

FCC PART 15C TEST REPORT FOR CERTIFICATION

On Behalf of

Sony Group Corporation

Product: Home Theatre System

Model No.: YY2089C

Speaker System: YY2089C1; YY2089C4

Active Subwoofer: YY2089C2

Wireless Amplifier: YY2089C3

FCC ID: AK8YY2089C2

Brand: SONY

EUT Name	EUT Model No.
Active Subwoofer	YY2089C2

Prepared for : Sony Group Corporation
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Date of Test : Aug.29~Oct.15, 2024
Date of Report : Oct.30, 2024

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TEST REPORT

Applicant : Sony Group Corporation
Product : Home Theatre System
Model No. : YY2089C
Speaker System : YY2089C1; YY2089C4
Active Subwoofer : YY2089C2
Wireless Amplifier : YY2089C3
Brand : SONY
FCC ID : AK8YY2089C2
Test Voltage : AC 120V/60Hz

Tested for comply with:
FCC CFR47 Part 15 Subpart C

Test procedure used:
ANSI C63.10:2020+COR1:2023

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 : Aug.29~Oct.15, 2024 Date of Report: Oct.30, 2024

Prepared by : Dora Yang Reviewed by : Thomas Chen
Dora Yang / Assistant Manager 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	PASS
Carrier Frequency Separation Test	FCC Part 15: 15.247(a)(1) ANSI C63.10:2020+COR1:2023	PASS
20dB & 99% Bandwidth Test	FCC Part 15: 15.215(c) ANSI C63.10:2020+COR1:2023	PASS
Number Of Hopping Frequency Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10:2020+COR1:2023	PASS
Dwell Time Test	FCC Part 15: 15.247(a)(1)(iii) 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
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

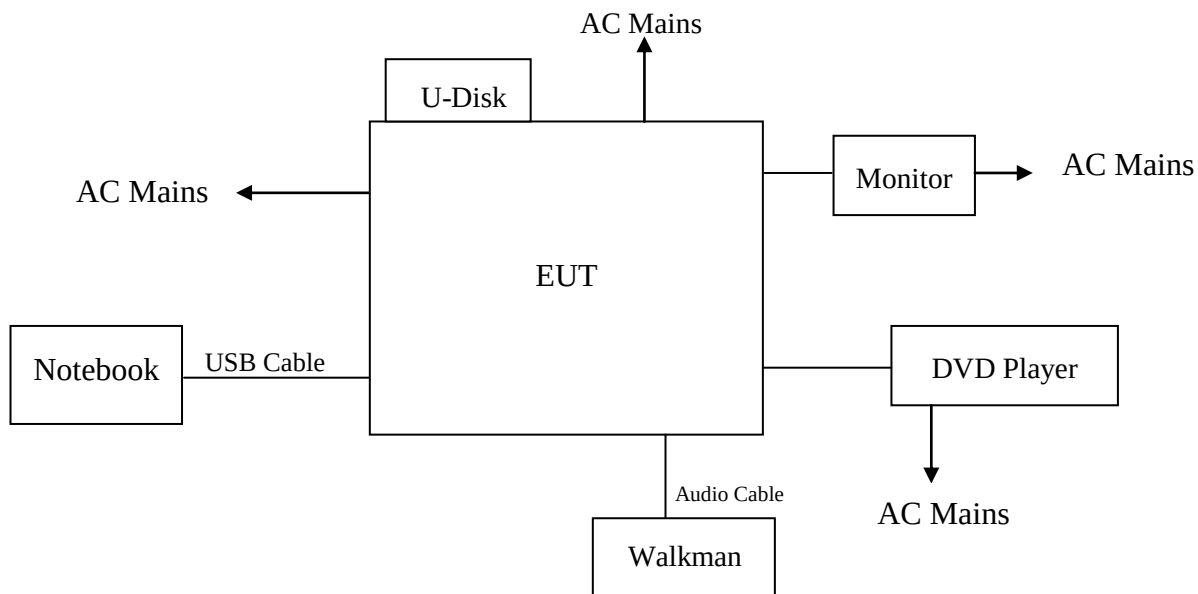
Applicant	Sony Group Corporation
Applicant Address	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
Manufacturer	Sony Group Corporation
Manufacturer Address	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
Product	Home Theatre System
Model No.	YY2089C
Speaker System	YY2089C1; YY2089C4
Active Subwoofer	YY2089C2
Wireless Amplifier	YY2089C3
Brand	SONY
EUT Name	Active Subwoofer
EUT Model No.	YY2089C2
FCC ID	AK8YY2089C2
Radio	BDR+EDR, BLE, SRD
Frequency Range	BT(BDR+EDR, BLE): 2402-2480MHz SRD: 2403-2479MHz
Type of Modulation(BT)	GFSK, $\pi/4$ DQPSK, 8DPSK
Type of Modulation(SRD)	GFSK
Remote Control	Manufacturer: Sony; Model: RMT-AH513U
Power Cord	Unshielded, Detachable, 1.5m (2 pins)
HDMI Cable	Shielded, Detachable, 1.5m
Sample Type	Prototype production
Date of Receipt	Aug.20, 2024
Date of Test	Aug.29~Oct.15, 2024
The EUT covered in this report is Active Subwoofer; This product (YY2089C) Home Theatre System consists of Speaker System (YY2089C1; YY2089C4), Active Subwoofer (YY2089C2) and Wireless Amplifier (YY2089C3).	

Antenna System	
Type of Antenna	Active Subwoofer SRD: PCB Antenna Active Subwoofer BT: PCB Antenna Wireless Amplifier SRD: PCB Antenna
Antenna Peak Gain	Active Subwoofer SRD: 2.61dBi Active Subwoofer BT: 2.1dBi Wireless Amplifier SRD: 2.5dBi

2.2. Tested Supporting System Details

No.	Description	ACS No.	Manufacturer	Model	Serial Number
1.	Monitor#1 (For CE Test)	ACS-EMC-Lenovo	Lenovoe	L2264W+	N/A
		Power Cord(3C): Unshielded, Detachable, 1.8m			
2.	Monitor#2 (For RE& Band Edge Test)	---	Lenovoe	A24240WT	N/A
		Power Cord(3C): Unshielded, Detachable, 1.8m			
3.	DVD Player	N/A	Pioneer	DV-310NC-K	N/A
		Power Cord(3C): Unshielded, Detachable, 1.8m			
4.	Notebook	N/A	ACER	ZOW	N/A
		Power Cord(3C): Unshielded, Detachable, 1.8m			
		Power Adaptor: Manufacturer: Lite-On, M/N: PA-1900-32 Cable: Unshielded, Undetectable, 4.0m(Bond one ferrite core)			
5.	Walkman	---	Sony	NWZ-E360	---
6.	U-Disk	---	Sandisk	CZ73	---

2.3. Block Diagram of connection between EUT and simulators



(EUT: Active Subwoofer)

2.4. Test information

A special software (BT FCC Tool V2.24) was used to control EUT work in TX mode

Tested mode, Packet Type, peak output power information			
Mode	Packet Type	Output power(dBm) P max	Output Power(dBm) P low
GFSK	DH1	7.217	7.105
	DH3		
	DH5		
8-DPSK	3-DH1	8.257	8.137
	3-DH3		
	3-DH5		

Note: $\pi/4$ DQPSK mode has been verified to have the lowest power, so the final test were performed with GFSK and 8-DPSK mode, the worse-case packet type were:

GFSK Mode: DH5

8-DPSK Mode: 3-DH5

Item		Modulation	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge	GFSK	1Mbps	00/78
		8-DPSK	3Mbps	00/78
	Radiated Emission Test	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
Conducted Test Case	20dB & 99% Bandwidth	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
	Carrier Frequency Separation	GFSK	1Mbps	Hopping Channel
		8-DPSK	3Mbps	Hopping Channel
	Dwell Time	GFSK	1Mbps	Hopping Channel
		8-DPSK	3Mbps	Hopping Channel
	Number Of Hopping Frequency	GFSK	1Mbps	Hopping Channel
		8-DPSK	3Mbps	Hopping Channel
	Maximum Peak Output Power	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
	Band Edge Compliance	GFSK	1Mbps	00/78
		8-DPSK	3Mbps	00/78
	Conducted Spurious Emissions	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78

2.5. 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

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

Accredited by NVLAP, USA
NVLAP Code: 200372-0
Valid Date: Mar.31, 2026

2.6. 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-18GHz)	$\pm 4.0\text{dB}(1\sim 6\text{GHz, Distance: } 3\text{m})$
	$\pm 4.0\text{dB}(6\sim 18\text{GHz, Distance: } 3\text{m})$
Uncertainty for S_{vswR} in 3m Chamber	$\pm 2.8\text{dB}(1\sim 6\text{GHz})$
	$\pm 2.8\text{dB}(6\sim 18\text{GHz})$
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	$\pm 4.6\%$
Uncertainty for DC power test	$\pm 0.1\%$
Uncertainty for test site temperature and humidity	$\pm 0.6^{\circ}\text{C}$
	$\pm 3\%$

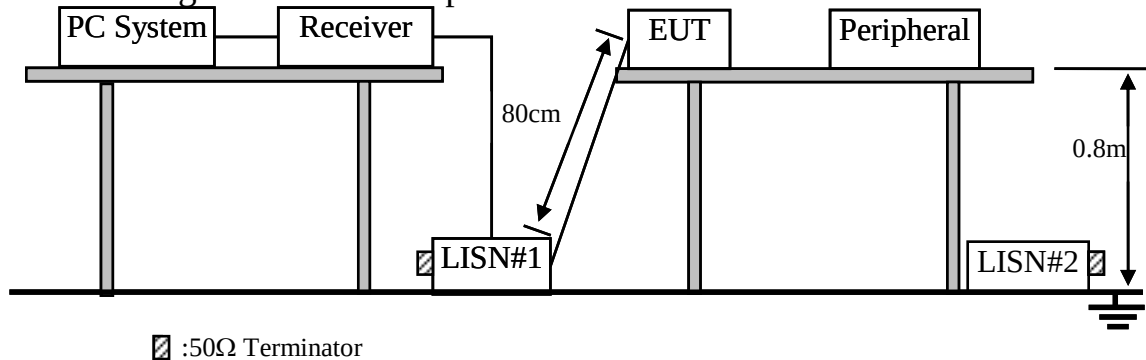
3. POWER LINE CONDUCTED EMISSION TEST

3.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	1# Shielding Room	AUDIX	N/A	N/A	Nov.09,22	3 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100842	Mar.16,24	1 Year
3.	L.I.S.N.#1	Rohde & Schwarz	ENV216	102160	Jun.19,24	1 Year
4.	RF Cable	Eastsheep	RG223	190424	Sep.12,24	1Year
5.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

Note: N/A means Not applicable.

3.2. Block Diagram of Test Setup



□ :50Ω Terminator

3.3. 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)

3.4. 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.

3.4.1. Active Subwoofer (EUT)

Model No. : YY2089C2

Serial No. : N/A

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

3.5. Operating Condition of EUT

- 3.5.1. Setup the EUT as shown as Section 3.2.
- 3.5.2. Turn on the power of EUT.
- 3.5.3. PC run test software to control EUT work in Tx mode.

3.6. Test Procedure

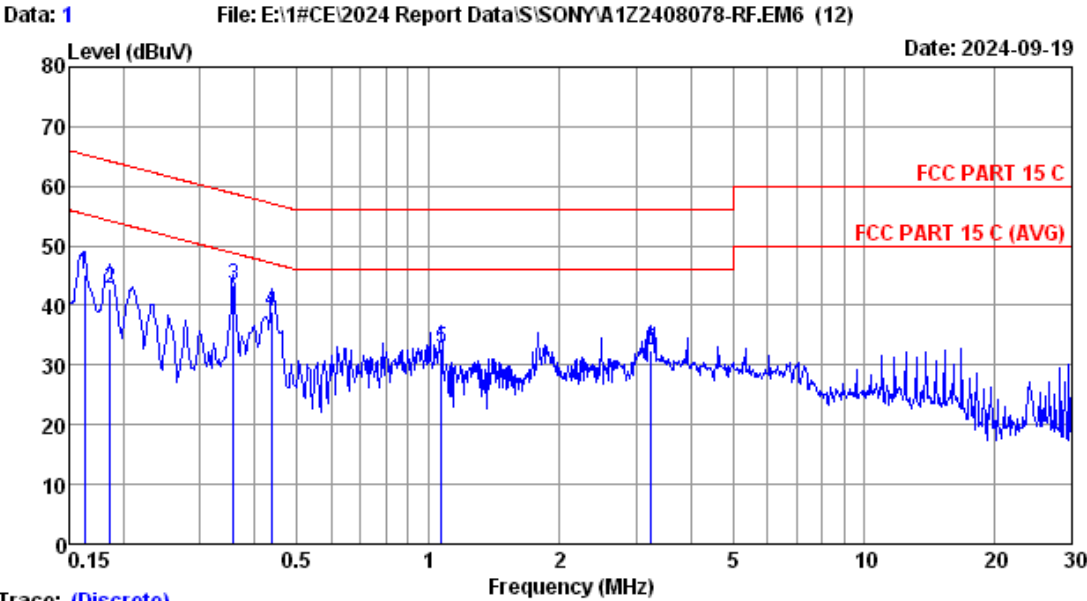
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. #1). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). The 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.

3.7. Power Line Conducted Emission Test Results

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



Trace: (Discrete)

Site no :1# CE Data No :1

Dis./Lisn :2024 ENV216-L

Limit :FCC PART 15 C

Env./Ins. :24.2°C/54% Engineer :Hongjie

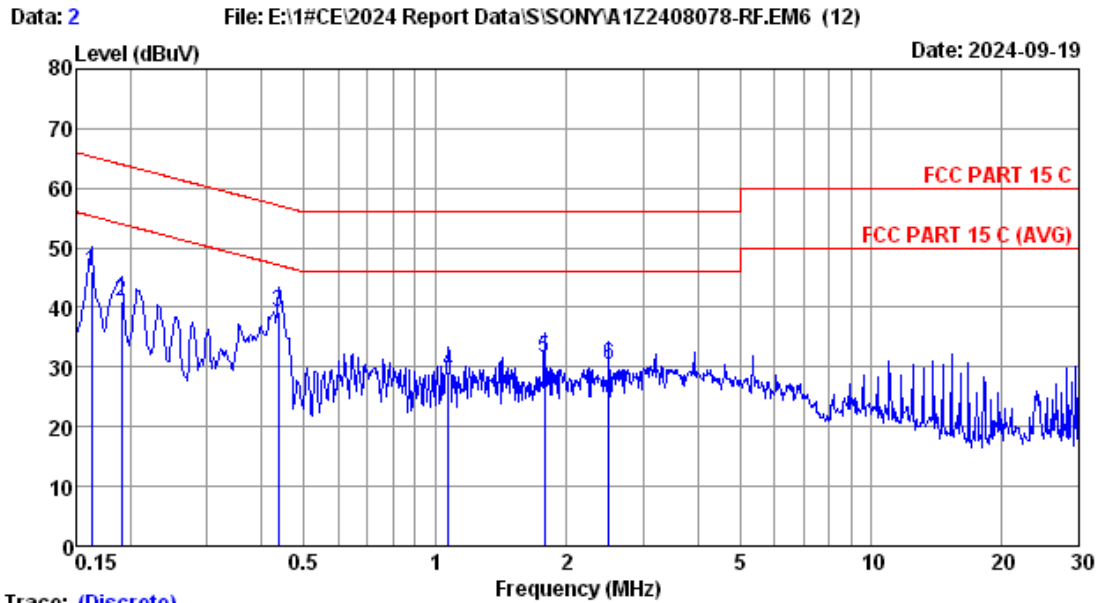
EUT :

Power Rating :AC 120V/60Hz

Test Mode :BT3.0 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	35.33	45.11	65.34	20.23	QP
2	0.186	9.76	0.01	33.08	42.85	64.20	21.35	QP
3	0.358	9.76	0.02	33.72	43.50	58.77	15.27	QP
4	0.437	9.76	0.02	29.12	38.90	57.11	18.21	QP
5	1.071	9.78	0.02	22.87	32.67	56.00	23.33	QP
6	3.241	9.80	0.05	22.65	32.50	56.00	23.50	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.



Trace: (Discrete)

Site no	:1# CE	Data No	:2
Dis./Lisn	:2024 ENV216-N		
Limit	:FCC PART 15 C		
Env./Ins.	:24.2°C/54%	Engineer	:Hongjie
EUT	:		
Power Rating	:AC 120V/60Hz		
Test Mode	:BT3.0 TX Mode		

No	Freq (MHz)	LISN		Cable		Emission		Margin (dB)	Remark
		Factor (dB)		Loss (dB)		Level (dBuV)	Limits (dBuV)		
1	0.162	9.76		0.01		36.28	46.05	19.29	QP
2	0.190	9.78		0.01		31.35	41.14	22.88	QP
3	0.437	9.78		0.02		29.48	39.28	17.83	QP
4	1.071	9.80		0.02		19.47	29.29	26.71	QP
5	1.781	9.80		0.04		21.88	31.72	24.28	QP
6	2.500	9.81		0.04		20.43	30.28	25.72	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 TEST

4.1. Test Equipments

Frequency range: 30~1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3m Chamber(NSA)	AUDIX	N/A	N/A	Aug.11,22	3Year
2.	3m Chamber(SE)	AUDIX	N/A	N/A	Sep.16,22	3 Year
3.	Signal Analyzer	Rohde & Schwarz	FSV40	101608	Nov.07,23	1 Year
4.	Tri-log-Broadband Antenna	SCHWARZBECK	VULB 9168	429	Oct.10,23	1 Year
5.	NSA Cable	HUBER+SUHNER	CFD400NL-LW	No.3+190411	Sep.13,24	1 Year
6.	Coaxial Switch	Anritsu	MP59B	6201397223	Mar.17,24	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESR3	101931	Mar.17,24	1 Year
8.	Amplifier	HP	8447D	2944A11159	Mar.17,24	1 Year
9.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

Note: N/A means Not applicable.

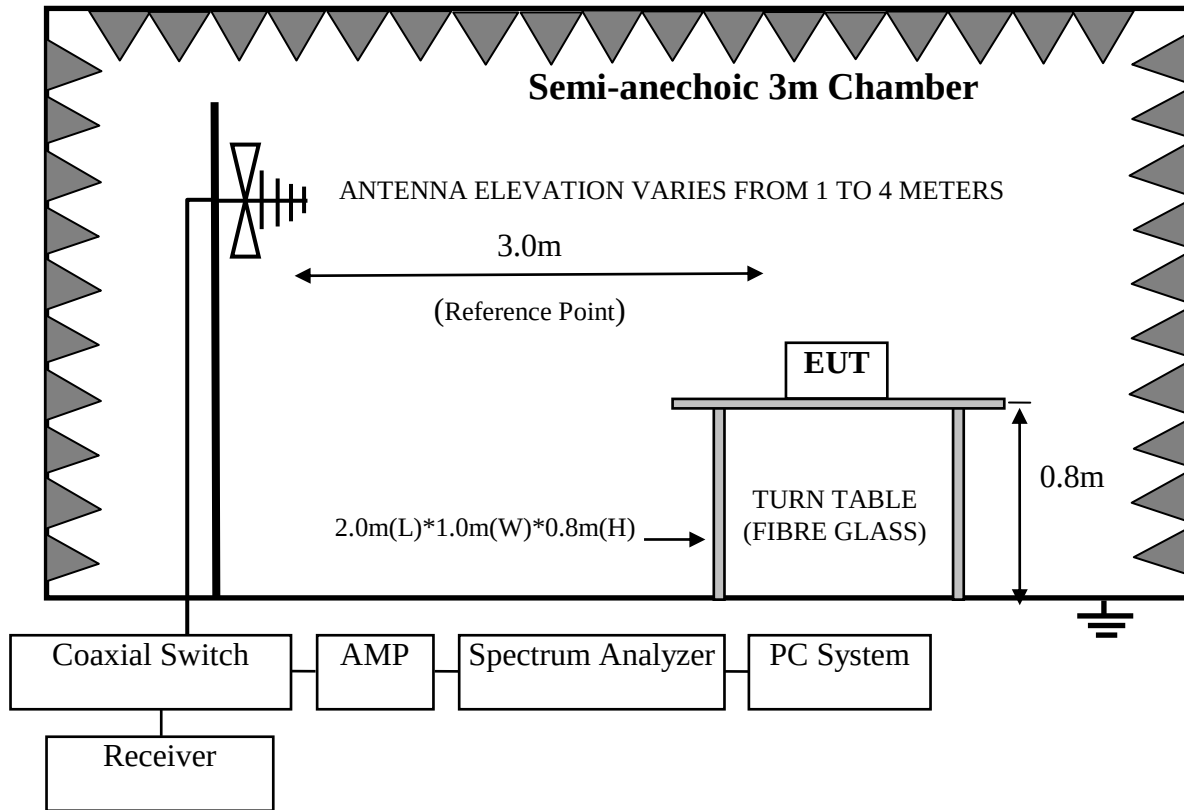
Frequency range: above 1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3mChamber(Svswr)	AUDIX	N/A	N/A	Aug.09,22	3Year
2.	3mChamber(SE)	AUDIX	N/A	N/A	Sep.16,22	3Year
3.	Signal Analyzer	Rohde & Schwarz	FSV40	101608	Nov.07,23	1 Year
4.	Amplifier	EMCI	EMC0518A45S E	980965	Aug.13,24	1 Year
5.	RF Cable	TIMES MICROWAVE	SFT205-NMSM- 10.00M	689241	Aug.13,24	1 Year
6.	Test Software	AUDIX	e3	6.100913a	N/A	N/A
7.	Horn Antenna	EMCO	3115	9510-4580	Jan.08,22	3 Year

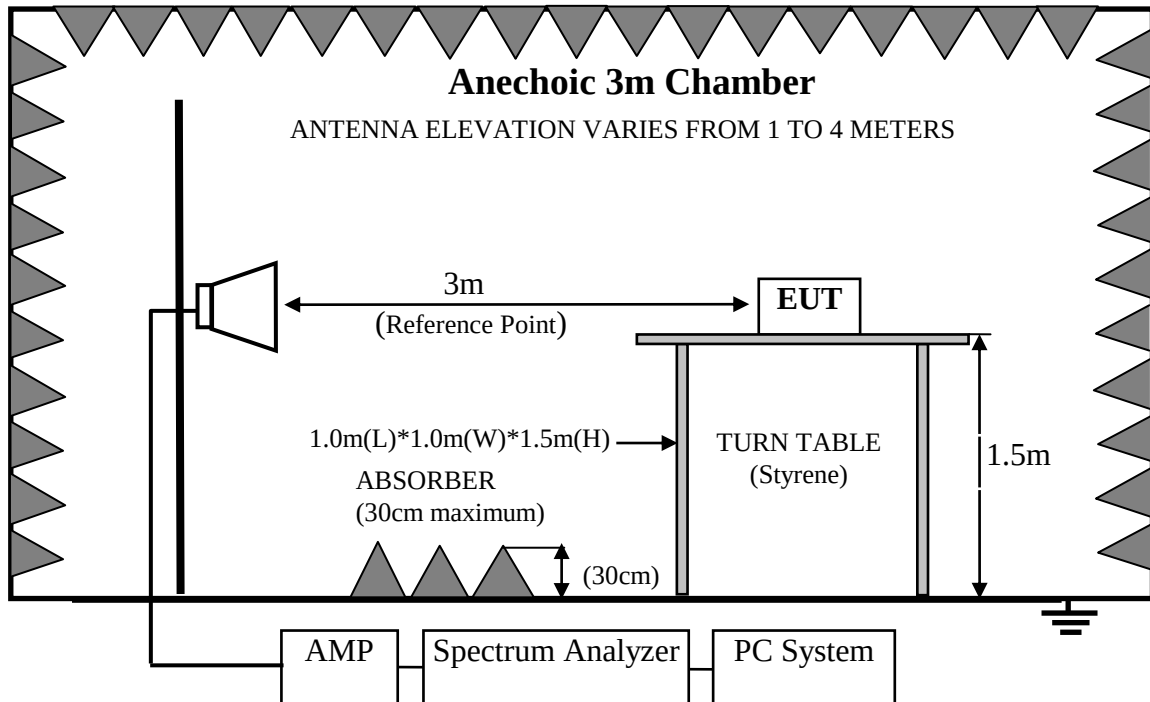
Note: N/A means Not applicable.

4.2. Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range above 1GHz



4.3. 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 ($\text{dB}\mu\text{V}/\text{m}$) = Reading (Receiver) ($\text{dB}\mu\text{V}$) + Antenna Factor (dB/m) + Cable Loss (dB)
Emission Level ($\text{dB}\mu\text{V}/\text{m}$) = 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 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.4. 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.

4.4.1. Active Subwoofer (EUT)

Model Number : YY2089C2
Serial Number : N/A

4.5. Operating Condition of EUT

- 4.5.1. Setup the EUT and simulator as shown as Section 4.2.
- 4.5.2. Turn on the power of all equipments.
- 4.5.3. Let EUT work in Tx mode.

4.6. 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.

Frequency Above 30MHz:

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

The bandwidth of the EMI test receiver (R&S ESR3) 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.

4.7. Radiated Emission Test Results

PASS.

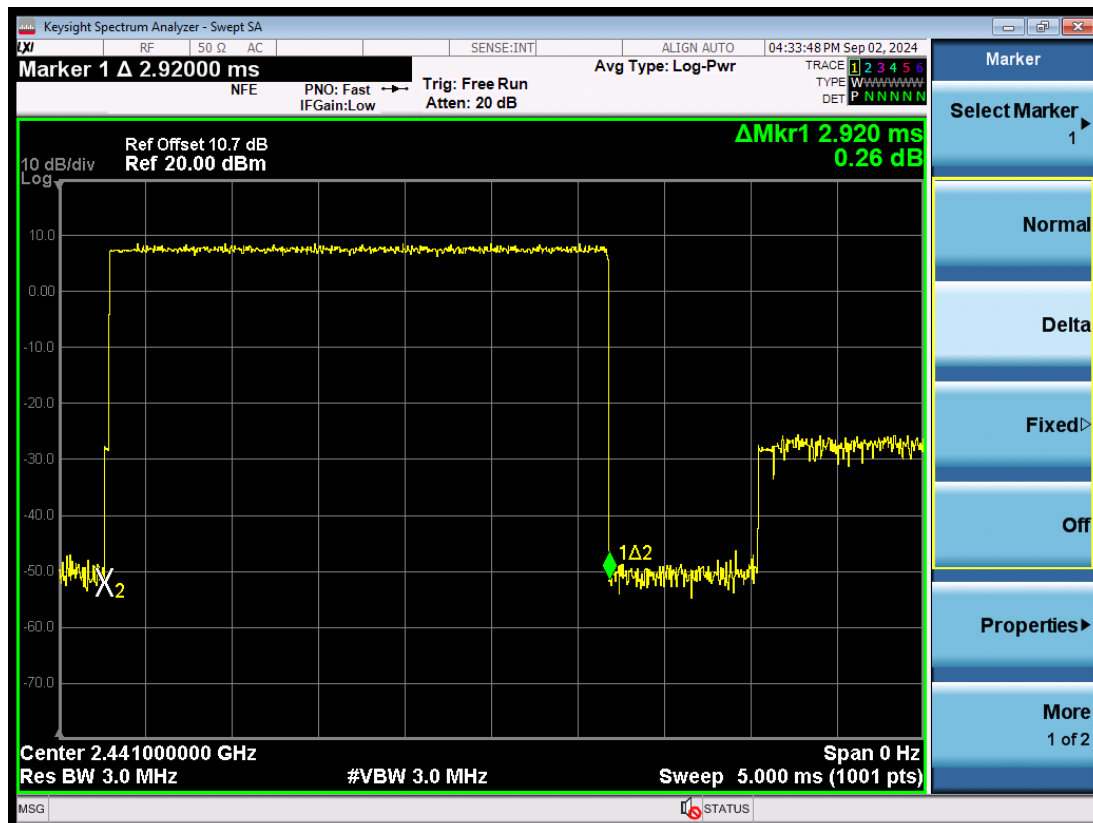
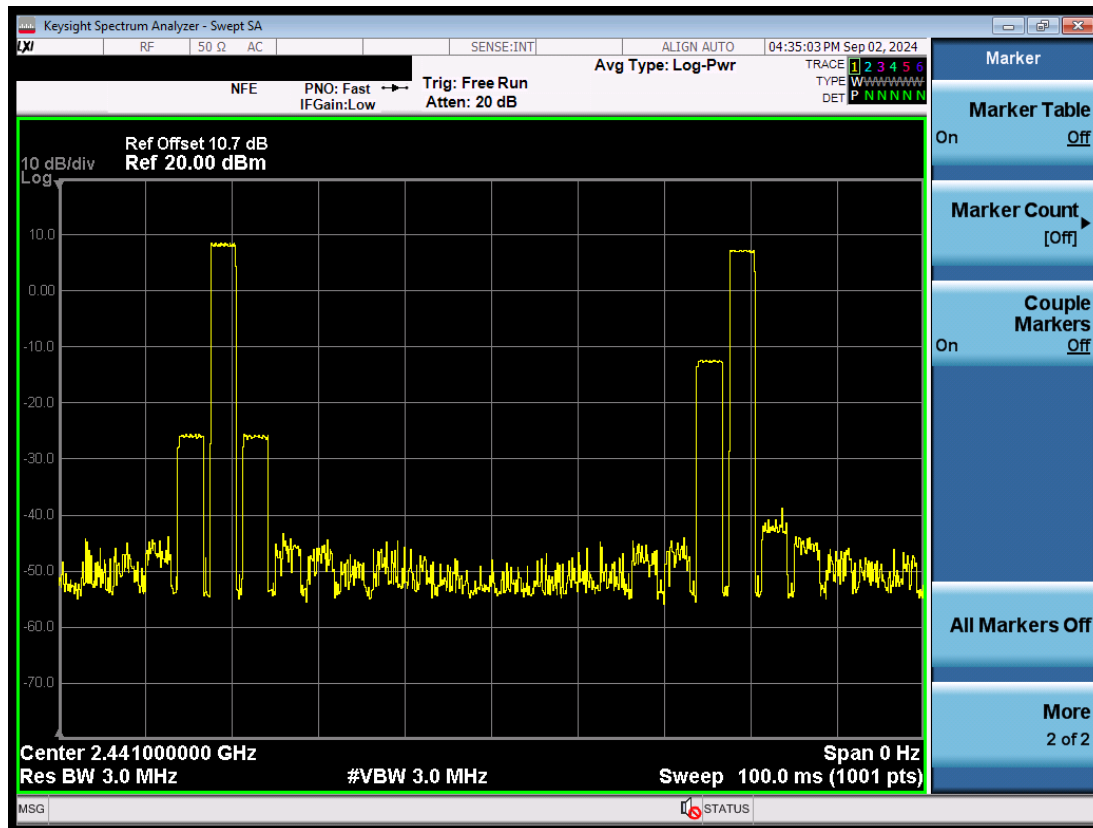
All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.

Note 1: The duty cycle factor for calculate average level is -16.713dB.

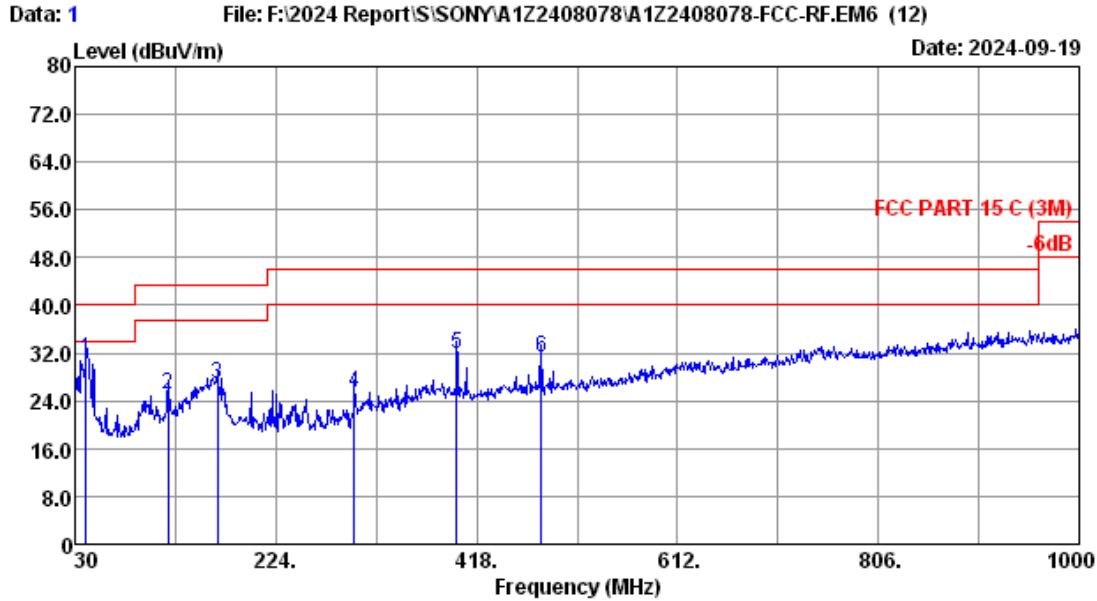
Note 2: The emissions (9kHz~30MHz) not reported for there is no emission be found.

Duty cycle factor = $20\log(\text{Dwell time}/100\text{ms}) = -16.713\text{dB}$

Dwell Time = $2.920 \times 5\text{ms}$



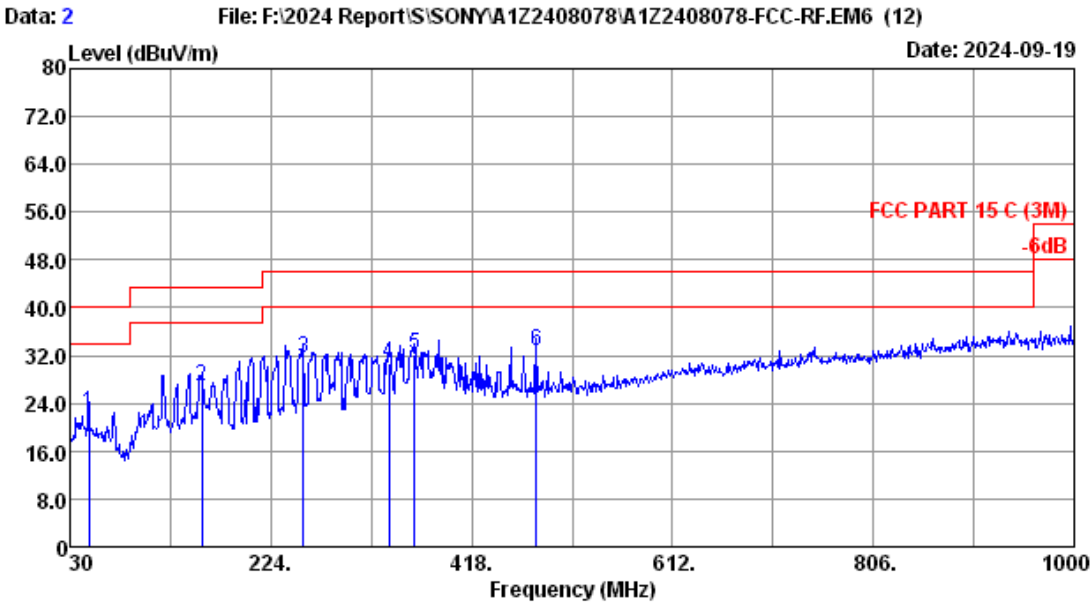
Frequency: 30MHz~1GHz



Site no. : 3m Chamber Data no. : 1
 Dis. / Ant. : 3m 2023 VULB 9168-429 Ant. pol. : VERTICAL
 Limit : FCC PART 15 C (3M)
 Env. / Ins. : 20.1°C/52% Engineer : Abel
 Test Mode : BT3.0 GFSK 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	40.67	19.30	0.77	10.87	30.94	40.00	9.06	QP
2	120.21	17.32	1.21	6.55	25.08	43.50	18.42	QP
3	167.74	18.90	1.45	6.47	26.82	43.50	16.68	QP
4	299.66	19.39	2.16	3.80	25.35	46.00	20.65	QP
5	398.60	21.47	2.78	7.60	31.85	46.00	14.15	QP
6	480.08	23.40	3.17	4.83	31.40	46.00	14.60	QP

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.



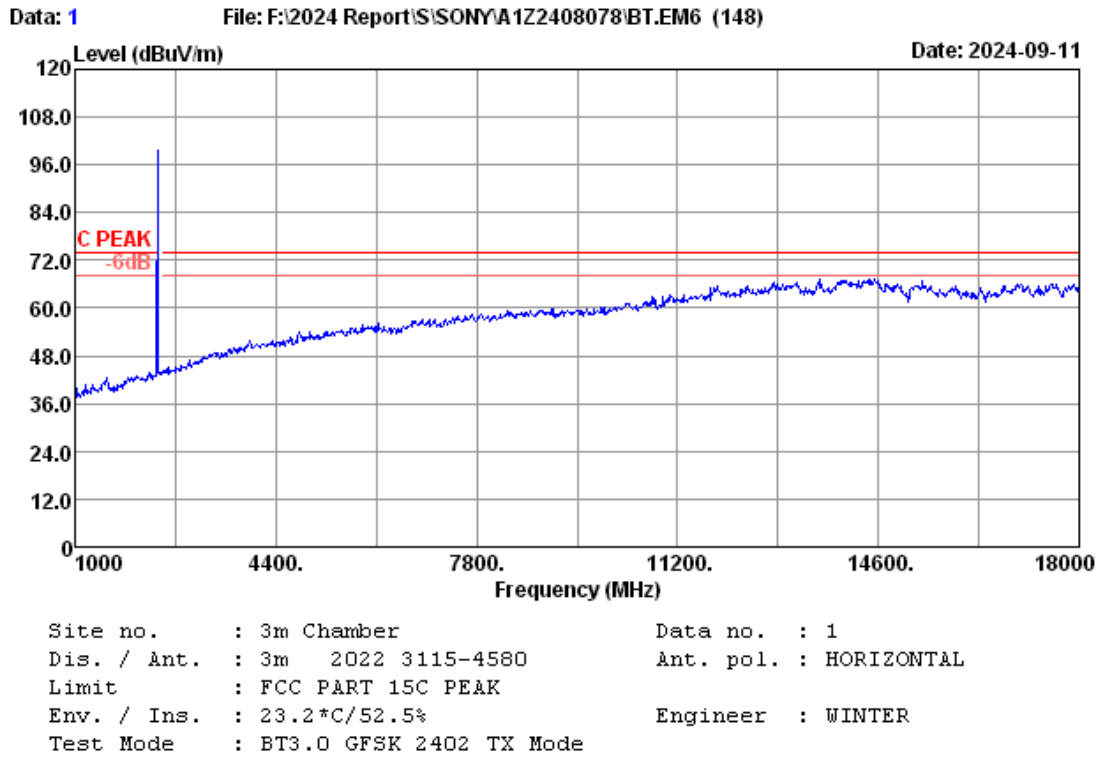
Site no.	: 3m Chamber	Data no.	: 2
Dis. / Ant.	: 3m 2023 VULB 9168-429	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15 C (3M)		
Env. / Ins.	: 20.1°C/52%	Engineer	: Abel
Test Mode	: BT3.0 GFSK TX MODE		

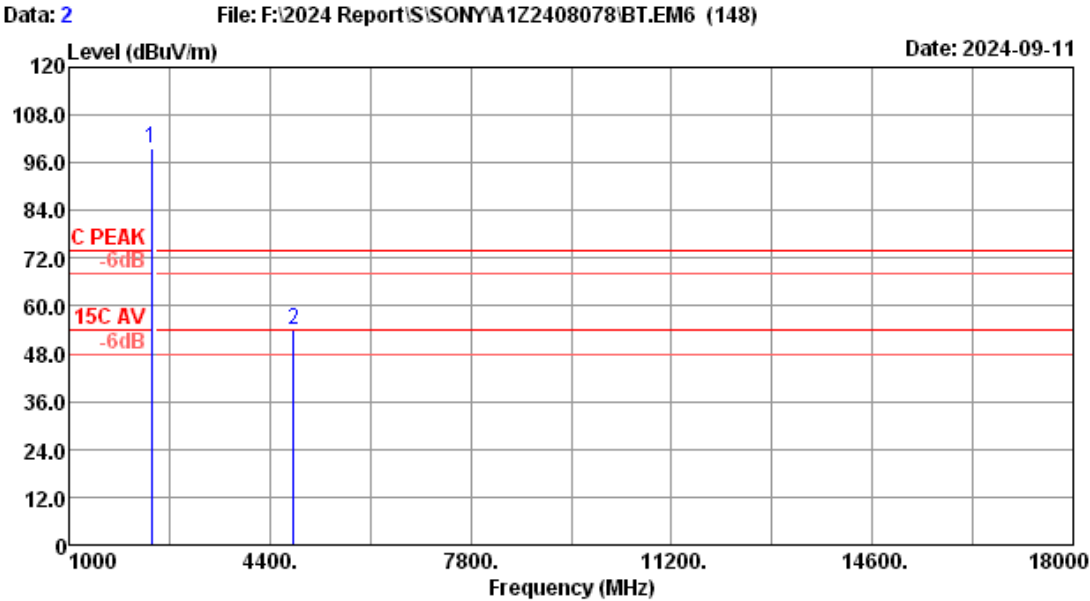
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission		Margin (dB)	Remark
					Level (dBuV/m)	Limits (dBuV/m)		
1	48.43	19.64	0.82	1.88	22.34	40.00	17.66	QP
2	157.07	19.30	1.40	6.19	26.89	43.50	16.61	QP
3	255.04	18.00	1.89	11.69	31.58	46.00	14.42	QP
4	338.46	20.30	2.40	8.00	30.70	46.00	15.30	QP
5	362.71	20.75	2.56	8.75	32.06	46.00	13.94	QP
6	480.08	23.40	3.17	6.13	32.70	46.00	13.30	QP

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.

Frequency: 1GHz~18GHz

Test Mode	ANT. PLO.	Frequency (MHz)	Peak(dBuv/m)		Margin	Duty cycle factor (dB)	AV(dBuv/m)		Margin	Conclusion
			Emission Level	Limit			Emission Level	Limit		
GFSK	H	4804	54.20	74	19.800	-16.713	37.487	54	16.513	Pass
GFSK	V	4804	54.85	74	19.150	-16.713	38.137	54	15.863	Pass
GFSK	H	4882	52.06	74	21.940	-16.713	35.347	54	18.653	Pass
GFSK	V	4882	53.36	74	20.640	-16.713	36.647	54	17.353	Pass
GFSK	V	4960	52.48	74	21.520	-16.713	35.767	54	18.233	Pass
GFSK	H	4960	52.62	74	21.380	-16.713	35.907	54	18.093	Pass
8-DPSK	V	4804	51.87	74	22.130	-16.713	35.157	54	18.843	Pass
8-DPSK	H	4804	53.26	74	20.740	-16.713	36.547	54	17.453	Pass
8-DPSK	V	4882	52.86	74	21.140	-16.713	36.147	54	17.853	Pass
8-DPSK	H	4882	52.23	74	21.770	-16.713	35.517	54	18.483	Pass
8-DPSK	H	4960	53.24	74	20.760	-16.713	36.527	54	17.473	Pass
8-DPSK	V	4960	53.00	74	21.000	-16.713	36.287	54	17.713	Pass

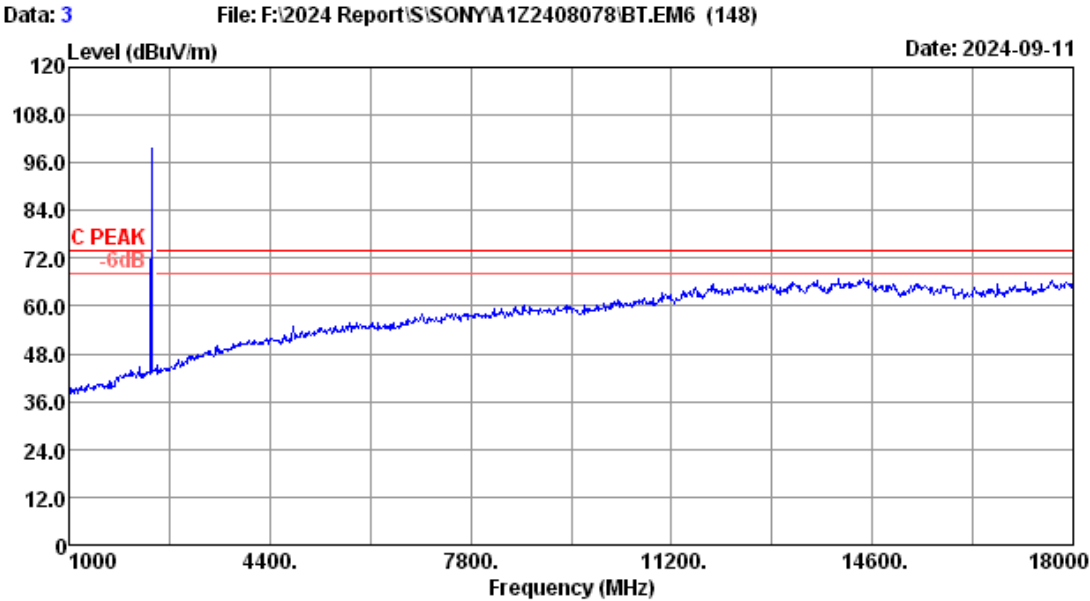




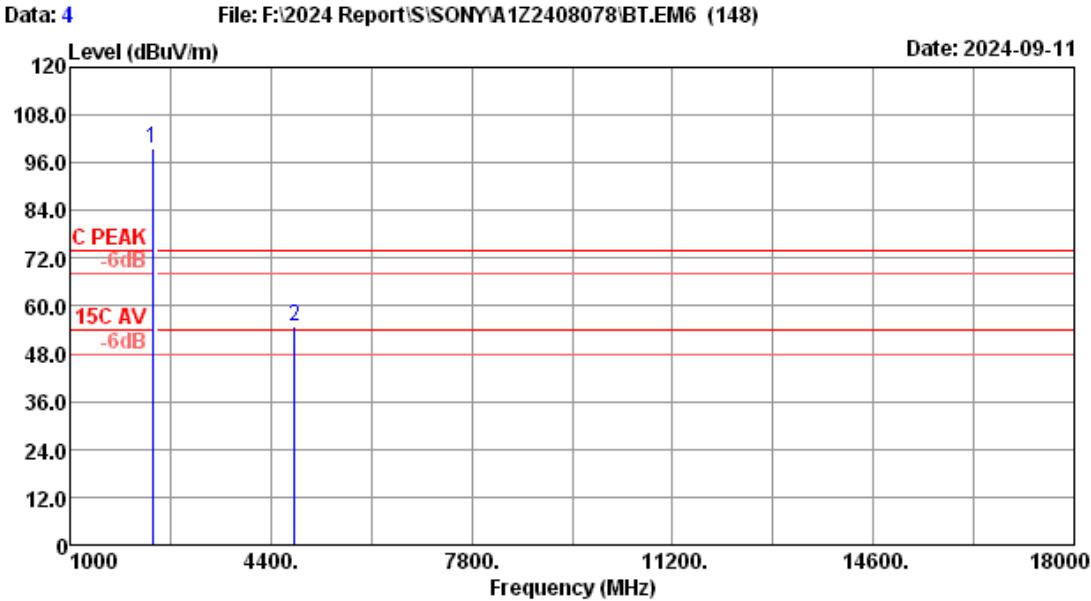
Site no. : 3m Chamber Data no. : 2
 Dis. / Ant. : 3m 2022 3115-4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23.2°C/52.5% Engineer : WINTER
 Test Mode : BT3.0 GFSK 2402 TX Mode

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	28.11	5.32	98.08	31.70	99.81	-----	-----	Peak
2	4804.00	32.71	7.41	44.50	30.42	54.20	74.00	19.80	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.



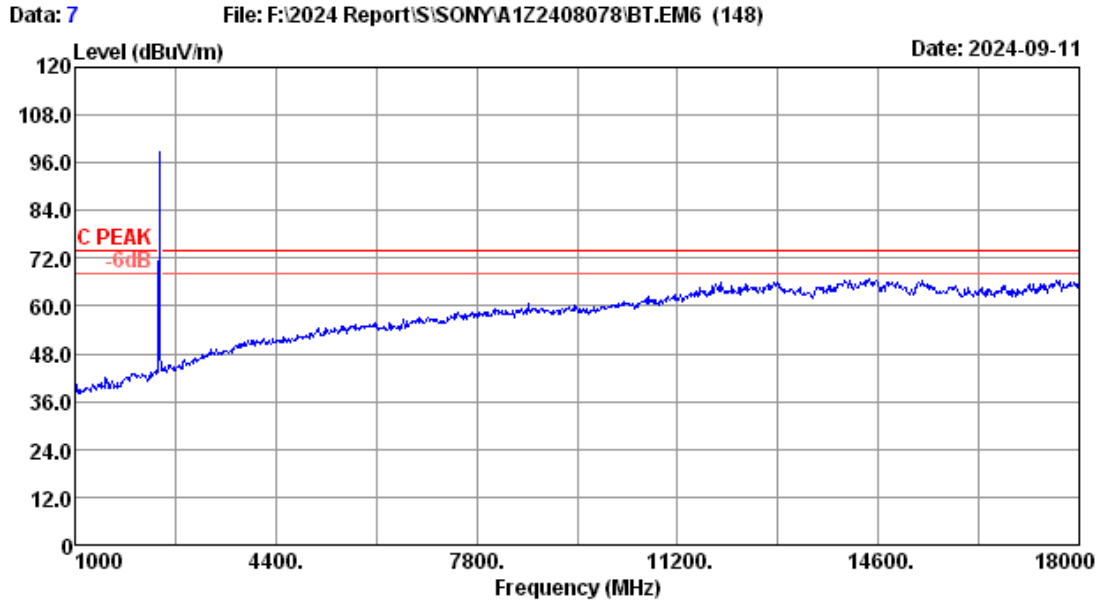
Site no.	: 3m Chamber	Data no.	: 3
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 GFSK 2402 TX Mode		



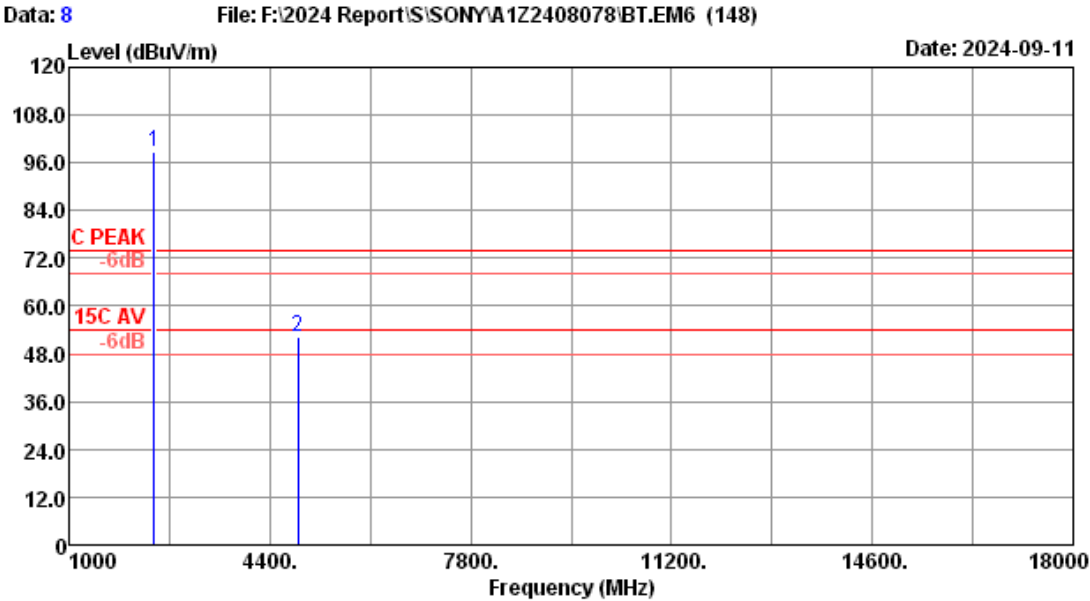
Site no.	: 3m Chamber	Data no.	: 4
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 GFSK 2402 TX Mode		

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	28.11	5.32	97.81	31.70	99.54	-----	-----	Peak
2	4804.00	32.71	7.41	45.15	30.42	54.85	74.00	19.15	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.



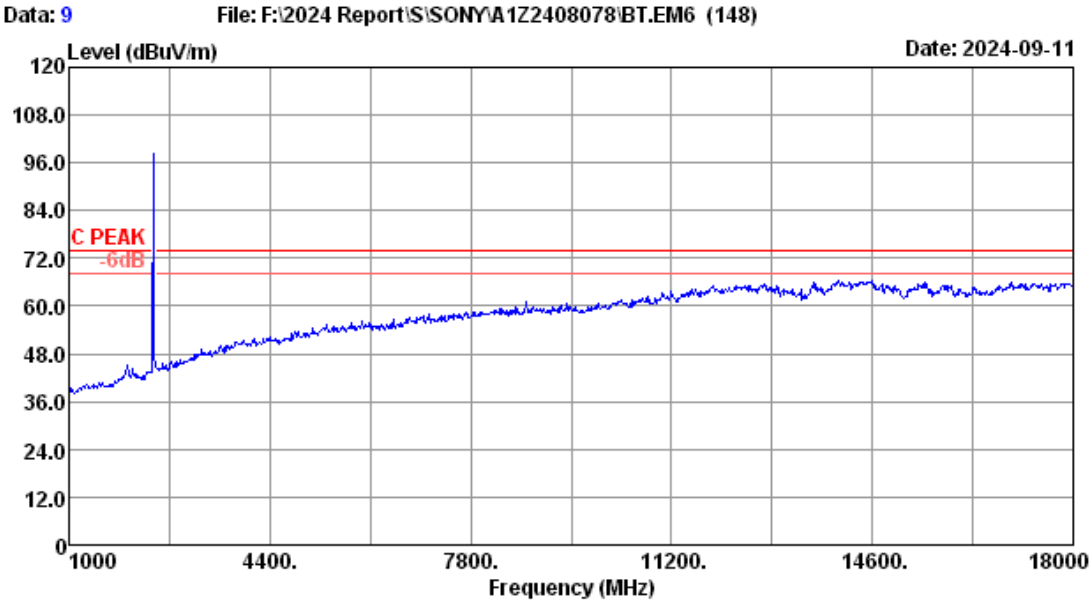
Site no.	: 3m Chamber	Data no.	: 7
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 GFSK 2441 TX Mode		



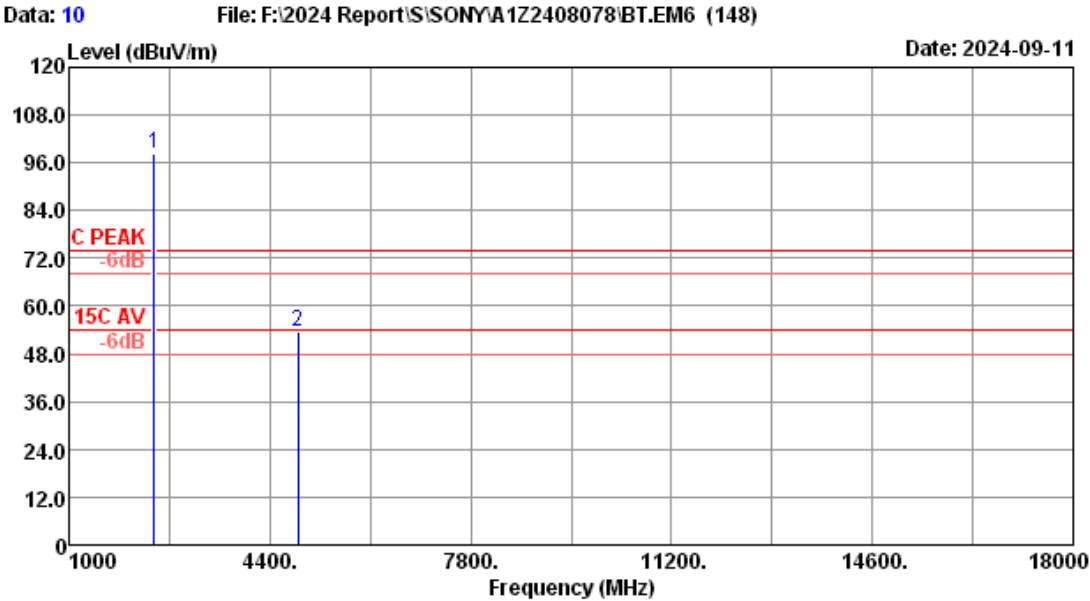
Site no. : 3m Chamber Data no. : 8
 Dis. / Ant. : 3m 2022 3115-4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23.2°C/52.5% Engineer : WINTER
 Test Mode : BT3.0 GFSK 2441 TX Mode

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	2441.00	28.26	5.37	96.67	31.68	98.62	-----	-----	Peak
2	4882.00	32.86	7.45	42.16	30.41	52.06	74.00	21.94	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.



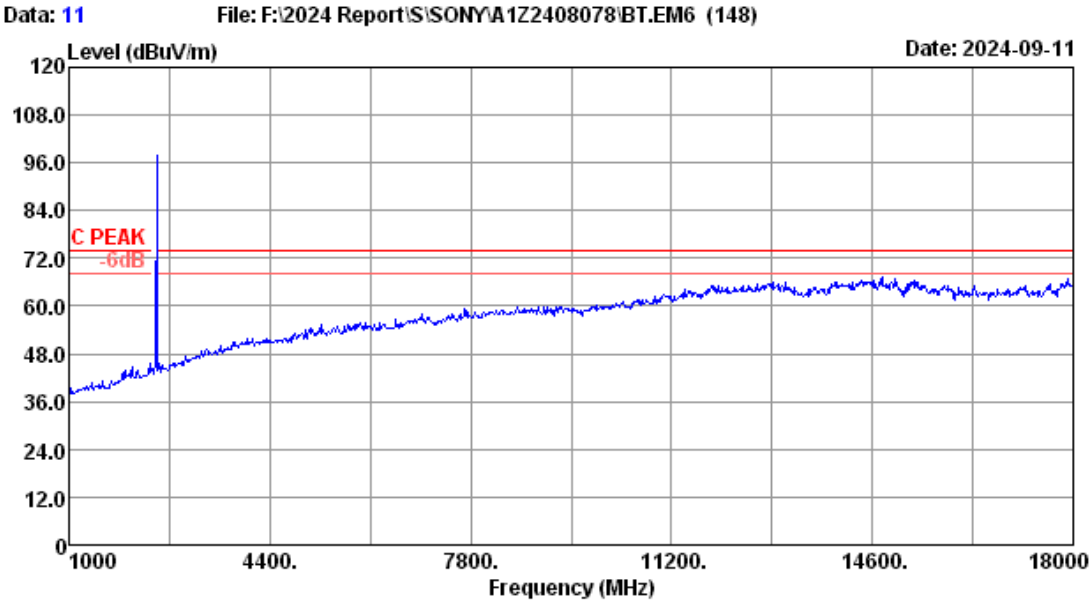
Site no.	: 3m Chamber	Data no.	: 9
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 GFSK 2441 TX Mode		



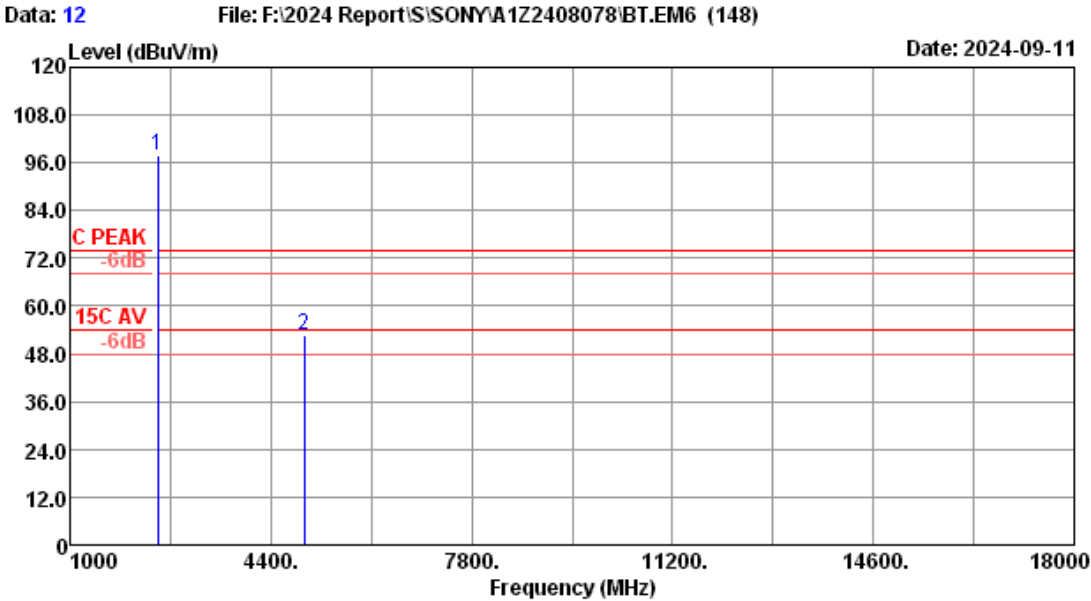
Site no.	: 3m Chamber	Data no.	: 10
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 GFSK 2441 TX Mode		

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	2441.00	28.26	5.37	96.30	31.68	98.25	-----	-----	Peak
2	4882.00	32.86	7.45	43.46	30.41	53.36	74.00	20.64	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.



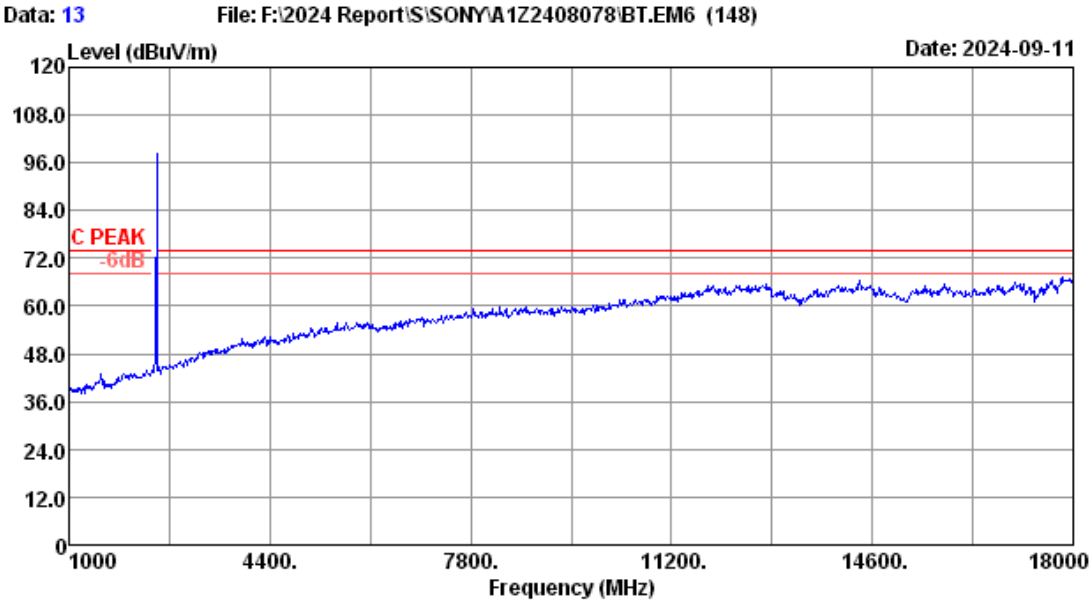
Site no.	: 3m Chamber	Data no.	: 11
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 GFSK 2480 TX Mode		



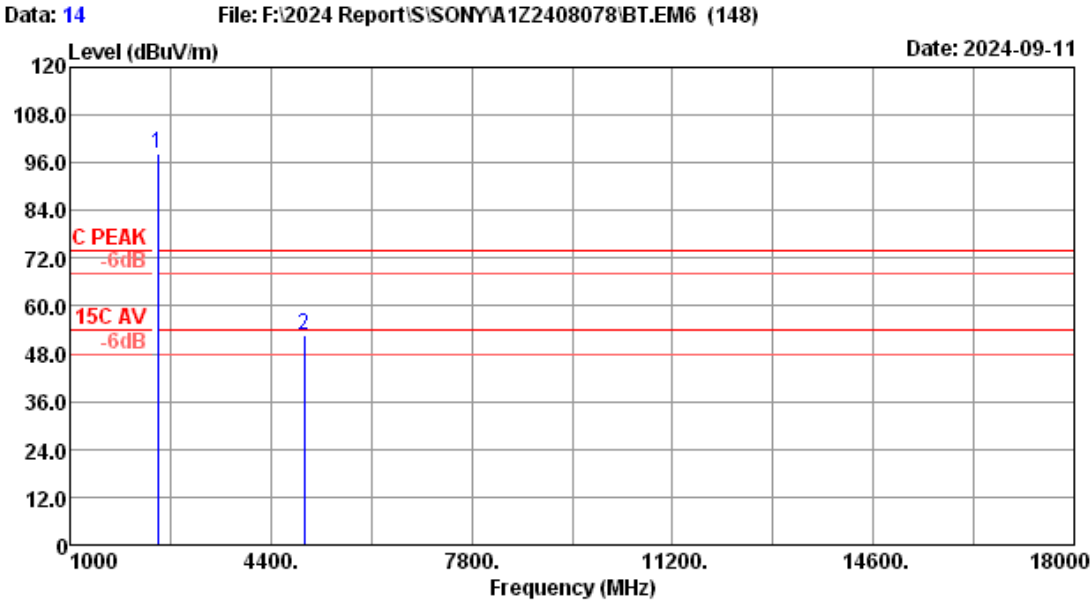
Site no. : 3m Chamber Data no. : 12
 Dis. / Ant. : 3m 2022 3115-4580 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23.2°C/52.5% Engineer : WINTER
 Test Mode : BT3.0 GFSK 2480 TX Mode

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	28.30	5.41	95.85	31.66	97.90	-----	-----	Peak
2	4960.00	33.02	7.50	42.36	30.40	52.48	74.00	21.52	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.



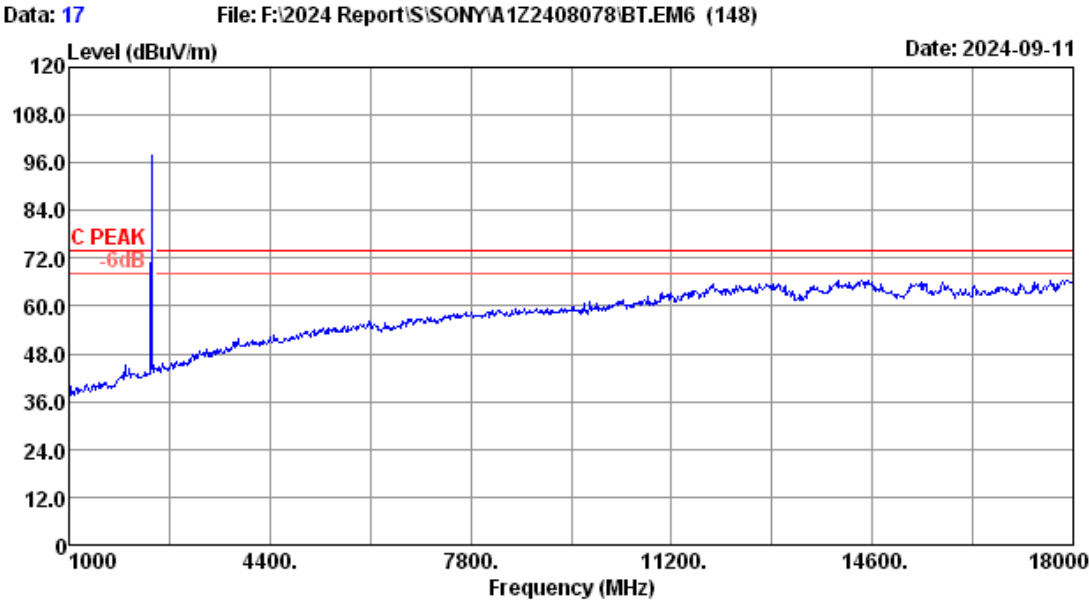
Site no.	: 3m Chamber	Data no.	: 13
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 GFSK 2480 TX Mode		



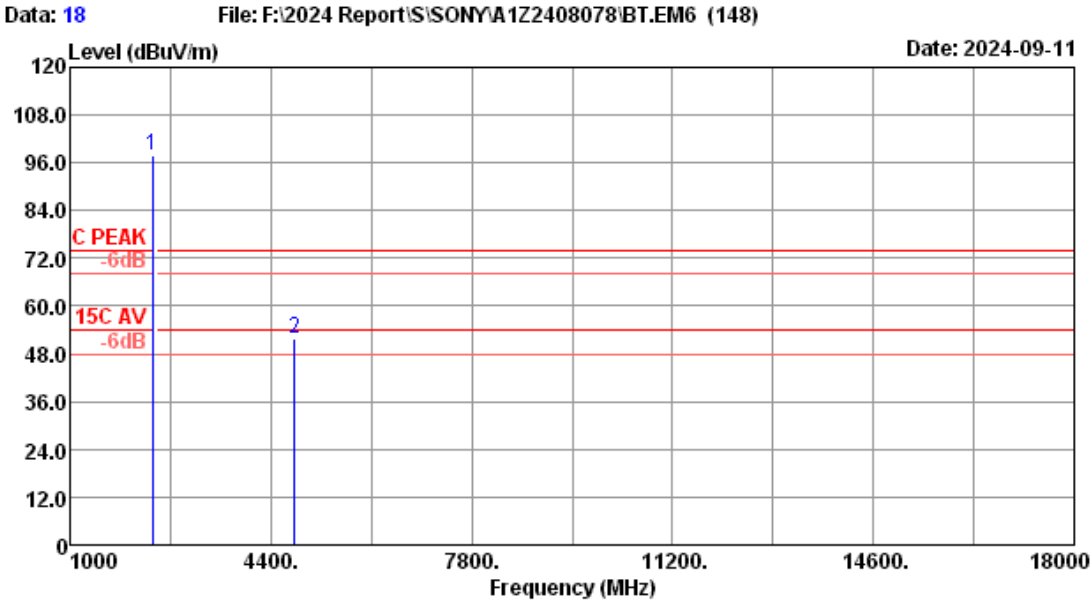
Site no. : 3m Chamber Data no. : 14
 Dis. / Ant. : 3m 2022 3115-4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23.2°C/52.5% Engineer : WINTER
 Test Mode : BT3.0 GFSK 2480 TX Mode

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	28.30	5.41	96.35	31.66	98.40	-----	-----	Peak
2	4960.00	33.02	7.50	42.50	30.40	52.62	74.00	21.38	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.



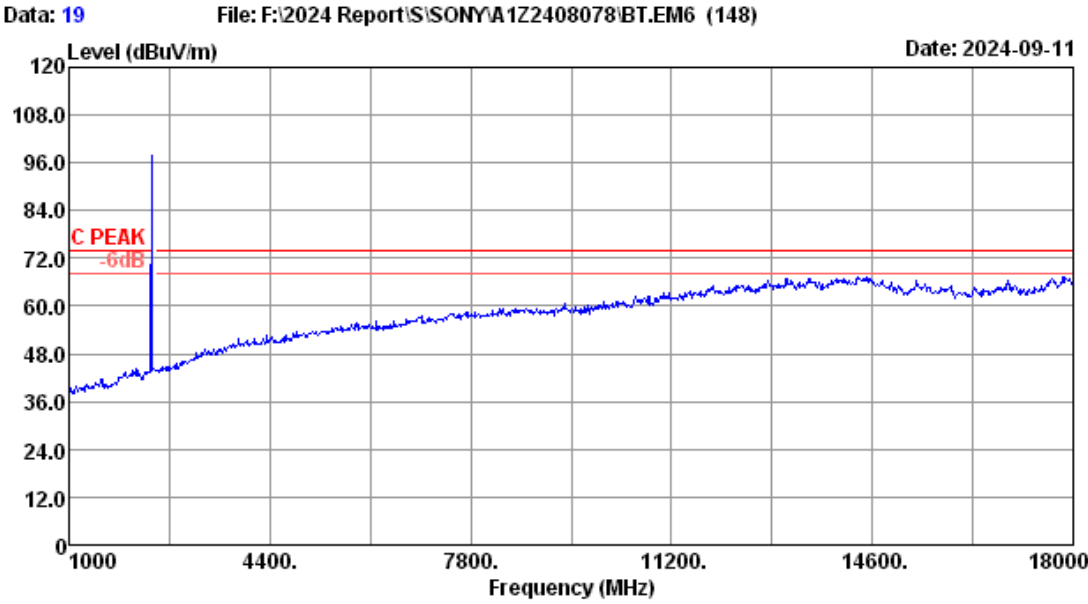
Site no.	: 3m Chamber	Data no.	: 17
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2402 TX Mode		



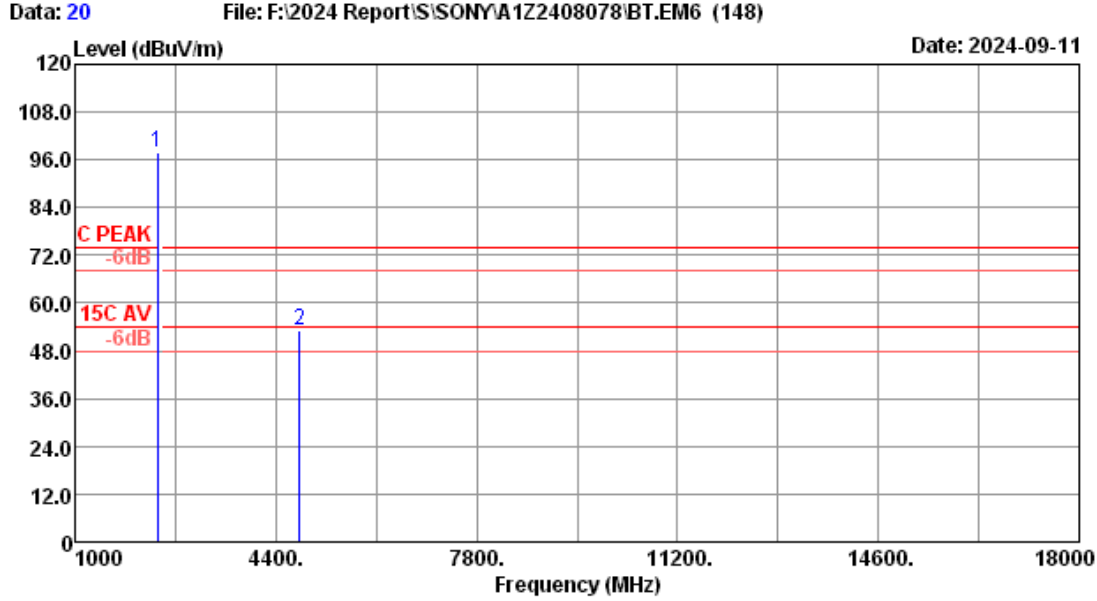
Site no.	: 3m Chamber	Data no.	: 18
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2402 TX Mode		

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	28.11	5.32	96.33	31.70	98.06	-----	-----	Peak
2	4804.00	32.71	7.41	42.17	30.42	51.87	74.00	22.13	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.



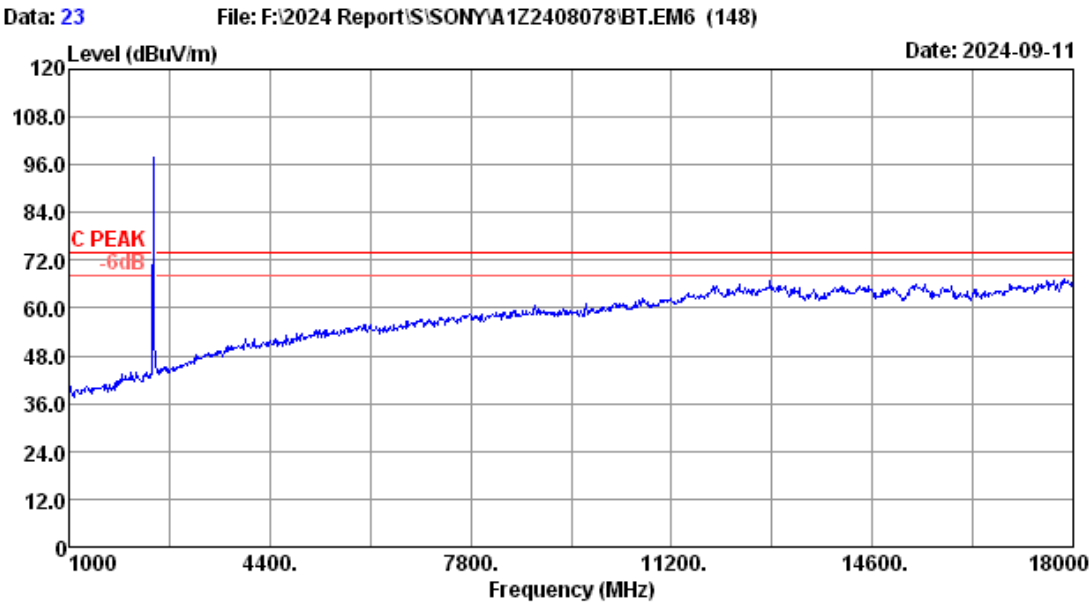
Site no.	: 3m Chamber	Data no.	: 19
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2402 TX Mode		



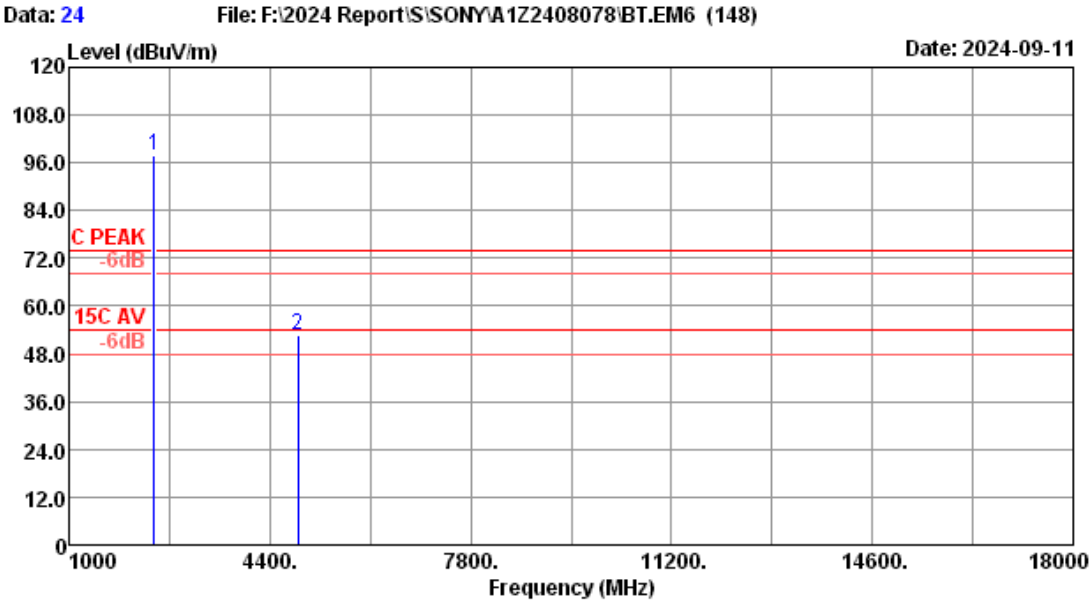
Site no. : 3m Chamber Data no. : 20
 Dis. / Ant. : 3m 2022 3115-4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23.2°C/52.5% Engineer : WINTER
 Test Mode : BT3.0 8DPSK 2402 TX Mode

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	28.11	5.32	96.16	31.70	97.89	-----	-----	Peak
2	4804.00	32.71	7.41	43.56	30.42	53.26	74.00	20.74	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.



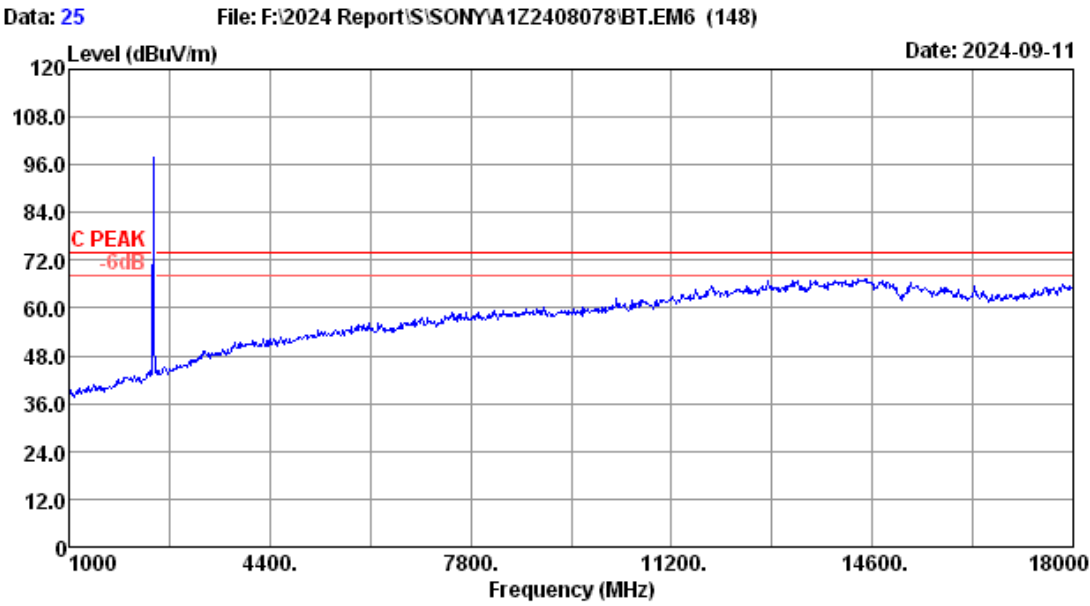
Site no.	: 3m Chamber	Data no.	: 23
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2441 TX Mode		



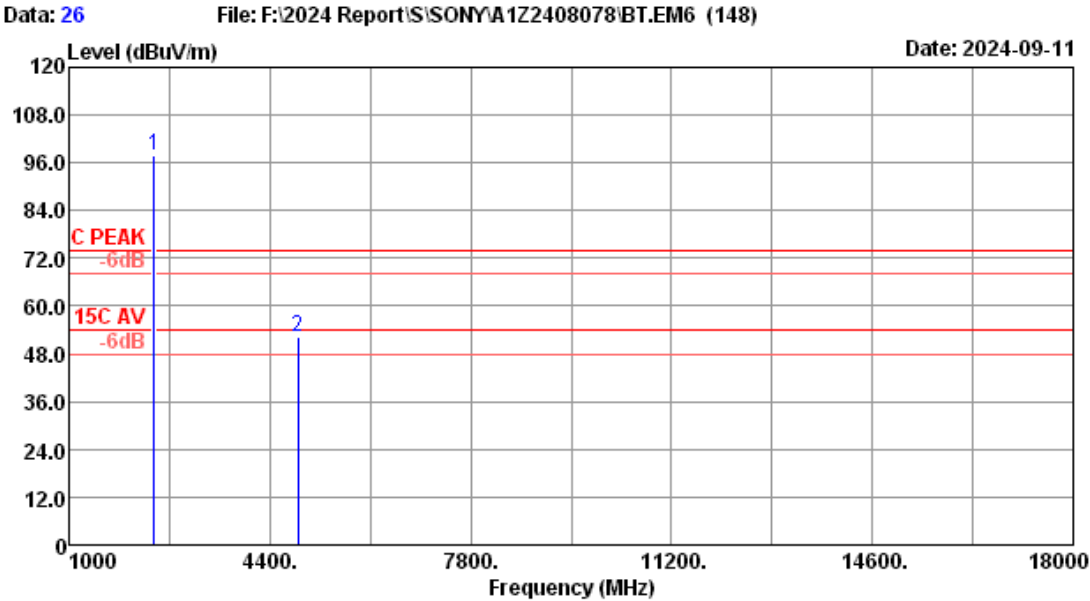
Site no.	: 3m Chamber	Data no.	: 24
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2441 TX Mode		

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	2441.00	28.26	5.37	95.95	31.68	97.90	-----	-----	Peak
2	4882.00	32.86	7.45	42.96	30.41	52.86	74.00	21.14	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.



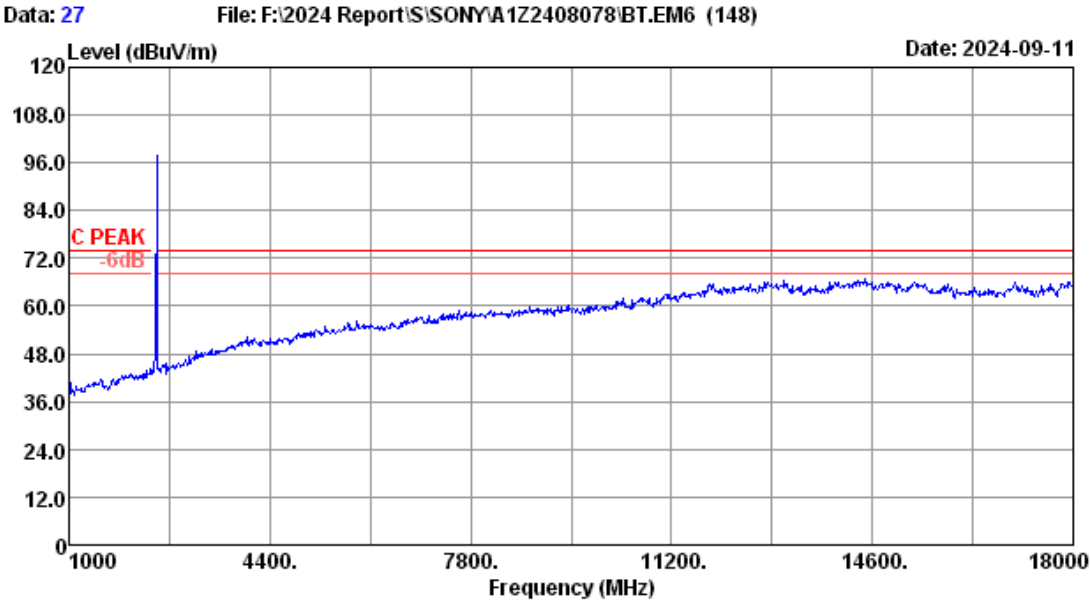
Site no.	: 3m Chamber	Data no.	: 25
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2441 TX Mode		



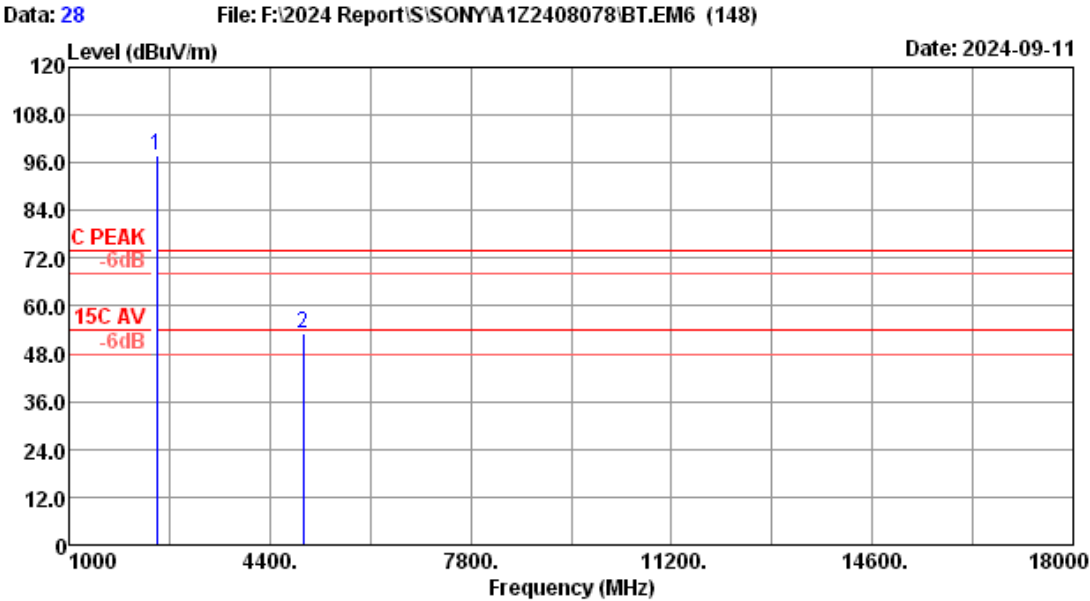
Site no. : 3m Chamber Data no. : 26
 Dis. / Ant. : 3m 2022 3115-4580 Ant. pol. : HORIZONTAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23.2°C/52.5% Engineer : WINTER
 Test Mode : BT3.0 8DPSK 2441 TX Mode

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	2441.00	28.26	5.37	95.88	31.68	97.83	-----	-----	Peak
2	4882.00	32.86	7.45	42.33	30.41	52.23	74.00	21.77	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.



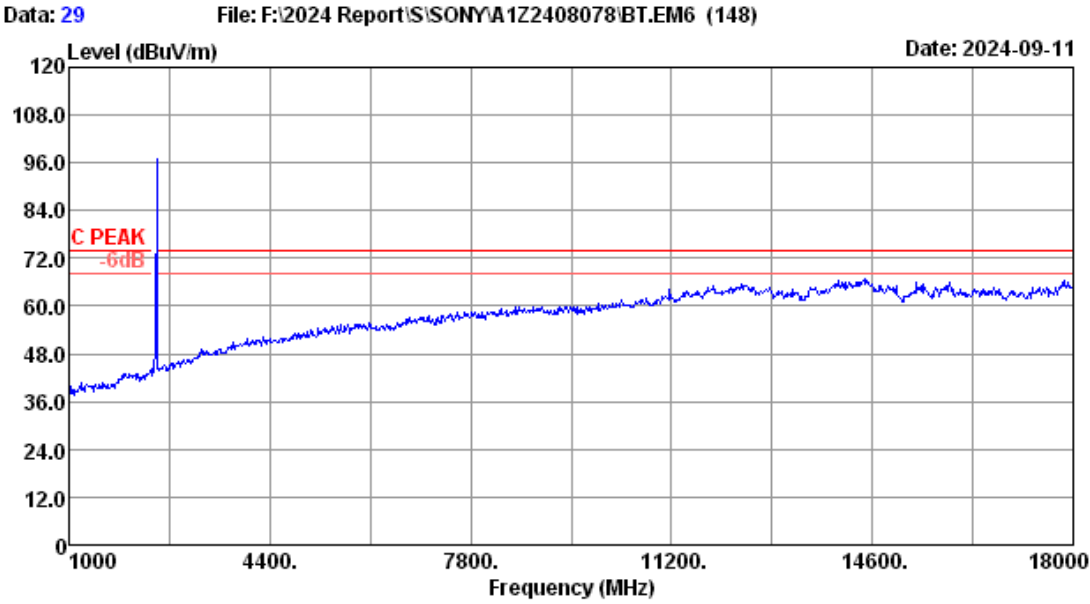
Site no.	: 3m Chamber	Data no.	: 27
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2480 TX Mode		



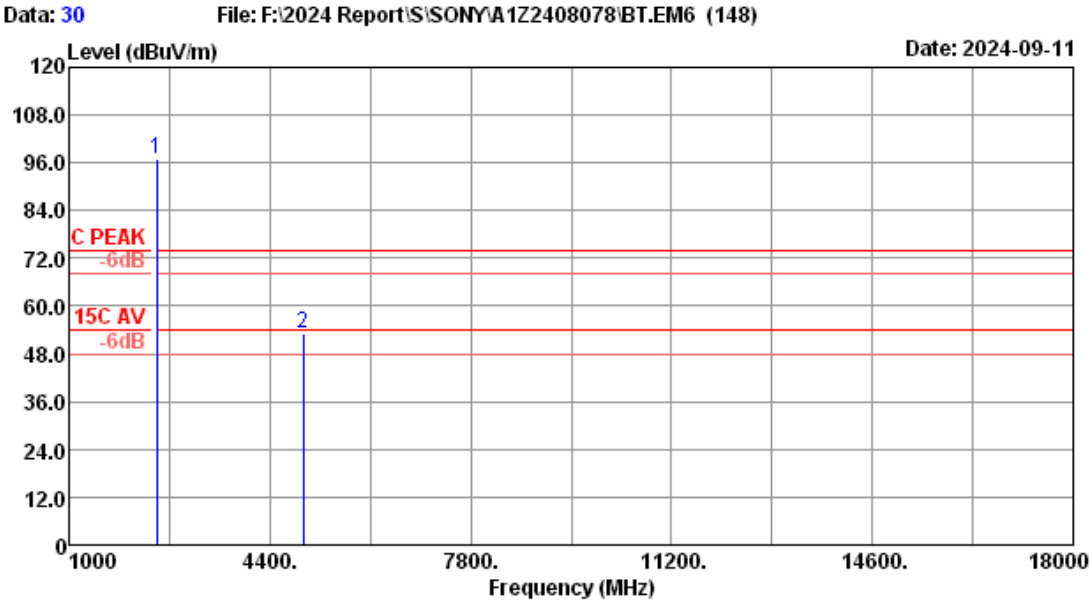
Site no.	: 3m Chamber	Data no.	: 28
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2480 TX Mode		

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	28.30	5.41	95.72	31.66	97.77	-----	-----	Peak
2	4960.00	33.02	7.50	43.12	30.40	53.24	74.00	20.76	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.	: 29
Dis. / Ant.	: 3m 2022 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK		
Env. / Ins.	: 23.2°C/52.5%	Engineer	: WINTER
Test Mode	: BT3.0 8DPSK 2480 TX Mode		



Site no. : 3m Chamber Data no. : 30
 Dis. / Ant. : 3m 2022 3115-4580 Ant. pol. : VERTICAL
 Limit : FCC PART 15C PEAK
 Env. / Ins. : 23.2°C/52.5% Engineer : WINTER
 Test Mode : BT3.0 8DPSK 2480 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	28.30	5.41	94.82	31.66	96.87	-----	-----	Peak
2	4960.00	33.02	7.50	42.88	30.40	53.00	74.00	21.00	Peak

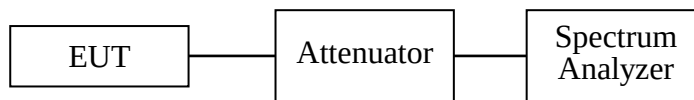
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official
 limit are not reported.

5. CONDUCTED SPURIOUS EMISSIONS

5.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Mar.16,24	1 Year
2.	RF Cable	Eastsheep	RM086-SMA/N-JJ -2000	NO.1	Jun.19,24	1 Year
3.	Attenuator(10dB)	Agilent	8491B	MY39269201	Mar.16,24	1 Year

5.2. Block Diagram of Test Setup



5.3. 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.

5.4. Test Procedure

Use the test method described in ANSI C63.10 clause 7.8.8:

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.

Note: The cable loss and attenuator loss were offset into spectrum analyzer as an amplitude offset.

5.5. Test result

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

EUT: Active Subwoofer		
M/N: YY2089C2		
Test date: 2024-09-03	Pressure: 102.4±1.0 kpa	Humidity: 54.7±3.0%
Tested by: Winter	Test site: RF site	Temperature: 23.6±0.6 °C

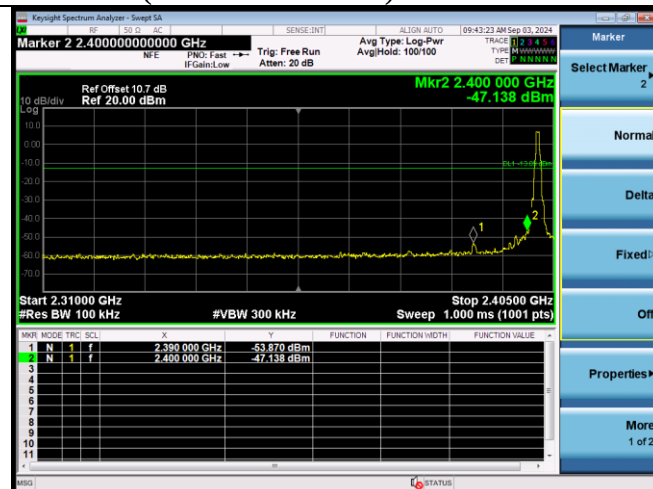
Hopping off

FSK

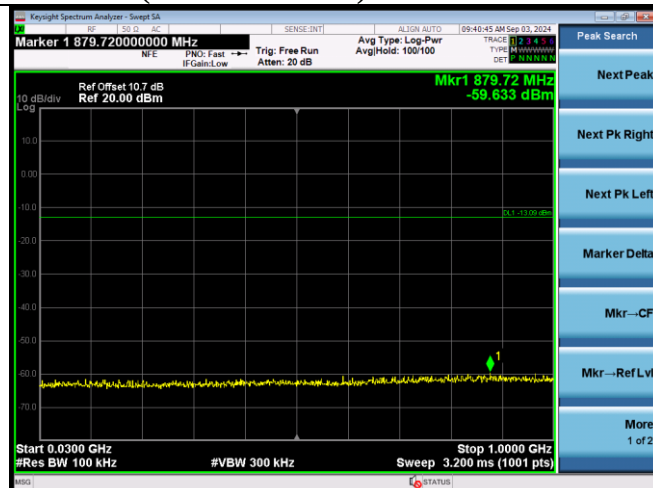
2402MHz



2402MHz(2.3GHz – 2.4GHz)



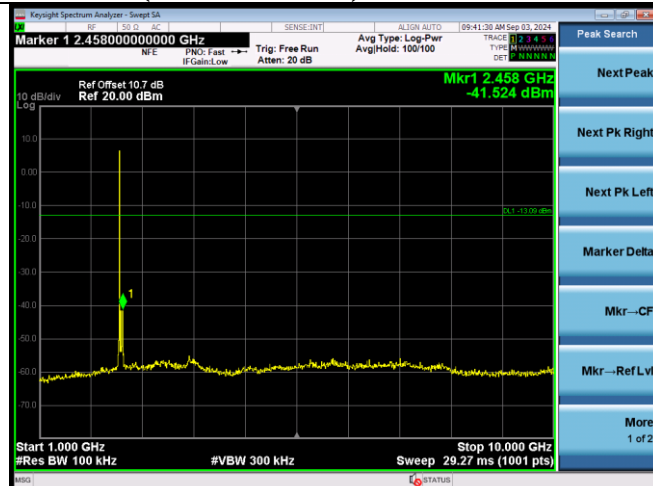
2402MHz(30MHz – 1GHz)



2402MHz(10GHz – 26GHz)



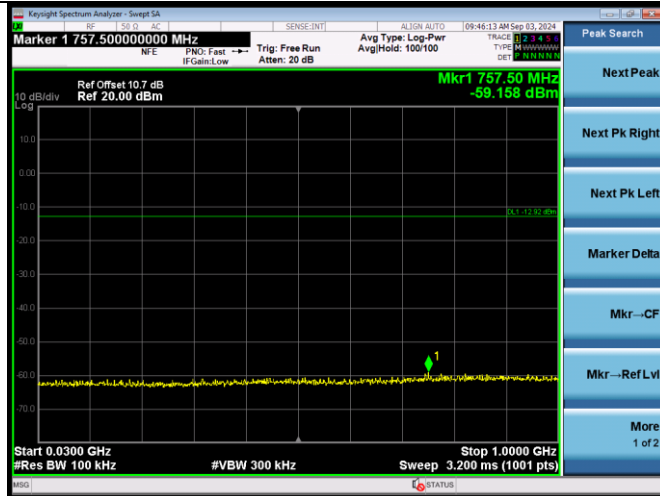
2402MHz(1GHz – 10GHz)



2441MHz



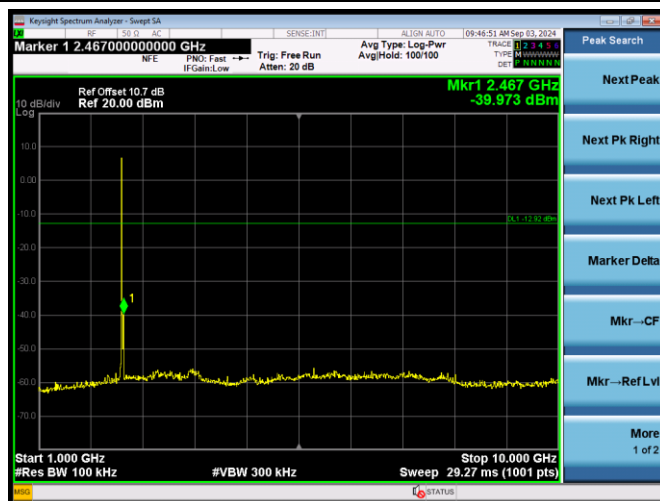
2441MHz(30MHz – 1GHz)



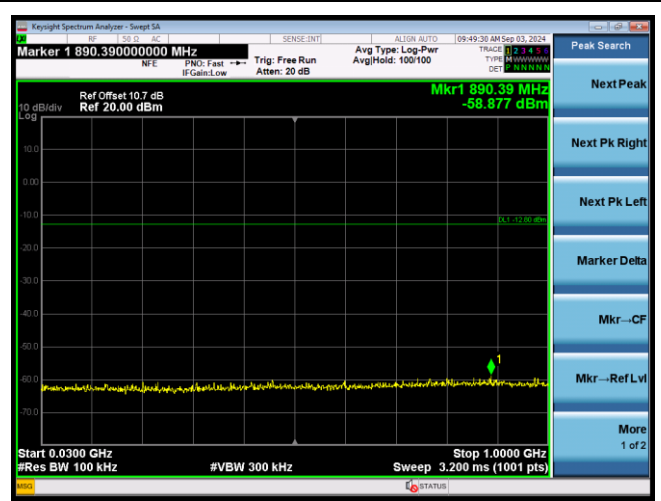
2480MHz



2441MHz(1GHz – 10GHz)



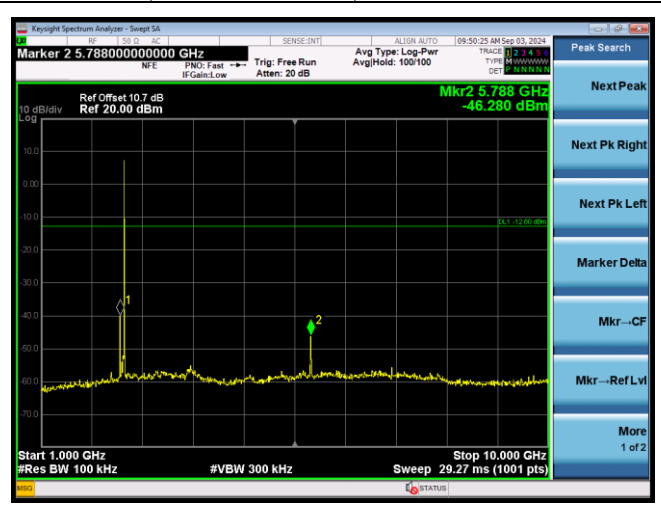
2480MHz(30MHz – 1GHz)



2441MHz(10GHz – 26GHz)



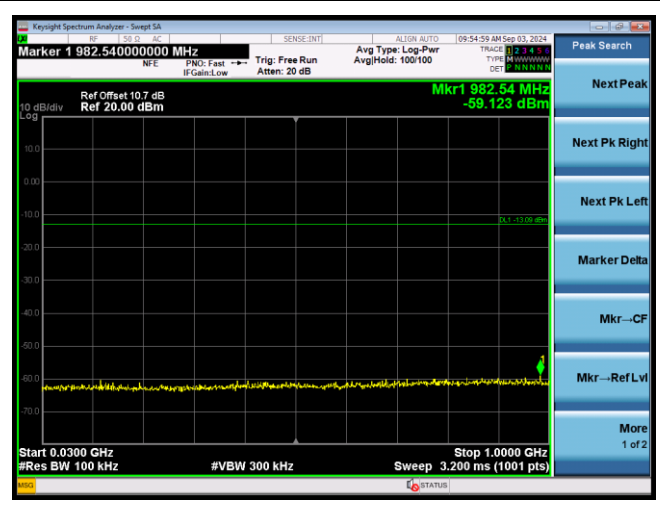
2480MHz(1GHz – 10GHz)



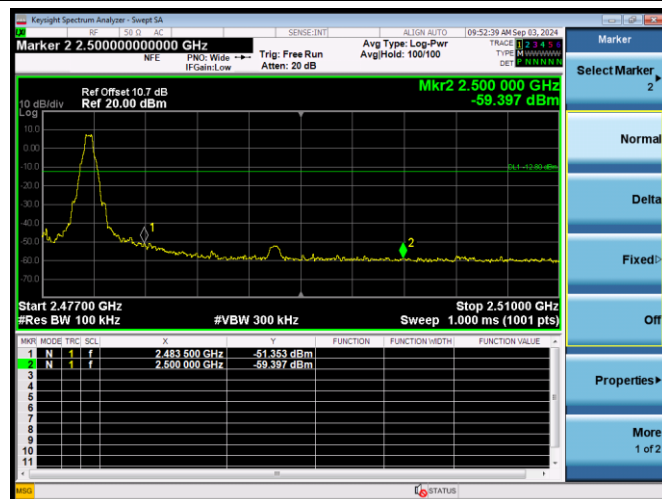
2480MHz(10GHz – 26GHz)



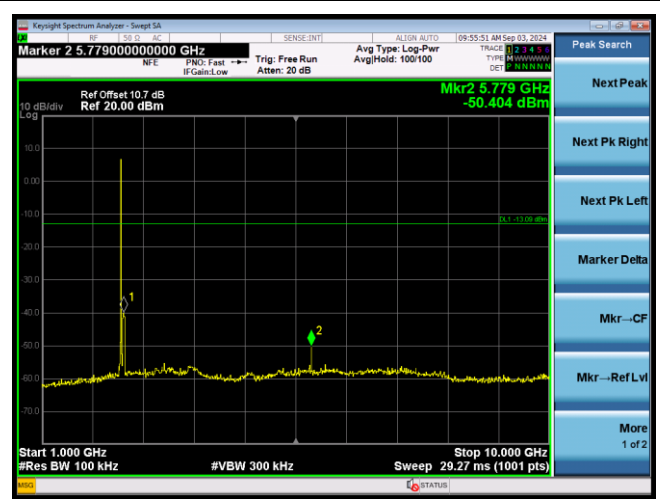
2402MHz(30MHz – 1GHz)



2480MHz(2.4GHz – 2.5GHz)

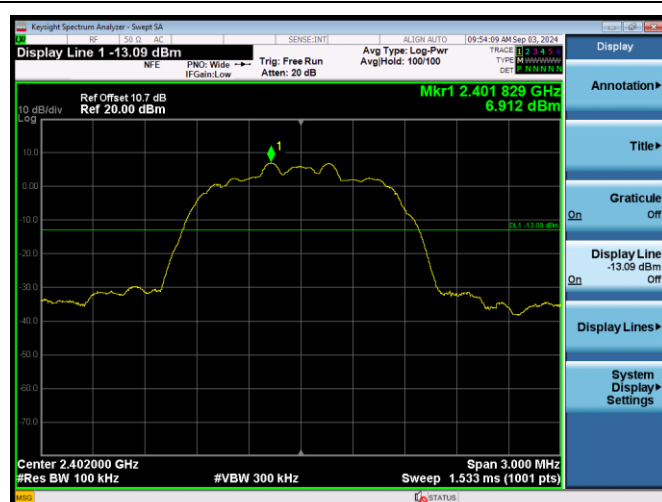


2402MHz(1GHz – 10GHz)



8-DPSK

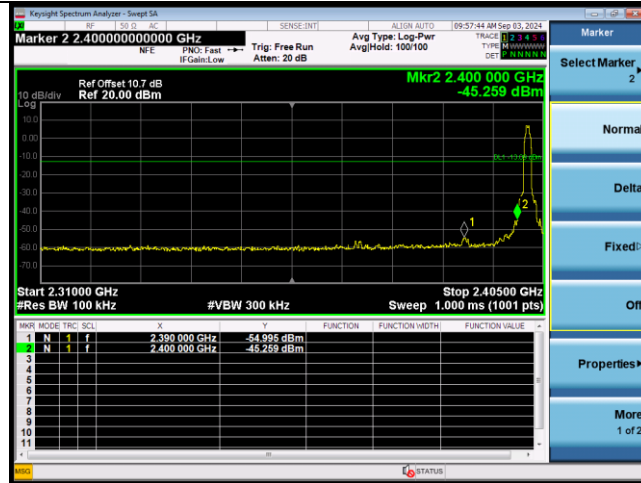
2402MHz



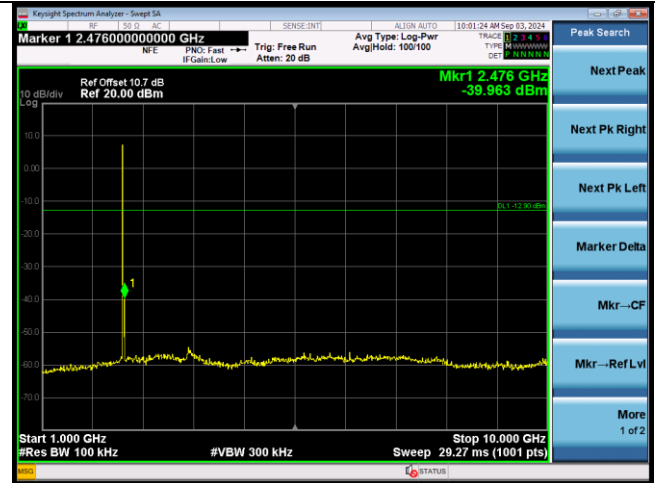
2402MHz(10GHz – 26GHz)



2402MHz(2.3GHz – 2.4GHz)



2441MHz(1GHz – 10GHz)



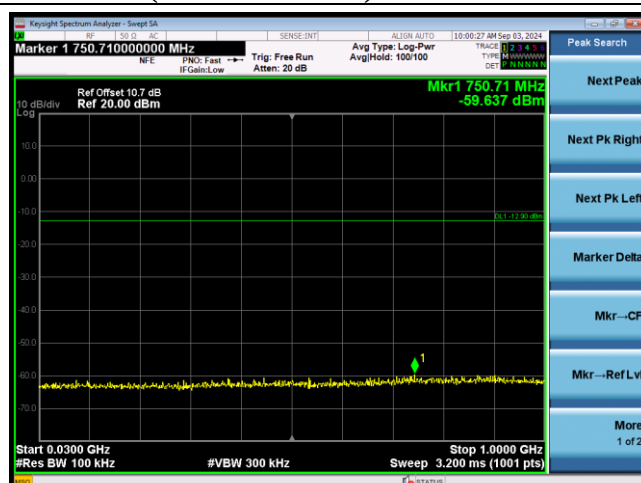
2441MHz



2441MHz(10GHz – 26GHz)



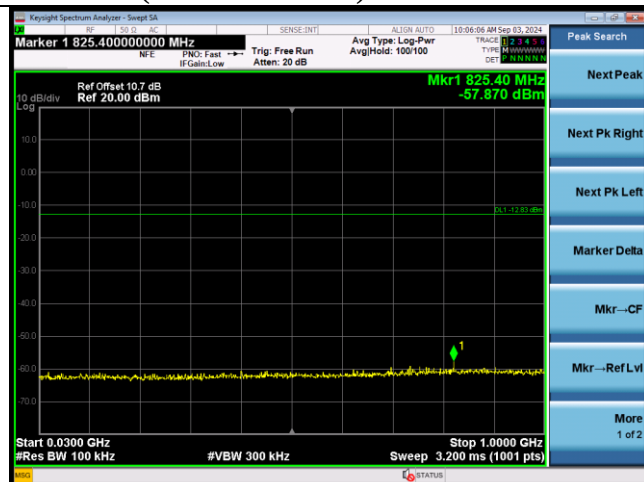
2441MHz (30MHz – 1GHz)



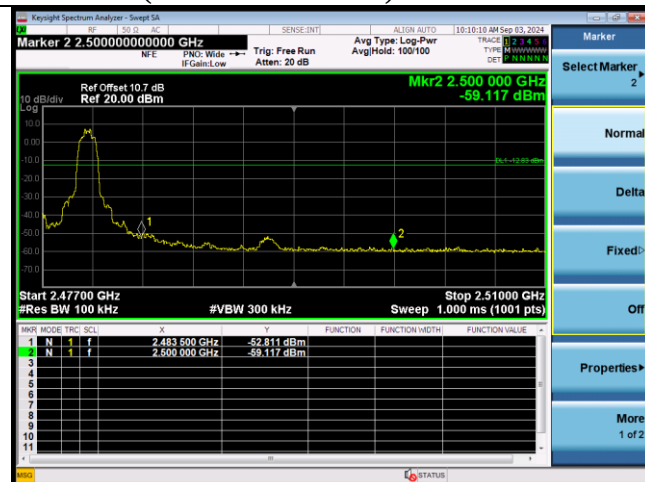
2480MHz



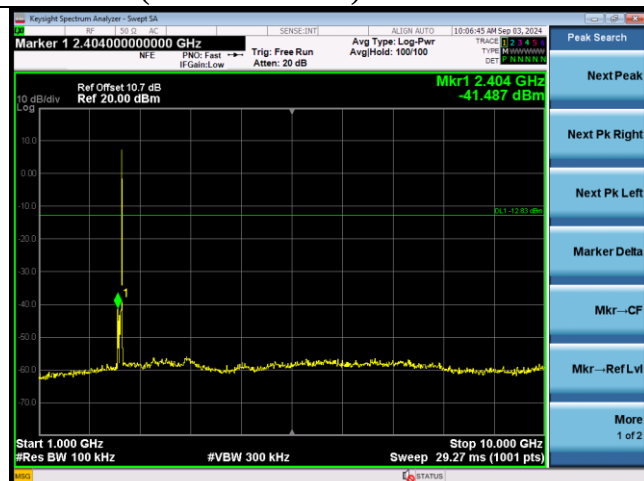
2480MHz(30MHz – 1GHz)



2480MHz(2.4GHz – 2.5GHz)

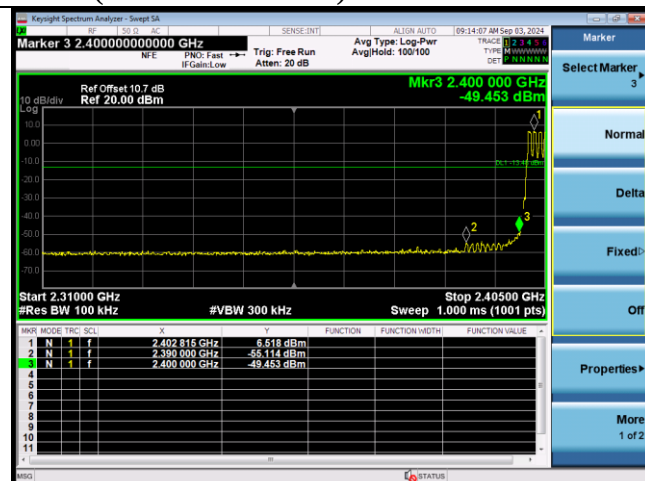


2480MHz(1GHz – 10GHz)



Hopping on

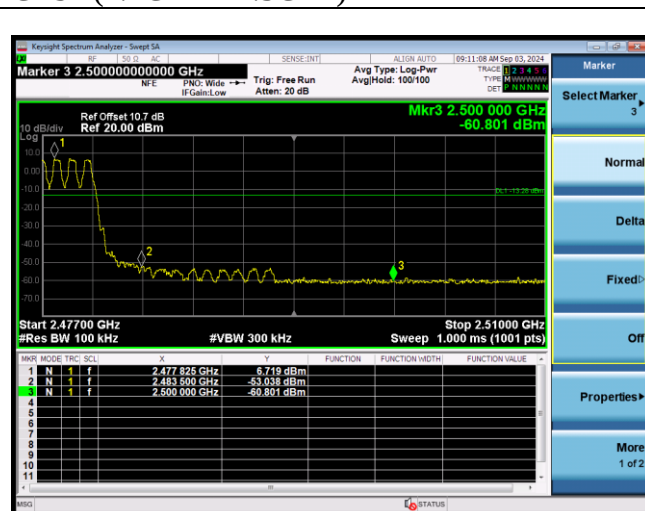
GFSK(2.3GHz – 2.4GHz)



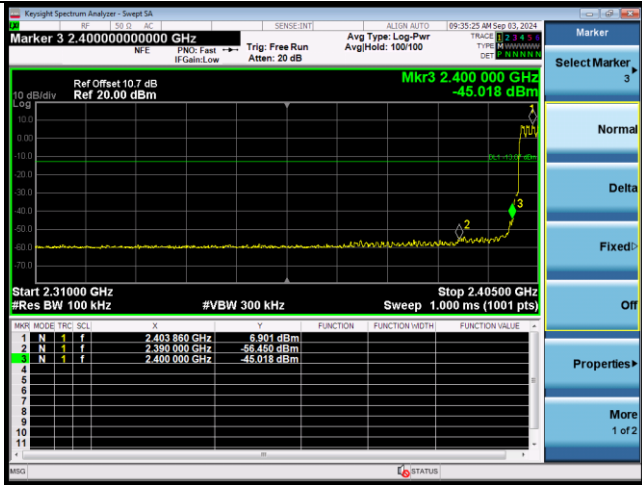
2480MHz(10GHz – 26GHz)



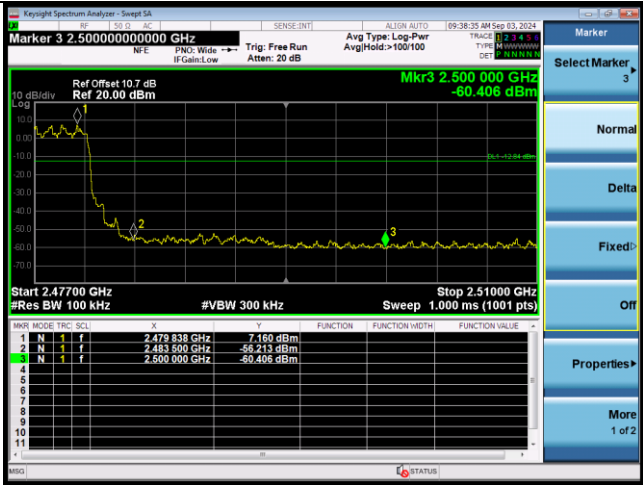
GFSK(2.4GHz – 2.5GHz)



8-DPSK(2.3GHz – 2.4GHz)



8-DPSK(2.4GHz – 2.5GHz)



6. 20 DB & 99% BANDWIDTH TEST

6.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Mar.16,24	1 Year
2.	RF Cable	Eastsheep	RM086-SMA/N -JJ-2000	NO.1	Jun.19,24	1 Year
3.	Attenuator(10dB)	Agilent	8491B	MY39269201	Mar.16,24	1 Year

6.2.Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

6.3.Test Procedure

Use the test method described in ANSI C63.10 clause 7.8.7:

1. Connect the antenna port of the EUT to the spectrum analyzer.
2. Let the EUT transmit at Low/ Mid/ High channel with test software.
3. Setting of SA is following as: RBW: 30kHz / VBW: 100kHz
Sweep Mode: Continuous sweep
Detect mode: Positive peak
Trace mode: Max hold.
4. Use the occupied bandwidth function of the SA measure the 20dB bandwidth directly.

6.4.Test Results

EUT: Active Subwoofer		
M/N: YY2089C2		
Date: 2024-09-02	Pressure: 101.3±1.0 kpa	Humidity: 52.4±3.0%
Tested by: Winter	Test Site: RF site	Temperature:23.1±0.6℃

Test Mode	Frequency (MHz)	20dB bandwidth (KHz)	Limit (KHz)
GFSK	2402	953.1	N/A
	2441	953.3	N/A
	2480	857.7	N/A
8-DPSK	2402	1262	N/A
	2441	1262	N/A
	2480	1267	N/A
Conclusion : PASS			

Test Mode	Frequency (MHz)	99% Bandwidth (KHz)	Limit (KHz)
GFSK	2402	896.90	N/A
	2441	899.93	N/A
	2480	904.39	N/A
8-DPSK	2402	1161.1	N/A
	2441	1161.5	N/A
	2480	1165.1	N/A
Conclusion : PASS			

GFSK

2402MHz



8-DPSK

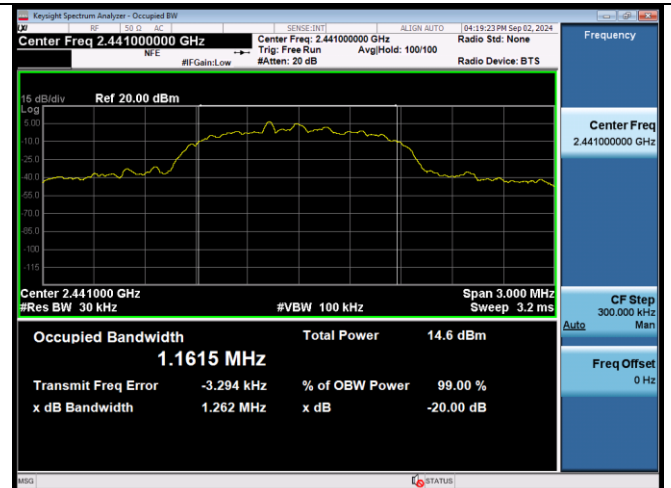
2402MHz



2441MHz



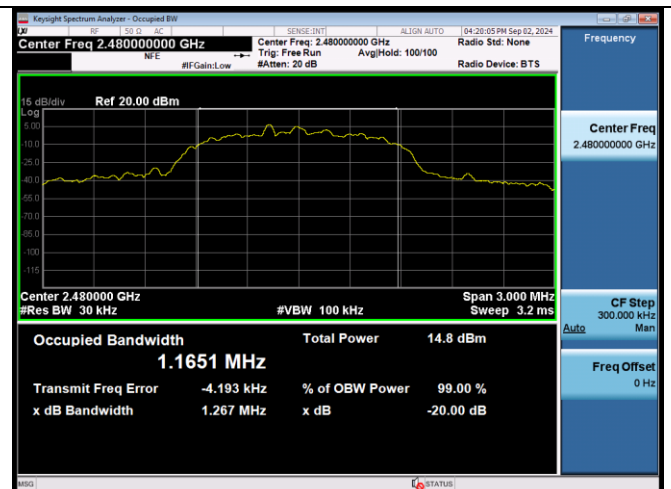
2441MHz



2480MHz



2480MHz



7. CARRIER FREQUENCY SEPARATION TEST

7.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Mar.16,24	1 Year
2.	RF Cable	Eastsheep	RM086-SMA/N-JJ-2000	NO.1	Jun.19,24	1 Year
3.	Attenuator(10dB)	Agilent	8491B	MY39269201	Mar.16,24	1 Year

7.2. Limit

Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

7.3. Test Procedure

Use the test method described in ANSI C63.10 clause 7.8.2:

1. Connect the antenna port of the EUT to the Spectrum analyzer.
2. Let the EUT working at hopping mode.
3. Setting of SA is following as: RBW: 100kHz / VBW: 300kHz.Span: 5MHz
4. Use the mark Delta function of the SA measure out the channel separation.