TEST REPORT

Application No.:	GZCR2406000631AT
Applicant:	GUANGZHOU HEYGEARS IMC.INC
Address of Applicant:	BLOCK B2, 501, 601, ENTERPRISE ACCELERATOR, KAIFA DISTRICT, GUANGZHOU, GUANGDONG, CHINA
Manufacturer:	GUANGZHOU HEYGEARS IMC.INC
Address of Manufacturer:	BLOCK B2, 501, 601, ENTERPRISE ACCELERATOR, KAIFA DISTRICT, GUANGZHOU, GUANGDONG, CHINA
Factory:	GUANGZHOU HEYGEARS IMC.INC
Address of Factory:	BLOCK B2, 501, 601, ENTERPRISE ACCELERATOR, KAIFA DISTRICT, GUANGZHOU, GUANGDONG, CHINA
Product Name:	UltraCraft Reflex RS
Model No.:	UltraCraft Reflex RS
Trade Mark:	HEYGEARS
Standard(s) :	47 CFR Part 15, Subpart C 15.225
Date of Receipt:	2024-06-06
Date of Test:	2024-06-21 to 2024-07-17
Date of Issue:	2024-08-02
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Ricky Liu
Manager

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Revision Record			
Version	**Report No.**	**Date**	**Remark**
01	GZCR240600063103	2024-08-02	Original

Authorized for issue by:				
		Damon. Guan **Damon Guan/Project Engineer**		
		Vico Cui **Vico Cui/Reviewer**		

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.225	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at Mains Terminals (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
20dB Bandwidth		ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Emission Mask		ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.225(a)&(b)&(C)	Pass
Frequency tolerance		ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.225(e)	Pass
Radiated Emissions (9kHz-30MHz)		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass
Radiated Emissions (30MHz-1GHz)		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass**

**: The EUT passed Radiated Emissions (30MHz-1GHz) test after modifications.

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.

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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 100-240VAC, 50/60Hz for AC/DC adapter.
AC/DC adapter:	Model: TDX-2407500
	Input: AC 100-240VAC, 50/60Hz 3.0A
	Output: DC 24.0V 7.5A 180.0W
Cable(s):	About 2.0m x 3 wires unscreened AC input cable for AC/DC adapter.
	About 1.5m x 2 wires unscreened DC output cable for AC/DC adapter.
	USB Port x1
	Micro SD Port x1
	4 Pin DC output Port x1(Reserved only, function not developed)
Test Voltage:	AC 120 V, 60 Hz
Operation Frequency:	13.56MHz
Modulation Type:	ASK
Antenna Type:	Coil Antenna
Antenna Number:	2

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at Mains Terminals (150kHz-30MHz)	± 2.76dB
20dB Bandwidth	± 3%
Emission Mask	± 3.12dB (below 30 MHz)
Frequency tolerance	± 7.25 E-8
Radiated Emissions (9kHz-30MHz)	± 3.12dB
Radiated Emissions (30MHz-1GHz)	± 5.00dB (30MHz-1GHz):3m;±4.38dB (30MHz-1GHz):10m

Remark:
The U_{lab} (lab Uncertainty) is less than $U_{cispr/etsi}$ (CISPR/ETSI Uncertainty), so the test results
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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4.4 Test Location

All tests were performed at:

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Tel: +86 20 82155555

No tests were sub-contracted.

4.5 Test Facility

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

- **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.

- **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.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

The EUT passed Radiated Emissions (30MHz-1GHz) test after modifications.

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5 Equipment List

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Coaxial Cable	HangTianXing	2m	EMC0107	2023-08-04	2024-08-03
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	2022-10-16	2025-10-15
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2023-09-08	2024-09-07
EMI Test Receiver (9kHz-3.6GHz)	Rohde & Schwarz	ESR3	EMC2221	2024-05-13	2025-05-12
Test Software E3r	Audix	Ver.6.11812	GZE100-77	N/A	N/A

20dB Bandwidth					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
MXA Signal Analyzer (10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2024-02-20	2025-02-19
MI CABLE	SGS-EMC	0.8M	EMC2136	2023-11-02	2025-11-01

Emission Mask					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2024-04-08	2026-04-07
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2229	2024-02-19	2025-02-18
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
966 Anechoic Chamber	Shenzhen C.R.T	CRTSGSSAC966	EMC2230	2022-04-12	2025-04-11
Coaxial Cable	Mirco-COAX UTIFLEX ve	LA2-C125-8000	EMC2239	2023-06-14	2025-06-13

Frequency tolerance					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	EMC0039	2024-06-17	2025-06-16
MXA Signal Analyzer (10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2024-02-20	2025-02-19
MI CABLE	SGS-EMC	0.8M	EMC2136	2023-11-02	2025-11-01

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Radiated Emissions (9kHz-30MHz)					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2024-04-08	2026-04-07
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2229	2024-02-19	2025-02-18
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
966 Anechoic Chamber	Shenzhen C.R.T	CRTSGSSAC966	EMC2230	2022-04-12	2025-04-11
Coaxial Cable	Mirco-COAX UTIFLEX ve	LA2-C125-8000	EMC2239	2023-06-14	2025-06-13

Radiated Emissions (30MHz-1GHz)					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
966 Anechoic Chamber	Shenzhen C.R.T	CRTSGSSAC966	EMC2230	2022-04-12	2025-04-11
EMI Test Receiver(1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2229	2024-02-19	2025-02-18
Amplifier(9k-1000MHz)	SONOMA	310	EMC2237	2024-03-22	2025-03-21
TRILOG Broadband Antenna（25M-2GHz)	SCHWRZBECK	VULB 9168	EMC2238	2022-04-20	2025-04-19
Coaxial Cable	Mirco-COAX UTIFLEX ve	LA2-C125-8000	EMC2239	2023-06-14	2025-06-13
Test Software E3	Audix	Ver.6.191211	GZE100-81	N/A	N/A

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DMM	Fluke	73	EMC0006	2024-06-13	2025-06-12

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

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, 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.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna location: Refer to Internal photos

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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at Mains Terminals (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

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

Limit:

Frequency range (MHz)	Limit (dBuV)	
	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.

7.1.1 E.U.T. Operation

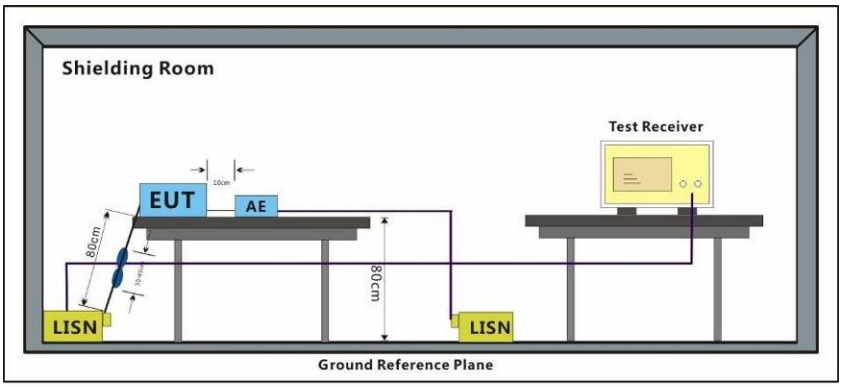
Operating Environment:

Temperature: 23.0 °C Humidity: 54.5 % RH Atmospheric Pressure: 1003 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode with modulation according to antenna 1
Final test	03	TX mode with modulation according to antenna 2

7.1.3 Test Setup Diagram



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

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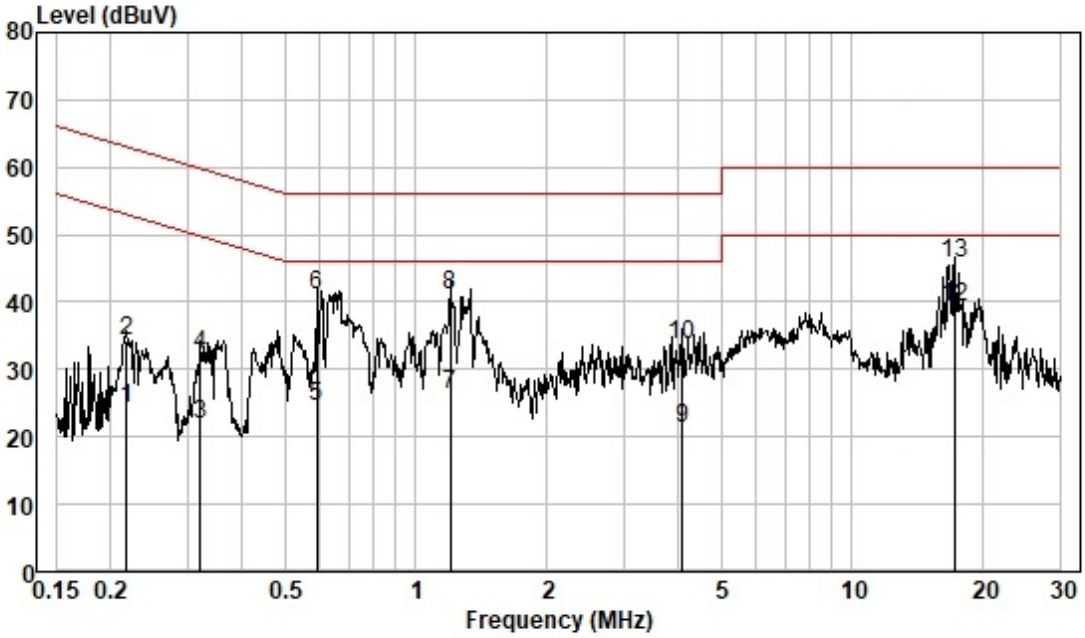
Test Mode: 01 & 03; Line: Live line



Pol :LINE
Mode :
Model :
Power :

	Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
1	0.217	14.49	0.04	9.55	24.08	52.92	-28.84	Average
2	0.217	24.71	0.04	9.55	34.30	62.92	-28.62	QP
3	0.320	12.39	0.04	9.56	21.99	49.71	-27.72	Average
4	0.320	22.70	0.04	9.56	32.30	59.71	-27.41	QP
5	0.592	14.89	0.05	9.57	24.51	46.00	-21.49	Average
6	0.592	31.27	0.05	9.57	40.89	56.00	-15.11	QP
7	1.197	16.53	0.08	9.56	26.17	46.00	-19.83	Average
8	1.197	31.26	0.08	9.56	40.90	56.00	-15.10	QP
9	4.092	11.53	0.18	9.60	21.31	46.00	-24.69	Average
10	4.092	23.87	0.18	9.60	33.65	56.00	-22.35	QP
12	17.109	29.19	0.35	9.87	39.41	50.00	-10.59	Average
13	17.109	35.67	0.35	9.87	45.89	60.00	-14.11	QP

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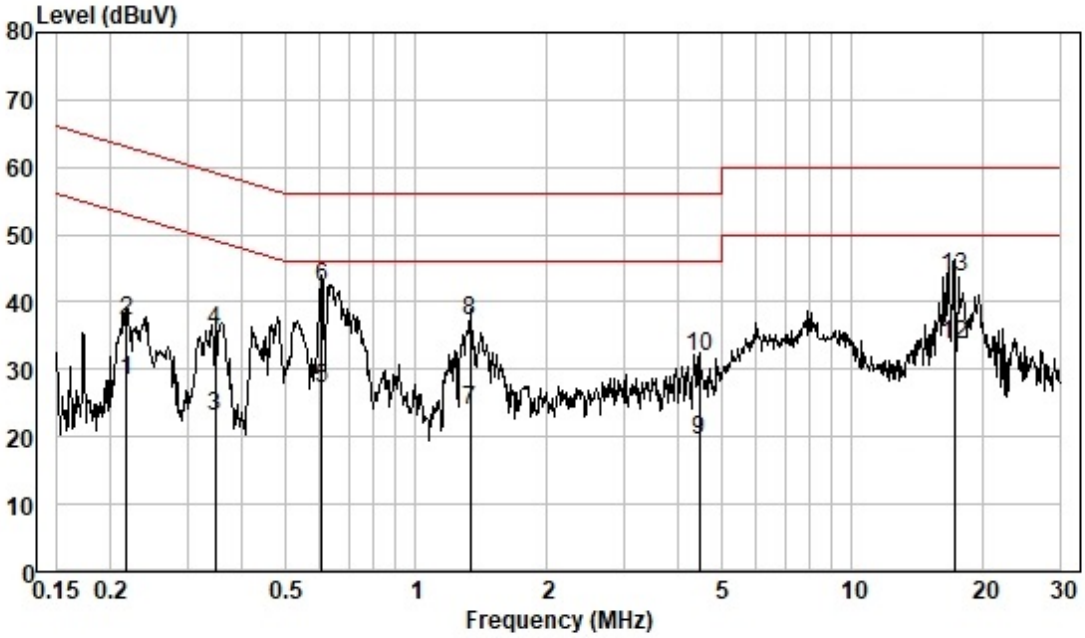
Test Mode: 01 & 03; Line: Neutral Line



Pol :NEUTRAL
Mode :
Model :
Power :

	Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
1	0.217	18.88	0.04	9.53	28.45	52.92	-24.47	Average
2	0.217	27.52	0.04	9.53	37.09	62.92	-25.83	QP
3	0.346	13.42	0.05	9.54	23.01	49.05	-26.04	Average
4	0.346	26.16	0.05	9.54	35.75	59.05	-23.30	QP
5	0.608	17.60	0.06	9.55	27.21	46.00	-18.79	Average
6	0.608	32.51	0.06	9.55	42.12	56.00	-13.88	QP
7	1.331	14.22	0.09	9.55	23.86	46.00	-22.14	Average
8	1.331	27.44	0.09	9.55	37.08	56.00	-18.92	QP
9	4.454	9.72	0.19	9.61	19.52	46.00	-26.48	Average
10	4.454	22.21	0.19	9.61	32.01	56.00	-23.99	QP
12	17.109	23.45	0.35	9.90	33.70	50.00	-16.30	Average
13	17.109	33.37	0.35	9.90	43.62	60.00	-16.38	QP

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7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215
Test Method: ANSI C63.10 (2013) Section 6.9

7.2.1 E.U.T. Operation

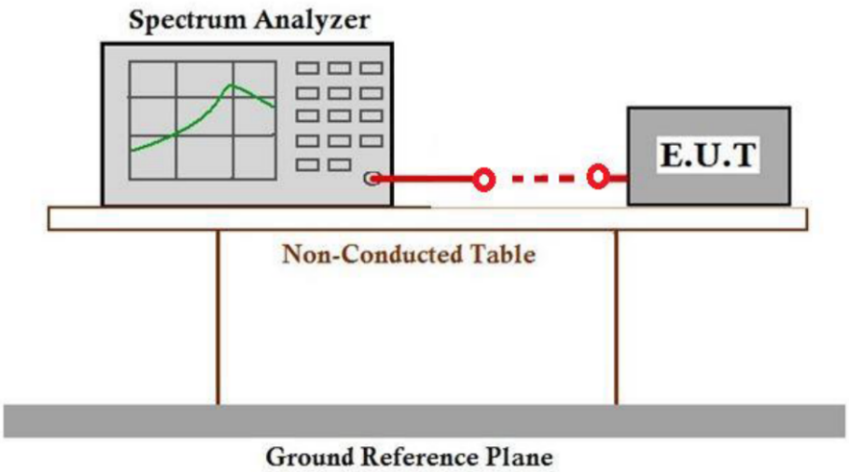
Operating Environment:

Temperature: 22.9 °C Humidity: 65.7 % RH Atmospheric Pressure: 1003 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode with modulation according to antenna 1
Pre-scan	03	TX mode with modulation according to antenna 2

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

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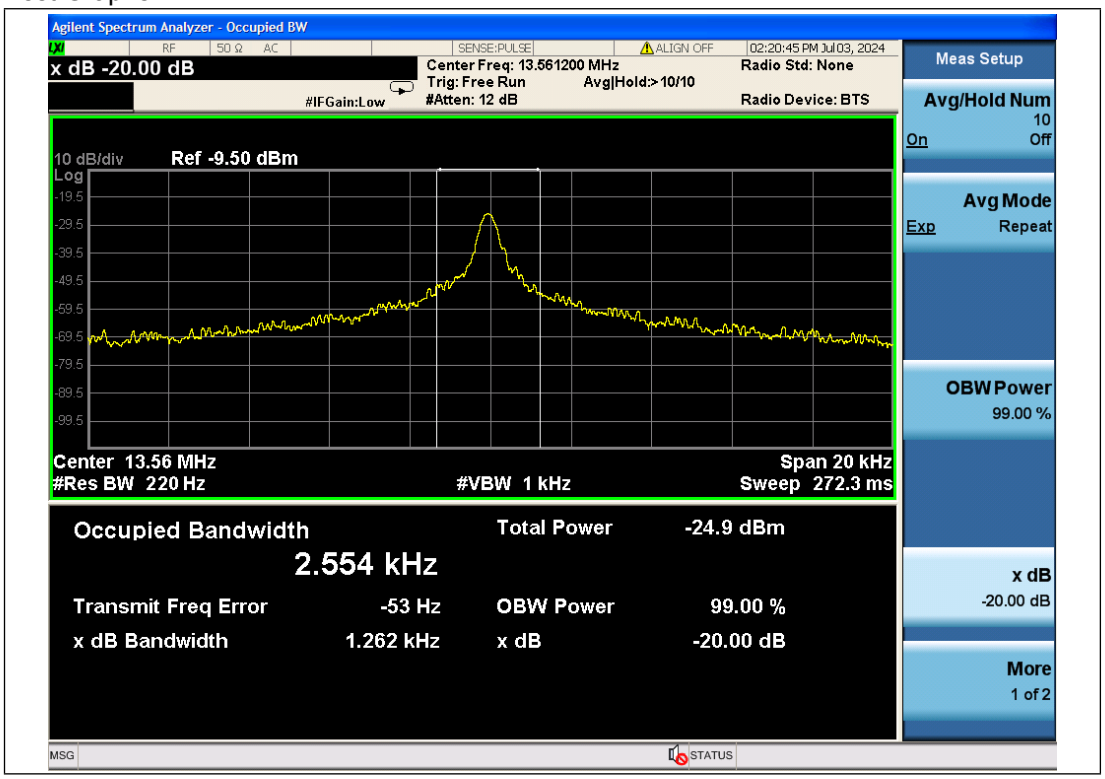
Test Mode: 01

Test Result

operating frequency	20dB Bandwidth	Limit	Result
13.56 MHz	2.262kHz	---	Pass

Test Graphs



Remark: The setting of RBW was the minimum for the spectrum.

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7.3 Emission Mask

Test Requirement 47 CFR Part 15, Subpart C 15.225(a)&(b)&(c)

Test Method: ANSI C63.10 (2013) Section 6.4

Limit:

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Below 30MHz

The test was performed at a 3m test site.

The factor calculated by the following equation:

$$FS_{\text{limit}} = FS_{\max} - 40\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

where

FS_{limit}	is the calculation of field strength at the limit distance, expressed in dBμV/m
$FS_{\max}$	is the measured field strength, expressed in dBμV/m
d_{measure}	is the distance of the measurement point from the EUT
d_{limit}	is the reference distance or the distance of the $\lambda/2\pi$ point

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 84dBuV/m at 30 meters.

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22.4 °C Humidity: 52.7 % RH Atmospheric Pressure: 1003 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode with modulation according to antenna 1
Final test	03	TX mode with modulation according to antenna 2

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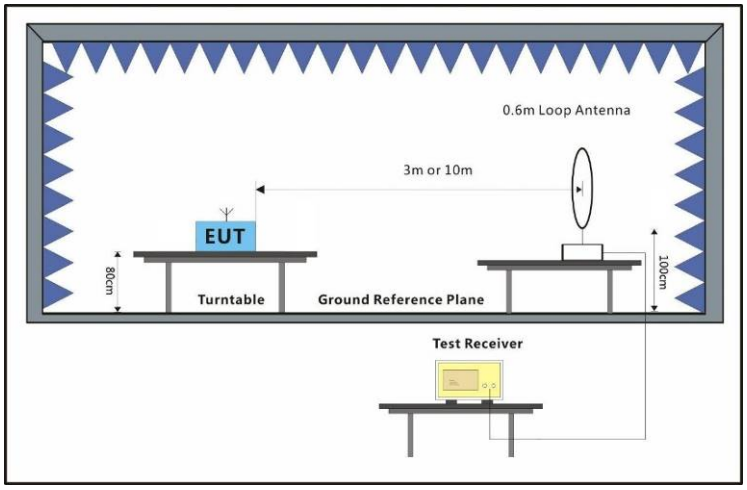
7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1.3 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Measured Level I=Read Level + Antenna Factor + Cable Loss - Preamp Factor + Extrapolation Correction

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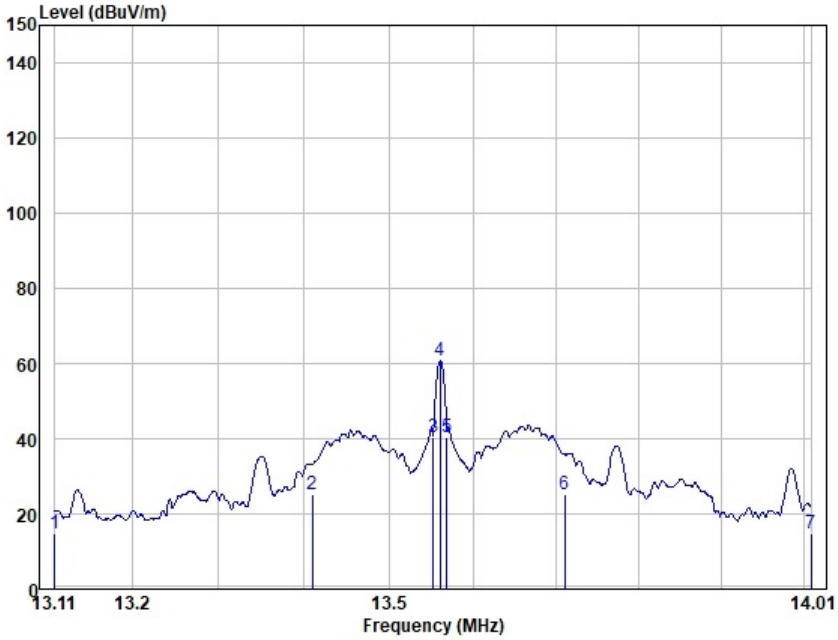
Test Mode: 01; Polarity: X



loop :
Test Mode:
Model :

Frequency MHz	Read level dBuV	Cable Loss dB	Antenna Factor dB/m	Preamp Factor db	Measured level dBuV/m	Limit Line dBuV/m	Over limit dB	Remark
13.110	36.94	0.19	10.61	32.80	14.94			QP
13.410	47.47	0.19	10.54	32.80	25.40			QP
13.553	62.31	0.20	10.51	32.81	40.21			QP
13.561	82.71	0.20	10.51	32.81	60.61			QP
13.569	62.51	0.20	10.51	32.81	40.41			QP
13.710	47.23	0.20	10.49	32.81	25.11			QP
14.010	37.13	0.20	10.43	32.81	14.95			QP

Frequency (MHz)	Measured Level (dBuV/m) @3m	Extrapolation Correction (dB)	Level (dBuV/m) @ 30m	Limit (dBuV/m) @30m	Over limit (dB)
13.110	14.94	40	-25.06	29.54	-54.6
13.410	25.40	40	-14.6	40.51	-55.11
13.550	40.21	40	0.21	50.47	-50.26
13.560	60.61	40	20.61	84	-63.39
13.570	40.41	40	0.41	50.47	-50.06
13.710	25.11	40	-14.89	40.51	-55.4
14.010	14.95	40	-25.05	29.54	-54.59

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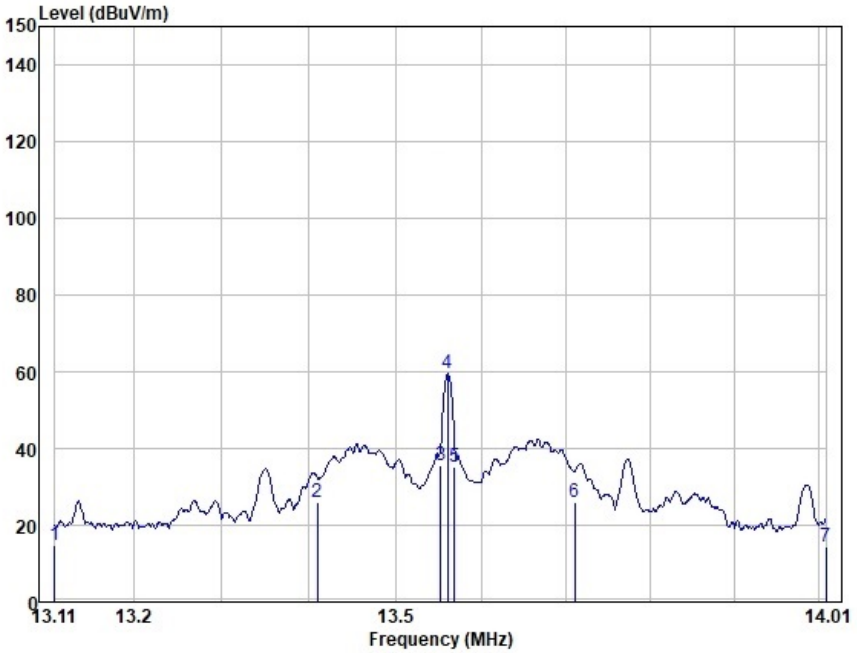
Test Mode: 03; Polarity: X



loop :
Test Mode:
Model :

Frequency MHz	Read level dBuV	Cable Loss dB	Antenna Factor dB/m	Preamp Factor db	Measured level dBuV/m	Limit Line dBuV/m	Over limit dB	Remark
13.110	37.00	0.19	10.61	32.80	15.00			QP
13.410	47.96	0.19	10.54	32.80	25.89			QP
13.553	57.80	0.20	10.51	32.81	35.70			QP
13.561	81.61	0.20	10.51	32.81	59.51			QP
13.569	57.20	0.20	10.51	32.81	35.10			QP
13.710	48.11	0.20	10.49	32.81	25.99			QP
14.010	36.70	0.20	10.43	32.81	14.52			QP

Frequency (MHz)	Measured Level (dBuV/m) @3m	Extrapolation Correction (dB)	Level (dBuV/m) @ 30m	Limit (dBuV/m) @30m	Over limit (dB)
13.110	15.00	40	-25	29.54	-54.54
13.410	25.89	40	-14.11	40.51	-54.62
13.550	35.70	40	-4.3	50.47	-54.77
13.560	59.51	40	19.51	84	-64.49
13.570	35.10	40	-4.9	50.47	-55.37
13.710	25.99	40	-14.01	40.51	-54.52
14.010	14.52	40	-25.48	29.54	-55.02

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7.4 Frequency tolerance

Test Requirement	47 CFR Part 15, Subpart C 15.225(e)
Test Method:	ANSI C63.10 (2013) Section 6.8
Limit:	Within ±0.01% of the operating frequency

7.4.1 E.U.T. Operation

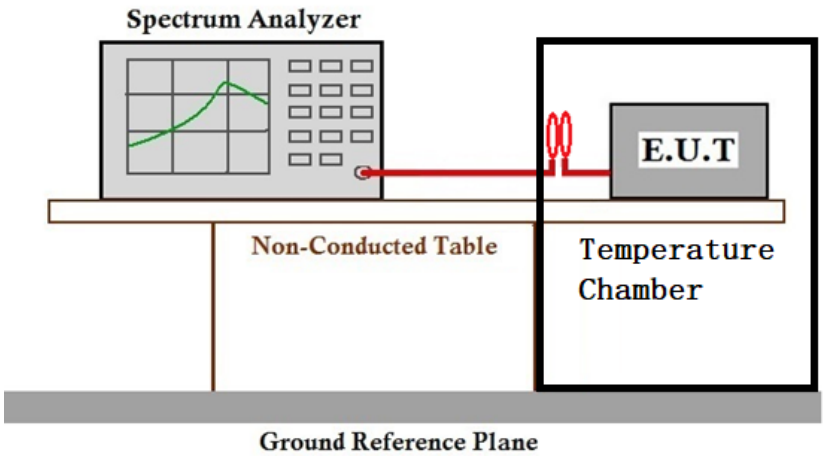
Operating Environment:

Temperature: 22.9 °C Humidity: 65.7 % RH Atmospheric Pressure: 1003 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode with modulation according to antenna 1
Pre-scan	03	TX mode with modulation according to antenna 2

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output.

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At startup:
Limit: ± 0.01%

Voltage (V AC)	Temperature (°C)	Frequency Measured (MHz)	Test data (%)	Verdict
V_{norm}: AC 120V 60Hz	-20	13.561234	0.0091%	Pass
	-10	13.561011	0.0075%	Pass
	0	13.561149	0.0085%	Pass
	10	13.561139	0.0084%	Pass
	T_{normal}: +20	13.560448	0.0033%	Pass
	30	13.561229	0.0091%	Pass
	40	13.561259	0.0093%	Pass
	50	13.561133	0.0084%	Pass
V_{norm}: AC 132V 60Hz	T_{normal}: +20	13.56112	0.0083%	Pass
V_{norm}: AC 108V 60Hz		13.561099	0.0081%	Pass

At 2 minutes later:
Limit: ± 0.01%

Voltage (V AC)	Temperature (°C)	Frequency Measured (MHz)	Test data (%)	Verdict
V_{norm}: AC 120V 60Hz	-20	13.561159	0.0085%	Pass
	-10	13.561192	0.0088%	Pass
	0	13.561039	0.0077%	Pass
	10	13.561354	0.0100%	Pass
	T_{normal}: +20	13.560448	0.0033%	Pass
	30	13.561049	0.0077%	Pass
	40	13.561186	0.0087%	Pass
	50	13.561177	0.0087%	Pass
V_{norm}: AC 132V 60Hz	T_{normal}: +20	13.5612	0.0088%	Pass
V_{norm}: AC 108V 60Hz		13.561009	0.0074%	Pass

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At 5 minutes later:
Limit: ± 0.01%

Voltage (V AC)	Temperature (°C)	Frequency Measured (MHz)	Test data (%)	Verdict
V_{norm}: AC 120V 60Hz	-20	13.561001	0.0074%	Pass
	-10	13.561125	0.0083%	Pass
	0	13.561188	0.0088%	Pass
	10	13.561307	0.0096%	Pass
	T_{normal}: +20	13.560448	0.0033%	Pass
	30	13.561149	0.0085%	Pass
	40	13.561013	0.0075%	Pass
	50	13.561186	0.0087%	Pass
V_{norm}: AC 132V 60Hz	T_{normal}: +20	13.56116	0.0086%	Pass
V_{norm}: AC 108V 60Hz		13.561119	0.0083%	Pass

At 10 minutes later:
Limit: ± 0.01%

Voltage (V AC)	Temperature (°C)	Frequency Measured (MHz)	Test data (%)	Verdict
V_{norm}: AC 120V 60Hz	-20	13.561056	0.0078%	Pass
	-10	13.561275	0.0094%	Pass
	0	13.561014	0.0075%	Pass
	10	13.561253	0.0092%	Pass
	T_{normal}: +20	13.560448	0.0033%	Pass
	30	13.561103	0.0081%	Pass
	40	13.561337	0.0099%	Pass
	50	13.561137	0.0084%	Pass
V_{norm}: AC 132V 60Hz	T_{normal}: +20	13.56121	0.0089%	Pass
V_{norm}: AC 108V 60Hz		13.561121	0.0083%	Pass

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7.5 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209
Test Method: ANSI C63.10 (2013) Section 6.4&6.5
Test Distance: 3 m
Limit:

Frequency(MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30

Below 30MHz

If field strength is measured at only a single point, then that point shall be at the radial from the EUT that produces the maximum emission at the frequency being measured, as described in 5.4. If that point is closer to the EUT than λ/2π and the limit distance is greater than λ/2π, the measurement shall be extrapolated to the limit distance by conservatively presuming that the field strength decreases at a 40 dB/decade of distance rate to the λ/2π distance, and at a 20 dB/decade of distance rate beyond λ/2π. This shall be accomplished using Equation (2):

$$FS_{(3m)} = FS_{(30/300m)} + 40\log\{d_{(near\ field)}/d_{(3m)}\} + 20\log\{d_{(30/300m)}/d_{(near\ field)}\} \quad (2)$$

If the single point measured is at a distance greater than λ/2π, then extrapolation to the limit distance shall be calculated using Equation (3):

$$FS_{(3m)} = FS_{(30/300m)} + 20\log\{d_{(30/300m)}/d_{(3m)}\} \quad (3)$$

If both the single point and the limit distance are equal to or closer to the EUT than λ/2π, then extrapolation to the limit distance shall be calculated using Equation (4):

$$FS_{(3m)} = FS_{(30/300m)} + 40\log\{d_{(30/300m)}/d_{(3m)}\} \quad (4)$$

Remark:

$$d_{near\ field} = 47.77 / f_{MHz}$$

where f_{MHz} is the frequency of the emission being measured in MHz.

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

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$$FS_{\text{limit}} = FS_{\max} - 40\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

where

FS_{limit}	is the calculation of field strength at the limit distance, expressed in dBμV/m
$FS_{\max}$	is the measured field strength, expressed in dBμV/m
d_{measure}	is the distance of the measurement point from the EUT
d_{limit}	is the reference distance or the distance of the λ/2π point

7.5.1 E.U.T. Operation

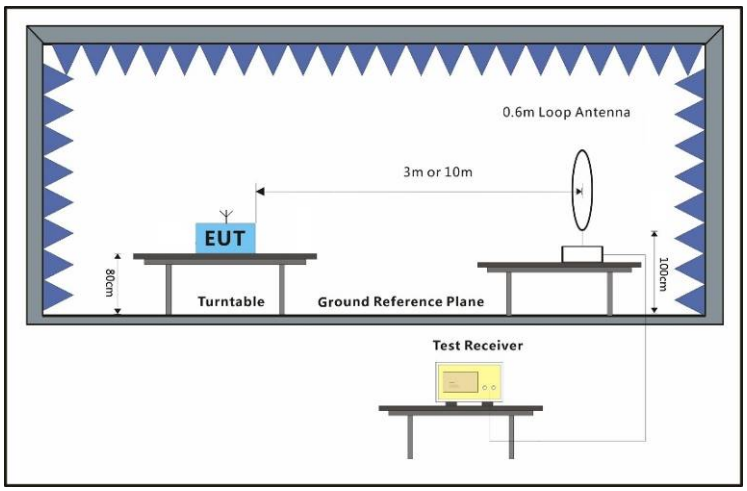
Operating Environment:

Temperature: 22.4 °C Humidity: 52.7 % RH Atmospheric Pressure: 1003 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode with modulation according to antenna 1
Final test	03	TX mode with modulation according to antenna 2

7.5.3 Test Setup Diagram



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7.5.4 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Measured Level l=Read Level + Antenna Factor + Cable Loss - Preamp Factor + Extrapolation Correction

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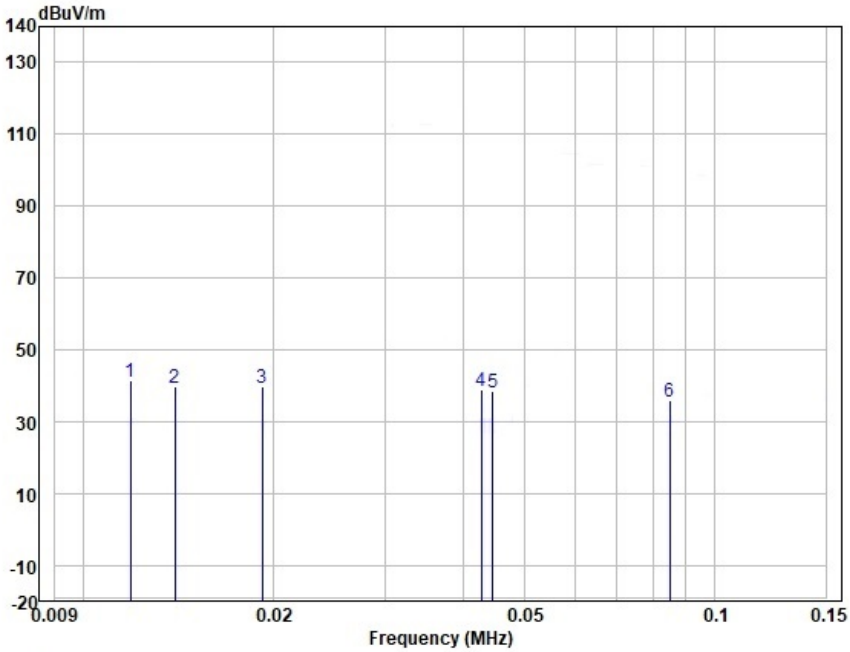
Test Mode: 01 & 03; Axial:X



loop :
Test Mode: X
Model :

Frequency MHz	Read level dBuV	Cable Loss dB	Antenna Factor dB/m	Preamp Factor db	Measured level dBuV/m	Limit Line dBuV/m	Over limit dB	Remark
0.01	53.07	0.01	20.69	32.84	40.93			
0.01	53.45	0.01	18.88	32.84	39.50			
0.02	54.92	0.01	17.13	32.84	39.22			
0.04	56.31	0.01	15.11	32.84	38.59			
0.04	55.94	0.01	15.07	32.84	38.18			
0.08	53.74	0.01	14.59	32.84	35.50			

Frequency (MHz)	Level @3m (dBuV/m)	Limit @300m (dBuV/m)	Convert Factor (dB)	Level @ 300m (dBuV/m)	Over limit (dB)	Remark
0.01	40.93	47.60	80	-39.07	-86.67	AV
0.01	39.50	47.60	80	-40.50	-88.10	AV
0.02	39.22	41.58	80	-40.78	-82.36	AV
0.04	38.59	35.56	80	-41.41	-76.97	AV
0.04	38.18	35.56	80	-41.82	-77.38	AV
0.08	35.50	29.54	80	-44.50	-74.04	AV

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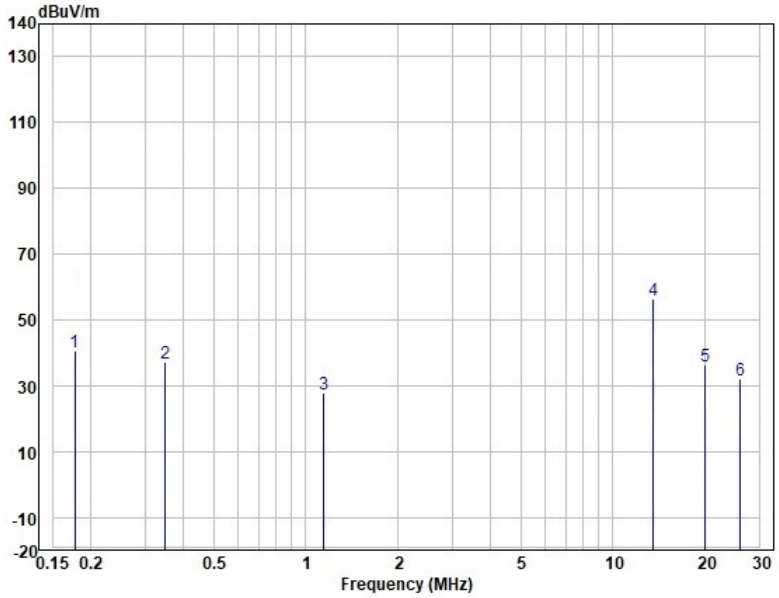
Test Mode: 01 & 03; Axial:X



loop :
Test Mode: X
Model :

Frequency MHz	Read level dBuV	Cable Loss dB	Antenna Factor dB/m	Preamp Factor db	Measured level dBuV/m	Limit Line dBuV/m	Over limit dB	Remark
0.18	58.23	0.01	14.68	32.84	40.08			
0.35	54.91	0.01	14.59	32.84	36.67			
1.14	46.80	0.05	13.38	32.83	27.40			
13.55	78.14	0.20	10.51	32.81	56.04			
19.95	58.90	0.24	9.41	32.81	35.74			
26.00	57.32	0.28	6.82	32.83	31.59			

Frequency (MHz)	Level @3m (dBuV/m)	Extrapolation Correction (dB)	Level @ 300m (dBuV/m)	Limit @300m (dBuV/m)	Over limit (dB)	Remark
0.18	40.08	80	-39.92	22.50	-62.42	AV
0.35	36.67	80	-43.33	16.72	-60.05	AV
Frequency (MHz)	**Level @3m (dBuV/m)**	**Extrapolation Correction (dB)**	**Level @ 30m (dBuV/m)**	**Limit @30m (dBuV/m)**	**Over limit (dB)**	**Remark**
1.14	27.40	40	-12.60	26.47	-39.07	QP
13.55	56.04	40	16.04	29.54	-13.50	QP
19.95	35.74	40	-4.26	29.54	-33.80	QP
26	31.59	40	-8.41	29.54	-37.95	QP

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中国・广东・广州高新技术产业开发区科学城科珠路198号 邮编：510663 t (86-20) 82155555 sgs.china@sgs.com
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7.6 Radiated Emissions (30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Limit:

Frequency (MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.6.1 E.U.T. Operation

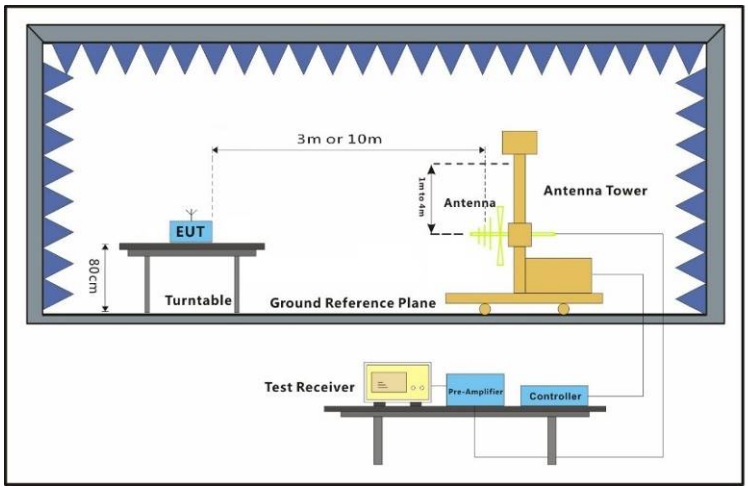
Operating Environment:

Temperature: 23.5 °C Humidity: 53.7 % RH Atmospheric Pressure: 1001 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode with modulation

7.6.3 Test Setup Diagram



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No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663 t (86-20) 82155555 www.sgsgroup.com.cn
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7.6.4 Measurement Procedure and Data

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter 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. 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. 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 (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. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report. Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663 t (86-20) 82155555 www.sgsgroup.com.cn
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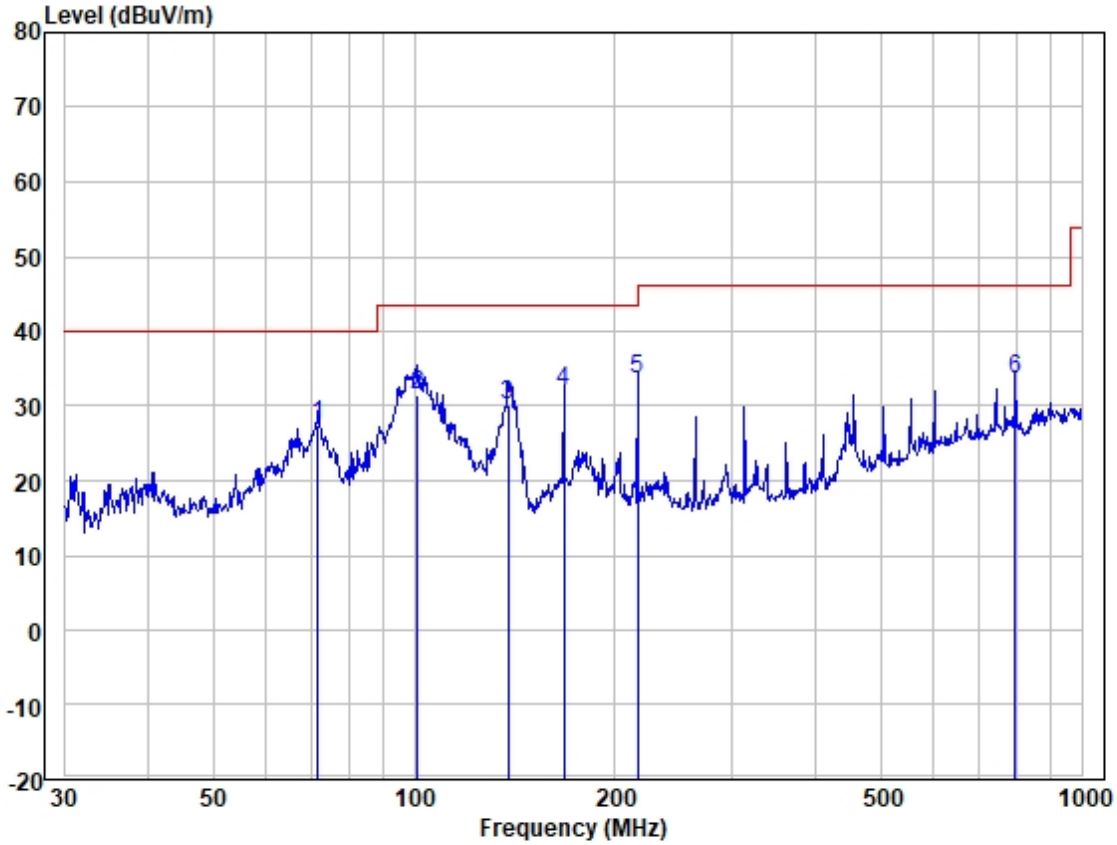
Test Mode: 01; Polarity: Horizontal



Site : 966 Chamber
Job :
Model :
Power : 120V
Test Mode :

	Freq	Read Level	Anterna 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	71.832	43.00	16.83	0.47	32.85	27.45	40.00	-12.55	HORIZONTAL	QP
2	101.289	49.07	14.71	0.54	32.80	31.52	43.52	-12.00	HORIZONTAL	QP
3	138.387	43.65	18.59	0.64	32.81	30.07	43.52	-13.45	HORIZONTAL	QP
4	167.824	45.11	18.88	0.72	32.83	31.88	43.52	-11.64	HORIZONTAL	QP
5	216.024	49.85	15.66	0.81	32.84	33.48	46.02	-12.54	HORIZONTAL	QP
6	793.396	36.15	28.32	1.66	32.43	33.70	46.02	-12.32	HORIZONTAL	QP

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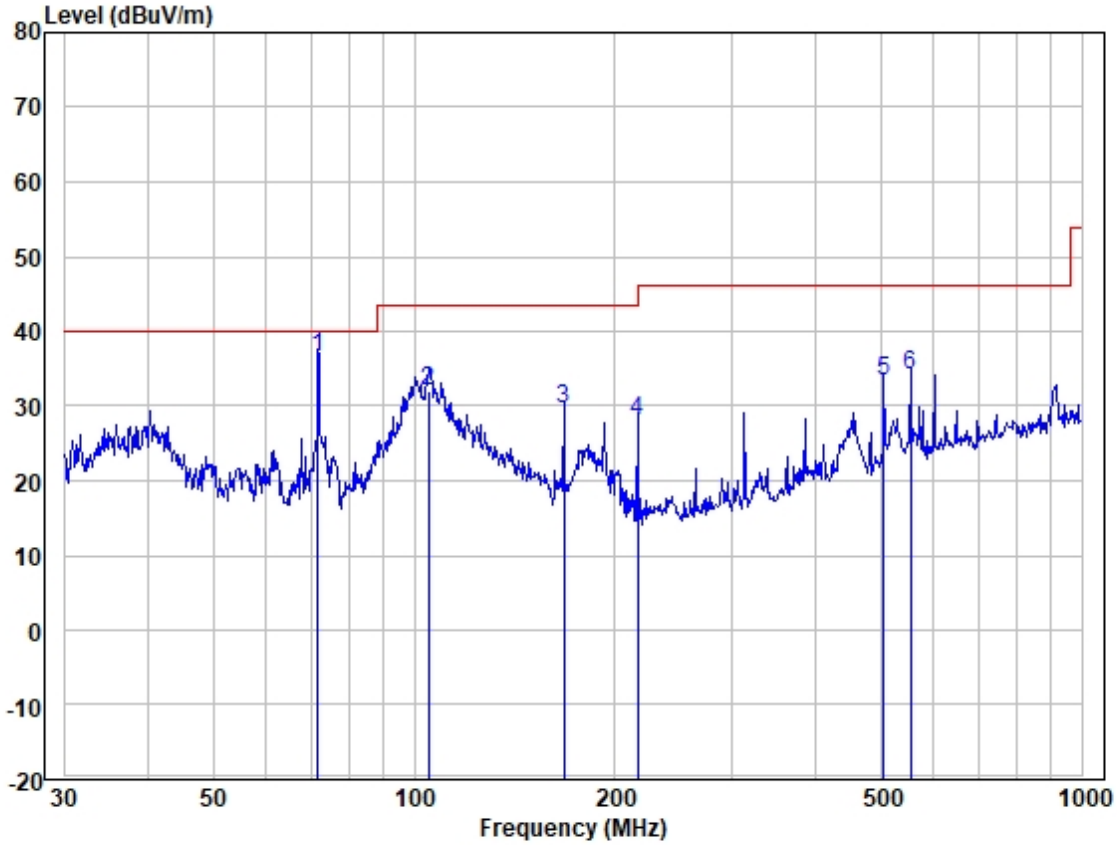
Test Mode: 01; Polarity: Vertical



Site : 966 Chamber
Job :
Model :
Power : 120V
Test Mode :

	Freq	Read Level	Anterna 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	71.832	52.05	16.83	0.47	32.85	36.50	40.00	-3.50	VERTICAL	QP
2	105.272	48.87	15.49	0.55	32.80	32.11	43.52	-11.41	VERTICAL	QP
3	167.824	42.75	18.88	0.72	32.83	29.52	43.52	-14.00	VERTICAL	QP
4	216.024	44.35	15.66	0.81	32.84	27.98	46.02	-18.04	VERTICAL	QP
5	504.706	41.31	23.61	1.29	32.99	33.22	46.02	-12.80	VERTICAL	QP
6	552.883	41.28	24.38	1.37	32.95	34.08	46.02	-11.94	VERTICAL	QP

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8 Test Setup Photo

Refer to Setup Photos for GZCR240600063103

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9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2406000631AT

- End of the Report -

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