



## FCC CERTIFICATION TEST REPORT

<b>Applicant</b>	:	Guangdong Hiway Integrated Circuit Technology Co., Ltd.
<b>Address of Applicant</b>	:	No. 1 Headquarters, Songshan Lake High Technology Industrial Park, Dongguan City, Guangdong Province, People's republic of China
<b>Manufacturer</b>	:	Guangdong Hiway Integrated Circuit Technology Co., Ltd.
<b>Address of Manufacturer</b>	:	No. 1 Headquarters, Songshan Lake High Technology Industrial Park, Dongguan City, Guangdong Province, People's republic of China
<b>Equipment under Test</b>	:	Sensor
<b>Model No.</b>	:	HW48244-SGY-100
<b>FCC ID</b>	:	2BLDF-HW48244
<b>Test Standard(s)</b>	:	FCC Rules and Regulations Part 15 Subpart C, ANSI C63.10:2013
<b>Report No.</b>	:	DDT-RE24091103-3E01
<b>Issue Date</b>	:	2024/11/20
<b>Issue By</b>	:	Guangdong Dongdian Testing Service Co., Ltd. Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808

# REPORT

## Table of Contents

1.	Summary of Test Results .....	6
2.	General Test Information .....	7
2.1.	Description of EUT .....	7
2.2.	Accessories of EUT .....	7
2.3.	Block diagram of EUT configuration for test .....	7
2.4.	Decision of final test mode .....	8
2.5.	Deviations of test standard .....	8
2.6.	Test environment conditions .....	8
2.7.	Test laboratory .....	8
2.8.	Measurement uncertainty .....	9
3.	On Time and Duty Cycle .....	10
3.1.	Test equipment .....	10
3.2.	Block diagram of test setup .....	10
3.3.	Limits .....	10
3.4.	Assistant equipment used for test .....	10
3.5.	Test procedure .....	10
3.6.	Test result .....	10
3.7.	Test data .....	12
4.	20dB Bandwidth and 99% Bandwidth .....	13
4.1.	Test equipment .....	13
4.2.	Block diagram of test setup .....	13
4.3.	Limits .....	13
4.4.	Assistant equipment used for test .....	13
4.5.	Test procedure .....	13
4.6.	Test result .....	13
4.7.	Test data .....	15
5.	Radiated Emission .....	16
5.1.	Test equipment .....	16
5.2.	Block diagram of test setup .....	17
5.3.	Limits .....	18
5.4.	Assistant equipment used for test .....	19
5.5.	Test procedure .....	19
5.6.	Test result .....	20
5.7.	Test data .....	21
6.	Field Strength Of The Fundamental Signal .....	25
6.1.	Test equipment .....	25

6.2. Block diagram of test setup ..... 26

6.3. Limits..... 26

6.4. Assistant equipment used for test ..... 26

6.5. Test procedure..... 26

6.6. Test result ..... 28

7. Antenna Requirement..... 29

7.1. Limits..... 29

7.2. Assess result..... 29

8. Test Setup Photograph..... 30

9. Photos of the EUT ..... 32

## Test Report Declare

<b>Applicant</b>	:	Guangdong Hiway Integrated Circuit Technology Co., Ltd.
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<b>Equipment under Test</b>	:	Sensor
<b>Model No.</b>	:	HW48244-SGY-100
<b>Manufacturer</b>	:	Guangdong Hiway Integrated Circuit Technology Co., Ltd.
<b>Address of Manufacturer</b>	:	No. 1 Headquarters, Songshan Lake High Technology Industrial Park, Dongguan City, Guangdong Province, People's republic of China

**Test Standard Used:**

FCC Rules and Regulations Part 15 Subpart C, ANSI C63.10:2013

**We Declare:**

The equipment described above is tested by Guangdong Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Guangdong Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

<b>Report No.:</b>	DDT-RE24091103-3E01		
<b>Date of Receipt:</b>	2024/09/14	<b>Date of Test:</b>	2024/09/14~2024/11/20

**Prepared By:****Jason Cao/Engineer****Approved By:****Damon Hu/EMC Manager**

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Guangdong Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	2024/11/20	

## 1. Summary of Test Results

No.	Test Parameter	Clause No.	Condition	Result
1	On Time and Duty Cycle	FCC Rules and Regulations Part 15 Subpart C	/	N/A
2	20dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.215, ANSI C63.10:2013	/	Pass
3	Radiated Emission	FCC Part 15: 15.209, FCC Part 15: 15.231(b), ANSI C63.10:2013	/	Pass
4	Field Strength Of The Fundamental Signal	FCC Part 15: 15.209, FCC Part 15: 15.231(b), ANSI C63.10:2013	/	Pass
5	Antenna Requirement	FCC Part 15: 15.203	/	Pass

Note: N/A is an abbreviation for Not Applicable, and means this item is not applicable for this device or no need to test according to standard.

## 2. General Test Information

### 2.1. Description of EUT

EUT Name	: Sensor
Model Number	: HW48244-SGY-100
EUT Function Description	: Please reference user manual of this device
Power Supply	: Button cell 3V
Operation frequency	: 433.92MHz
Modulation	: FSK
Antenna information	
Antenna Type	: Steel sheet antenna
Max Antenna Gain(dBi)	: 3

Note: The above EUT information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications or User's Manual. The above Antenna information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

“☑” means to be chosen or applicable; “☐” means don't to be chosen or not applicable; This note applies to entire report.

### 2.2. Accessories of EUT

Accessories	Manufacturer	Model number	Description
/	/	/	/

### 2.3. Block diagram of EUT configuration for test



## 2.4. Decision of final test mode

According pre-test, the worst test modes were reported as below:

Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
TX mode	/	433.92

Note : New battery is used during all test

## 2.5. Deviations of test standard

No deviation.

## 2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	+15°C to +35°C
Humidity range:	20% to 75%
Pressure range:	86 kPa to 106 kPa

Note: The specific temperature and humidity information of each test item refers to the temperature and humidity record in the corresponding test data.

## 2.7. Test laboratory

Guangdong Dongdian Testing Service Co., Ltd.

Add.: Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808.

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: [ddt@dgddt.com](mailto:ddt@dgddt.com).

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, R-20155, G-20118



## 2.8. Measurement uncertainty

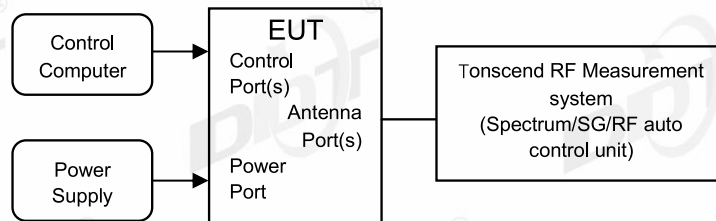
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB ( $10 \text{ MHz} \leq f < 3.6 \text{ GHz}$ ); 1.38 dB ( $3.6 \text{ GHz} \leq f < 8 \text{ GHz}$ )
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB ( $10 \text{ MHz} \leq f < 3.6 \text{ GHz}$ ); 1.38 dB ( $3.6 \text{ GHz} \leq f < 8 \text{ GHz}$ )
Frequencies Stability	$6.7 \times 10^{-8}$ (Antenna couple method) $5.5 \times 10^{-8}$ (Conducted method)
Conducted spurious emissions	0.86 dB ( $10 \text{ MHz} \leq f < 3.6 \text{ GHz}$ ); 1.40 dB ( $3.6 \text{ GHz} \leq f < 8 \text{ GHz}$ ) 1.66 dB ( $8 \text{ GHz} \leq f < 26.5 \text{ GHz}$ )
Uncertainty for radio frequency (RBW < 20 kHz)	$3 \times 10^{-8}$
Temperature	0.4 °C
Humidity	2 %
Uncertainty for Radiation Emission test (9 kHz – 30 MHz)	3.44 dB
Uncertainty for Radiation Emission test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V) 4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1 GHz - 40 GHz)	4.10 dB (1 - 6 GHz) 4.40 dB (6 GHz - 18 GHz) 3.54 dB (18 GHz - 26 GHz) 4.30 dB (26 GHz - 40 GHz)
Uncertainty for Power line conduction emission test	3.34dB (150KHz-30MHz) 3.72dB (9KHz-150KHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

### 3. On Time and Duty Cycle

#### 3.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
SPECTRUM ANALYZER	R&S	FSU26	DDT-ZC00236	2025/07/08

#### 3.2. Block diagram of test setup



#### 3.3. Limits

Just for report.

#### 3.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

#### 3.5. Test procedure

Set the Centre frequency of the spectrum analyzer to the transmitting frequency;

Set the span=0MHz, RBW=3MHz, VBW=10MHz, Sweep time=100ms;

Trace mode = Single hold.

#### 3.6. Test result

Test Site: 2#EMC Shield Room	Test Date: 2024/09/14-2024/11/20
Condition: 24.2°C,60.4%	Test Engineer: Zora Zhang
Memo: /	

EUT Name: Sensor	EUT Model: HW48244-SGY-100
Sample No.: S24091103-006	Test Mode: TX mode
Power supply: Button cell 3V	Memo: /

Test Channel (MHz)	Duty Cycle [%]	20 log(duty cycle)
433.92	27.4	-11.24

Note 1: The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by below Equation:

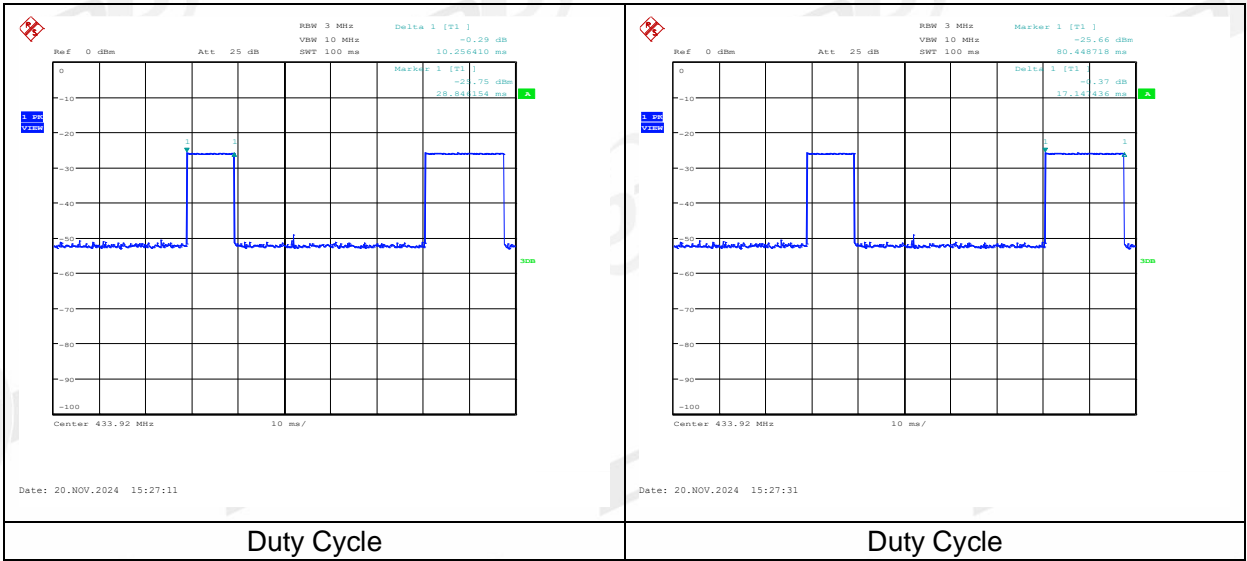
$$\delta(\text{dB}) = 20\log(\Delta) = 20\log(27.4/100) = -11.24 \text{ dB}$$

$\delta$  is the duty cycle correction factor (dB)

$\Delta$  is the duty cycle (dimensionless)

Note 2: In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval

3.7. Test data

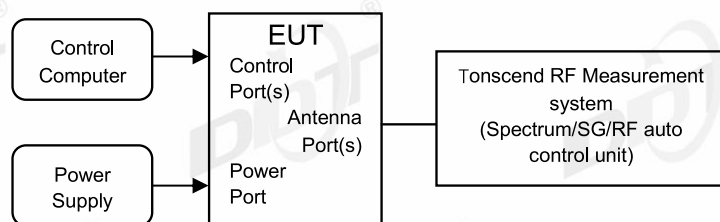


## 4. 20dB Bandwidth and 99% Bandwidth

### 4.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
SPECTRUM ANALYZER	R&S	FSU26	DDT-ZC00236	2025/07/08

### 4.2. Block diagram of test setup



### 4.3. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency of devices operation above 70MHz and below 900MHz.

### 4.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

### 4.5. Test procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3 kHz RBW and 10 kHz VBW. Use the 99% bandwidth function of the spectrum analyzer to measure the occupied bandwidth of the EUT.

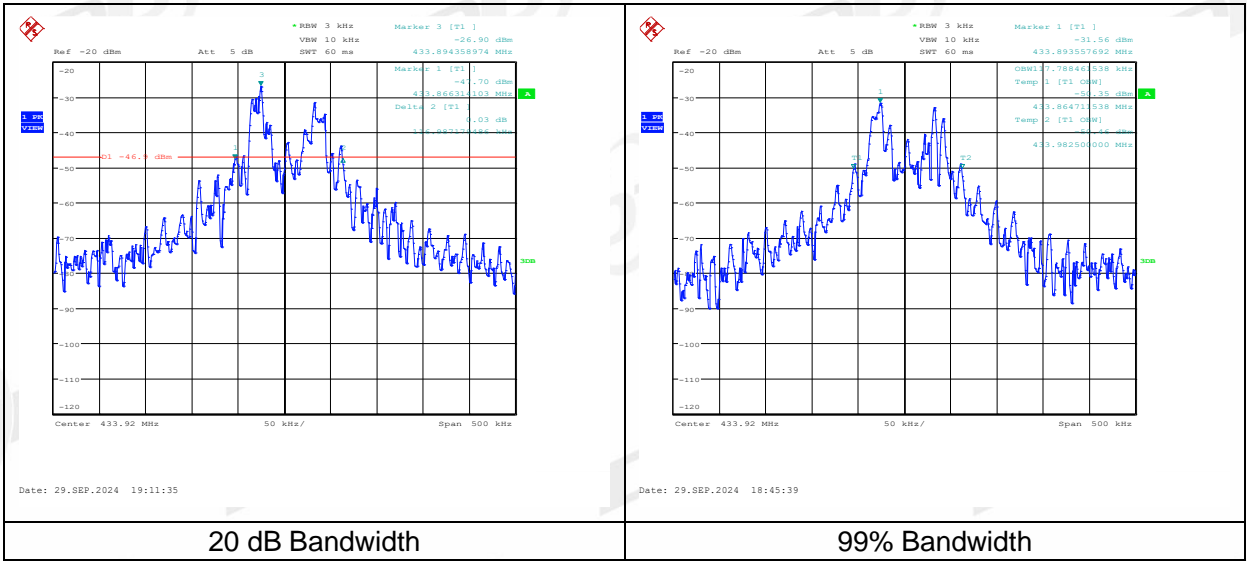
### 4.6. Test result

Test Site: 2#EMC Shield Room	Test Date: 2024/09/14-2024/10/22
Condition: 23.4°C, 53.1%	Test Engineer: Zora Zhang
Memo: /	

EUT Name: Sensor	EUT Model: HW48244-SGY-100
Sample No.: S24091103-006	Test Mode: TX mode
Power supply: Button cell 3V	Memo: /

Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (MHz): No wider than 0.25% of the center frequency	Conclusion
FSK	116.987	117.788	$433.92 \times 0.25\% = 1.0848\text{MHz}$	PASS

4.7. Test data



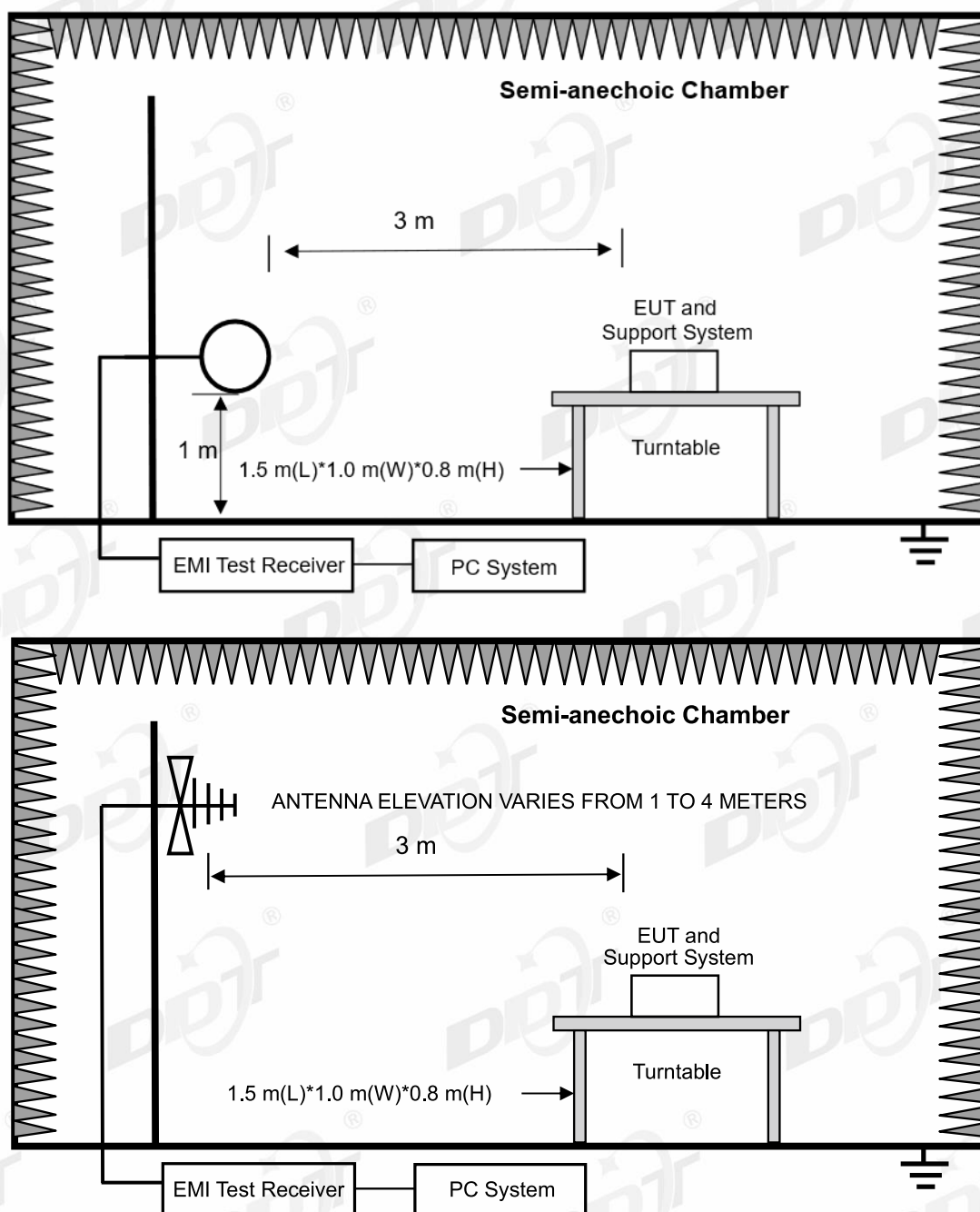
## 5. Radiated Emission

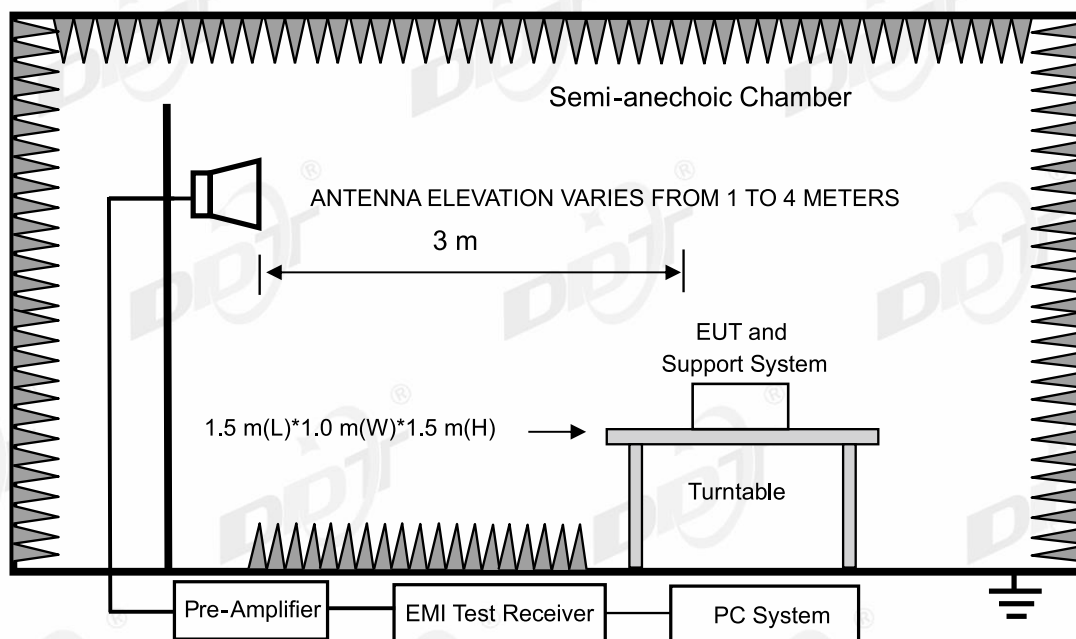
### 5.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
High pass filter	Micro-Tronics	HPM50102	DDT-ZC00561	2025/04/22
Micro-Tronics filters	REBES	BRM50716	DDT-ZC03240	/
Active Loop Antenna	Schwarzbeck	FMZB1519	DDT-ZC00524	2025/09/11
Micro-Tronics filters	REBES	BRM50702	DDT-ZC03242	/
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	DDT-ZC02050	2025/07/11
Hochgewinn-Hornantenne	SCHWARZBEC K	BBHA 9120 D	DDT-ZC02129	2025/09/18
High pass filter	Micro-Tronics	HPM50108	DDT-ZC00560	2025/04/22
RF cable	Zhongke Junchuang	JCT26S-NJ-NJ- 1.5M	DDT-ZC02762	2025/03/31
Pre-amplifier	COM-POWER	PAM-118A	DDT-ZC01293	2025/08/25
EMI TEST RECEIVER	R&S	ESU26	DDT-ZC01909	2025/03/31
Pre-amplifier	COM-POWER	PAM-840A	DDT-ZC01693	2025/03/31
RF cable	Yuhu Technology	JCTB810-NJ-NJ- 9M	DDT-ZC02538	2025/03/31
RF Cable	N/A	W13.02 AP1-X2	DDT-ZC04023	2025/03/31
PSA Series Spectrum Analyzer	Agilent	E4447A	DDT-ZC00517	2025/03/31
High Pass filter	Xi'an Xingbo	XBLBQ-GTA67	DDT-ZC02179	2025/04/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	DDT-ZC00506	2025/04/26
RF cable	Yuhu Technology	ZT26S-SMAJ- SMAJ-1M	DDT-ZC02037	2025/03/31
RF Cable	N/A	W24.02 HL-562	DDT-ZC04022	2025/03/31



## 5.2. Block diagram of test setup





### 5.3. Limits

#### (1) FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.1772&4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.G
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	( <sup>2</sup> )
13.36-13.41			

## (2) FCC 15.209 Limit.

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT	
		( $\mu\text{V}/\text{m}$ )	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	$2400/\text{F}(\text{kHz})$	$67.6-20\log(\text{F})$
0.490 ~ 1.705	30	$24000/\text{F}(\text{kHz})$	$87.6-20\log(\text{F})$
1.705 ~ 30.0	30	30	29.54
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 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Note:

(1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit}_{300\text{m}}(\text{dB}\mu\text{V}/\text{m}) + 40\log(300\text{m}/3\text{m}) = \text{Limit}_{300\text{m}}(\text{dB}\mu\text{V}/\text{m}) + 80$$

$$\text{Limit}_{3\text{m}}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit}_{30\text{m}}(\text{dB}\mu\text{V}/\text{m}) + 40\log(30\text{m}/3\text{m}) = \text{Limit}_{30\text{m}}(\text{dB}\mu\text{V}/\text{m}) + 40$$

## (3) Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions include fundamental emission shall not exceed FCC 15.231 section (e) limit of comply with FCC 15.209 limit which permit higher emission level.

**5.4. Assistant equipment used for test**

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

**5.5. Test procedure**

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
30MHz - 1GHz	TRILOG Broadband Antenna	3m

The TRILOG Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the

measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(5) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz,110kHz-490kHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
30MHz - 1GHz	120kHz

(7) X axis, Y axis, Z axis are tested, and worse setup X axis is reported

## 5.6. Test result

**PASS. (See below detailed test result)**

5.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-10-21

Tested By:

Guoyuan Lin

EUT:

Sensor

Model Number:

HW48244-SGY-100

Test Mode:

433.92 MHz TX mode

Power Supply:

Button cell 3V

Condition:

Temp:24.5°C;Humi:47.4%

Test Site:

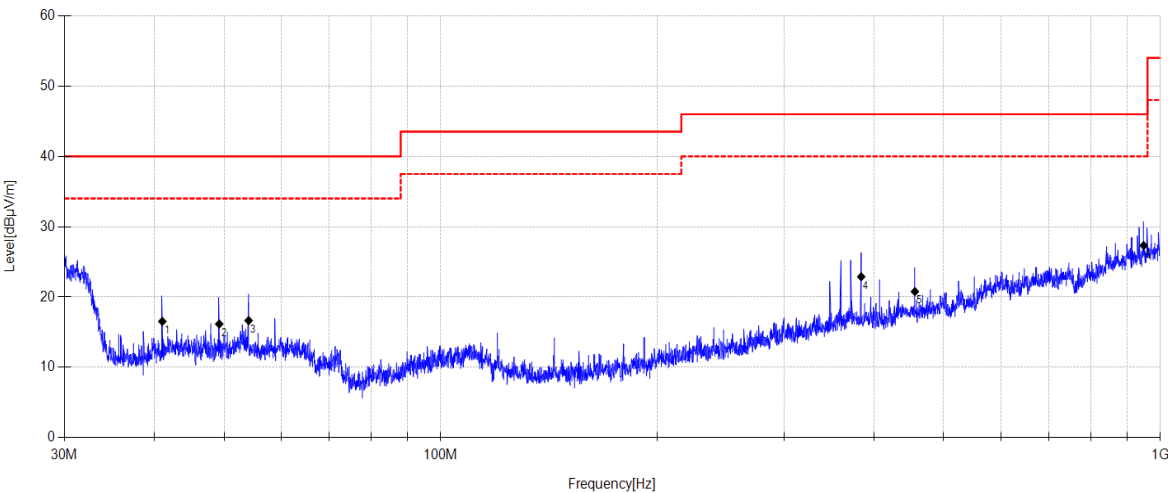
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24091103-2E\FCC Below 1G\20241021-194734\_H

Memo:

Sample Number:S24091103-009



Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable Loss [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	41.043	29.1	12.43	3.83	16.54	40.00	23.46	QP	Horizontal
2	49.251	28.31	12.78	3.88	16.17	40.00	23.83	QP	Horizontal
3	54.103	29.2	12.34	3.91	16.66	40.00	23.34	QP	Horizontal
4	384.005	30.44	15.34	5.56	22.89	46.00	23.11	QP	Horizontal
5	455.977	27.89	15.98	5.83	20.79	46.00	25.21	QP	Horizontal
6	948.106	26.02	22.25	7.33	27.32	46.00	18.68	QP	Horizontal

Note:

1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-10-21

Tested By:

Guoyuan Lin

EUT:

Sensor

Model Number:

HW48244-SGY-100

Test Mode:

433.92 MHz TX mode

Power Supply:

Button cell 3V

Condition:

Temp:24.5°C;Humi:47.4%

Test Site:

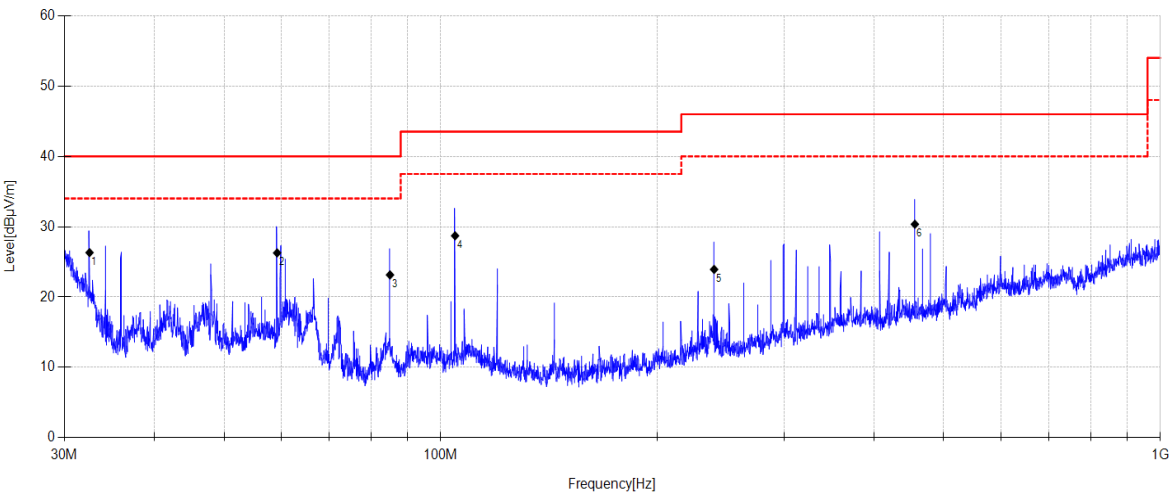
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24091103-2E\FCC Below 1G\20241021-194821\_V

Memo:

Sample Number:S24091103-009



Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable Loss [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	32.519	40.86	10.52	3.78	26.32	40.00	13.68	QP	Vertical
2	59.266	38.67	12.43	3.95	26.28	40.00	13.72	QP	Vertical
3	85.041	38.52	9.18	4.12	23.15	40.00	16.85	QP	Vertical
4	104.730	41.61	11.43	4.25	28.71	43.50	14.79	QP	Vertical
5	239.888	35.31	11.79	4.94	23.93	46.00	22.07	QP	Vertical
6	455.977	37.45	15.98	5.83	30.35	46.00	15.65	QP	Vertical

Note:

1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-10-21

Tested By:

Guoyuan Lin

EUT:

Sensor

Model Number:

HW48244-SGY-100

Test Mode:

433.92 MHz TX mode

Power Supply:

Button cell 3V

Condition:

Temp:24.5°C;Humi:47.4%

Test Site:

DDT 3# Chamber

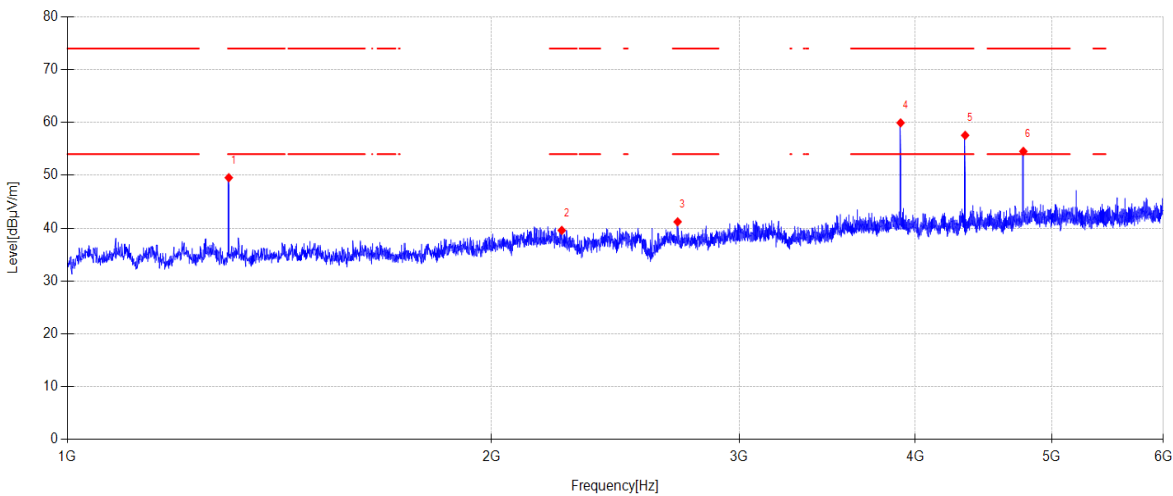
File Path:

d:\ts\2024 report data\Q24091103-2E\FCC Above 1G\77

Memo:

Sample Number:S24091103-009

Test Graph



Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	1302.000	58.72	24.61	3.39	-37.17	49.55	74.00	24.45	PK	Horizontal
2	2244.000	45.97	27.36	4.74	-38.49	39.58	74.00	34.42	PK	Horizontal
3	2712.000	47.72	27.52	5.04	-39.08	41.20	74.00	32.80	PK	Horizontal
4	3905.000	63.33	31.19	5.07	-39.66	59.93	74.00	14.07	PK	Horizontal
						48.69	54.00	5.31	AV	
5	4339.500	60.37	31.60	5.25	-39.65	57.57	74.00	16.43	PK	Horizontal
						46.33	54.00	7.67	AV	
6	4773.000	56.25	32.39	5.51	-39.62	54.53	74.00	19.47	PK	Horizontal
						43.29	54.00	10.71	AV	

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. AV=PK + 20log(Duty Cycle)

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-10-21

Tested By:

Guoyuan Lin

EUT:

Sensor

Model Number:

HW48244-SGY-100

Test Mode:

433.92MHz TX mode

Power Supply:

Button cell 3V

Condition:

Temp:24.5°C;Humi:47.4%

Test Site:

DDT 3# Chamber

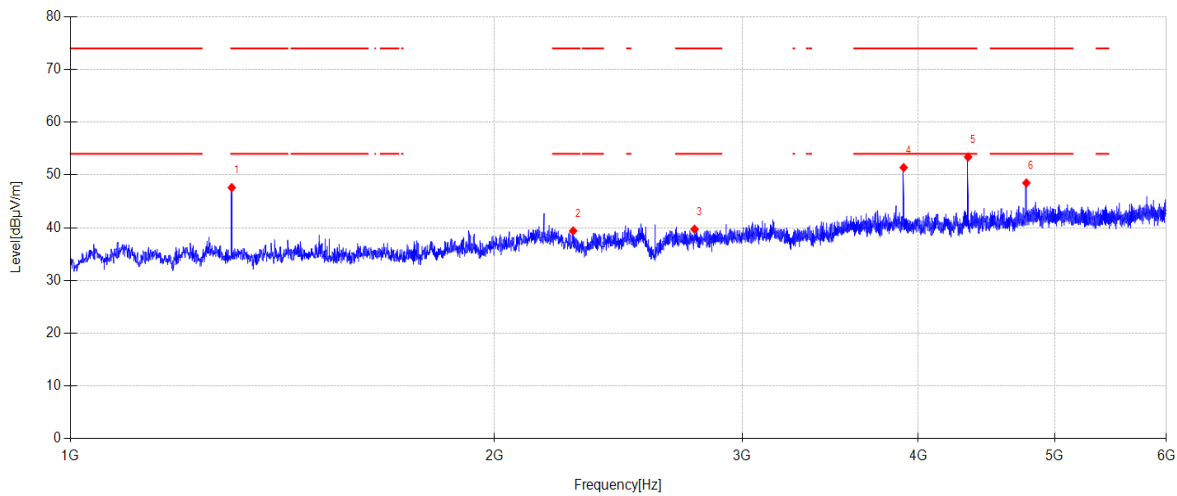
File Path:

d:\ts\2024 report data\Q24091103-2E\FCC Above 1G\78

Memo:

Sample Number:S24091103-009

Test Graph



Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	1302.000	56.78	24.61	3.39	-37.17	47.61	74.00	26.39	PK	Vertical
2	2275.000	46.13	27.05	4.76	-38.53	39.41	74.00	34.59	PK	Vertical
3	2774.500	46.30	27.50	5.08	-39.16	39.72	74.00	34.28	PK	Vertical
4	3905.500	54.80	31.19	5.07	-39.66	51.40	74.00	22.60	PK	Vertical
						40.16	54.00	13.84	AV	
5	4339.000	56.20	31.60	5.25	-39.65	53.40	74.00	20.60	PK	Vertical
						42.16	54.00	11.84	AV	
6	4773.000	50.21	32.39	5.51	-39.62	48.49	74.00	25.51	PK	Vertical
						37.25	54.00	16.75	AV	

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

4. AV=PK + 20log(Duty Cycle)

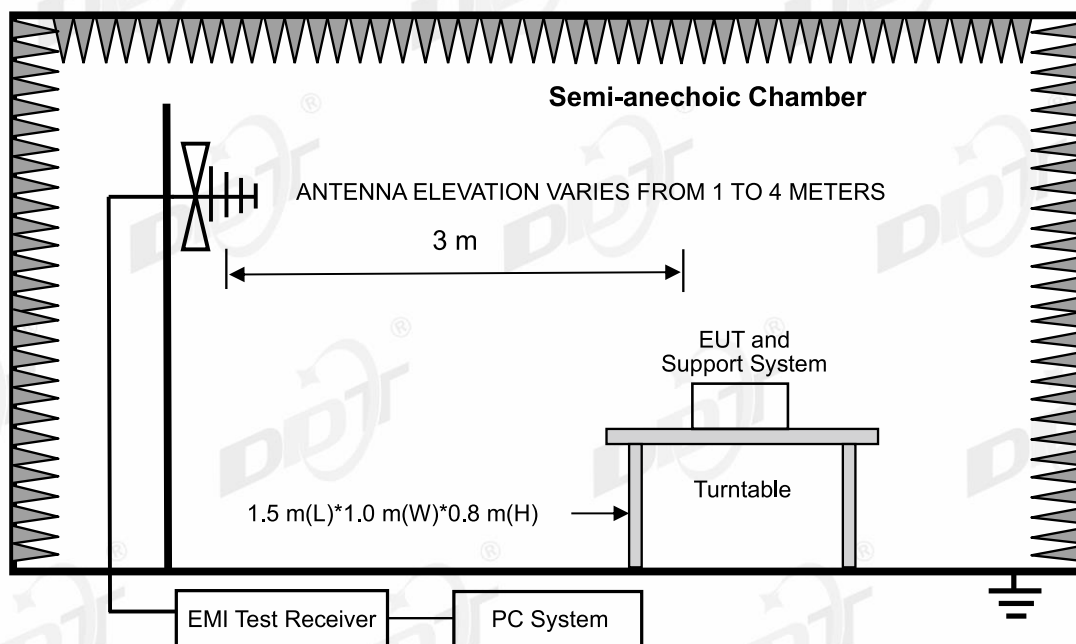


## 6. Field Strength Of The Fundamental Signal

### 6.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
PSA Series Spectrum Analyzer	Agilent	E4447A	DDT-ZC00517	2025/03/31
RF cable	Yuhu Technology	JCTB810-NJ-NJ-9M	DDT-ZC02538	2025/03/31
RF cable	Yuhu Technology	ZT26S-SMAJ-SMAJ-1M	DDT-ZC02037	2025/03/31
High pass filter	Micro-Tronics	HPM50102	DDT-ZC00561	2025/04/22
Hochgewinn-Hornantenne	SCHWARZBEC K	BBHA 9120 D	DDT-ZC02129	2025/09/18
Pre-amplifier	COM-POWER	PAM-840A	DDT-ZC01693	2025/03/31
Micro-Tronics filters	REBES	BRM50702	DDT-ZC03242	/
High pass filter	Micro-Tronics	HPM50108	DDT-ZC00560	2025/04/22
RF Cable	N/A	W13.02 AP1-X2	DDT-ZC04023	2025/03/31
High Pass filter	Xi'an Xingbo	XBLBQ-GTA67	DDT-ZC02179	2025/04/22
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	DDT-ZC02050	2025/07/11
Pre-amplifier	COM-POWER	PAM-118A	DDT-ZC01293	2025/08/25
Active Loop Antenna	Schwarzbeck	FMZB1519	DDT-ZC00524	2025/09/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	DDT-ZC00506	2025/04/26
EMI TEST RECEIVER	R&S	ESU26	DDT-ZC01909	2025/03/31
Micro-Tronics filters	REBES	BRM50716	DDT-ZC03240	/
RF Cable	N/A	W24.02 HL-562	DDT-ZC04022	2025/03/31
RF cable	Zhongke Junchuang	JCT26S-NJ-NJ-1.5M	DDT-ZC02762	2025/03/31

## 6.2. Block diagram of test setup



## 6.3. Limits

### (3) FCC 15.231 section (e) limit

Fundamental Frequency (MHz)	Field Strength of Fundamental
433.92	AV: 72.87 dB $\mu$ V/m @3m PK: 92.87 dB $\mu$ V/m @3m

## 6.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

## 6.5. Test procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
30MHz - 1GHz	TRILOG Broadband Antenna	3m

The TRILOG Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(5) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz,110kHz-490kHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
30MHz - 1GHz	120kHz

(7) X axis, Y axis, Z axis are tested, and worse setup X axis is reported.

6.6. Test result

Test Site: 3#3m chamber	Test Date: 2024/09/14--2024/10/22
Condition: 23.4°C,53.1%	Test Engineer: Guoyuan Lin
Memo: /	

EUT Name: Sensor	EUT Model: HW48244-SGY-100
Sample No.: S24091103-009	Test Mode: TX mode
Power supply: Button cell 3V	Memo: /

Frequency (MHz)	PK Level (dBμV/m)	PK Limit Line (dBμV/m)	Over Limit (dB)	Polarization
433.92	66.01	92.87	-26.86	Horizontal
433.92	73.69	92.87	-19.18	Vertical

Frequency (MHz)	AV Level (dBμV/m)	AV Limit Line (dBμV/m)	Over Limit (dB)	Polarization
433.92	54.77	72.87	-18.1	Horizontal
433.92	62.45	72.87	-10.42	Vertical

Note: AV Level= PK Level+ Duty factor

## **7. Antenna Requirement**

### **7.1. Limits**

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

### **7.2. Assess result**

The antenna used for this product is steel sheet antenna and that no antenna other than that furnished by the responsible party shall be used with the device.

## 9. Photos of the EUT

Please refer to DDT-Q24091103-3E appendix I

-----End Report-----