

TEST REPORT

Reference No. : WTD22D03050574W001
FCC ID : 2A6NW-E9T-OBP
Applicant : Ad Hoc Electronics
Address : 115 S State St Ste B / Lindon UT 84042 / United States
Manufacturer : Ad Hoc Electronics
Address : 115 S State St Ste B / Lindon UT 84042 / United States
Product : PIR-Motion Sensor
Model(s) : E9T-OBP
Brand Name : N/A
Standards : FCC CFR47 Part 15 Section 15.249
Date of Receipt sample : 2022-03-23
Date of Test : 2022-03-23 to 2022-05-26
Date of Issue : 2022-07-08
Test Result : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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3 Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD22D03050574W001	2022-03-23	2022-03-23 to 2022-05-26	2022-07-08	original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product: PIR-Motion Sensor
Model(s): E9T-OBP
Model Description: N/A
Operation Frequency: 902.9MHz
Antenna installation: internal permanent antenna
Antenna Gain: 1.4dBi
Type of Modulation: FSK
Hardware Version: V5.0
Software Version: V1.0

4.2 Details of E.U.T.

Ratings: DC 3V 30mA

4.3 Channel List

Channel No.	Frequency (MHz)
1	902.9

4.4 Standards Applicable for Testing

The tests were performed according to following standards:

FCC CFR47 Part 15 Section 15.249: 2019 Telecommunication-RADIO FREQUENCY DEVICES-Intentional Radiators-Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

4.5 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

4.6 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests.

And according to FCC 47 CFR Section 15.203(m):

Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Only the one channel was recorded and reported.

Test mode	channel
Transmitting	902.9MHz

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2021-04-30 2022-04-26	2022-04-29 2023-04-25
2	Broad-band Horn Antenna(1-18GHz)	SCHWARZBECK	BBHA 9120 D	667	2021-04-30 2022-04-26	2022-04-29 2023-04-25
3	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2021-07-26	2022-07-25
4	Coaxial Cable (above 1GHz)	Top	1GHz-18GHz	N/A	2021-04-30 2022-04-26	2022-04-29 2023-04-25
3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2021-04-30 2022-04-26	2022-04-29 2023-04-25
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2021-10-30	2022-10-29
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2021-04-30 2022-04-26	2022-04-29 2023-04-25
4	Amplifier	ANRITSU	MH648A	M43381	2021-04-30 2022-04-26	2022-04-29 2023-04-25
5	Cable	HUBER+SUHNER	CBL2	525178	2021-04-30 2022-04-26	2022-04-29 2023-04-25
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	Spectrum Analyzer	R&S	FSL6	100959	2021-04-30 2022-04-26	2022-04-29 2023-04-25
2	Coaxial Cable	Top	10Hz-30GHz	-	2021-04-30 2022-04-26	2022-04-29 2023-04-25
3	Antenna Connector*	Realacc	45RSm	-	2021-04-30 2022-04-26	2022-04-29 2023-04-25
4	DC Block	Gwave	GDCB-3G-N-SMA	140307001	2021-04-30 2022-04-26	2022-04-29 2023-04-25

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz) ± 5.47 dB (Horn antenna 1000M~2500MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave, Tianhe District, Guangzhou, Guangdong, China.

6 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	N/A*
Radiated Emission	15.249(a) 15.209 15.205(a)	Pass
Periodic Operation	15.35(c)	Pass*
Band Edge	15.249 15.205 15.209	Pass*
20dB Bandwidth	15.215(c)	Pass*
Antenna Requirement	15.203	Pass

Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.

*: This requirement does not apply for device powered by battery.

Pass*: These items reference the module report ,FCC ID:SZV-STM300U

7 Radiation Emission Test

Test Requirement: FCC Part15 Paragraph 15.249&15.209&15.205

Test Method: ANSI 63.10: 2013

Measurement Distance: 3m

Test Result: Pass Fail

15.249(a)Limit:

Fundamental frequency	Field strength of fundamental		Field strength of harmonics	
	mV/m	dBuV/m	uV/m	dBuV/m
902-928 MHz	50	94	500	54
2400-2483.5 MHz	50	94	500	54
5725-5875 MHz	50	94	500	54
24.0-24.25 GHz	250	108	2500	68

15.209 Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40(29.54+40)$
30 ~ 88	100	3	100	$20\log^{(100)} = (40)$
88 ~ 216	150	3	150	$20\log^{(150)} = (43.5)$
216 ~ 960	200	3	200	$20\log^{(200)} = (46)$
Above 960	500	3	500	$20\log^{(500)} = (54)$

Note: RF Voltage(dBuV)= $20 \log_{10}$ RF Voltage(uV)

7.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 51.1 % RH

Atmospheric Pressure: 101.2kPa

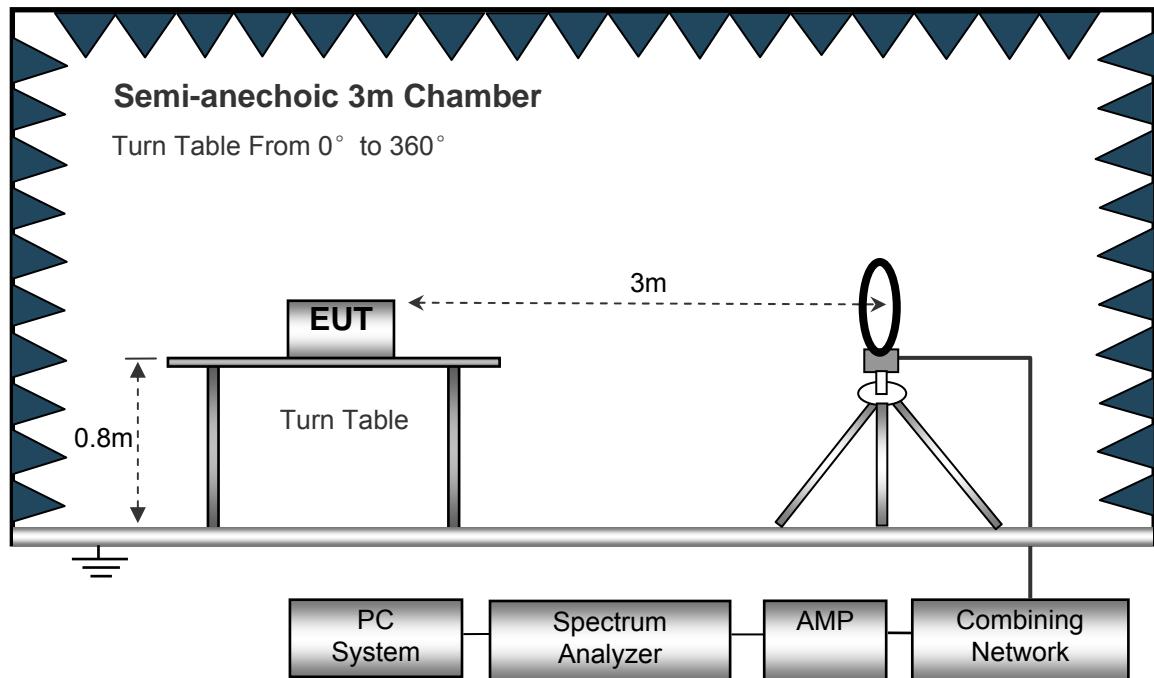
EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

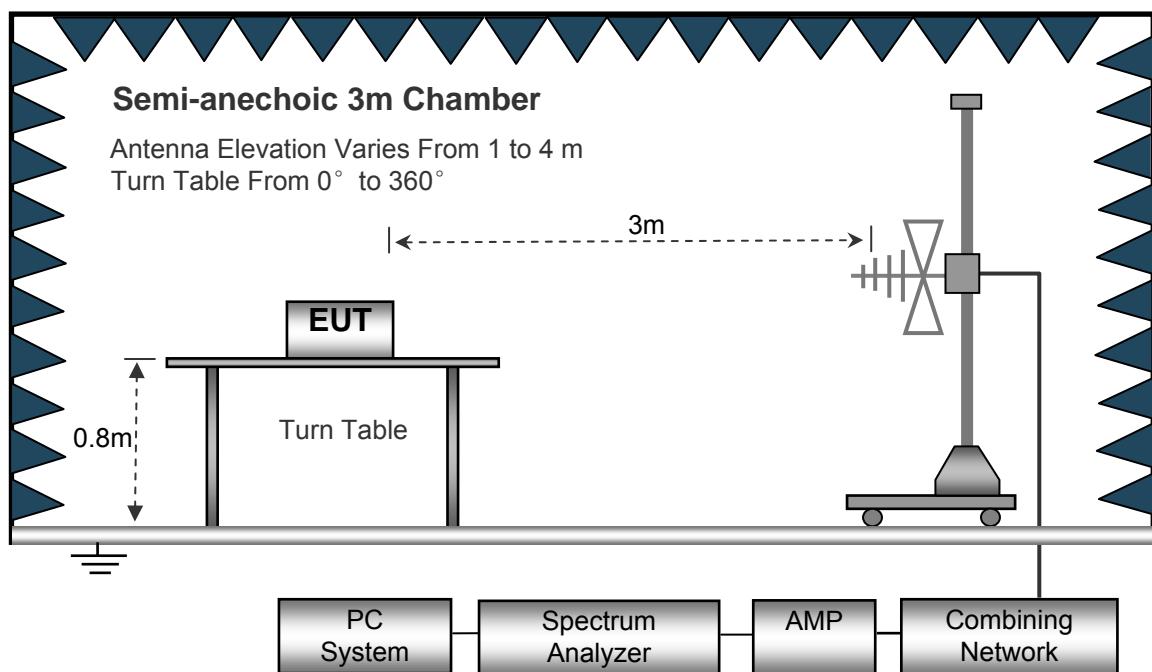
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10: 2013.

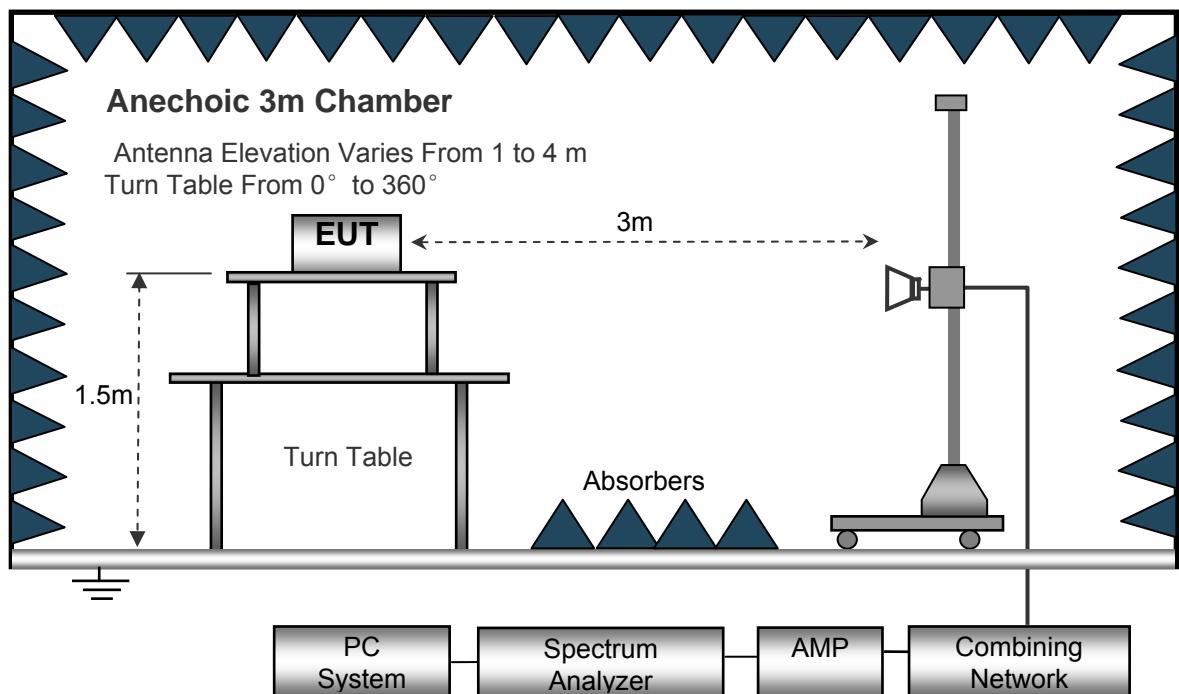
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed	Auto
IF Bandwidth.....	10kHz
Video Bandwidth	10kHz
Resolution Bandwidth	10kHz

30MHz ~ 1GHz

Sweep Speed	Auto
Detector	PK
Resolution Bandwidth.....	100kHz
Video Bandwidth	300kHz

Above 1GHz

Sweep Speed	Auto
Detector	PK
Resolution Bandwidth.....	1MHz
Video Bandwidth	3MHz
Detector	Ave.
Resolution Bandwidth.....	1MHz
Video Bandwidth	10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane; For above 1GHz, the EUT is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.5 Frequency range of radiated measurements.

According to FCC 47 CFR Section 15.33:

- (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:
 - (1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
 - (2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
 - (3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
 - (4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1) through (a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this section, whichever is the higher frequency range of investigation.

7.6 Test Result

Test Frequency: 9 kHz ~ 30 MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency: 30MHz ~ 10GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.249/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dB μ V)	(PK/QP)	Degre e	(m)	(H/V)	(dB/m)	(dB μ V/m)	(dB μ V/m)	(dB)
39.52	39.45	QP	91	1.7	V	-14.25	25.20	40.00	-14.80
902.90	86.63	PK	81	1.1	H	1.25	87.88	114.00	-26.12
902.90	88.52	PK	142	1.3	V	1.25	89.77	114.00	-24.23
1805.80	60.48	PK	86	1.9	H	-13.21	47.27	74.00	-26.73
1805.80	62.63	PK	69	1.9	V	-13.21	49.42	74.00	-24.58
2708.70	55.46	PK	239	1.8	H	-12.35	43.11	74.00	-30.89
2708.70	54.43	PK	179	1.4	V	-12.35	42.08	74.00	-31.92
3611.60	45.62	PK	250	1.5	H	-8.95	36.67	74.00	-37.33
3611.60	48.14	PK	53	1.1	V	-8.95	39.19	74.00	-34.81

AV = Peak +20Log10(duty cycle) =PK+(-9.19) [refer to section 8 for more detail]

Frequency	PK	RX Antenna Polar	Duty cycle Factor	AV	FCC Part 15.249/209/205	
					Limit	Margin
(MHz)	(dB μ V/m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
902.90	87.88	H	-9.19	78.69	94.00	-15.31
902.90	89.77	V	-9.19	80.58	94.00	-13.42
1805.80	47.27	H	-9.19	38.08	54.00	-15.92
1805.80	49.42	V	-9.19	40.23	54.00	-13.77
2708.70	43.11	H	-9.19	33.92	54.00	-20.08
2708.70	42.08	V	-9.19	32.89	54.00	-21.11
3611.60	36.67	H	-9.19	27.48	54.00	-26.52
3611.60	39.19	V	-9.19	30.00	54.00	-24.00

8 Antenna Requirement

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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Result:

The EUT has one internal permanent antenna, the gain is 1.4dBi. meets the requirements of FCC 15.203.

9 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix- E9T-OBP-Photos.

=====End of Report=====