



## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 1 of 41

**Applicant** : inMusic Brand, Inc.  
200 Scenic View Drive, Cumberland, RI 02864 U.S.A

**Supplier / Manufacturer** : inMusic Brand, Inc.  
200 Scenic View Drive, Cumberland, RI 02864 U.S.A

**Description of Sample(s)** : Submitted sample(s) said to be  
Product: Drum Module or Digital Drum Set  
Brand Name: **ALESIS**  
Model No.: LDMG  
FCC ID: Y4O-LDMG

**Date Samples Received** : 2024-05-21

**Date Tested** : 2024-05-22 to 2024-05-27

**Investigation Requested** : Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 and ANSI C63.10:2013 for FCC Certification.

**Conclusions** : The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

**Remarks** : Bluetooth DTS (GFSK)  
For additional model(s) details, please see page 3

**Test by** : Susu

  
Dr.CHAN Kwok Hung, Brian  
Authorized Signatory



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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 2 of 41

### CONTENT:

Cover		Page 1 of 41
Content		Page 2 of 41
<b><u>1.0</u></b>	<b><u>General Details</u></b>	
1.1	Test Laboratory	Page 3 of 41
1.2	Equipment Under Test [EUT] Description of EUT operation	Page 3 of 41
1.3	Date of Order	Page 3 of 41
1.4	Submitted Sample(s)	Page 3 of 41
1.5	Test Duration	Page 3 of 41
1.6	Country of Origin	Page 3 of 41
1.7	RF Module Details	Page 4 of 41
1.8	Antenna Details	Page 4 of 41
1.9	Channel List	Page 4 of 41
<b><u>2.0</u></b>	<b><u>Technical Details</u></b>	
2.1	Investigations Requested	Page 5 of 41
2.2	Test Standards and Results Summary	Page 6 of 41
<b><u>3.0</u></b>	<b><u>Test Results</u></b>	
3.1	Emission	Page 7-35 of 41
<b><u>Appendix A</u></b>		
List of Measurement Equipment		Page 36 of 41
<b><u>Appendix B</u></b>		
Photographs		Page 37-41 of 41

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 3 of 41

### **1.0 General Details**

#### **1.1 Test Laboratory**

The Hong Kong Standards and Testing Centre Ltd.  
EMC Laboratory  
10 Dai Wang Street, Taipo Industrial Estate, New Territories, Hong Kong  
Telephone: 852 2666 1888  
Fax: 852 2664 4353

#### **1.2 Equipment Under Test [EUT]**

##### **Description of Sample(s)**

Product: Drum Module or Digital Drum Set  
Manufacturer: inMusic Brands, Inc.  
200 Scenic View Drive, Cumberland, RI 02864 U.S.A.  
Brand Name: **ALESIS**  
Model Number: LDMG  
Additional Model Number: LDLM, CRIMSON, CRIMSON III  
Rating: 9.0Vd.c. by adapter  
The AC/DC adapter was provided by the applicant with following details:  
Brand name: GQ; Model no.: GQ07-090050-DX  
Input: 100-240Va.c. 50-60Hz 0.3A Max, Output: 9.0Vd.c. 0.5A 4.5W

##### **1.2.1 Description of EUT Operation**

The Equipment Under Test (EUT) is a Drum Module or Digital Drum Set. The transmission signal is digital modulated with channel frequency range 2402-2480MHz. The R.F. signal was modulated by IC; the type of modulation used was digital transmission Modulation.

#### **1.3 Date of Order**

2024-05-21

#### **1.4 Submitted Sample(s):**

1 Sample

#### **1.5 Test Duration**

2024-05-22 to 2024-05-27

#### **1.6 Country of Origin**

China

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 4 of 41

### 1.7 RF Module Details

Module Model Number: WLT8761M  
Module FCC ID: N/A  
Module Transmission Type: Bluetooth 5.0BR/EDR/ BLE  
Modulation: GFSK  
Data Rates: 1Mbps  
Frequency Range: 2400-2483.5MHz  
Carrier Frequencies: 2402MHz – 2480MHz

Module Specification (specification provided by manufacturer)

### 1.8 Antenna Details

Antenna Type: PCB antenna  
Antenna Gain: 3.0dBi

### 1.9 Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

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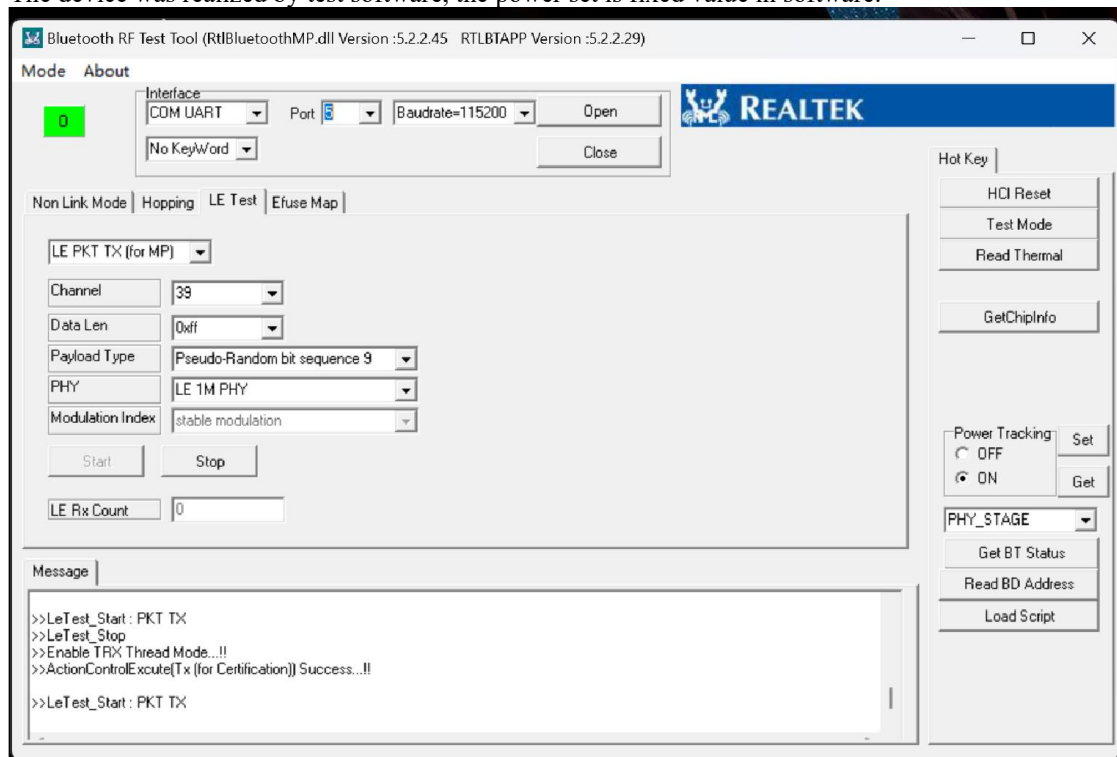
Date : 2024-06-12  
No. : HMD24050007

Page 5 of 41

### 2.0 Technical Details

#### 2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 Regulations and ANSI C63.10:2013 for FCC Certification. The device was realized by test software, the power set is fixed value in software.



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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 6 of 41

### 2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Maximum Peak Output Power	FCC 47CFR 15.247(b)(3)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Spurious Emissions	FCC 47CFR 15.209 FCC 47CFR 15.205	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducted Spurious Emissions	FCC 47CFR 15.247(d)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Spectral Density	FCC 47CFR 15.247(e)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Band Edge Emissions (Radiated)	FCC 47CFR 15.247(d)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 7 of 41

### **3.0 Test Results**

#### **3.1 Emission**

##### **3.1.1 Maximum Peak Output Power**

Test Requirement:	FCC 47CFR 15.247(b)(3)
Test Method:	ANSI C63.10: 2013
Test Date:	2024-05-22
Mode of Operation:	Bluetooth DTS Tx mode

Ambient Temperature: 25°C

Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

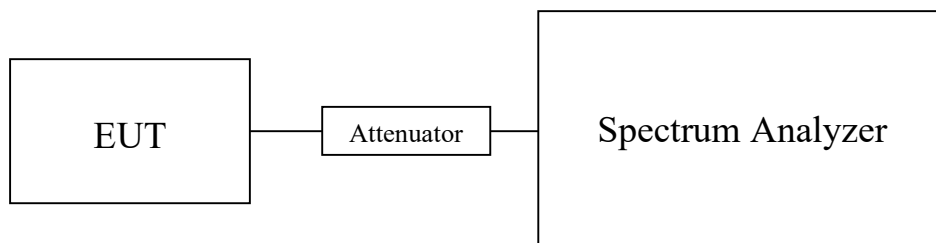
#### **Test Method:**

The RF output of the EUT was connected to the spectrum analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in Watt.

#### **Spectrum Analyzer Setting:**

RBW = 3 MHz,  
VBW= 10MHz,  
Sweep = Auto,  
Span = 10MHz  
Detector = Peak,  
Trace = Max. hold

#### **Test Setup:**



Note: a temporary antenna connector was soldered to the RF output.

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 8 of 41

### Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt (30dBm)

Results of BT DTS Tx Mode (2402MHz to 2480MHz) : Pass (TX Unit) (GFSK 1Mbps)					
Channel	Frequency(MHz)	Conducted power(dBm)	Antenna Gain(dBi)	E.I.R.P(dBm)	E.I.R.P (Watt)
0	2402	2.08	3.0	5.08	0.003221
19	2440	1.58	3.0	4.58	0.002871
39	2480	1.62	3.0	4.62	0.002897

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB  
1GHz to 26GHz 1.7dB

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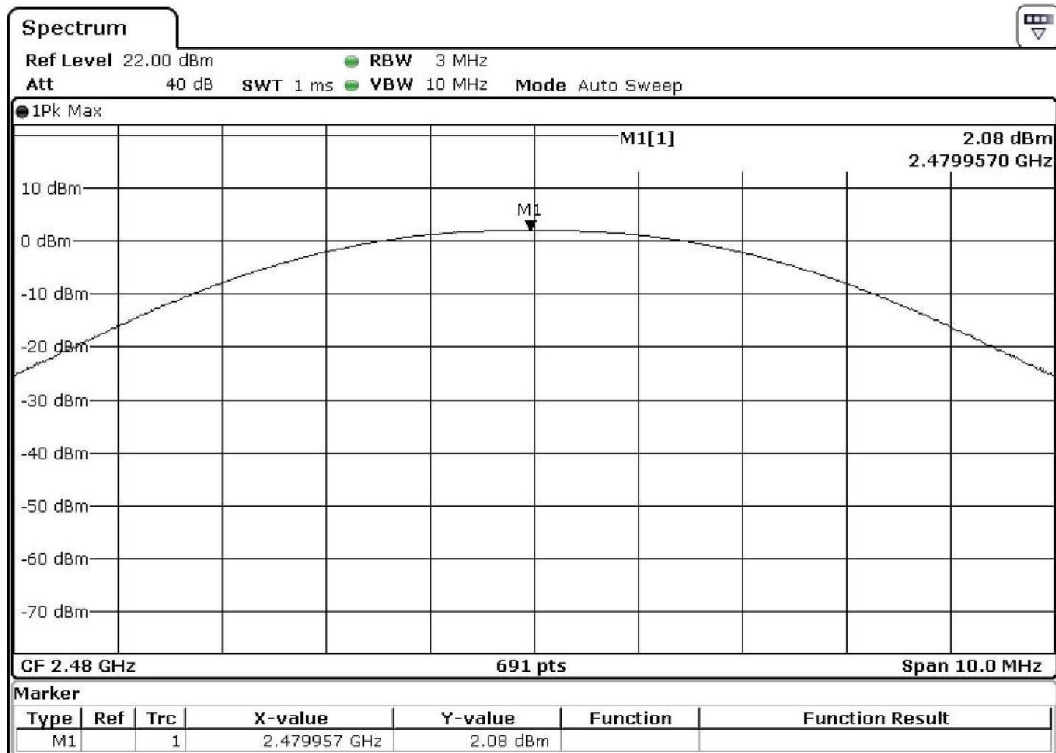
## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 9 of 41

Test plot of Maximum Peak Conducted Output Power :

Bluetooth Communication mode (BT DTS-GFSK 1Mbps, 2402MHz)



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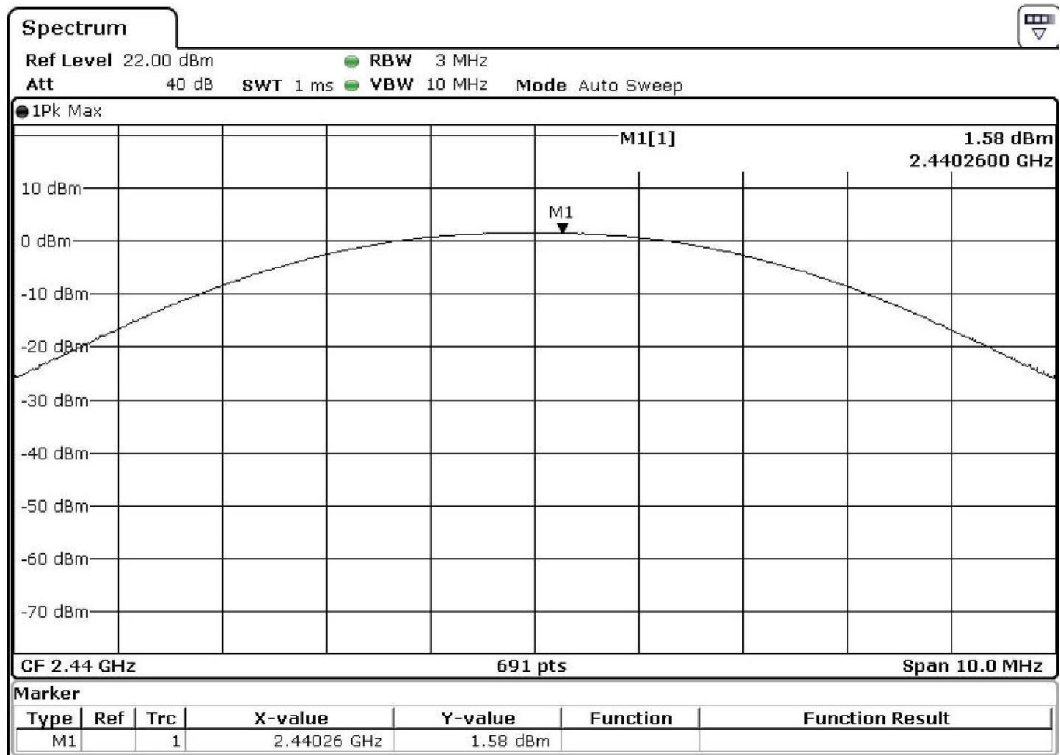


## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 10 of 41

Bluetooth Communication mode (BT DTS-GFSK 1Mbps, 2440MHz)



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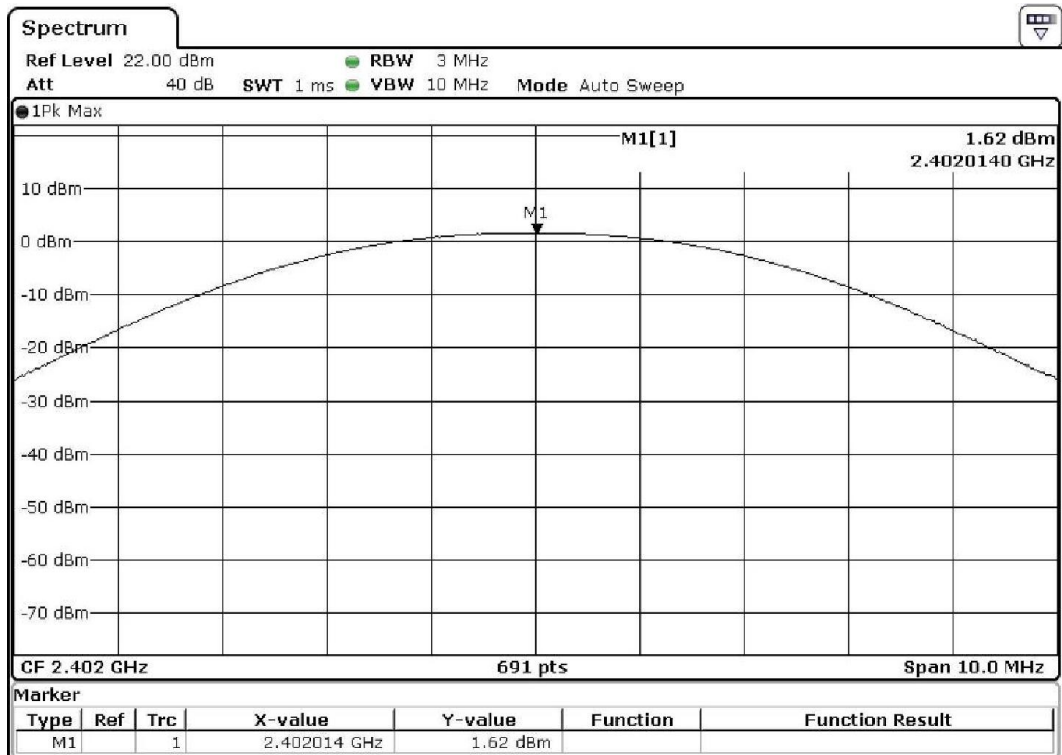
## Test Report

Date : 2024-06-12

Page 11 of 41

No. : HMD24050007

Bluetooth Communication mode (BT DTS-GFSK 1Mbps, 2480MHz)



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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 12 of 41

### 3.1.2 Radiated Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.10:2013
Test Date:	2024-05-21 to 2024-05-22
Mode of Operation:	Tx mode / Bluetooth Communication mode (GFSK)

Ambient Temperature: 25°C      Relative Humidity: 50%      Atmospheric Pressure: 101 kPa

#### Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber\*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with  
Registration Number: HK0001  
Test Firm Registration Number: 367672

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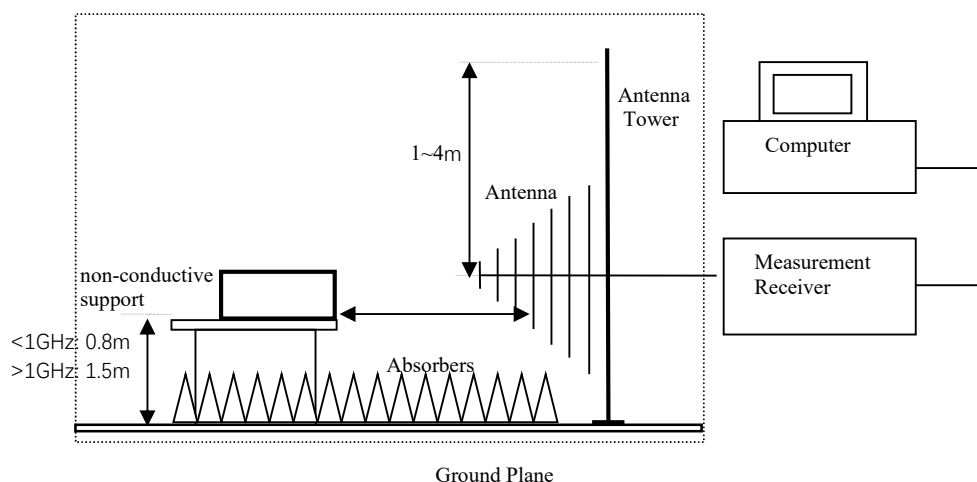
Date : 2024-06-12  
No. : HMD24050007

Page 13 of 41

### Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)	RBW: 10kHz VBW: 30kHz Sweep: Auto Span: Fully capture the emissions being measured Trace: Max. hold
30MHz – 1GHz (QP)	RBW: 120kHz VBW: 120kHz Sweep: Auto Span: Fully capture the emissions being measured Trace: Max. hold
Above 1GHz (Pk)	RBW: 1MHz VBW: 1MHz Sweep: Auto Span: Fully capture the emissions being measured Trace: Max. hold
Above 1GHz (Av)	RBW: 1MHz VBW: 10Hz Sweep: Auto Span: Fully capture the emissions being measured Trace: Max. hold

### Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used.

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Page 14 of 41

Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500



## Test Report

Date : 2024-06-12

Page 15 of 41

No. : HMD24050007

### Result of Tx mode (2402.0 MHz) (GFSK 1Mbps) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

### Result of Tx mode (2402.0 MHz) (GFSK 1Mbps) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dB	E-Field Polarity
4804.0	57.2	0.82	58.0	74.0	16.0	Vertical
4804.0	57.4	0.52	57.9	74.0	16.1	Horizontal
7206.0	49.9	7	56.9	74.0	17.1	Vertical
7206.0	49.8	6.5	56.3	74.0	17.7	Horizontal
9608.0	46.6	8.5	55.1	74.0	18.9	Vertical
9608.0	47.2	8.3	55.5	74.0	18.5	Horizontal
12010.0	44.7	10.9	55.6	74.0	18.4	Vertical
12010.0	45.3	10.8	56.1	74.0	17.9	Horizontal

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dB	E-Field Polarity
4804.0	41.4	0.82	42.2	54.0	11.8	Vertical
4804.0	41.5	0.52	42.0	54.0	12.0	Horizontal
7206.0	35.1	7	42.1	54.0	11.9	Vertical
7206.0	35.2	6.5	41.7	54.0	12.3	Horizontal
9608.0	30.9	8.5	39.4	54.0	14.6	Vertical
9608.0	31.8	8.3	40.1	54.0	13.9	Horizontal
12010.0	30.9	10.9	41.8	54.0	12.2	Vertical
12010.0	30.8	10.8	41.6	54.0	12.4	Horizontal

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## Test Report

Date : 2024-06-12

Page 16 of 41

No. : HMD24050007

Result of Tx mode (2440.0 MHz) (GFSK 1Mbps) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2440.0 MHz) (GFSK 1Mbps) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4880.0	57.5	0.82	58.3	74.0	15.7	Vertical
4880.0	57.0	0.52	57.5	74.0	16.5	Horizontal
7320.0	50.2	7	57.2	74.0	16.8	Vertical
7320.0	50.0	6.5	56.5	74.0	17.5	Horizontal
9760.0	47.0	8.5	55.5	74.0	18.5	Vertical
9760.0	47.6	8.3	55.9	74.0	18.1	Horizontal
12200.0	45.2	10.9	56.1	74.0	17.9	Vertical
12200.0	45.4	10.8	56.2	74.0	17.8	Horizontal

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4880.0	41.5	0.82	42.3	54.0	11.7	Vertical
4880.0	41.3	0.52	41.8	54.0	12.2	Horizontal
7320.0	35.2	7	42.2	54.0	11.8	Vertical
7320.0	35.4	6.5	41.9	54.0	12.1	Horizontal
9760.0	33.0	8.5	41.5	54.0	12.5	Vertical
9760.0	32.9	8.3	41.2	54.0	12.8	Horizontal
12200.0	30.8	10.9	41.7	54.0	12.3	Vertical
12200.0	30.5	10.8	41.3	54.0	12.7	Horizontal

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 17 of 41

Result of Tx mode (2480.0 MHz) (GFSK 1Mbps) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2480.0 MHz) (GFSK 1Mbps) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4960.0	57.5	0.82	58.3	74.0	15.7	Vertical
4960.0	57.3	0.52	57.8	74.0	16.2	Horizontal
7440.0	50.2	7	57.2	74.0	16.8	Vertical
7440.0	51.1	6.5	57.6	74.0	16.4	Horizontal
9920.0	47.3	8.5	55.8	74.0	18.2	Vertical
9920.0	47.4	8.3	55.7	74.0	18.3	Horizontal
12400.0	45.3	10.9	56.2	74.0	17.8	Vertical
12400.0	45.2	10.8	56.0	74.0	18.0	Horizontal

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4960.0	41.5	0.82	42.3	54.0	11.7	Vertical
4960.0	42.0	0.52	42.5	54.0	11.5	Horizontal
7440.0	34.9	7	41.9	54.0	12.1	Vertical
7440.0	35.7	6.5	42.2	54.0	11.8	Horizontal
9920.0	32.6	8.5	41.1	54.0	12.9	Vertical
9920.0	32.6	8.3	40.9	54.0	13.1	Horizontal
12400.0	30.8	10.9	41.7	54.0	12.3	Vertical
12400.0	30.3	10.8	41.1	54.0	12.9	Horizontal

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## Test Report

Date : 2024-06-12

Page 18 of 41

No. : HMD24050007

### Radiated Emissions Measurement:

#### Limit :

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

### Result: RF Radiated Emissions (Lowest)-GFSK 1Mbps

Field Strength of Band-edge Compliance						
Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB	E-Field Polarity
2390.0	48.3	-4.8	43.5	74.0	30.5	Vertical
2390.0	48.0	-4.7	43.3	74.0	30.7	Horizontal

Field Strength of Band-edge Compliance						
Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB	E-Field Polarity
2390.0	42.3	-4.8	37.5	54.0	16.5	Vertical
2390.0	41.9	-4.7	37.2	54.0	16.8	Horizontal

### Result: RF Radiated Emissions (Highest) -GFSK 1Mbps

Field Strength of Band-edge Compliance						
Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB	E-Field Polarity
2483.5	58.3	-4.8	53.5	74.0	20.5	Vertical
2483.5	58.0	-4.7	53.3	74.0	20.7	Horizontal

Field Strength of Band-edge Compliance						
Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V	Correction Factor dB/m	Field Strength dB $\mu$ V/m	Limit @3m dB $\mu$ V/m	Margin dB	E-Field Polarity
2483.5	44.0	-4.8	39.2	54.0	14.8	Vertical
2483.5	43.6	-4.7	38.9	54.0	15.1	Horizontal

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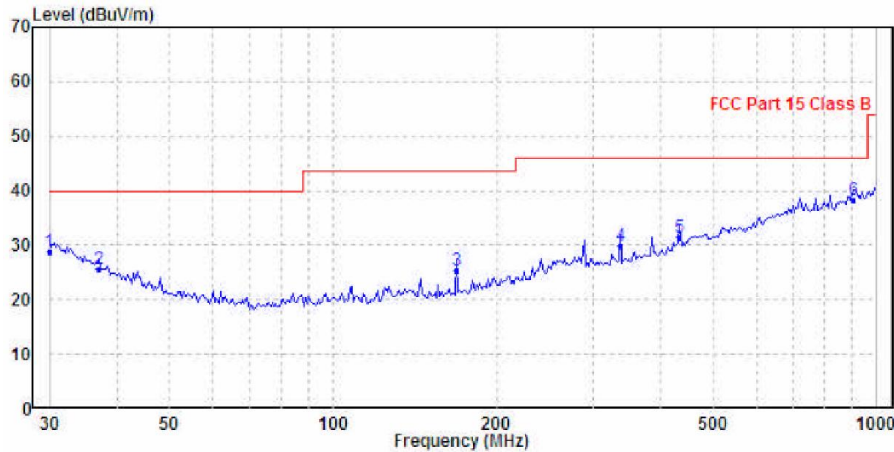
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No. : HMD24050007

Page 19 of 41

### Results of Bluetooth mode (2402.0 MHz) (30MHz – 1GHz): Pass

Please refer to the following table for result details(The data is the worst cases)

Horizontal



Ambient Temperature: 26.3C  
Relative Humidity : 54.7%  
Air Pressure : 100.9kPa

	Freq	Level	Limit	Over		
	MHz	dBuV/m	Line	Limit	Remark	Pol/Phase
				dB		
1	30.000	28.88	40.00	-11.12	QP	Horizontal
2	37.025	25.55	40.00	-14.45	QP	Horizontal
3	168.414	25.30	43.50	-18.20	QP	Horizontal
4	337.216	29.97	46.00	-16.03	QP	Horizontal
5	434.065	31.44	46.00	-14.56	QP	Horizontal
6	906.482	38.22	46.00	-7.78	QP	Horizontal

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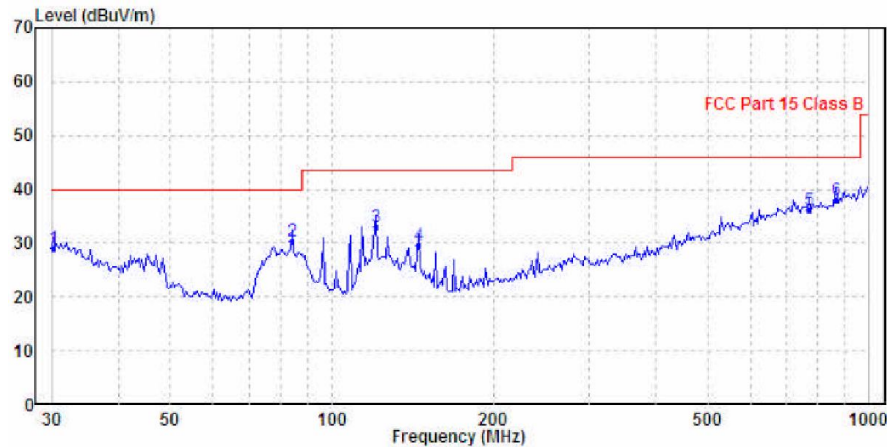
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No. : HMD24050007

Page 20 of 41

### Results of Bluetooth mode (2402.0 MHz) (30MHz – 1GHz): Pass

Please refer to the following table for result details(The data is the worst cases)

Vertical



Ambient Temperature: 26.3C  
Relative Humidity : 54.7%  
Air Pressure : 100.9kPa

	Freq	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	30.211	29.08	40.00	-10.92	QP	Horizontal
2	84.110	30.39	40.00	-9.61	QP	Horizontal
3	120.277	33.00	43.50	-10.50	QP	Horizontal
4	144.335	29.68	43.50	-13.82	QP	Horizontal
5	771.449	36.31	46.00	-9.69	QP	Horizontal
6	869.130	38.12	46.00	-7.88	QP	Horizontal

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 21 of 41

### 3.1.3 AC Mains Conducted Emissions (0.15MHz to 30MHz)

Test Requirement: FCC 47CFR 15.207  
Test Method: ANSI C63.10:2013  
Test Date: 2024-05-23  
Mode of Operation: TX mode  
Test Voltage: 120V a.c. 60Hz

Ambient Temperature: 25°C      Relative Humidity: 51%      Atmospheric Pressure: 101 kPa

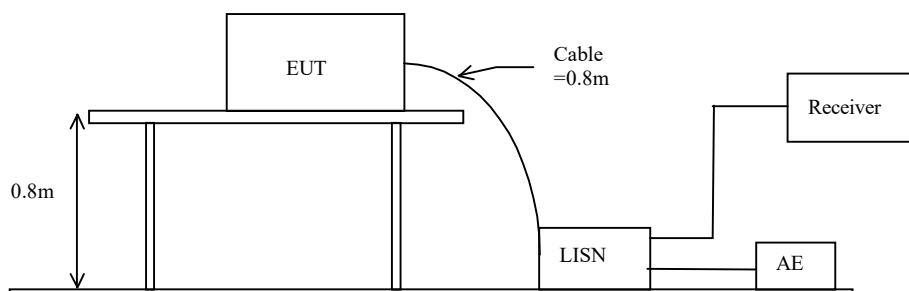
#### Test Method:

The test was performed in accordance with ANSI C63.10:2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

#### Receiver Setting:

Bandw. = 9 kHz, Meas. Time= 10.0 ms, Step Width = 5.0kHz  
Detector = MaxPeak and CISPR AV

#### Test Setup:



#### Limits for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

\* Decreases with the logarithm of the frequency.

#### Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.25dB

-\*- Emission(s) that is far below the corresponding limit line.

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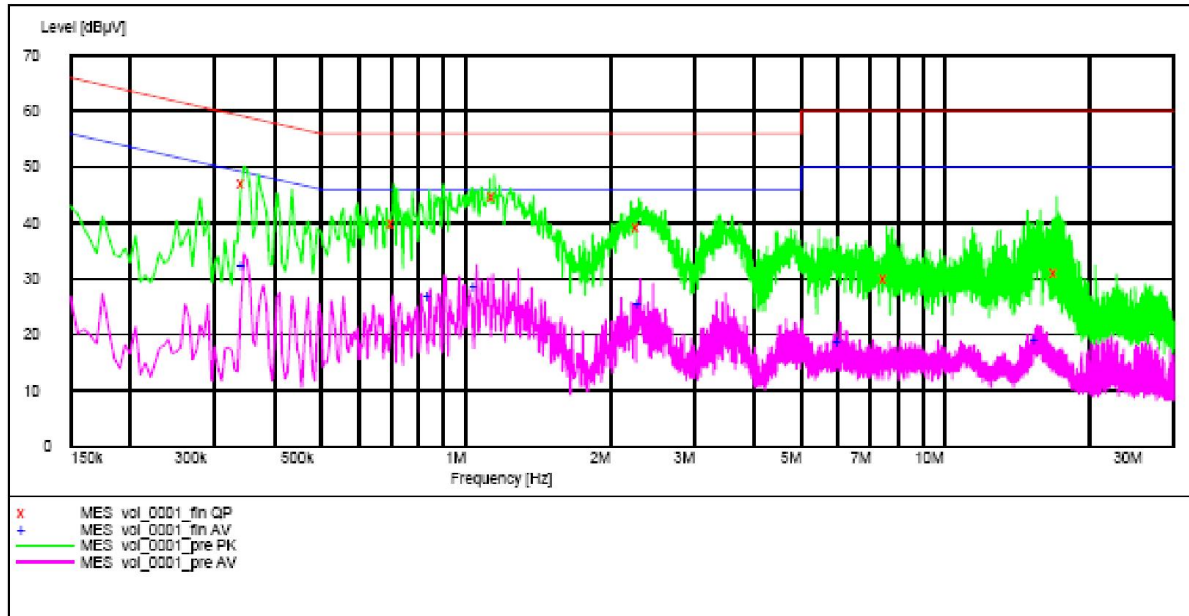
## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 22 of 41

### Results of Bluetooth mode (L): PASS

Please refer to the following diagram for individual results.



#### MEASUREMENT RESULT: "vol\_0001\_fin QP"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.345000	47.10	9.7	59	12.0	N	GND
0.710000	40.00	9.7	56	16.0	N	GND
1.150000	44.60	9.7	56	11.4	N	GND
2.300000	39.20	9.8	56	16.8	N	GND
7.555000	29.90	9.9	60	30.1	N	GND
17.120000	30.90	10.3	60	29.1	N	GND

#### MEASUREMENT RESULT: "vol\_0001\_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.345000	32.40	9.7	49	16.7	N	GND
0.845000	27.00	9.7	46	19.0	N	GND
1.055000	28.60	9.7	46	17.4	N	GND
2.315000	25.60	9.8	46	20.4	N	GND
6.065000	18.90	9.9	50	31.1	N	GND
15.585000	19.10	10.2	50	30.9	N	GND

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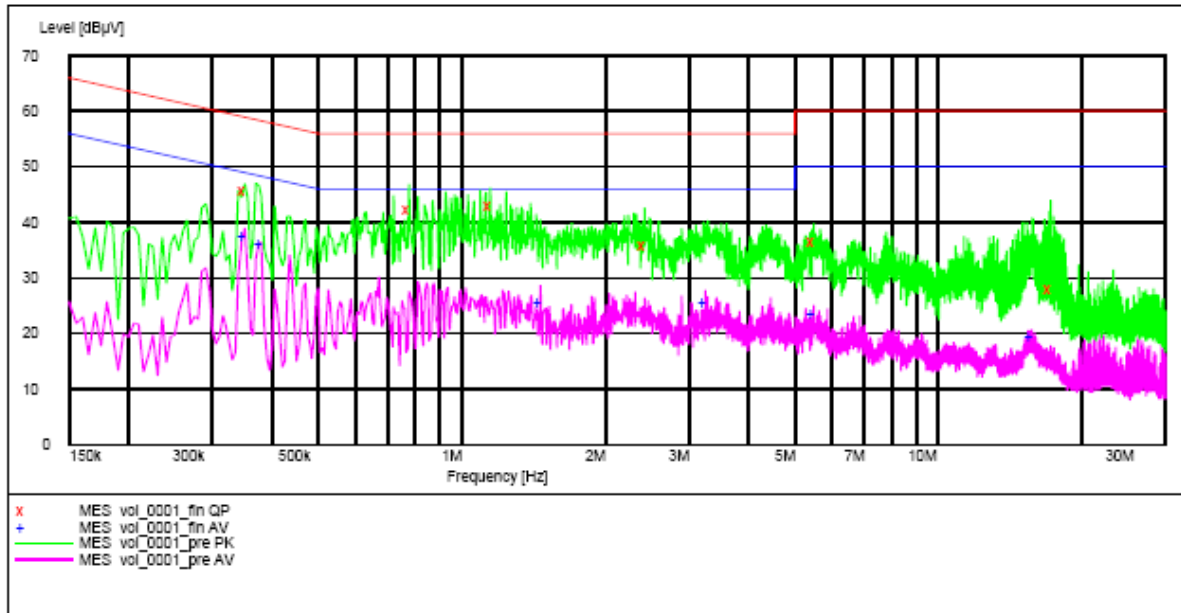
## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 23 of 41

### Results of Bluetooth mode (N): PASS

Please refer to the following diagram for individual results.



#### MEASUREMENT RESULT: "vol\_0001\_fin QP"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.350000	45.70	9.7	59	13.3	L1	GND
0.775000	42.30	9.7	56	13.7	L1	GND
1.150000	42.90	9.7	56	13.1	L1	GND
2.425000	35.80	9.8	56	20.2	L1	GND
5.480000	36.40	9.9	60	23.6	L1	GND
17.220000	27.80	10.3	60	32.2	L1	GND

#### MEASUREMENT RESULT: "vol\_0001\_fin AV"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.350000	37.50	9.7	49	11.5	L1	GND
0.380000	36.10	9.7	48	12.2	L1	GND
1.465000	25.70	9.8	46	20.3	L1	GND
3.250000	25.40	9.8	46	20.6	L1	GND
5.480000	23.50	9.9	50	26.5	L1	GND
15.720000	19.30	10.2	50	30.7	L1	GND

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 24 of 41

### 3.1.4 Power Spectral Density

Test Requirement: FCC 47CFR 15.247(e)  
Test Method: ANSI C63.10:2013  
Test Date: 2024-05-22  
Mode of Operation: Tx mode

Ambient Temperature: 25°C      Relative Humidity: 51%      Atmospheric Pressure: 101 kPa

#### Test Method:

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=3kHz, VBW= 10KHz, Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple, Trace mode = max hold. Measure the Power Spectral Density (PSD) and record the results in dBm.

#### Test Setup:

As Test Setup of clause 3.1.1 in this test report.

#### Test Limit:

The maximum power spectral density (PSD) shall not exceeded 8dBm in any 3kHz band.

Results of Tx Mode GFSK 1Mbps (Tx:2402MHz to 2480MHz) : Pass (Tx Unit)

Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2402.0	-14.10	8dBm
2440.0	-14.63	8dBm
2480.0	-14.08	8dBm

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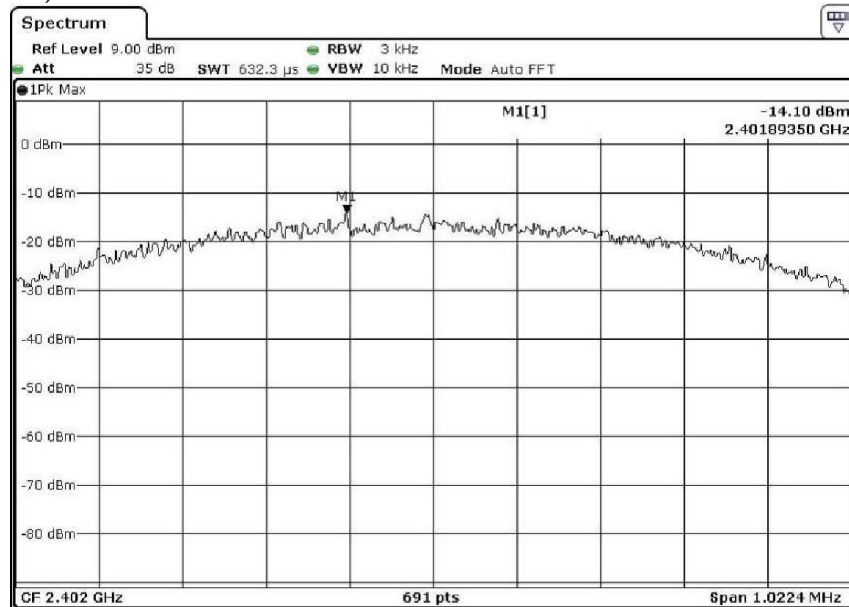


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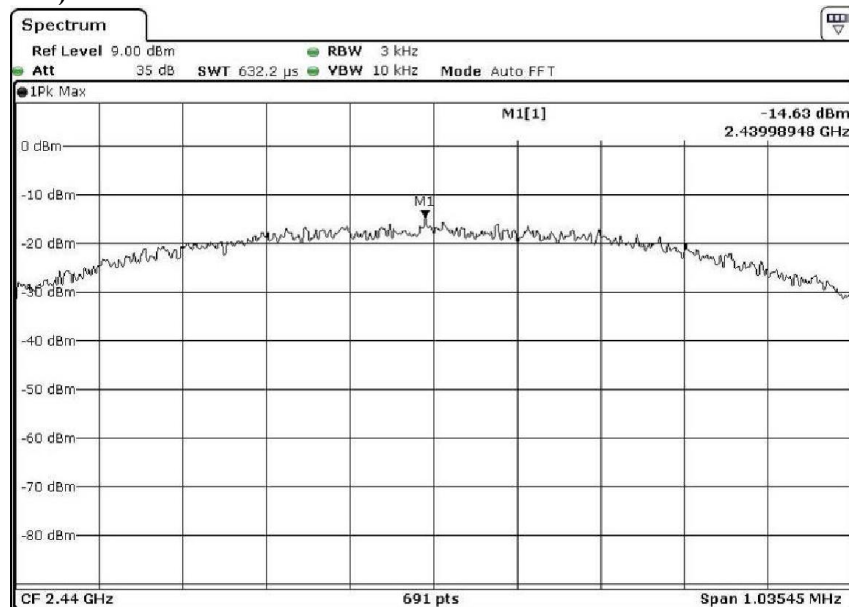
Date : 2024-06-12  
No. : HMD24050007

Page 25 of 41

Tx mode GFSK 1Mbps (Tx: 2402MHz to 2480MHz)  
CH 0 (2402.0 MHz)



CH 19 (2440.0 MHz)



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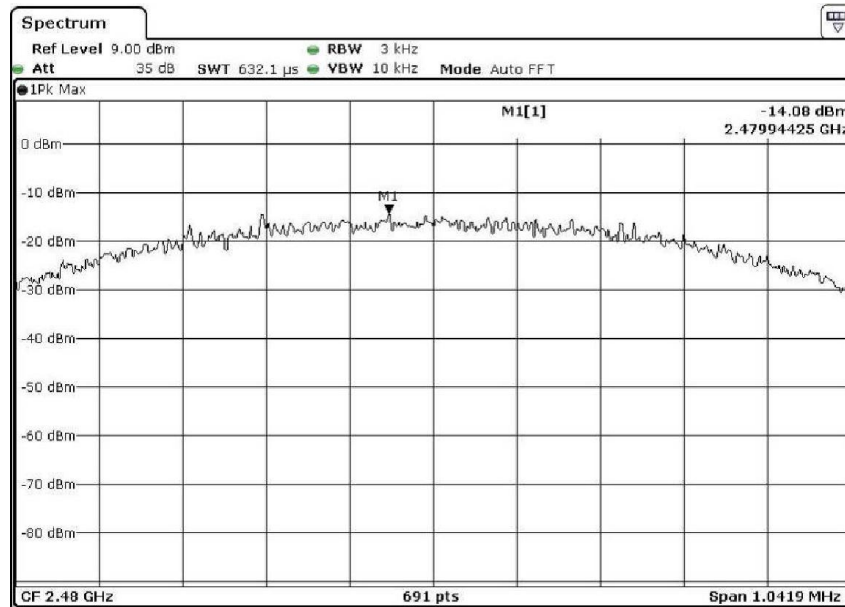


## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 26 of 41

CH 39 (2480.0 MHz)



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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 27 of 41

### 3.1.5 6dB Spectrum Bandwidth Measurement

Test Requirement: FCC 47CFR 15.247(a)(2)  
Test Method: ANSI C63.10:2013  
Test Date: 2024-03-22  
Mode of Operation: Tx mode

Ambient Temperature: 25°C      Relative Humidity: 51%      Atmospheric Pressure: 101 kPa

#### Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

#### Test Setup:

As Test Setup of clause 3.1.1 in this test report.

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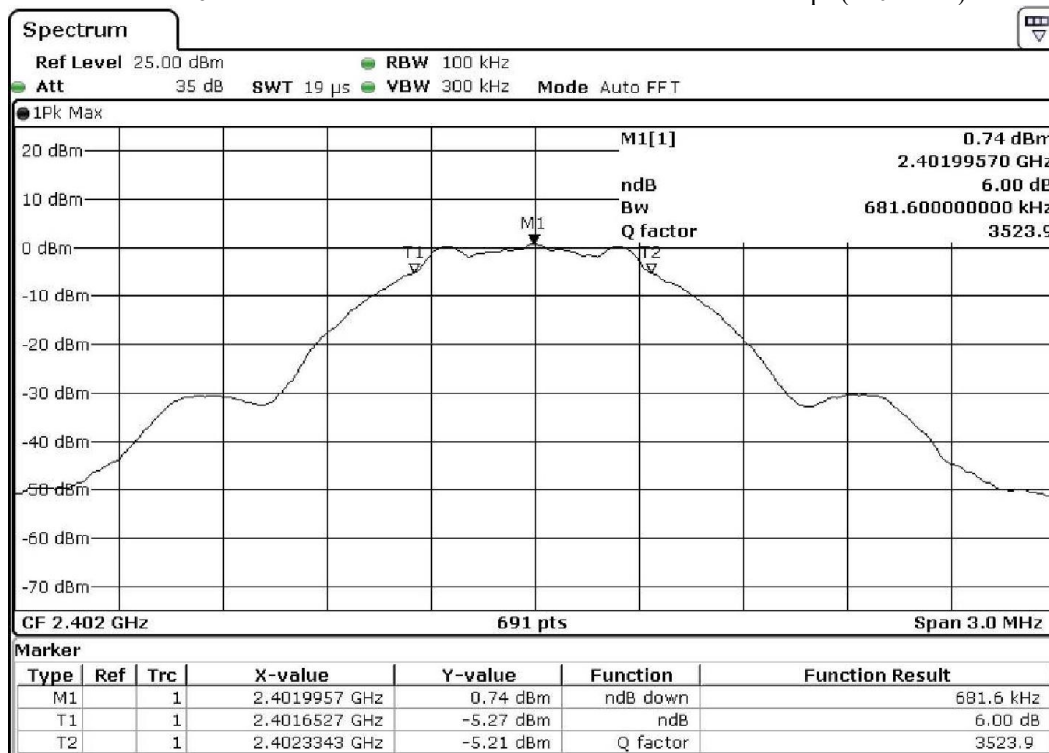
Page 28 of 41

No. : HMD24050007

### Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [KHz]	FCC Limits [kHz]
2402.0	681.6	> 500

### 6dB Bandwidth of Fundamental Emission on GFSK 1Mbps (2402MHz)



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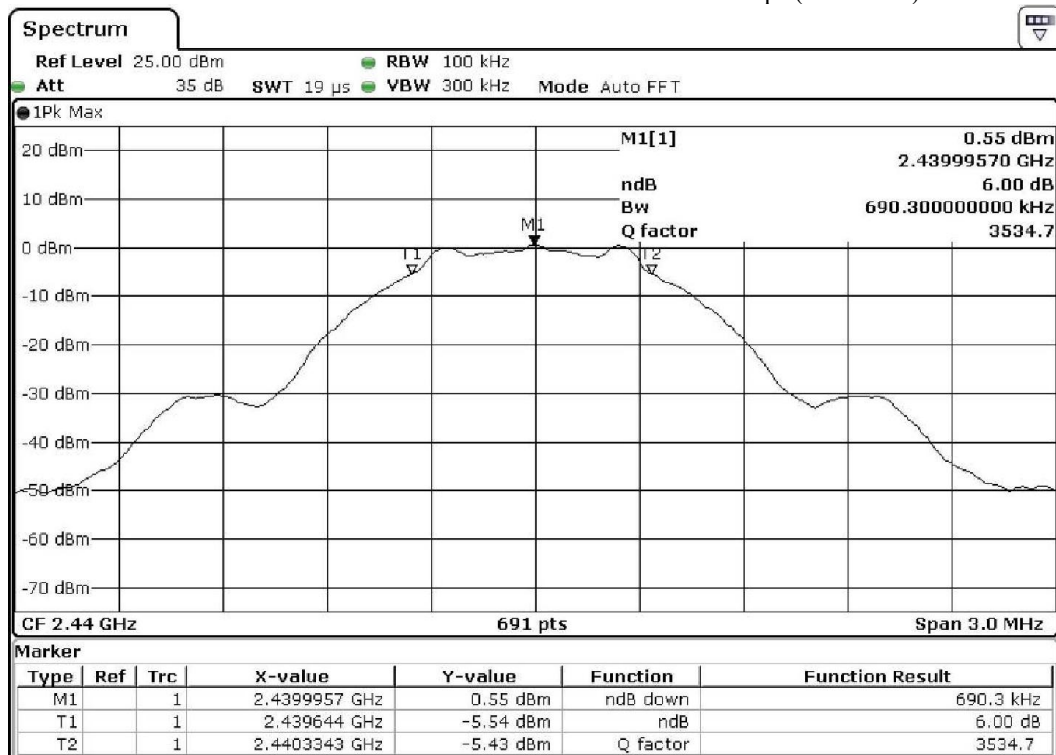
Date : 2024-06-12  
No. : HMD24050007

Page 29 of 41

### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [KHz]	FCC Limits [kHz]
2440.0	690.3	> 500

6dB Bandwidth of Fundamental Emission on GFSK 1Mbps (2440MHz)



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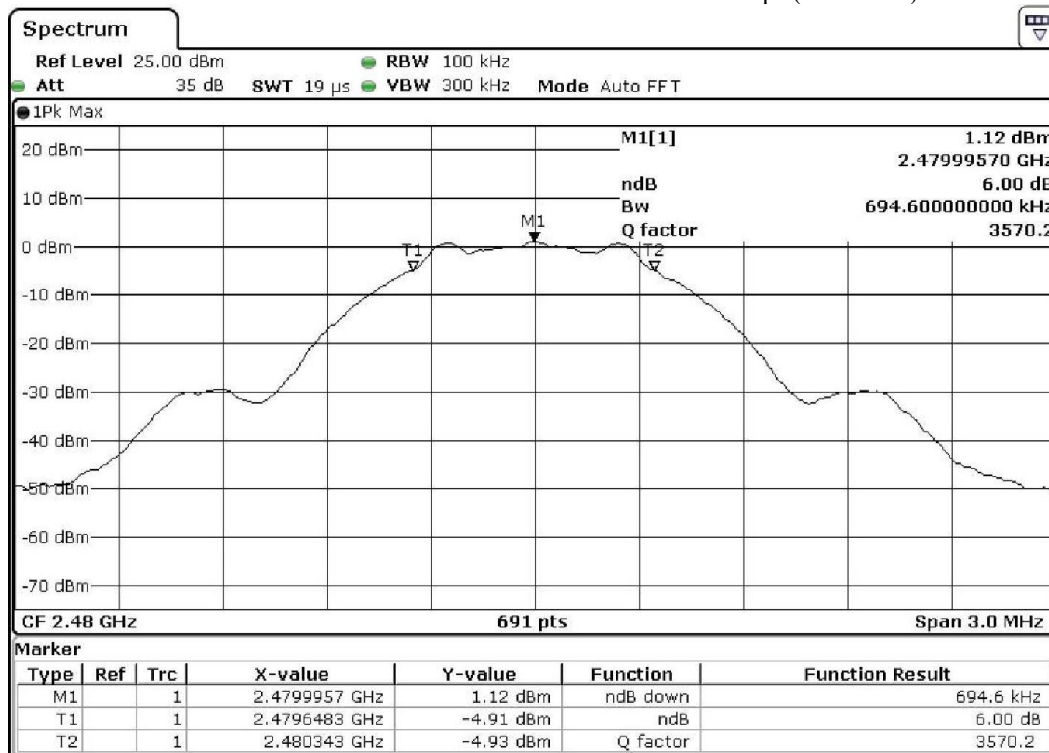
Date : 2024-06-12  
No. : HMD24050007

Page 30 of 41

### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [KHz]	FCC Limits [kHz]
2480.0	694.6	> 500

6dB Bandwidth of Fundamental Emission on GFSK 1Mbps (2480MHz)



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## Test Report

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No. : HMD24050007

Page 31 of 41

### 3.1.6 Band Edges Measurement

Test Requirement: FCC 47CFR 15.247  
Test Method: ANSI C63.10:2013  
Test Date: 2024-05-23  
Mode of Operation: Tx mode

Ambient Temperature: 25°C      Relative Humidity: 51%      Atmospheric Pressure: 101 kPa

#### Test Method:

The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. The RBW are set to 100kHz and VBW are set to 300kHz for this measurement.

#### Test Setup:

As Test Setup of clause 3.1.2 in this test report.

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 32 of 41

### Band-edge Compliance of RF Conducted Emissions Measurement:

#### Limit :

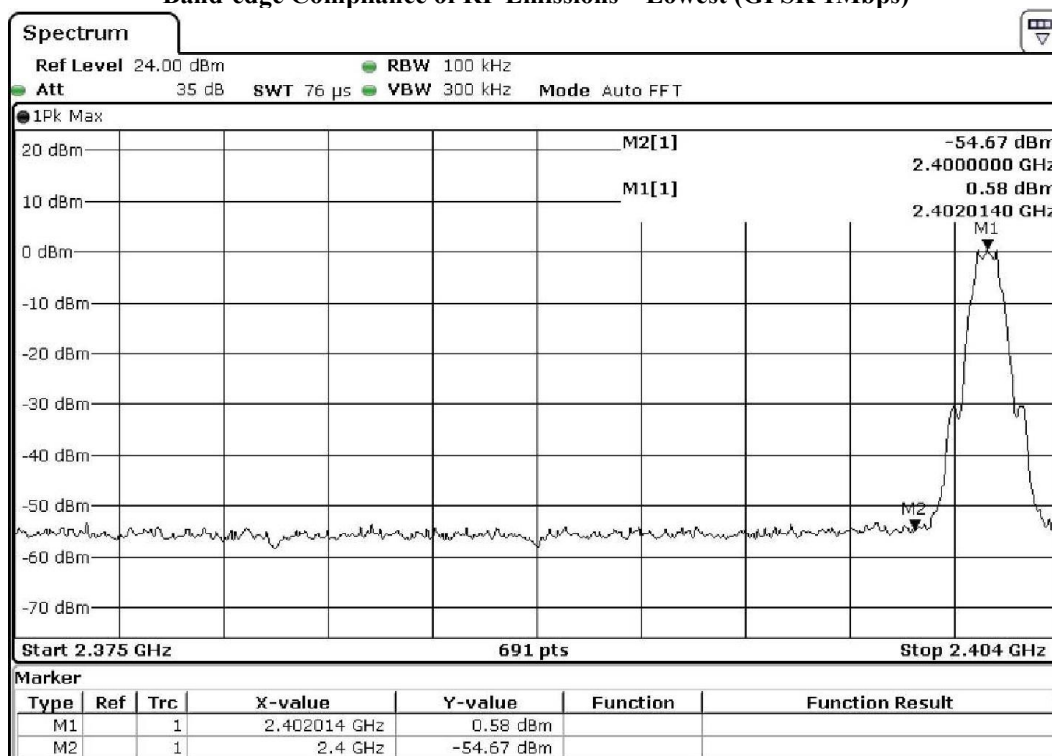
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2400 – Lowest Fundamental (2402)	0.58	-19.42	-54.67	PASS

### Band-edge Compliance of RF Emissions – Lowest (GFSK 1Mbps)



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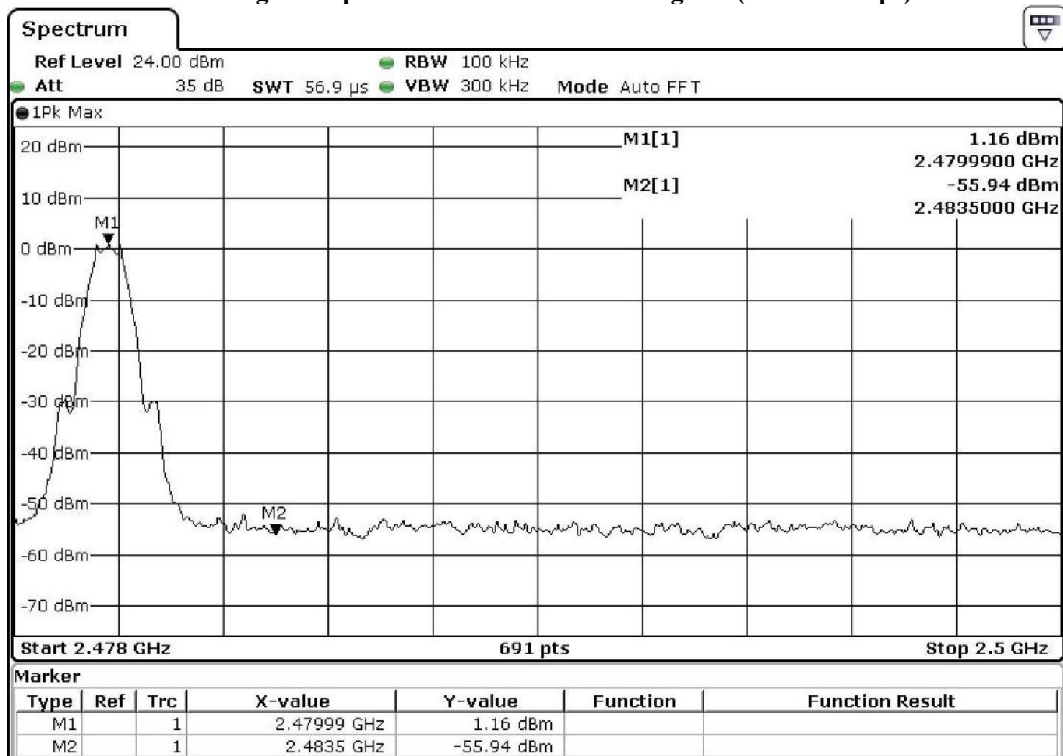
Date : 2024-06-12  
No. : HMD24050007

Page 33 of 41

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 - Highest Fundamental (2480)	1.16	-18.84	-55.94	PASS

### Band-edge Compliance of RF Emissions – Highest (GFSK 1Mbps)



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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 34 of 41

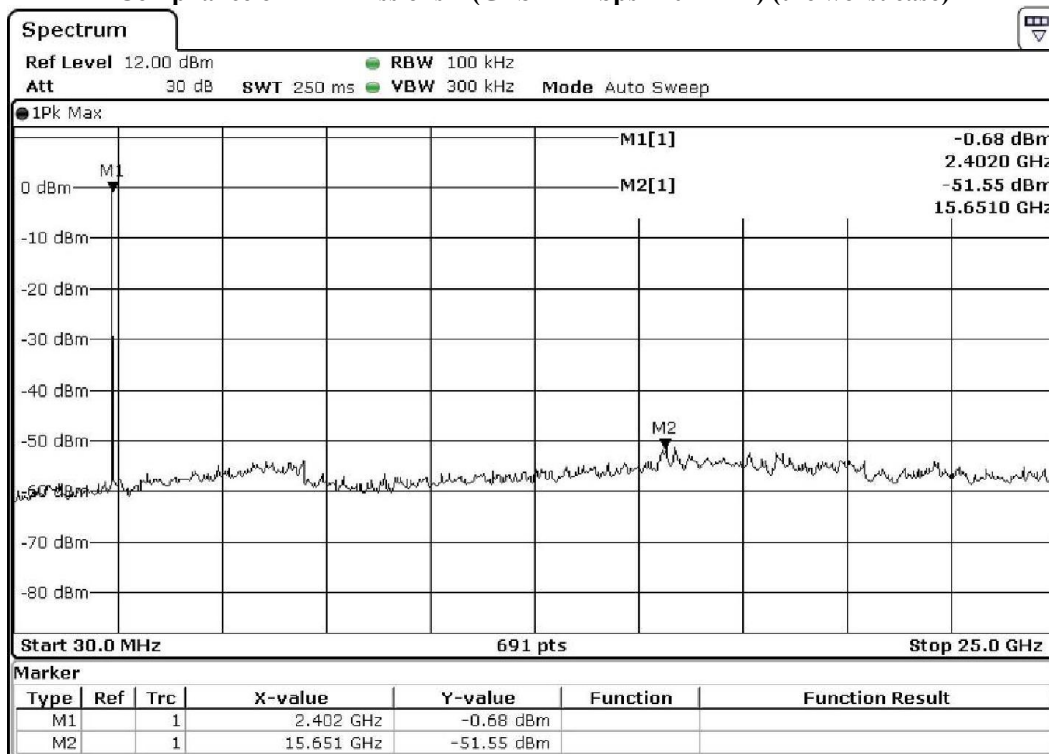
### Compliance of RF Emissions Measurement:

#### Limit :

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

### Compliance of RF Emissions – (GFSK 1Mbps 2402MHz) (the worst case)



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## Test Report

Date : 2024-06-12

No. : HMD24050007

Page 35 of 41

### 3.1.7 Antenna Requirement

Ambient Temperature: 25°C

Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

**Test Requirements: § 15.203**

#### **Test Specification:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### **Test Results:**

This is PCB antenna. There is no external antenna, the antenna gain = 3.0dBi. User is unable to remove or changed the Antenna.

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 36 of 41

### Appendix A

#### List of Measurement Equipment

##### Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDevice CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM217	ELECTRIC POWERED TURN TABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2024-04-18	2029-04-18
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A
EM293	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	N9020A	MY50510152	2023-03-21	2025-03-21
EM363	SIGNAL ANALYZER(10HZ- 40GHZ)	R & S	FSV40	101231	2024-01-17	2026-01-17
EM299	BROADBAND HORN ANTENNA	ETS-LINDGREN	3115	00114120	2023-01-25	2025-01-25
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2023-01-16	2025-01-16
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2023-02-15	2025-02-15
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2022-09-26	2024-09-26
EM355	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00094856	2022-08-26	2024-08-26
EM200	DUAL CHANNEL POWER METER	R & S	NRVD	100592	2023-08-02	2025-08-02

##### Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM232	LISN	SCHAFFNER	NNB41	04/100082	2023-05-30	2025-05-30
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	2024-04-18	2025-04-18
EM179	IMPULSE LIMITER	R & S	ESH3-Z2	357.8810.52/54	2023-03-17	2025-03-17
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	2022-02-06	2027-02-06
N/A	MEASUREMENT AND EVALUATION SOFTWARE	ROHDE & SCHWARZ	BSIB-K1	V1.20	N/A	N/A

#### Remarks:-

CM CORRECTIVE MAINTENANCE  
N/A NOT APPLICABLE  
TBD TO BE DETERMINED

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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 37 of 41

### Appendix B

#### Photographs of EUT

View of the product



View of the product



View of the product



View of adapter



Inner circuit bottom view



Inner circuit top view



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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 38 of 41

### Photographs of EUT

Inner circuit top view



Inner circuit top view



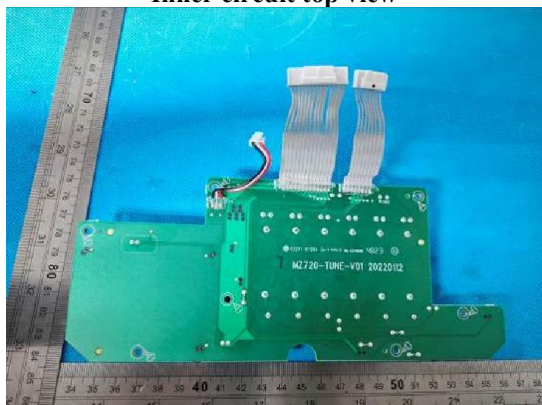
Inner circuit top view



Inner circuit top view



Inner circuit top view



Inner circuit top view



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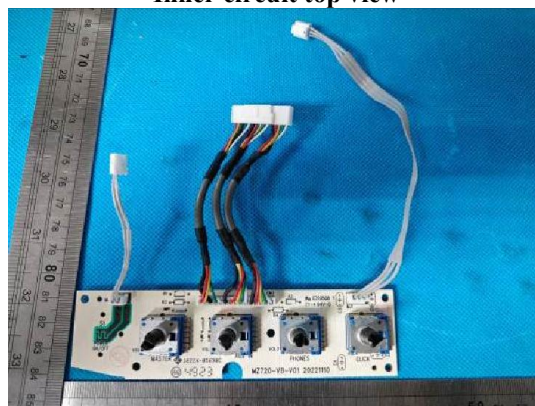
Page 39 of 41

### Photographs of EUT

Inner circuit top view



Inner circuit top view



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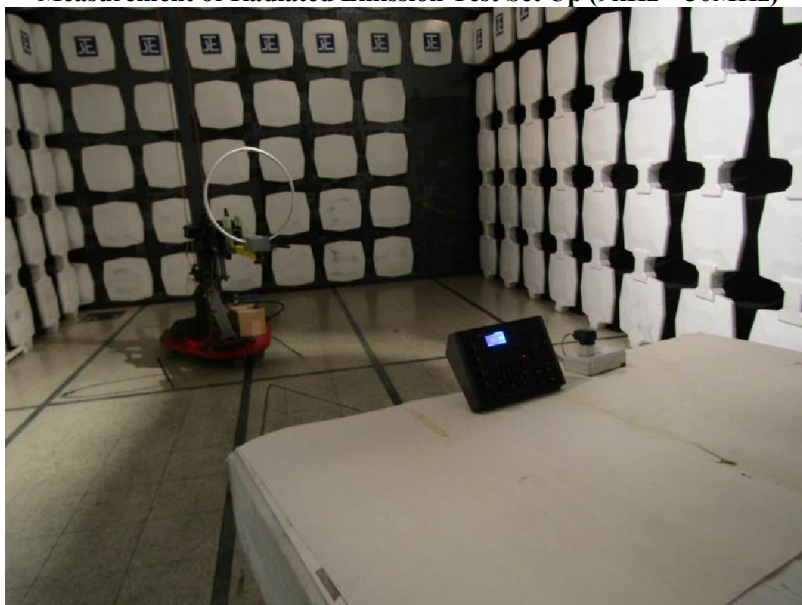
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No. : HMD24050007

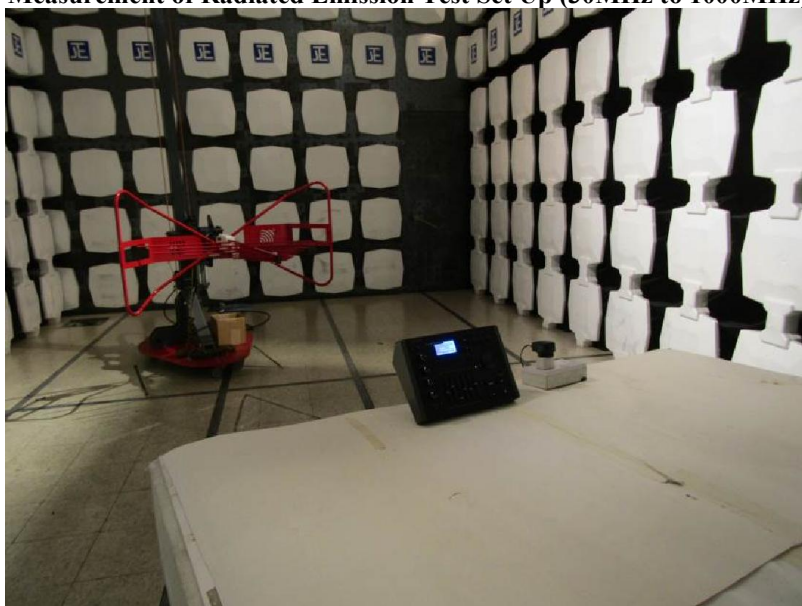
Page 40 of 41

### Photographs of EUT

**Measurement of Radiated Emission Test Set Up (9kHz – 30MHz)**



**Measurement of Radiated Emission Test Set Up (30MHz to 1000MHz)**



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## Test Report

Date : 2024-06-12  
No. : HMD24050007

Page 41 of 41

### Photographs of EUT

**Measurement of Radiated Emission Test Set Up (Above 1000MHz)**



**Measurement of Conducted Emission Test Set Up**



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

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