CFR 47 FCC PART 15 SUBPART F
ISED RSS-220 ISSUE 1

TEST REPORT

For

Vest Sensor Terminal

MODEL NUMBER: VSTA10

FCC ID: 2BBEG-VSTA10

IC: 31079-VSTA10

REPORT NUMBER: E04A23080794F00802

ISSUE DATE: Apr. 09, 2024

Prepared for

HAI ROBOTICS Co., Ltd.

Room 201,301,401,Building B,Anluo Technology Industrial Park,Nanchang Community,Xixiang Street,Bao'an District, Shenzhen City,Guangdong Province, P.R. China

Prepared by

Guangdong Global Testing Technology Co., Ltd.

Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People's Republic of China, 523808

This report is based on a single evaluation of the submitted sample(s) of the above mentioned Product, it does not imply an assessment of the production of the products.
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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	Apr. 09, 2024	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	Radiated Spurious Emission	CFR 47 FCC §15.209 CFR 47 FCC §15.517(c) CFR 47 FCC §15.517 (d) ISED RSS-220 3.4 ISED RSS-220 5.2.1(d) ISED RSS-220 5.2.1(e)	Pass
2	Peak Emissions within a 50MHz Bandwidth	CFR 47 FCC §15.517(e) ISED RSS-220 5.2.1(g)	Pass
3	10dBc UWB Bandwidth	CFR 47 FCC §15.517(b) ISED RSS-220 2	Pass
4	Conducted Emission Test For AC Power Port	CFR 47 FCC §15.207 ISED RSS-Gen 8.8	N/A
5	Antenna Requirement	CFR 47 FCC §15.203 ISED RSS-Gen Clause 6.3	Pass
Note 1: N/A: In this whole report not applicable. Note 2:This test report is only published to and used by the applicant, and it is not for evidence purpose in China. Note 3: The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART F, ISED RSS-220 ISSUE 1> when <Accuracy Method> decision rule is applied.			

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	HAI ROBOTICS Co., Ltd.
Address:	Room 201,301,401,Building B,Anluo Technology Industrial Park,Nanchang Community,Xixiang Street,Bao'an District, Shenzhen City,Guangdong Province, P.R. China

Manufacturer Information

Company Name:	HAI ROBOTICS Co., Ltd.
Address:	Room 201,301,401,Building B,Anluo Technology Industrial Park,Nanchang Community,Xixiang Street,Bao'an District, Shenzhen City,Guangdong Province, P.R. China

EUT Information

EUT Name:	Vest Sensor Terminal
Model:	VSTA10
Brand:	N/A
Sample Received Date:	Aug. 25, 2023
Sample Status:	Normal
Sample ID:	A23080794 007
Date of Tested:	Aug. 25, 2023 to Apr. 09, 2024

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART F	PASS
ISED RSS-220 ISSUE 1	PASS
ISED RSS-GEN ISSUE 5	PASS

Prepared By:

Win Huang

Project Engineer

Checked By:

Alan He

Laboratory Leader

Approved By:

Shawn Wen

Laboratory Manager

2. TEST METHODOLOGY

All tests were performed in accordance with the standard CFR 47 FCC Part 2, CFR 47 FCC Part 15, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013, ISED RSS-220 ISSUE 1 and ISED RSS-GEN ISSUE 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 6947.01)** Guangdong Global Testing Technology Co., Ltd. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1343)** Guangdong Global Testing Technology Co., Ltd. has been recognized to perform compliance testing on equipment subject to Supplier's Declaration of Conformity (SDoC) and Certification rules **ISED (Company No.: 30714)** Guangdong Global Testing Technology Co., Ltd. has been registered and fully described in a report filed with ISED. The Company Number is 30714 and the test lab Conformity Assessment Body Identifier (CABID) is CN0148.

Note: All tests measurement facilities use to collect the measurement data are located at Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People’s Republic of China, 523808

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Frequency Range	k	U(dB)
Radiated emissions	9 kHz ~ 30 MHz	2	4.16
Radiated emissions	30 MHz ~ 1 GHz	2	3.79
Radiated emissions	1 GHz ~ 18 GHz	2	5.62
Radiated emissions	18 GHz ~ 40 GHz	2	5.54
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	Vest Sensor Terminal	
Model	VSTA10	
Series Model	N/A	
Product Description	Operation Frequency	6489.6 MHz
	Modulation Type	BPM
Ratings	5V/2.5W	
Hardware Version	SVF1A_RTS1_B230119	
Software Version	V2.0	
Note	according to the manufacture declaration, base on the use case and product design, the product will be only operated indoors, the locations will be completely enclosed by walls and a ceiling, compliance with § 15.517 (a) and Clause 5.2.1 (a) of RSS-220.	

5.2. MAXIMUM PEAK POWER

Frequency (MHz)	Number of Transmit Chains (NTX)	Channel Number	Max Peak field strength (dBμV/m)
6489.6	1	1	87.43

5.3. TEST CHANNEL CONFIGURATION

Channel	Frequency (MHz)	Channel	Frequency(MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
5	6489.6	/	/	/	/	/	/

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	6489.6	Internal Antenna	3

Test Mode	Transmit and Receive Mode	Description
6489.6MHz	☒1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

Note: The value of the antenna gain was declared by customer.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

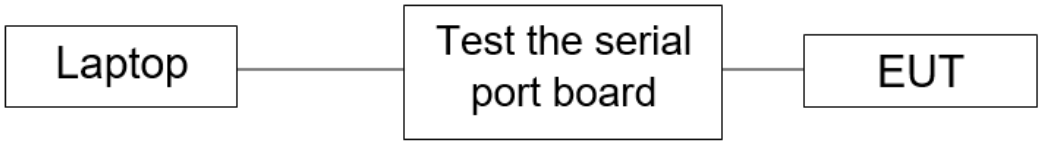
Equipment	Manufacturer	Model No.
Vest Robot Terminal, Vest Door Robot	HAI ROBOTICS Co., Ltd.	VSTA10
PC	Lenovo	T14
Test the serial port board	N/A	N/A

TEST SETUP

The EUT can work in engineering mode with the inside software.

SETUP DIAGRAM FOR TESTS

Radiated emissions:



6. MEASURING INSTRUMENT AND SOFTWARE USED

Test Equipment of Radiated emissions below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2146	2022/08/30	2025/08/29
EMI Test Receiver	Rohde & Schwarz	ESCI3	101409	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2023/09/18	2024/09/17
Pre-Amplifier	HzEMC	HPA-9K0130	HYPA21001	2023/09/18	2024/09/17
Biconilog Antenna	Schwarzbeck	VULB 9168	01315	2022/10/10	2025/10/09
Biconilog Antenna	ETS	3142E	00243646	2022/03/23	2025/03/22
Loop Antenna	ETS	6502	243668	2022/03/30	2025/03/29
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A	N/A

Test Equipment of Radiated emissions above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2149	2022/08/30	2025/08/29
Spectrum Analyzer	Rohde & Schwarz	FSV40	101413	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2023/09/18	2024/09/17
Pre-Amplifier	A-INFO	HPA-1G1850	HYPA21003	2023/09/18	2024/09/17
Horn antenna	A-INFO	3117	246069	2022/03/11	2025/03/10
Pre-Amplifier	ZKJC	HPA-184057	HYPA21004	2023/09/18	2024/09/17
Horn antenna	ZKJC	3116C	246265	2022/03/29	2025/03/28
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE+)	N/A	N/A	N/A

7. RADIATED EMISSION TEST

LIMITS

For FCC, please refer to FCC §15.205, §15.209, §15.517
For ISED, please refer to RSS-220 Clause 3.4, RSS-220 Clause 5.2.1, and RSS-GEN Clause 8.9

(a). Limits below 960MHz for FCC & ISED

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3

(b). Limits above 960MHz
For RSS-220 Clause 5.2.1

Indoor Communication, Measurement, Location Sensing and Tracking Devices	
Frequency	**E.i.r.p. in a Resolution Bandwidth of 1 MHz**
960-1 610 MHz	-75.3 dBm
1.61-4.75 GHz	-70.0 dBm
4.75-10.6 GHz	-41.3 dBm
Above 10.6 GHz	-51.3 dBm

Frequency	E.i.r.p (dBm)	Field Strength (dBuV/m @ 3m)	Field Strength (dBuV/m @ 1m)
960-1 610 MHz	-75.3	19.9	29.44
1.61-4.75 GHz	-70	25.2	34.74
4.75-10.6 GHz	-41.3	53.9	63.44
Above 10.6 GHz	-51.3	43.9	53.44

E(dBuV/m)@3m=P(dBm EIRP)+ 95.2
E(dBuV/m)@1m=E(dBuV/m)@3m+20*log(3/1)

For FCC 15.517

Frequency in MHz	EIRP in dBm
960-1610	−75.3
1610-1990	−53.3
1990-3100	−51.3
3100-10600	−41.3
Above 10600	−51.3

Frequency (MHz)	E.i.r.p (dBm)	Field Strength (dBuV/m @ 3m)	Field Strength (dBuV/m @ 1m)
960 - 1610	-75.3	19.9	29.44
1610 - 1990	-53.3	41.9	51.44
1990 - 3100	-51.3	43.9	53.44
3100 -10600	-41.3	53.9	63.44
above 10600	-51.3	43.9	53.44

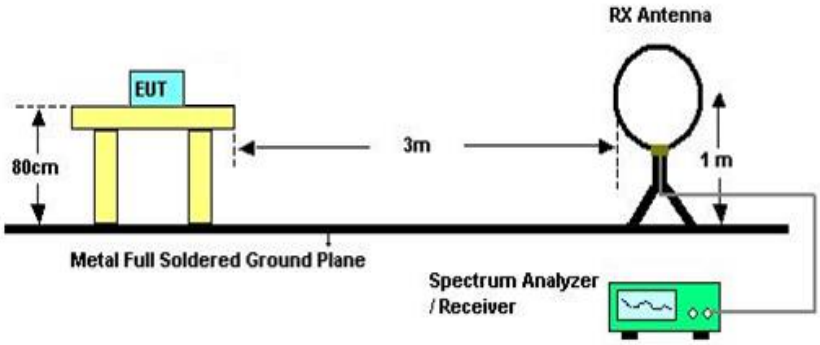
E(dBuV/m)@3m=P(dBm EIRP)+ 95.2
E(dBuV/m)@1m=E(dBuV/m)@3m+20*log(3/1)

(c). In addition to the radiated emission limits specified in the table in paragraph (a)(b) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1164-1240	−85.3
1559-1610	−85.3

TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.

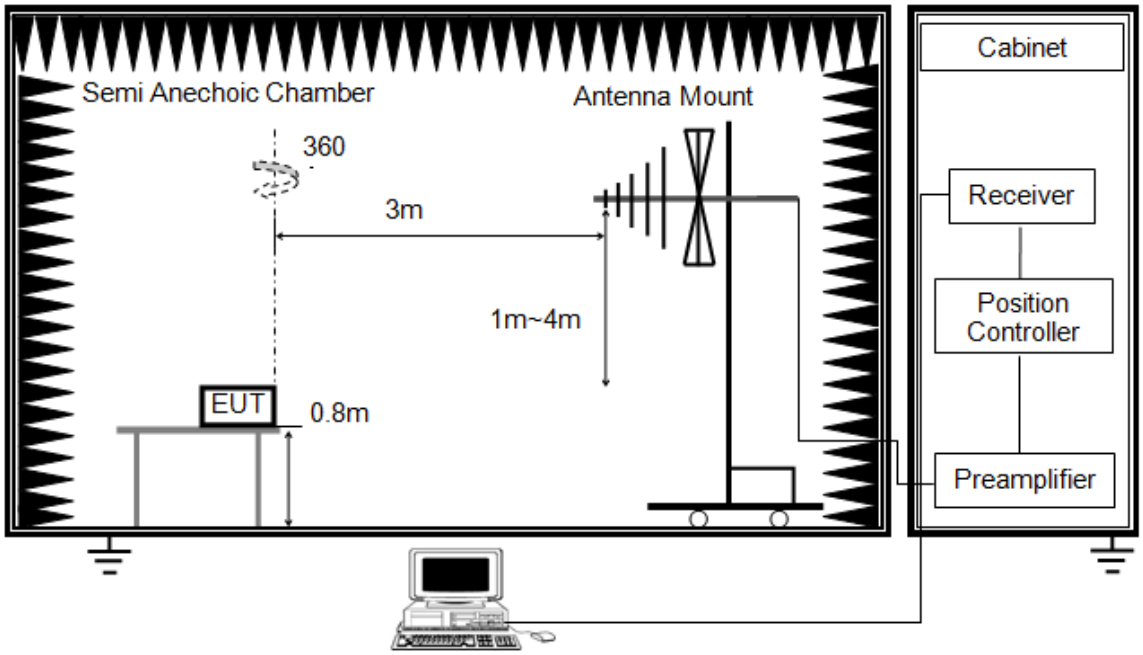
5. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

6. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

7. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

8. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open field site. Therefore, the sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Below 1G



The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

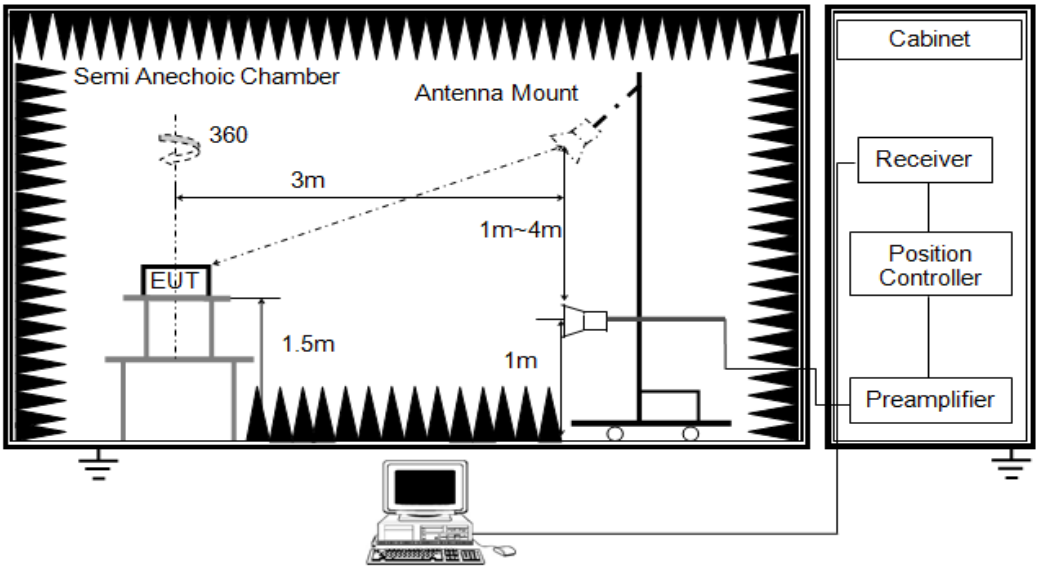
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

6. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

7. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

Above 1G



The setting of the spectrum analyser

RBW	1M
VBW	3M
Sweep	Auto/see note 6
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter or band reject filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

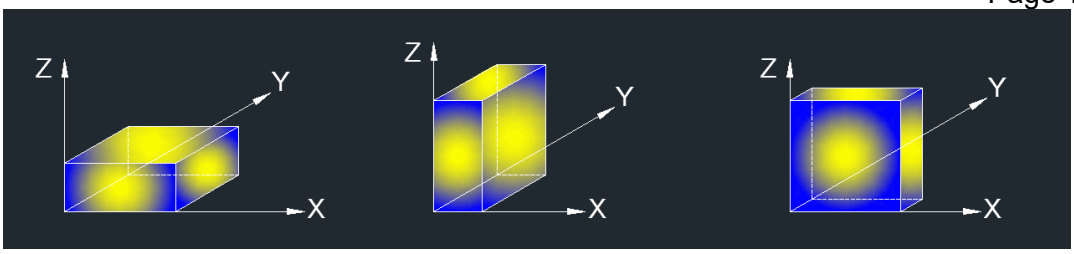
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

4. The EUT was set 1 meter from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

6. For AVG measurements, select the power averaging (rms) detector, set the sweep time so that there is no more than a 1 ms integration period over each measurement bin. Many older instruments use a default value of approximately 600 bins per scan. Assuming this value, a sweep time of 600 ms provides the required 1 ms integration period within each measurement bin. The number of measurement bins can be specified with many modern instruments, providing many other possible combinations of sweep time and number of measurement bins that also result in adherence to the 1 ms maximum integration time requirement. The rms-average power spectral density is the highest integrated power detected within a 1 MHz RBW over a 1 ms integration period.

X axis, Y axis, Z axis positions:



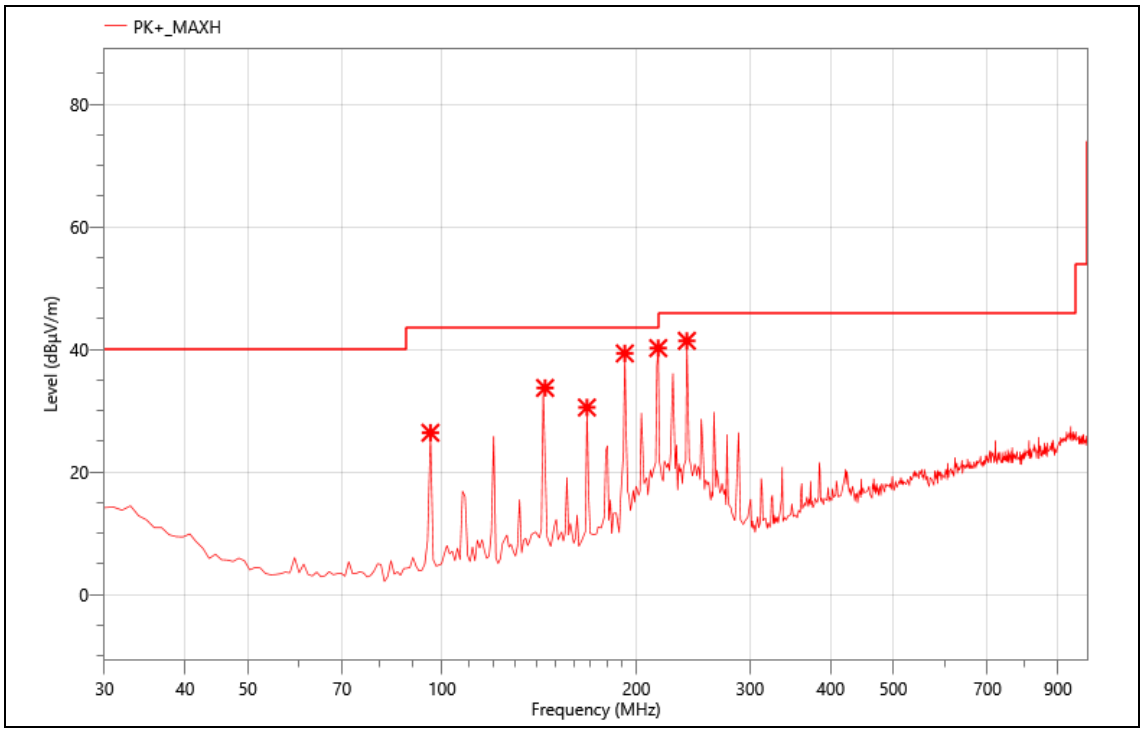
Note: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis for horizontal and Z axis for vertical) data recorded in the report.

TEST ENVIRONMENT

Temperature	24.1°C	Relative Humidity	52%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

TEST RESULT - FCC PART 15 SUBPART F & RSS-220

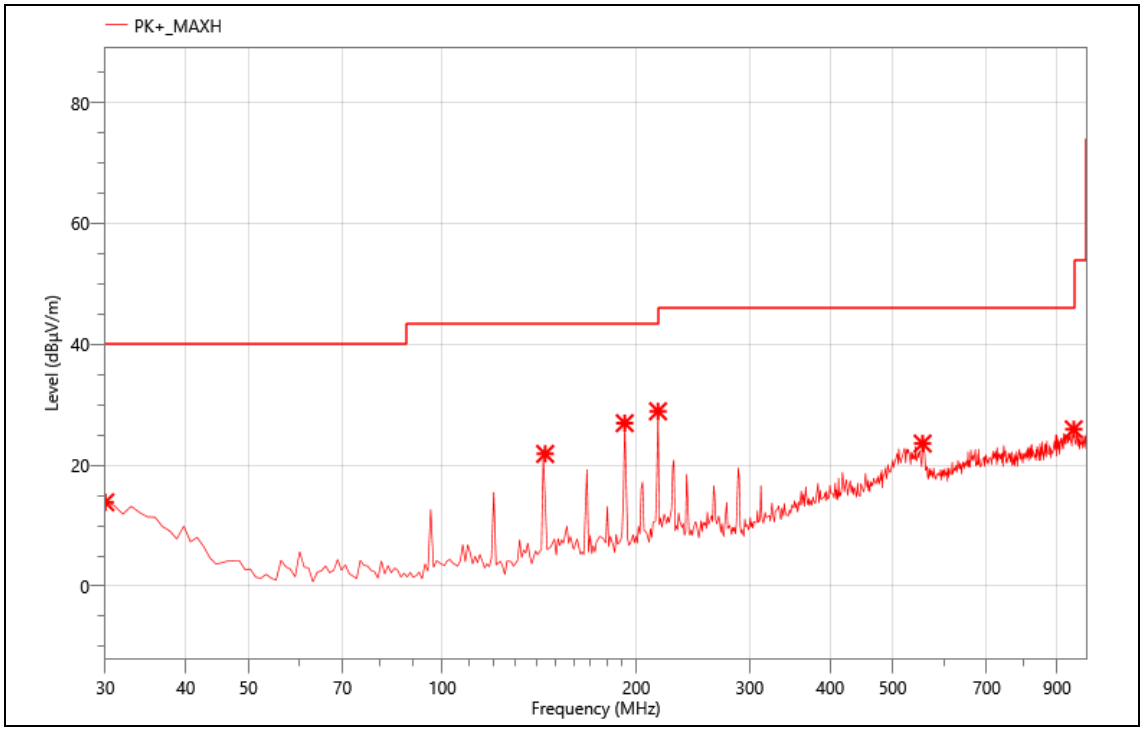
Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/01
T/A/P	24.1℃/52%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	95.960	50.89	-24.49	26.40	43.50	17.10	PK+	H
2	144.460	57.18	-23.47	33.71	43.50	9.79	PK+	H
3	167.740	53.22	-22.7	30.52	43.50	12.98	PK+	H
4	191.990	61.92	-22.57	39.35	43.50	4.15	PK+	H
5	216.240	61.17	-20.95	40.22	46.00	5.78	PK+	H
6	239.520	61.06	-19.66	41.40	46.00	4.60	PK+	H

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/01
T/A/P	24.1℃/52%/101Kpa



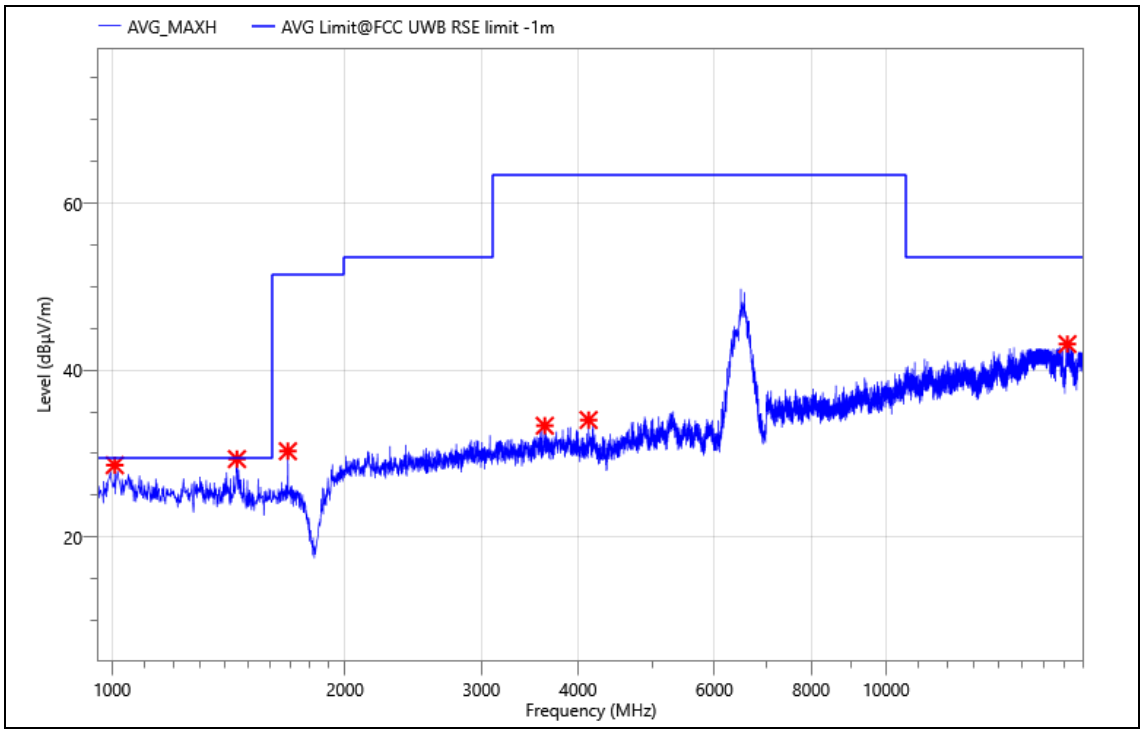
Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	30.000	28.15	-14.27	13.88	40.00	26.12	PK+	V
2	144.460	45.35	-23.47	21.88	43.50	21.62	PK+	V
3	191.990	49.53	-22.57	26.96	43.50	16.54	PK+	V
4	216.240	49.88	-20.95	28.93	46.00	17.07	PK+	V
5	556.710	33.68	-10.09	23.59	46.00	22.41	PK+	V
6	955.380	29.60	-3.64	25.96	46.00	20.04	PK+	V

Note 1: Test distance is 3m.

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/01
T/A/P	24.1℃/52%/101Kpa

Test Template	FCC UWB 960M-18G @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	960 MHz-18 GHz	AVG	1 MHz	Auto

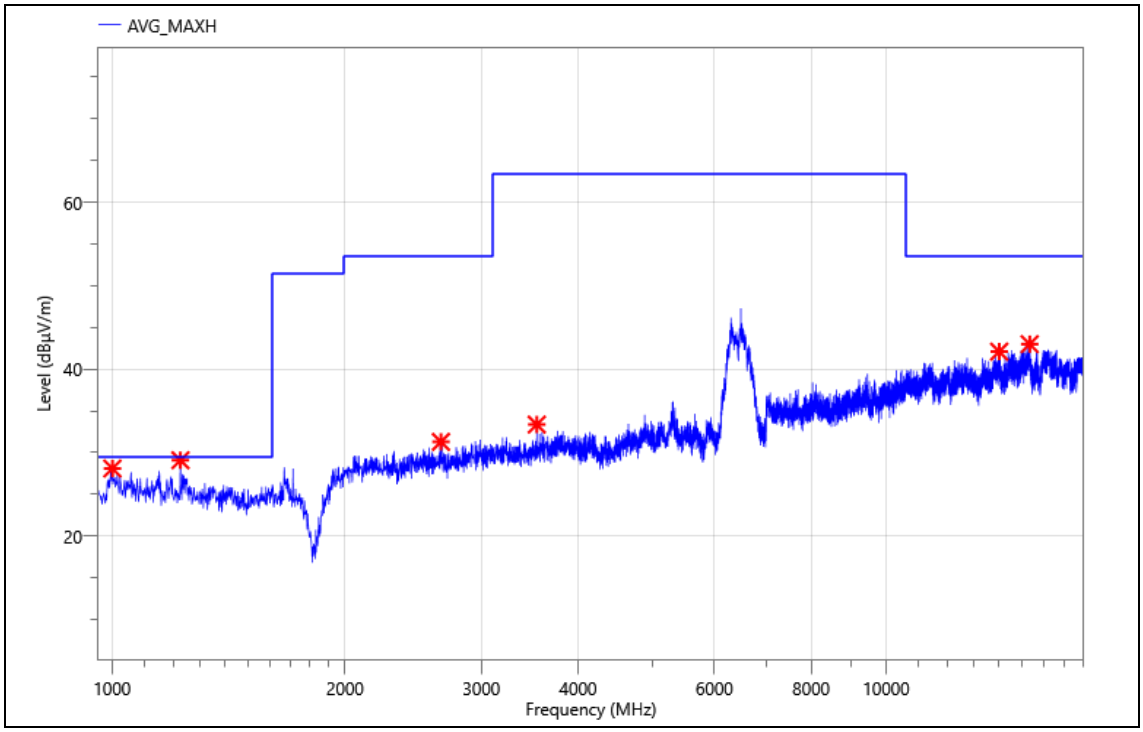


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	E.I.R.P. Meas. (dBm)	E.I.R.P. Limit (dBm)	Margin (dB)	Det.	Pol.
1	1008.280	50.56	-21.95	28.61	29.44	-76.13	-75.3	0.83	AVG	V
2	1449.900	51.92	-22.57	29.35	29.44	-75.39	-75.3	0.09	AVG	V
3	1687.040	51.25	-20.96	30.29	51.44	-74.45	-53.3	21.15	AVG	V
4	3622.500	47.13	-13.79	33.34	63.44	-71.40	-41.3	30.10	AVG	V
5	4126.600	46.66	-12.63	34.03	63.44	-70.71	-41.3	29.41	AVG	V
6	17146.580	43.48	-0.36	43.12	53.44	-61.62	-51.3	10.32	AVG	V

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/01
T/A/P	24.1℃/52%/101Kpa

Test Template	FCC UWB 960M-18G @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	960 MHz-18 GHz	AVG	1 MHz	Auto

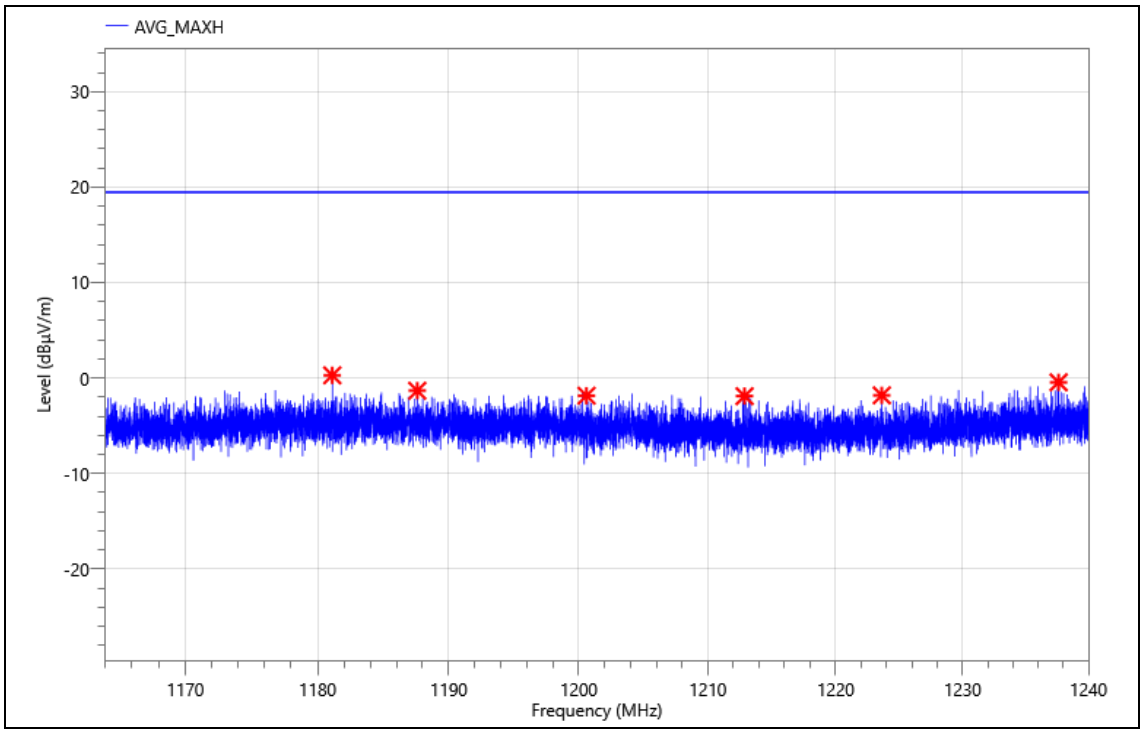


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	E.I.R.P. Meas. (dBm)	E.I.R.P. Limit (dBm)	Margin (dB)	Det.	Pol.
1	1001.180	50.02	-21.92	28.10	29.44	-76.64	-75.3	1.34	AVG	H
2	1225.540	51.93	-22.84	29.09	29.44	-75.65	-75.3	0.35	AVG	H
3	2659.740	48.07	-16.78	31.29	53.44	-73.45	-51.3	22.15	AVG	H
4	3537.300	47.40	-14.04	33.36	63.44	-71.38	-41.3	30.08	AVG	H
5	13997.020	45.28	-3.18	42.10	53.44	-62.64	-51.3	11.34	AVG	H
6	15327.560	45.87	-2.87	43.00	53.44	-61.74	-51.3	10.44	AVG	H

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/03
T/A/P	24.1℃/52%/101Kpa

Test Template	FCC UWB 1164 MHz-1240 MHz @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	1164 MHz-1240 MHz	AVG	1 MHz	Auto

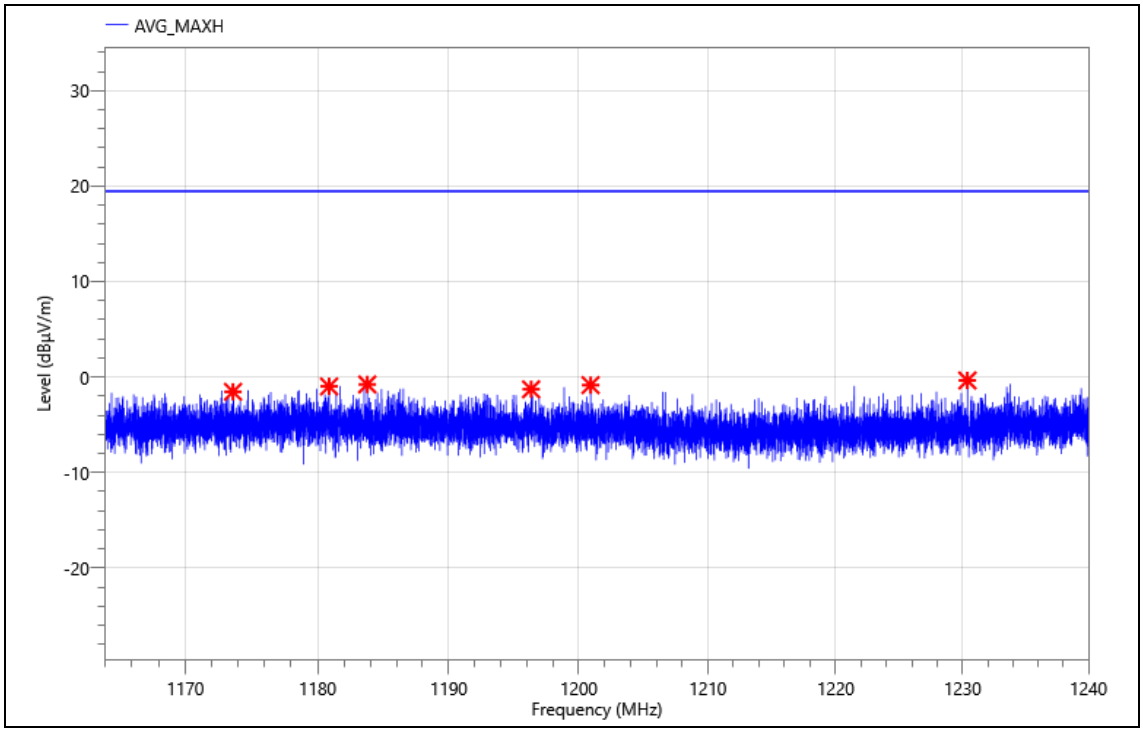


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	E.I.R.P. Meas. (dBm)	E.I.R.P. Limit (dBm)	Margin (dB)	Det.	Pol.
1	1181.119	23.10	-22.81	0.29	19.44	-104.45	-85.3	19.15	AVG	V
2	1187.598	21.42	-22.74	-1.32	19.44	-106.06	-85.3	20.76	AVG	V
3	1200.594	20.78	-22.62	-1.84	19.44	-106.58	-85.3	21.28	AVG	V
4	1212.868	20.84	-22.73	-1.89	19.44	-106.63	-85.3	21.33	AVG	V
5	1223.622	21.02	-22.83	-1.81	19.44	-106.55	-85.3	21.25	AVG	V
6	1237.619	22.36	-22.8	-0.44	19.44	-105.18	-85.3	19.88	AVG	V

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Berny
Date	2023/10/30
T/A/P	24.3℃/54%/101Kpa

Test Template	FCC UWB 1164 MHz-1240 MHz @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	1164 MHz-1240 MHz	AVG	1 MHz	Auto

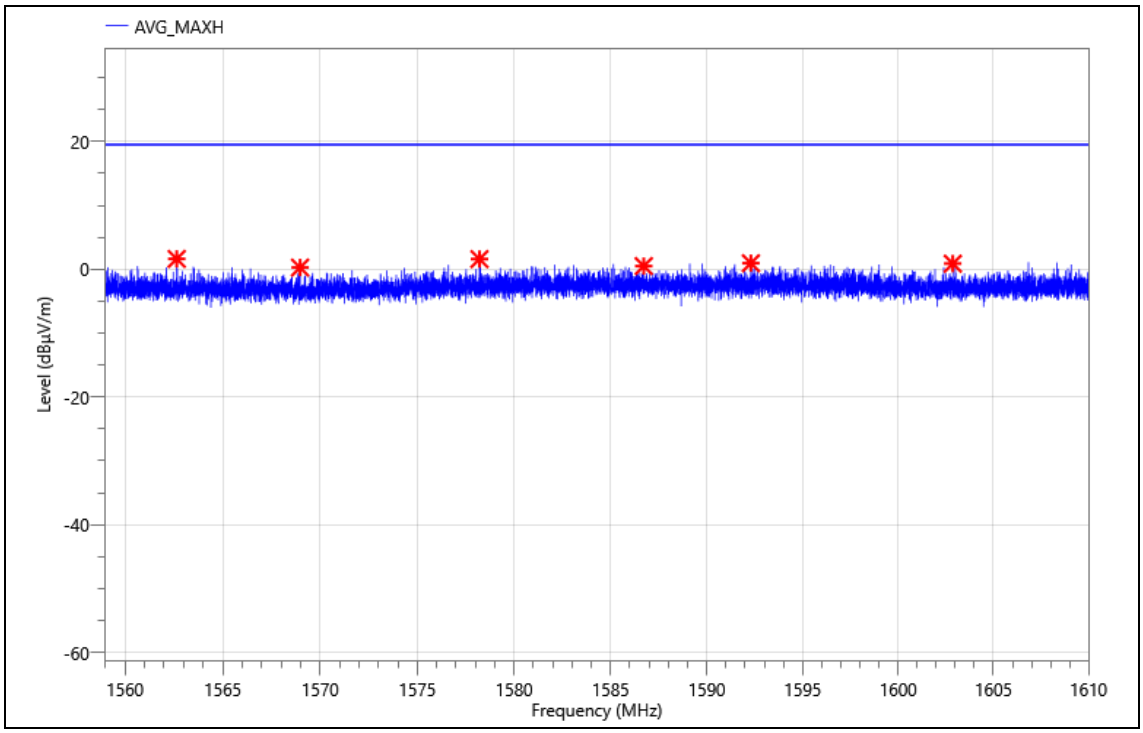


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	E.I.R.P. Meas. (dBm)	E.I.R.P. Limit (dBm)	Margin (dB)	Det.	Pol.
1	1173.601	21.34	-22.88	-1.54	19.44	-106.28	-85.3	20.98	AVG	H
2	1180.878	21.83	-22.81	-0.98	19.44	-105.72	-85.3	20.42	AVG	H
3	1183.779	22.01	-22.78	-0.77	19.44	-105.51	-85.3	20.21	AVG	H
4	1196.325	21.37	-22.65	-1.28	19.44	-106.02	-85.3	20.72	AVG	H
5	1200.911	21.78	-22.62	-0.84	19.44	-105.58	-85.3	20.28	AVG	H
6	1230.380	22.48	-22.83	-0.35	19.44	-105.09	-85.3	19.79	AVG	H

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/03
T/A/P	24.1℃/52%/101Kpa

Test Template	FCC UWB 1559 MHz-1610 MHz @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	1559 MHz-1610 MHz	AVG	1 MHz	Auto

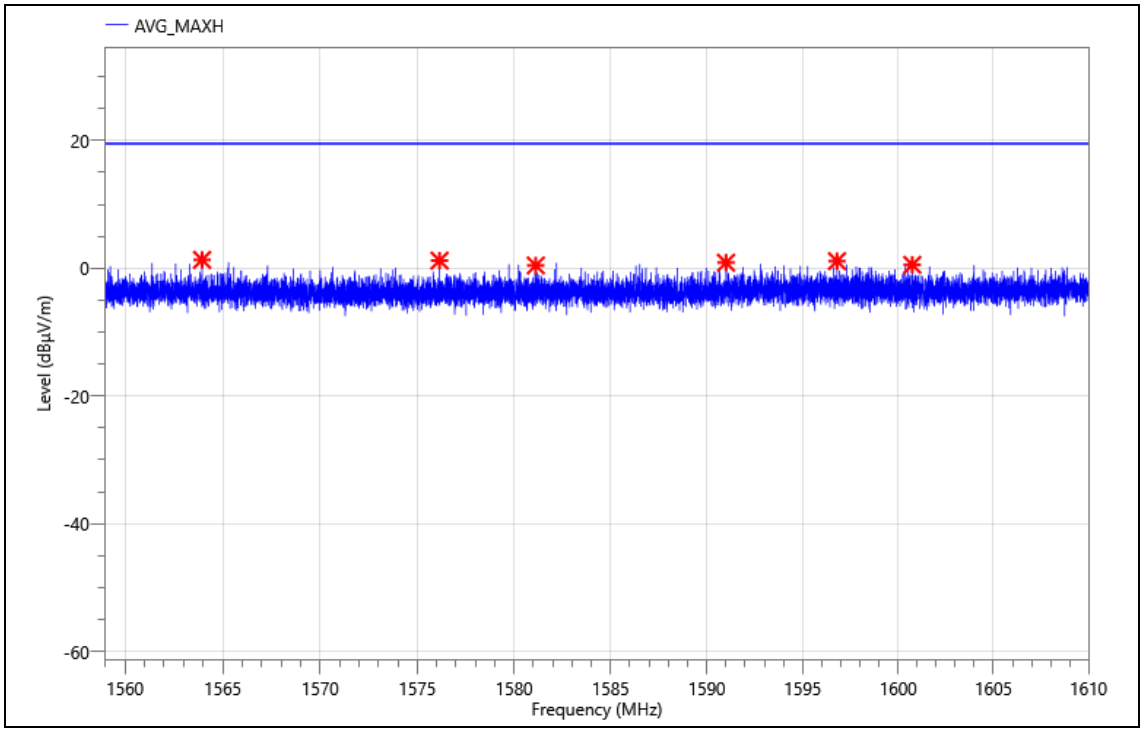


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	E.I.R.P. Meas. (dBm)	E.I.R.P. Limit (dBm)	Margin (dB)	Det.	Pol.
1	1562.647	23.60	-21.98	1.62	19.44	-103.12	-85.3	17.82	AVG	V
2	1568.971	22.19	-21.93	0.26	19.44	-104.48	-85.3	19.18	AVG	V
3	1578.214	23.45	-21.86	1.59	19.44	-103.15	-85.3	17.85	AVG	V
4	1586.727	22.30	-21.8	0.50	19.44	-104.24	-85.3	18.94	AVG	V
5	1592.303	22.70	-21.76	0.94	19.44	-103.80	-85.3	18.50	AVG	V
6	1602.864	22.55	-21.68	0.87	19.44	-103.87	-85.3	18.57	AVG	V

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/03
T/A/P	24.1℃/52%/101Kpa

Test Template	FCC UWB 1559 MHz-1610 MHz @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	1559 MHz-1610 MHz	AVG	1 MHz	Auto

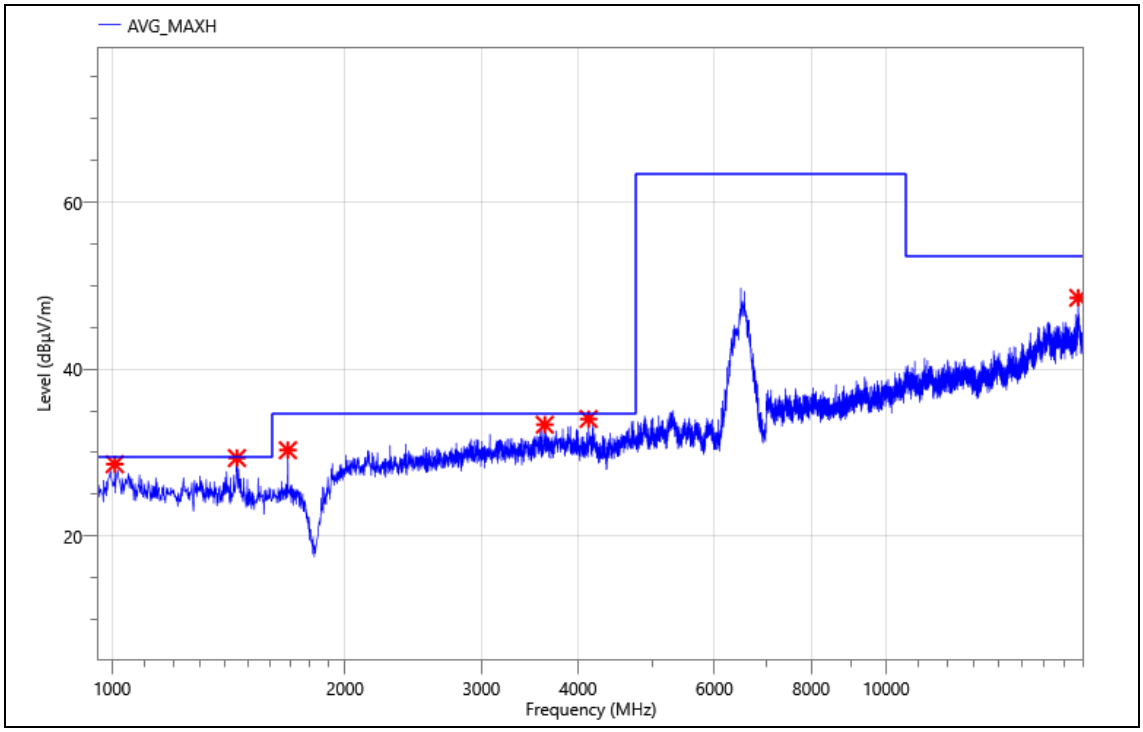


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	E.I.R.P. Meas. (dBm)	E.I.R.P. Limit (dBm)	Margin (dB)	Det.	Pol.
1	1563.947	23.28	-21.97	1.31	19.44	-103.43	-85.3	18.13	AVG	V
2	1576.153	23.07	-21.88	1.19	19.44	-103.55	-85.3	18.25	AVG	V
3	1581.126	22.28	-21.84	0.44	19.44	-104.30	-85.3	19.00	AVG	V
4	1591.007	22.64	-21.77	0.87	19.44	-103.87	-85.3	18.57	AVG	V
5	1596.800	22.83	-21.72	1.11	19.44	-103.63	-85.3	18.33	AVG	V
6	1600.739	22.22	-21.69	0.53	19.44	-104.21	-85.3	18.91	AVG	V

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/03
T/A/P	24.1℃/52%/101Kpa

Test Template	ISED UWB 960M-18G @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	960 MHz-18 GHz	AVG	1 MHz	Auto

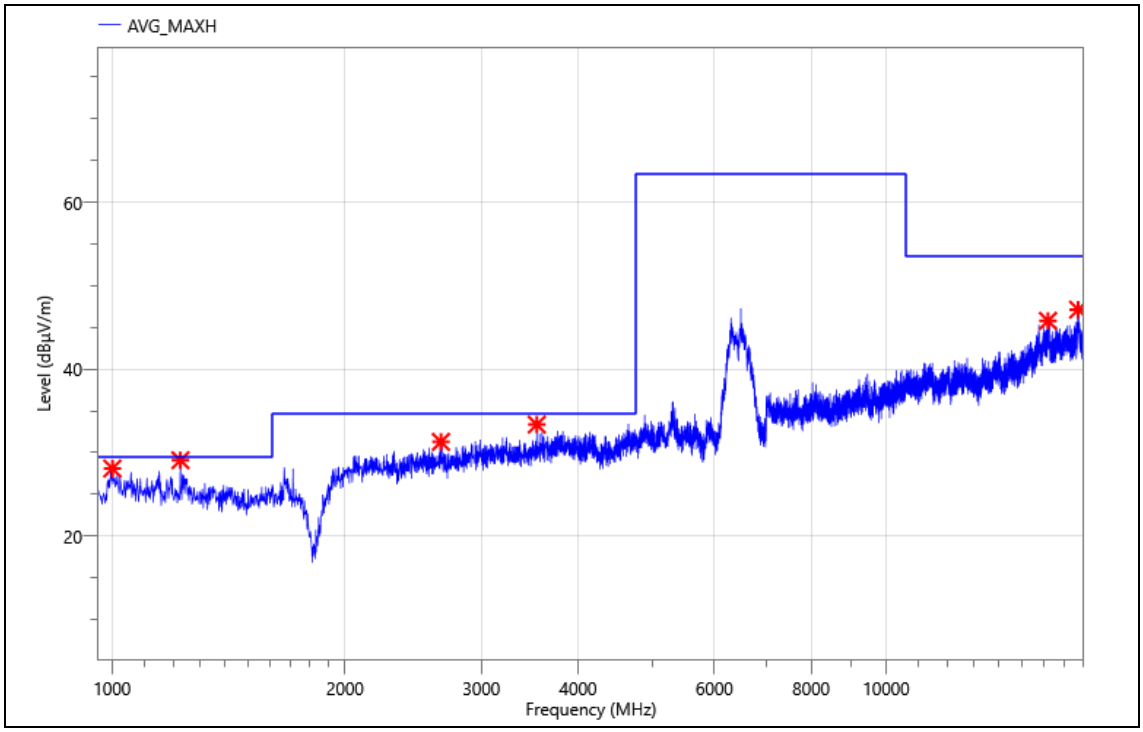


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	E.I.R.P. Meas. (dBm)	E.I.R.P. Limit (dBm)	Margin (dB)	Det.	Pol.
1	1008.280	50.56	-21.95	28.61	29.44	-76.13	-75.3	0.83	AVG	V
2	1449.900	51.92	-22.57	29.35	29.44	-75.39	-75.3	0.09	AVG	V
3	1687.040	51.25	-20.96	30.29	34.74	-74.45	-70	4.45	AVG	V
4	3622.500	47.13	-13.79	33.34	34.74	-71.40	-70	1.40	AVG	V
5	4126.600	46.66	-12.63	34.03	34.74	-70.71	-70	0.71	AVG	V
6	17707.480	48.37	0.18	48.55	53.44	-56.19	-51.3	4.89	AVG	V

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/03
T/A/P	24.1℃/52%/101Kpa

Test Template	ISED UWB 960M-18G @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	960 MHz-18 GHz	AVG	1 MHz	Auto



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	E.I.R.P. Meas. (dBm)	E.I.R.P. Limit (dBm)	Margin (dB)	Det.	Pol.
1	1001.180	50.02	-21.92	28.10	29.44	-76.64	-75.3	1.34	AVG	H
2	1225.540	51.93	-22.84	29.09	29.44	-75.65	-75.3	0.35	AVG	H
3	2659.740	48.07	-16.78	31.29	34.74	-73.45	-70	3.45	AVG	H
4	3537.300	47.40	-14.04	33.36	34.74	-71.38	-70	1.38	AVG	H
5	16183.820	45.86	-0.07	45.79	53.44	-58.95	-51.3	7.65	AVG	H
6	17703.220	47.03	0.1	47.13	53.44	-57.61	-51.3	6.31	AVG	H

Note: 1. The frequency, which started from 18 GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.
2. Test distance is 1m.

8. PEAK EMISSIONS WITHIN A 50MHZ BANDWIDTH

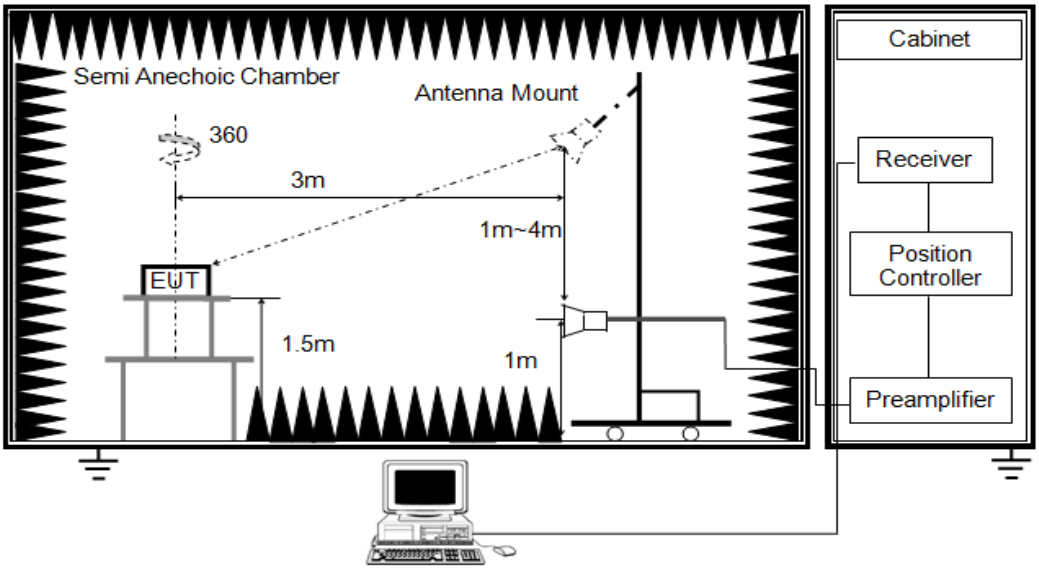
LIMITS

Please refer to FCC §15.517 (e)
There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in §15.521.

According to FCC §15.521 (g)
When a peak measurement is required, it is acceptable to use a resolution bandwidth other than the 50 MHz specified in this subpart. This resolution bandwidth shall not be lower than 1 MHz or greater than 50 MHz, and the measurement shall be centered on the frequency at which the highest radiated emission occurs, fM. If a resolution bandwidth other than 50 MHz is employed, the peak EIRP limit shall be 20 log (RBW/50) dBm where RBW is the resolution bandwidth in megahertz that is employed. This may be converted to a peak field strength level at 3 meters using E(dBuV/m) = P(dBm EIRP) + 95.2.

When the test RBW = 1MHz, the 0 dBm EIRP limit should be 0+20 log (1/50)=-33.98dBm

TEST SETUP AND PROCEDURE



1). The EUT was powered ON and placed on a 1.5m high table in a semi-anechoic chamber.

2). Adjust the settings of the Universal Radio Communication Tester to set the EUT to its maximum power at the required channel.

3). Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.

4).The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

4. The EUT was set 1 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

6. This may be converted to a peak field strength level at 3 meters using E(dBuV/m) = P(dBm EIRP) + 95.2.

7. The spectral characterization of a UWB device shall begin with a peak-detected radiated measurement because the results obtained from this measurement could preclude the need for subsequent average measurements. For example, if the data collected from the peak-power measurement show that the radiated emissions levels are equal to, or less than, the applicable emissions limit, then these data are adequate to
determine compliance. This is predicated on the fact that the average levels are always less than, or equal to, the peak signal level.

The peak detector of the instrument is selected and the maximum hold feature activated. The RBW is set to 1 MHz and the VBW is set to at least 1 MHz (3 MHz is recommended).

8. It is acceptable to employ an RBW of less than 50 MHz (but no less than 1 MHz) when performing the required peak power measurements. When this approach is employed, the peak emissions EIRP limit (0 dBm / 50 MHz) is converted to a limit commensurate with the RBW by employing a [20 log (RBW/50 MHz)] relationship. For example, the peak power limit could be expressed in a 1 MHz bandwidth as follows in Equation (28):

$$\mathrm{EIRP}_{1\,\mathrm{MHz}} = \mathrm{EIRP}_{50\,\mathrm{MHz}} + 20\log\left(1\,\mathrm{MHz}/50\,\mathrm{MHz}\right) = 0\ \mathrm{dBm} + \left(-34\ \mathrm{dB}\right) = -34\ \mathrm{dBm}$$

When a resolution bandwidth of less than 50 MHz is used, this measurement shall be performed over a 50 MHz span centered on the frequency associated with the highest detected average emission level.

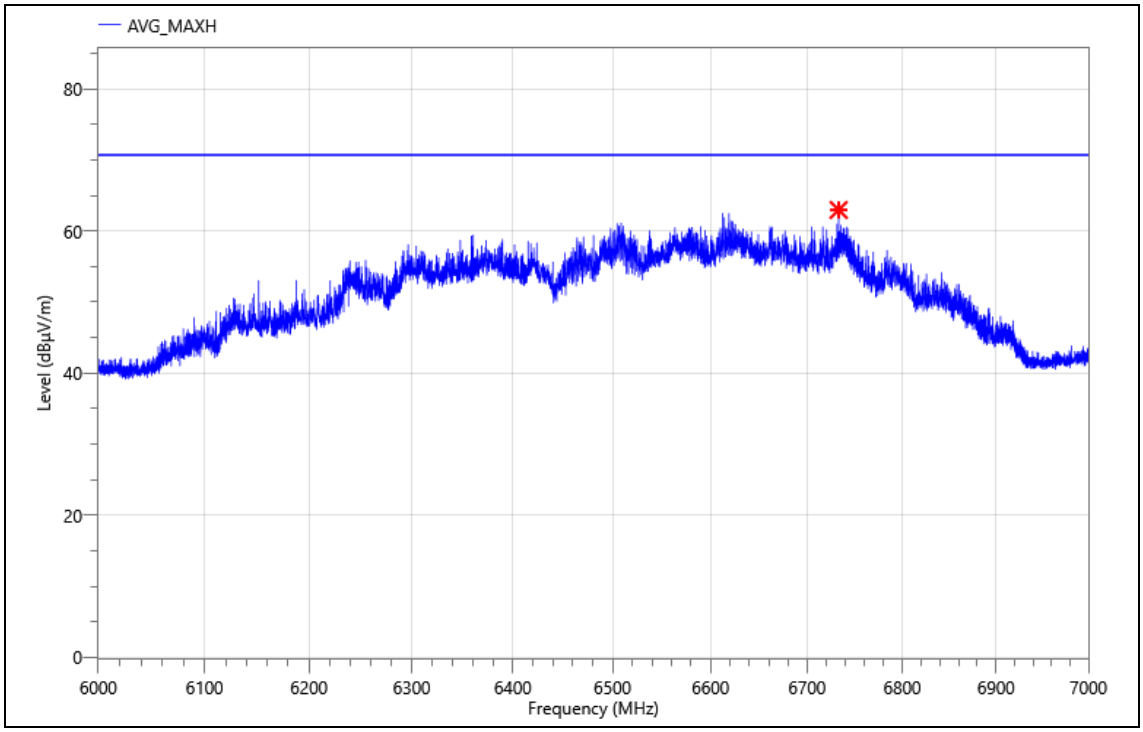
TEST ENVIRONMENT

Temperature	24.1°C	Relative Humidity	52%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

RESULTS

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/03
T/A/P	24.1℃/52%/101Kpa

Test Standard	FCC UWB 6 – 7GHz @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	6 – 7GHz	PK+	1 MHz	Auto

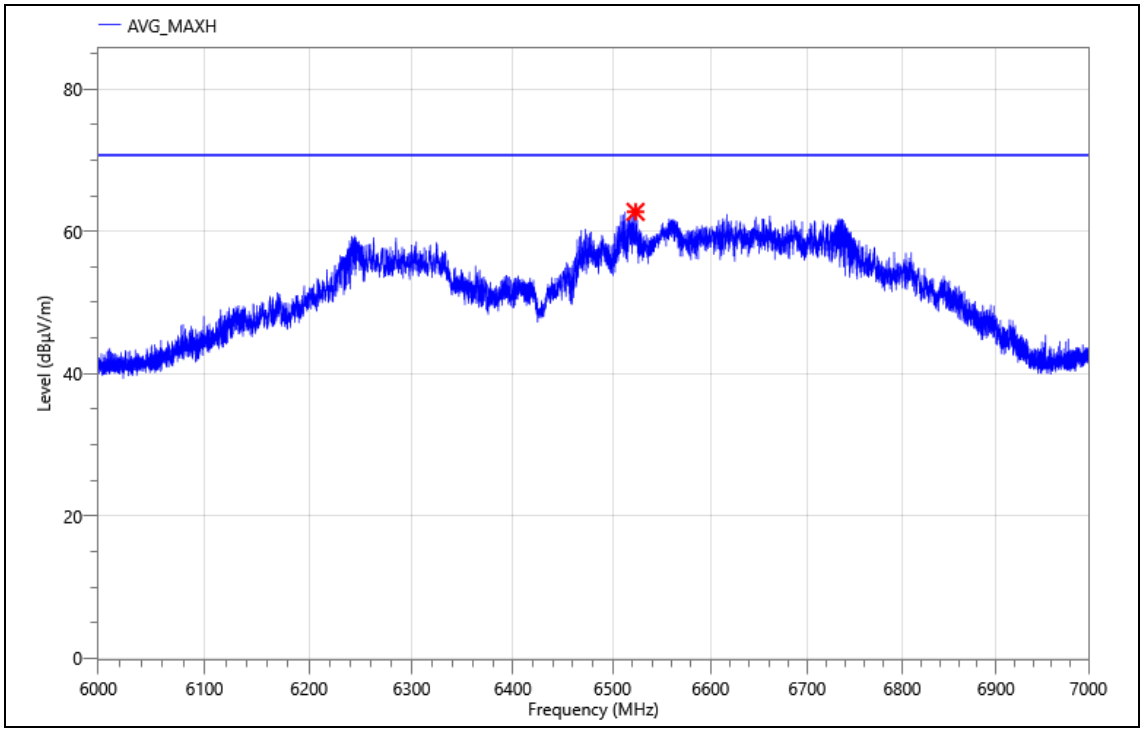


Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	6733.000	71.55	-8.58	62.97	70.74	7.77	AVG	V

Mode:	6489.6 MHz
Power:	DC 5V
TE:	Big
Date	2024/04/03
T/A/P	24.1℃/52%/101Kpa

Test Standard	FCC UWB 6 – 7GHz @ 1m				
Instrument	Device	Band	Detector	RBW	Time
FSV	Ant-3117-RX	6 – 7GHz	PK+	1 MHz	Auto



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Corr. (dB)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.	Pol.
1	6523.417	70.91	-8.17	62.74	70.74	8.00	AVG	H

Note:
1. 62.97 dBµV/m is 1m Test Results.
2. 62.97 dBµV/m - 20*log(3/1) = 62.97 – 9.54 =53.43 dBµV/m@ 3m
3. 53.43dBuV/m-95.2=-41.77dBm/1Mhz, -41.77dBm/1Mhz+34 = -7.77dBm/50MHz.

Limit is 0dBm/50MHz

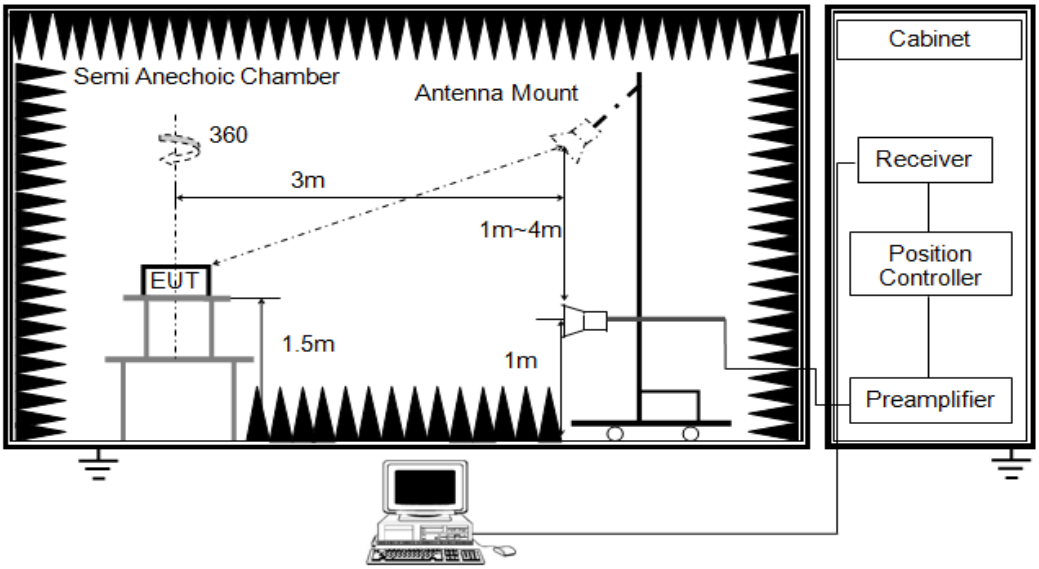
E(dBuV/m)@3m=P(dBm EIRP)+ 95.2
E(dBuV/m)@1m=E(dBuV/m)@3m+20*log(3/1)

9. 10dBc UWB BANDWIDTH

LIMITS

The UWB bandwidth of a UWB system operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.
At any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

TEST SETUP AND PROCEDURE



a) For the lowest frequency bound fL, the emission is searched from a frequency lower than fM that has, by inspection, a peak power much lower than 10 dB less than the power at fM and increased toward fM until the peak power indicates 10 dB less than the power at fM. The frequency of that segment is recorded.
b) This process is repeated for the highest frequency bound fH, beginning at a frequency higher than fM that has, by inspection, a peak power much lower than 10 dB below the power at fM. The frequency of that segment is recorded.
c) The two recorded frequencies represent the highest fH and lowest fL bounds of the UWB transmission, and the −10 dB bandwidth (B − 10) is defined as (fH − fL).82 The center frequency (fc) is mathematically determined from (fH − fL) / 2.
d) The fractional bandwidth is defined as 2(fH − fL) / (fH + fL).
e) Determine whether the −10 dB bandwidth (fH − fL) is ≥500 MHz, or whether the fractional bandwidth 2(fH − fL) / (fH + fL) is ≥0.2.

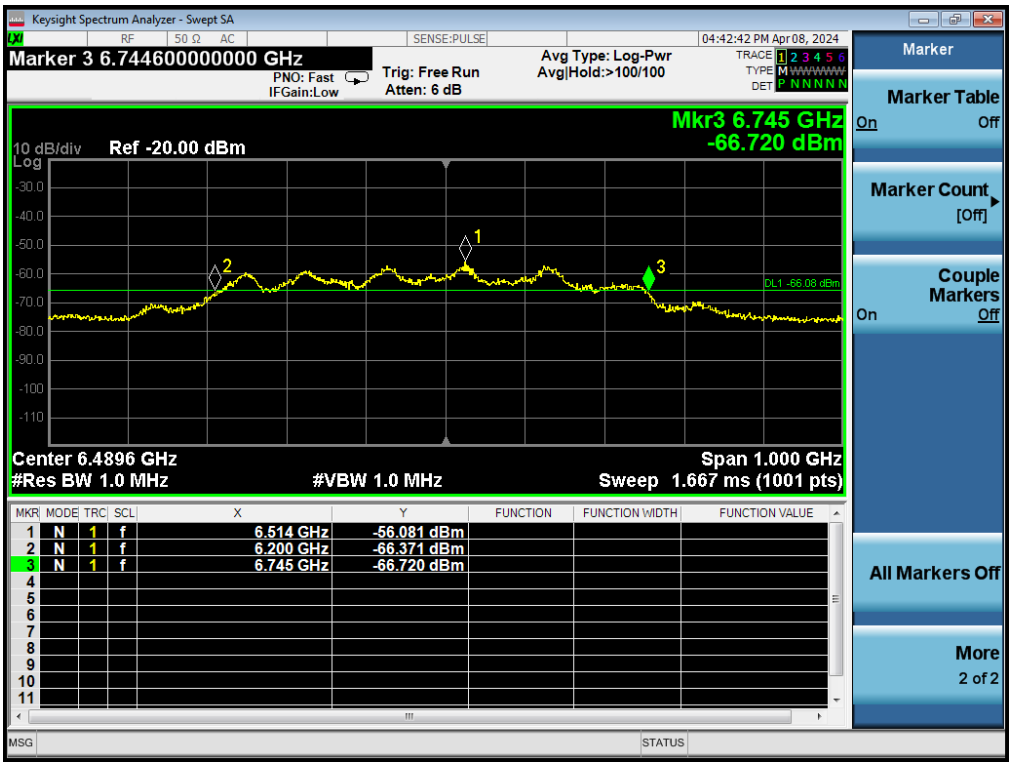
TEST ENVIRONMENT

Temperature	24.1°C	Relative Humidity	51%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

RESULTS

Test Channel	f_M (MHz)	f_L (MHz)	f_H (MHz)	-10dB Bandwidth (MHz)	f_C (MHz)	Limit	Result
CH5	6489.6	6200	6745	545	6472.5	-10dB Bandwidth≥500MHz	Pass

CH 5



10. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

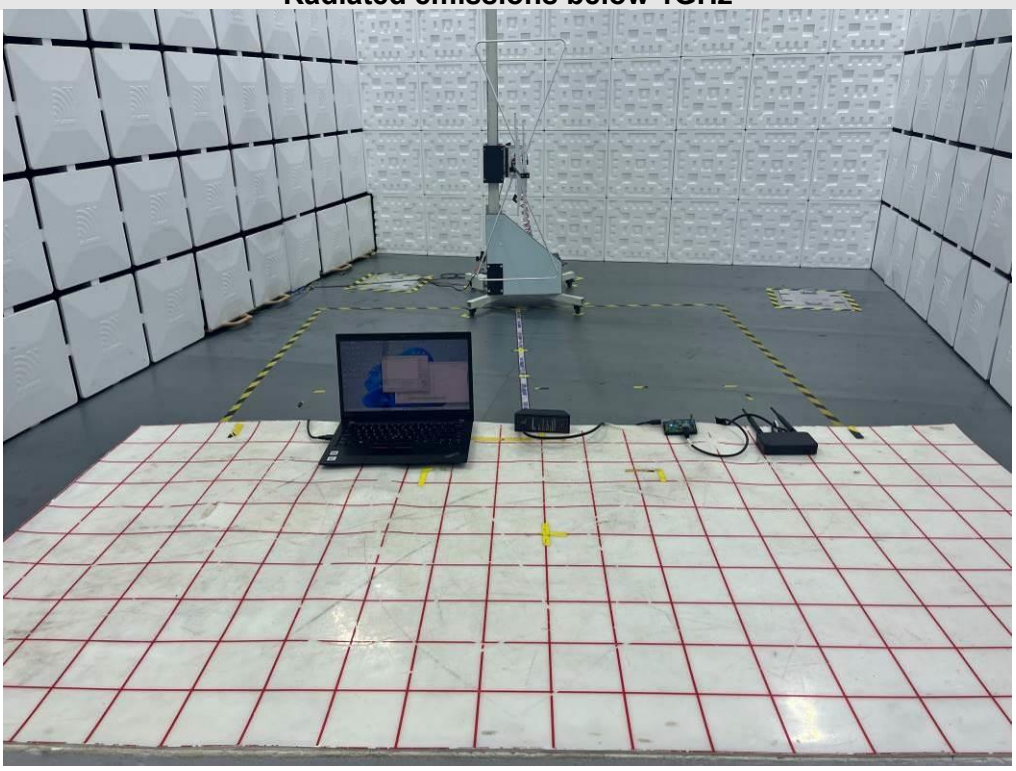
Please refer to FCC §15.203, ISED RSS-Gen Clause 6.3
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional 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.

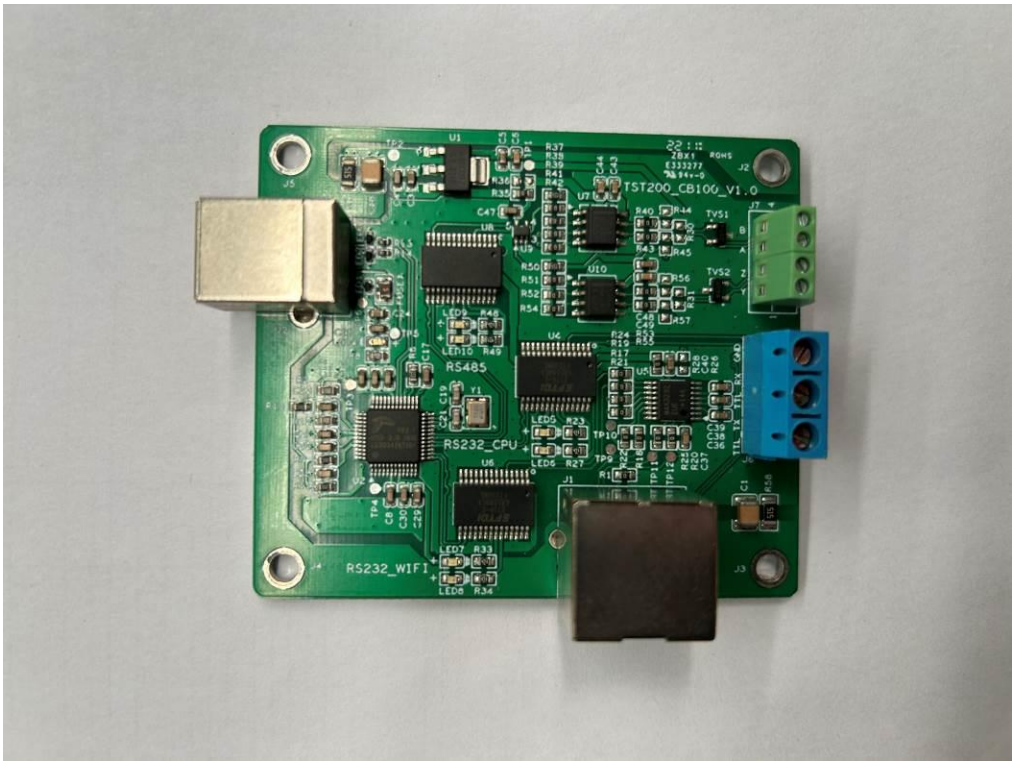
RESULTS

Complies

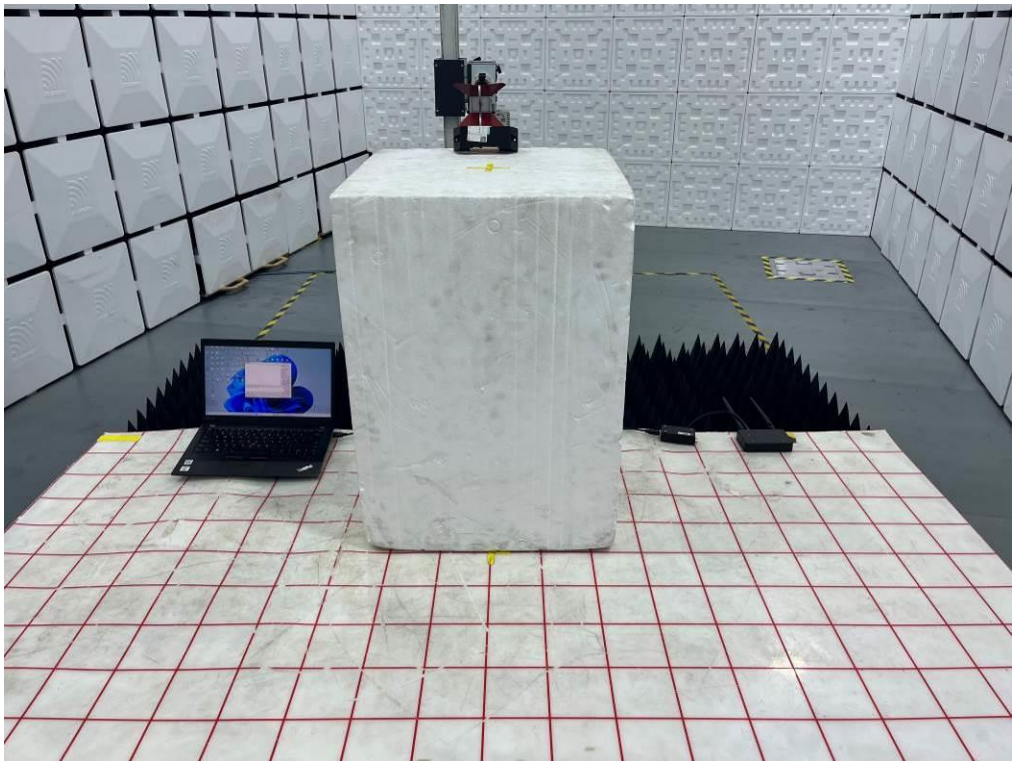
PHOTOGRAPHS OF TEST CONFIGURATION

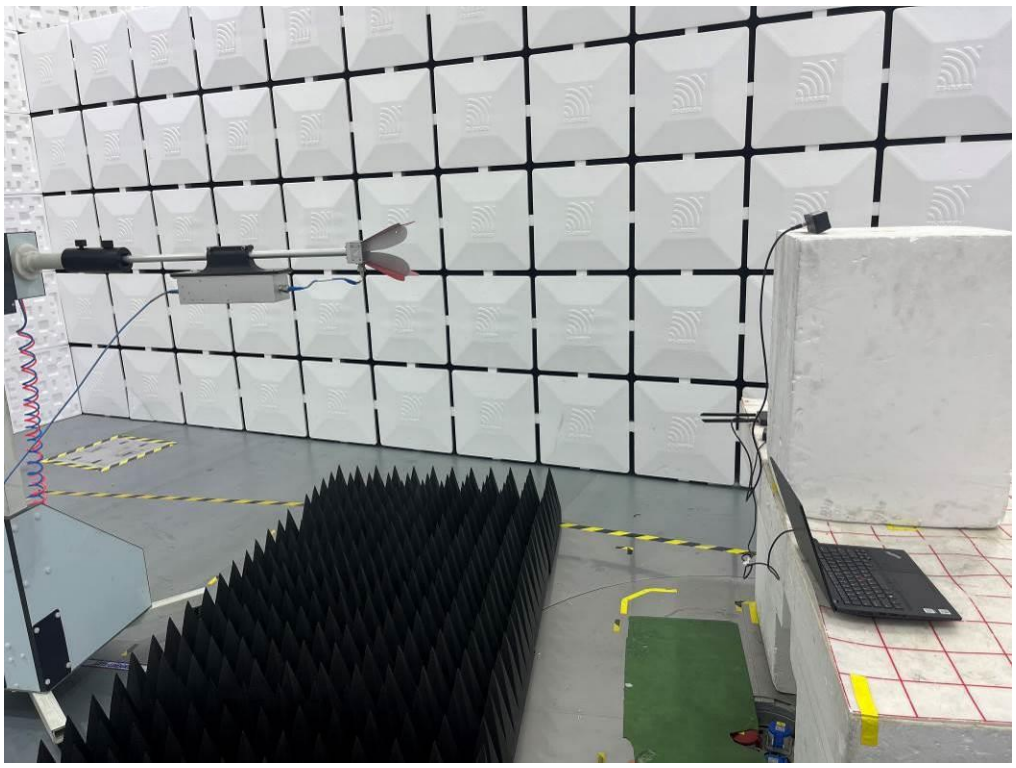
Radiated emissions below 1GHz





Radiated emissions above 1GHz





PHOTOGRAPHS OF EUT

Please refer to the report: E04A23080794F00801.

END OF REPORT