TEST REPORT

Application No.:	GZCR2211001400AT
Applicant:	Guangzhou e-Design Intelligent Technology Co., Ltd.
Address of Applicant:	Room 3308, Holdround Plaza, DaNan Road, YueXiu District, Guangzhou City, GuangDong Prov., China
Manufacturer:	The same as applicant
Address of Manufacturer:	The same as applicant
Factory:	The same as applicant
Address of Factory:	The same as applicant
Equipment Under Test (EUT):	
EUT Name:	DC Electronic Load
Model No.:	MDP-L1060
Trade Mark:	MINI
Standard(s) :	47 CFR Part 15, Subpart C 15.249
Date of Receipt:	2022-11-02
Date of Test:	2022-11-11 to 2022-12-06
Date of Issue:	2023-04-03
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	GZCR221100140002	2023-04-03	Original

Authorized for issue by:				
		Kevin Zhang **Kevin Zhang/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 15.249	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.249	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
Field Strength of the Fundamental Signal (15.249(a))		ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass
Restricted Band Around Fundamental Frequency		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209	Pass
Radiated Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass
Radiated Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	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.

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4 General Information

4.1 Details of E.U.T.

Power supply:	Powered by built-in battery for normal working Model: YJ702045 Rated: DC 3.7 V, 600mAh, 2.22Wh DC 5V, 2 A for charging
Cable(s):	VS input ports +/- Load output ports +/-
Test Voltage:	AC 120 V, 60 Hz powered by AC/DC Adapter refer to section 4.2
Operation Frequency:	2405 MHz, 2441 MHz, 2478 MHz
Modulation Type:	GFSK
Number of Channels:	3
Channel Spacing:	N/A
Antenna Type:	Integral Antenna

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
AC/DC Adapter	MEAN WELL	Model: RSP-75-5; Input: AC 100-240V, 0.9A, 50/60Hz; Output: DC 5V, 15A max.	/
USB Cable (1.0m length)	/	/	/

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4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	± 2.76dB (150kHz to 30MHz)
20dB Bandwidth	± 3%
Field Strength of the Fundamental Signal (15.249(a))	±5.00dB (30MHz-1GHz; 3m);±4.38dB (30MHz-1GHz; 10m);± 5.12dB (1GHz-6GHz);± 5.38dB (6GHz-18GHz);± 5.61dB (18GHz-40GHz)
Restricted Band Around Fundamental Frequency	±5.00dB (30MHz-1GHz; 3m);±4.38dB (30MHz-1GHz; 10m);± 5.12dB (1GHz-6GHz);± 5.38dB (6GHz-18GHz);± 5.61dB (18GHz-40GHz)
Radiated Emissions Below 1GHz	± 5.00dB (30MHz-1GHz):3m; ± 4.38dB (30MHz-1GHz):10m
Radiated Emissions Above 1GHz	±5.12 dB (1GHz-6 GHz); ±5.38 dB (6GHz-18GHz); ±5.61 dB(18GHz-40GHz)

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,

198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

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

No tests were sub-contracted.

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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

None

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5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Coaxial Cable	HangTianXing	2m	EMC0107	2022-08-24	2023-08-23
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	2022-09-09	2023-09-08
EMI Test Receiver (9kHz-3.6GHz)	Rohde & Schwarz	ESR3	EMC2221	2022-05-20	2023-05-19
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**
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
MXA Signal Analyzer (10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2022-03-03	2023-03-02

Field Strength of the Fundamental Signal (15.249(a))					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

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Restricted Band Around Fundamental Frequency					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

Radiated Emissions Below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15
Chamber cable	HangTianXing	N/A	EMC0542	2022-08-24	2023-08-23
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2022-06-21	2023-06-20
High Pass Filter (915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2021-12-17	2022-12-16
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2022-05-20	2023-05-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	EMC2174	2022-06-19	2025-06-18

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Radiated Emissions Above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DMM	Fluke	73	EMC0006	2022-06-24	2023-06-23

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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 AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

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		

7.1.1 E.U.T. Operation

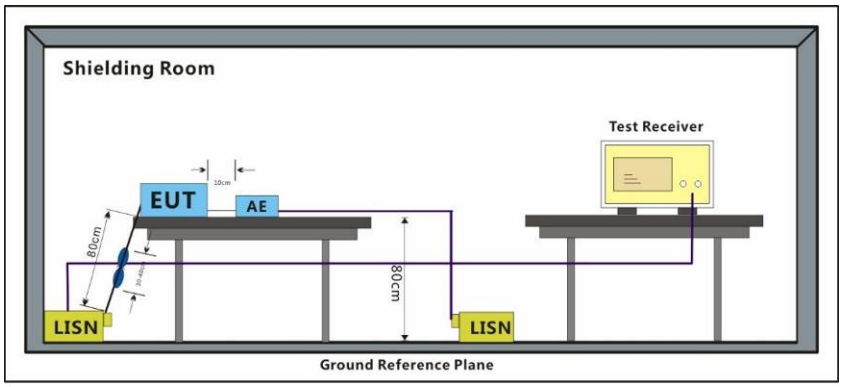
Operating Environment:

Temperature: 24.6 °C Humidity: 53.5 % RH Atmospheric Pressure: 1014 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	Charge + TX mode_Keep the EUT in charging and transmitting with modulation mode.

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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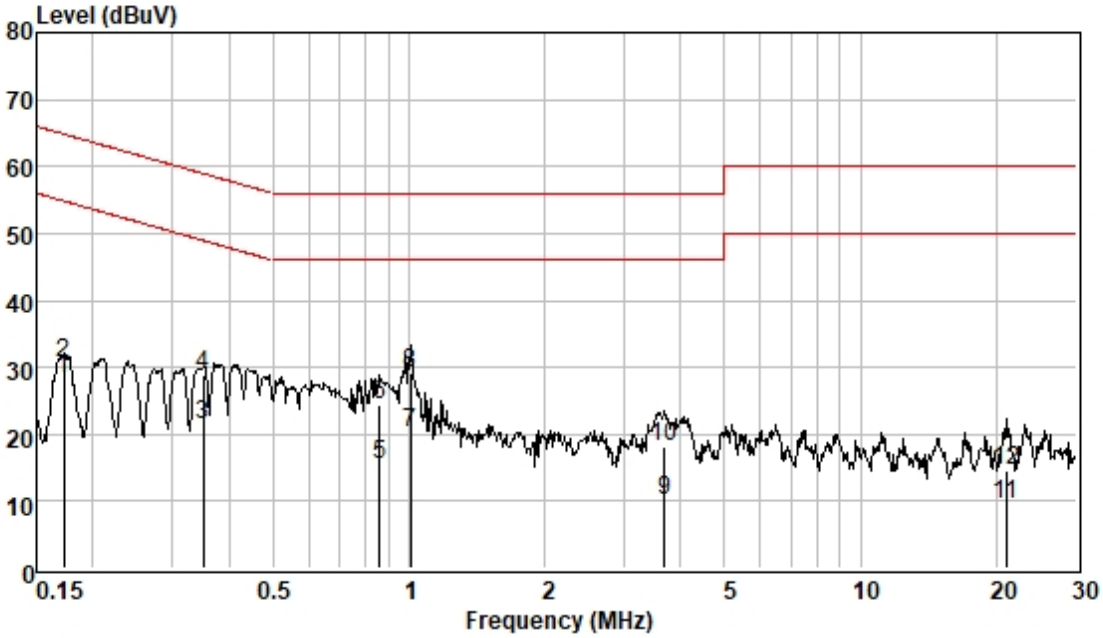
Test Mode: 01; Line: Live line



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
1	0.172	18.44	0.06	9.61	28.11	54.86	-26.75	Average
2	0.172	20.96	0.06	9.61	30.63	64.86	-34.23	QP
3	0.350	11.81	0.06	9.60	21.47	48.96	-27.49	Average
4	0.350	19.30	0.06	9.60	28.96	58.96	-30.00	QP
5	0.862	5.72	0.07	9.60	15.39	46.00	-30.61	Average
6	0.862	14.84	0.07	9.60	24.51	56.00	-31.49	QP
7	1.010	10.43	0.07	9.59	20.09	46.00	-25.91	Average
8	1.010	19.37	0.07	9.59	29.03	56.00	-26.97	QP
9	3.681	0.22	0.16	9.63	10.01	46.00	-35.99	Average
10	3.681	8.39	0.16	9.63	18.18	56.00	-37.82	QP
11	20.924	-0.57	0.36	9.67	9.46	50.00	-40.54	Average
12	20.924	4.46	0.36	9.67	14.49	60.00	-45.51	QP

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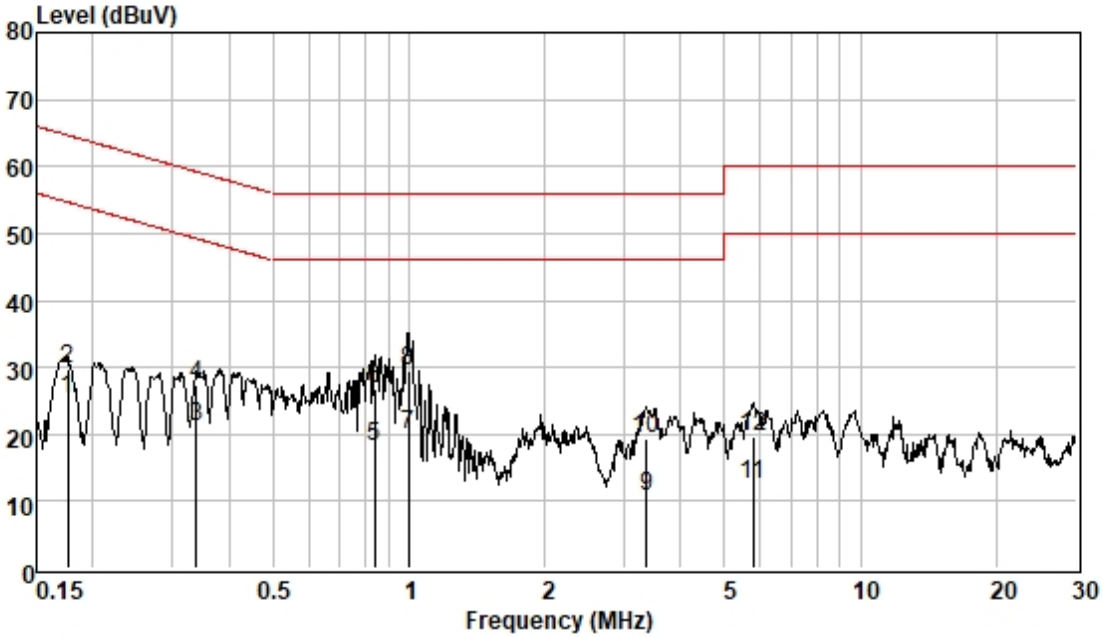
Test Mode: 01; Line: Neutral Line



Pol :NEUTRAL
Mode :
Model :

	Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
1	0.176	15.76	0.06	9.60	25.42	54.68	-29.26	Average
2	0.176	20.19	0.06	9.60	29.85	64.68	-34.83	QP
3	0.339	11.31	0.06	9.61	20.98	49.22	-28.24	Average
4	0.339	17.64	0.06	9.61	27.31	59.22	-31.91	QP
5	0.839	8.57	0.07	9.61	18.25	46.00	-27.75	Average
6	0.839	17.19	0.07	9.61	26.87	56.00	-29.13	QP
7	1.000	10.15	0.07	9.61	19.83	46.00	-26.17	Average
8	1.000	19.80	0.07	9.61	29.48	56.00	-26.52	QP
9	3.364	0.87	0.15	9.63	10.65	46.00	-35.35	Average
10	3.364	9.59	0.15	9.63	19.37	56.00	-36.63	QP
11	5.774	2.76	0.18	9.66	12.60	50.00	-37.40	Average
12	5.774	9.71	0.18	9.66	19.55	60.00	-40.45	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

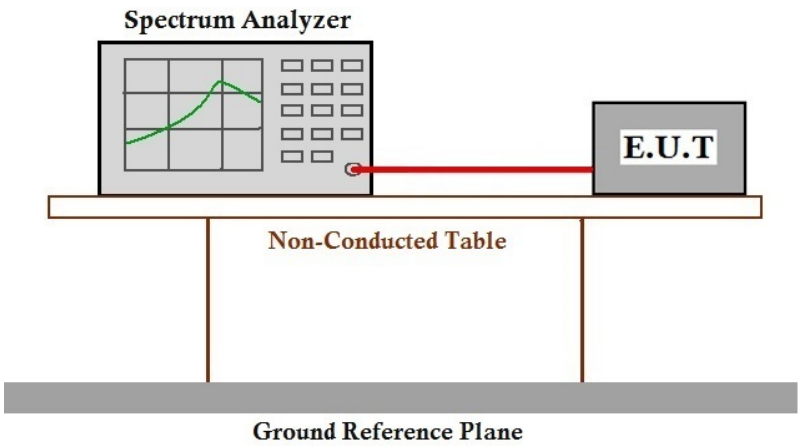
Operating Environment:

Temperature: 23.3 °C Humidity: 51.9 % RH Atmospheric Pressure: 1022 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

7.2.3 Test Setup Diagram



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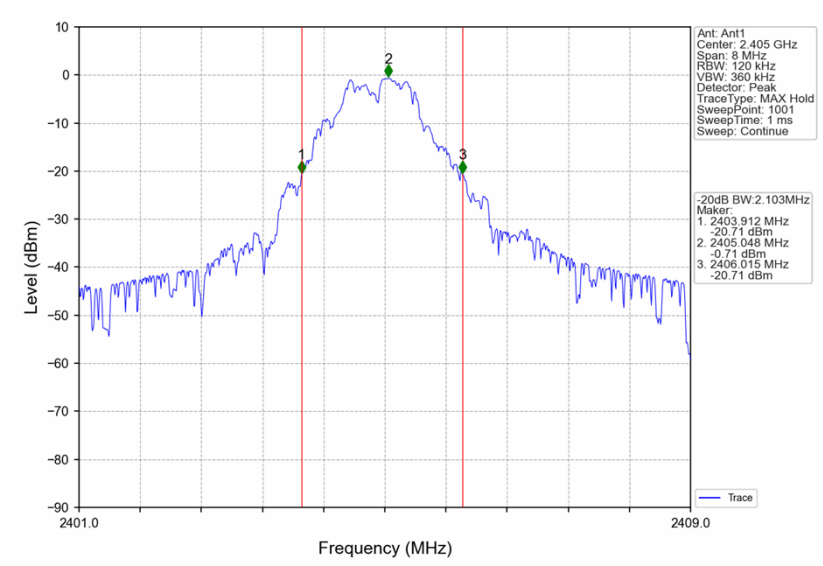
7.2.4 Measurement Procedure and Data

1.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	20dB Bandwidth (MHz)	Verdict
				Result	
GFSK	SISO	2405	1	2.103	Pass
		2441	1	2.087	Pass
		2478	1	2.244	Pass

1.1.2 Test Graph

LCH_2405MHz_Ant1_NTNV



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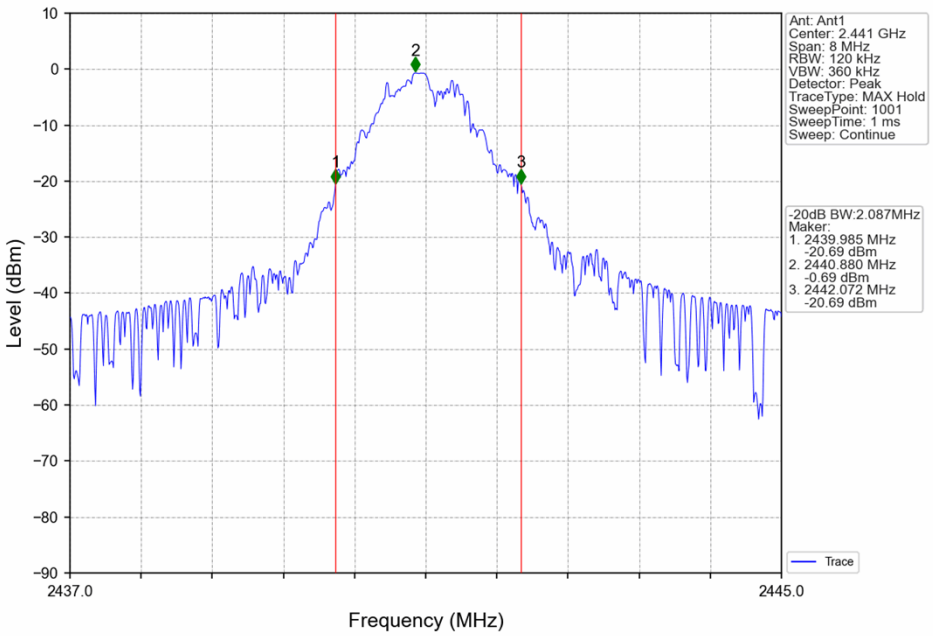
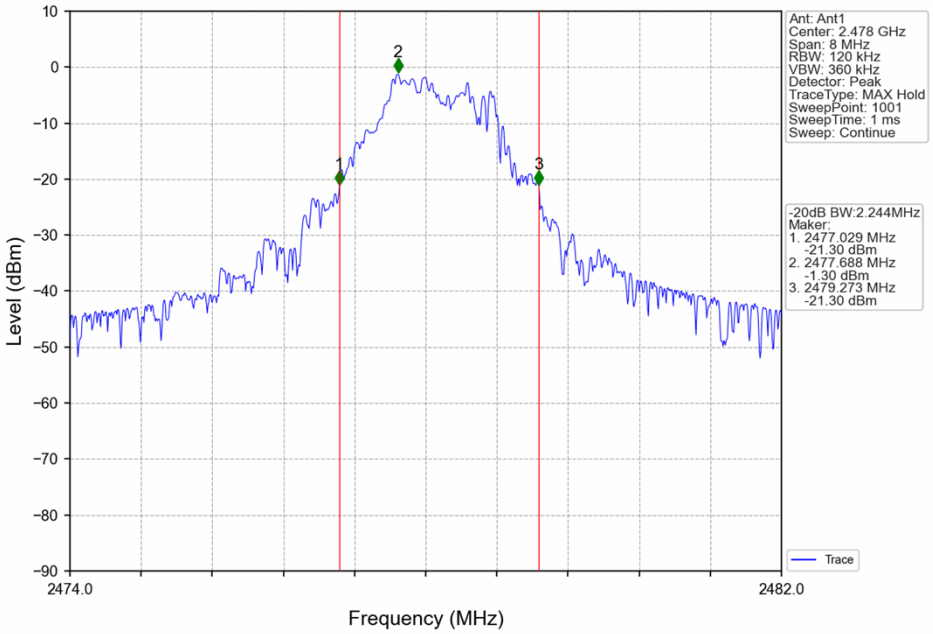
MCH_2441MHz_Ant1_NTNV



HCH_2478MHz_Ant1_NTNV



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7.3 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)

Test Method: ANSI C63.10 (2013) Section 6.5&6.6

Limit:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500
Remark: The frequencies above 1000MHz are based on average limits. However, 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. For fundamental frequency in “902-928MHz”, the field strength of fundamental is based on Quasi-Peak.		

7.3.1 E.U.T. Operation

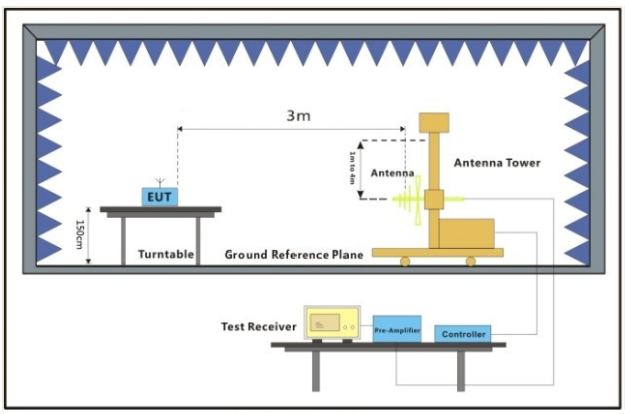
Operating Environment:

Temperature: 24.3 °C Humidity: 64.9 % RH Atmospheric Pressure: 1014 mbar

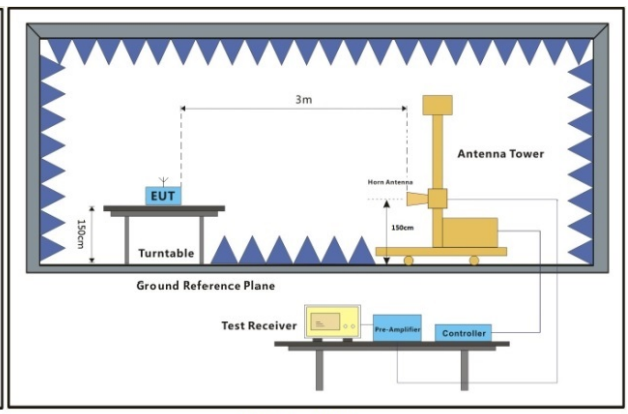
7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.
Pre-scan	01	Charge + TX mode_Keep the EUT in charging and transmitting with modulation mode.

7.3.3 Test Setup Diagram



30MHz-1GHz



Above 1GHz

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7.3.4 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c.The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. 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.

e.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.

f.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g.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.

h.Test the EUT in the lowest channel, the middle channel, the Highest channel.

i.The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j.Repeat above procedures until all frequencies measured was complete.

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

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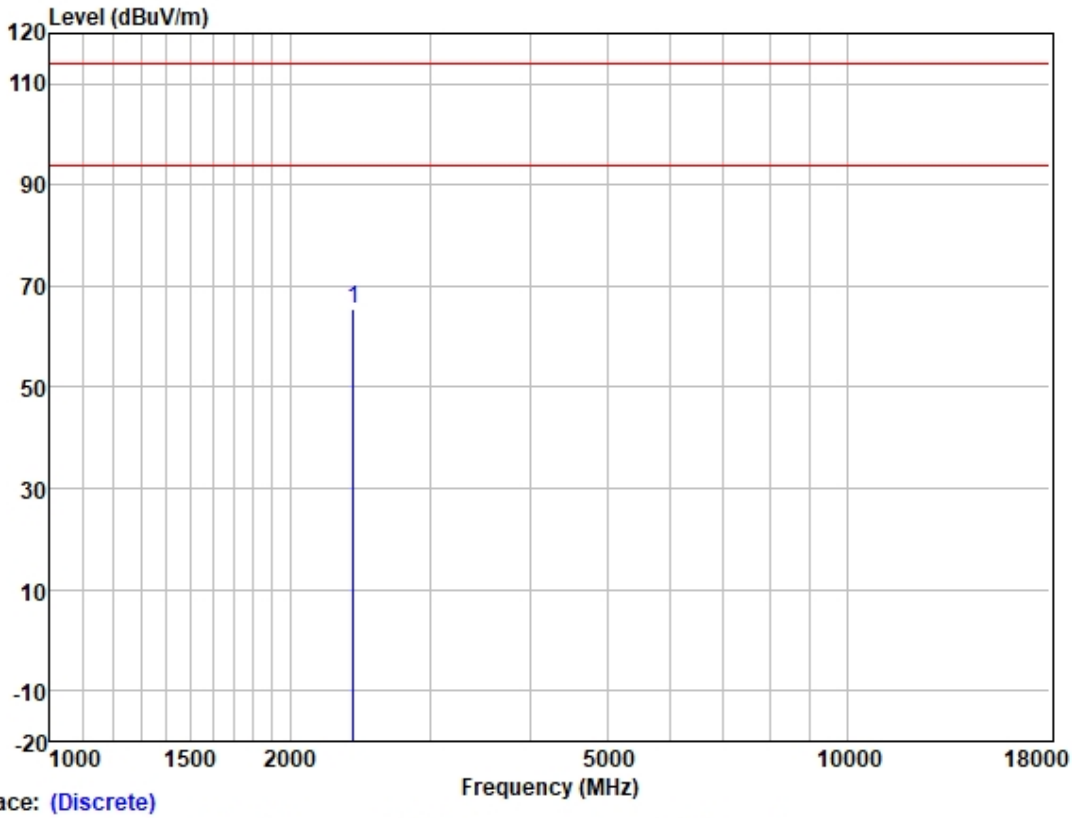
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2405.753	71.23	27.48	4.07	37.14	65.64	114.00	-48.36	HORIZONTAL	Peak

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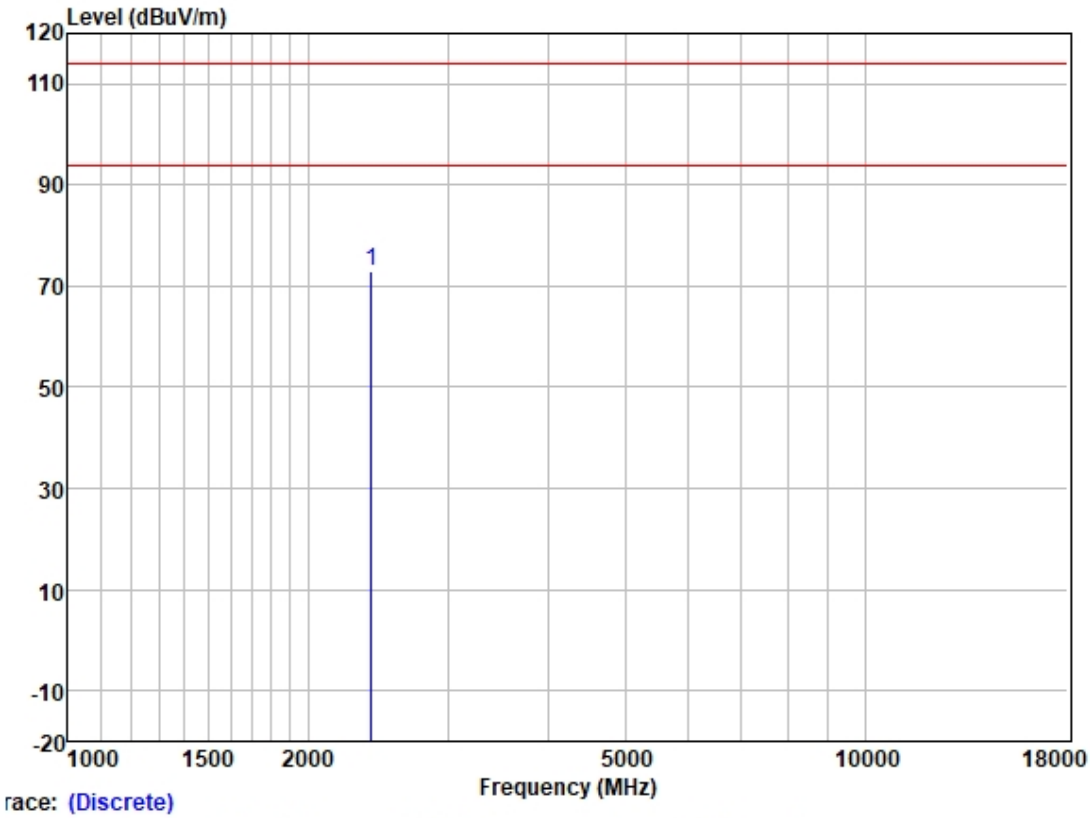
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2405.753	78.46	27.48	4.07	37.14	72.87	114.00	-41.13	VERTICAL	Peak

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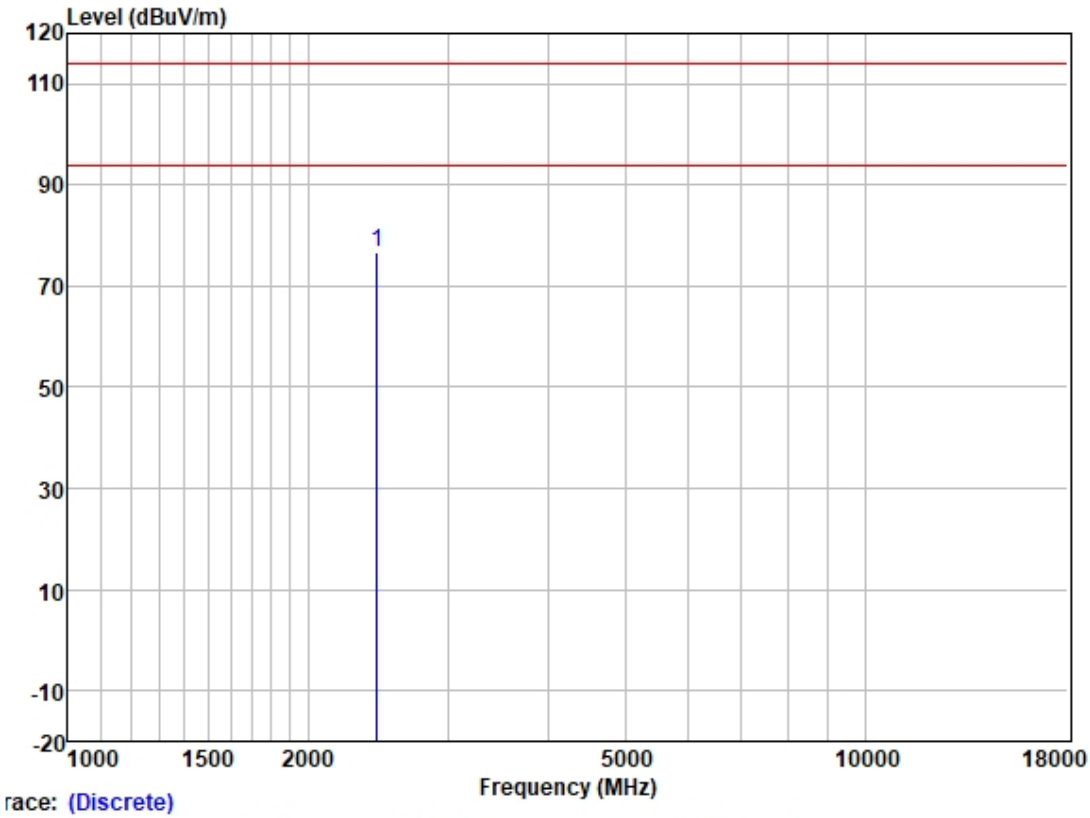
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:middle



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2441.751	82.23	27.62	3.82	37.13	76.54	114.00	-37.46	VERTICAL	Peak

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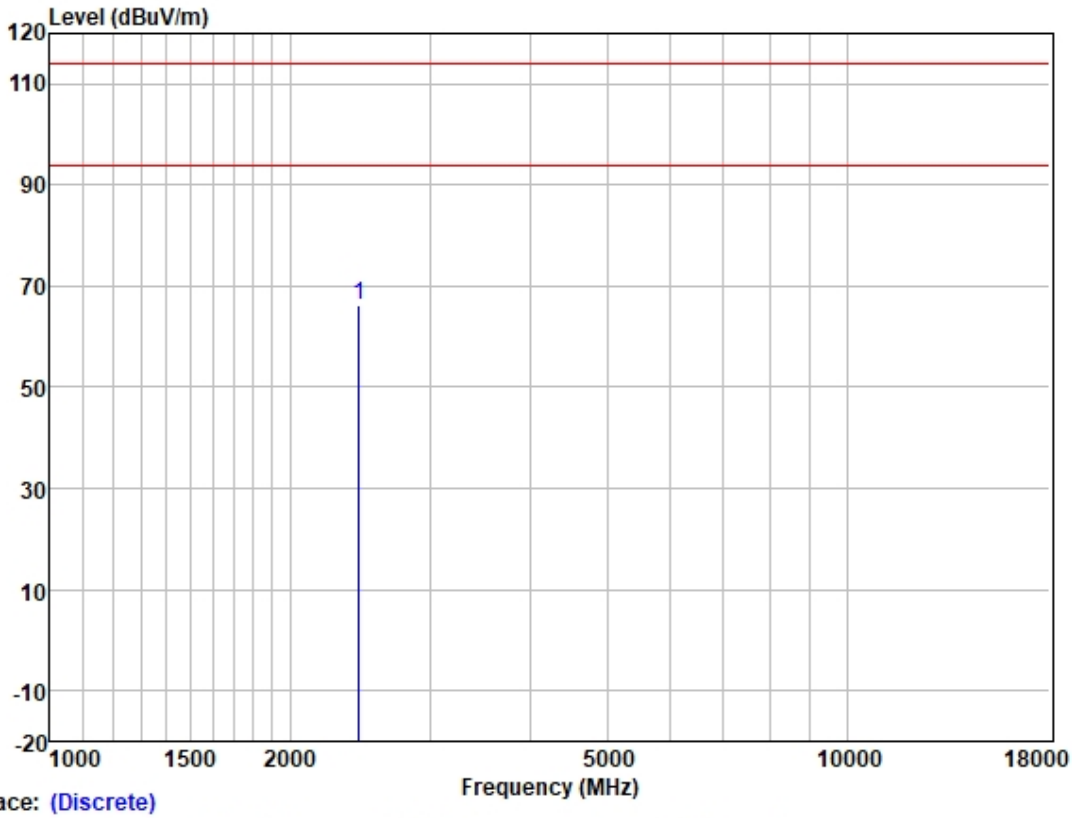
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:middle



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2441.751	72.09	27.62	3.82	37.13	66.40	114.00	-47.60	HORIZONTAL	Peak

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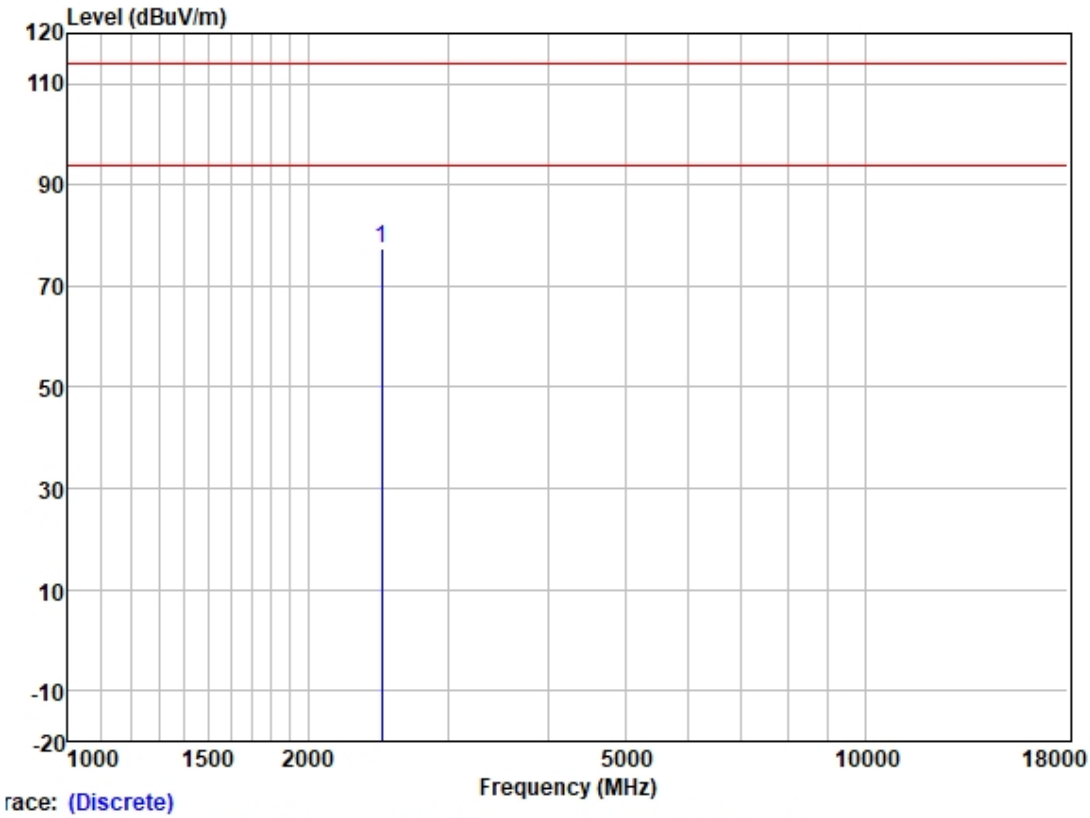
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2478.157	83.18	27.78	3.50	37.13	77.33	114.00	-36.67	HORIZONTAL	Peak

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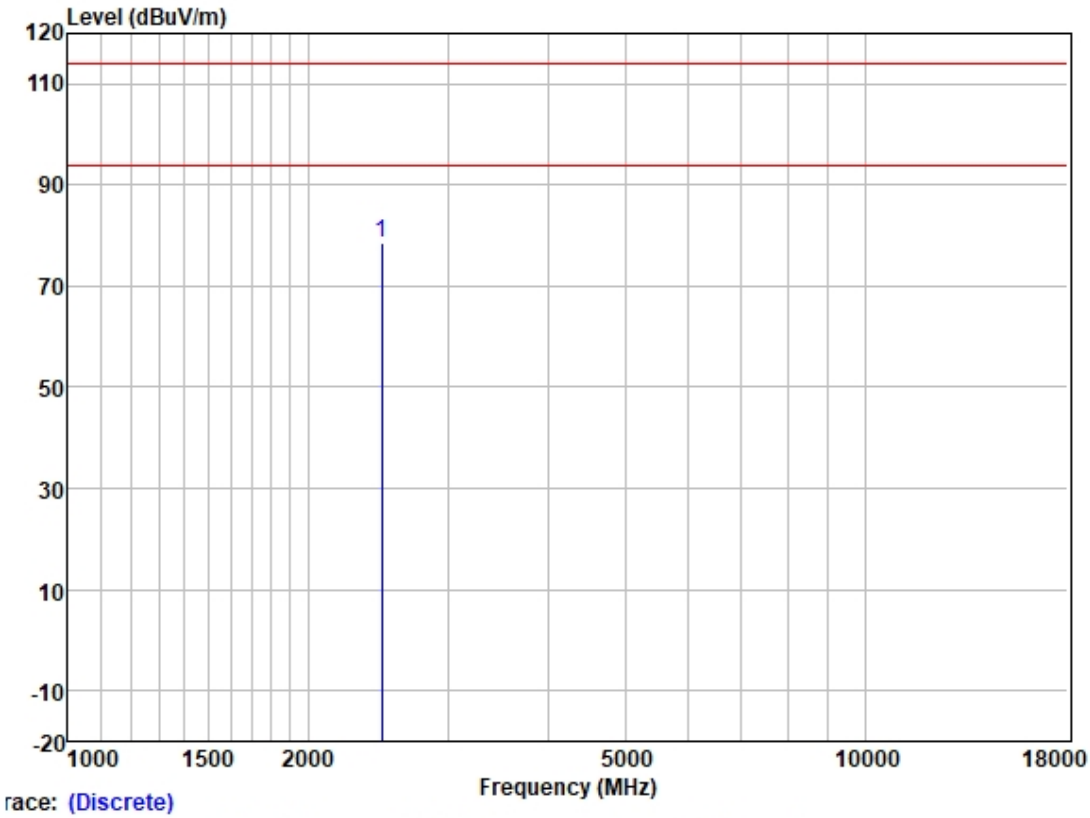
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2478.157	84.33	27.78	3.50	37.13	78.48	114.00	-35.52	VERTICAL	Peak

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7.4 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
Above 1GHz	74.0	Peak Value
Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.		

7.4.1 E.U.T. Operation

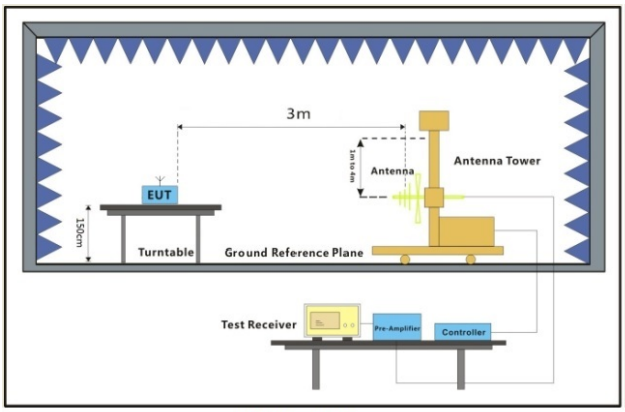
Operating Environment:

Temperature: 24.3 °C Humidity: 64.9 % RH Atmospheric Pressure: 1014 mbar

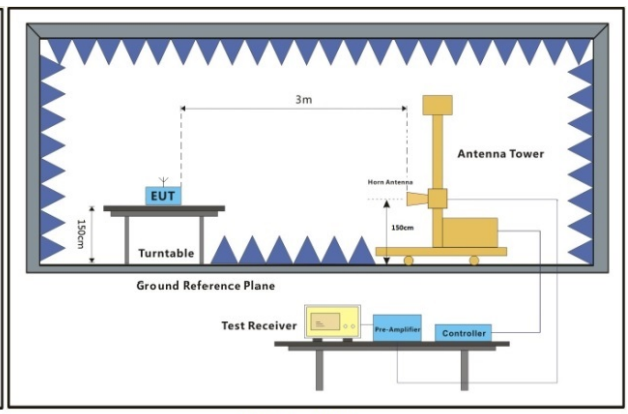
7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.
Pre-scan	01	Charge + TX mode_Keep the EUT in charging and transmitting with modulation mode.

7.4.3 Test Setup Diagram



30MHz-1GHz



Above 1GHz

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7.4.4 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. 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.

e. 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.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. 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.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

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

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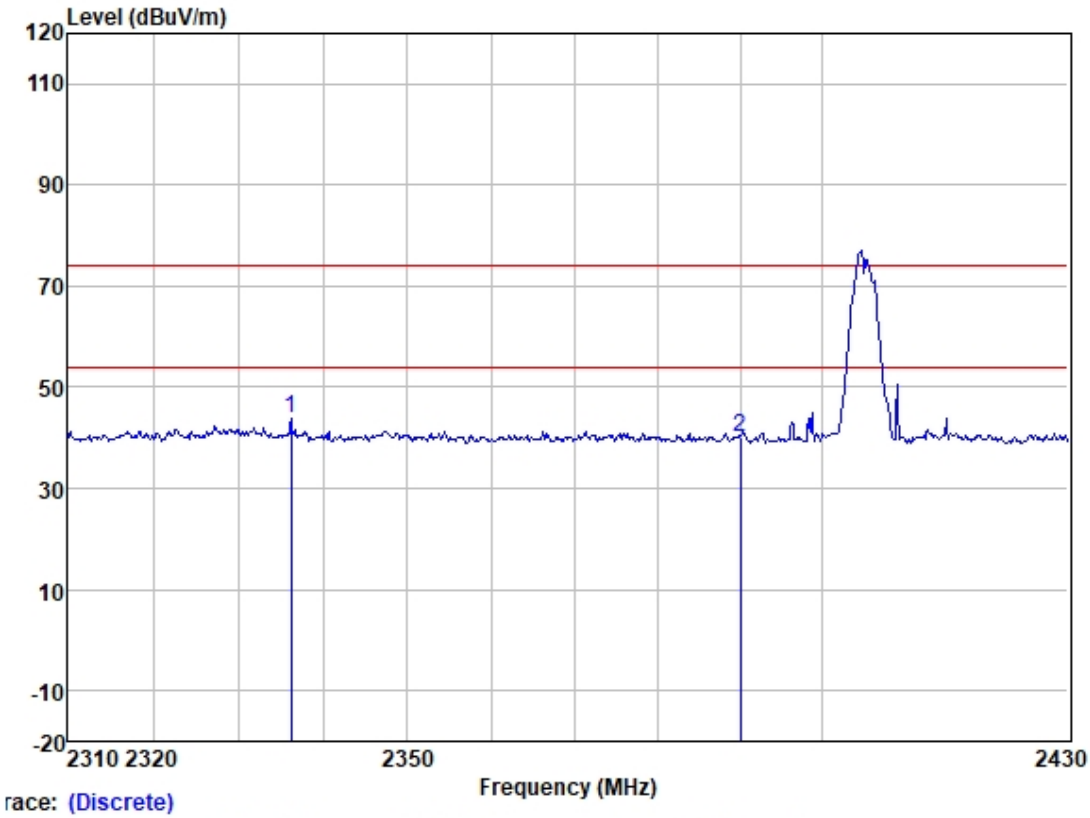
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2336.236	48.97	27.39	4.68	37.15	43.89	74.00	-30.11	VERTICAL	Peak
2	2390.000	45.45	27.45	4.22	37.14	39.98	74.00	-34.02	VERTICAL	Peak

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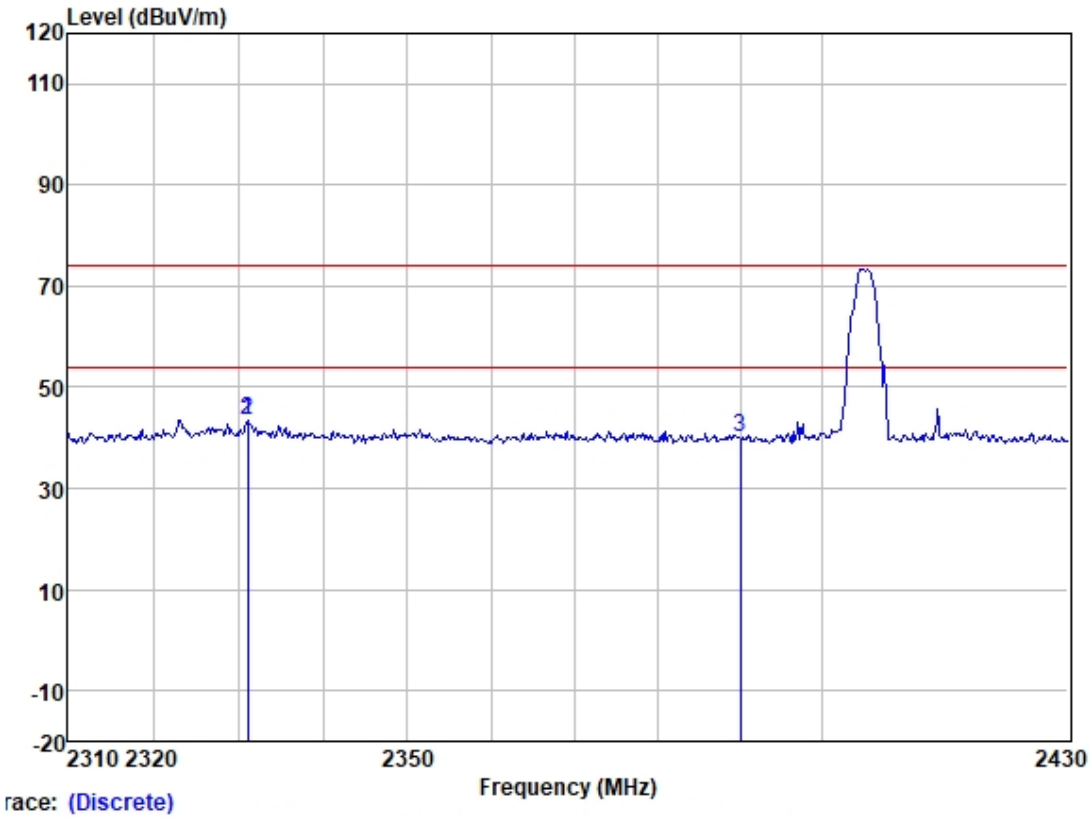
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2331.154	48.55	27.38	4.76	37.15	43.54	74.00	-30.46	HORIZONTAL	Peak
2	2331.154	48.55	27.38	4.76	37.15	43.54	74.00	-30.46	HORIZONTAL	Peak
3	2390.000	45.60	27.45	4.22	37.14	40.13	74.00	-33.87	HORIZONTAL	Peak

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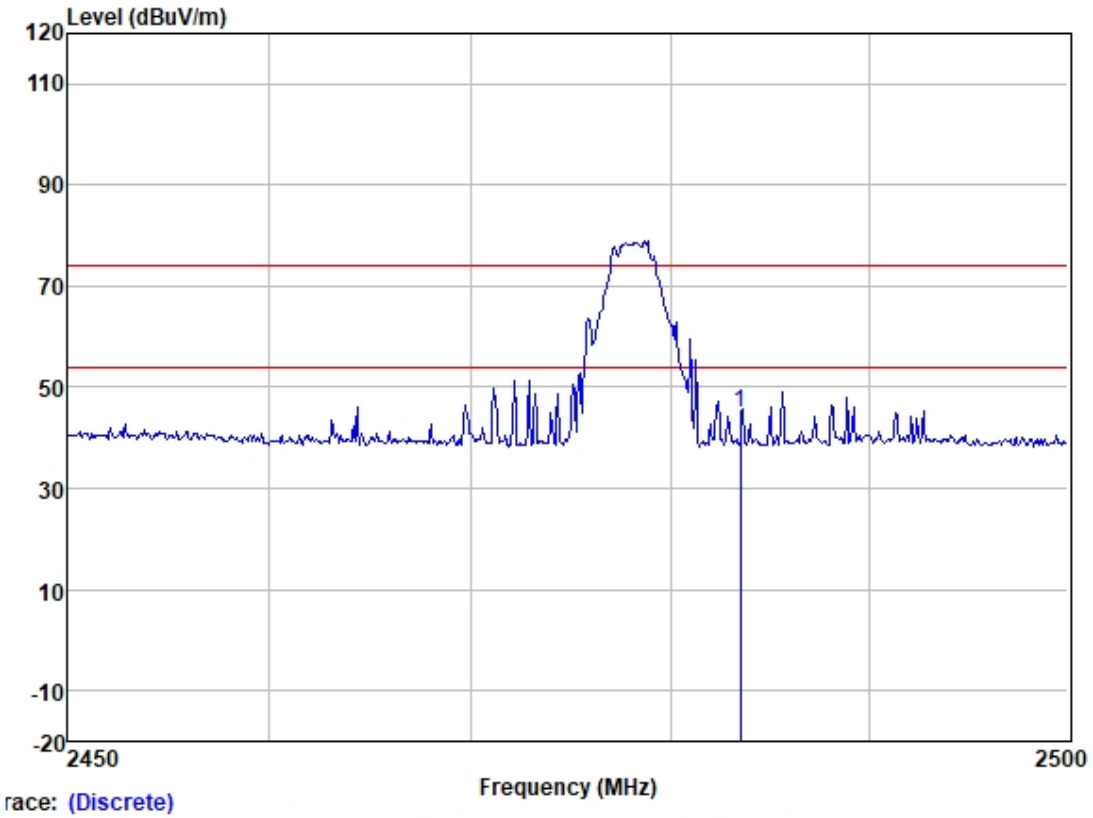
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2483.500	50.77	27.80	3.42	37.13	44.86	74.00	-29.14	VERTICAL	Peak

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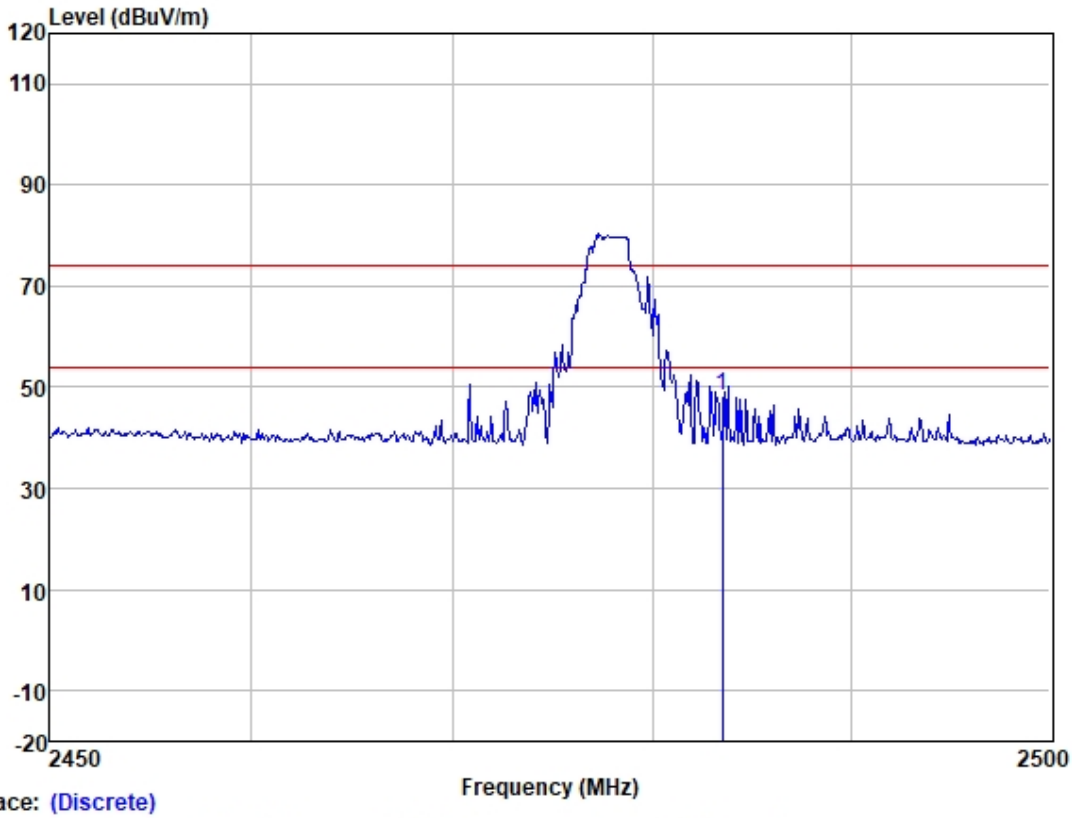
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2483.500	54.37	27.80	3.42	37.13	48.46	74.00	-25.54	HORIZONTAL	Peak

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7.5 Radiated Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)

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

Limit:

Test Distance: 3 m

Frequency (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
960-1000	500	3

7.5.1 E.U.T. Operation

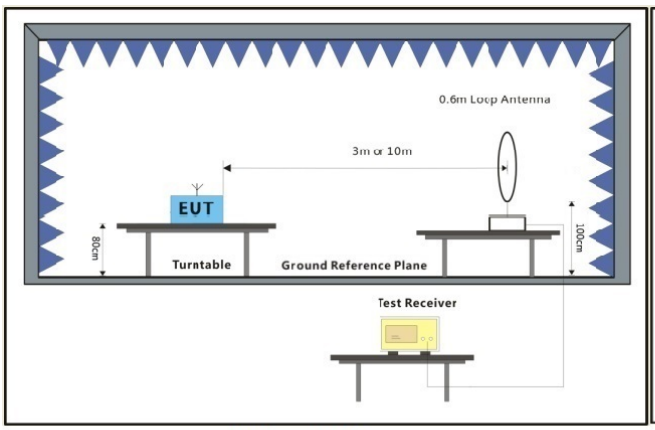
Operating Environment:

Temperature: 23.6 °C Humidity: 56.3 % RH Atmospheric Pressure: 1014 mbar

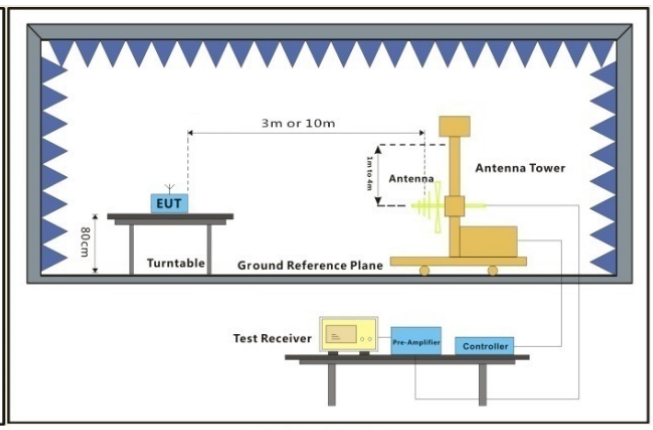
7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	00	TX mode_Keep the EUT in transmitting with modulation mode.
Final test	01	Charge + TX mode_Keep the EUT in charging and transmitting with modulation mode.

7.5.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz

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7.5.4 Measurement Procedure and Data

a. For below 1GHz, 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.

b. The EUT was set 3 or 10 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 quasi-peak method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel, the middle channel, the Highest channel.

h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

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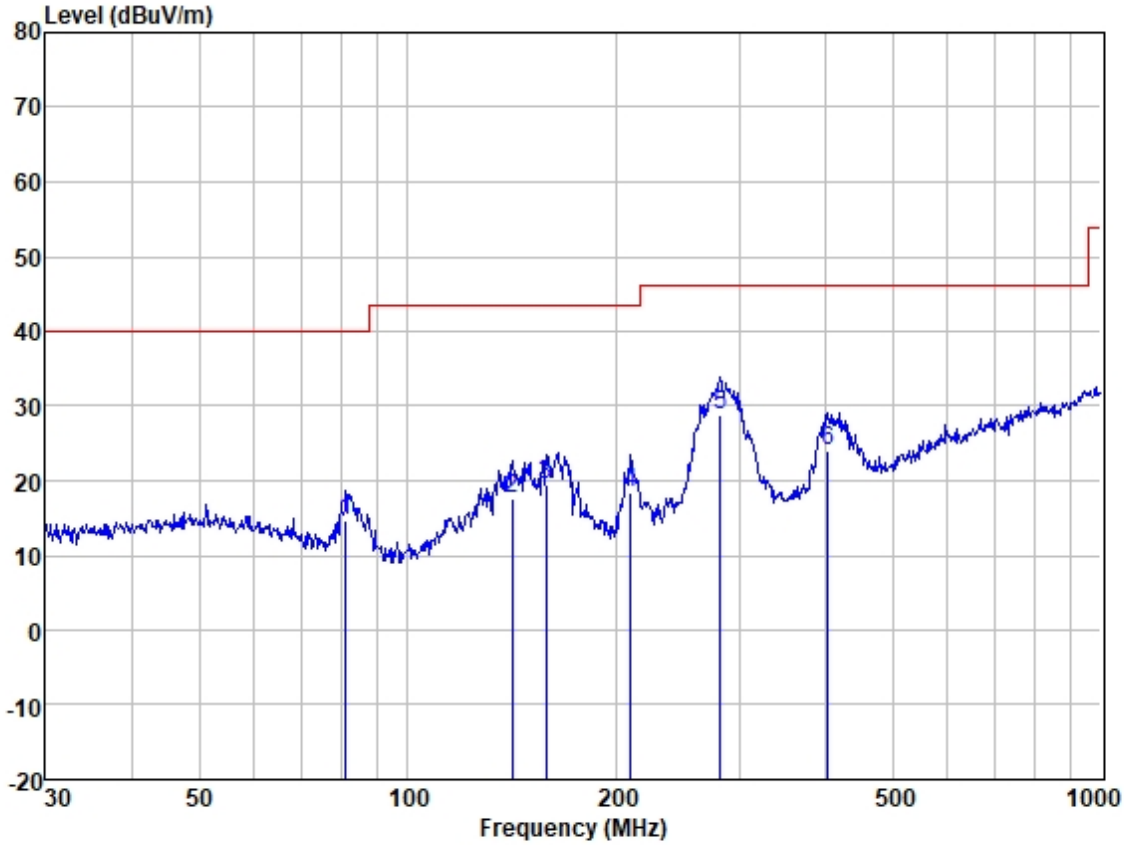
Test Mode: 01; Polarity: Horizontal



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	81.212	31.86	8.87	1.49	27.60	14.62	40.00	-25.38	HORIZONTAL	QP
2	141.330	29.92	13.11	2.11	27.45	17.69	43.52	-25.83	HORIZONTAL	QP
3	158.112	30.76	13.64	2.30	27.36	19.34	43.52	-24.18	HORIZONTAL	QP
4	209.313	33.22	9.98	2.58	27.29	18.49	43.52	-25.03	HORIZONTAL	QP
5	281.995	39.86	12.98	3.15	27.21	28.78	46.02	-17.24	HORIZONTAL	QP
6	403.250	32.52	15.62	3.90	28.01	24.03	46.02	-21.99	HORIZONTAL	QP

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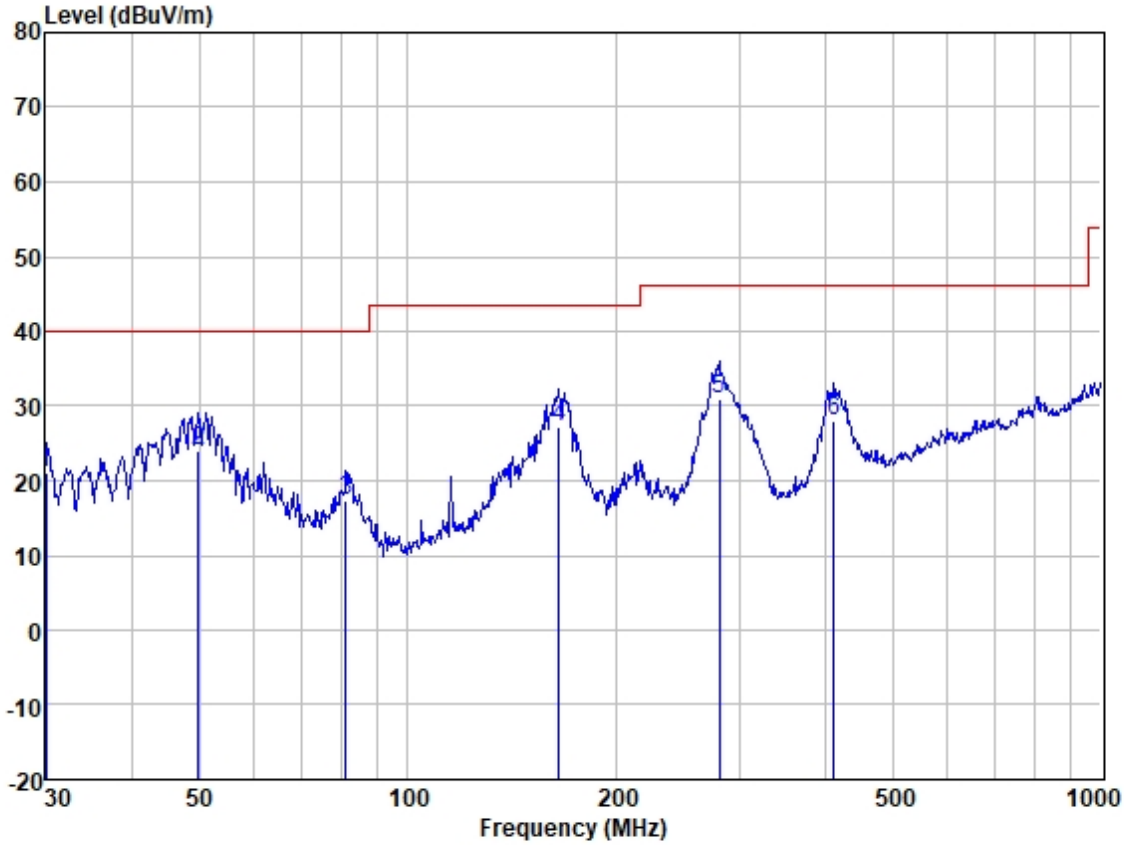
Test Mode: 01; Polarity: Vertical



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	30.000	34.73	12.94	1.01	27.67	21.01	40.00	-18.99	VERTICAL	QP
2	49.881	36.48	13.98	1.13	27.60	23.99	40.00	-16.01	VERTICAL	QP
3	81.212	34.50	8.87	1.49	27.60	17.26	40.00	-22.74	VERTICAL	QP
4	164.908	38.70	13.44	2.36	27.35	27.15	43.52	-16.37	VERTICAL	QP
5	281.008	42.02	12.96	3.15	27.21	30.92	46.02	-15.10	VERTICAL	QP
6	411.824	36.37	15.79	3.95	28.05	28.06	46.02	-17.96	VERTICAL	QP

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7.6 Radiated Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)

Test Method: ANSI C63.10 (2013) Section 6.6

Limit:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
Above 1000	500	3

7.6.1 E.U.T. Operation

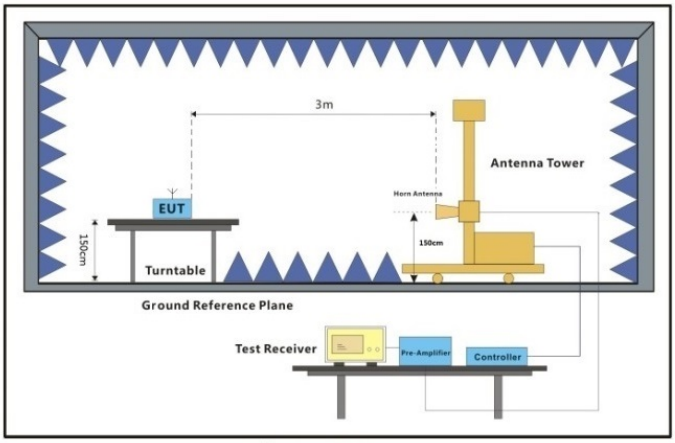
Operating Environment:

Temperature: 23.3 °C Humidity: 59.7 % RH Atmospheric Pressure: 1014 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.
Pre-scan	01	Charge + TX mode_Keep the EUT in charging and transmitting with modulation mode.

7.6.3 Test Setup Diagram



Above 1GHz

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7.6.4 Measurement Procedure and Data

a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-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 or average method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel, the middle channel, the Highest channel.

h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, 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. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

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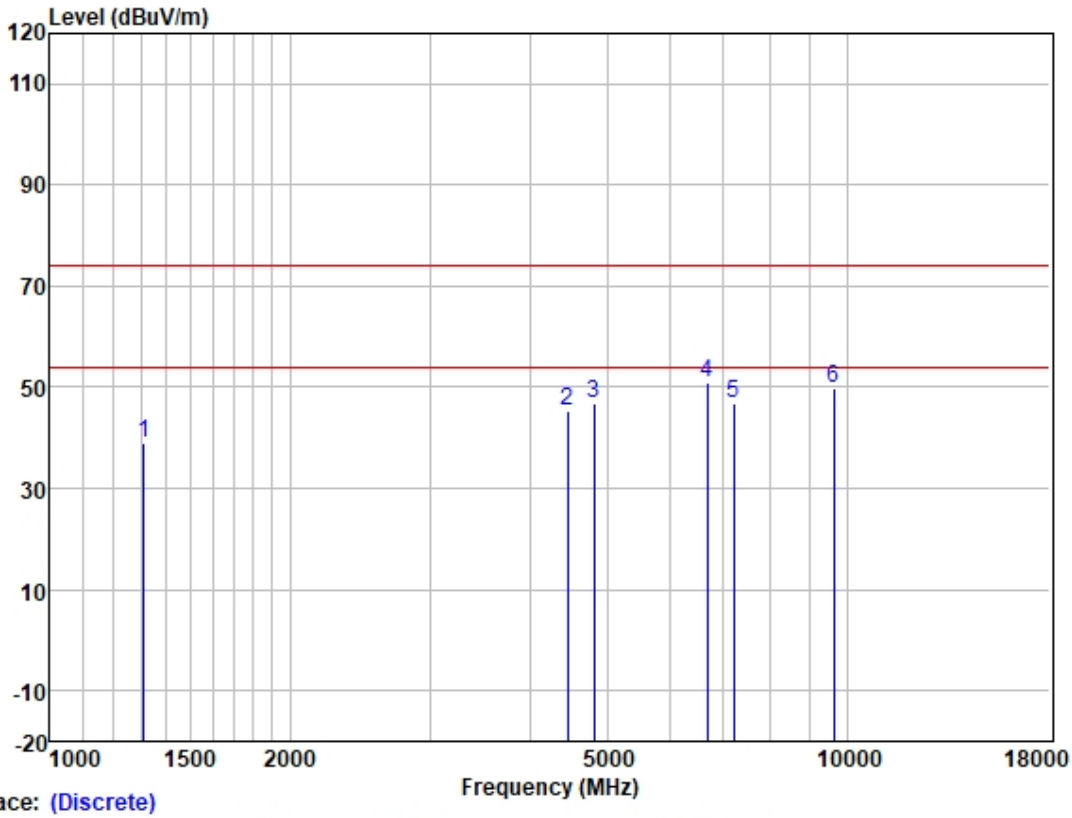
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1312.187	48.27	25.98	2.70	38.04	38.91	74.00	-35.09	VERTICAL	peak
2	4456.315	44.87	31.77	5.35	36.62	45.37	74.00	-28.63	VERTICAL	peak
3	4810.000	45.19	32.51	5.46	36.51	46.65	74.00	-27.35	VERTICAL	peak
4	6679.040	45.32	35.87	6.27	36.39	51.07	74.00	-22.93	VERTICAL	peak
5	7215.000	40.56	36.71	6.35	36.94	46.68	74.00	-27.32	VERTICAL	peak
6	9620.000	40.10	38.42	7.99	36.86	49.65	74.00	-24.35	VERTICAL	peak

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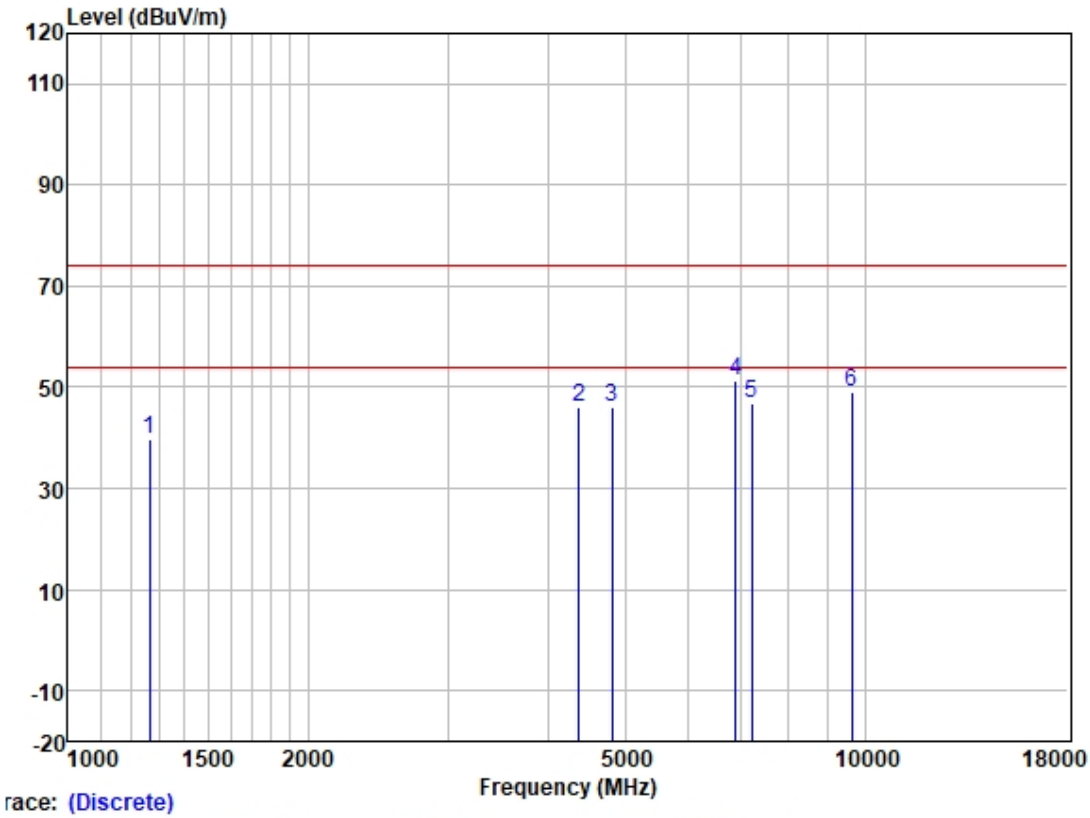
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1267.454	49.03	25.97	2.63	38.07	39.56	74.00	-34.44	HORIZONTAL	peak
2	4379.699	45.80	31.73	5.35	36.63	46.25	74.00	-27.75	HORIZONTAL	peak
3	4810.000	44.46	32.51	5.46	36.51	45.92	74.00	-28.08	HORIZONTAL	peak
4	6874.906	45.78	35.79	6.37	36.55	51.39	74.00	-22.61	HORIZONTAL	peak
5	7215.000	40.82	36.71	6.35	36.94	46.94	74.00	-27.06	HORIZONTAL	peak
6	9620.000	39.47	38.42	7.99	36.86	49.02	74.00	-24.98	HORIZONTAL	peak

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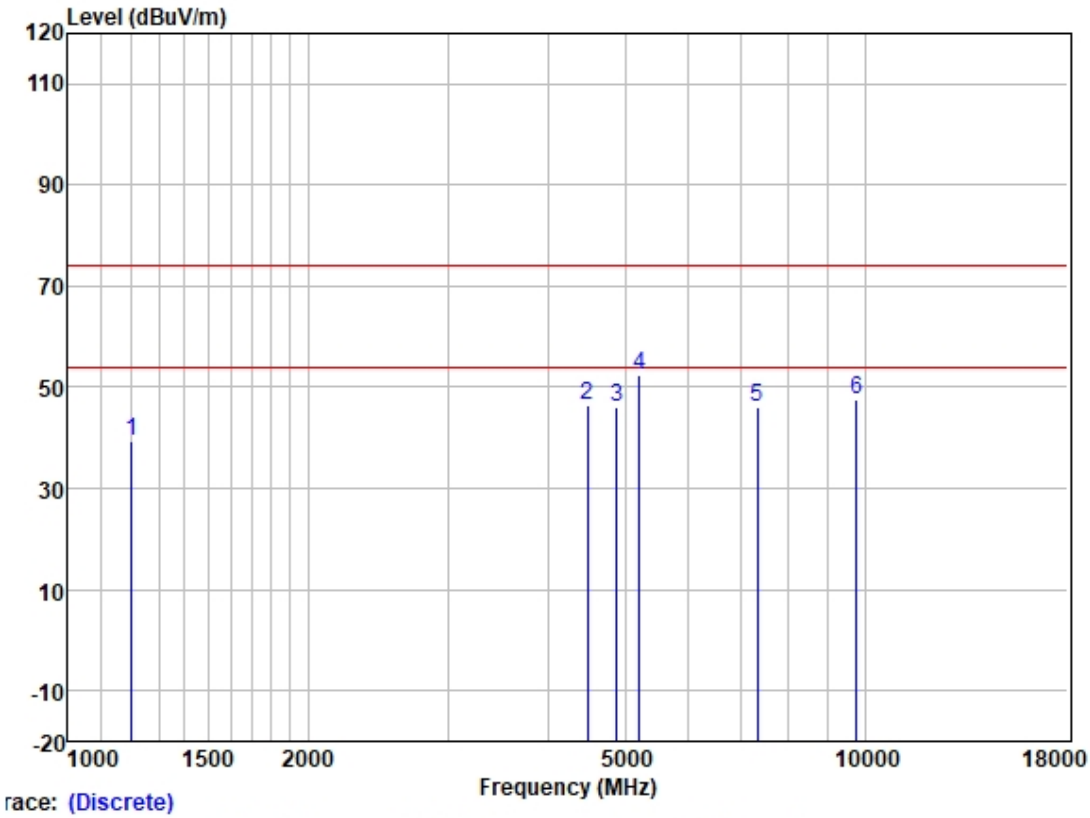
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:middle



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1203.199	48.99	25.90	2.58	38.14	39.33	74.00	-34.67	VERTICAL	peak
2	4482.150	45.92	31.77	5.34	36.61	46.42	74.00	-27.58	VERTICAL	peak
3	4882.000	44.22	32.88	5.49	36.48	46.11	74.00	-27.89	VERTICAL	peak
4	5209.075	50.42	33.12	5.33	36.29	52.58	74.00	-21.42	VERTICAL	peak
5	7323.000	40.35	36.61	6.32	37.01	46.27	74.00	-27.73	VERTICAL	peak
6	9764.000	38.82	38.26	7.43	36.83	47.68	74.00	-26.32	VERTICAL	peak

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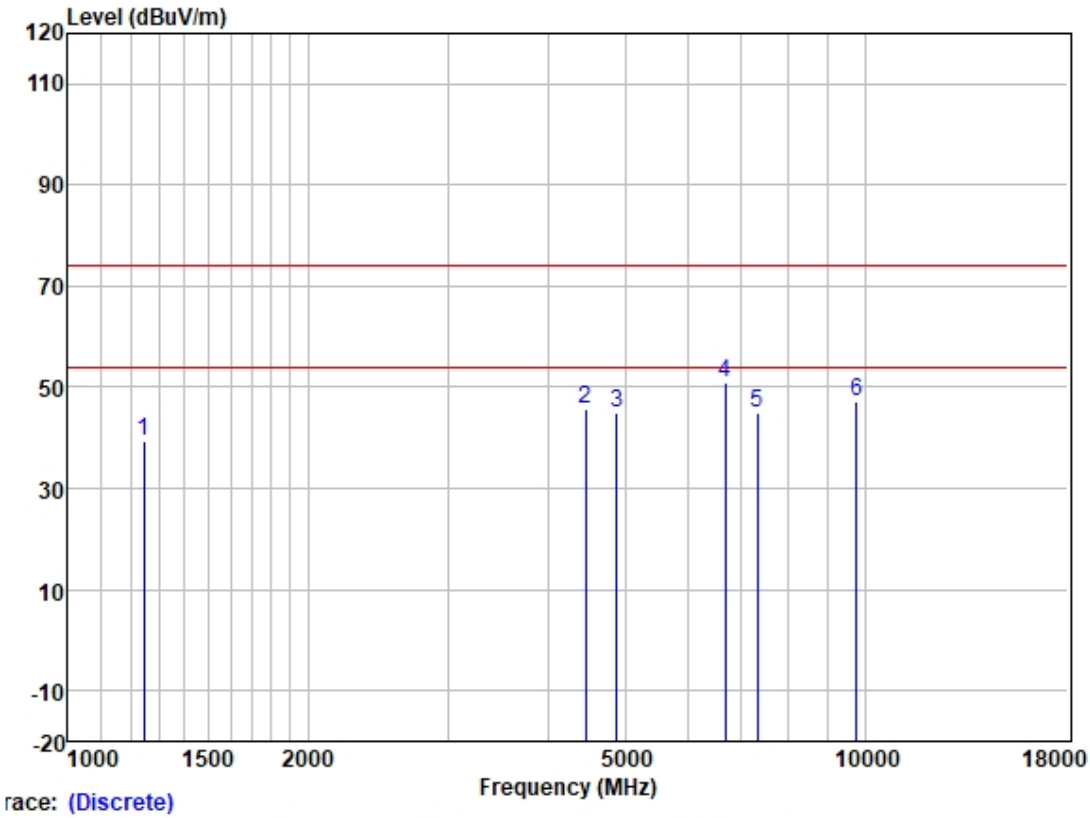

race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1245.663	48.78	25.94	2.61	38.10	39.23	74.00	-34.77	HORIZONTAL	peak
2	4456.315	45.11	31.77	5.35	36.62	45.61	74.00	-28.39	HORIZONTAL	peak
3	4882.000	43.01	32.88	5.49	36.48	44.90	74.00	-29.10	HORIZONTAL	peak
4	6679.040	45.04	35.87	6.27	36.39	50.79	74.00	-23.21	HORIZONTAL	peak
5	7323.000	39.10	36.61	6.32	37.01	45.02	74.00	-28.98	HORIZONTAL	peak
6	9764.000	38.40	38.26	7.43	36.83	47.26	74.00	-26.74	HORIZONTAL	peak

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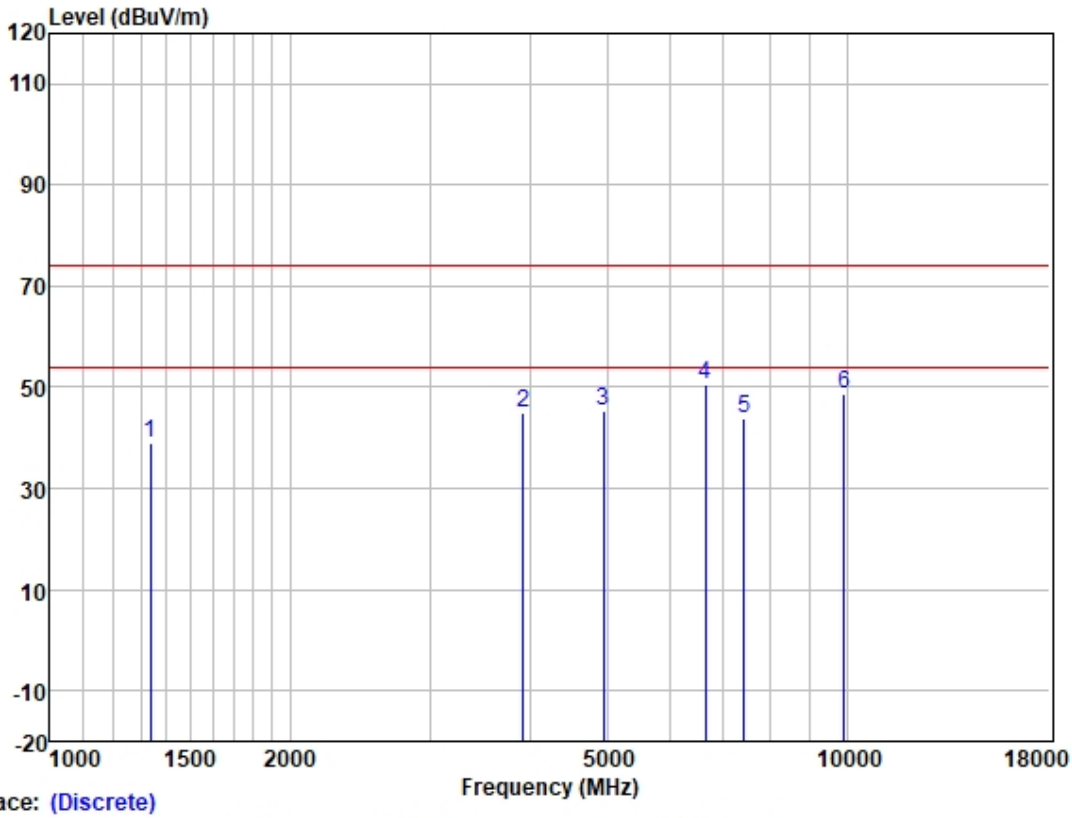

race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1335.141	48.38	25.92	2.73	38.02	39.01	74.00	-34.99	VERTICAL	peak
2	3924.135	45.79	31.01	5.02	36.71	45.11	74.00	-28.89	VERTICAL	peak
3	4956.000	43.29	33.08	5.53	36.43	45.47	74.00	-28.53	VERTICAL	peak
4	6640.542	44.95	35.78	6.25	36.37	50.61	74.00	-23.39	VERTICAL	peak
5	7434.000	38.18	36.32	6.29	37.07	43.72	74.00	-30.28	VERTICAL	peak
6	9912.000	40.22	38.34	6.77	36.81	48.52	74.00	-25.48	VERTICAL	peak

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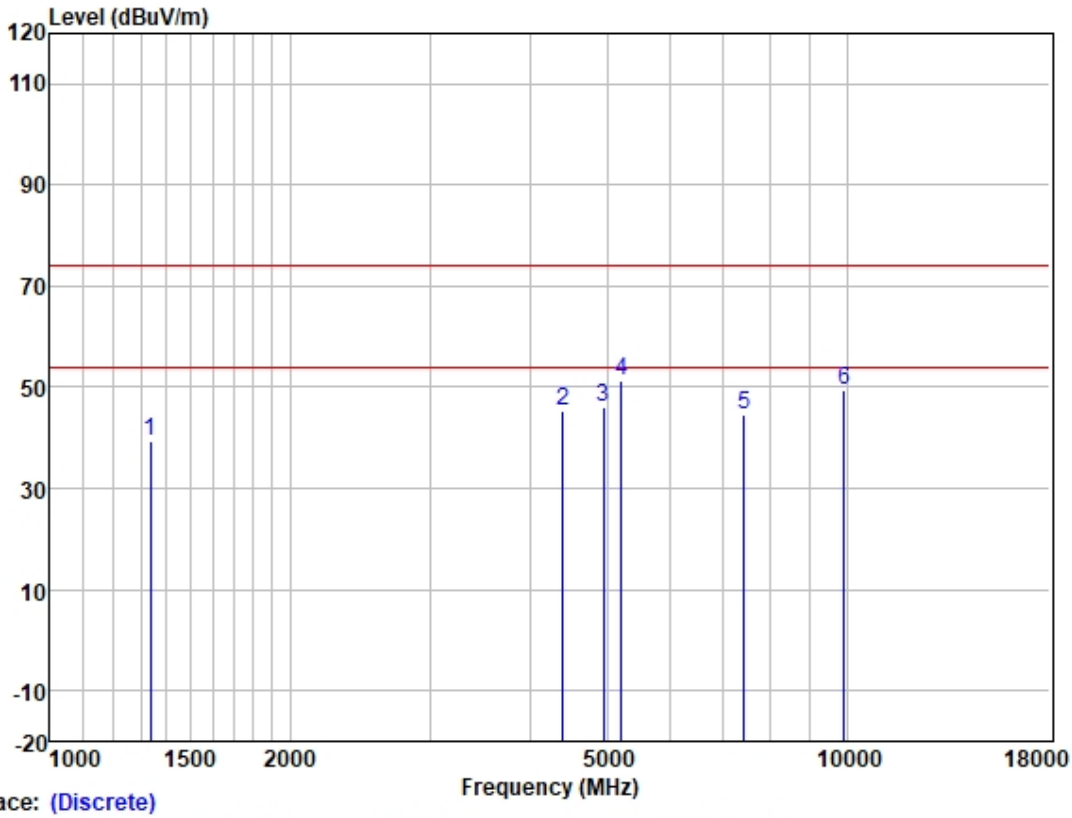
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1335.141	48.68	25.92	2.73	38.02	39.31	74.00	-34.69	HORIZONTAL	peak
2	4405.090	44.97	31.77	5.37	36.63	45.48	74.00	-28.52	HORIZONTAL	peak
3	4956.000	43.87	33.08	5.53	36.43	46.05	74.00	-27.95	HORIZONTAL	peak
4	5209.075	49.20	33.12	5.33	36.29	51.36	74.00	-22.64	HORIZONTAL	peak
5	7434.000	39.05	36.32	6.29	37.07	44.59	74.00	-29.41	HORIZONTAL	peak
6	9912.000	40.99	38.34	6.77	36.81	49.29	74.00	-24.71	HORIZONTAL	peak

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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR221100140002

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9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2211001400AT

- End of the Report -

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