



TEST REPORT

Application No.: GZCR2201000100AT
Applicant: POZYX NV
Address of Applicant: Vrijdagmarkt 10/201, 9000, Gent, Belgium
Manufacturer: POZYX NV
Address of Manufacturer: Vrijdagmarkt 10/201, 9000, Gent, Belgium
Factory: NOTE Pärnu Oü
Address of Factory: Laki 2, 80010 Pärnu, Estonia
Equipment Under Test (EUT):
EUT Name: Pozyx Anchor V2.2
Model No.: 100020022
Trade Mark:



Standard(s) : 47 CFR Part 15 Subpart F
Date of Receipt: 2022-01-19
Date of Test: 2022-01-19 to 2022-01-29
Date of Issue: 2022-02-18

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian
EMC Laboratory Manager



Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022-02-18		Original
02		2022-03-18		Update

Remark: 02 version is based on 01 version, to add 15.521 requirement description to each section of the test items.

Authorized for issue by:				
				
		Curry Wu/Project Engineer		
				
		Ricky Liu/Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15 Subpart F	N/A	47 CFR Part 15F Section 15.517(a3), 15.521(b), 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
EIRP	47 CFR Part 15 Subpart F	ANSI C63.10: 2013 section 10.3	47 CFR Part 15, Subpart F Section 15.517 (c)(e), 15.521(g)	Pass
Spurious Emissions Below 1GHz		ANSI C63.10: 2013 section 10.2	47 CFR Part 15, Subpart F Section 15.517 (c), 15.209, 15.521(c)(d)(h)	Pass
Spurious Emissions Above 1GHz		ANSI C63.10: 2013 section 10.3	47 CFR Part 15, Subpart F Section 15.517 (c)(d), 15.521(d)(h)	Pass
UWB Bandwidth		ANSI C63.10:2013 section 10.1	47 CFR Part 15F Section 15.503, 15.521(e)	Pass
Conducted Emissions at AC Power Line (150kHz-30MHz)		ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart F 15.207, 15.505, 15.521(j),	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

Remark: for 47 CFR Part 15.521 General Requirement, Section 15.521(f)(i), is not applicable for this product, so it's not evaluated in the report.

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9 EUT Constructional Details (EUT Photos)31

4 General Information

4.1 Details of E.U.T.

Power supply: DC48V Powered by POE/POE+
Or DC6V-53V

Operating Frequency: 3993.6MHz(ch2);6489.6MHz(ch5)

Modulation Type: PM

Number of Channels: 2

Sample Type: Indoor Use

Antenna Type: PCB Antenna

Antenna Gain: 3.15dBi for 3993.6MHz, 3.86dBi for 6489.6MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	LENOVO	X240	/
Mouse	LENOVO	MOJUO	00BABF8
Wireless Router	TP-LINK	TL-WDR5620	120B531012491
POE Adapter	GlobTek	GT-96300-3656-T3-AP	N/A

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
EIRP	5.08dB
Spurious Emissions Below 1GHz	5.14dB
Spurious Emissions Above 1GHz	5.08dB
UWB Bandwidth	± 3%
Conducted Emissions at AC Power Line (150kHz-30MHz)	±3.12dB

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

EIRP					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-16	2022-09-15
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-08-30	2022-08-29

Spurious Emissions Below 1GHz					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver(9kHz-3GHz)	Rohde & Schwarz	ESCI	EMC0056	2021-12-29	2022-12-28
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Trilog Broadband Antenna(25MHz-1GHz)- On Site	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	EMC2174	2019-08-08	2022-08-07
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

Spurious Emissions Above 1GHz					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-16	2022-09-15



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Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-08-30	2022-08-29

UWB Bandwidth

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01

Conducted Emissions at AC Power Line (150kHz-30MHz)

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver(9kHz-3GHz)	Rohde & Schwarz	ESCI	EMC0056	2021-12-29	2022-12-28
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	N/A	N/A
Two-Line V-Network	Rohde & Schwarz	ENV216	EMC0118	2021-12-23	2022-12-22
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2021-09-24	2022-09-23
Coaxial Cable	HangTianXing	2m	EMC0107	2020-09-09	2022-09-08
Test Software E3c	Audix	Ver. 5.4.1221b	GZE100-62	N/A	N/A

General used equipment

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2021-07-05	2022-07-05



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15F Section 15.517(a3), 15.521(b), 15.203

Limit:

15.203 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, 15.221, or 15.236. 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. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

15.517(a3)

The use of outdoor mounted antennas, e.g., antennas mounted on the outside of a building or on a telephone pole, or any other outdoors infrastructure is prohibited.

15.521(b)

Manufacturers and users are reminded of the provisions of § 15.203.

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 3.15dBi for 3993.6MHz, 3.86dBi for 6489.6MHz.

Please refer to internal photos of EUT.

7 Radio Spectrum Matter Test Results

7.1 EIRP

Test Requirement 47 CFR Part 15, Subpart F Section 15.517 (c) (e), 15.521(g)
 Test Method: ANSI C63.10: 2013 section 10.3
 Measurement Distance: 3m
 Limit:

Frequency	Limit	Detector	Measurement distance (m)
960MHz-1610MHz	-75.3 dBm (EIRP, RBW=1MHz)	AV	3
1610MHz-1990MHz	-53.3 dBm (EIRP, RBW=1MHz)	AV	3
1990MHz-3100MHz	-51.3 dBm (EIRP, RBW=1MHz)	AV	3
3100MHz-10600MHz	-41.3 dBm (EIRP, RBW=1MHz)	AV	3
Above 10600MHz	-51.3 dBm (EIRP, RBW=1MHz)	AV	3
Fundamental	0 dBm (EIRP, RBW=50MHz)	Peak	3

Remark: Due to some spectrum analyzer does not support 50MHz RBW setting, RBW set to the maximum value, and add a correction factor is allowed for Max Peak EIRP measurement. According to ANSI 63.10 Clause 10.3.9, the EIRP to field strength at a specified measurement distance of 3 m is below:

$$E \text{ (dBuV/m)} = \text{EIRP(dBm)} + 95.3$$

For peak power test, the spectrum analyzer was set to RBW=8MHz, VBW=10MHz, and add a conversion factor of $20 \cdot \log(50\text{MHz}/8\text{MHz})=15.92\text{dB}$.

Thus, the field strength limit for the test above 1GHz is below:

Frequency	Limit	Detector	Measurement Distance
	Field Strength (dBuV/m)		
960MHz-1610MHz	20.00	AV	3
1610MHz-1990MHz	42.00	AV	3
1990MHz-3100MHz	44.00	AV	3
3100MHz-10600MHz	54.00	AV	3
Above 10600MHz	44.00	AV	3
Fundamental	95.3	Peak	3

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21.5 °C Humidity: 45.5 % RH Atmospheric Pressure: 1003 mbar

7.1.2 Test Mode Description

Pre-scan /	Mode	Description
Final test	Code	
Final test	00	

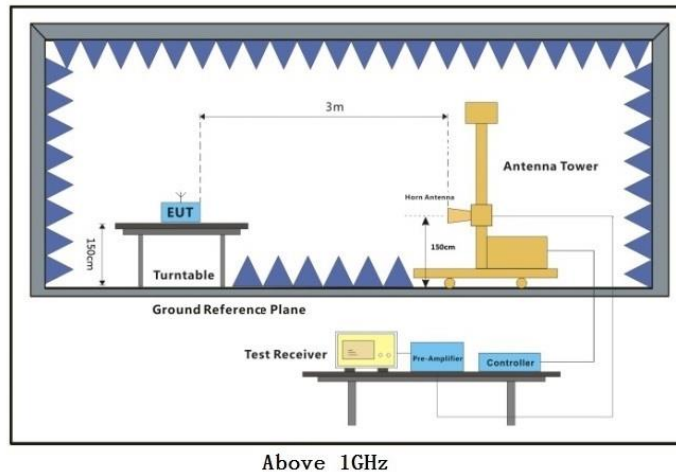
Continuous Tx Mode: Keep the EUT Transmitting with Modulation



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7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

- 1) The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The antenna 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.
- 4) 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.
- 5) The test-receiver system was set to Peak detector with Maximum Hold Mode for Max Peak EIRP measurement and AV detector for Average EIRP measurement.
- 6) Test the EUT in the lowest channel and the Highest channel
- 7) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
- 8) Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Peak Field Strength for fundamental @ RBW=8MHz						
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Polarization
3919.521	29.72	4.60	36.82	81.57	79.07	Horizontal
4010.340	29.82	4.60	36.80	74.99	72.61	Vertical
6490.321	33.96	5.85	37.01	75.95	78.75	Horizontal
6487.315	33.96	5.85	37.00	66.87	69.68	Vertical

Calculated Peak Field Strength of fundamental @ RBW=50MHz					
Frequency (MHz)	Measured Field Strength of fundamental (FS _M) (dBuV/m)	Calculated Field Strength of fundamental (FS _C) (dBuV/m)	Limit (dBuV/m)	Margin (dBuV)	Polarization
3919.521	79.07	94.99	95.3	0.31	Horizontal
4010.340	72.61	88.53	95.3	6.77	Vertical
6490.321	78.75	94.67	95.3	0.63	Horizontal
6487.315	69.68	85.60	95.3	9.7	Vertical

Note: $FS_C = FS_M + 20\log(50\text{MHz}/8\text{MHz}) = FS_M + 15.92$

Average Field Strength for fundamental @ RBW=1MHz								
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dBuV)	Polarization
3911.636	29.70	4.60	36.82	55.17	52.65	54.00	1.35	Horizontal
4047.866	29.87	4.60	36.80	49.27	46.94	54.00	7.06	Vertical
6531.537	34.03	5.84	37.02	49.94	52.79	54.00	1.21	Horizontal
6506.374	34.00	5.84	37.01	43.81	46.64	54.00	7.36	Vertical

7.2 Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart F Section 15.517 (c),15.209, 15.521(c)(d) (h)

Test Method: ANSI C63.10: 2013 section 10.2

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1000MHz	-	20	RMS/AV	3

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 20.5 °C

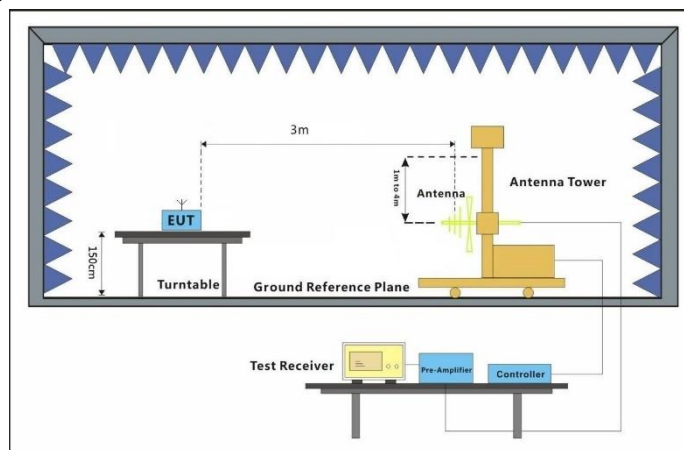
Humidity: 48.5 % RH

Atmospheric Pressure: 1003 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Continuous Tx Mode: Keep the EUT Transmitting with Modulation

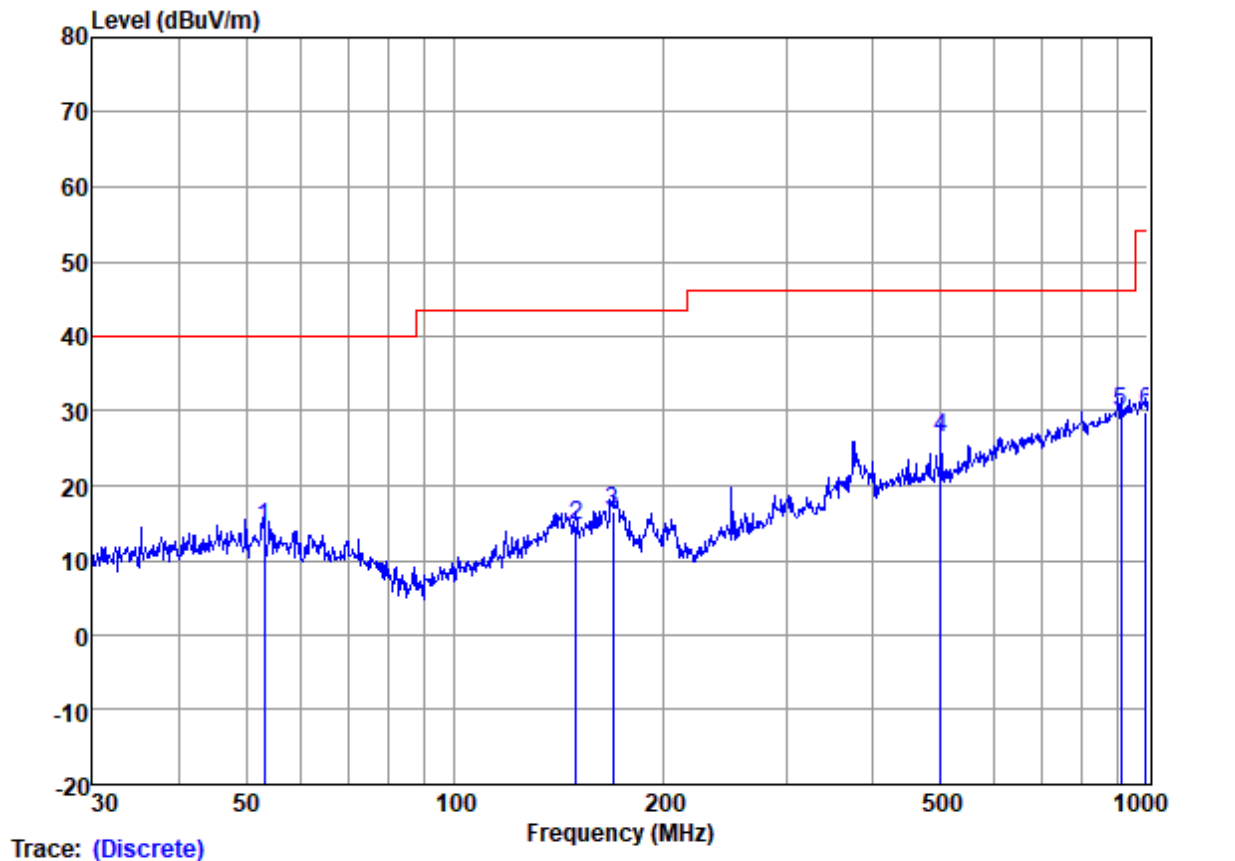
7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

- 1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - 3) The antenna 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.
 - 4) 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
 - 5) The test-receiver system was set to Peak detector with Maximum Hold Mode. And use Quasi-Peak to measure the six highest frequencies.
 - 6) Test the EUT in the lowest channel, the Highest channel and only recorded worst channel--Lowest channel in the test report.
 - 7) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
 - 8) Repeat above procedures until all frequencies measured was complete
- Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. According to FCC Part 15.521(h), test was performed from 9KHz to 40GHz for the EUT.
- Emission below 30MHz was very low, so it's not recorded in the test report.

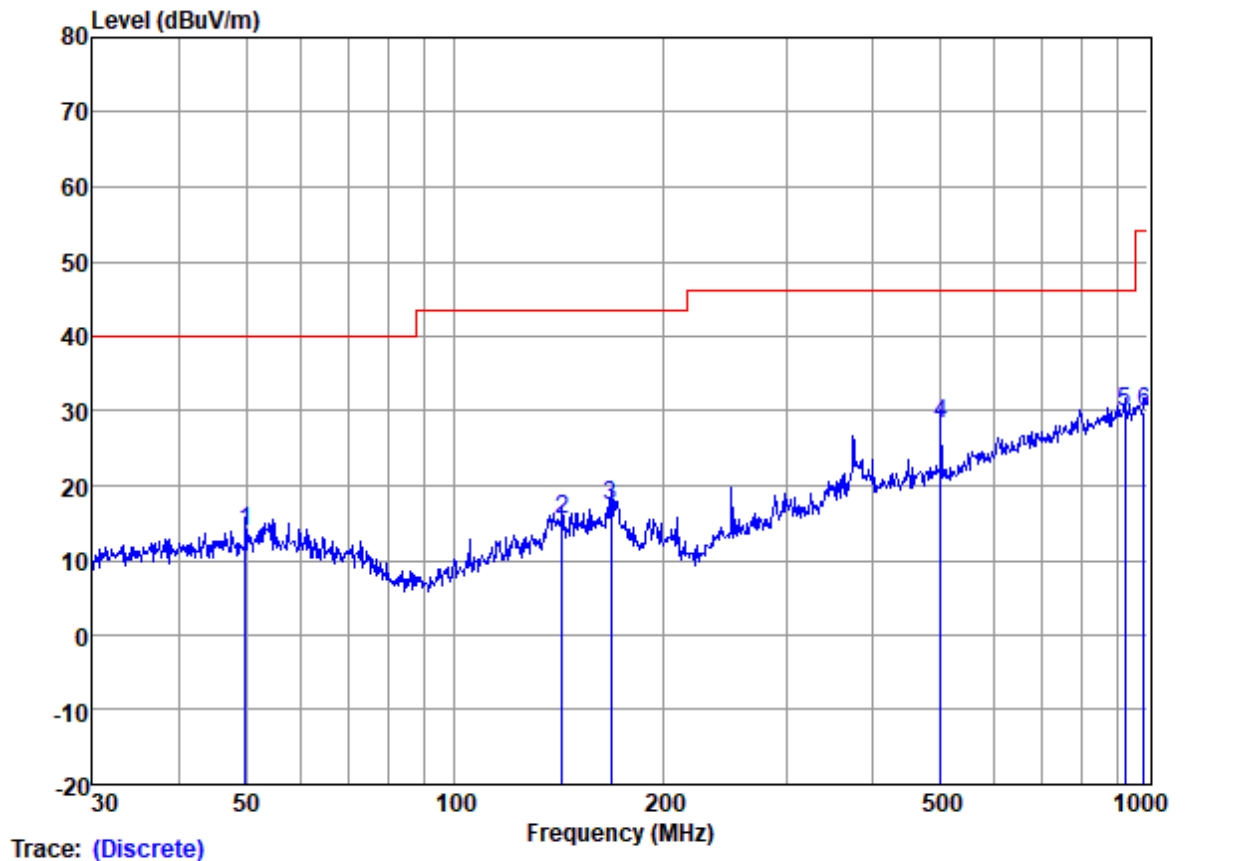
Test Mode: 00; Polarity: Horizontal



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	53.13	26.61	13.88	1.17	27.17	14.49	40.00	-25.51	HORIZONTAL	QP
2	149.49	25.51	13.78	2.22	26.84	14.67	43.50	-28.83	HORIZONTAL	QP
3	169.01	27.73	13.20	2.39	26.77	16.55	43.50	-26.95	HORIZONTAL	QP
4	501.18	32.12	17.93	4.43	27.98	26.50	46.00	-19.50	HORIZONTAL	QP
5	912.86	27.35	23.47	6.96	27.83	29.95	46.00	-16.05	HORIZONTAL	QP
6	993.01	26.06	24.23	7.37	27.67	29.99	54.00	-24.01	HORIZONTAL	QP

Test Mode: 00; Polarity: Vertical



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	49.88	26.00	13.91	1.14	27.17	13.88	40.00	-26.12	HORIZONTAL	QP
2	142.82	26.56	13.55	2.12	26.88	15.35	43.50	-28.15	HORIZONTAL	QP
3	167.82	28.34	13.30	2.38	26.78	17.24	43.50	-26.26	HORIZONTAL	QP
4	501.18	33.95	17.93	4.43	27.98	28.33	46.00	-17.67	HORIZONTAL	QP
5	925.76	26.94	23.73	7.01	27.81	29.87	46.00	-16.13	HORIZONTAL	QP
6	986.07	26.06	24.17	7.37	27.68	29.92	54.00	-24.08	HORIZONTAL	QP

7.3 Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart F Section 15.517 (c)(d), 15.521(d) (h)

Test Method: ANSI C63.10: 2013 section 10.3

Limit:

Frequency	Limit (dBuV/m)@3m	RBW	Detector	Measurement distance (m)
1000MHz-1610MHz	20.0	1MHz	AV	0.5
1610MHz-1990MHz	42.0	1MHz	AV	0.5
1990MHz-3100MHz	44.0	1MHz	AV	0.5
3100MHz-10600MHz	54.0	1MHz	AV	0.5
Above 10600MHz	44.0	1MHz	AV	0.5
1164MHz-1240MHz	10.0	1KHz	AV	3
1559MHz-1610MHz	10.0	1KHz	AV	3

7.3.1 E.U.T. Operation

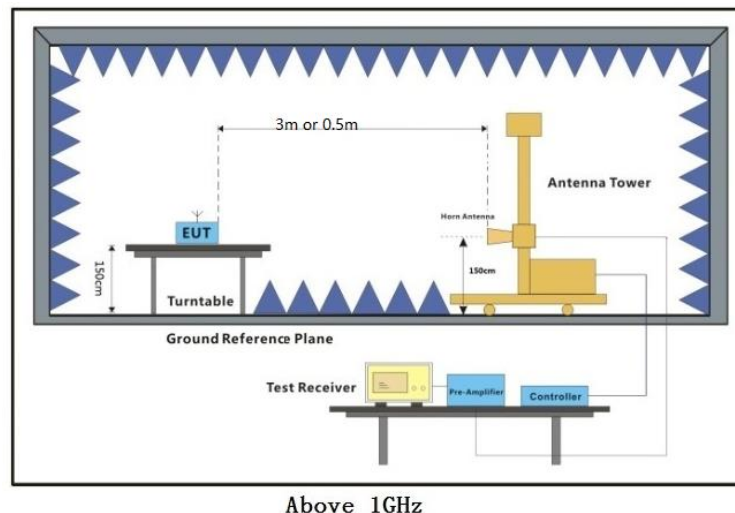
Operating Environment:

Temperature: 21.5 °C Humidity: 45.5 % RH Atmospheric Pressure: 1003 mbar

7.3.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 00	Continuous Tx Mode: Keep the EUT Transmitting with Modulation

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

- 1) The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 0.5 meters / 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The antenna 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.
- 4) 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.
- 5) The test-receiver system was set to AV detector with Maximum Hold Mode.
- 6) Test the EUT in the lowest channel, the Highest channel
- 7) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
- 8) Repeat above procedures until all frequencies measured was complete

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor+ Distance Factor - Preamp Factor

Distance factor = $20 \cdot \log(0.5/3) = -15.56\text{dB}$

2: As the EUT operate at 3993.6MHz and 6489.6MHz, according to Part 15.521(h), test was performed at frequency up to 40GHz. For frequency above 18GHz, emission was very low, so it's not recorded in the test report.

Average Field Strength within 1164-1240MHz & 1559-1610MHz @ RBW=1KHz for ch2								
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dBuV)	Polarization
1238.746	24.96	2.3	38.35	13.55	2.46	10	7.54	Horizontal
1607.152	25.59	2.8	37.98	11.27	1.68	10	8.32	Horizontal
1234.444	24.93	2.3	38.37	13.53	2.39	10	7.61	Vertical
1583.887	25.56	2.8	38	11.48	1.84	10	8.16	Vertical

Average Field Strength within 1164-1240MHz & 1559-1610MHz @ RBW=1KHz for ch5								
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dBuV)	Polarization
1238.198	24.96	2.3	38.35	13.46	2.37	10	7.63	Horizontal
1607.928	25.59	2.8	37.98	11.25	1.66	10	8.34	Horizontal
1236.319	24.93	2.3	38.37	13.98	2.84	10	7.16	Vertical
1583.428	25.56	2.8	38	11.3	1.66	10	8.34	Vertical

Average Field Strength out of 1164-1240MHz & 1559-1610MHz @ RBW=1MHz for ch2									
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Distance factor (dBuV)	Read Level (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dBuV)	Polarization
1300.858	25.2	2.6	38.31	-15.56	39.31	13.24	20	6.76	Horizontal
2012.686	26.12	3.1	37.69	-15.56	42.84	18.81	44	25.19	Horizontal
7519.349	36.42	6.26	37.5	-15.56	42.51	32.13	54	21.87	Horizontal
16891.04	41.18	9.4	35.36	-15.56	31.89	31.55	44	12.45	Horizontal
1289.627	25.17	2.55	38.31	-15.56	39.85	13.7	20	6.3	Vertical
2089.751	26.27	3.15	37.68	-15.56	41.54	17.72	44	26.28	Vertical
7989.893	36.9	6.15	37.6	-15.56	41.94	31.83	54	22.17	Vertical
14450.13	41.25	8.45	35.31	-15.56	32.69	31.52	44	12.48	Vertical



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Average Field Strength out of 1164-1240MHz & 1559-1610MHz @ RBW=1MHz for ch5									
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Distance factor (dBuV)	Read Level (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dBuV)	Polarization
1304.623	25.21	2.6	38.31	-15.56	39.27	13.21	20	6.79	Horizontal
2001.084	26.1	3.1	37.7	-15.56	40.35	16.29	44	27.71	Horizontal
4988.058	31.69	5.68	36.85	-15.56	40.72	25.68	54	28.32	Horizontal
16939.94	41.45	9.39	35.36	-15.56	31.27	31.19	44	12.81	Horizontal
2188.663	26.85	3.2	37.65	-15.56	42.12	18.96	44	25.04	Vertical
3159.355	28.54	3.97	37.12	-15.56	41.63	21.46	54	32.54	Vertical
4902.3	31.58	5.55	36.84	-15.56	40.74	25.47	54	28.53	Vertical
15850.41	38.52	9.86	35.4	-15.56	33.36	30.78	44	13.22	Vertical

7.4 UWB Bandwidth

Test Requirement 47 CFR Part 15F Section 15.503,15.521(e)

Test Method: ANSI C63.10:2013 section 10.1

Limit:

≥500MHz

7.4.1 E.U.T. Operation

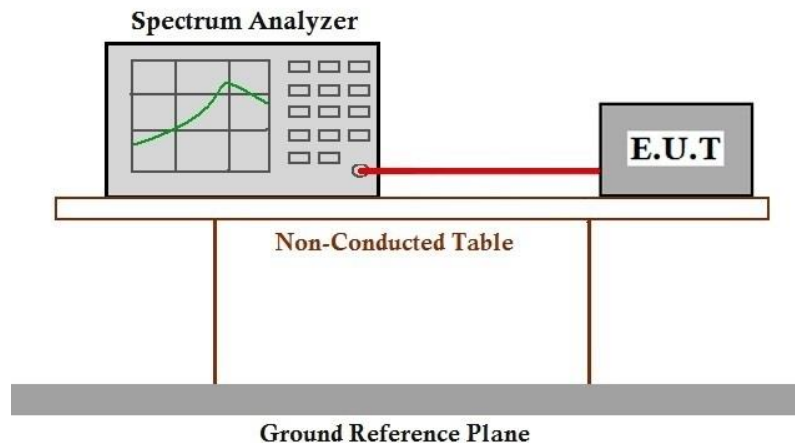
Operating Environment:

Temperature: 21 °C Humidity: 46 % RH Atmospheric Pressure: 1003 mbar

7.4.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 00	Continuous Tx Mode: Keep the EUT Transmitting with Modulation

7.4.3 Test Setup Diagram



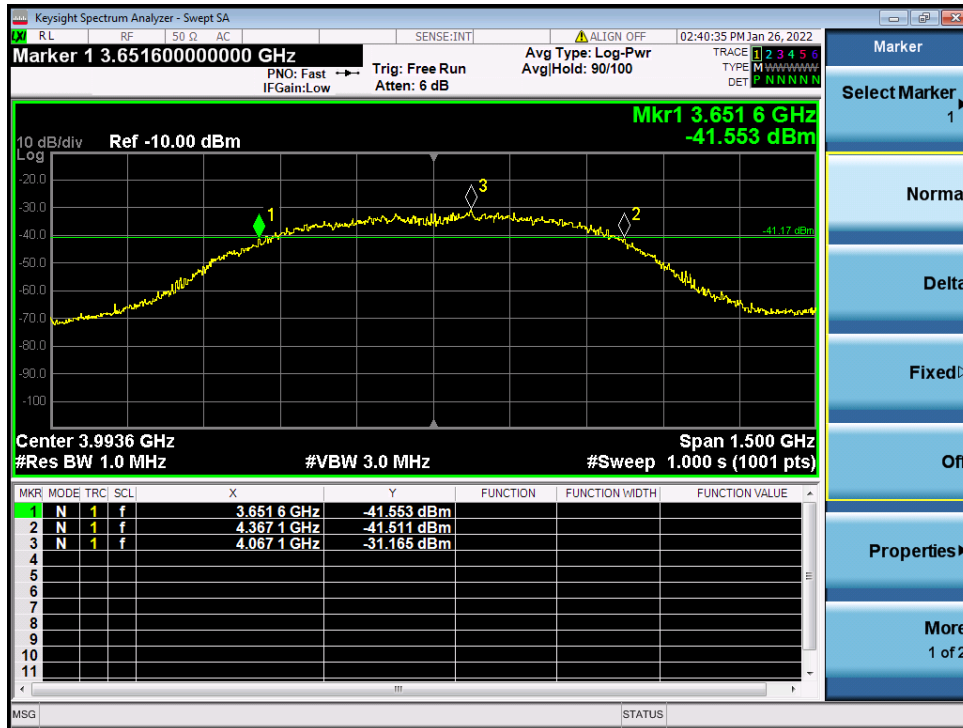
7.4.4 Measurement Procedure and Data

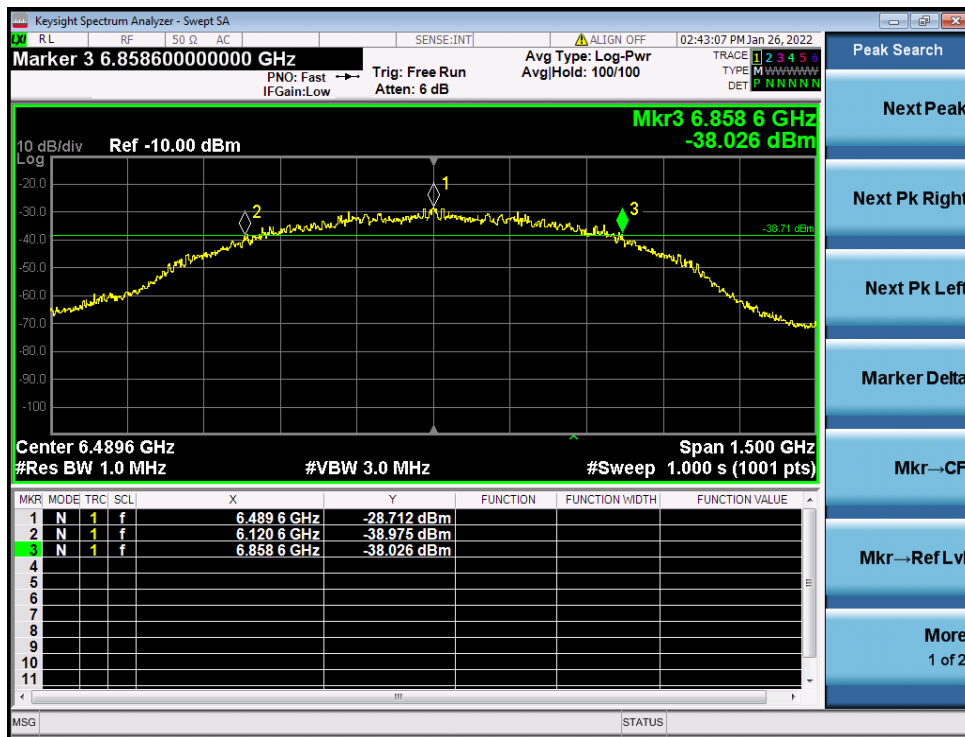
The frequency at which the maximum power level is measured with the peak detector is designated fM. The peak power measurements shall be made using a spectrum analyzer or EMI receiver with a 1 MHz resolution bandwidth and a video bandwidth of 1 MHz or greater. The instrument shall be set to peak detection using the maximum-hold trace mode. The outermost 1 MHz segments above and below fM, where the peak power falls by 10 dB relative to the level at fM, are designated as fH and fL, respectively:

- 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). 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 Frequency (MHz)	FM(GHz)	FL (GHz)	FH (GHz)	10dB bandwidth (MHz)	Limit (MHz)	Results
3993.6	4.0671	3.6516	4.3671	715.5	≥500MHz	Pass
6489.6	6.4896	6.1206	6.8586	738	≥500MHz	Pass





7.5 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart F 15.207, 15.505, 15.521(j),

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		
Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz		

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

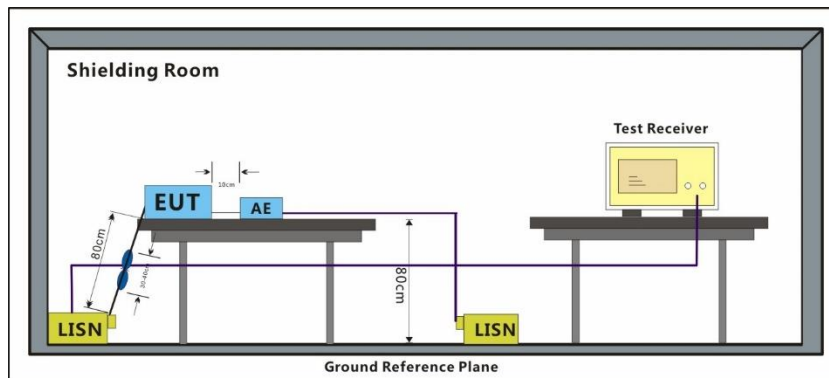
Humidity: 45 % RH

Atmospheric Pressure: 1003 mbar

7.5.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 00	Continuous Tx Mode: Keep the EUT Transmitting with Modulation

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

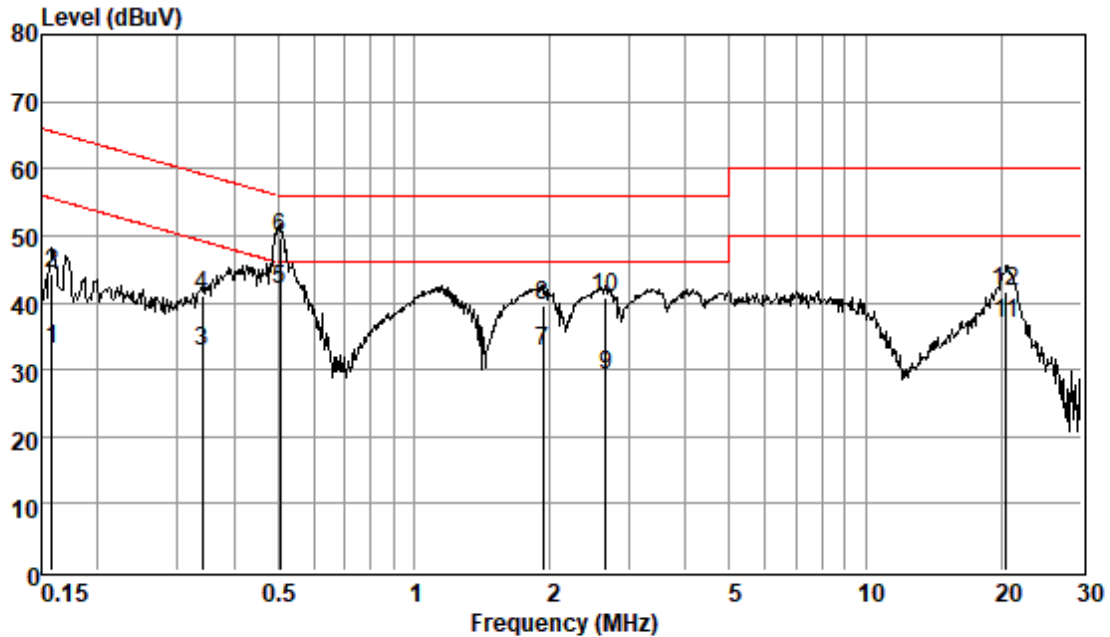
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground

reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

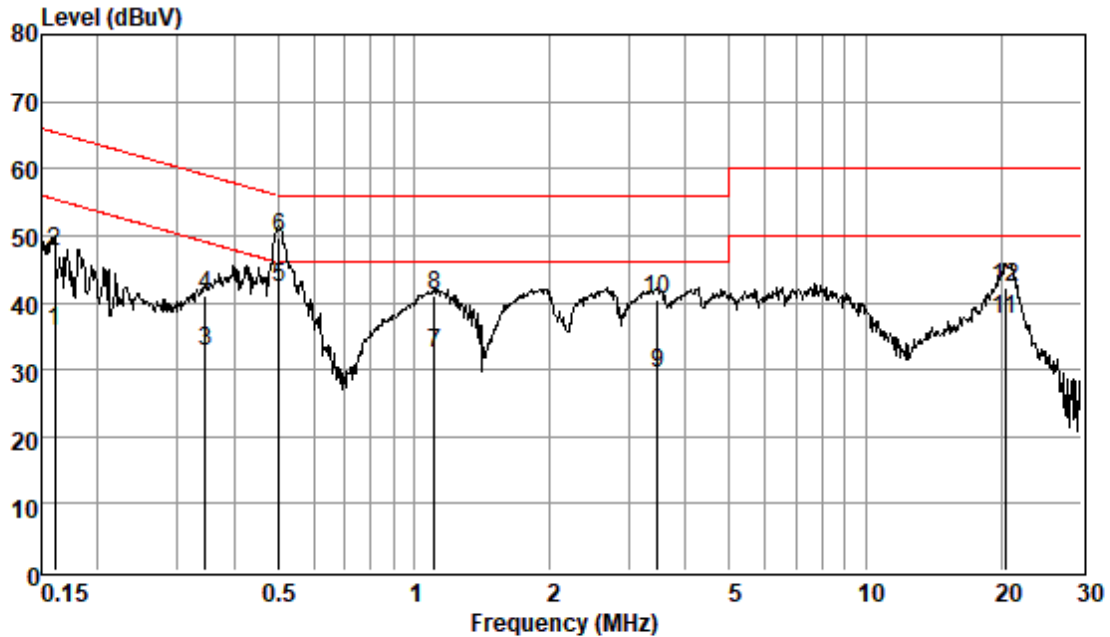
Remark: LISN=Read Level+ Cable Loss+ LISN Factor

Test Mode: 00; Line: Live line

Pol : LINE
Mode :
Model :

Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.16	23.24	0.06	9.62	32.92	55.56	-22.64	Average
0.16	34.73	0.06	9.62	44.41	65.56	-21.15	QP
0.34	22.90	0.06	9.63	32.59	49.18	-16.59	Average
0.34	31.41	0.06	9.63	41.10	59.18	-18.08	QP
0.50	32.18	0.07	9.63	41.88	46.00	-4.12	Average
0.50	39.87	0.07	9.63	49.57	56.00	-6.43	QP
1.93	22.88	0.12	9.62	32.62	46.00	-13.38	Average
1.93	29.67	0.12	9.62	39.41	56.00	-16.59	QP
2.66	19.38	0.14	9.62	29.14	46.00	-16.86	Average
2.66	30.99	0.14	9.62	40.75	56.00	-15.25	QP
20.49	26.61	0.37	9.77	36.75	50.00	-13.25	Average
20.49	31.37	0.37	9.77	41.51	60.00	-18.49	QP

Test Mode: 00; Line: Neutral Line



Pol : NEUTRAL
Mode :
Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.16	25.93	0.06	9.55	35.54	55.43	-19.89	Average
0.16	38.10	0.06	9.55	47.71	65.43	-17.72	QP
0.35	23.08	0.06	9.54	32.68	49.05	-16.37	Average
0.35	31.44	0.06	9.54	41.04	59.05	-18.01	QP
0.50	32.57	0.07	9.55	42.19	46.00	-3.81	Average
0.50	39.98	0.07	9.55	49.60	56.00	-6.40	QP
1.11	22.69	0.08	9.55	32.32	46.00	-13.68	Average
1.11	31.32	0.08	9.55	40.95	56.00	-15.05	QP
3.45	19.81	0.16	9.56	29.53	46.00	-16.47	Average
3.45	30.64	0.16	9.56	40.36	56.00	-15.64	QP
20.38	27.55	0.37	9.68	37.60	50.00	-12.40	Average
20.38	32.29	0.37	9.68	42.34	60.00	-17.66	QP

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR2201000100AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for GZCR2201000100AT

- End of the Report -