

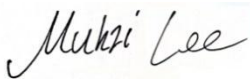






## RF Test Report

EUT : SAGA  
MODEL : OV1  
BRAND NAME :   
APPLICANT : OSOM Products Inc.  
Classification Of Test : N/A

**Shenzhen NTEK Testing Technology Co., Ltd.**

<b>Applicant</b>		Name: OSOM Products Inc. Address: 21701 Stevens Creek Blvd #2270, Cupertino, CA 95015, USA	
<b>Manufacturer</b>		Name: OSOM Products Inc. Address: 21701 Stevens Creek Blvd #2270, Cupertino, CA 95015, USA	
<b>Equipment Under Test</b>		Product Name: SAGA Model/Type: OV1 Brand Name:  Serial NO.: N/A Sample NO.:15-1	
Date of Receipt.	2022.09.13	Date of Testing	2022.09.13~2022.11.01
<b>Test Specification</b>		<b>Test Result</b>	
FCC Part 15, Subpart F, Section 15.519 RSS-220 Issue 1(2009-03) + A1(2018-07)		PASS	
<b>Evaluation of Test Result</b>	The equipment under test was found to comply with the requirements of the standards applied.  <b>Issue Date: 2022.11.01</b>		
Tested by:  Mukzi Lee Name      Signature	Reviewed by:  Cheng Jiawen Name      Signature	Approved by:  Alex Li Name      Signature	
<b>Other Aspects: NONE.</b>			
Abbreviations:OK, Pass= passed      Fail = failed      N/A= not applicable      EUT= equipment, sample(s) under tested			

This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of NTEK.

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**RELEASE CONTROL RECORD**

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
S22092102103002	Original release	2022.11.01

## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart F (Section 15.519), RSS-Gen , RSS-220				
FCC STANDARD SECTION	IC STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	RSS-Gen Issue 5 8.8	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.519(a)(1)	RSS-220 Issue 1 5.3.1(b)	Cease Transmission Time	PASS	Meet the requirement of limit.
15.503 15.521(e)	RSS-220 Issue 1 2	10dB bandwidth	PASS	Meet the requirement of limit.
-	RSS-Gen Issue 5 6.7	99 % Bandwidth	PASS	Meet the requirement of limit.
15.209(a) 15.519(c) 15.519(d) 15.521(b) 15.521(c) 15.521(d) 15.521(h)	RSS-220 Issue 1 3.4 5.3.1(d)(e)(f)	Radiated Emissions	PASS	Meet the requirement of limit.
15.519(e) 15.519(c) 15.521(a) 15.521(b) 15.521(g)	RSS-220 Issue 1 5.3.1(d)(g)	Maximum Peak Power and Average Emissions	PASS	Meet the requirement of limit.
15.203	RSS-Gen Issue 5 8.8	Antenna Requirement	PASS	No antenna connector isused

## 1.1 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
WIFI & Bluetooth Test System 1					/
Communication Shielded Room 1	4m*3m*3m	CRTDSWKS44301	VGDS-0699	CRT	2024/04/24
Spectrum Analyzer	FSV40	101580	DZ-000238-3	R&S	2023/06/05
Comprehensive Test Instrument	CMW270	100304	DZ-000240-1	R&S	2022/12/09
Analog Signal Generator	SMB100A	181858	DZ-000238-2	R&S	2023/06/05
Vector Signal Generator	SGT100A	111661	DZ-000238-1	R&S	2023/06/05
RF Radio Frequency Switch	JS0806-2	19H9080187		Tonscend	2023/06/06
Programmable DC Power Supply	E3644A	MY58036222	DZ-000178	KEYSIGHT	2023/04/21
Spectrum Analyzer	FSV40	101580	DZ-000238-3	R&S	2023/06/05
Radiation SpuriousTest System					/
3m Semi-Anechoic Chamber	FACT-4	ST08035	WKNA-0024	ETS	2024/12/12
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	2023/03/02
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2023/03/02
Broadband Antenna	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2023/06/25
Waveguide Horn Antenna	HF906	360306/008	WKNA-0024-8	R&S	2023/03/04
Waveguide Horn Antenna	BBHA9170	00949	DZ-000209-2	SCHWARZBECK	2023/07/31
Preamplifier	BBV 9721	9721-050	DZ-000209-1	SCHWARZBECK	2023/06/05
5G Bandstop Filters	WRCJV12-4900-5100-5900-6100-50EE	1	DZ-000186	WI	2022/12/20
Comprehensive tester	CMW500	159000	DZ-000240-2	R&S	2022/12/20
Conducted emission					/
EMI Test Receiver	ESCI	100857	WKNB-0081	R&S	2022-12-08
EMI Test Receiver	ESR3	102394	VG DY-0705	R&S	2023-03-04
LISN	NSLK 8127	8127644	VG DY-0150	SCHWARZBECK	2023-09-04
LISN	NSLK 8128	8128-316	VG DY-0149	SCHWARZBECK	2023-09-04
LISN	NSLK 8129	8129-268	EM-000388	SCHWARZBECK	2023-03-03
Plus Limiter ( #1 )	VTSD 9561 F-N	00515	VG DY-0808	SCHWARZBECK	2023-03-04
Plus Limiter ( #2 )	VTSD 9561	9561-F017	VG DY-0152	SCHWARZBECK	2024-09-04
Impedance Stabilization Network	ISN T800	27095	WKNE-0195	TESEQ	2023-09-04
Impedance Stabilization Network	NTFM8158	8158-0092	VG DY-0356	SCHWARZBECK	2023-06-07
ImpedanceStabilizationNetwork	NTFM8131	#184	EM-000498	SCHWARZBECK	2023-06-07
Voltage Probe	TK9420	9420-499	VG DY-0128	SCHWARZBECK	2023-03-04
Power Divider	4901.17.B	22643830	DB-0016	HUBER+SUHNER	2023-09-01
Video Signal Generator	GV-798+	151064920001	VGDS-0215	PROMAX	2023-05-30
AudioSignalGenerator	GAG-810	EK871591	EM-000309	GW	2022-12-08
Shielding Room(#1)	GP1A	001	WKNF-0001	LEINING	2024-08-08

## 1.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

No.	ITEM	FREQUENCY	UNCERTAINTY
1	Radiated Spurious Emissions	9KHz ~ 30MHz	±0.769dB
		30MHz ~ 1GMHz	±0.877dB
		1GHz ~ 18GHz	±0.777dB
		18GHz ~ 40GHz	±1.315dB
2	Conducted Emissions	9kHz~30MHz	±2.66dB

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

## 1.3 TEST LOCATION

The tests and measurements refer to this report were performed by EMC testing Lab. of Shenzhen NTEK Testing Technology Co., Ltd.

Address: 1/F, Building E, Fenda Science Park, Sanwei Community,Xixiang Street Bao'an District, Shenzhen 518126 P.R. China

Post Code: 518126 Tel: 400-800-6106, 0755-2320 0050, 0755-2320 0090


Website: <http://www.ntek.org.cn>

Test Firm Registration Number: 463705

CN Number: 9270A Wireless Test Site Registration Number: CN1184

## 2 GENERAL INFORMATION

### 2.1 GENERAL PRODUCT INFORMATION

PRODUCT	SAGA
BRAND	
TEST MODEL	OV1
ADDITIONAL MODEL	N/A
FCC ID	2AW49200731A
IC ID	26394-200731A
POWER SUPPLY	DC 3.89 from Battery or USB host unit
MODULATION TYPE	BPM/BPSK
OPERATING FREQUENCY	See section 2.2
NUMBER OF CHANNEL	2
ANTENNA TYPE (Note 3)	ANT 1: Patch Antenna, with -2.50dBi gain ANT 2: Patch Antenna, with -5.76dBi gain ANT 3: Patch Antenna, with -3.27dBi gain
I/O PORTS	Refer to user's manual
HARDWARE REVISION	MP
SOFTWARE REVISION	SQ3A.220705.126
CABLE SUPPLIED	USB line, 1.2 Meter, Shielded without ferrite
<p>Note:</p> <ol style="list-style-type: none"> <li>For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.</li> <li>For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.</li> <li>Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, NTEK is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion</li> <li>EUT photo refer to the report (Report NO.: FCC2022-0064-E).</li> <li>According to 15.519(a), antennas mounted on outdoor structures such, as antennas mounted on the outside of a building or on a telephone pole or any fixed outdoors infrastructure are prohibited for use with this device.</li> <li>According to 15.521(a), UWB devices may not be employed for the operation of toys. Operation onboard aircraft, a ship or a satellite is prohibited.</li> </ol>	



## 2.2 OTHER INFORMATION

The EUT only have one channel.

CHANNEL	FREQUENCY (MHz)	CHANNEL	FREQUENCY (MHz)
5	6489.6	9	7987.2

## 2.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports  
The worst case was found when positioned on Xaxis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

TEST MODE			
MODE	UWB ANT	CHANNEL	PREAM_LEN
1	1	9	128
2	2	5	128
3	3	9	128

EUT CONFIGURE MODE	APPLICABLE TO						DESCRIPTION
	RE ≥ 1G	RE < 1G	PLC	BW	MP	CTT	
1-6	√	√	√	√	√	√	DC 3.89V from Battery

Where **RE ≥ 1G**: Radiated Emission above 1GHz      **RE < 1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **BW**: 10dB Bandwidth measurement  
**MP**: Maximum Peak Power and Average Emissions  
**CTT**: Cease Transmission Time

### TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	23deg. C, 53%RH	DC 3.89V from Battery	Liu Shiwei
RE≥1G	23deg. C, 53%RH	DC 3.89V from Battery	Liu Shiwei
PLC	23deg. C, 53%RH	DC 5V from Adapter	Liu Shiwei
BW	20deg. C, 55%RH	DC 3.89V from Battery	Liu Shiwei
MP	23deg. C, 53%RH	DC 3.89V from Battery	Liu Shiwei
CTT	23deg. C, 53%RH	DC 3.89V from Battery	Liu Shiwei

## 2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

**FCC PART 15, SUBPART F, SECTION 15.519**

**RSS-220 ISSUE 1(2009-03) + A1(2018-07)**

**ANSI C63.10-2013**

All test items have been performed and recorded as per the above standards

## 2.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support Equipment							
NO	Description	Brand	Model No.	Serial Number	Supplied by		
N/A	N/A	N/A	N/A	N/A	N/A		
Support Cable							
NO	Description	Quantity (Number)	Length (m)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

### 3 TEST TYPES AND RESULTS

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 Limit

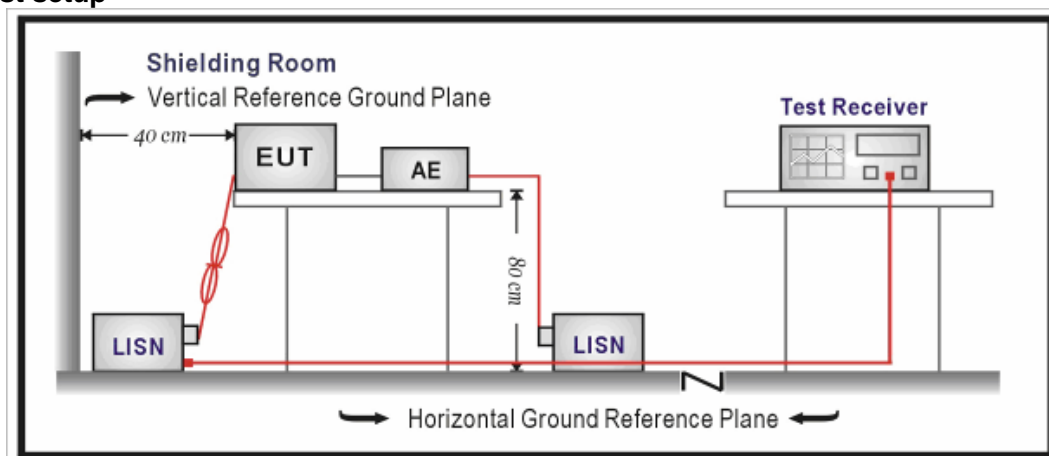
Frequency (MHz)	Conducted Limits(dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.  
NOTE: 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

##### 3.1.2 Measurement procedure

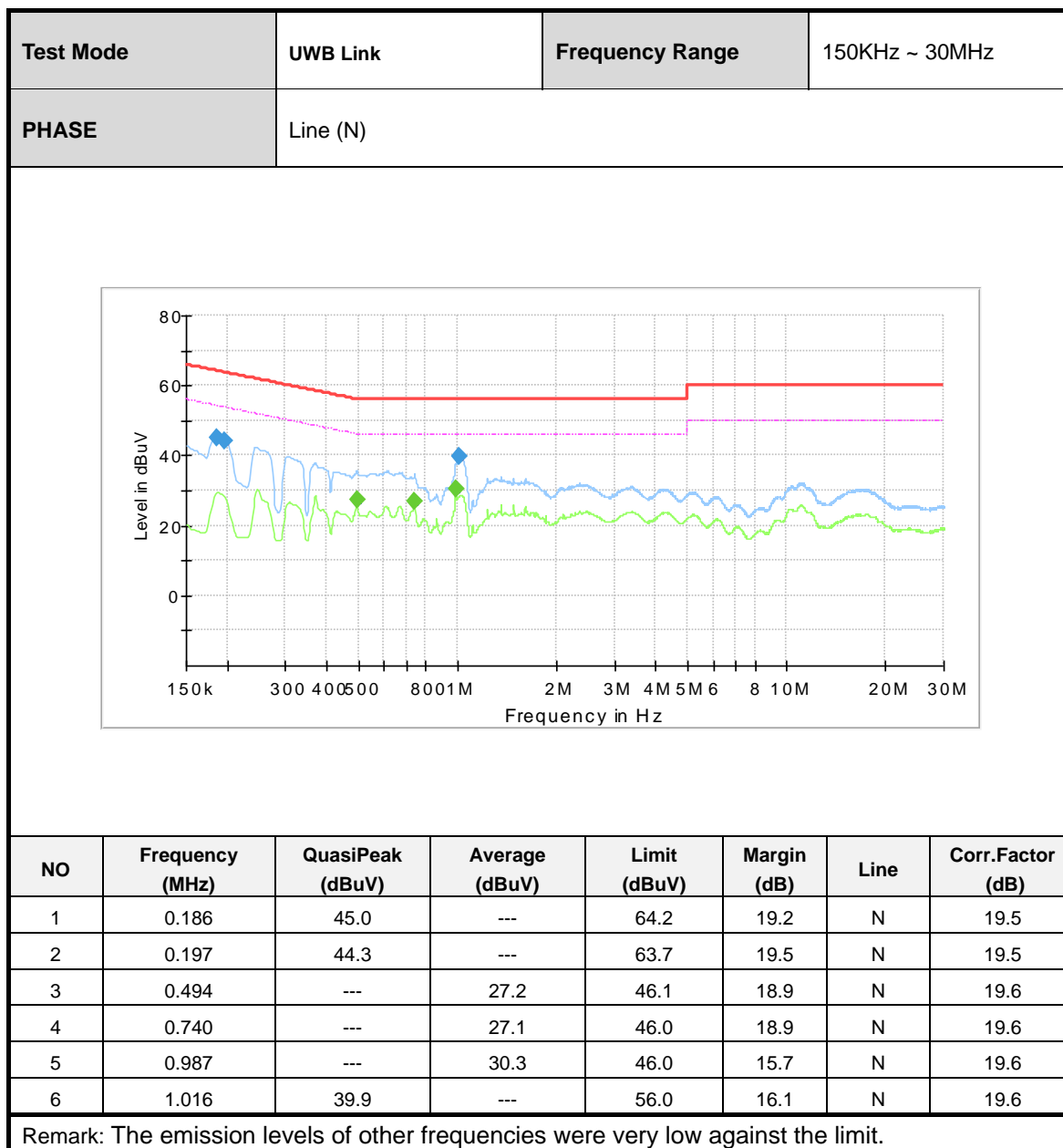
- The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the Test photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The equipment under test shall be placed on a support of non-metallic material, the height of which shall be 1.5m above the ground,
- The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

##### 3.1.3 Test setup



### 3.1.4 Test results





## 3.2 RADIATED EMISSIONS

### 3.2.1 Limits-FCC

- (a) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/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

**NOTE:**

- The lower limit shall apply at the transition frequencies.
  - Emission level (dBuV/m) = 20 log Emission level (uV/m).
- (b) The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-10600	-41.3
Above 10600	-61.3

- (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

### 3.2.2 Limits-IC

- (a) Radiated emissions at or below 960 MHz for all subclasses of UWB device shall not exceed the following limits. Measurements of radiated emissions at and below 960 MHz are to be made using a CISPR quasi-peak detector. CISPR measurement bandwidth specifications are to be used.

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	E.i.r.p. (dBmW)
0.009 ~ 0.490	2,400/F (F in kHz)	300	10 log (17.28 / F2) (F in kHz)
0.490 ~ 1.705	24,000/F (F in kHz)	30	10 log (17.28 / F2) (F in kHz)
1.705 ~ 30.0	30	30	-45.7
30 ~ 88	100	3	-55.2
88 ~ 216	150	3	-51.7
216 ~ 960	200	3	-49.2

**NOTE:**

3. The lower limit shall apply at the transition frequencies.
4. Emission level (dBuV/m) = 20 log Emission level (uV/m).

- (b) Radiated emissions above 960 MHz from a device shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

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	-61.3 dBm

- (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	E.i.r.p. in a Resolution Bandwidth of no less than 1 kHz
1 164-1 240 MHz	-85.3 dBm
1 559-1 610 MHz	-85.3 dBm

### 3.2.3 Measurement procedure

- a. The EUT was placed on the top of a rotating table 1.5 meters(above 1GHz) and 0.8 meters(below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- g. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

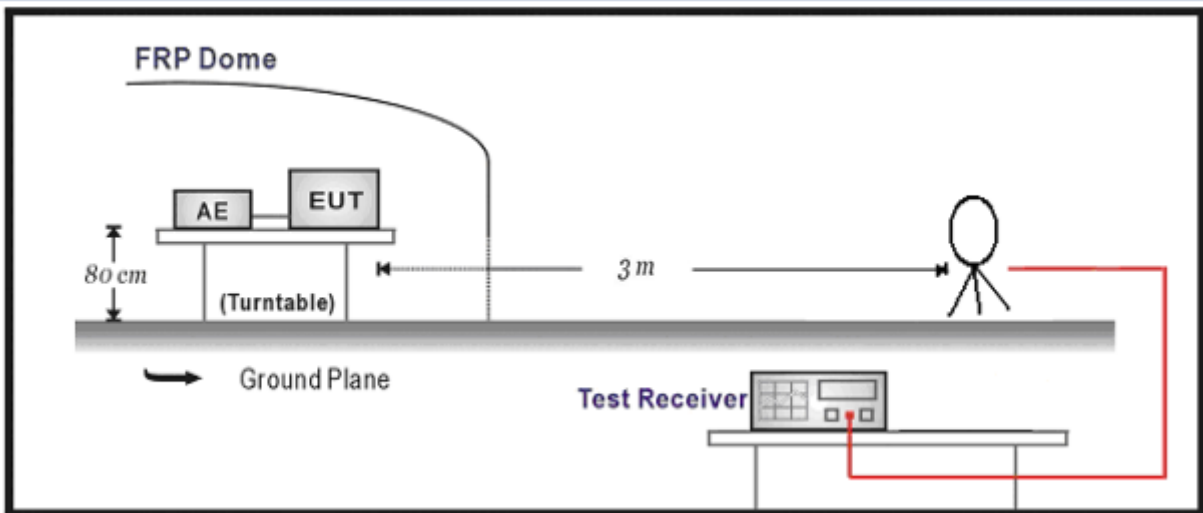
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

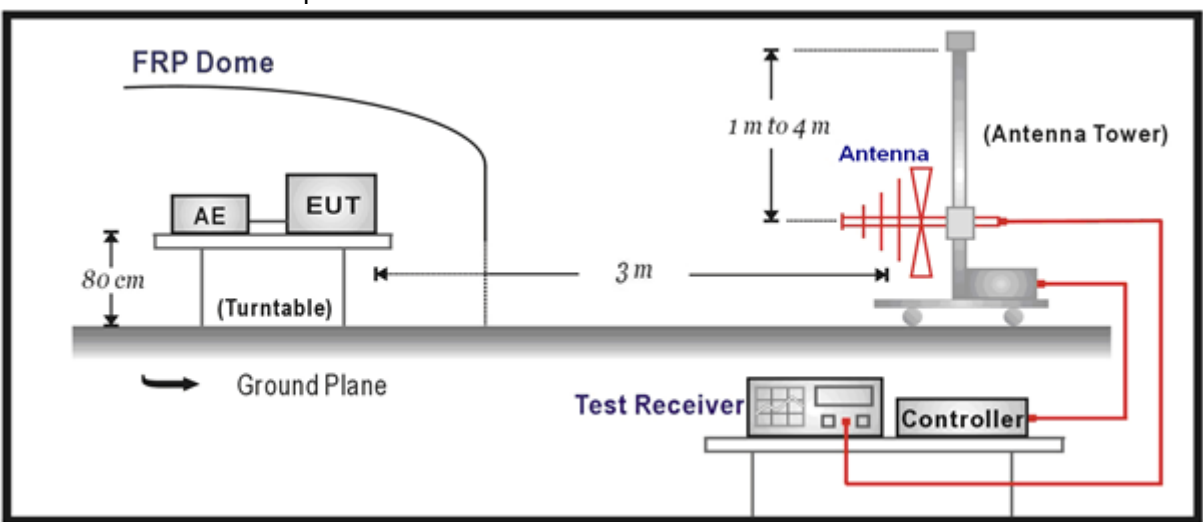


### 3.2.4 Test setup

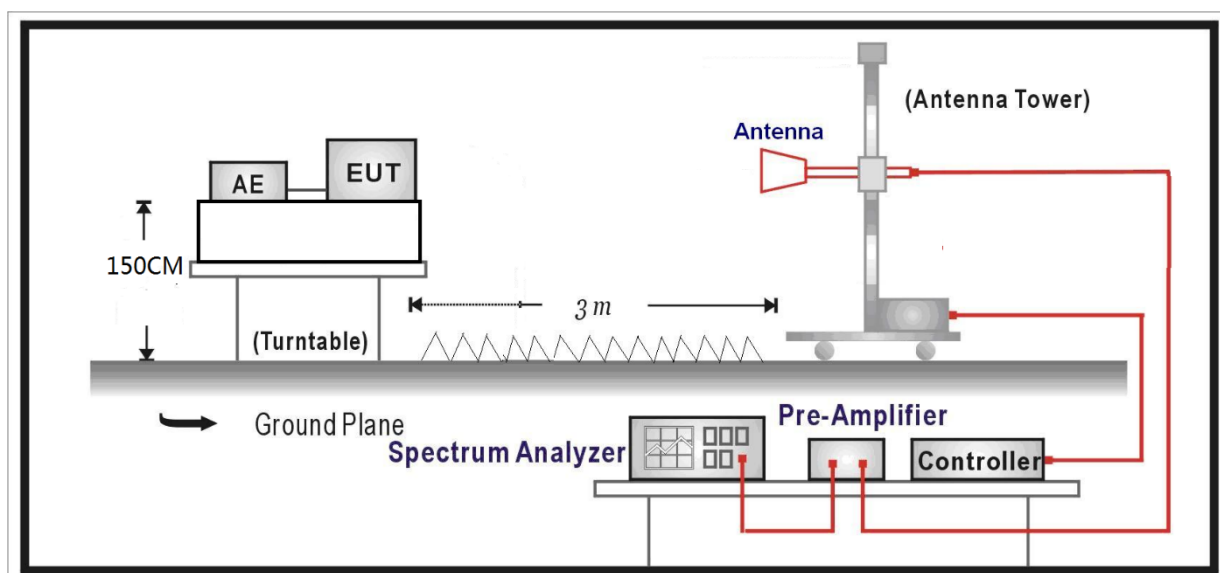
Below 30MHz Test Setup:



Below 960MHz Test Setup:

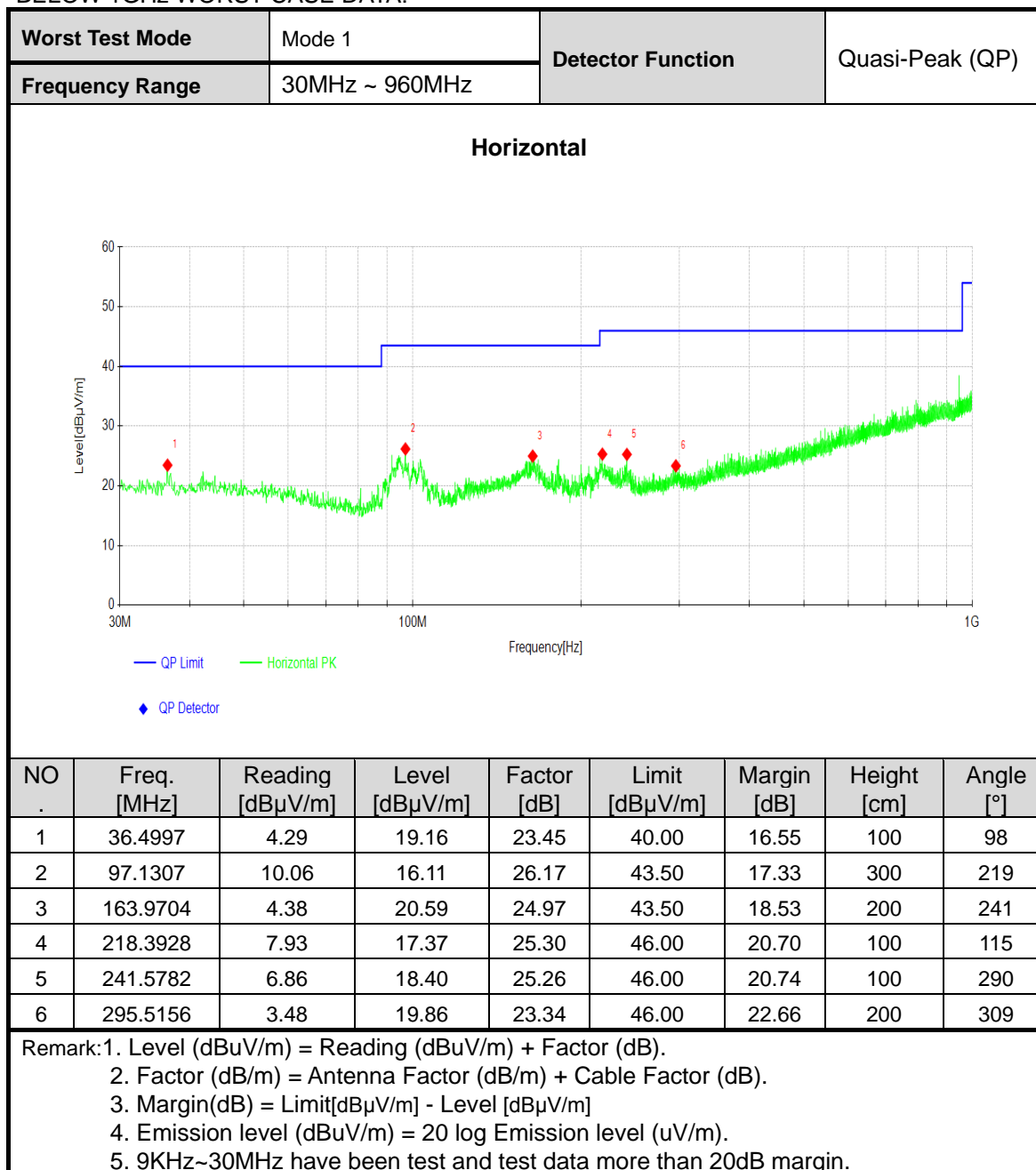


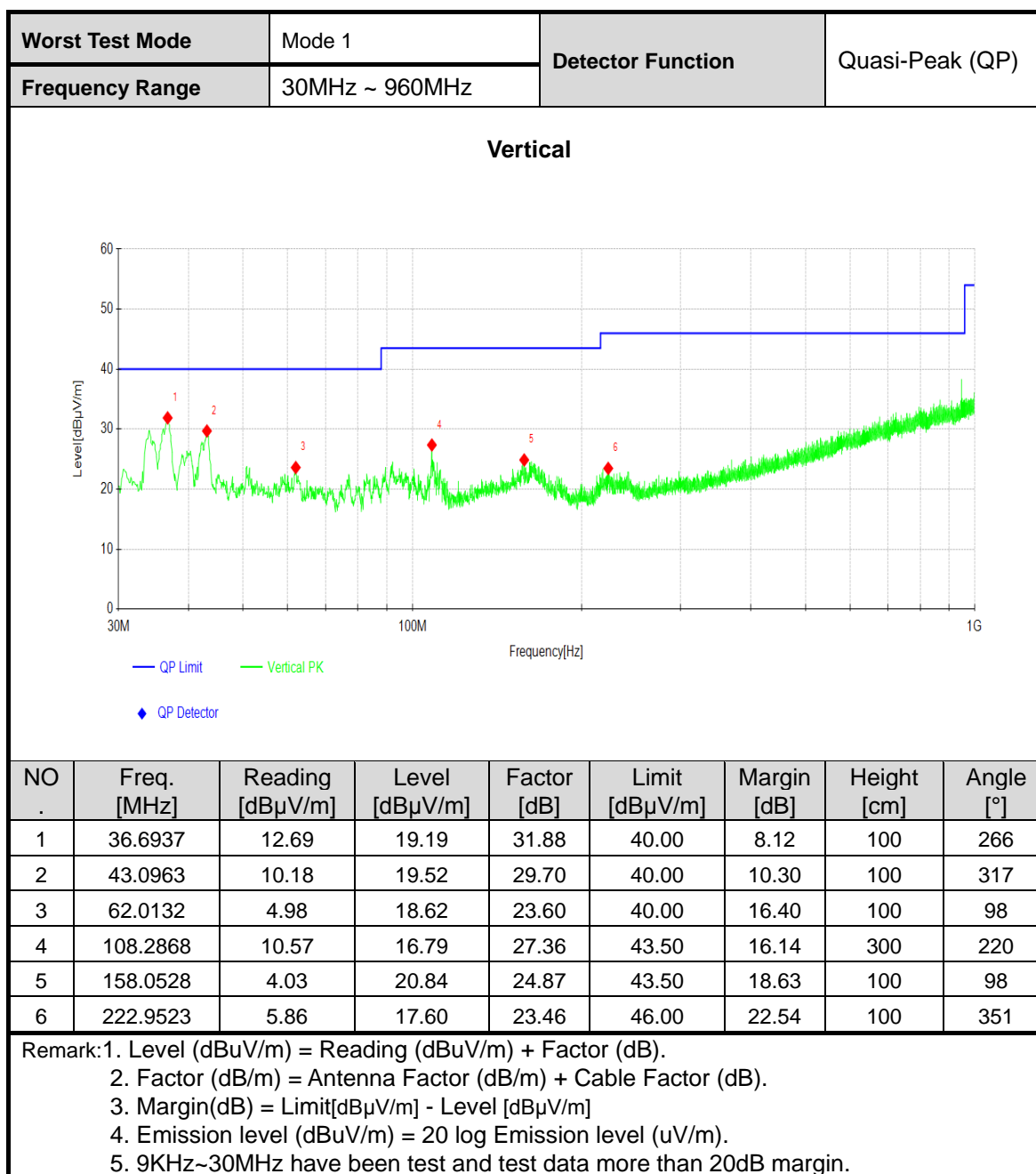
Above 960MHz Test Setup:



### 3.2.5 Test results

BELOW 1GHz WORST-CASE DATA:





## Radiated Emissions above 960 MHz:

Channel		CH 9 ANT1		Frequency		7987.2MHz		
Frequency Range		Above 1G						
Horizontal								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1567.7636	-95.57	-97.22	-85.30	11.92	-1.65	20	Horizontal
2	1177.8804	-95.52	-98.48	-85.30	13.18	-2.96	80	Horizontal
3	1920.2345	-79.94	-78.87	-70.00	8.87	1.07	20	Horizontal
4	2219.9255	-81.06	-76.43	-70.00	6.43	4.63	10	Horizontal
5	3480.6725	-78.36	-72.77	-70.00	2.77	5.59	250	Horizontal
6	23961.6000	-67.10	-82.64	-61.30	21.34	-15.54	200	Horizontal
7	31948.8000	-63.94	-78.87	-61.30	17.57	-14.93	140	Horizontal
8	39936.0000	-64.17	-71.02	-61.30	9.72	-6.85	110	Horizontal
Vertical								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1567.5187	-93.17	-95.13	-85.30	9.83	-1.96	20	Vertical
2	1177.3331	-98.85	-102.56	-85.30	17.26	-3.71	20	Vertical
3	1801.3805	-80.11	-79.96	-70.00	9.96	0.15	110	Vertical
4	2314.817	-81.15	-76.46	-70.00	6.46	4.69	180	Vertical
5	3529.2365	-82.35	-75.90	-70.00	5.90	6.45	10	Vertical
6	15974.4000	-89.91	-65.62	-61.30	4.32	24.29	110	Vertical
7	23961.6000	-67.38	-82.79	-61.30	21.49	-15.41	260	Vertical
8	31948.8000	-63.99	-78.60	-61.30	17.30	-14.61	200	Vertical
9	39936.0000	-63.50	-69.93	-61.30	8.63	-6.43	50	Vertical
Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]								

Channel		CH 5 ANT2		Frequency		6489.6MHz		
Frequency Range		Above 1G						
Horizontal								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1200.0920	-89.71	-91.70	-85.30	6.40	-1.99	20	Horizontal
2	1584.4643	-94.92	-97.12	-85.30	11.82	-2.20	20	Horizontal
3	1956.977	-80.73	-77.97	-70.00	7.97	2.76	170	Horizontal
4	2433.671	-81.47	-76.35	-70.00	6.35	5.12	240	Horizontal
5	3520.61	-81.76	-76.01	-70.00	6.01	5.75	0	Horizontal
6	12957.2000	-89.74	-68.34	-61.30	7.04	21.40	20	Horizontal
7	19435.8000	-67.77	-88.93	-61.30	27.63	-21.16	170	Horizontal
8	26914.4000	-67.69	-84.83	-61.30	23.53	-17.14	80	Horizontal
9	32393.0000	-60.98	-79.14	-61.30	17.84	-18.16	360	Horizontal
Vertical								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1200.0920	-90.51	-94.18	-85.30	8.88	-3.67	140	Vertical
2	1582.0158	-94.29	-95.96	-85.30	10.66	-1.67	20	Vertical
3	1848.347	-80.23	-79.02	-70.00	9.02	1.21	210	Vertical
4	2324.402	-81.36	-76.61	-70.00	6.61	4.75	10	Vertical
5	3326.993	-81.00	-75.07	-70.00	5.07	5.93	210	Vertical
6	12957.2000	-91.18	-69.88	-61.30	8.58	21.30	360	Vertical
7	19435.8000	-67.53	-88.41	-61.30	27.11	-20.88	350	Vertical
8	26914.4000	-68.17	-85.21	-61.30	23.91	-17.04	290	Vertical
9	32393.0000	-61.72	-79.23	-61.30	17.93	-17.51	20	Vertical
Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]								

Channel		CH 9 ANT3		Frequency		7987.2MHz		
Frequency Range		Above 1G						
Horizontal								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1177.8804	-95.52	-98.48	-85.30	13.18	-2.96	80	Horizontal
2	1601.9200	-94.32	-96.87	-85.30	11.57	-2.55	20	Horizontal
3	1825.6625	-80.76	-81.94	-70.00	11.94	-1.18	10	Horizontal
4	2582.2385	-80.13	-77.16	-70.00	7.16	2.97	90	Horizontal
5	3359.9015	-81.55	-75.85	-70.00	5.85	5.70	230	Horizontal
6	23961.6000	-67.61	-83.15	-61.30	21.85	-15.54	260	Horizontal
7	31948.8000	-64.18	-79.11	-61.30	17.81	-14.93	260	Horizontal
8	39936.0000	-63.98	-70.83	-61.30	9.53	-6.85	360	Horizontal
Vertical								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Angle [°]	Polarity
1	1227.8680	-98.99	-102.08	-85.30	16.78	-3.09	20	Vertical
2	1598.1350	-95.26	-96.43	-85.30	11.13	-1.17	20	Vertical
3	1801.061	-78.70	-78.55	-70.00	8.55	0.15	180	Vertical
4	2537.828	-80.84	-77.24	-70.00	7.24	3.60	180	Vertical
5	3553.5185	-82.21	-75.39	-70.00	5.39	6.82	110	Vertical
6	23961.6000	-67.51	-82.92	-61.30	21.62	-15.41	350	Vertical
7	31948.8000	-64.20	-78.81	-61.30	17.51	-14.61	320	Vertical
8	39936.0000	-63.95	-70.38	-61.30	9.08	-6.43	320	Vertical
Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]								

### 3.3 10dB BANDWIDTH

#### 3.3.1 LIMIT -FCC

FCC 15.503(d) 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.

FCC 15.519(3)(b) The UWB bandwidth of a device operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.

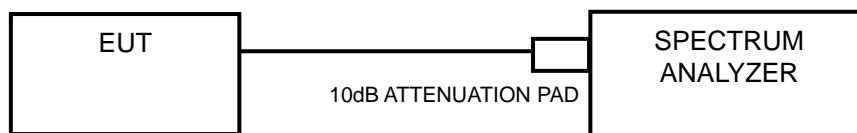
#### 3.3.2 LIMIT -IC

A UWB device is an intentional radiator that has either a -10 dB bandwidth<sup>1</sup> of at least 500 MHz or a -10 dB fractional bandwidth<sup>2</sup> greater than 0.2. There are eight distinct subclasses of UWB device.

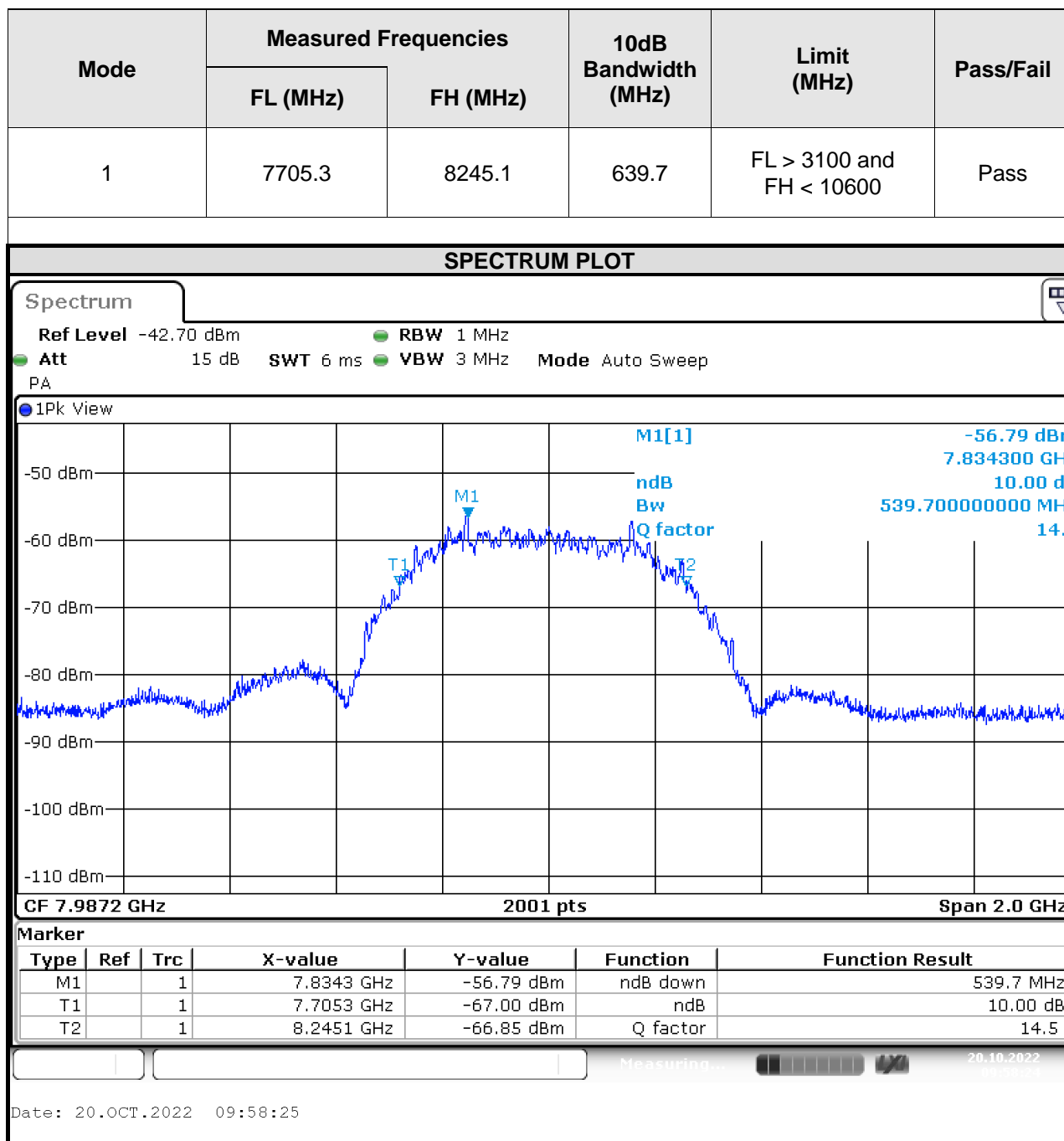
#### 3.3.3 TEST PROCEDURES

1. Set the centre frequency of the channel under test
2. Set resolution bandwidth (RBW) = 1MHz
3. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 10 dB relative to the maximum level measured in the fundamental emission.

#### 3.3.4 TEST SETUP

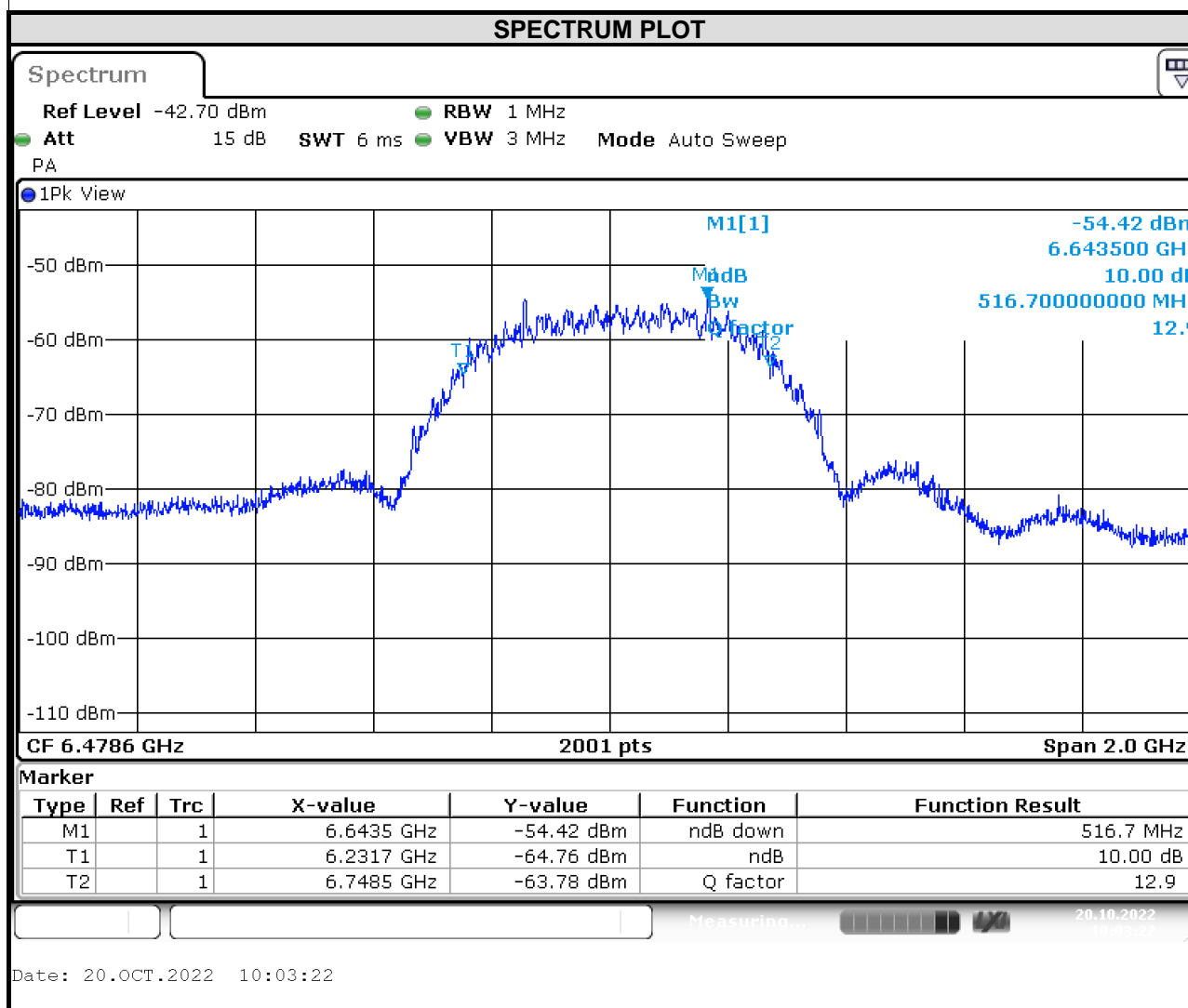


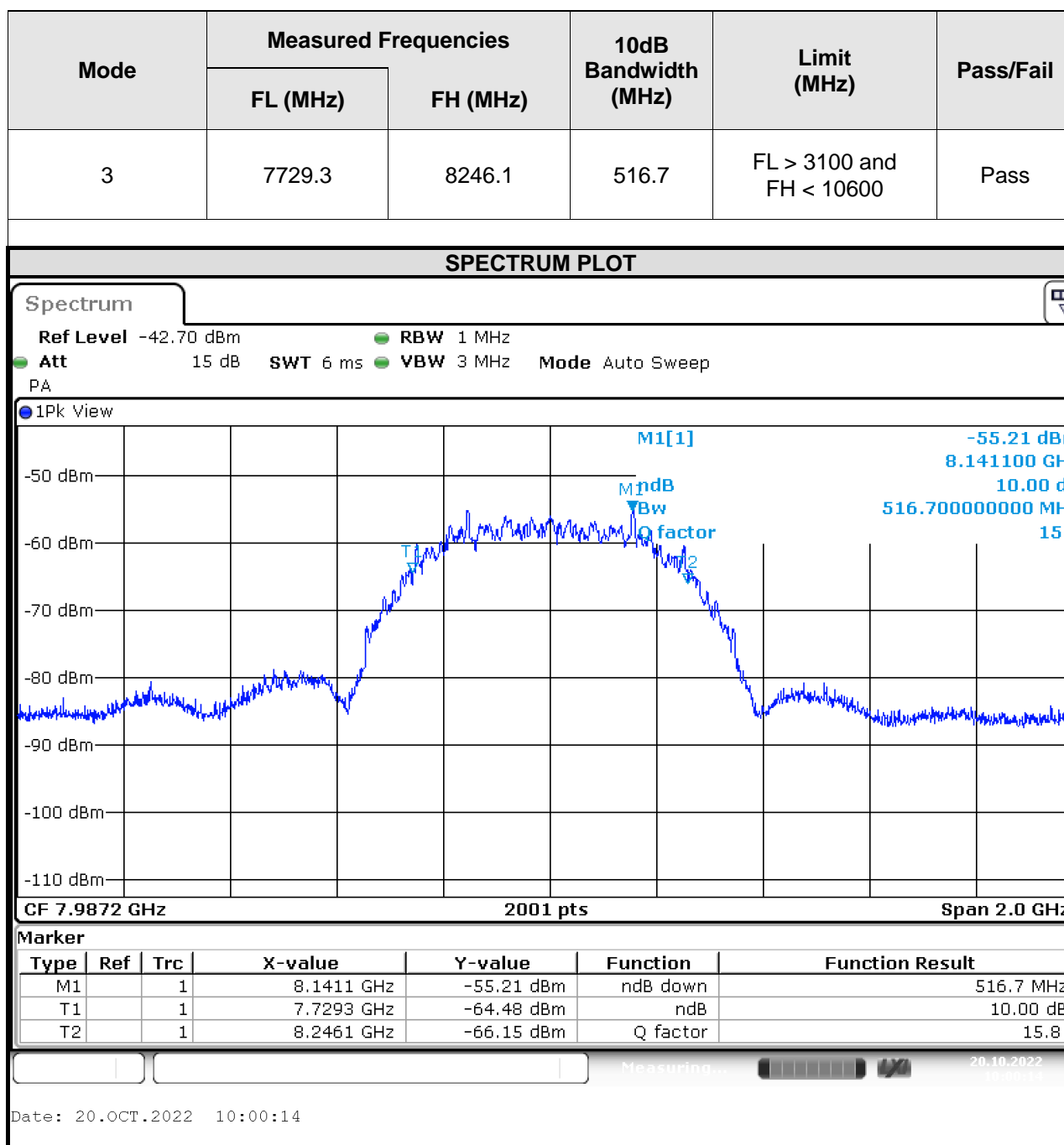
### 3.3.5 TEST RESULTS





Mode	Measured Frequencies		10dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
	FL (MHz)	FH (MHz)			
2	6231.7	6748.5	516.7	FL > 3100 and FH < 10600	Pass





### 3.4 99% OCCUPIED BANDWIDTH

#### 3.4.1 LIMIT

Only report

#### 3.4.2 Measurement procedure

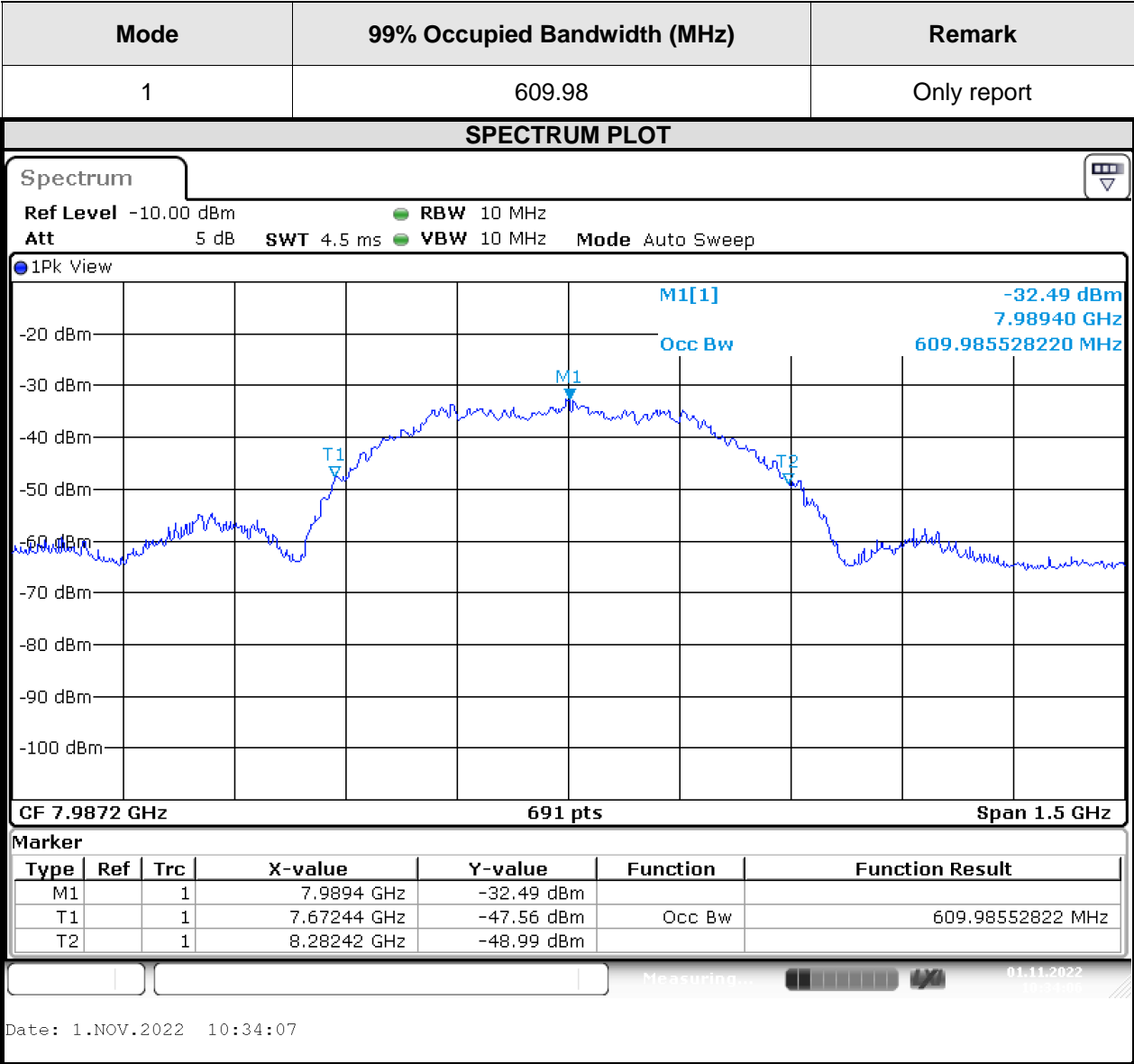
The transmitter antenna output was connected to the spectrum analyzer through an attenuator. The resolution bandwidth shall be set to the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

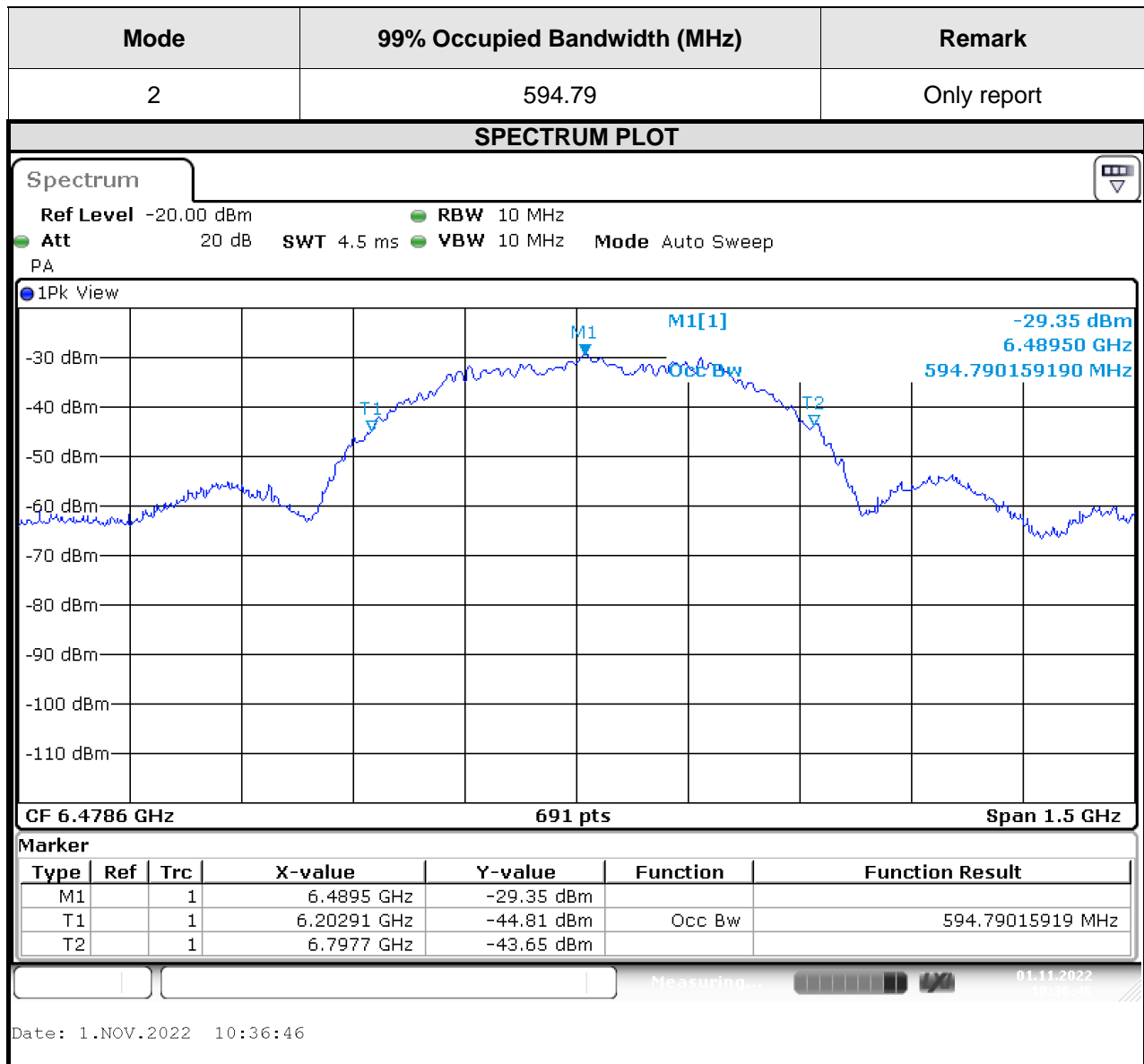
below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

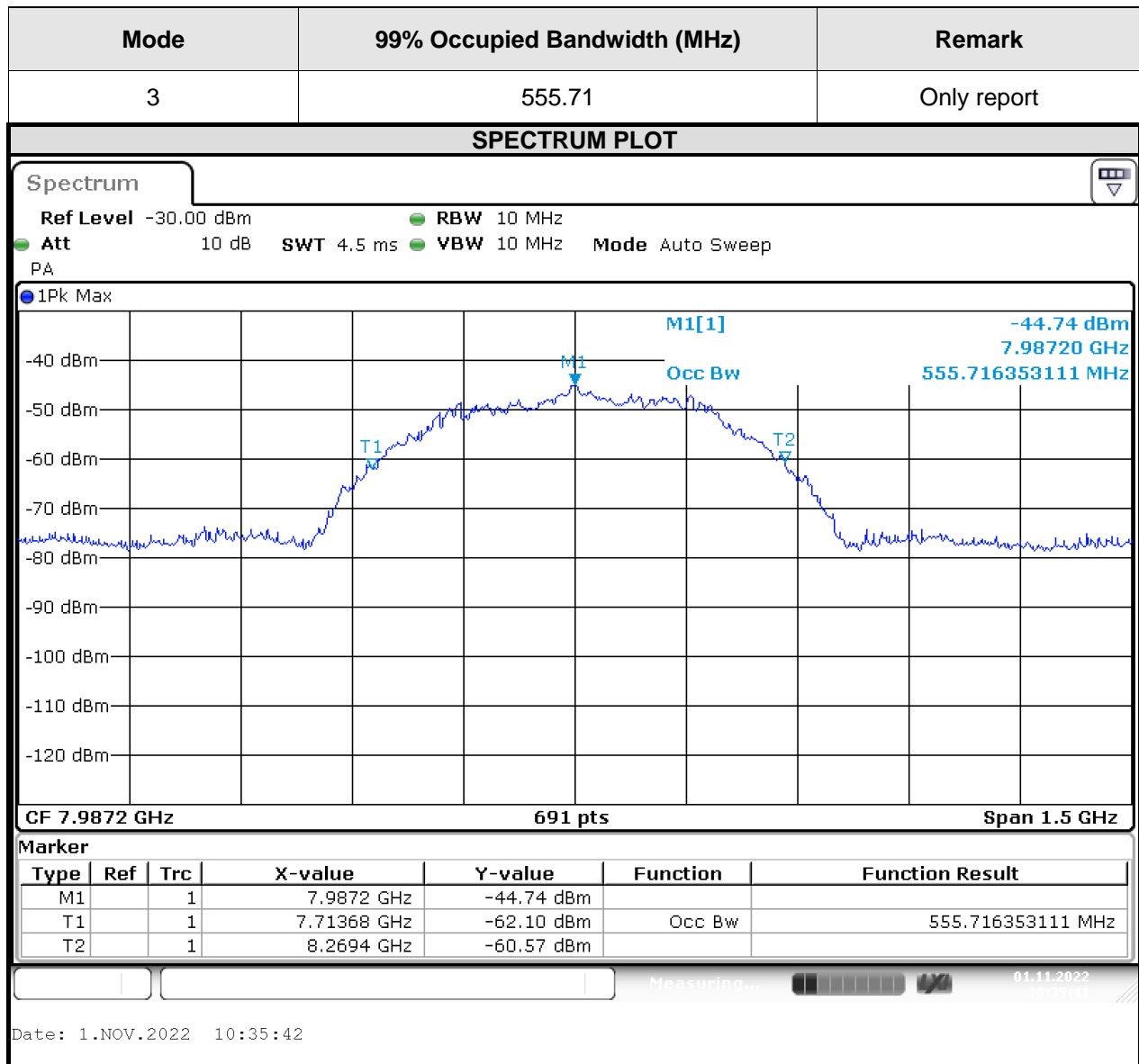
#### 3.4.3 TEST SETUP



3.4.4 TEST RESULTS







### 3.5 Maximum Peak Power and Average Emissions

#### 3.5.1 LIMITS

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.

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  $E(\text{dBuV/m}) = P(\text{dBm EIRP}) + 95.2$ .

#### 3.5.2 TEST PROCEDURE

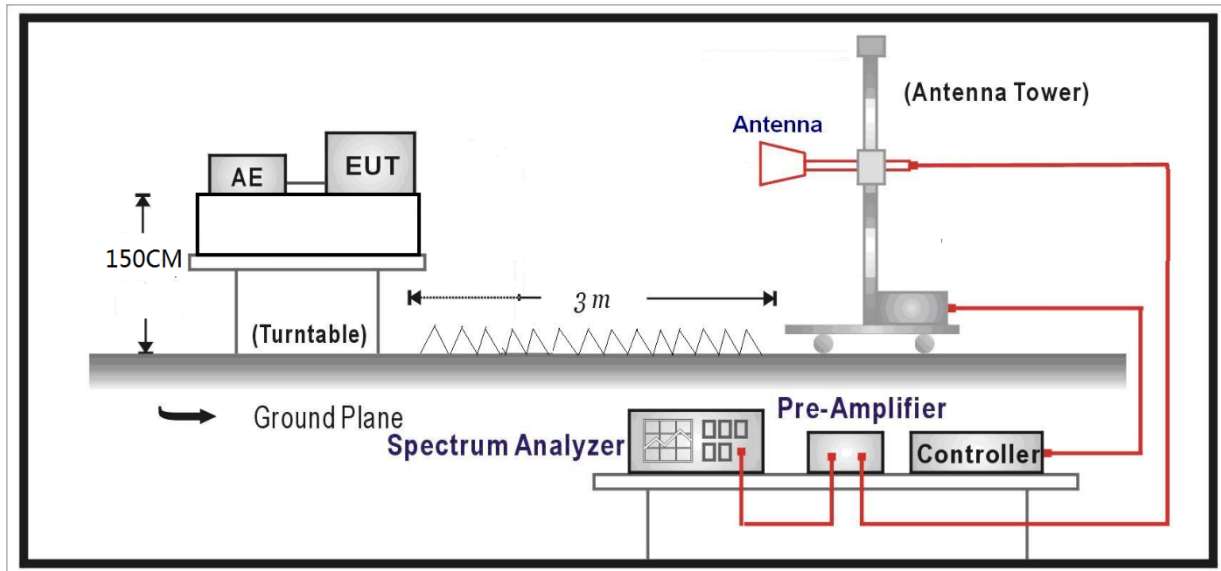
- h. The EUT was placed on the top of a rotating table 1.5 meters(above 1GHz) and 0.8 meters(below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- i. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- j. For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- k. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- l. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- m. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- n. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

#### NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

### 3.5.3 TEST SETUP

Above 960MHz Test Setup:





### 3.5.4 TEST RESULTS

Mode	Pol(H/V)	Frequency (MHz)	Maximum Peak Power (dBm/10MHz)	Maximum Peak Power (dBm/50MHz)	Limit (dBm/50MHz)	Pass/Fail
1	H	7819.0350	-38.92	-24.94	0	Pass
1	V	7868.0250	-33.01	-19.03	0	Pass
2	H	6334.5750	-36.33	-22.35	0	Pass
2	V	6657.1500	-36.53	-22.55	0	Pass
3	H	7982.6250	-39.01	-25.03	0	Pass
3	V	7986.3000	-33.13	-19.15	0	Pass

Bandwidth correction factor (BWCF)=  $20\log(10\text{MHz}/50\text{MHz}) = -13.98$

Maximum Peak Power (dBm/50MHz) = Maximum Peak Power (dBm/10MHz) -BWCF

Mode	Frequency (MHz)	Average Emissions (dBm/MHz)	Limit (dBm/MHz)	Pass/Fail
1	H	-61.01	-41.3	Pass
1	V	-55.70	-41.3	Pass
2	H	-62.15	-41.3	Pass
2	V	-60.84	-41.3	Pass
3	H	-58.99	-41.3	Pass
3	V	-55.14	-41.3	Pass

## 3.6 Cease Transmission Time

### 3.6.1 LIMIT -FCC

The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

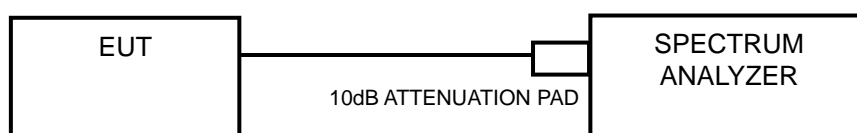
### 3.6.2 LIMIT -IC

The device is to transmit only when it is sending information to an associated receiver. The device shall cease transmission of information within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB device at least every 10 seconds or the UWB device shall cease transmitting any information other than periodic signals used for the establishment or re-establishment of a communication link with an associated receiver.

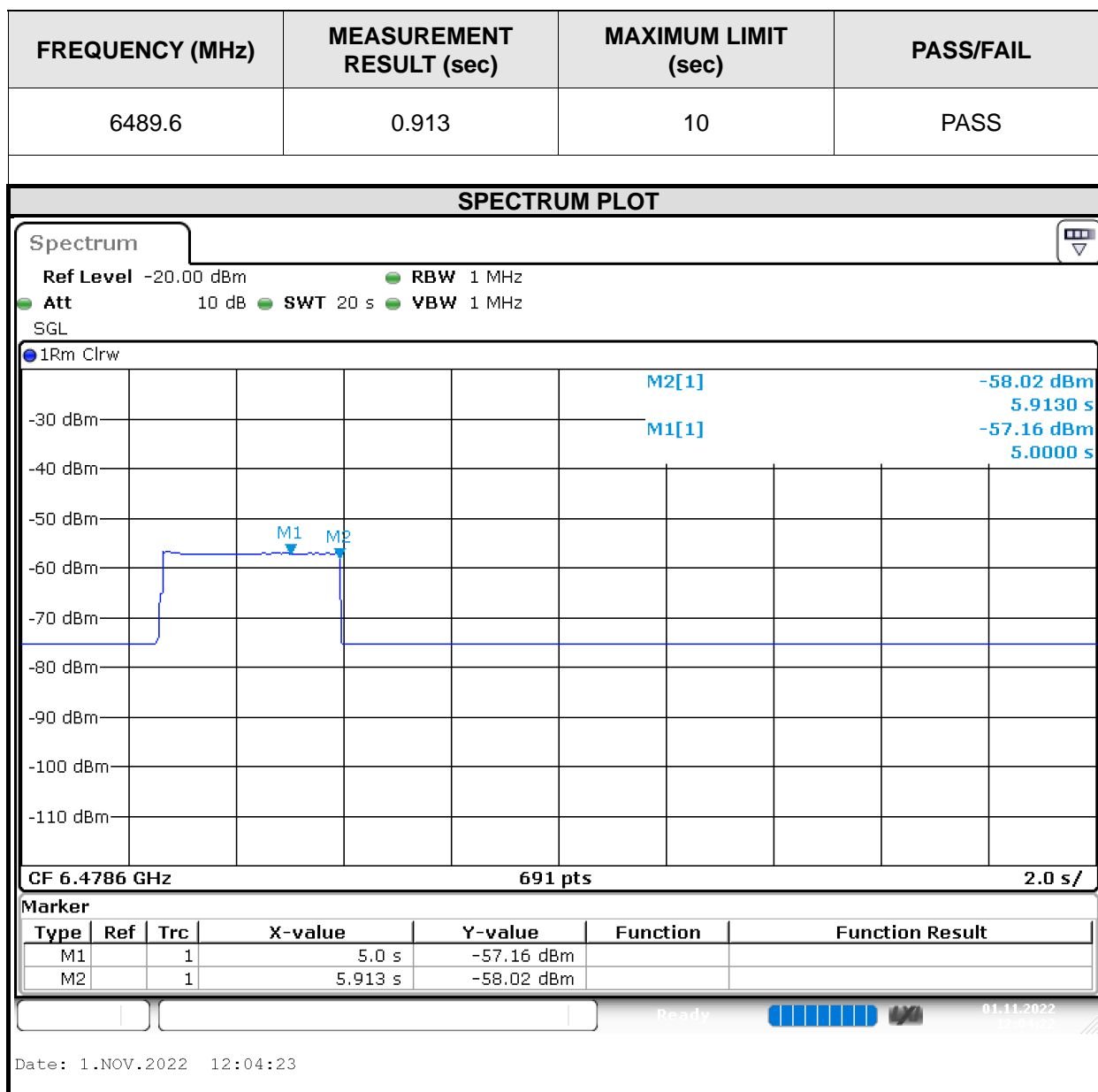
### 3.6.3 TEST PROCEDURES

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer set the center frequency, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the transmission duration was measured and recorded.

### 3.6.4 TEST SETUP



### 3.6.5 TEST RESULTS



Note: Release the interference signal at 5s,so

Cease Transmission Time = Mark2-Mark1 = 5.913s - 5.0s = 0.913s

## 4 PHOTOGRAPHS OF TEST SETUP

Please refer to the attached file (Test Photos).

## 5 PHOTOGRAPHS OF THE EUT

Please refer to the attached file (External Photos report and Internal Photos).

## Important

- (1) The test report is valid with the official seal of the laboratory and the signatures of Test engineer, Author and Reviewer simultaneously.
- (2) The test report is invalid if altered.
- (3) Any photocopies or part photocopies in the test report are forbidden without the written permission from the laboratory.
- (4) Objections to the test report must be submitted to the laboratory within 15 days.
- (5) Generally, commission test is responsible for the tested samples only.

*Address of the laboratory:*

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