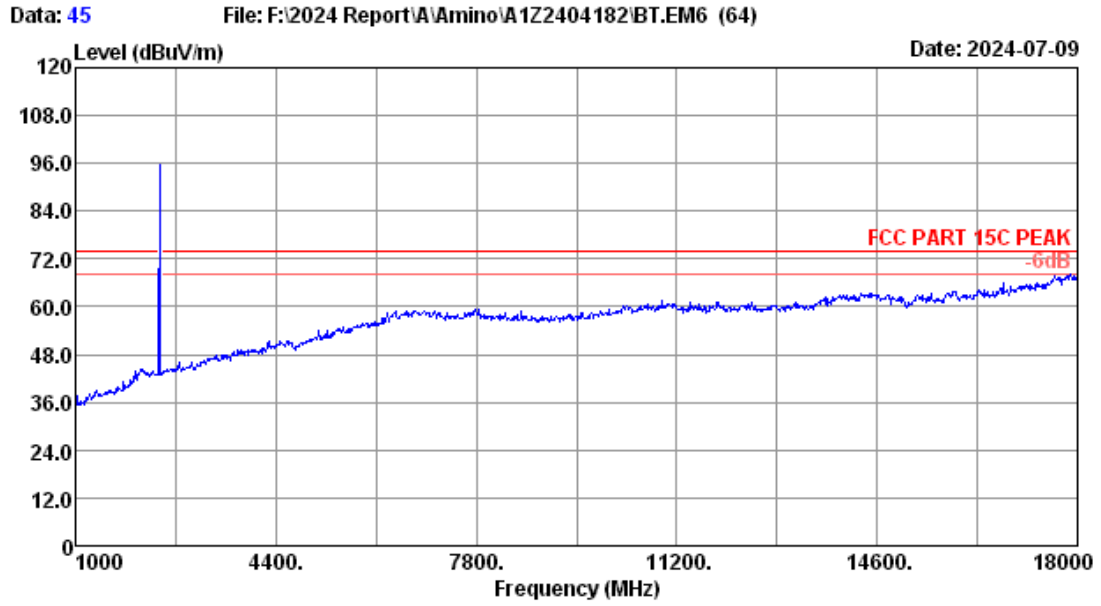
Site no.	: 3m Chamber	Data no.	: 43
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE1M 2402MHz TX Mode		



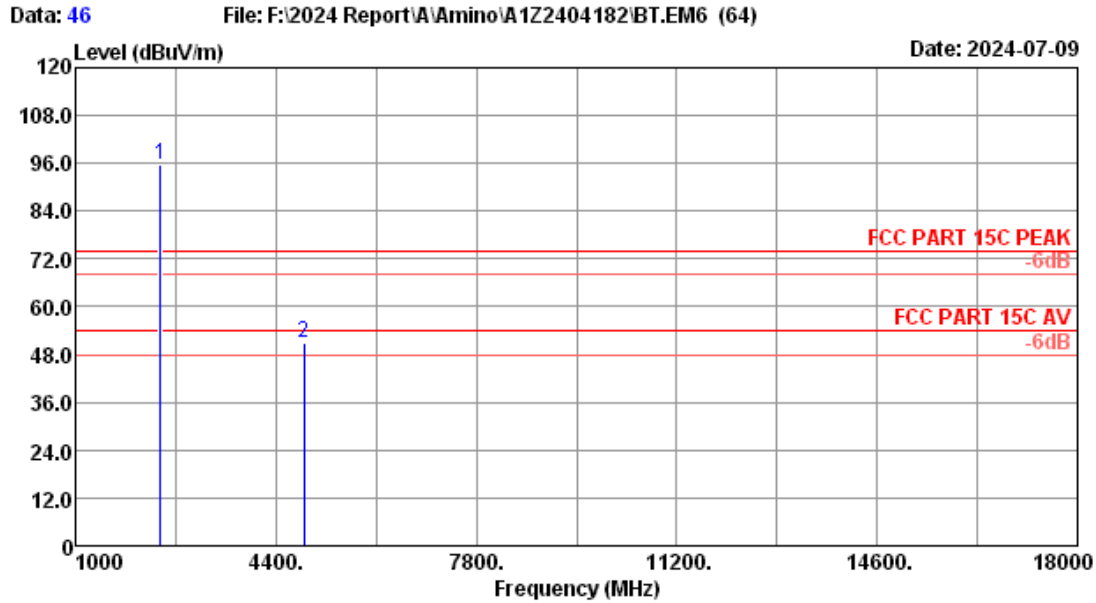
Site no. : 3m Chamber Data no. : 44
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2402MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.61	5.32	95.04	32.22	95.75	-----	-----	Peak
2	4804.00	31.20	7.41	42.37	31.08	49.90	74.00	24.10	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



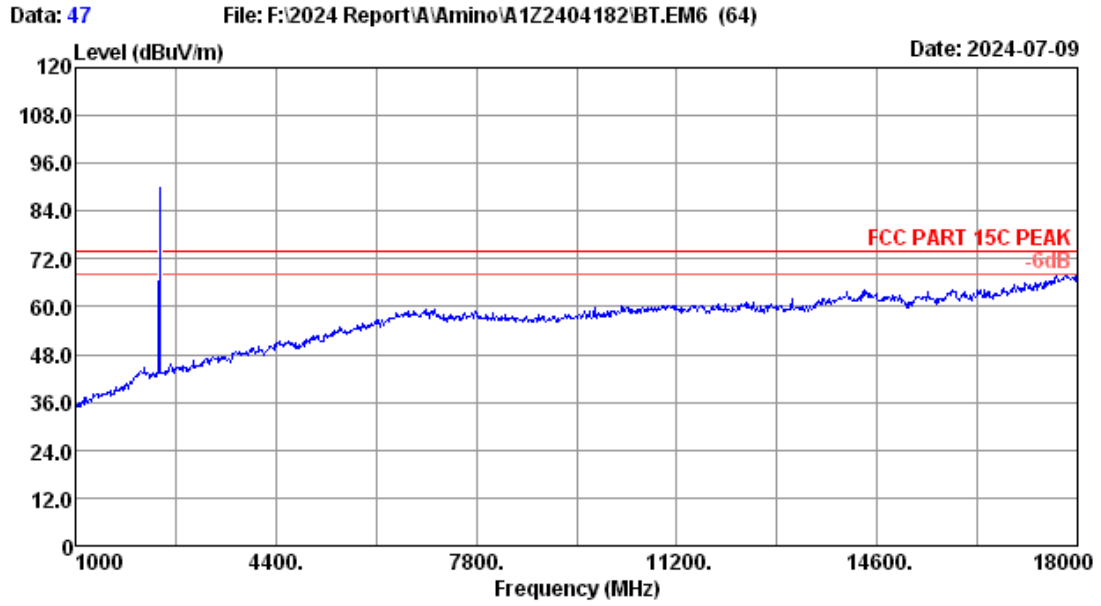
Site no.	: 3m Chamber	Data no.	: 45
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE1M 2440MHz TX Mode		



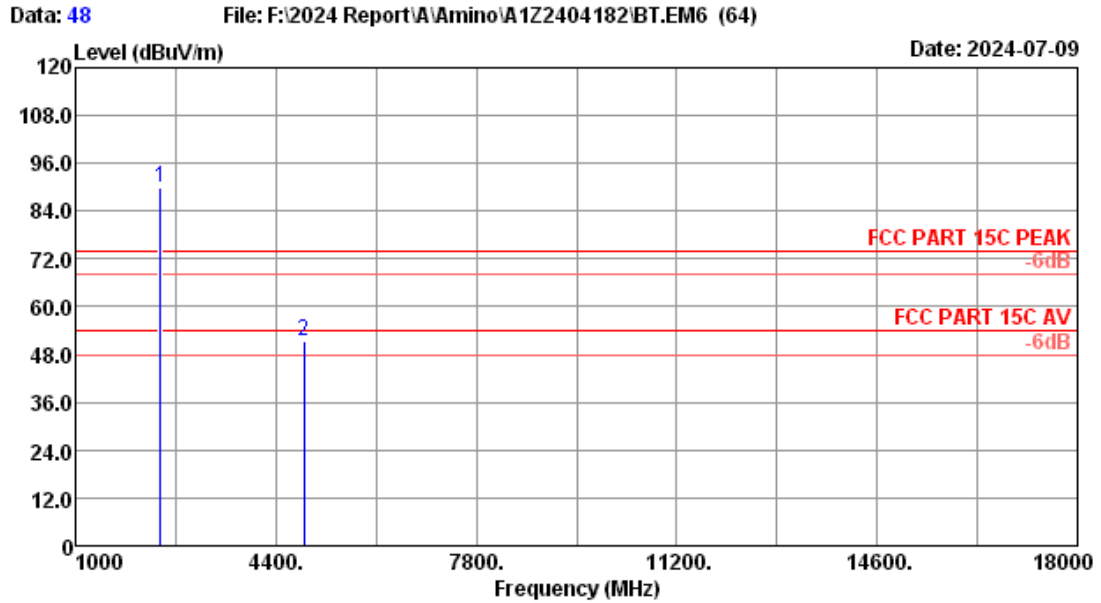
Site no. : 3m Chamber Data no. : 46
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2440MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2440.00	27.76	5.37	94.54	32.19	95.48	-----	-----	Peak
2	4880.00	31.44	7.45	43.05	31.05	50.89	74.00	23.11	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



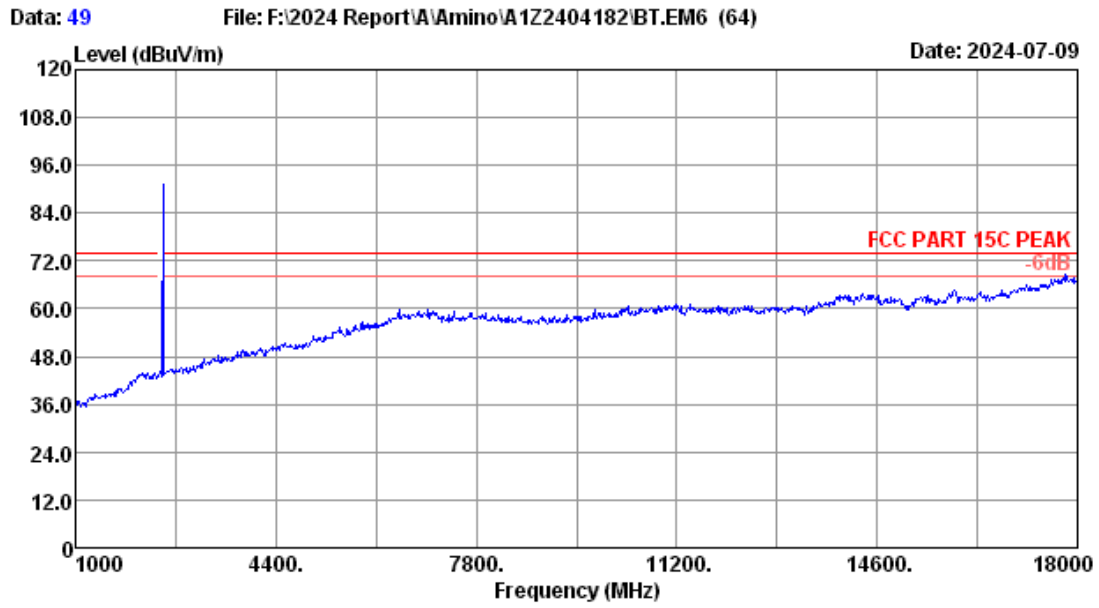
Site no.	: 3m Chamber	Data no.	: 47
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE1M 2440MHz TX Mode		



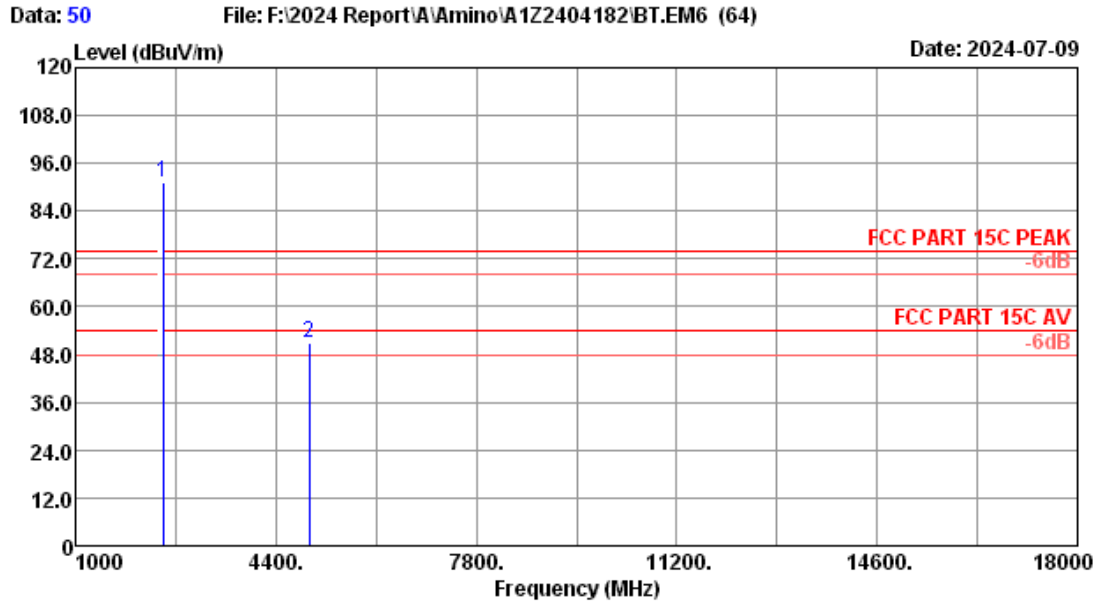
Site no. : 3m Chamber Data no. : 48
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2440MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2440.00	27.76	5.37	88.87	32.19	89.81	-----	-----	Peak
2	4880.00	31.44	7.45	43.35	31.05	51.19	74.00	22.81	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



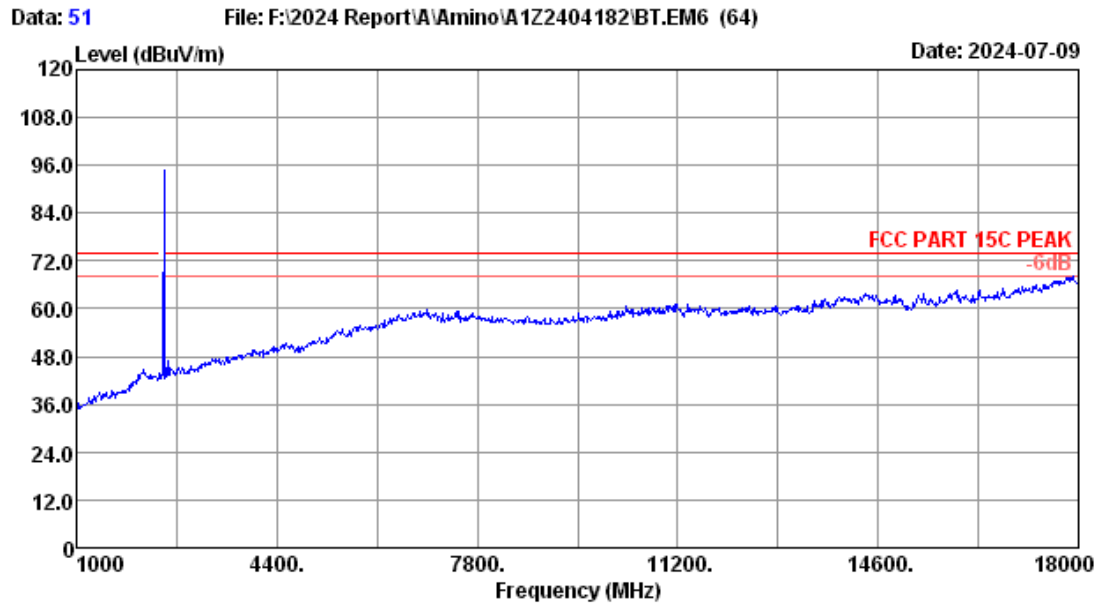
Site no.	: 3m Chamber	Data no.	: 49
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE1M 2480MHz TX Mode		



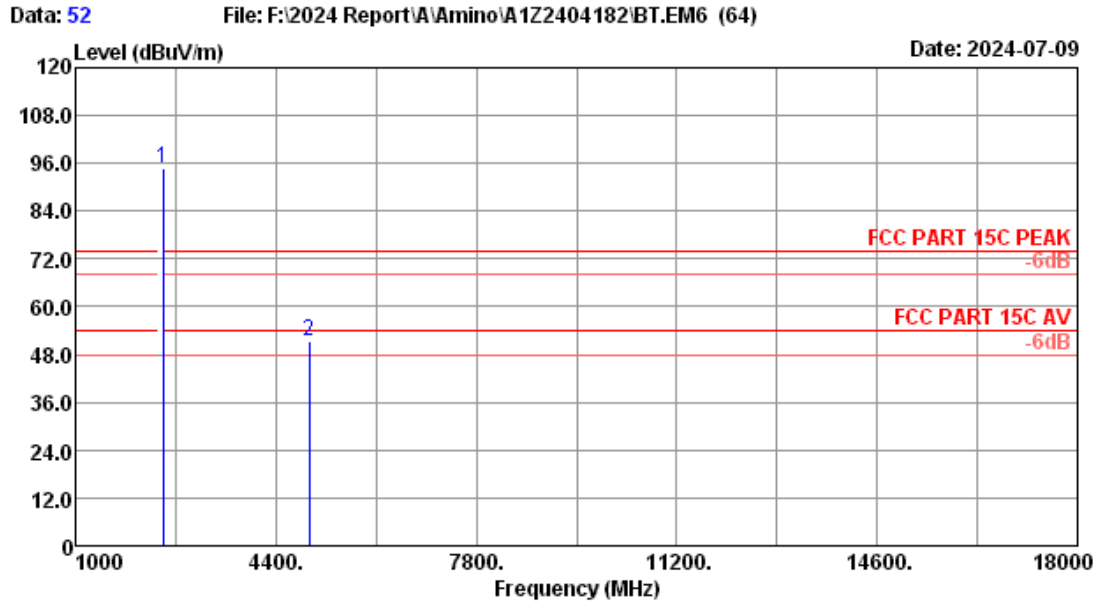
Site no. : 3m Chamber Data no. : 50
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2480MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.80	5.41	90.33	32.16	91.38	-----	-----	Peak
2	4960.00	31.98	7.50	42.65	31.02	51.11	74.00	22.89	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no.	: 3m Chamber	Data no.	: 51
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE1M 2480MHz TX Mode		

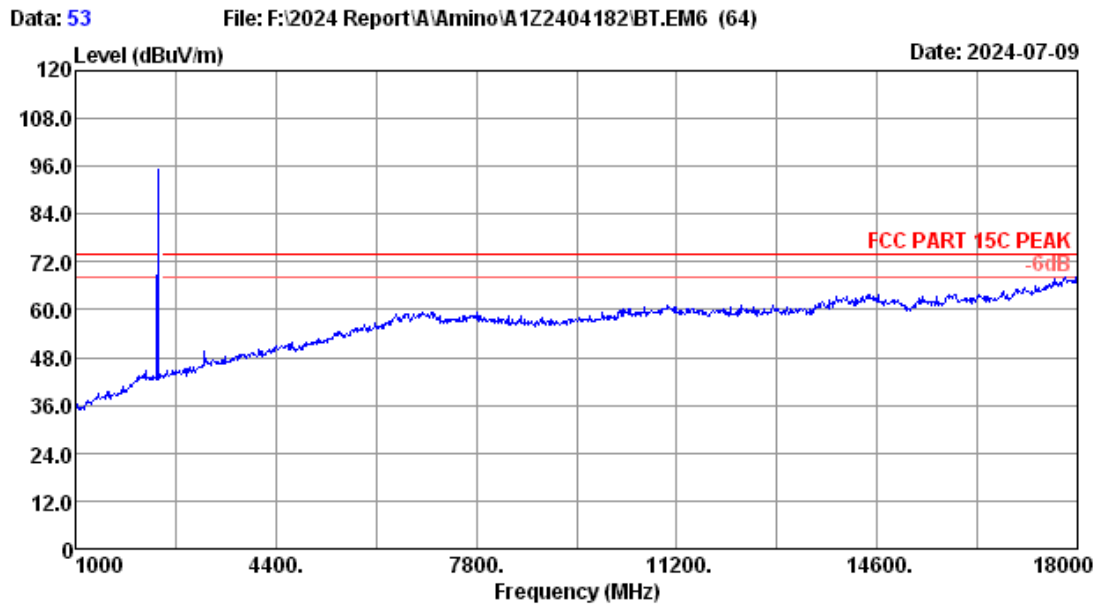


Site no. : 3m Chamber Data no. : 52
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2480MHz TX Mode

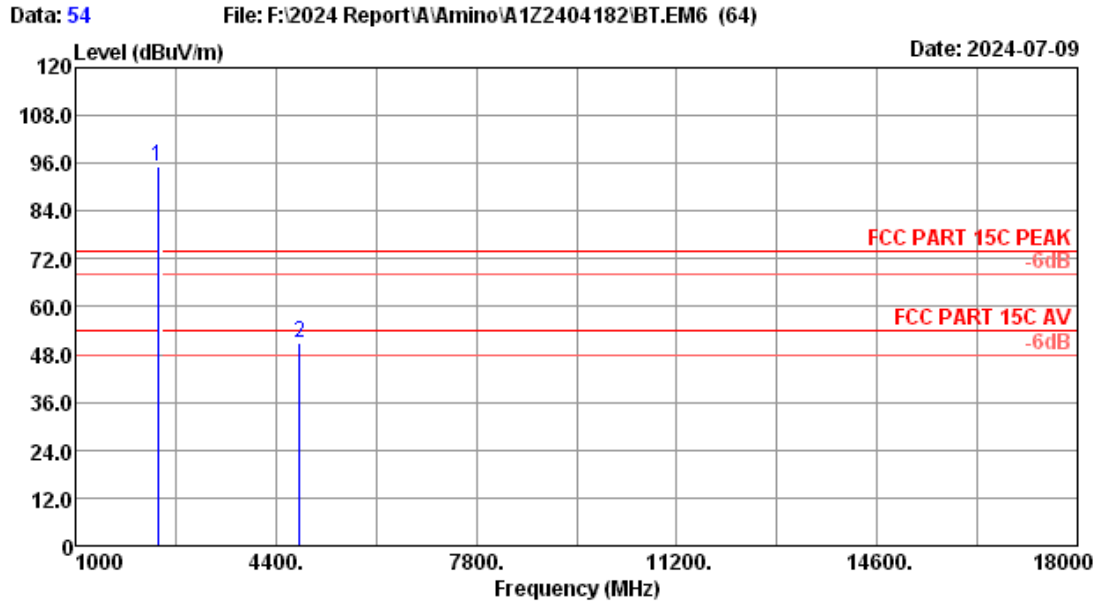
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.80	5.41	93.64	32.16	94.69	-----	-----	Peak
2	4960.00	31.98	7.50	43.04	31.02	51.50	74.00	22.50	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.

2Mbps:



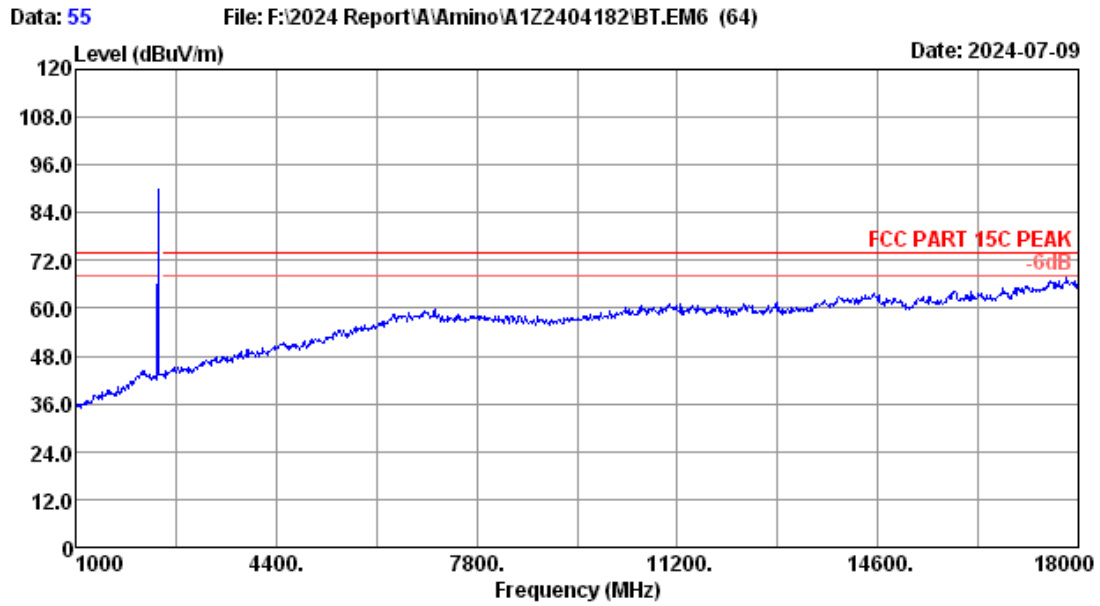
Site no.	: 3m Chamber	Data no.	: 53
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE2M 2402MHz TX Mode		



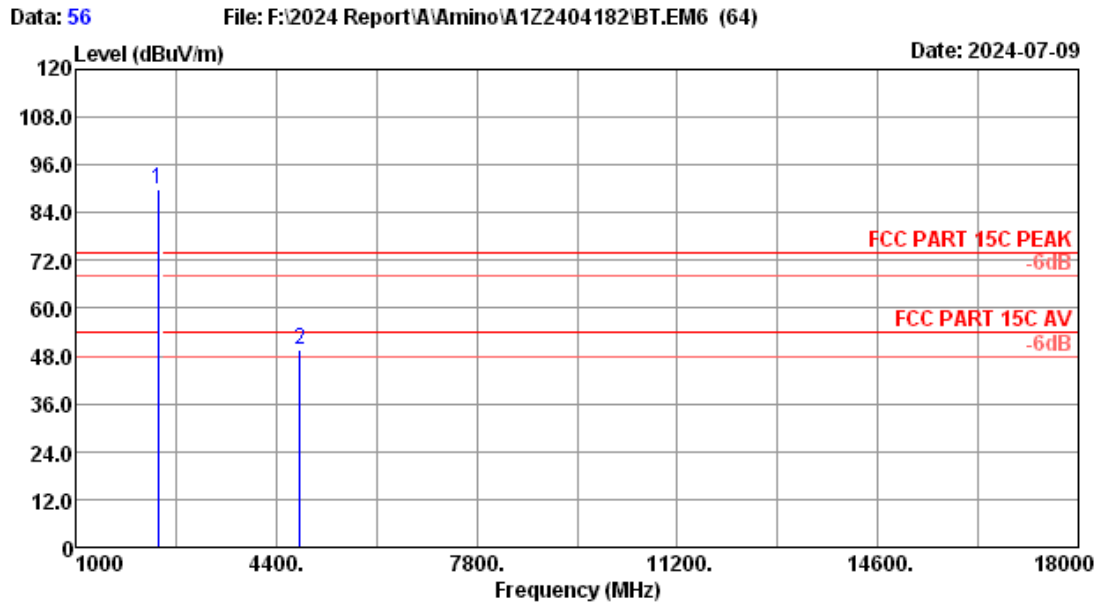
Site no. : 3m Chamber Data no. : 54
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2402MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.61	5.32	94.61	32.22	95.32	-----	-----	Peak
2	4804.00	31.20	7.41	43.24	31.08	50.77	74.00	23.23	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



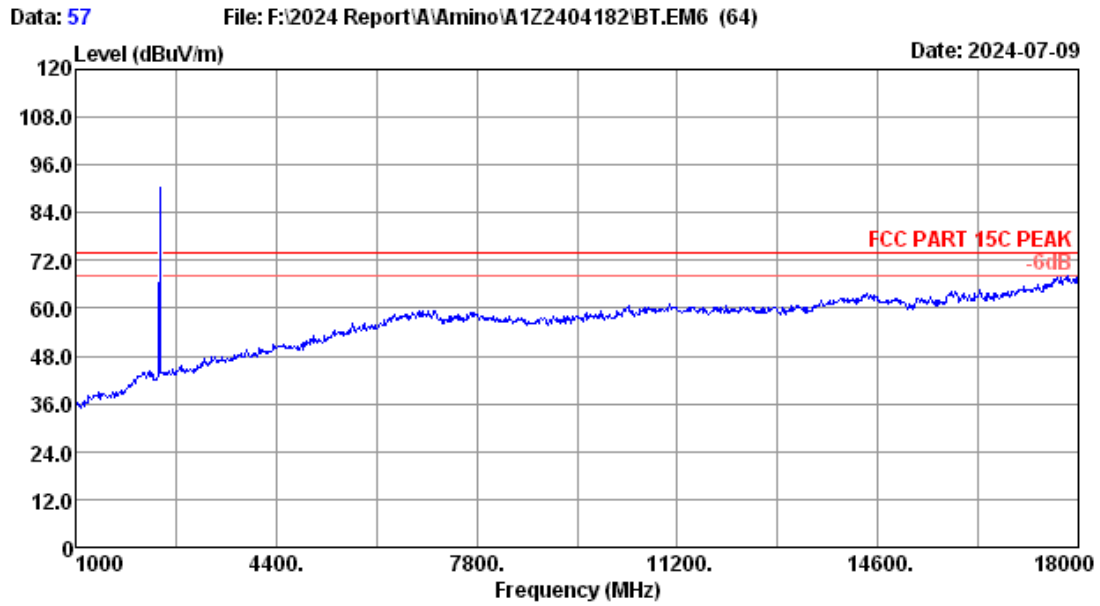
Site no.	: 3m Chamber	Data no.	: 55
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE2M 2402MHz TX Mode		



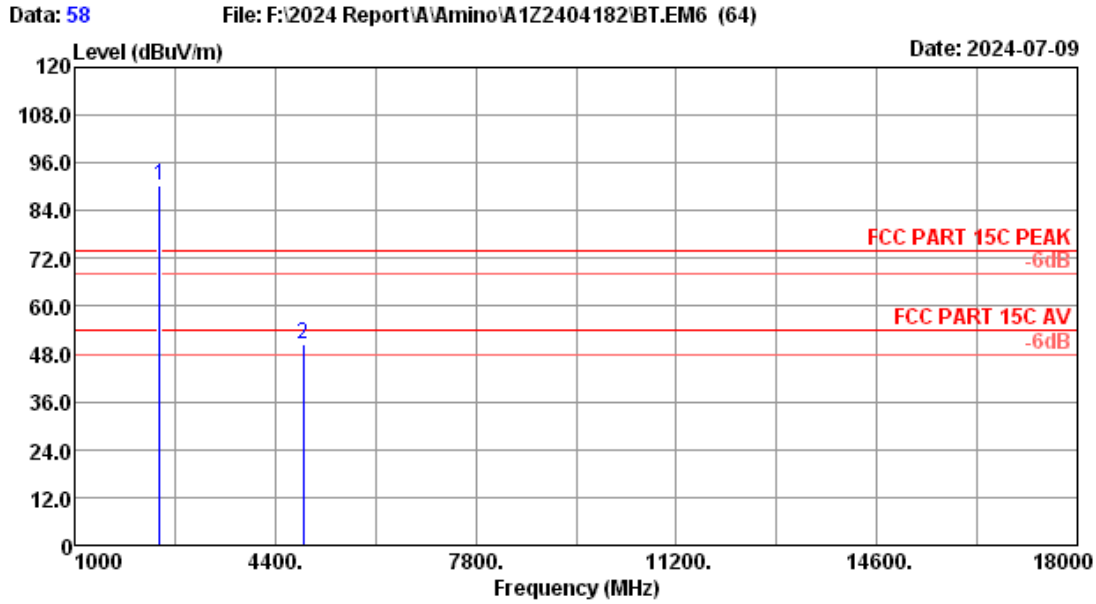
Site no. : 3m Chamber Data no. : 56
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2402MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.61	5.32	89.19	32.22	89.90	-----	-----	Peak
2	4804.00	31.20	7.41	42.10	31.08	49.63	74.00	24.37	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



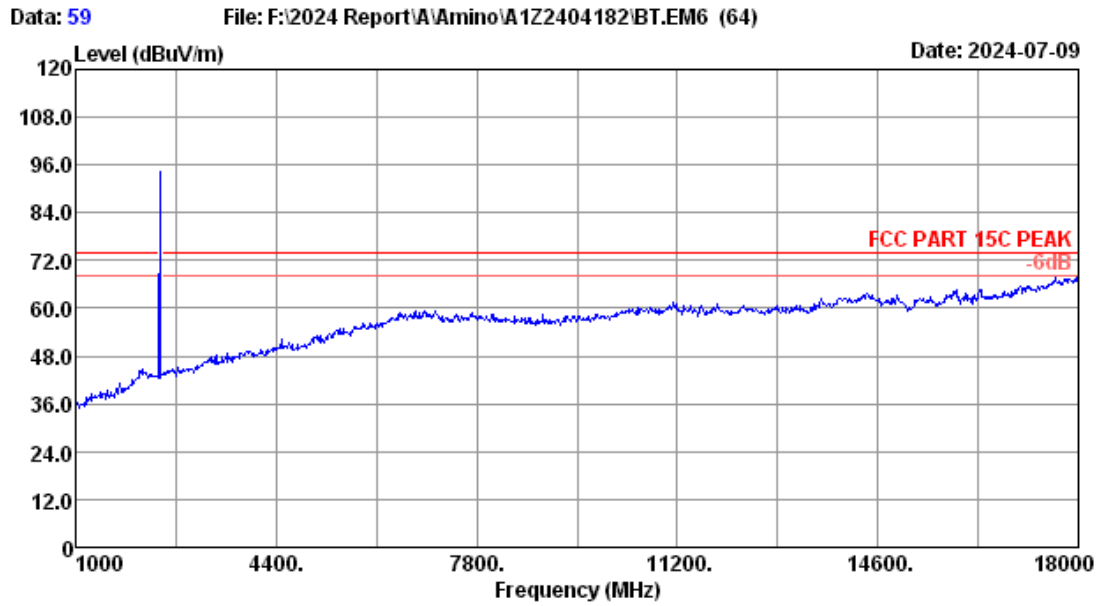
Site no.	: 3m Chamber	Data no.	: 57
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE2M 2440MHz TX Mode		



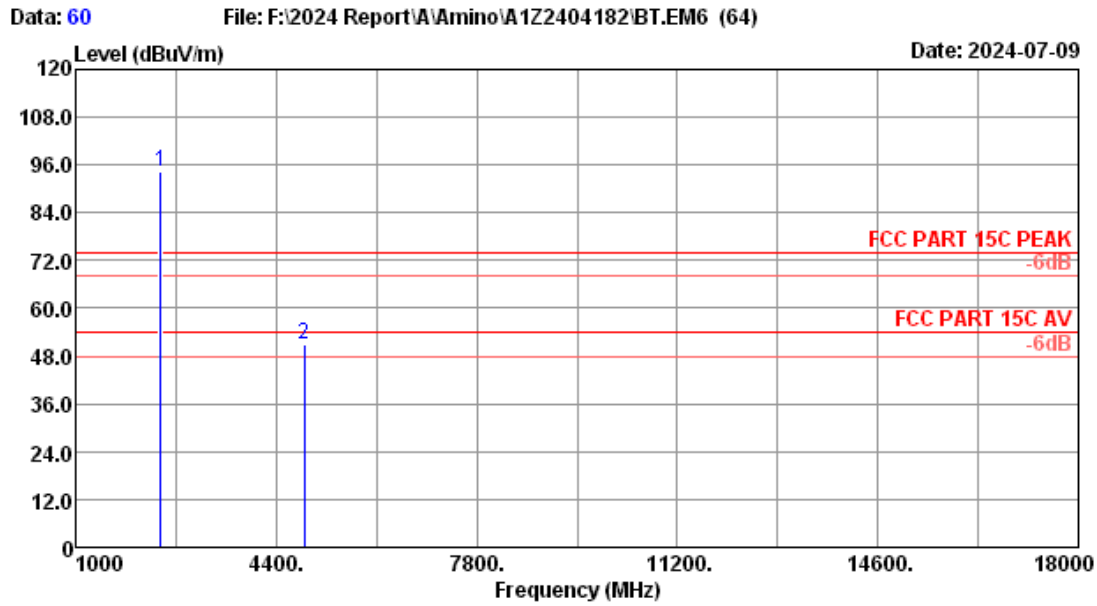
Site no. : 3m Chamber Data no. : 58
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2440MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2440.00	27.76	5.37	89.29	32.19	90.23	-----	-----	Peak
2	4880.00	31.44	7.45	42.49	31.05	50.33	74.00	23.67	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



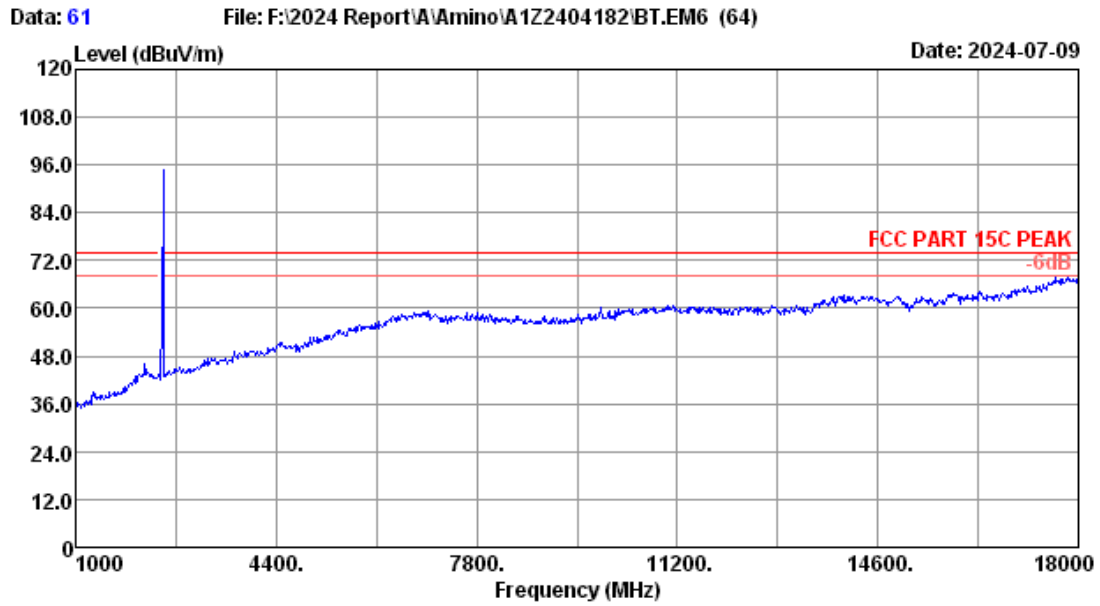
Site no.	: 3m Chamber	Data no.	: 59
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE2M 2440MHz TX Mode		



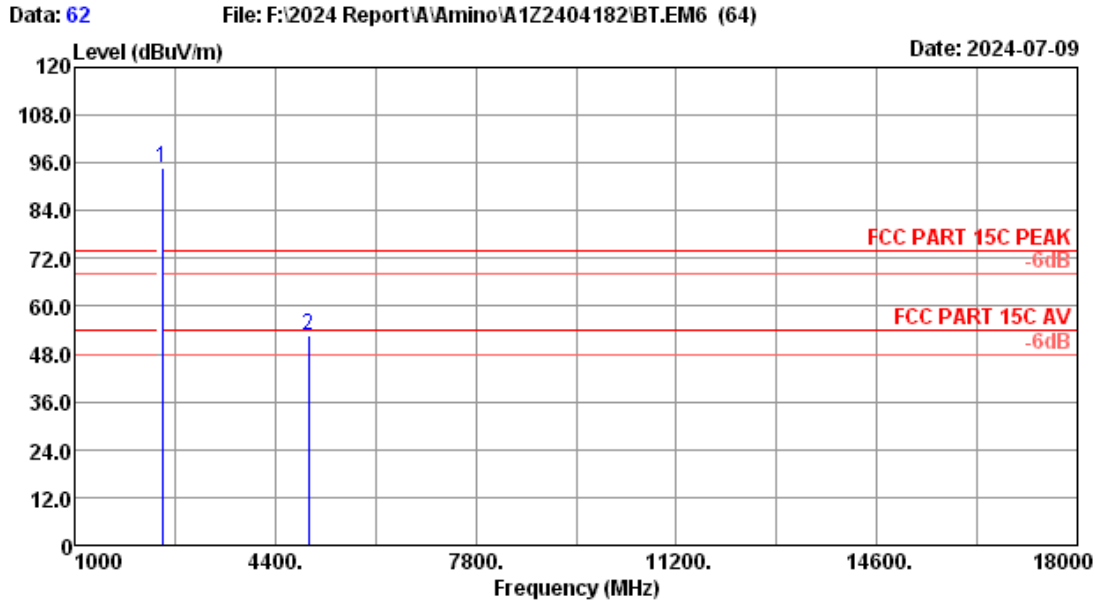
Site no. : 3m Chamber Data no. : 60
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2440MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2440.00	27.76	5.37	93.56	32.19	94.50	72.00	22.50	Peak
2	4880.00	31.44	7.45	43.14	31.05	50.98	50.00	23.02	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



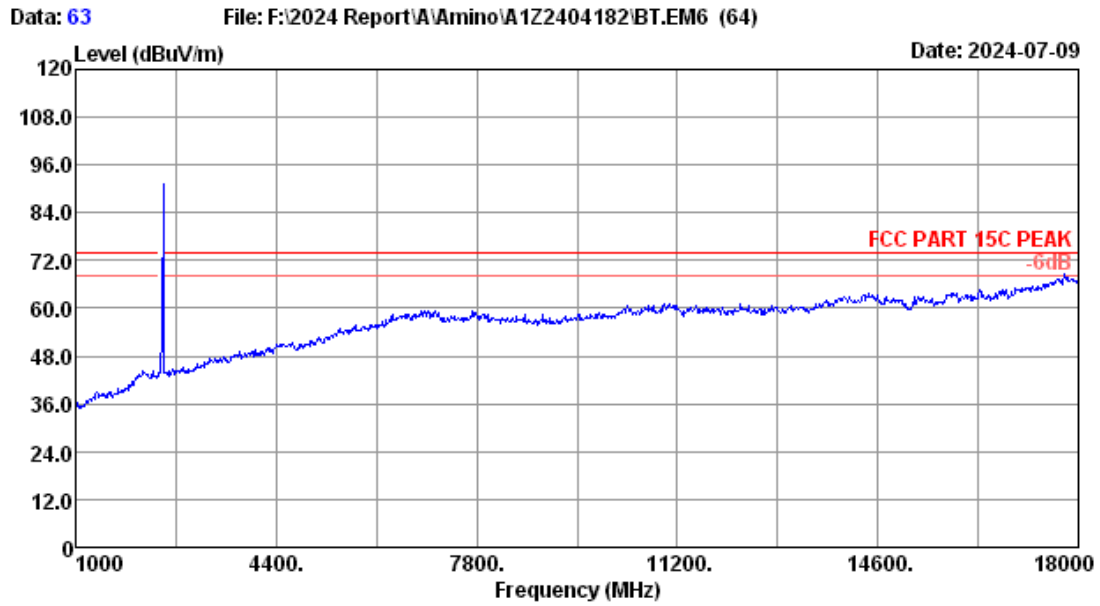
Site no.	: 3m Chamber	Data no.	: 61
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE2M 2480MHz TX Mode		



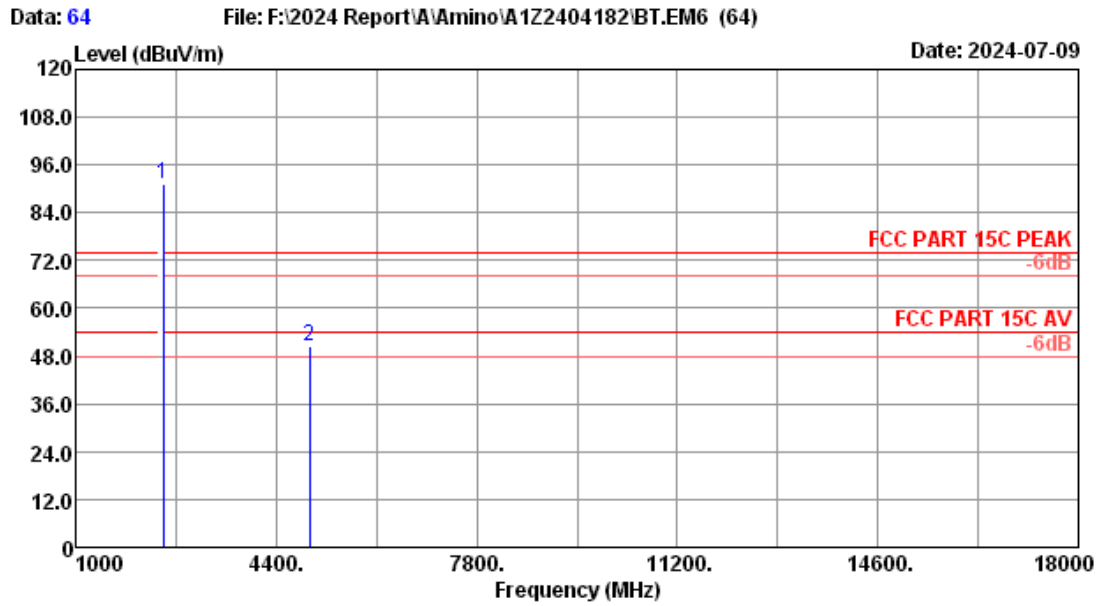
Site no. : 3m Chamber Data no. : 62
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2480MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.80	5.41	93.74	32.16	94.79	-----	-----	Peak
2	4960.00	31.98	7.50	44.19	31.02	52.65	74.00	21.35	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no.	: 3m Chamber	Data no.	: 63
Dis. / Ant.	: 3m 2023 MCTD1209-3006	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 21.5°C/53.1%	Engineer	: WINTER
Test Mode	: BLE2M 2480MHz TX Mode		



Site no. : 3m Chamber Data no. : 64
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2480MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.80	5.41	90.09	32.16	91.14	-----	-----	Peak
2	4960.00	31.98	7.50	42.14	31.02	50.60	74.00	23.40	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.

5. CONDUCTED SPURIOUS EMISSIONS

5.1. Block Diagram of Test Setup

Please reference to section 2.4.

5.2. Limit

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30dB instead of 20dB.

5.3. Test Procedure

Use the test method described in ANSI C63.10:

The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions With peak detector.

5.4. Test result

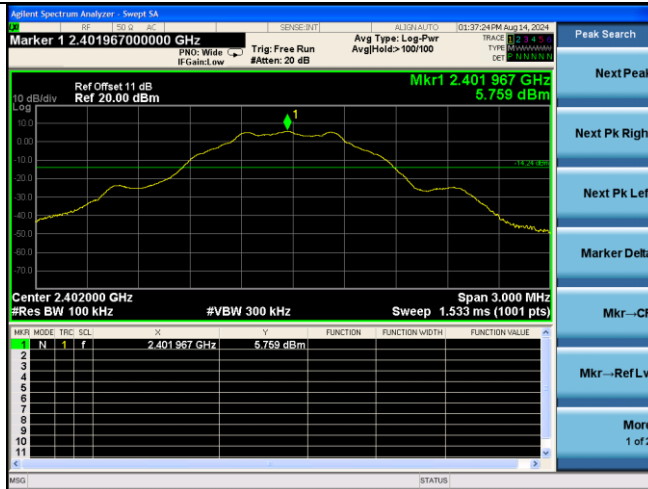
PASS (The testing data was attached in the next pages.)

EUT: STB		
M/N: H200W		
Test date: 2024-08-14	Pressure: 102.3±1.0 kpa	Humidity: 53.5±3.0%
Tested by: Epoch	Test site: RF site	Temperature:25.4±0.6 °C

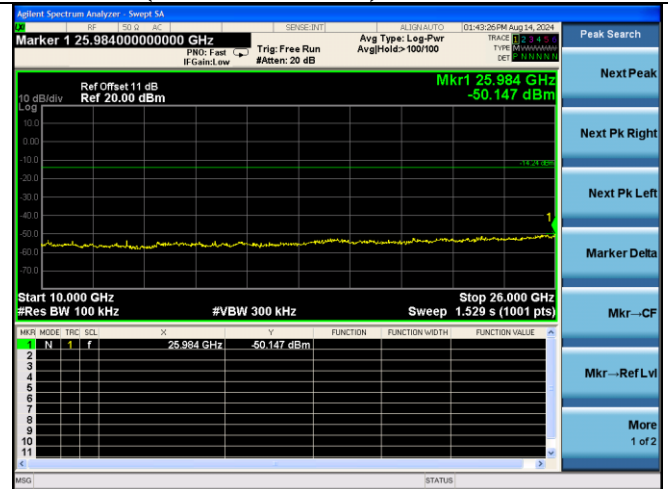
1Mbps:

GFSK

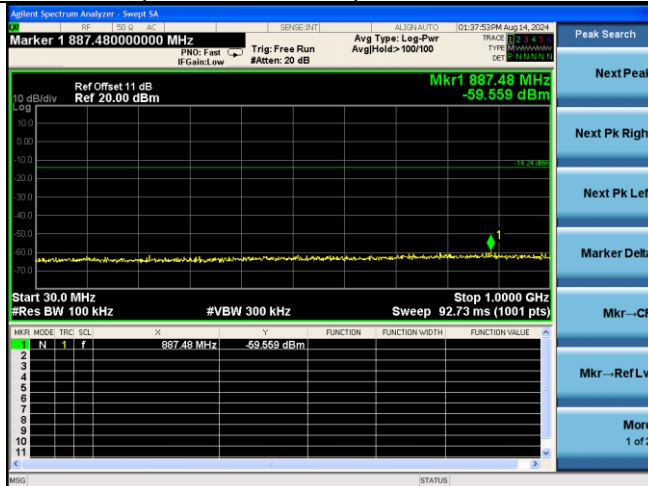
2402MHz



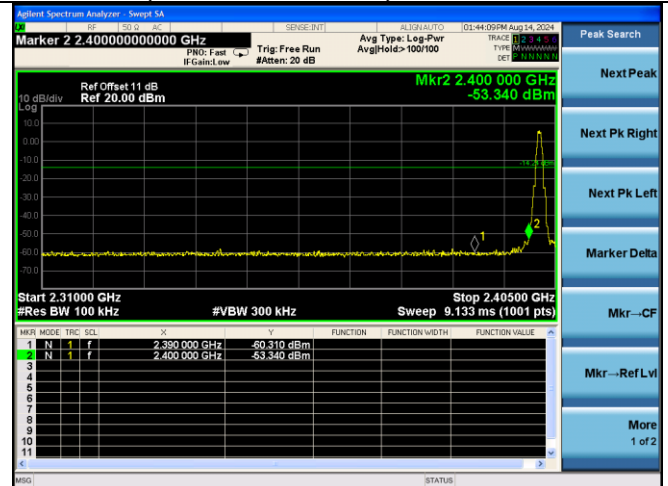
2402MHz(10GHz – 26GHz)



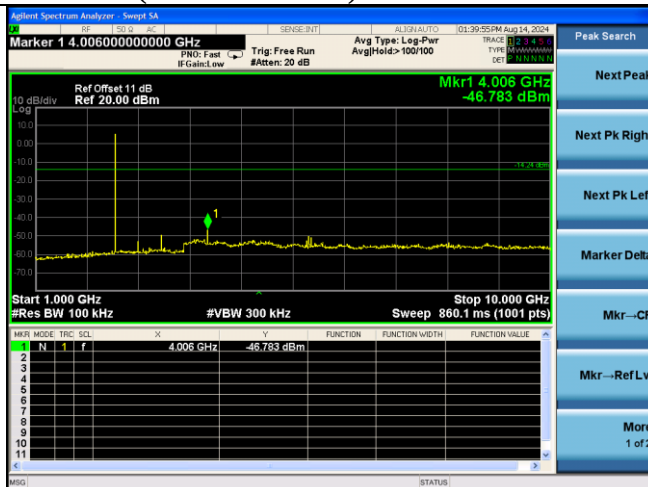
2402MHz(30MHz – 1GHz)



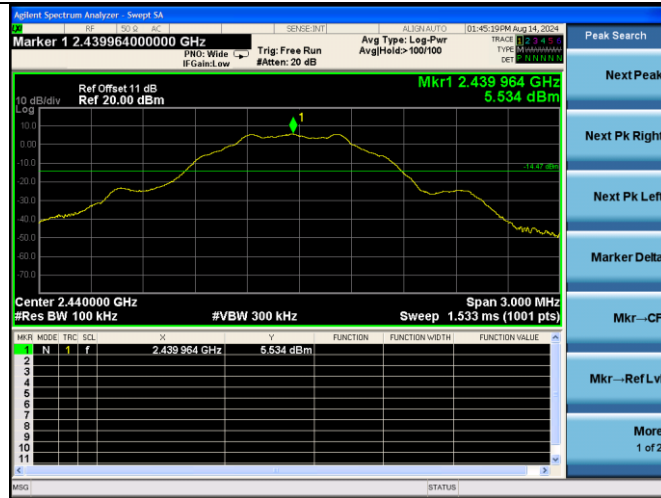
2402MHz(2.3GHz – 2.4GHz)



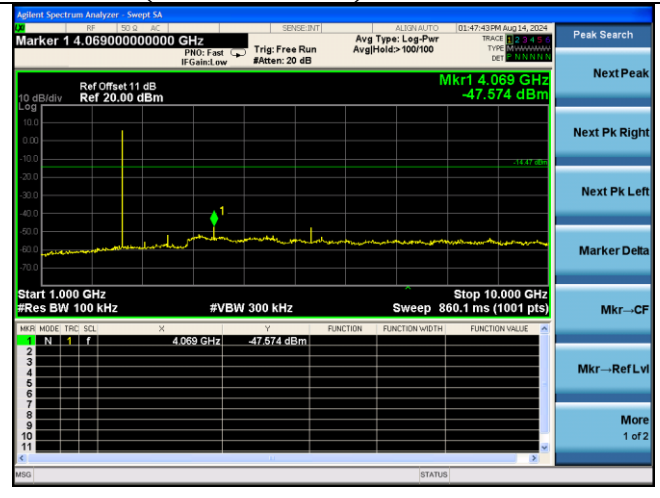
2402MHz(1GHz – 10GHz)



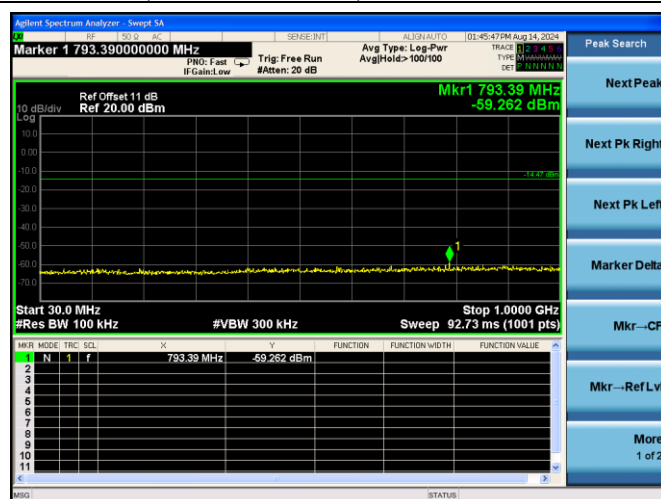
2440MHz



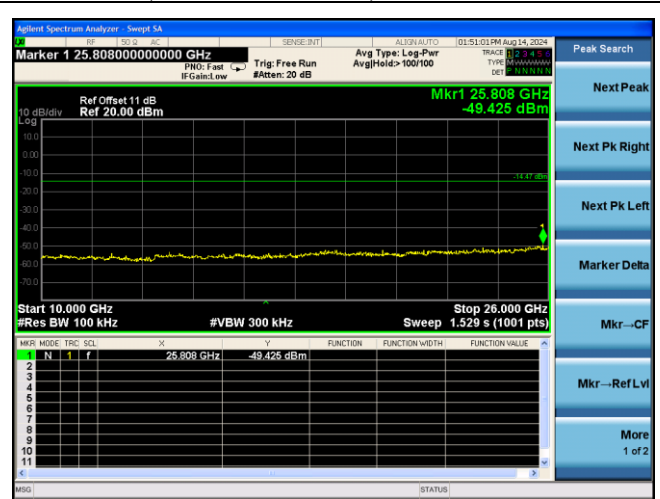
2440MHz(1GHz – 10GHz)



2440MHz(30MHz – 1GHz)



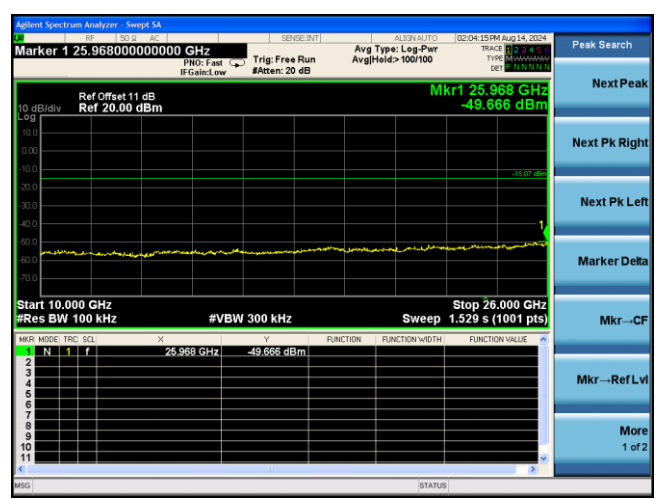
2440MHz(10GHz – 26GHz)



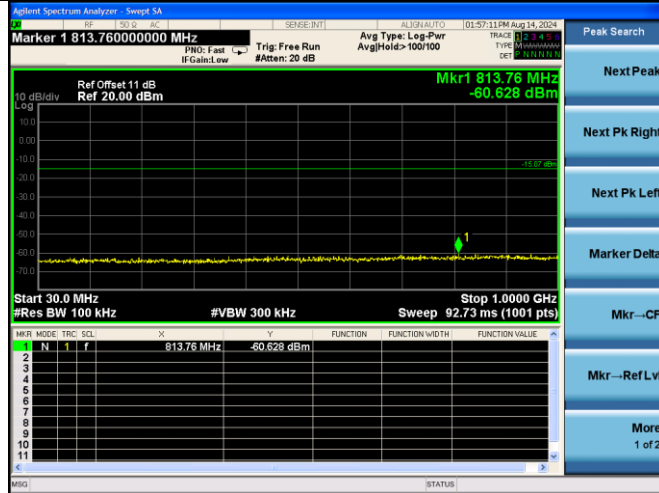
2480MHz



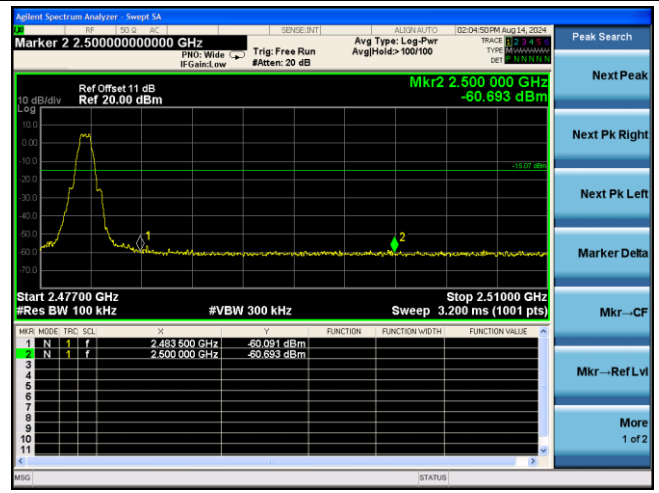
2480MHz(10GHz – 26GHz)



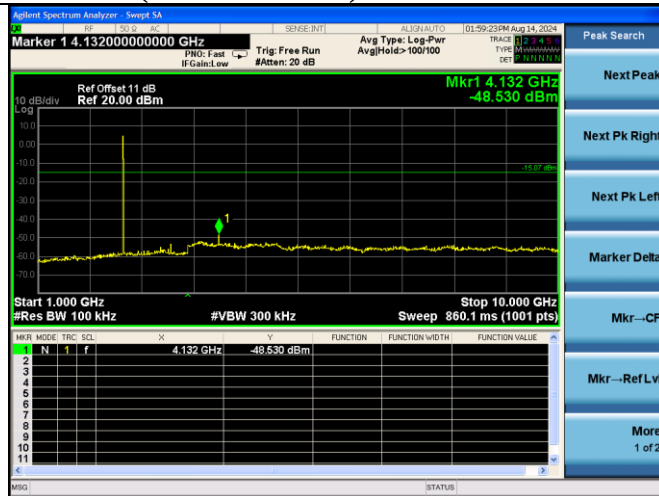
2480MHz(30MHz – 1GHz)

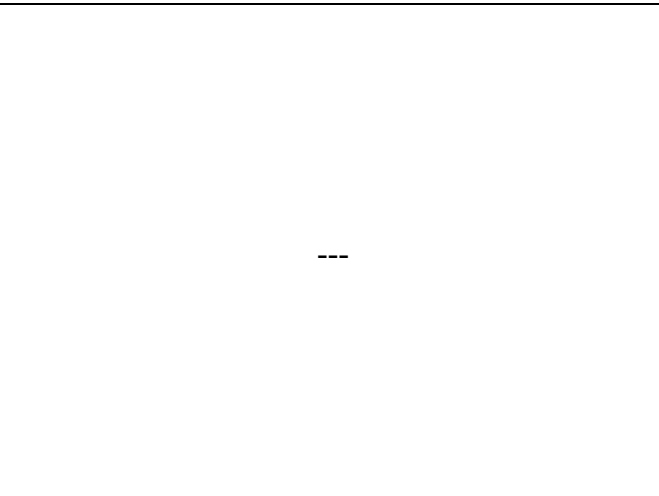


2480MHz(2.4GHz – 2.5GHz)



2480MHz(1GHz – 10GHz)

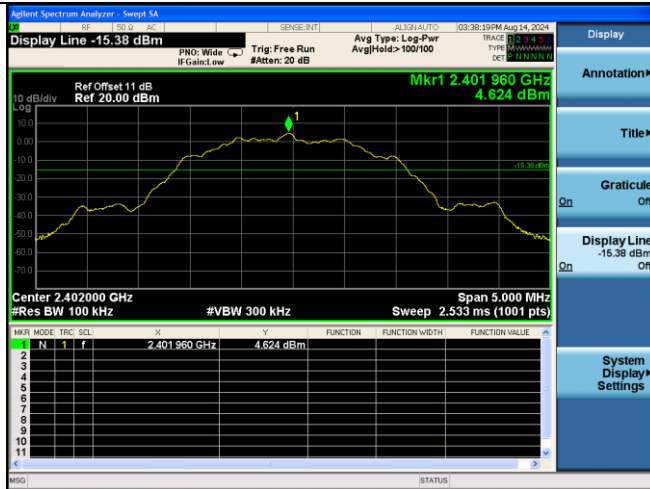




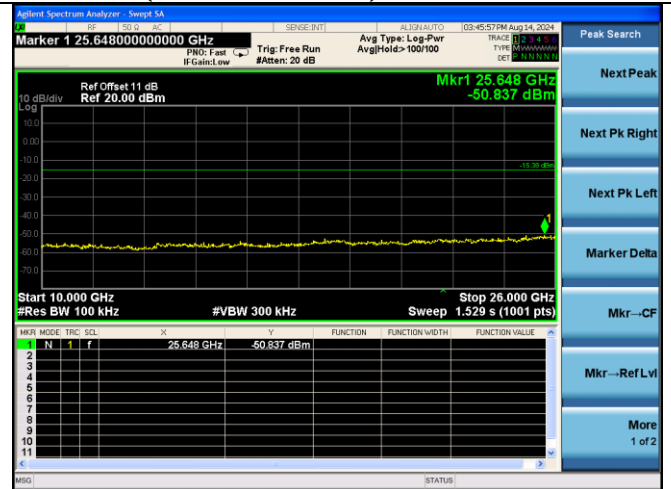
2Mbps:

GFSK

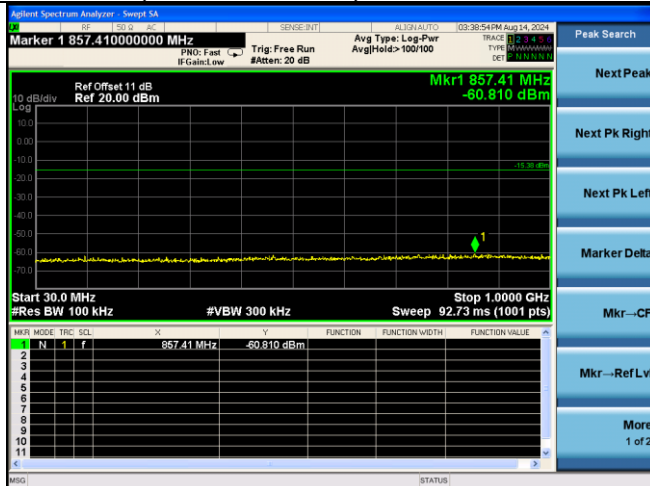
2402MHz



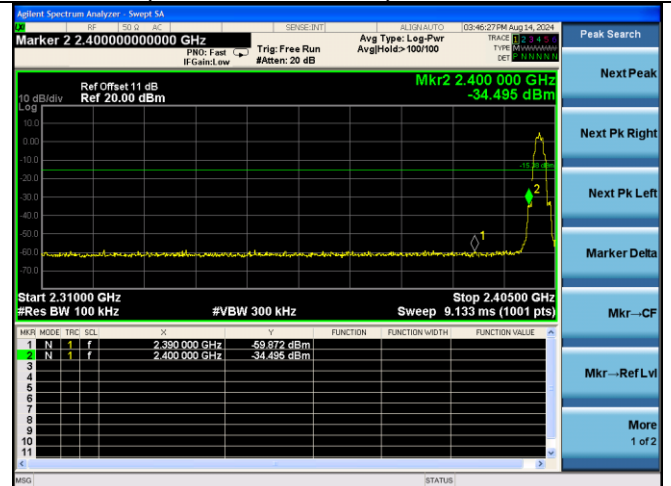
2402MHz(10GHz – 26GHz)



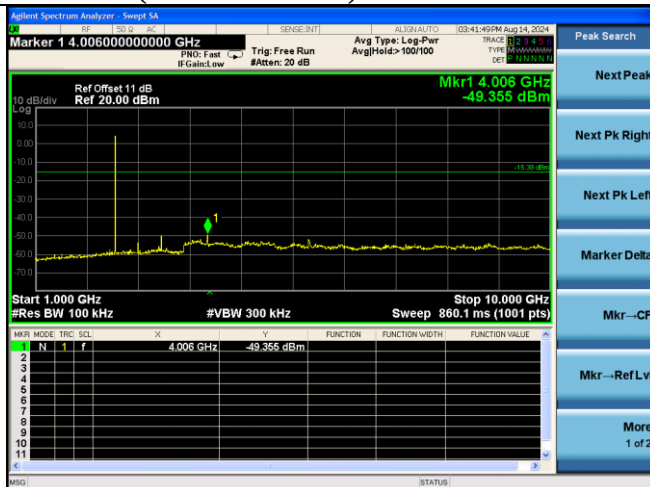
2402MHz(30MHz – 1GHz)

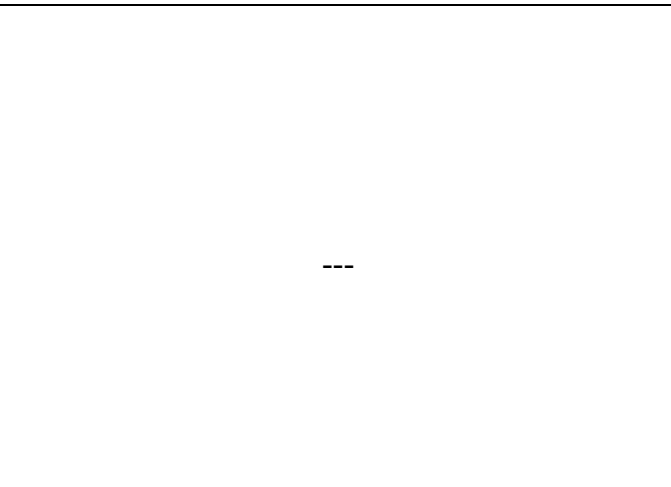


2402MHz(2.3GHz – 2.4GHz)

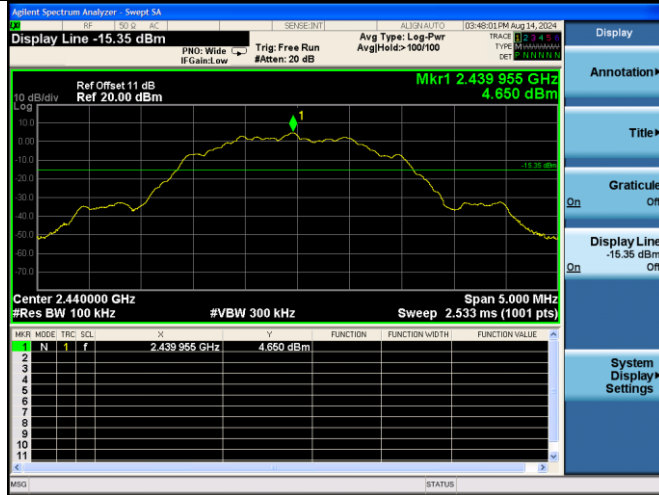


2402MHz(1GHz – 10GHz)

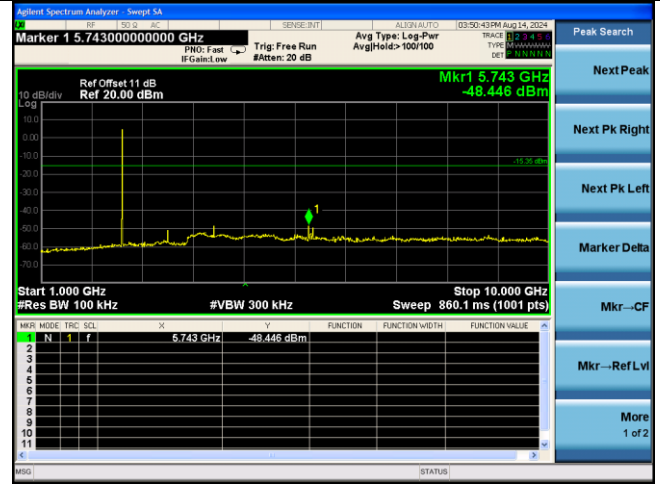




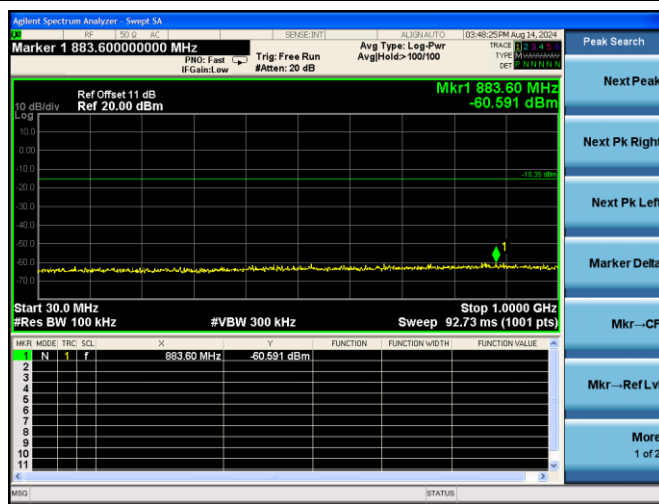
2440MHz



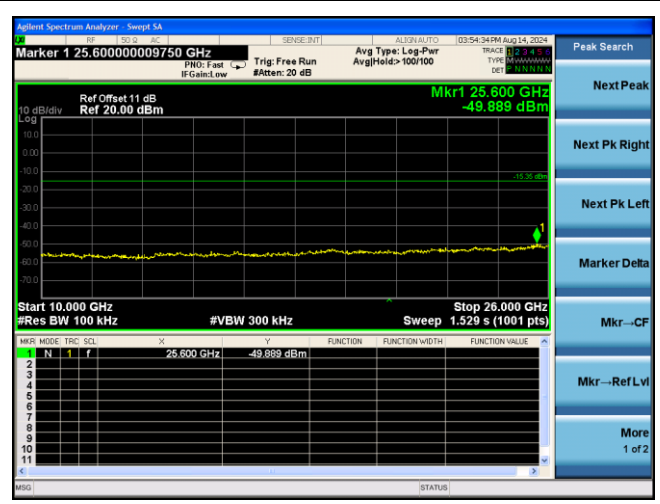
2440MHz(1GHz – 10GHz)



2440MHz(30MHz – 1GHz)



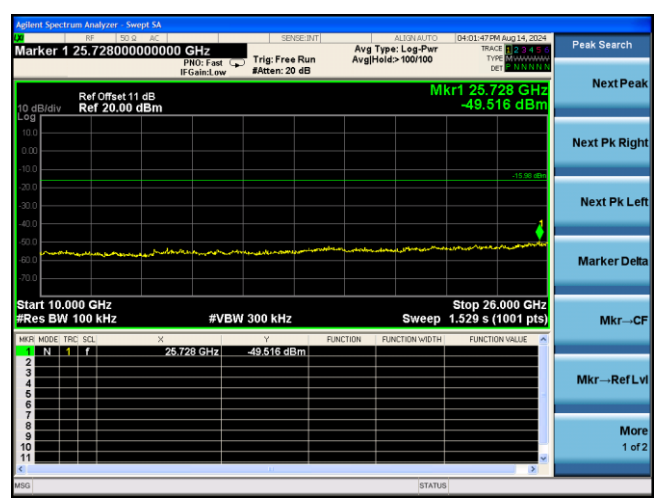
2440MHz(10GHz – 26GHz)



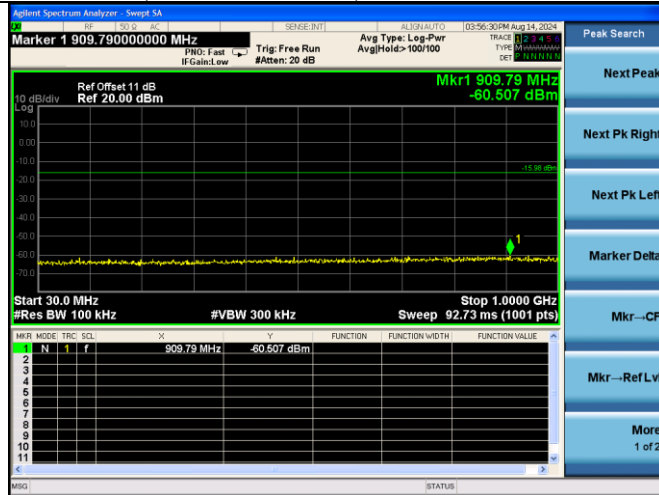
2480MHz



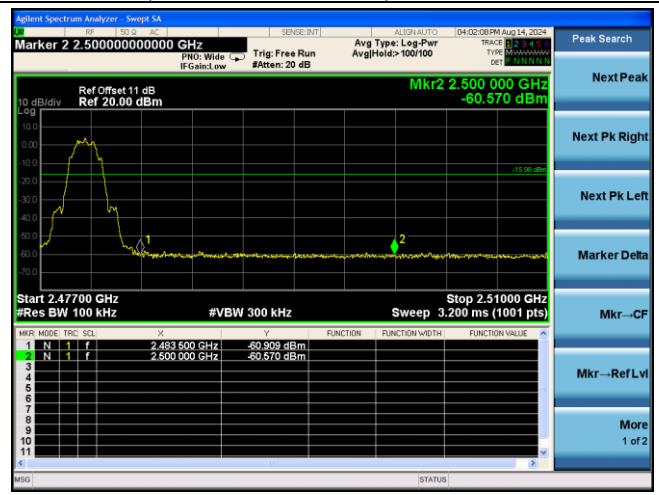
2480MHz(10GHz – 26GHz)



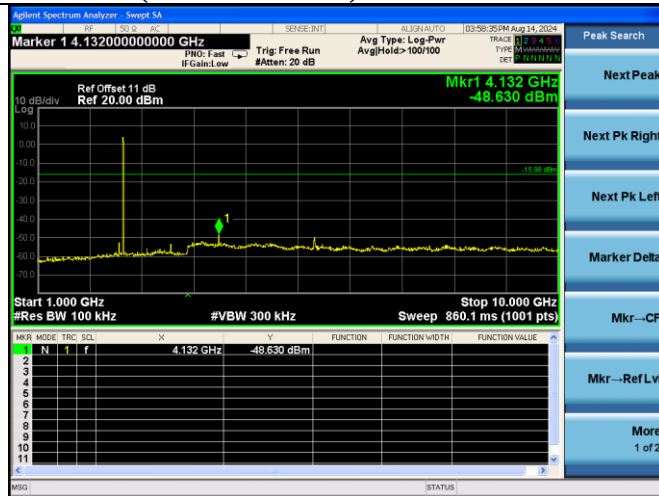
2480MHz(30MHz – 1GHz)

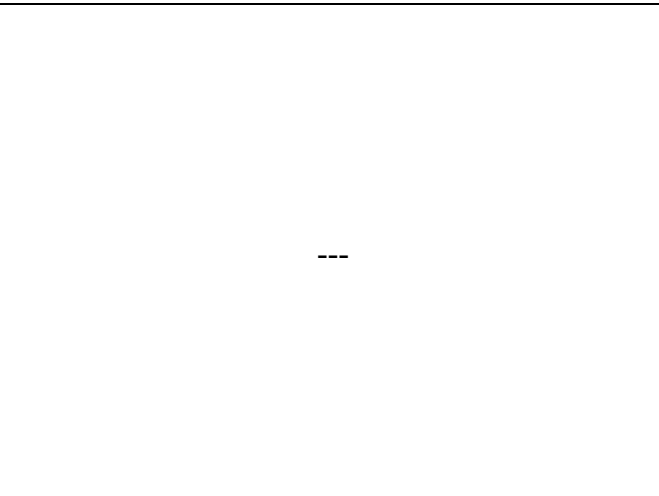


2480MHz(2.4GHz – 2.5GHz)



2480MHz(1GHz – 10GHz)





6. 6DB & 99% BANDWIDTH TEST

6.1. Block Diagram of Test Setup

Please reference to section 2.4.

6.2. Limit

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

6.3. Test Procedure

Use the test method described in ANSI C63.10 clause 11.8.2:

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., $RBW = 100 \text{ kHz}$, $VBW \geq 3 \times RBW$, 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 $\geq 6 \text{ dB}$.

Use the test method described in ANSI C63.10 clause 6.9.2:

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.4. Test Results

EUT: STB		
M/N: H200W		
Test date: 2024-08-15	Pressure: 103.3±1.0 kpa	Humidity: 52.5±3.0%
Tested by: Epoch	Test site: RF site	Temperature: 24.4±0.6℃

1Mbps:

Test Mode	Frequency (MHz)	-6dB Bandwidth (KHz)	Limit (KHz)
GFSK	2402	703.6	≥500
	2440	707.0	≥500
	2480	712.6	≥500
Conclusion : PASS			

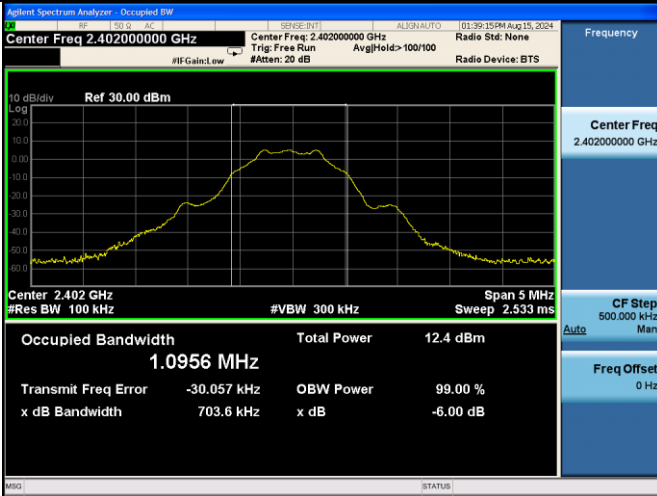
2Mbps:

Test Mode	Frequency (MHz)	-6dB Bandwidth (KHz)	Limit (KHz)
GFSK	2402	1281	≥500
	2440	1278	≥500
	2480	1281	≥500
Conclusion : PASS			

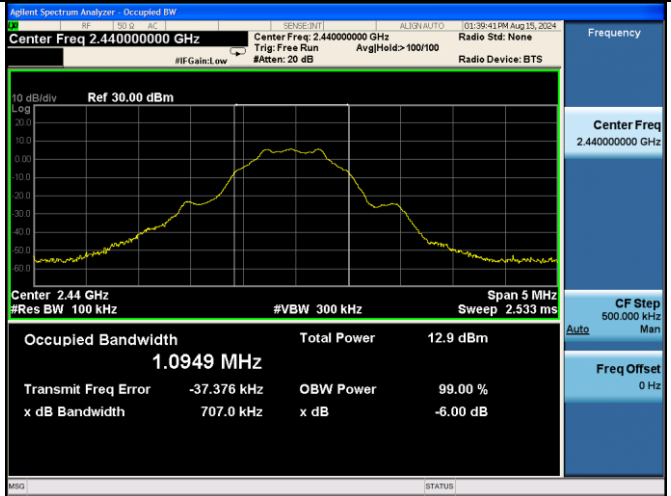
1Mbps:

GFSK

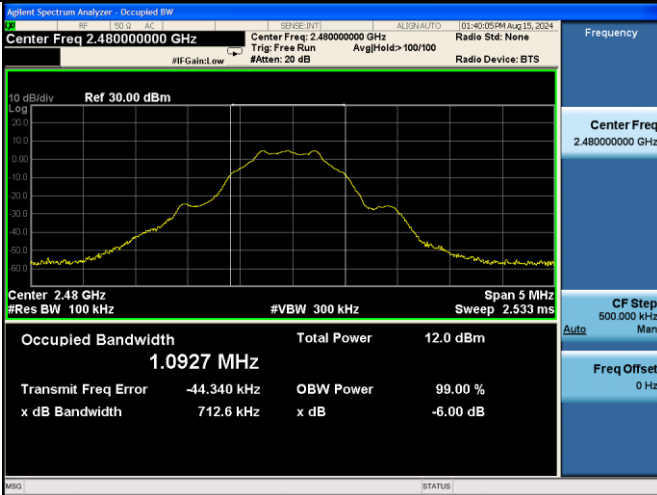
2402MHz



2440MHz



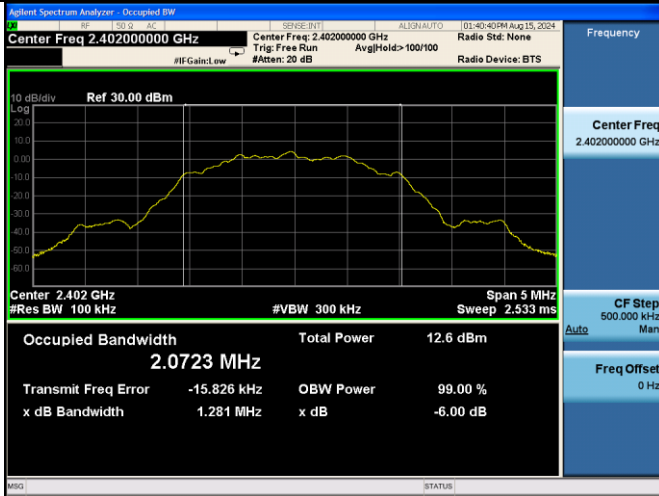
2480MHz



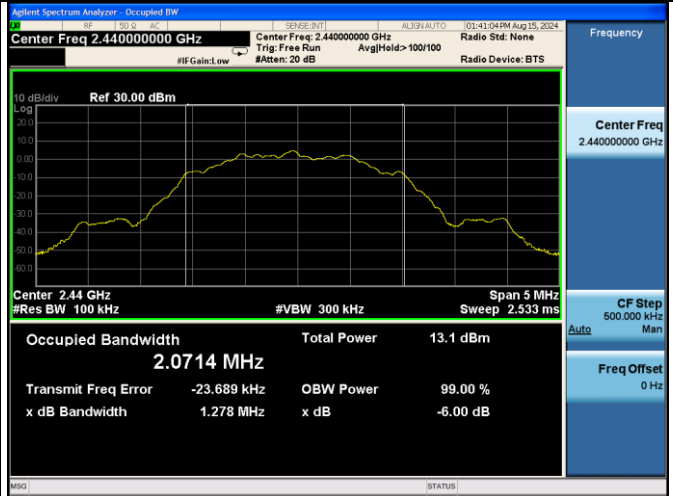
2Mbps:

GFSK

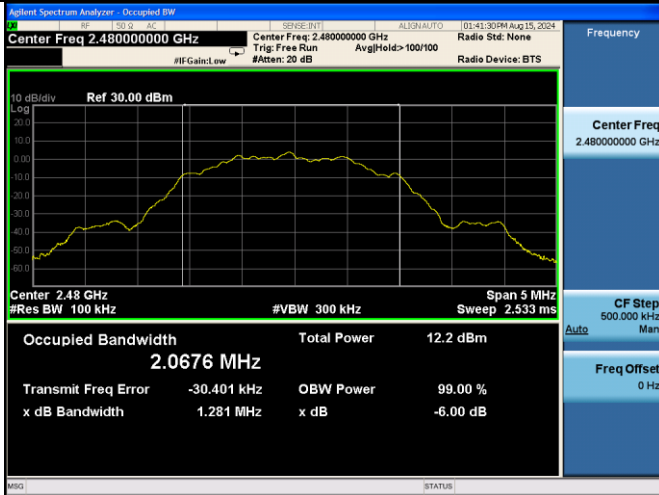
2402MHz



2440MHz



2480MHz



EUT: STB		
M/N: H200W		
Test date: 2024-08-15	Pressure: 103.3±1.0 kpa	Humidity: 52.5±3.0%
Tested by: Epoch	Test site: RF site	Temperature: 24.4±0.6℃

1Mbps:

Test Mode	CH	99%Bandwidth (KHz)	Limit (MHz)
GFSK	2402	1057.2	N/A
	2440	1057.3	
	2480	1055.4	

Conclusion:Pass

2Mbps:

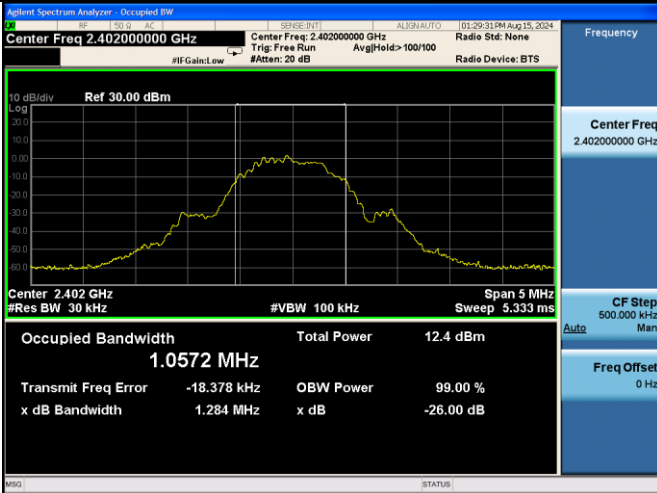
Test Mode	CH	99%Bandwidth (KHz)	Limit (MHz)
GFSK	2402	2049.8	N/A
	2440	2049.7	
	2480	2045.9	

Conclusion:Pass

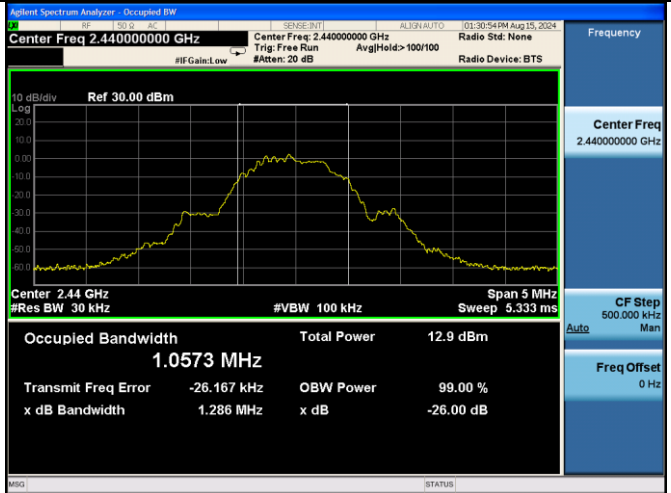
1Mbps:

GFSK

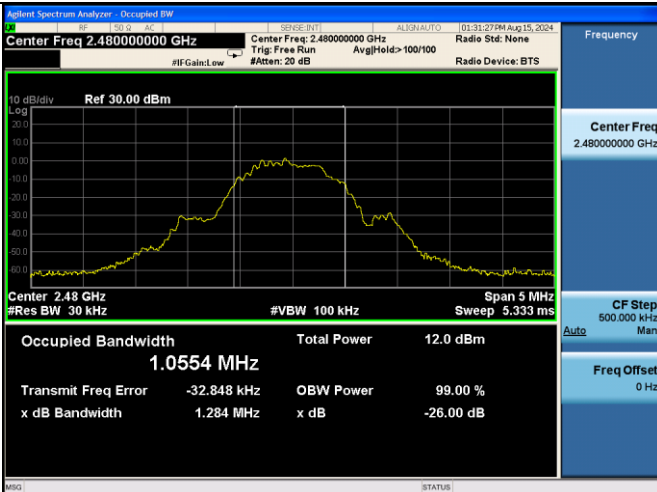
2402MHz



2440MHz



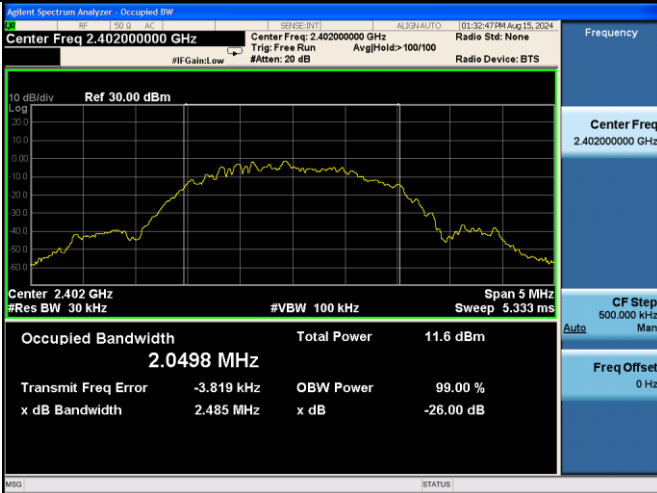
2480MHz



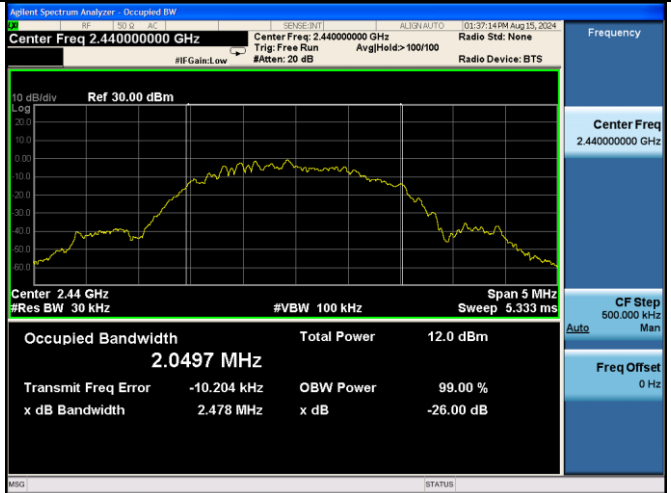
2Mbps:

GFSK

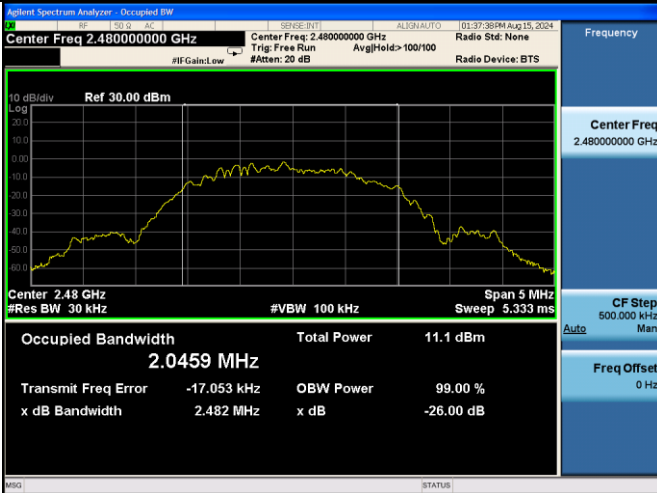
2402MHz



2440MHz



2480MHz



7. MAXIMUM PEAK OUTPUT POWER TEST

7.1. Limit

For systems using digital modulation in the 2400—2483.5MHz, The Peak out put Power shall not exceed 1W(30dBm).

7.2. Test Procedure

Use the test method descried in ANSI C63.10 clause 11.9.1.3:

Connected the EUT's antenna port to Power Sensor, and use power meter to test peak output power.

7.3. Test Results

EUT: STB		
M/N: H200W		
Test date: 2024-07-23~09-29	Pressure: 102.3±2.0 kpa	Humidity: 53.5±3.0%
Tested by: Epoch	Test site: RF site	Temperature: 23.4±0.6℃

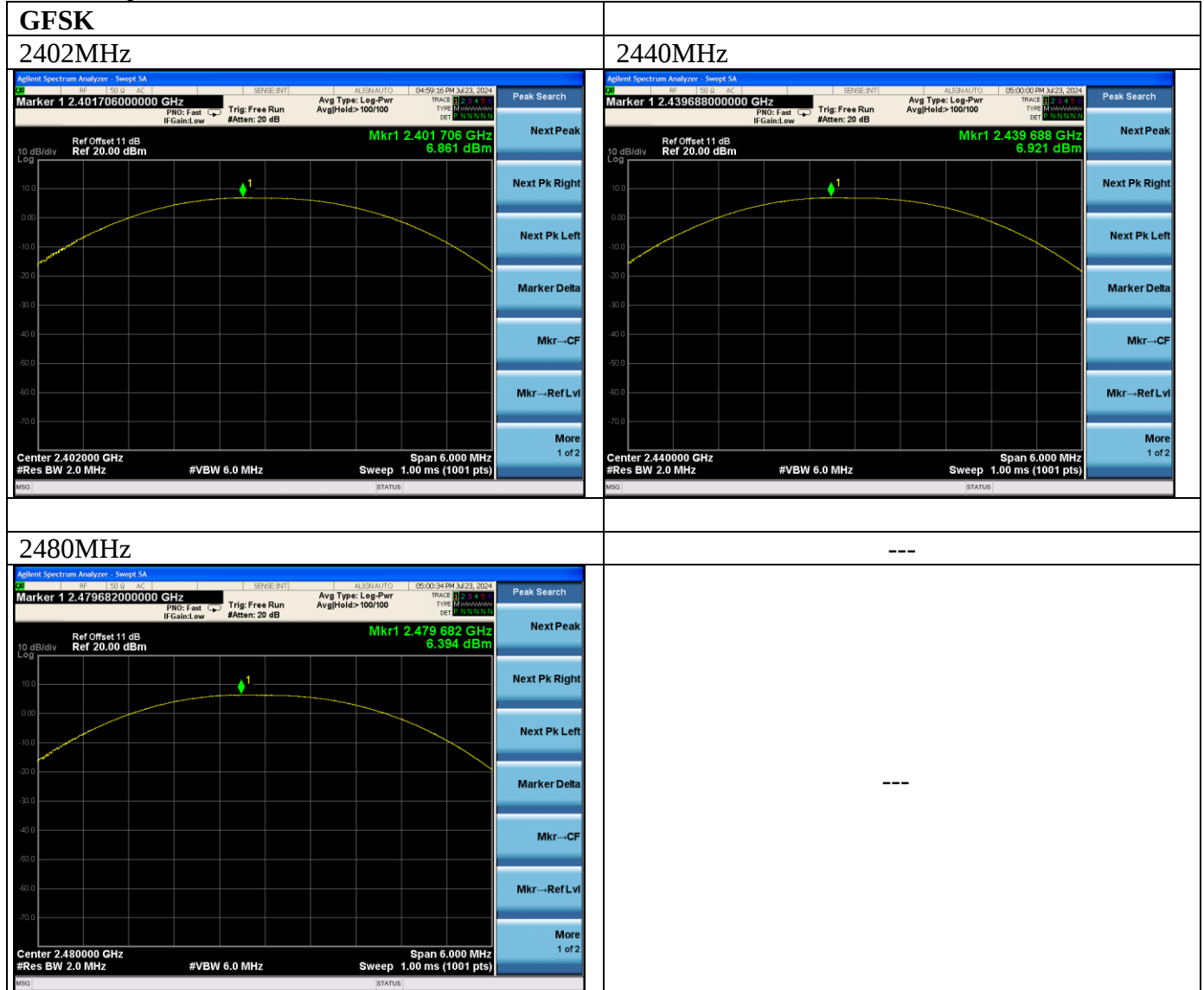
1Mbps:

Test Mode	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	Limit (dBm)
GFSK	2402	Default	6.861	30
	2440		6.921	
	2480		6.394	

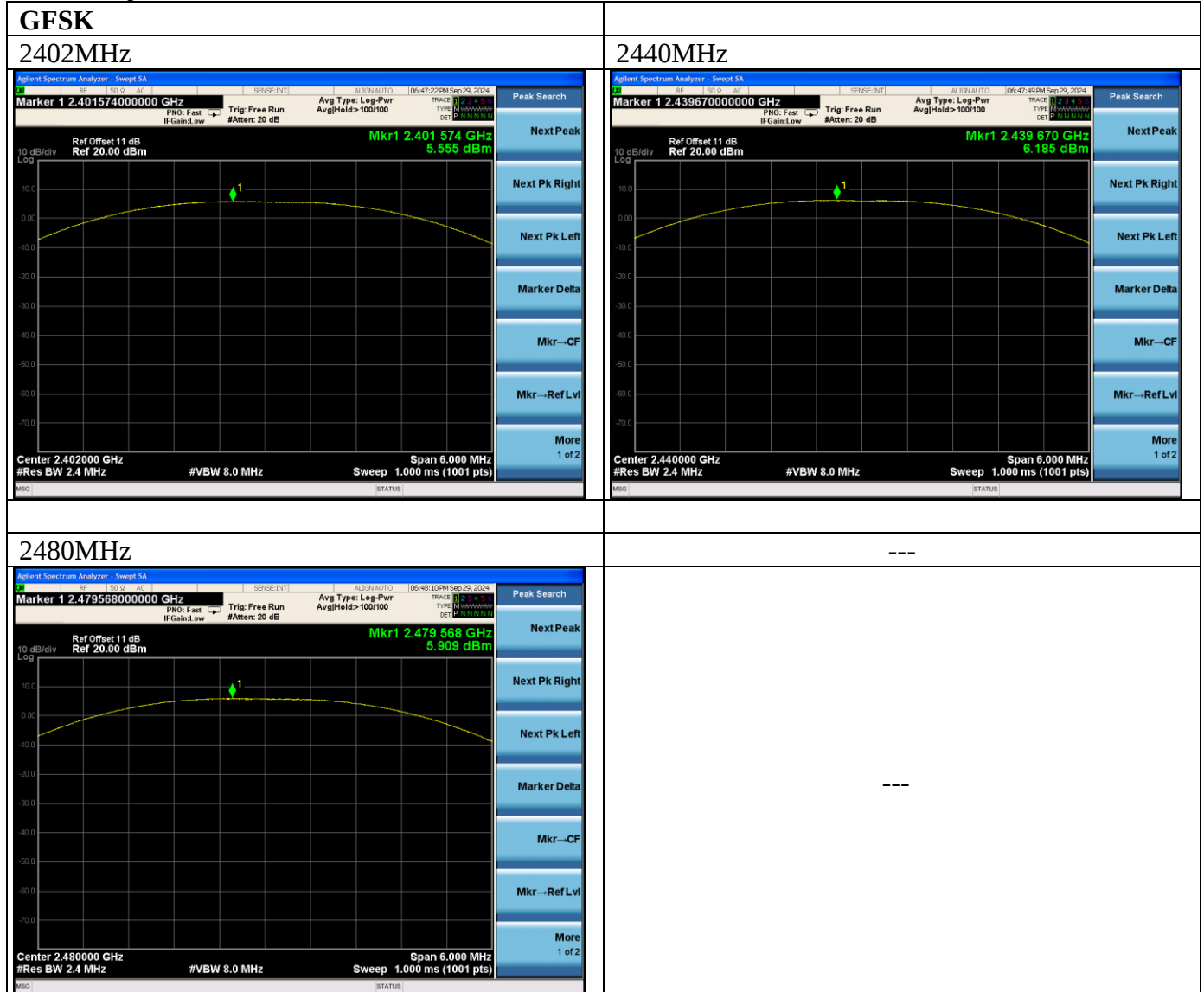
2Mbps:

Test Mode	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	Limit (dBm)
GFSK	2402	Default	5.555	30
	2440		6.185	
	2480		5.909	

1Mbps:



2Mbps:



8. BAND EDGE COMPLIANCE TEST

8.1. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

8.2. Test Produce

Use the test method described in ANSI C63.10 clause 6.10:

For upper band emissions that are up to two bandwidths(2MHz) away (2483.5MHz to 2485.5MHz) from the band-edge use below produce:

1. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 100KHz and with a video bandwidth 300KHz. Record the peak levels of the fundamental emission and the relevant band-edge emission, Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.
2. Subtract the delta measured in step (1) from the maximum field strengths measured in clause 4 .The resultant field strengths are then used to determine band-edge compliance as required by Section 15.205

For emissions above two bandwidths away from the band-edge use below produce:

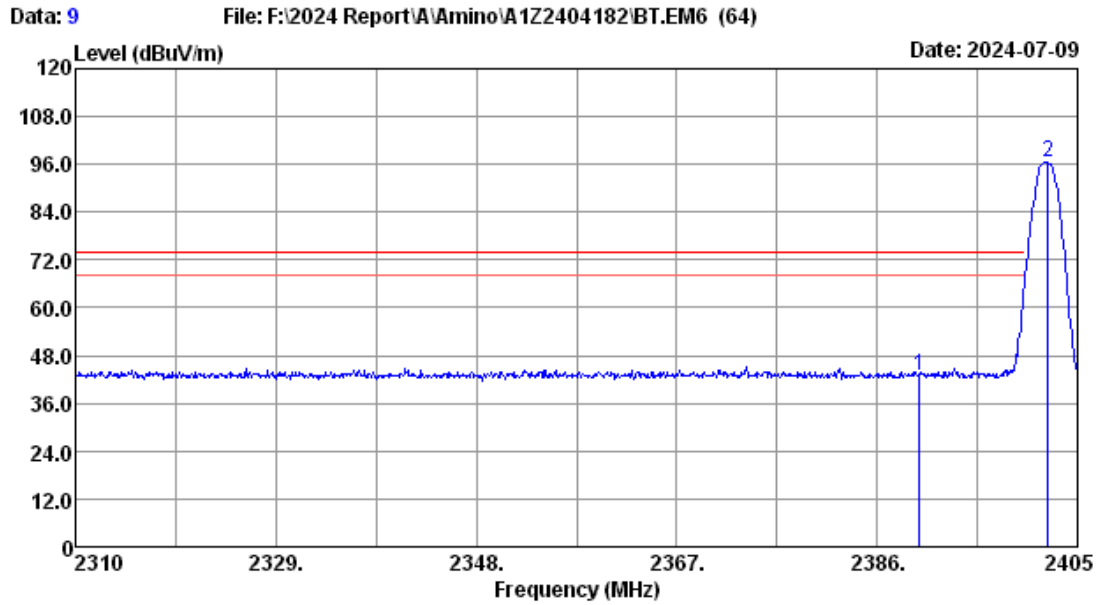
1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
 - (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
 - (b) This is pulse Modulation device a duty cycle factor was used to calculate average level based measured peak level.

8.3. Test Results

Pass (The testing data was attached in the next pages.)

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

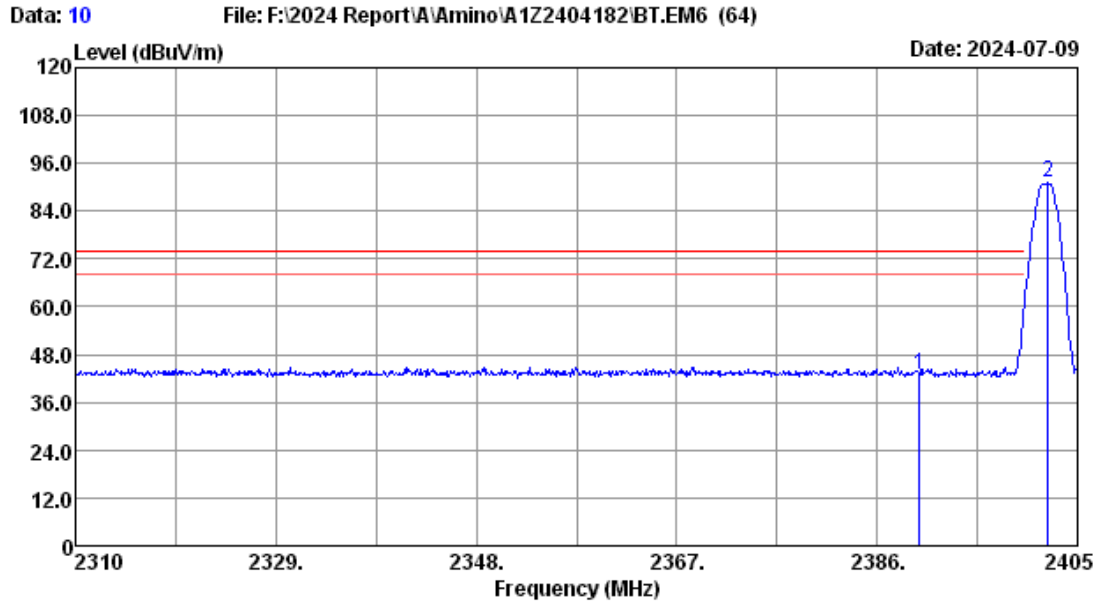
1Mbps:



Site no. : 3m Chamber Data no. : 9
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2402MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.62	5.30	42.37	32.23	43.06	74.00	30.94	Peak
2	2402.25	27.61	5.32	95.80	32.22	96.51	-----	-----	Peak

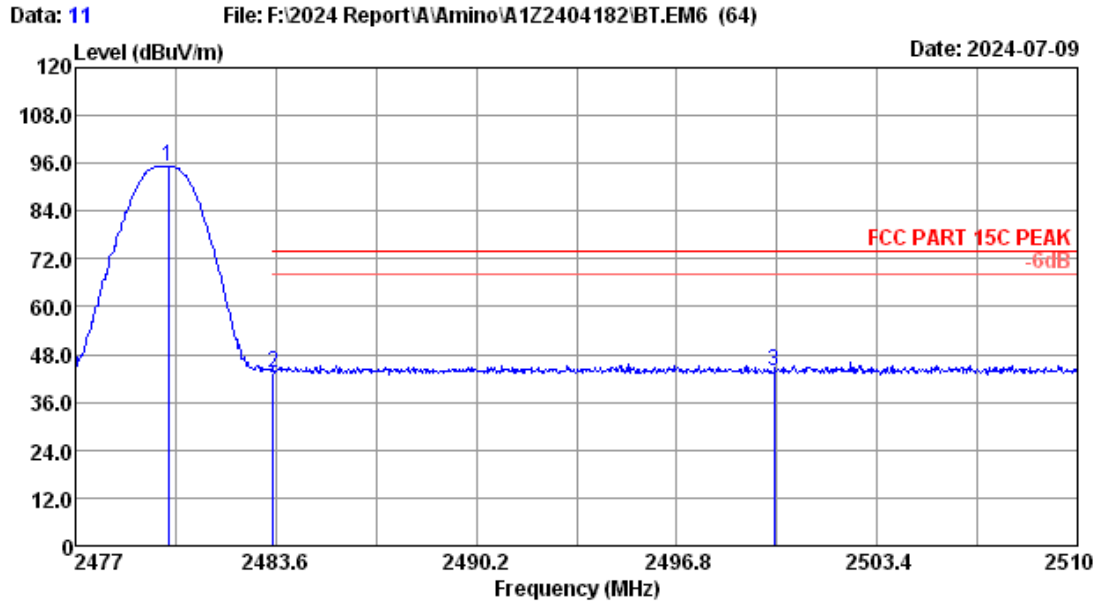
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no. : 3m Chamber Data no. : 10
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2402MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.62	5.30	42.44	32.23	43.13	74.00	30.87	Peak
2	2402.25	27.61	5.32	90.32	32.22	91.03	-----	-----	Peak

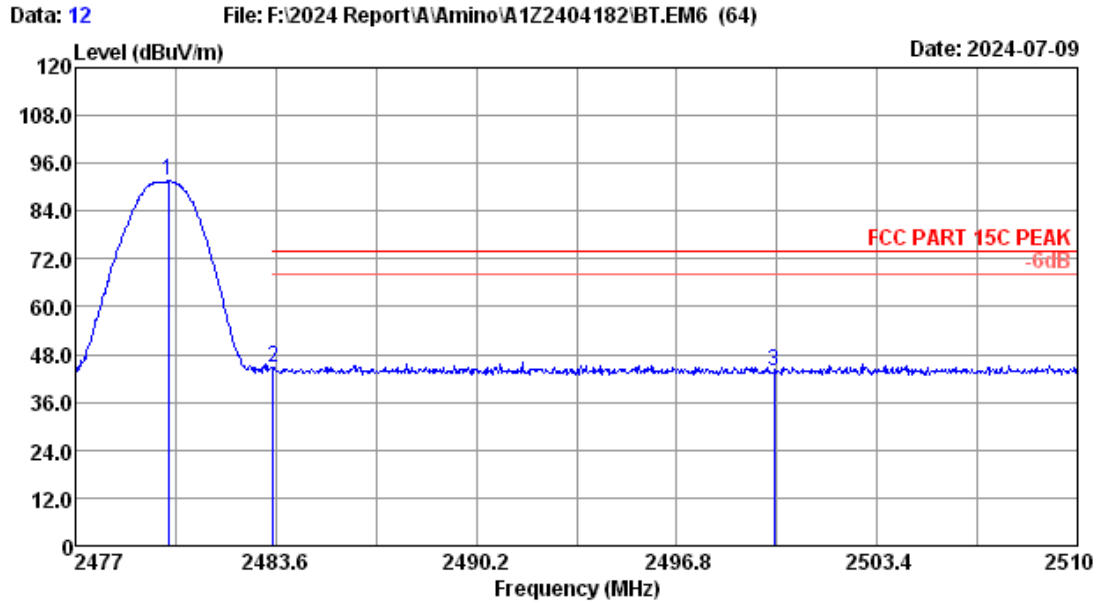
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no. : 3m Chamber Data no. : 11
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2480MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.07	27.80	5.41	94.19	32.16	95.24	-----	-----	Peak
2	2483.50	27.80	5.41	42.52	32.16	43.57	74.00	30.43	Peak
3	2500.00	27.80	5.44	42.66	32.15	43.75	74.00	30.25	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.

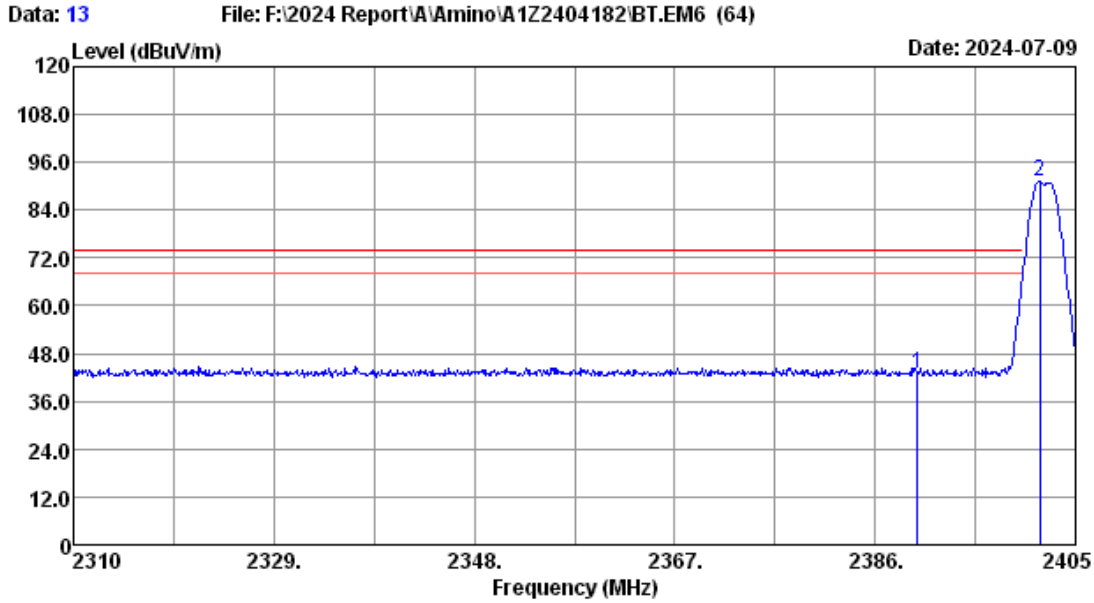


Site no. : 3m Chamber Data no. : 12
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE1M 2480MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.07	27.80	5.41	90.46	32.16	91.51	-----	-----	Peak
2	2483.50	27.80	5.41	43.68	32.16	44.73	74.00	29.27	Peak
3	2500.00	27.80	5.44	42.64	32.15	43.73	74.00	30.27	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.

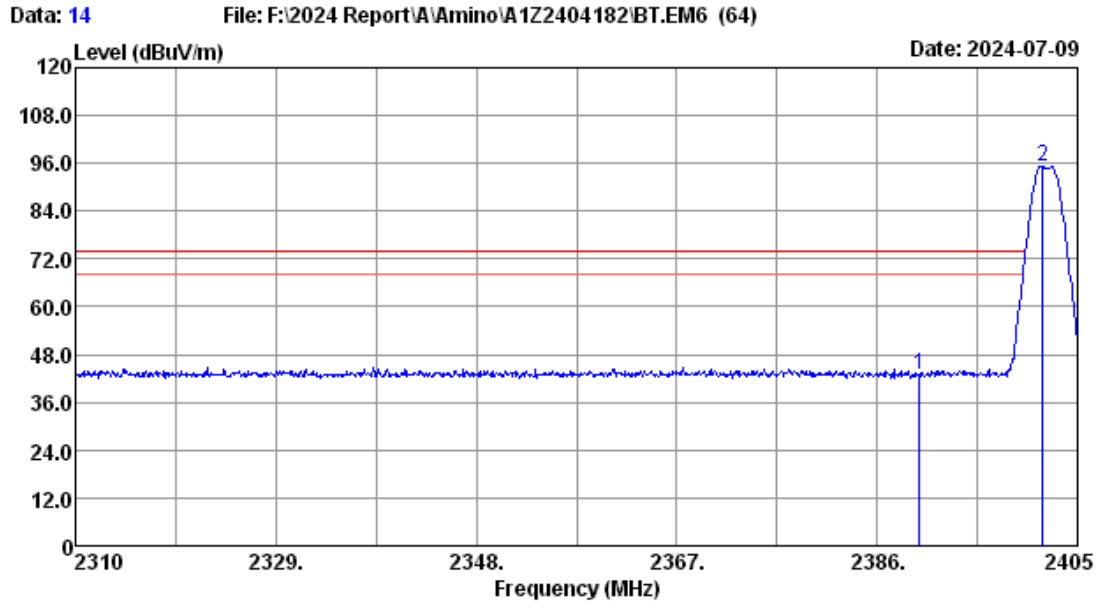
2Mbps:



Site no. : 3m Chamber Data no. : 13
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2402MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.62	5.30	42.35	32.23	43.04	74.00	30.96	Peak
2	2401.58	27.61	5.32	90.49	32.22	91.20	-----	-----	Peak

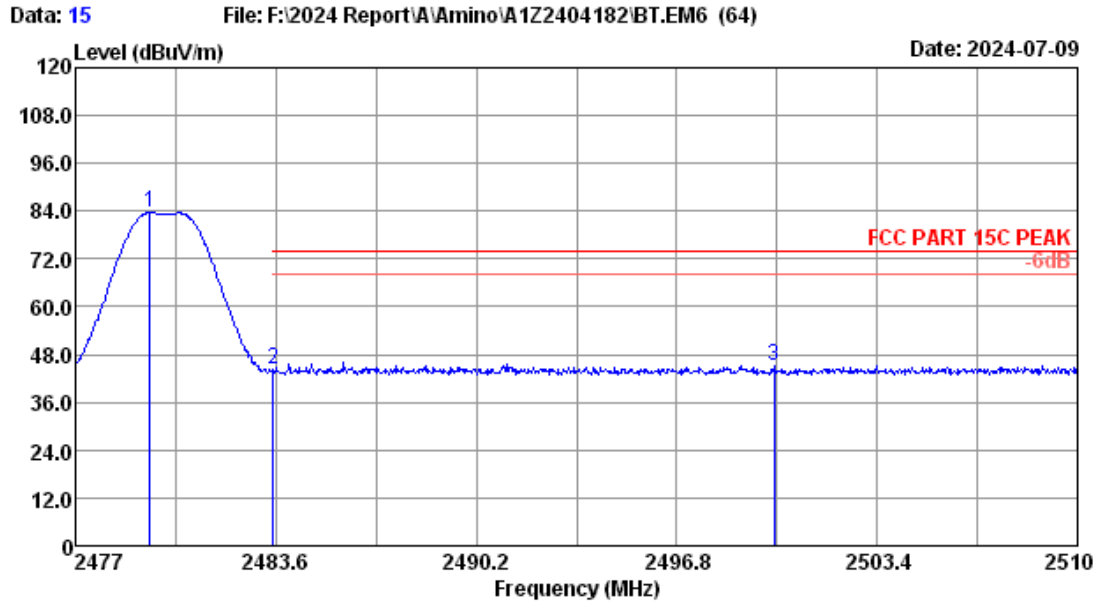
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no. : 3m Chamber Data no. : 14
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2402MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBUV)	Amp factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2390.00	27.62	5.30	42.47	32.23	43.16	74.00	30.84	Peak
2	2401.68	27.61	5.32	94.67	32.22	95.38	-----	-----	Peak

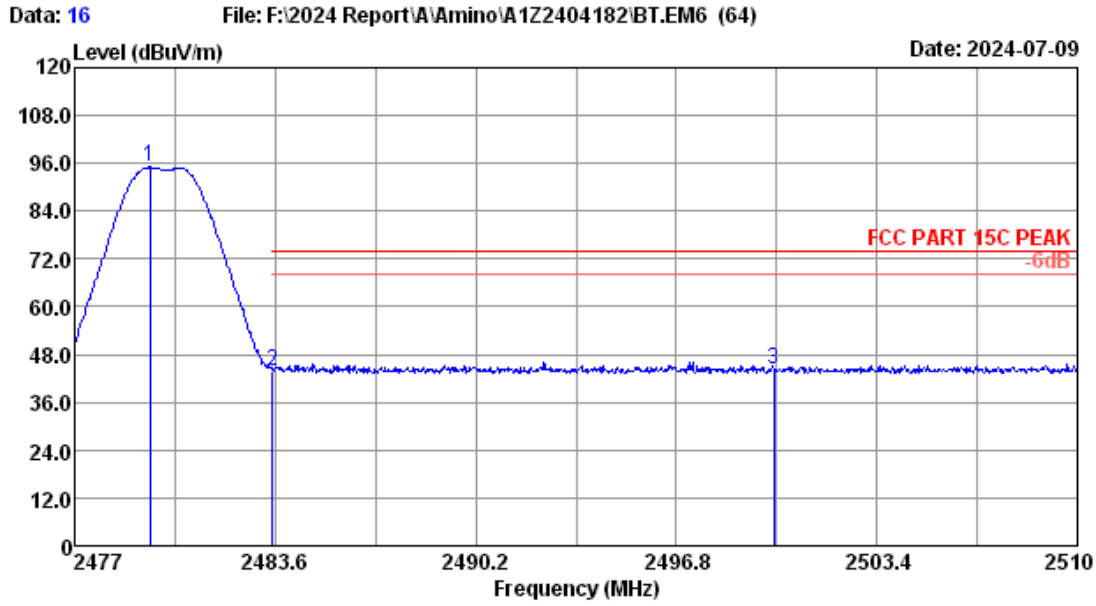
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no. : 3m Chamber Data no. : 15
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2480MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.44	27.80	5.41	82.60	32.16	83.65	-----	-----	Peak
2	2483.50	27.80	5.41	43.01	32.16	44.06	74.00	29.94	Peak
3	2500.00	27.80	5.44	43.91	32.15	45.00	74.00	29.00	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.



Site no. : 3m Chamber Data no. : 16
 Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 21.5°C/53.1% Engineer : WINTER
 Test Mode : BLE2M 2480MHz TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.48	27.80	5.41	94.05	32.16	95.10	-----	-----	Peak
2	2483.50	27.80	5.41	42.85	32.16	43.90	74.00	30.10	Peak
3	2500.00	27.80	5.44	43.09	32.15	44.18	74.00	29.82	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.

9. POWER SPECTRAL DENSITY TEST

9.1. Block Diagram of Test Setup

Please reference to section 2.4.

9.2. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

9.3. Test Procedure

Use the test method described in ANSI C63.10 clause 11.10.2:

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq [3 \times \text{RBW}]$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

9.4. Test Results

EUT: STB		
M/N: H200W		
Test date: 2024-08-13	Pressure: 102.3±1.0 kpa	Humidity: 53.5±3.0%
Tested by: Epoch	Test site: RF site	Temperature: 23.4±0.6°C

1Mbps:

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/3KHz)	Limit (dBm/MHz)
GFSK	2402	-9.132	8
	2440	-9.966	8
	2480	-10.830	8
Conclusion : PASS			

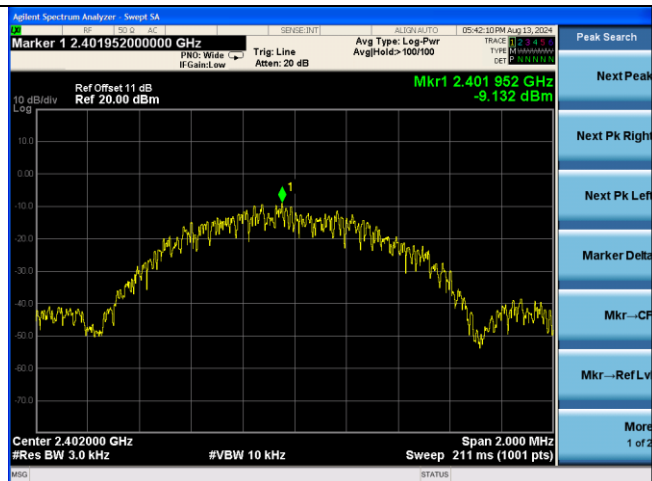
2Mbps:

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/3KHz)	Limit (dBm/MHz)
GFSK	2402	-11.454	8
	2440	-12.259	8
	2480	-13.234	8
Conclusion : PASS			

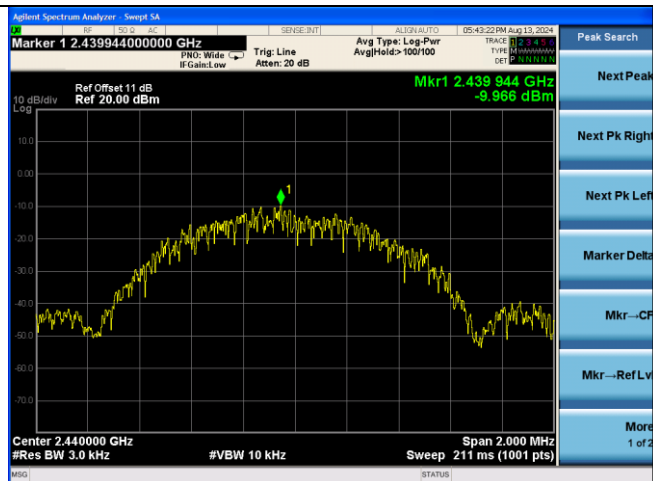
1Mbps:

FSK

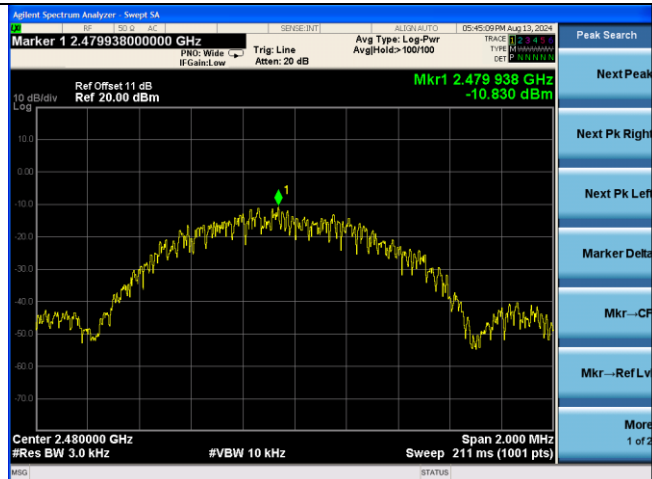
2402MHz



2440MHz



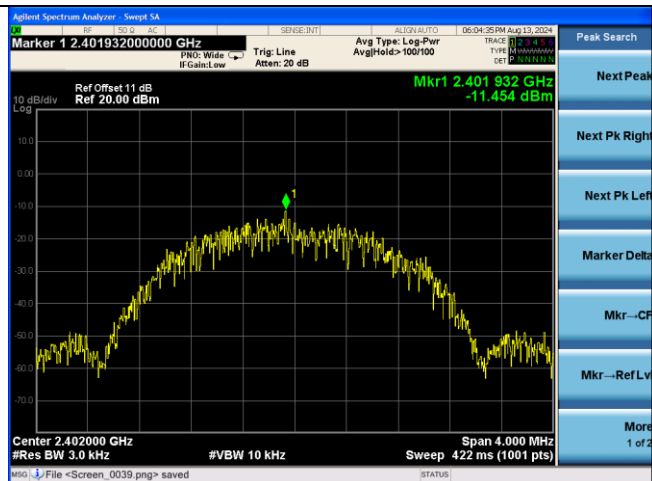
2480MHz



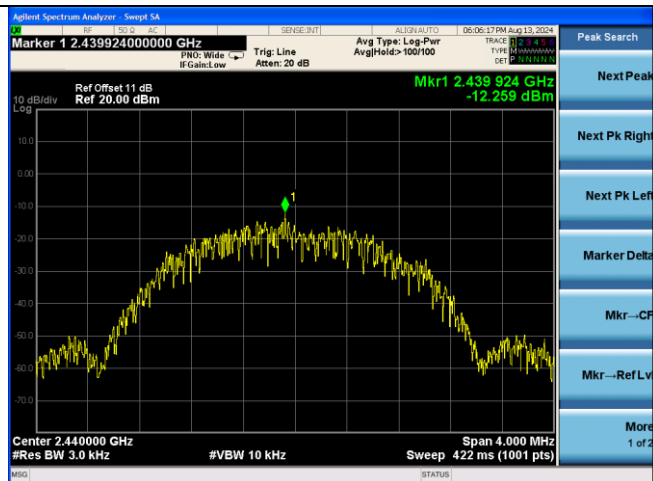
2Mbps:

FSK

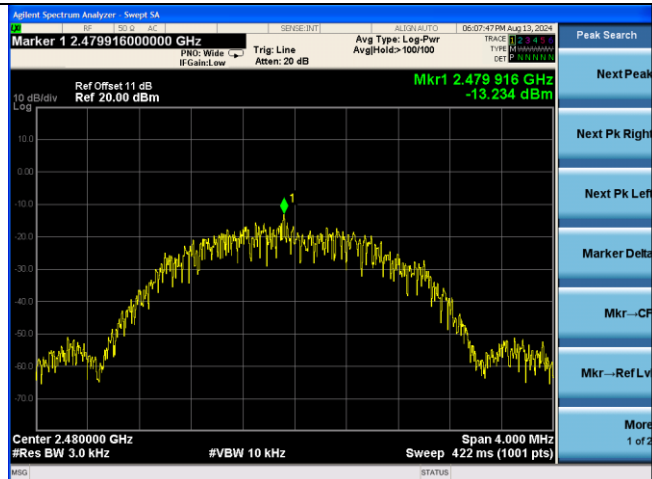
2402MHz



2440MHz



2480MHz



10.ANTENNA REQUIREMENT

10.1. STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2. ANTENNA CONNECTED CONSTRUCTION

The antennas used for this product are PCB Antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 3dBi.

11. DEVIATION TO TEST SPECIFICATIONS

[NONE]

THE END