

TEST REPORT

Reference No...... : WTD22D05090812W V1
FCC ID..... : 2AD9X0E-PIR433
Applicant..... : Versa Wireless Inc.
Address..... : 103 - 19292 60th Ave. Surrey, BC, V3S 3M2 Canada
Manufacturer..... : A&R Technologies Ltd
Address..... : Block 34B, Phase 4, Huaide Cuigang Ind, Park, Fuyong , Baoan, Shenzhen, China.
Product..... : Motion Sensor
Model(s)..... : 0E-PIR433
Standards..... : FCC CFR47 Part 15 Section 15.231
Date of Receipt sample.... : 2022-05-11
Date of Test..... : 2022-05-12 to 2022-05-27
Date of Issue..... : 2022-06-13
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.

Prepared By:

Waltek Testing Group Co., Ltd.

Address: No. 77, Houjie Section, Guantai Road, Houjie Town, Dongguan City, Guangdong, China

Tel: +86-769-2267 6998

Fax: +86-769-2267 6828

Compiled by:

Ford Wang

Ford Wang / Project Engineer

Approved by:



Daniel Liu

Daniel Liu / Designated Reviewer

2 Contents

	Page
2 CONTENTS	2
3 REVISION HISTORY	3
4 GENERAL INFORMATION	4
4.1 GENERAL DESCRIPTION OF E.U.T.	4
4.2 DETAILS OF E.U.T.	4
4.3 TEST MODE	4
4.4 TEST FACILITY	4
5 EQUIPMENT USED DURING TEST	5
5.1 EQUIPMENTS LIST	5
5.2 MEASUREMENT UNCERTAINTY	5
5.3 SUBCONTRACTED	5
6 TEST SUMMARY	6
7 RADIATED SPURIOUS EMISSIONS	7
7.1 EUT OPERATION	7
7.2 TEST SETUP	8
7.3 SPECTRUM ANALYZER SETUP	9
7.4 TEST PROCEDURE	10
7.5 SUMMARY OF TEST RESULTS	11
8 PERIODIC OPERATION	12
9 EMISSION BANDWIDTH	15
9.1 TEST PROCEDURE	15
9.2 TEST RESULT	15
10 ANTENNA REQUIREMENT	16
11 PHOTOGRAPHS –TEST SETUP PHOTOS	17
12 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS	17

3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD22D05090812W	2022-05-11	2022-05-12 to 2022-05-27	2022-06-13	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Motion Sensor
Model(s):	0E-PIR433
Type of Modulation:	ASK
Frequency Range:	433.92 MHz
Antenna installation:	Loop antenna
Antenna Gain:	0dBi

4.2 Details of E.U.T.

Ratings:	3.0VDC From Battery
----------	---------------------

4.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Test channel
Transmitting	433.92MHz

4.4 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.

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2022-04-28	2023-04-27
2	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2022-04-28	2023-04-27
3	Broadband Pre-amplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2021-07-26	2022-07-26
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2022-04-28	2023-04-27
3m Semi-anechoic Chamber for Radiation Emissions2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2022-04-28	2023-04-27
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2021-10-31	2022-10-31
3	Amplifier	ANRITSU	MH648A	M43381	2022-04-28	2023-04-27
4	Cable	HUBER+SUHNER	CBL2	525178	2022-04-28	2023-04-27
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EXA Signal Analyzer	Keysight	N9010A	MY5052020752 6B25MPBW7X	2022-04-28	2023-04-27
2	Spectrum Analyzer	R&S	FSP40	100501	2021-07-26	2022-07-26

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Confidence interval: 95%. Confidence factor:k=2	

5.3 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

Yes No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

6 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	N/A
Radiated Spurious Emissions	15.205(a) 15.209 15.231(a)	Pass
Periodic Operation	15.231(a)	Pass
Emission Bandwidth	15.231(c)	Pass
Antenna Requirement	15.203	Pass
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

7 Radiated Spurious Emissions

Test Requirement: FCC Part15 Paragraph 15.231(a), 15.209, 15.205

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Fundamental Frequency (MHz)	Field Strength of Fundamental (uV/m)	Field Strength of Fundamental (dBuV/m)	Field Strength of Spurious Emission (uV/m)	Field Strength of Spurious Emission (dBuV/m)
44.66-40.70	2250	67	225	47
70-130	1250	62	125	42
130-174	1250 to 3750*	62 to 71.48*	125 to 375*	42 to 51.48*
174-260	3750	71.48	375	51.48
260-470	3750 to 12500*	71.48 to 81.94*	375 to 1250*	51.48 to 61.94*
Above 470	12500	81.94	1250	61.94
* linear interpolations				

7.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 54.6% RH

Atmospheric Pressure: 101.7kPa

Test Voltage: DC 3.0V by Battery*

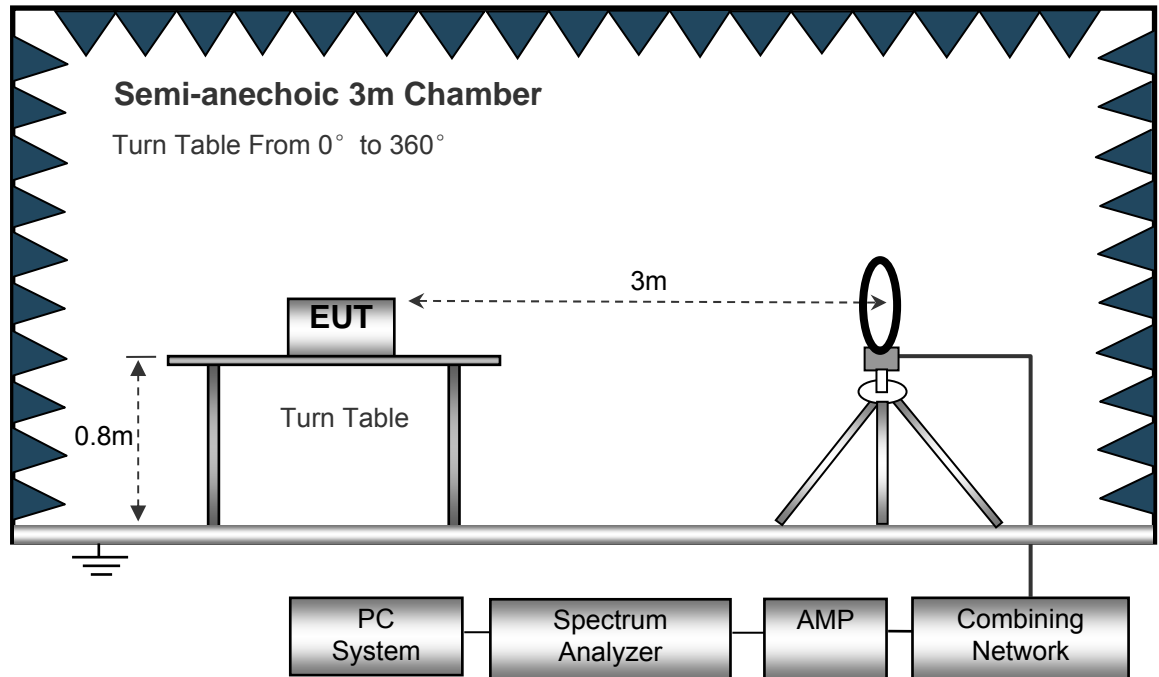
EUT Operation :

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

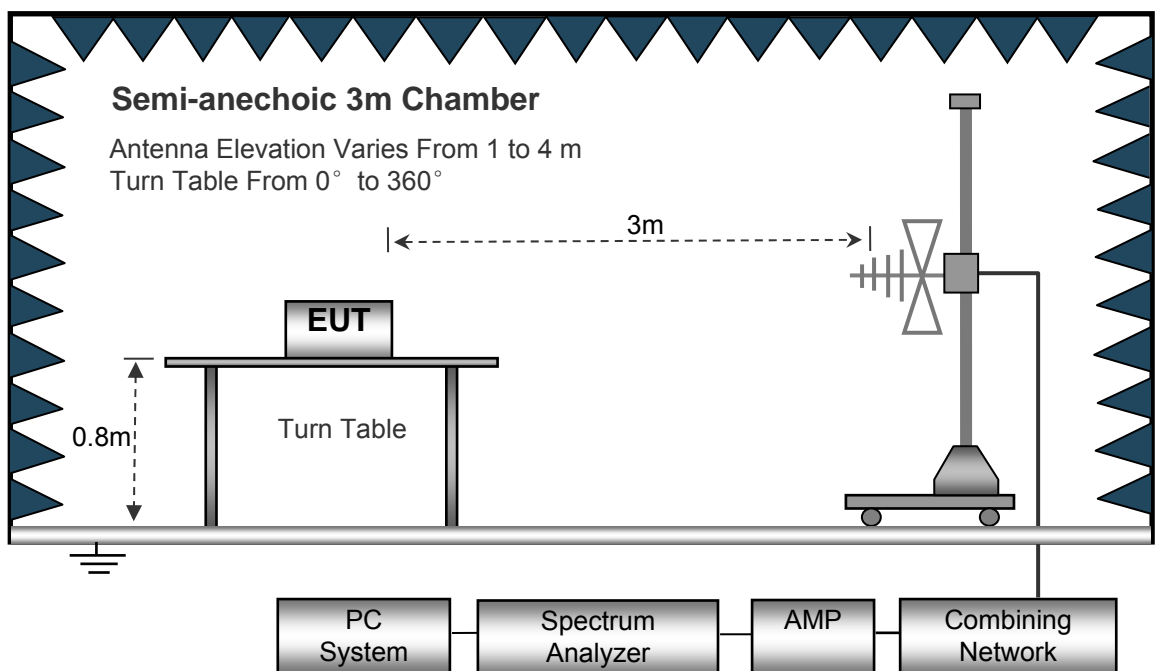
7.2 Test Setup

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

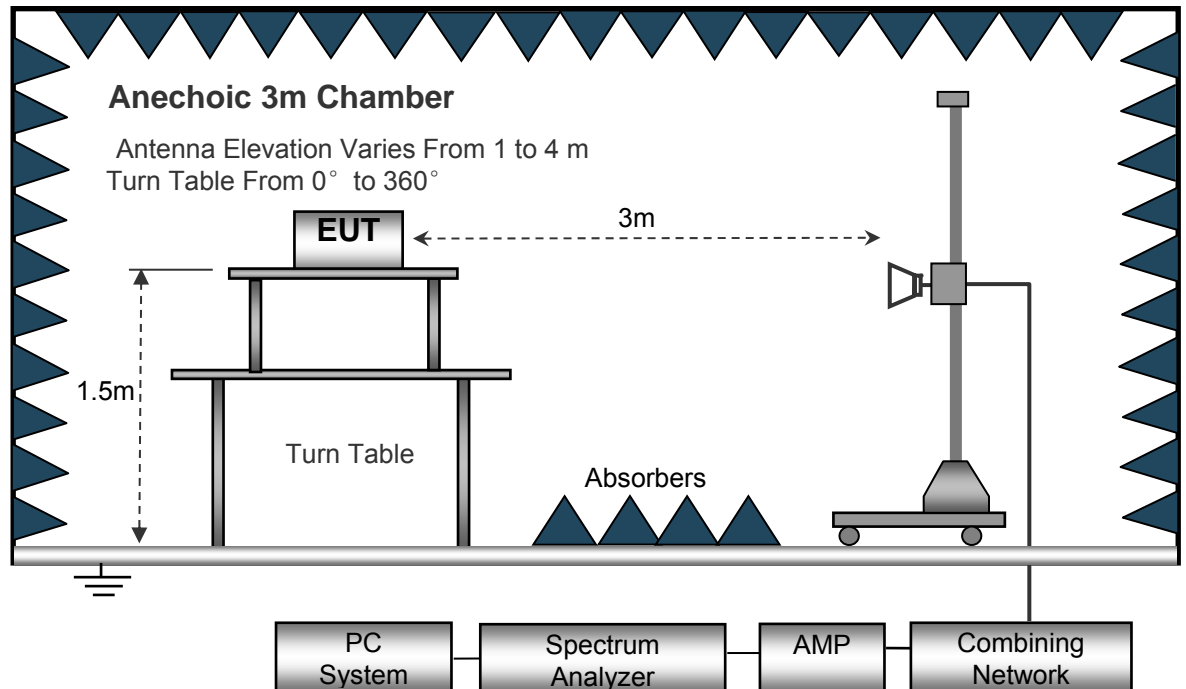
The test setup for emission measurement below 30MHz.



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



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

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 Summary of Test Results

Test Frequency: 9 kHz~30 MHz

Lowest frequency generated in the device is above 30MHz, frequency range of measurement should be above 30MHz.

Test Frequency: 30 MHz ~ 5 GHz

Lowest frequency generated in the device is above 30MHz, frequency range of measurement should be above 30MHz.

Frequency (MHz)	Receiver Reading (PK)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB/m)	Corrected Amplitude (PK)	FCC Part 15.231/15.209/205	
	(dBμV)		Height (m)	Polar (H/V)		(dBμV/m)	Limit (dBμV/m)	Margin (dB)
433.92	81.71	313	1.5	H	-7.28	74.43	100.82	-26.39
433.92	81.84	246	1.9	V	-7.28	74.56	100.82	-26.26
867.84	63.21	254	1.2	H	0.04	63.25	80.82	-17.57
867.84	62.98	26	1.5	V	0.04	63.02	80.82	-17.80
1735.68	69.59	32	1.1	H	-14.38	55.21	74.00	-18.79
1735.68	69.46	108	1.5	V	-14.38	55.08	74.00	-18.92
2169.60	66.09	37	1.9	H	-12.87	53.22	74.00	-20.78
2169.60	66.51	169	1.9	V	-12.87	53.64	74.00	-20.36

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

AV = Peak +20Log₁₀(duty cycle) =PK+(-7.64) (refer to section 8 for more detail)

Frequency (MHz)	PK (dBμV/m)	RX Antenna Polar (H/V)	Duty cycle Factor (dB)	Result (dBμV/m)	FCC Part 15.231/209/205	
					Limit (dBμV/m)	Margin (dB)
433.92	74.43	H	-7.97	66.46	80.82	-14.36
433.92	74.56	V	-7.97	66.59	80.82	-14.23
867.84	63.25	H	-7.97	55.28	60.82	-5.54
867.84	63.02	V	-7.97	55.05	60.82	-5.77
1735.68	55.21	H	-7.97	47.24	54.00	-6.76
1735.68	55.08	V	-7.97	47.11	54.00	-6.89
2169.60	53.22	H	-7.97	45.25	54.00	-8.75
2169.60	53.64	V	-7.97	45.67	54.00	-8.33

8 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, The duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train * %

Duty Cycle Correction Factor(dB)=20 * Log₁₀(Duty Cycle(%))

Total transmission time(ms)	2.58*1+0.24*33=10.5
Length of a complete transmission period(ms)	26.28
Duty Cycle (%)	39.95
Duty Cycle Correction Factor(dB)	-7.97

Refer to the duty cycle plot (as below), this device meets the FCC requirement.

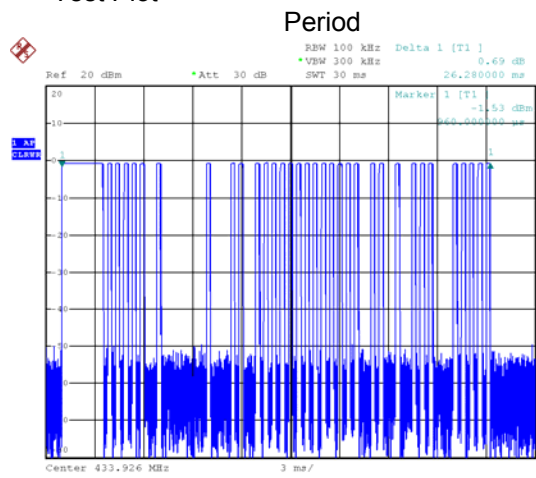
Length of a complete pulse train:

Remark:

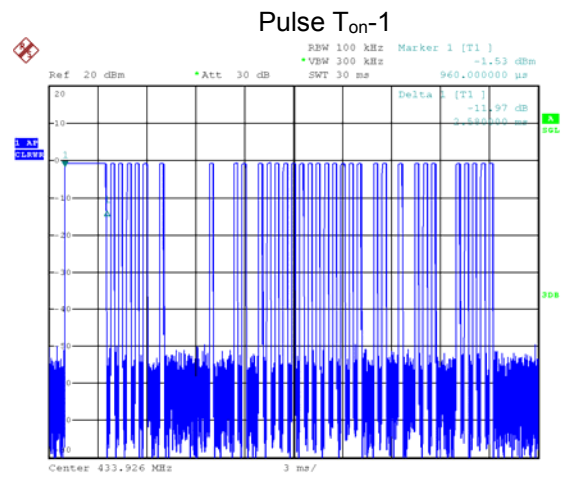
According to FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

Refer to the duty cycle plot (as below)

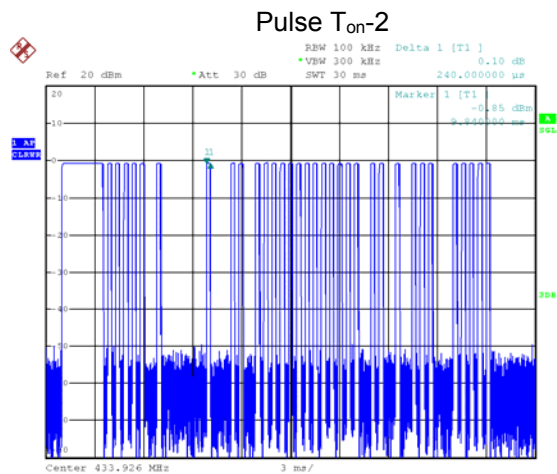
Test Plot



Date: 27.MAY.2022 12:39:19



Date: 27.MAY.2022 12:38:34



Date: 27.MAY.2022 12:38:54

According to FCC Part15.231(a)

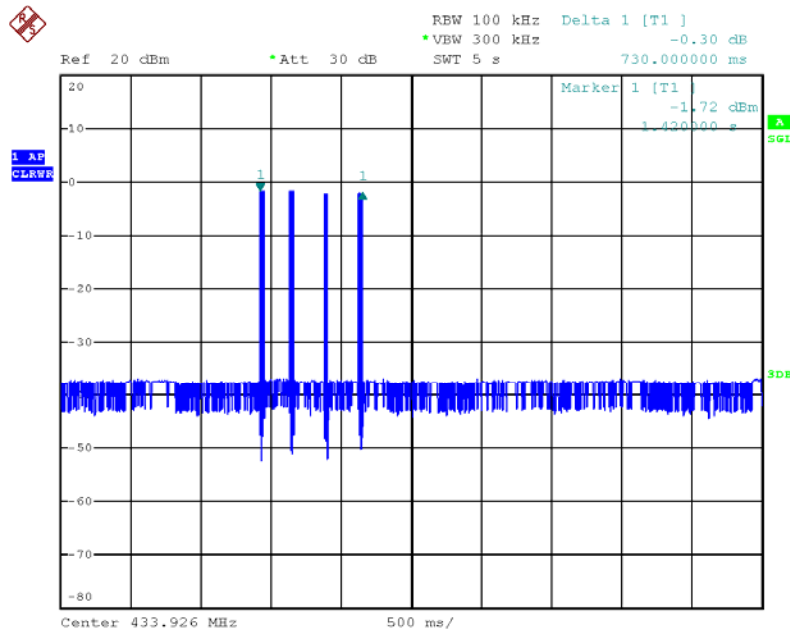
(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2)A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test result

Duration Time (ms)	Limit (s)	Result
730	<5.0	Compliance

Test Plot



Date: 27.MAY.2022 12:36:18

9 Emission Bandwidth

Test Requirement:	FCC Part15.231(c)
Test Method:	FCC Part15.231(c)
Limit	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

9.1 Test Procedure

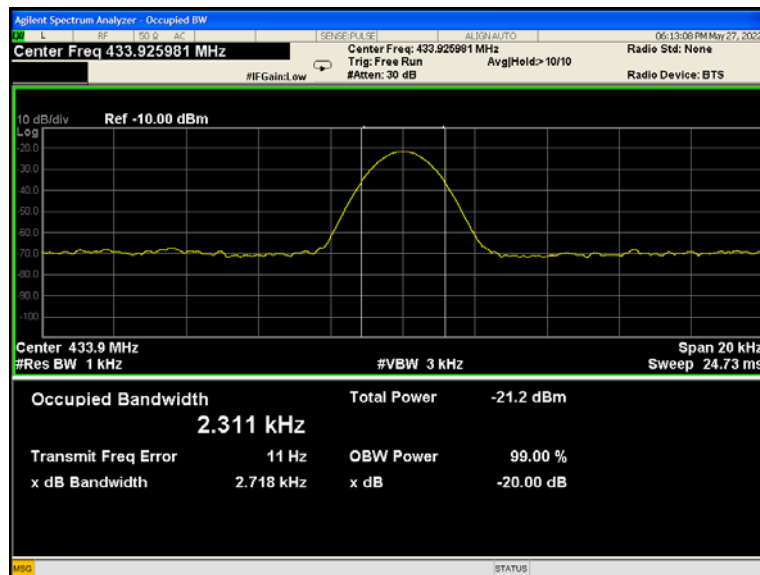
1. The transmitter output (antenna port) was connected to the spectrum analyzer. EUT and its simulators are placed on a table, let EUT working in test mode, then test it.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 3 kHz RBW and 10 kHz VBW. The 20 dB bandwidth was recorded.

9.2 Test Result

Frequency (MHz)	20dB Bandwidth Emission(kHz)	99% Bandwidth Emission(kHz)	Limit (kHz)	Result
433.92	2.718	2.311	1084.5	Compliance

Limit=Center Frequency*0.25%

Test Plot



10 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 Loop antenna, the gain is 0dBi. meets the requirements of FCC 15.203.

11 Photographs –Test Setup Photos

Note: Please refer to appendix: Appendix- 0E-PIR433-Photos.

12 Photographs - Constructional Details

Note: Please refer to appendix: Appendix- 0E-PIR433-Photos.

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