



Test Report

Date : 2025-06-26
No. : HMD25050005

Page 1 of 24

Applicant : Radiance Instruments Ltd.
Flat 2002, 20/F, CEO Tower, 77 Wing Hong Street Lai Chi Kok,
Kowloon, Hong Kong, China.

Supplier / Manufacturer : HUIZHOU LIHENG ELECTRONICS PLASTIC CO.LTD
Da Jing Village, Si Jiao Lou, Luo Yang Town, Hui Zhou City, China

Description of Sample(s) : Submitted sample(s) said to be
Product: RFX MUDULE
Brand Name: N/A
Model No.: TMWRFX-M-CHIP
FCC ID: 2AI67-RFXM02

Date Samples Received : 2025-05-22

Date Tested : 2025-05-23 to 2025-05-30

Investigation Requested : Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 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 : 433.92MHz

Test by: Susu



Dr.CHAN Kwok Hung, Brian
Authorized Signatory



Test Report

Date : 2025-06-26
No. : HMD25050005

Page 2 of 24

CONTENT:

Cover	Page 1 of 24
Content	Page 2-3 of 24
<u>1.0 General Details</u>	
1.1 Test Laboratory	Page 4 of 24
1.2 Equipment Under Test [EUT] Description of EUT operation	Page 4 of 24
1.3 Date of Order	Page 4 of 24
1.4 Submitted Sample(s)	Page 4 of 24
1.5 Test Duration	Page 4 of 24
1.6 Country of Origin	Page 4 of 24
<u>2.0 Technical Details</u>	
2.1 Investigations Requested	Page 5 of 24
2.2 Test Standards and Results Summary	Page 5 of 24
<u>3.0 Test Results</u>	
3.1 Emission	Page 6-15 of 24
3.2 20dB Bandwidth of Fundamental Emission	Page 16-17 of 24



Test Report

Date : 2025-06-26
No. : HMD25050005

Page 3 of 24

Appendix A

List of Measurement Equipment

Page 18 of 24

Appendix B

Duty Cycle Correction During 100 msec

Page 19-20 of 24

Appendix C

Manually Operated Transmitter Transmission Time

Page 21 of 24

Appendix D

Photograph(s) of Product

Page 22-24 of 24

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Test Report

Date : 2025-06-26
No. : HMD25050005

Page 4 of 24

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: RFX MODULE
Manufacturer: HUIZHOU LIHENG ELECTRONICS PLASTIC CO.LTD
Da Jing Village, Si Jiao Lou, Luo Yang Town, Hui Zhou City, China
Brand Name: N/A
Model Number: TMWRFX-M-CHIP
Rating: DC 3V

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a RFX MODULE. The EUT is operating at 433.92MHz.
Test was conducted under Tx mode.

TX Frequency: 433.92MHz
RF modulation: GFSK
Antenna gain: -1.72dBi
Antenna type: Ceramic Chip antenna

1.3 Date of Order

2025-05-22

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2025-05-23 to 2025-05-30

1.6 Country of Origin

China

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Test Report

Date : 2025-06-26
No. : HMD25050005

Page 5 of 24

2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 and ANSI C63.10: 2013 for FCC Certification.
This is a manually operated transmitter, Press the button to start sending signals.

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
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231(a)	ANSI C63.10: 2013	N/A	☒	☐	☐
20dB Bandwidth of Fundamental Emission	FCC 47CFR 15.231(c)	ANSI C63.10: 2013	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	☒	☐	☐
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10: 2013	N/A	☒	☐	☐
Manual Operated Transmitter Transmission Time	FCC 47CFR 15.231(a)	ANSI C63.10: 2013	N/A	☒	☐	☐
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	☒	☐	☐

Note: N/A - Not Applicable

Test Report

Date : 2025-06-26
No. : HMD25050005

Page 6 of 24

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

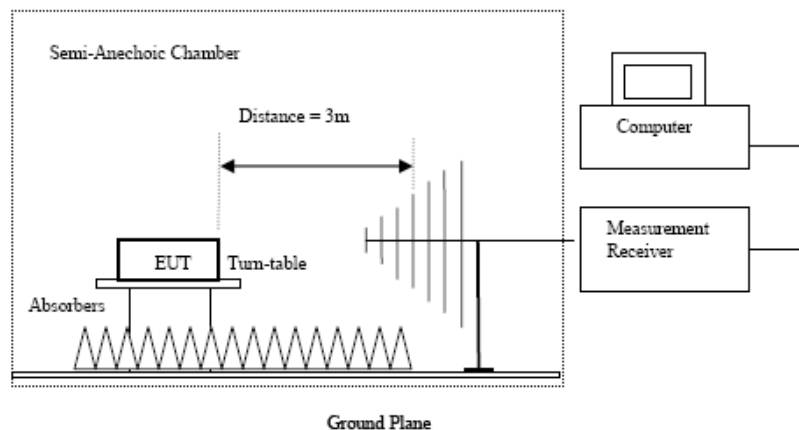
Test Requirement:	FCC 47CFR 15.231(a)	
Test Method:	ANSI C63.10:2013	
Test Date:	2025-05-26	
Mode of Operation:	Tx mode	
Ambient Temperature: 25°C	Relative Humidity: 52%	Atmospheric Pressure: 101 kPa

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

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, 9kHz to 30MHz loop antennas are used.

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Test Report

Date : 2025-06-26
No. : HMD25050005

Page 7 of 24

Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.231a]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [μV/m]	Field Strength of Spurious Emission [Average] [μV/m]
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12,500 *	375 to 1,250 *
Above 470	12,500	1,250

¹Linear interpolations.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Results of Tx mode(1GHz – 18GHz): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m	Correction Factor dB/m	Field Strength	Field Strength μV/m	Limit @3m	E-Field Polarity
433.92	38.7	15.4	54.1	506.4	109,966.8	Vertical
433.92	50.6	15.3	65.9	1963.4	109,966.8	Horizontal

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
867.84	17.3	22.8	40.1	101.2	10,996.7	Vertical
867.84	18.1	22.5	40.6	107.2	10,996.7	Horizontal
1301.76	11.8	26.8	38.6	85.1	5,011.87	Vertical
1301.76	12.1	26.8	38.9	88.1	5,011.87	Horizontal
1735.68	7.1	32.9	40.0	100.0	10,996.7	Vertical
1735.68	7.0	32.7	39.7	96.6	10,996.7	Horizontal
2169.60	1.9	38.2	40.1	101.2	10,996.7	Vertical
2169.60	2.0	38.1	40.1	101.2	10,996.7	Horizontal

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Test Report

Date : 2025-06-26
No. : HMD25050005

Page 8 of 24

Results of Tx mode(1GHz – 18GHz): PASS

Field Strength of Fundamental Emissions						
Average Value						
Frequency MHz	Peak Value Level @3m dBμV	Duty Cycle Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
433.92	54.1	-11.2	42.9	139.6	10,996.7	Vertical
433.92	65.9	-11.2	54.7	541.4	10,996.7	Horizontal

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Peak Value Level @3m dBμV	Duty Cycle Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
867.84	40.1	-11.2	28.9	27.9	1,099.7	Vertical
867.84	40.6	-11.2	29.4	29.5	1,099.7	Horizontal
1301.76	38.6	-11.2	27.4	23.5	501.190	Vertical
1301.76	38.9	-11.2	27.7	24.3	501.190	Horizontal
1735.68	40.0	-11.2	28.8	27.6	1,099.7	Vertical
1735.68	39.7	-11.2	28.5	26.6	1,099.7	Horizontal
2169.60	40.1	-11.2	28.9	27.9	1,099.7	Vertical
2169.60	40.1	-11.2	28.9	27.9	1,099.7	Horizontal

Remarks:

- FCC Limit for Fundamental Average Measurement: Linear interpolations
- +: Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.
- *: Adjusted by Duty Cycle = -11.19dB
Duty Cycle Correction = -11.19dB
Correction Factor= Cable loss Factor+ Ant Factor-Amp Factor
Average Value Final Field Strengthed = Peak Value Final Field Strengthed +Duty Cycle
- Correction Factor includes Antenna Factor and Cable Attenuation.
- Calculated measurement uncertainty (9kHz-30MHz): 2.0dB
(30MHz -1GHz): 4.9dB
(1GHz -6GHz): 4.02dB
(6GHz -26.5GHz): 4.03dB
- Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.



Test Report

Date : 2025-06-26
No. : HMD25050005

Page 9 of 24

Limits for Radiated Emissions FCC 47 CFR 15.209 Class B1:

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

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: (9kHz-30MHz): 2.0dB

(30MHz -1GHz): 4.9dB

(1GHz -6GHz): 4.02dB

(6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

Result of Tx mode (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the limit line(s).

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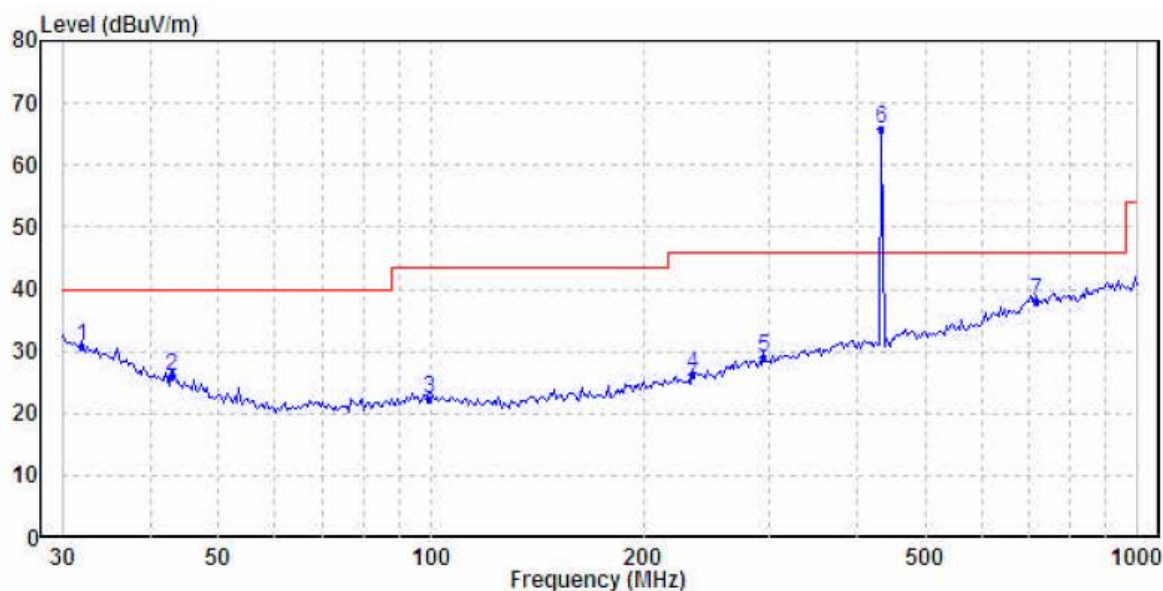


Test Report

Date : 2025-06-26
No. : HMD25050005

Page 10 of 24

Results of Tx mode (30MHz – 1GHz): PASS
Horizontal



Ambient Temperature: 25.1C
Relative Humidity : 53.6%
Air Pressure : 100.9kPa

	Freq	Level	Limit	Over		
	MHz	dBuV/m	Line	Limit	Remark	Pol/Phase
1	31.955	30.85	40.00	-9.15	QP	Horizontal
2	42.900	26.03	40.00	-13.97	QP	Horizontal
3	99.528	22.20	43.50	-21.30	QP	Horizontal
4	234.168	26.19	46.00	-19.81	QP	Horizontal
5	295.147	29.04	46.00	-16.96	QP	Horizontal
6	433.920	65.86				
7	719.200	38.03	46.00	-7.97	QP	Horizontal

*: Frequency 433.92MHz is the fundamental.

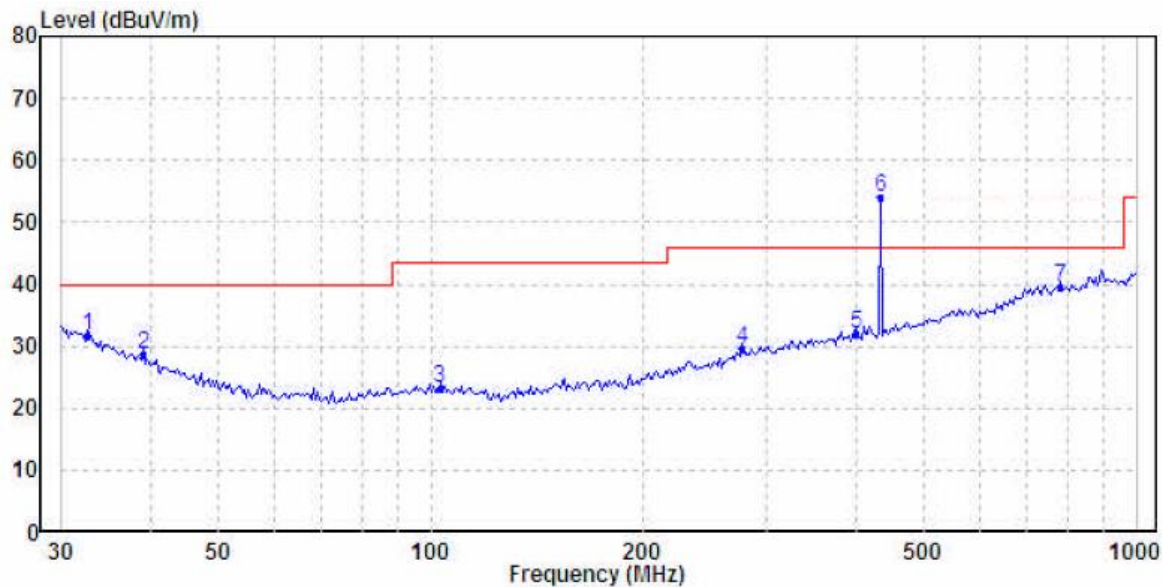


Test Report

Date : 2025-06-26
No. : HMD25050005

Page 11 of 24

Vertical



Ambient Temperature: 25.1C
Relative Humidity : 53.6%
Air Pressure : 100.9kPa

	Freq	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	32.634	31.60	40.00	-8.40	QP	Vertical
2	39.162	28.58	40.00	-11.42	QP	Vertical
3	103.080	23.20	43.50	-20.30	QP	Vertical
4	277.094	29.53	46.00	-16.47	QP	Vertical
5	401.839	32.09	46.00	-13.91	QP	Vertical
6	433.920	54.09				
7	782.345	39.42	46.00	-6.58	QP	Vertical

*: Frequency 433.92MHz is the fundamental.

Test Report

Date : 2025-06-26
No. : HMD25050005

Page 12 of 24

3.1.2 AC Mains Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10:2013
Test Date:	2025-05-30
Mode of Operation:	TX mode
Test Voltage:	120Va.c. 60Hz

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

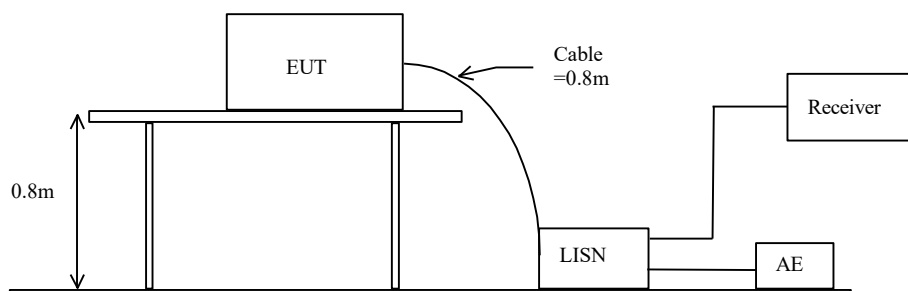
Test Method:

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.

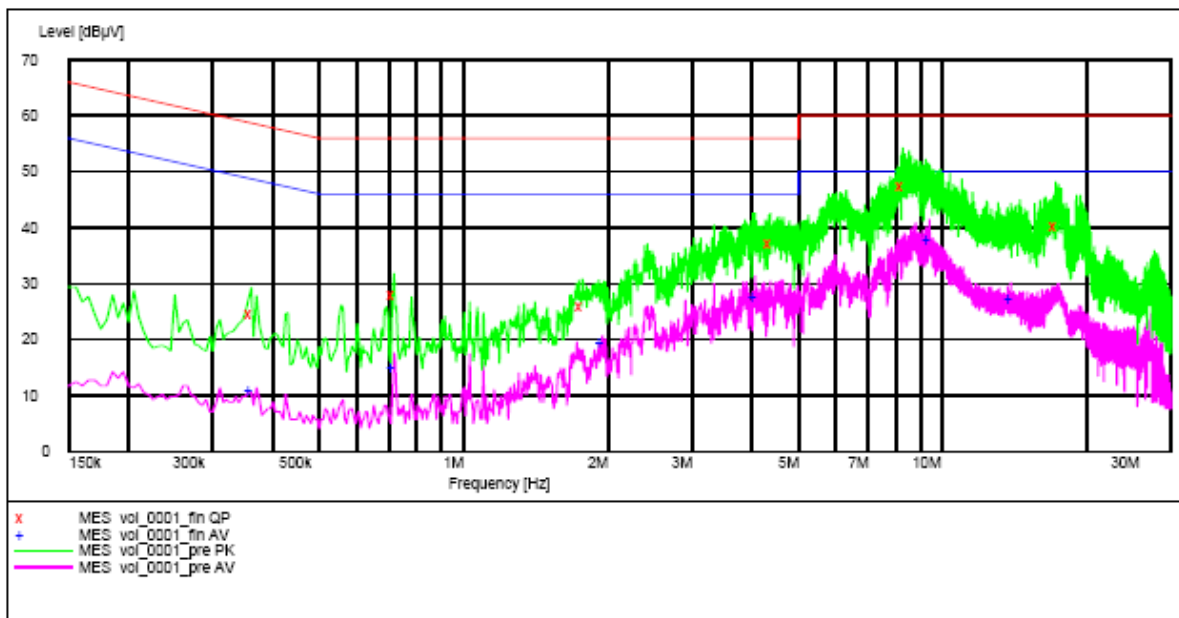
Test Report

Date : 2025-06-26
No. : HMD25050005

Page 13 of 24

Results of TX 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
0.360000	24.60	9.7	58.70	34.20	L1	GND
0.715000	28.00	9.7	56.00	28.00	L1	GND
1.770000	25.90	9.8	56.00	30.10	L1	GND
4.375000	37.20	9.8	56.00	18.80	L1	GND
8.255000	47.40	10.0	60.00	12.60	L1	GND
17.245000	40.20	10.3	60.00	19.80	L1	GND

MEASUREMENT RESULT: "vol_0001_fin AV"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.360000	10.90	9.7	48.70	37.80	L1	GND
0.715000	15.10	9.7	46.00	30.90	L1	GND
1.950000	19.50	9.8	46.00	26.50	L1	GND
4.070000	27.50	9.8	46.00	18.50	L1	GND
9.385000	37.70	10.0	50.00	12.30	L1	GND
13.890000	27.30	10.2	50.00	22.70	L1	GND

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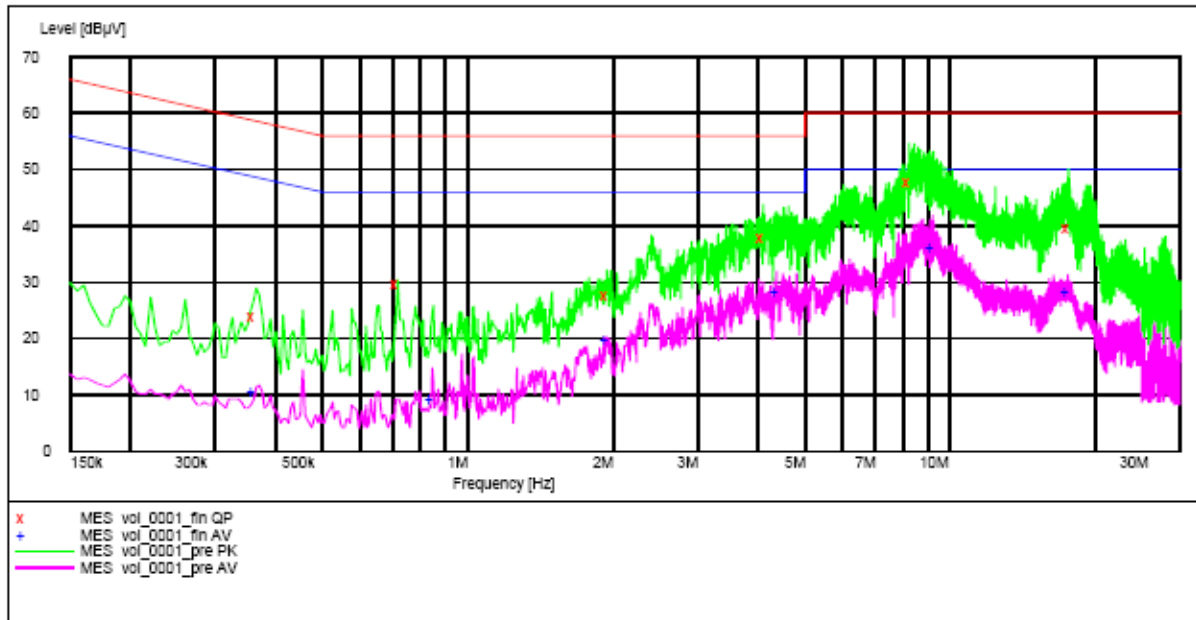
Test Report

Date : 2025-06-26
No. : HMD25050005

Page 14 of 24

Results of TX 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
0.360000	23.90	9.7	58.70	34.80	N	GND
0.715000	29.60	9.7	56.00	26.40	N	GND
1.945000	27.70	9.8	56.00	28.30	N	GND
4.100000	37.90	9.8	56.00	18.10	N	GND
8.240000	47.80	10.0	60.00	12.20	N	GND
17.635000	39.60	10.3	60.00	20.40	N	GND

MEASUREMENT RESULT: "vol_0001_fin AV"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.360000	10.70	9.7	48.70	38.00	N	GND
0.845000	9.10	9.7	46.00	36.90	N	GND
1.945000	19.70	9.8	46.00	26.30	N	GND
4.375000	28.20	9.8	46.00	17.80	N	GND
9.195000	36.00	10.0	50.00	14.00	N	GND
17.555000	28.40	10.3	50.00	21.60	N	GND



Test Report

Date : 2025-06-26
No. : HMD25050005

Page 15 of 24

3.1.3 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 Ceramic Chip antenna. There is no external antenna, the antenna gain = -1.72dBi. User is unable to remove or changed the Antenna.

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Test Report

Date : 2025-06-26
No. : HMD25050005

Page 16 of 24

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement: FCC 47 CFR 15.231(c)
Test Method: ANSI C63.10:2013
Test Date: 2025-05-26
Mode of Operation: Tx mode

Ambient Temperature: 25°C Relative Humidity: 52% 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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Test Report

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No. : HMD25050005

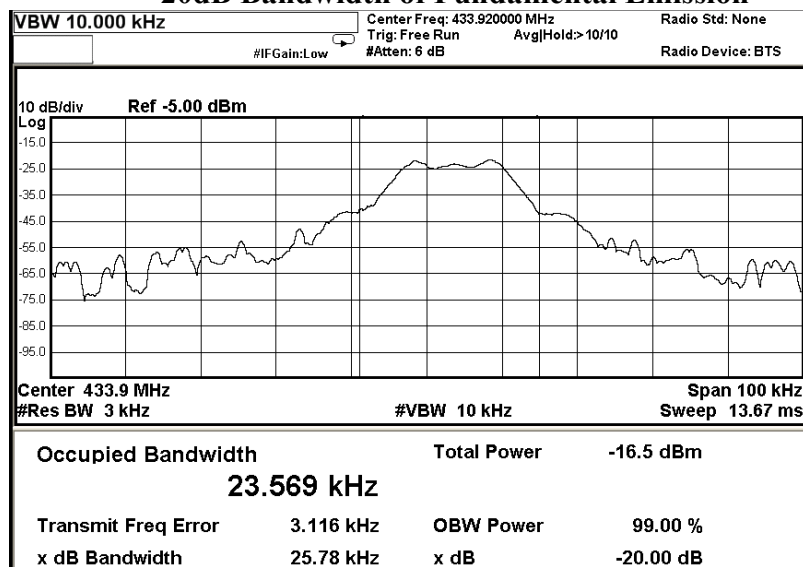
Page 17 of 24

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [MHz]
433.92	25.78	1.0848

*: FCC Limit for Bandwidth measurement
= (0.25%)(Center Frequency)
= (0.0025)(433.92)
= 1.0848MHz

20dB Bandwidth of Fundamental Emission



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Test Report

Date : 2025-06-26
No. : HMD25050005

Page 18 of 24

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 TURNTABLE	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	2024-11-07	2025-11-07
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	2026-01-25
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2023-01-16	2026-01-16
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2023-02-15	2026-02-15
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2022-09-26	2025-09-26
EM355	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00094856	2022-08-26	2025-08-26
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
EM191	LISN	R & S	ESH3-Z5	0831.5518.52	2025-03-20	2026-03-20
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	2025-04-24	2026-04-24
EM179	IMPULSE LIMITER	R & S	ESH3-Z2	357.8810.52/54	2025-03-17	2027-03-17
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

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

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Test Report

Date : 2025-06-26
No. : HMD25050005

Page 19 of 24

Appendix B

Duty Cycle Correction During 100msec

Each packet period (100msec) never exceeds a series of 1 (1*27.57ms) pulses. Assuming any combination of pulses may be obtained due to encoding the worst case transmit duty cycle would be considered
(27.57 ms) per 100msec = 27.57% duty cycle.

Remarks:

Duty cycle factor = $20\text{Log} [27.57/100] = -11.19\text{dB}$

The following figures [Figure A to Figure B] showed the characteristics of the pulse train for one of these functions.

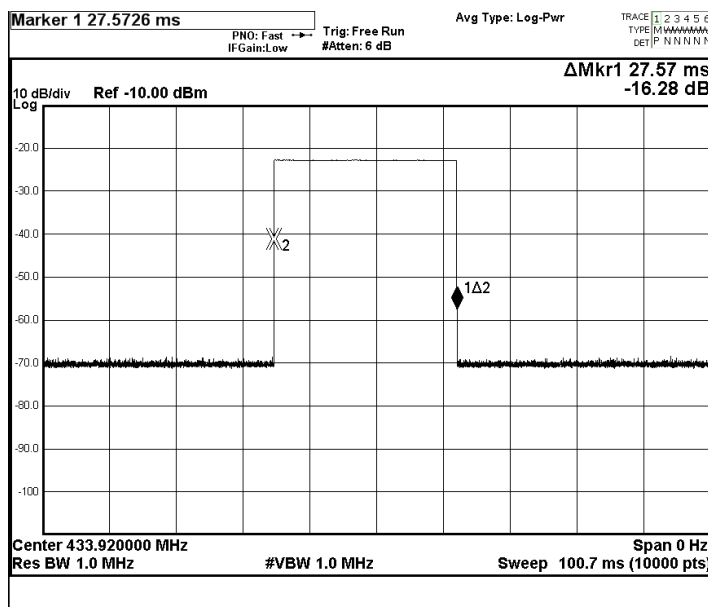
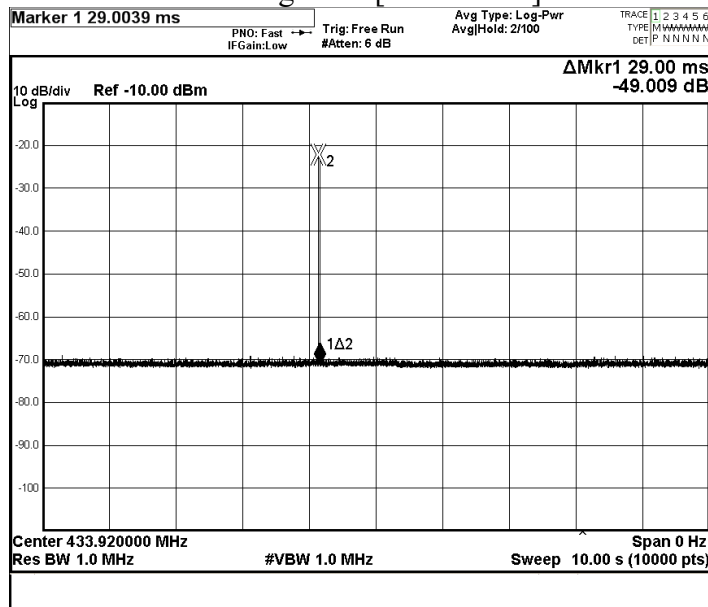


Test Report

Date : 2025-06-26
No. : HMD25050005

Page 20 of 24

Figure A [Pulse Train]



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10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

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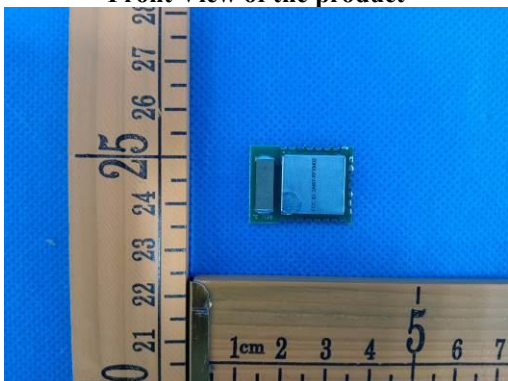
Test Report

Date : 2025-06-26
No. : HMD25050005

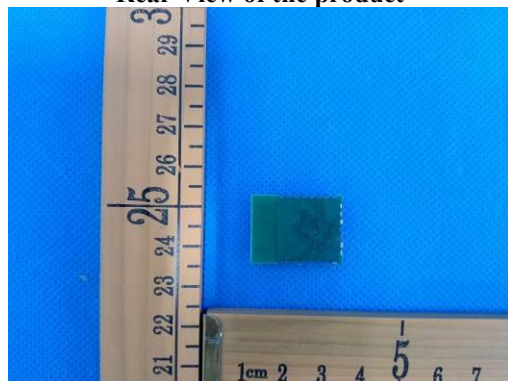
Page 22 of 24

Appendix D Photographs of EUT

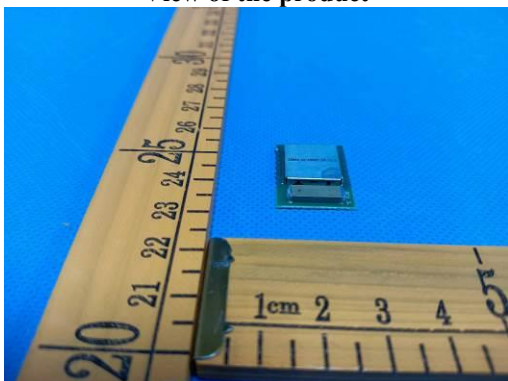
Front View of the product



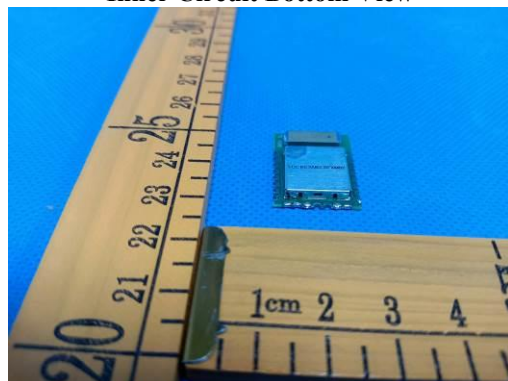
Rear View of the product



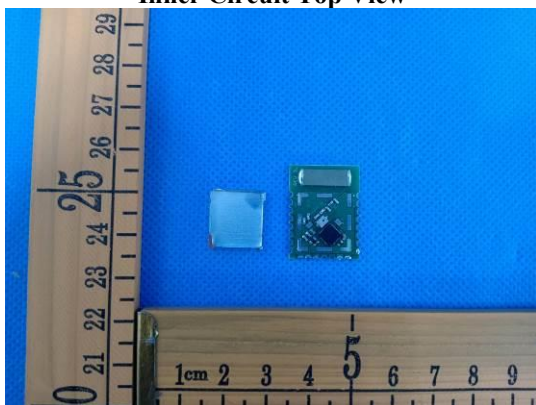
View of the product



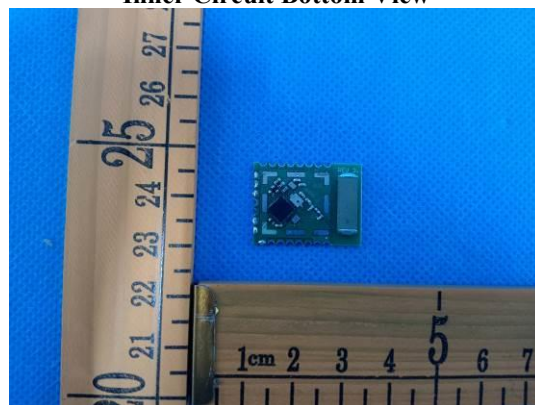
Inner Circuit Bottom View



Inner Circuit Top View



Inner Circuit Bottom View



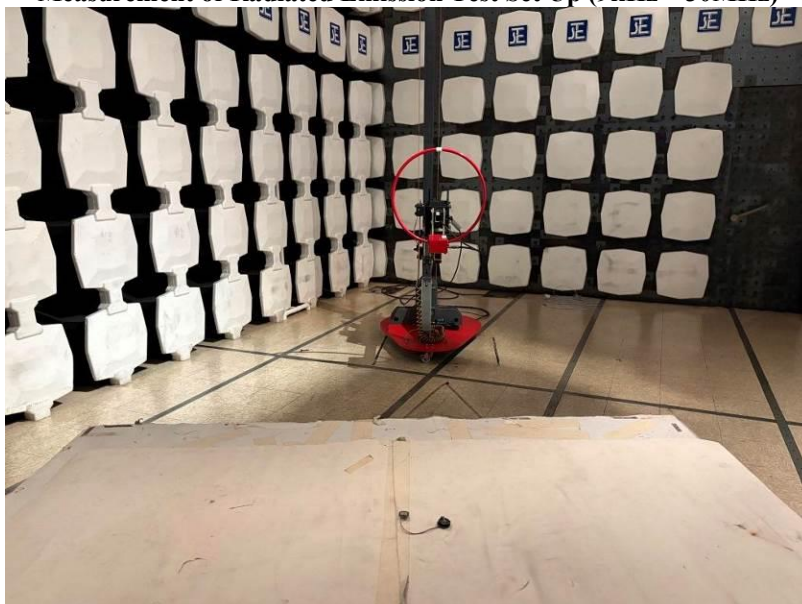
Test Report

Date : 2025-06-26
No. : HMD25050005

Page 23 of 24

Photographs of EUT

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



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



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Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

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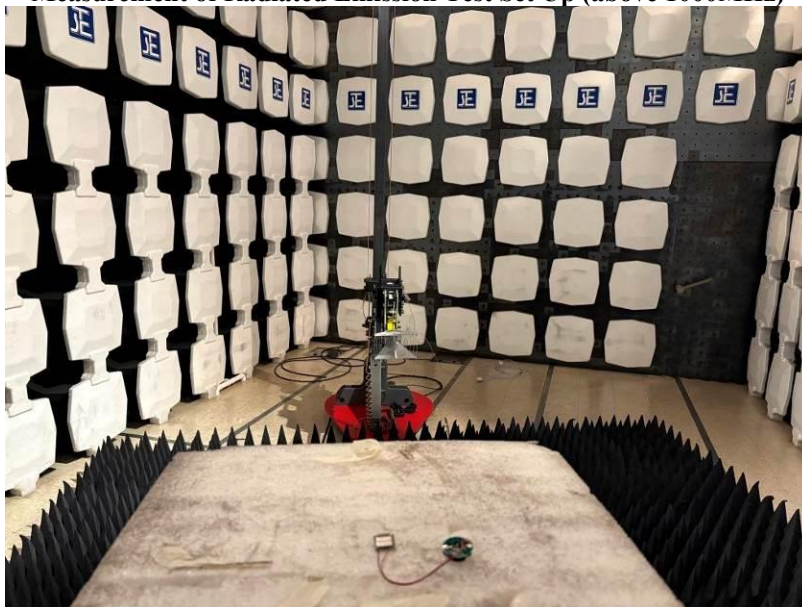
Test Report

Date : 2025-06-26
No. : HMD25050005

Page 24 of 24

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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