TEST REPORT

Application No.:	GZCR2311001260HS
Applicant:	Jiangxi Zhongyang Electric Appliance Co., LTD
Address of Applicant:	No.2, Yigong Avenue, Economic and Technological Development Zone, Yichun, Jiangxi China
Manufacturer:	Jiangxi Zhongyang Electric Appliance Co., LTDJiangxi Zhongyang Electric Appliance Co., LTD
Address of Manufacturer:	No.2, Yigong Avenue, Economic and Technological Development Zone, Yichun, Jiangxi China
Factory:	Jiangxi Zhongyang Electric Appliance Co., LTD
Address of Factory:	No.2, Yigong Avenue, Economic and Technological Development Zone, Yichun, Jiangxi China
Product Name:	2.4G remote control
Model No.:	TWD146A-YK-2.4G
Standard(s) :	47 CFR Part 15, Subpart C 15.249
Date of Receipt:	2023-11-30
Date of Test:	2024-01-24 to 2024-05-29
Date of Issue:	2025-03-31
Test Result:	**Pass***

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

Ricky Liu
Manager

Revision Record			
Version	**Report No.**	**Date**	**Remark**
01	GZCR231100126001	2025-03-31	Original

Authorized for issue by:				
		Jim Li **Jim Li/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**
20dB Bandwidth	47 CFR Part 15, Subpart C 15.249	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.

**: The EUT passed Restricted Band Around Fundamental Frequency and Radiated Emissions Above 1GHz test after modifications.

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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3V = Size "CR2032" Lithium Cell battery x 1 pcs
Cable(s):	N/A
Test Voltage:	DC 3 V
Operation Frequency:	2404MHz, 2425MHz, 2454MHz, 2469MHz
Test Channel:	Low: 2404MHz Middle: 2454MHz High: 2469MHz
Modulation Type:	GFSK
Number of Channels:	4
Antenna Type:	PCB Antenna
Antenna Gain:	1.22 dBi according to antenna specification
Antenna Number:	1

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
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)
Remark: The U_{lab} (lab Uncertainty) is less than U_{etsi} (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.	

4.4 Test Location

All tests were performed at:

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

No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663

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

None

5 Equipment List

20dB Bandwidth					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
MI CABLE	SGS-EMC	0.8M	EMC2137	2023-11-02	2025-11-01
MXA Signal Analyzer (10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2024-02-20	2025-02-19

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	2023-11-10	2024-11-09
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2023-12-15	2024-12-14
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
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2023-08-23	2024-08-22
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

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	2023-11-10	2024-11-09
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2023-12-15	2024-12-14
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	2023-12-20	2026-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

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Radiated Emissions Below 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
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2024-04-08	2026-04-07

Radiated Emissions Above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2023-11-10	2024-11-09
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2023-12-15	2024-12-14
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	2023-06-18	2026-06-17
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2023-11-10	2024-11-09
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2023-08-23	2024-08-22
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2023-08-21	2024-08-20
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	2023-06-11	2024-06-10

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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. The best case gain of the antenna is 1.22 dBi.

Antenna location: Refer to Internal photos

7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

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

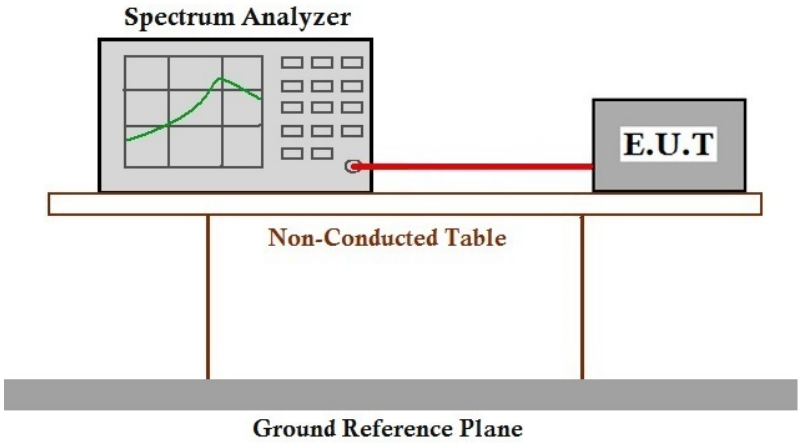
7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 20.3 °C Humidity: 46.2 % RH Atmospheric Pressure: 1021 mbar

7.1.2 Test Mode Description

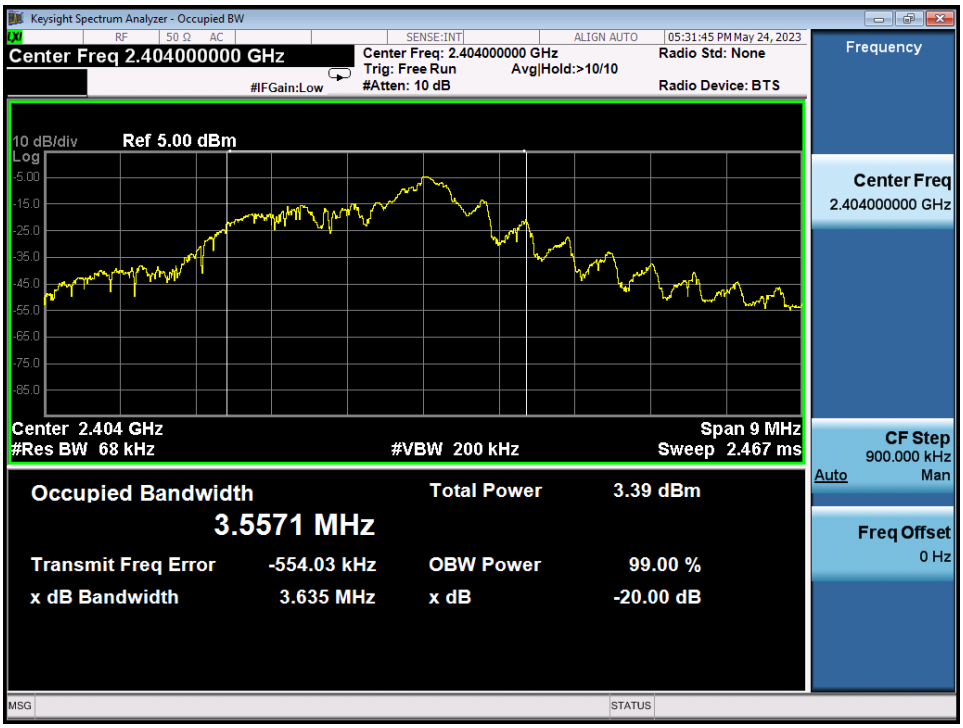
Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

7.1.3 Test Setup Diagram

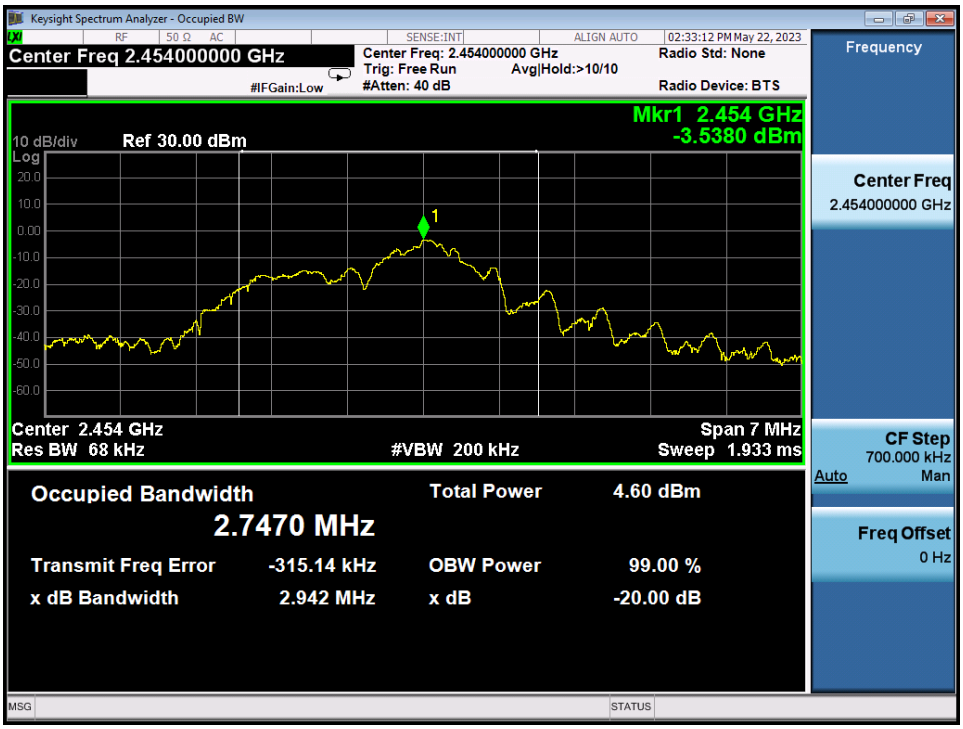


7.1.4 Measurement Procedure and Data

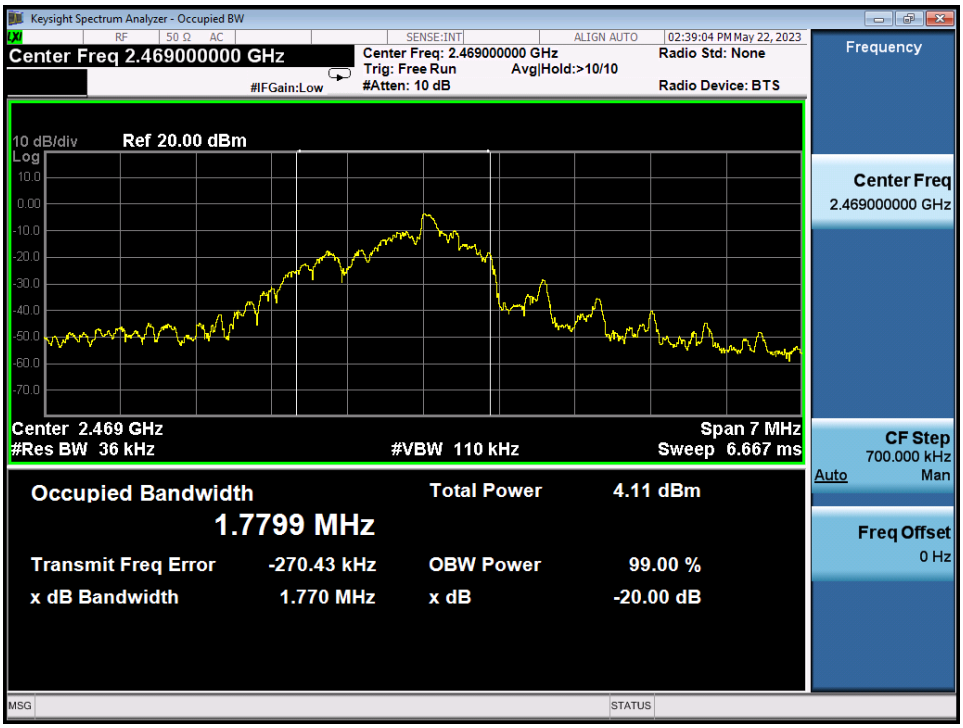
Test Mode: 00; Test channel: Low



Test Mode: 00; Test channel: Middle



Test Mode: 00; Test channel: High



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7.2 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.		

7.2.1 E.U.T. Operation

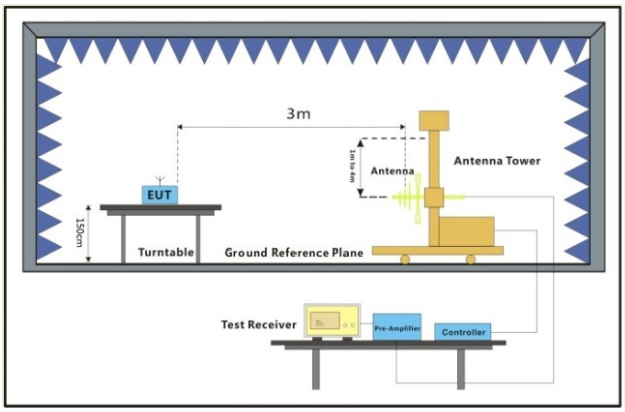
Operating Environment:

Temperature: 19.7 °C Humidity: 48.1 % RH Atmospheric Pressure: 1021 mbar

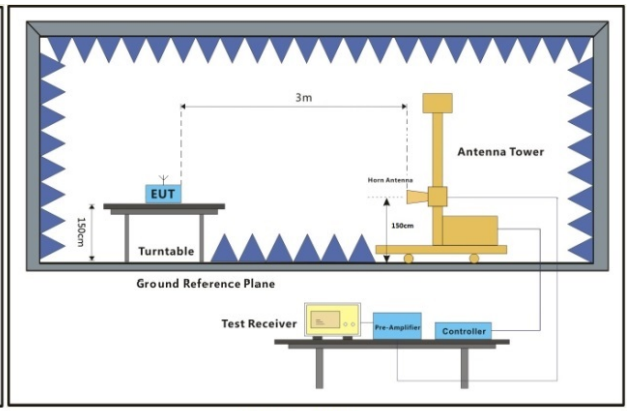
7.2.2 Test Mode Description

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



30MHz-1GHz



Above 1GHz

7.2.4 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.

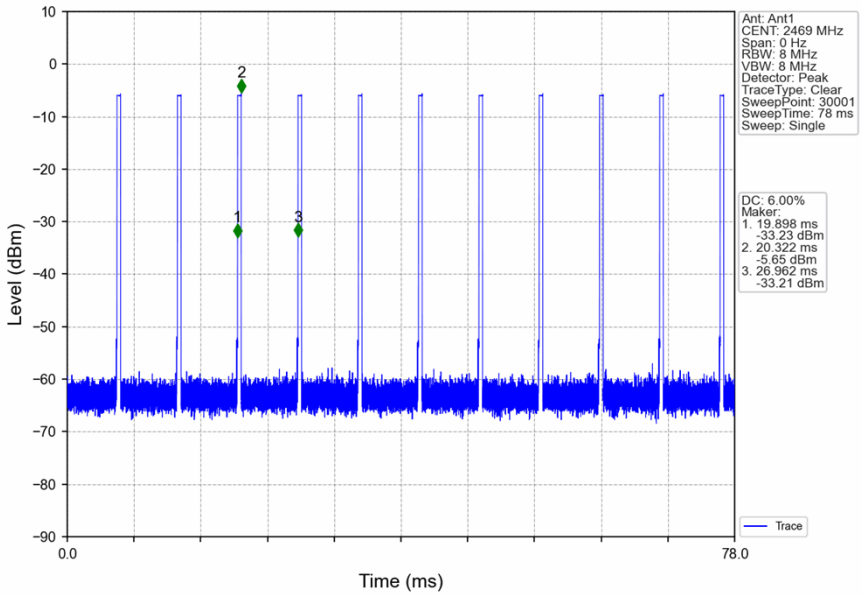
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Duty cycle:

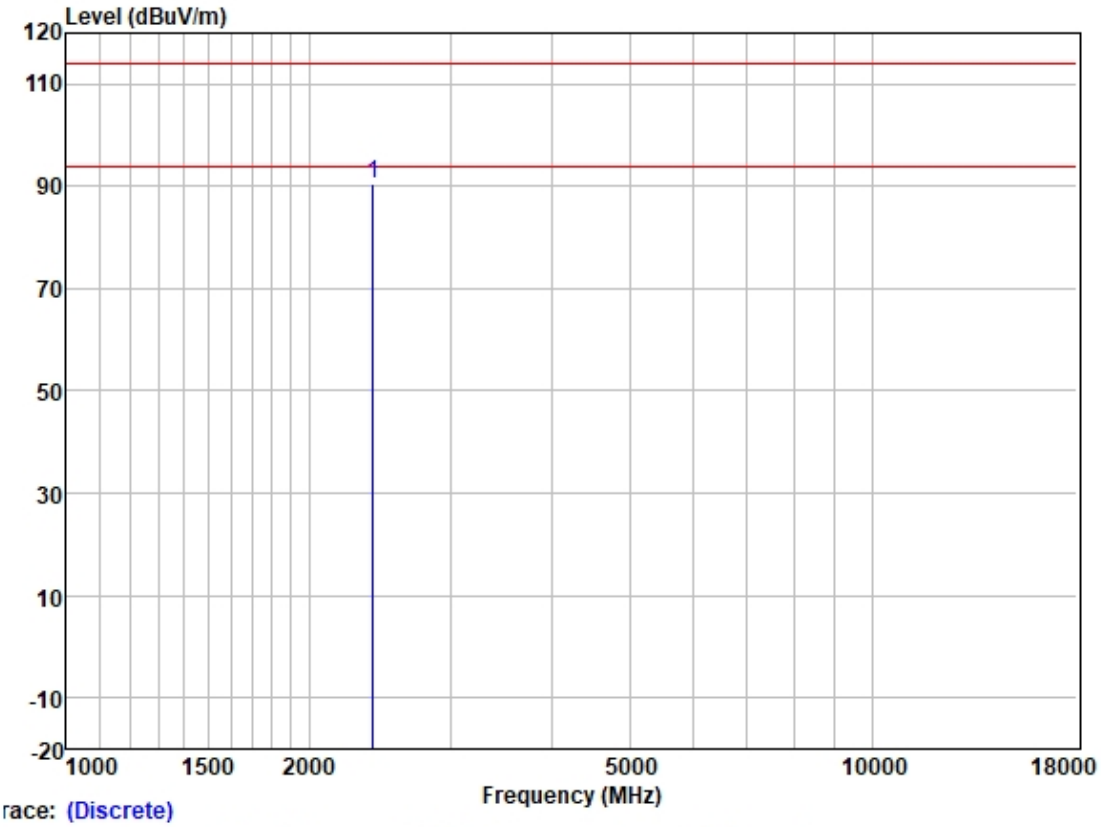
20log (Duty cycle) = 20log(0.06)= -24.44 dB

Here:
Duty cycle = Ton_cum / Ton+off
Ton_cum = 20.322 ms-19.898ms =0.424 (ms)
Ton+off = 26.862-19.898=6.964 (ms)
Duty cycle = 0.424/6.964=0.06

Test Data of worst case for all channels.



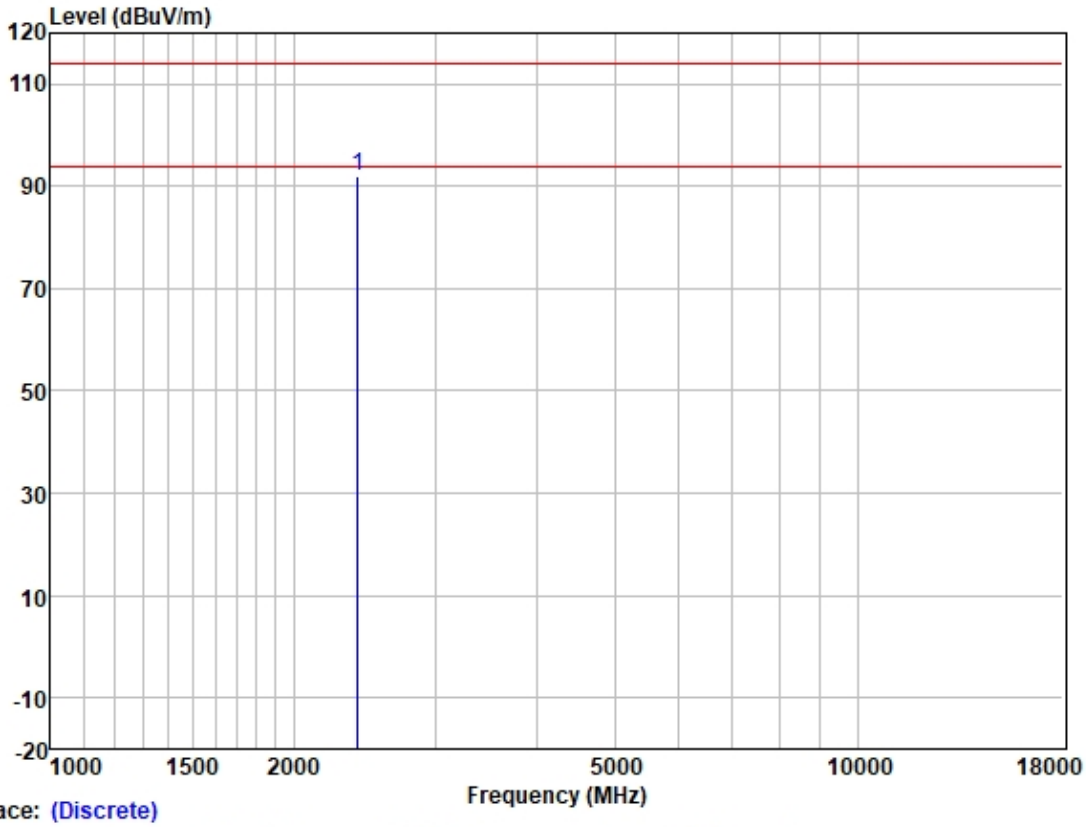
Test Mode: 00; Polarity: Vertical; Channel: Low



race: (Discrete)

	Freq	ReadAntenna 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	2404.753	96.24	27.73	3.78	37.21	90.54	114.00	-23.46	VERTICAL	Peak

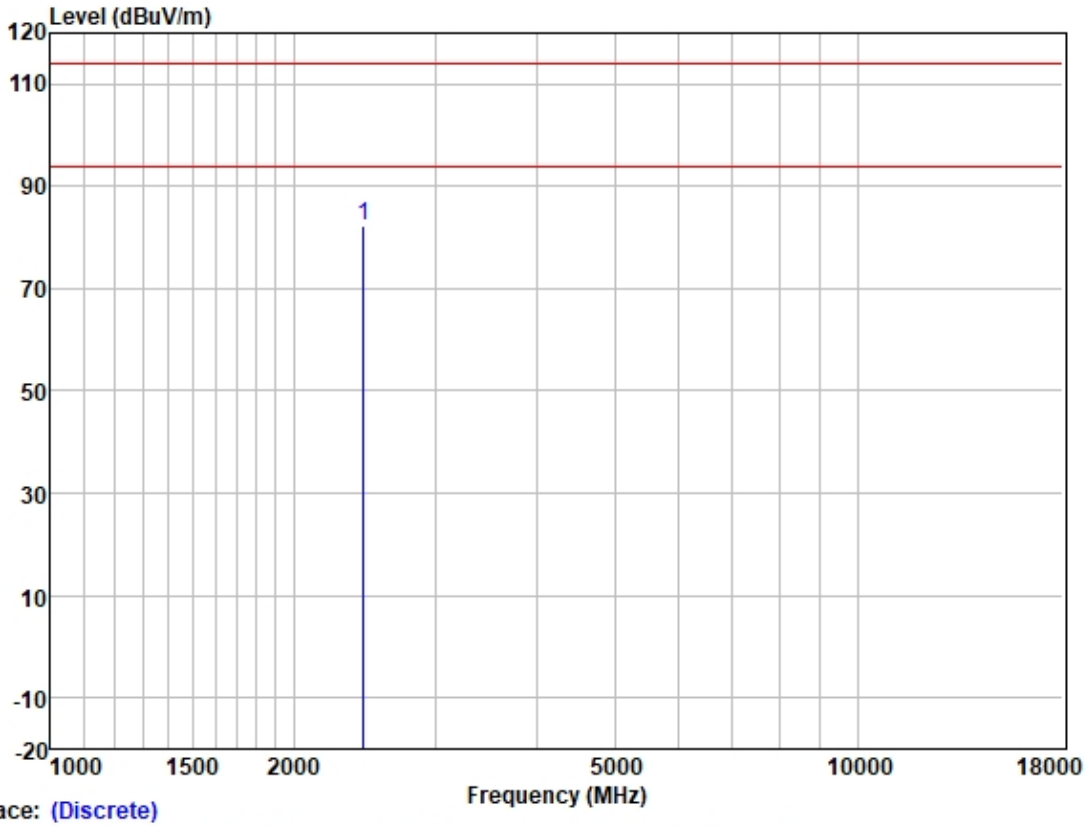
Test Mode: 00; Polarity: Horizontal; Channel: Low



race: (Discrete)

	Freq	ReadLevel	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	2404.753	97.59	27.73	3.78	37.21	91.89	114.00	-22.11	HORIZONTAL	Peak

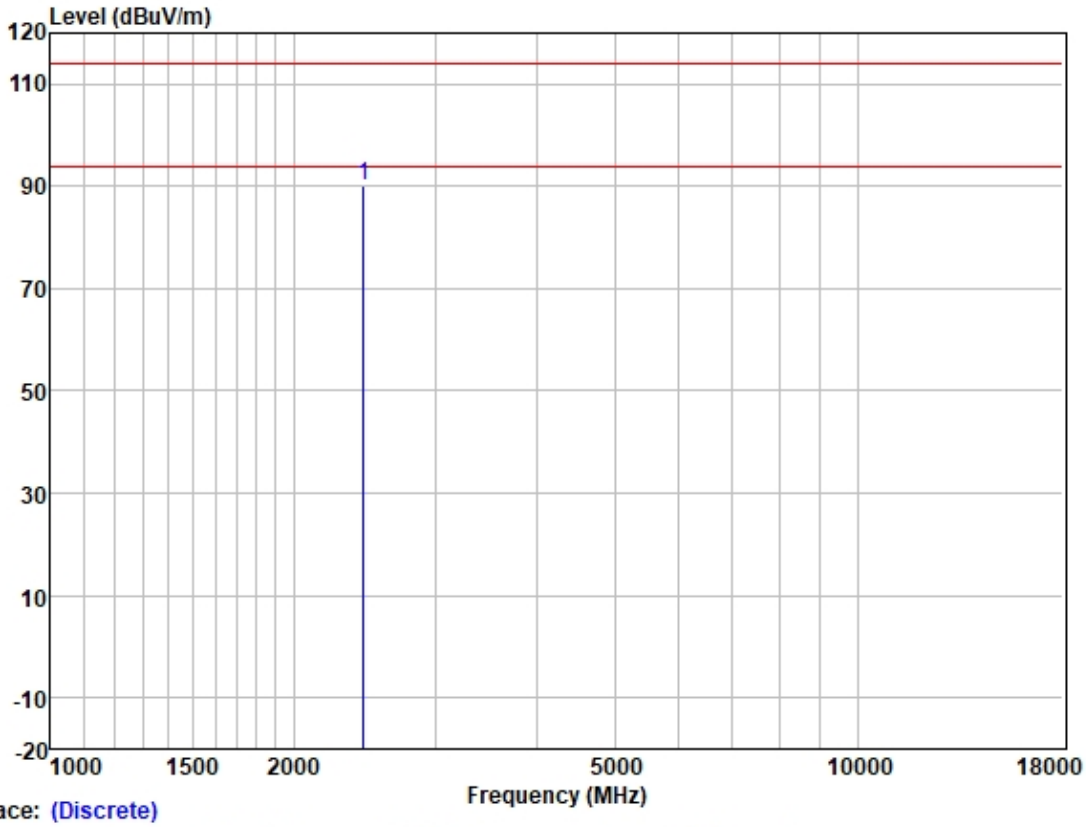
Test Mode: 00; Polarity: Vertical; Channel: Middle



race: (Discrete)

	Freq	ReadAntenna Level	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	2442.751	87.82	27.79	3.80	37.20	82.21	114.00	-31.79	VERTICAL	Peak

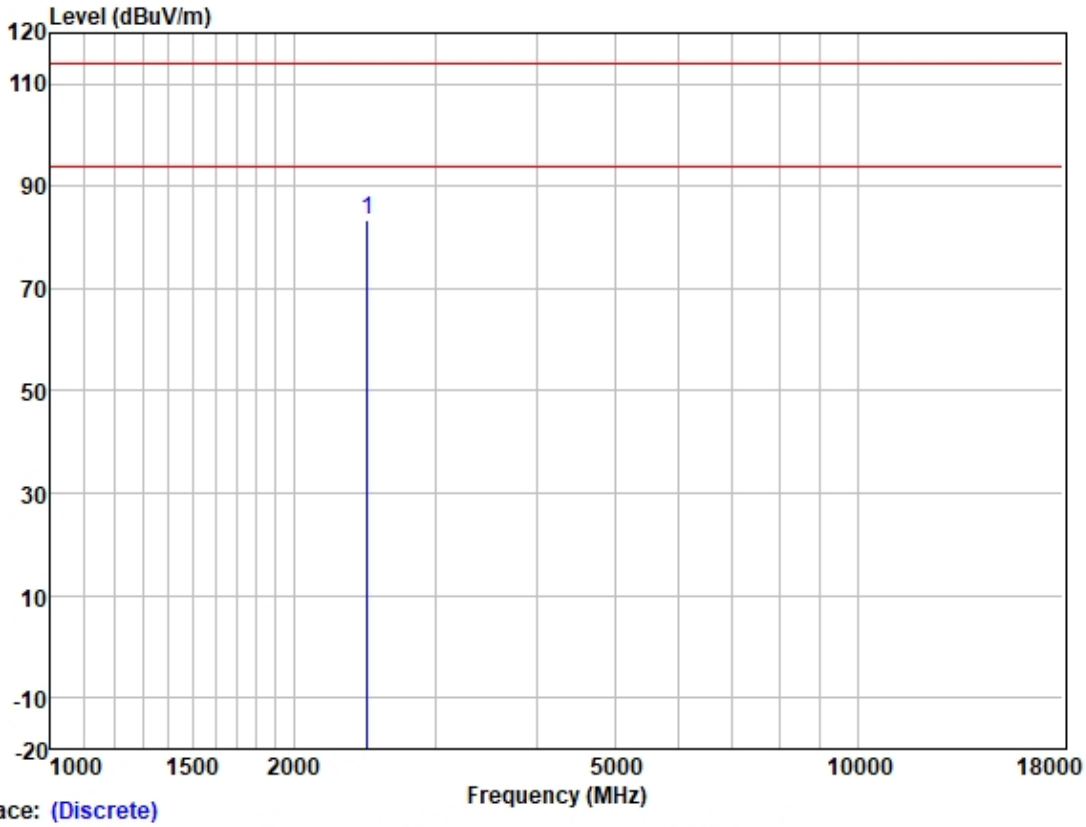
Test Mode: 00; Polarity: Horizontal; Channel: Middle



race: (Discrete)

	Freq	ReadLevel	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	2442.751	95.79	27.79	3.80	37.20	90.18	114.00	-23.82	HORIZONTAL	Peak

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



race: (Discrete)

	Freq	ReadAntenna Level	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	2471.157	89.10	27.83	3.82	37.19	83.56	114.00	-30.44	VERTICAL	Peak

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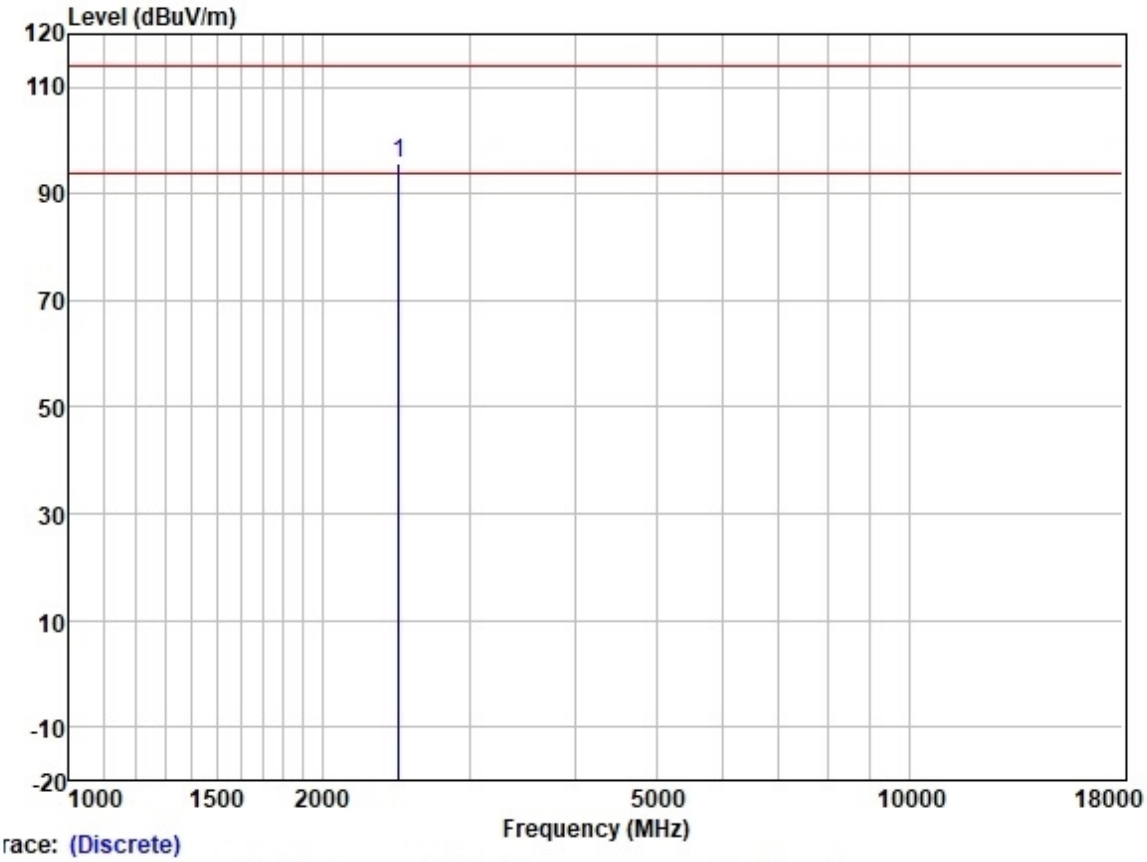
Test Mode: 00; Polarity: Horizontal; Channel: High



race: (Discrete)

	Freq	ReadAntenna 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	2469.100	101.34	27.83	3.82	37.19	95.80	114.00	-18.20	HORIZONTAL	Peak

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2469.100	95.80	None	114.00	-18.20	PK
2469.100	71.36	-24.44	94.00	-22.64	AV

Remark: AV level=PK level+Factor (dB)

Factor (dB)=20*log(Duty cycle)

Duty cycle= 0.06

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7.3 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.		

7.3.1 E.U.T. Operation

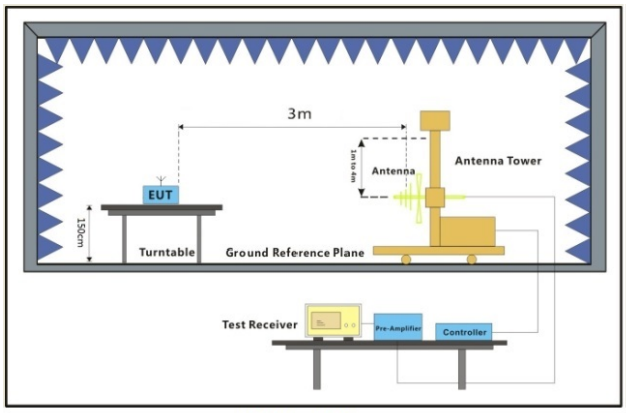
Operating Environment:

Temperature: 25.9 °C Humidity: 60.0 % RH Atmospheric Pressure: 1008 mbar

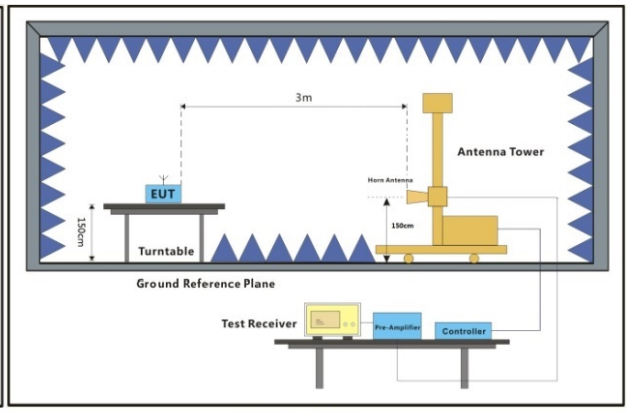
7.3.2 Test Mode Description

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

7.3.3 Test Setup Diagram



30MHz-1GHz



Above 1GHz

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.

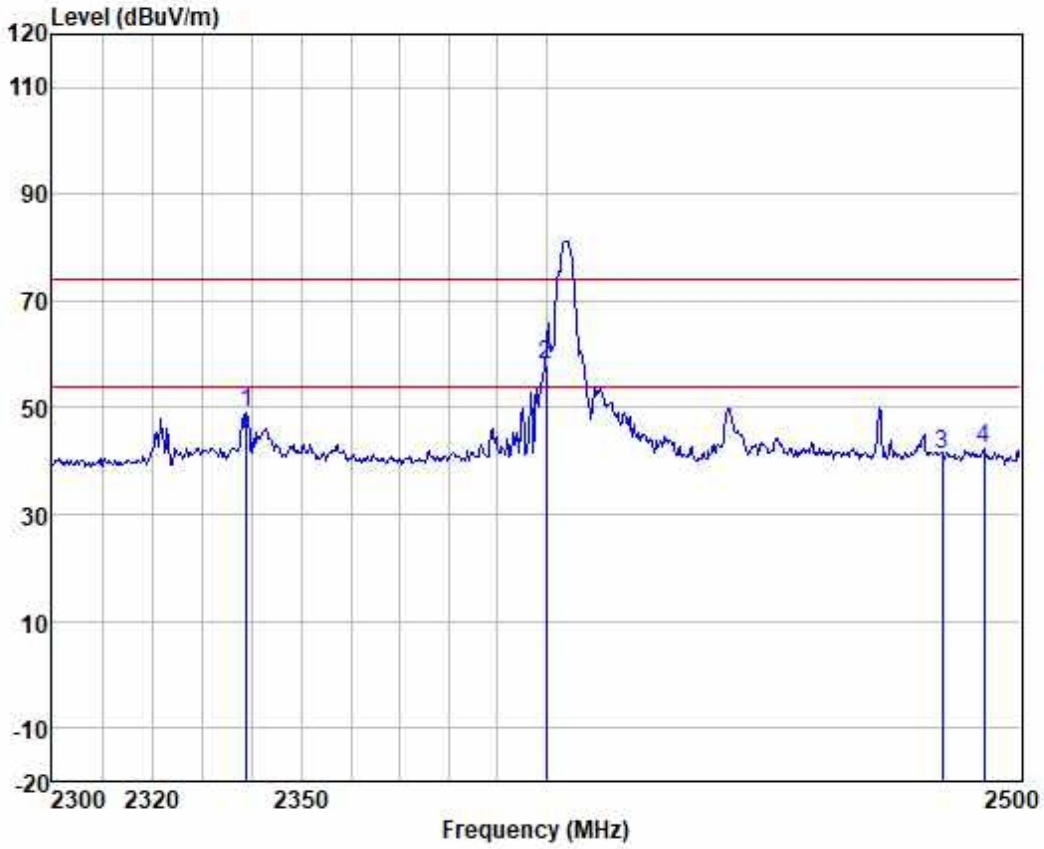
h. Test the EUT in the lowest channel, the Highest channel.

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

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



	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	2338.872	54.85	27.57	3.73	37.23	48.92	74.00	-25.08	VERTICAL	peak
2	2400.000	63.64	27.71	3.78	37.21	57.92	74.00	-16.08	VERTICAL	peak
3	2483.500	46.71	27.85	3.82	37.19	41.19	74.00	-32.81	VERTICAL	peak
4	2492.299	47.75	27.86	3.83	37.18	42.26	74.00	-31.74	VERTICAL	peak

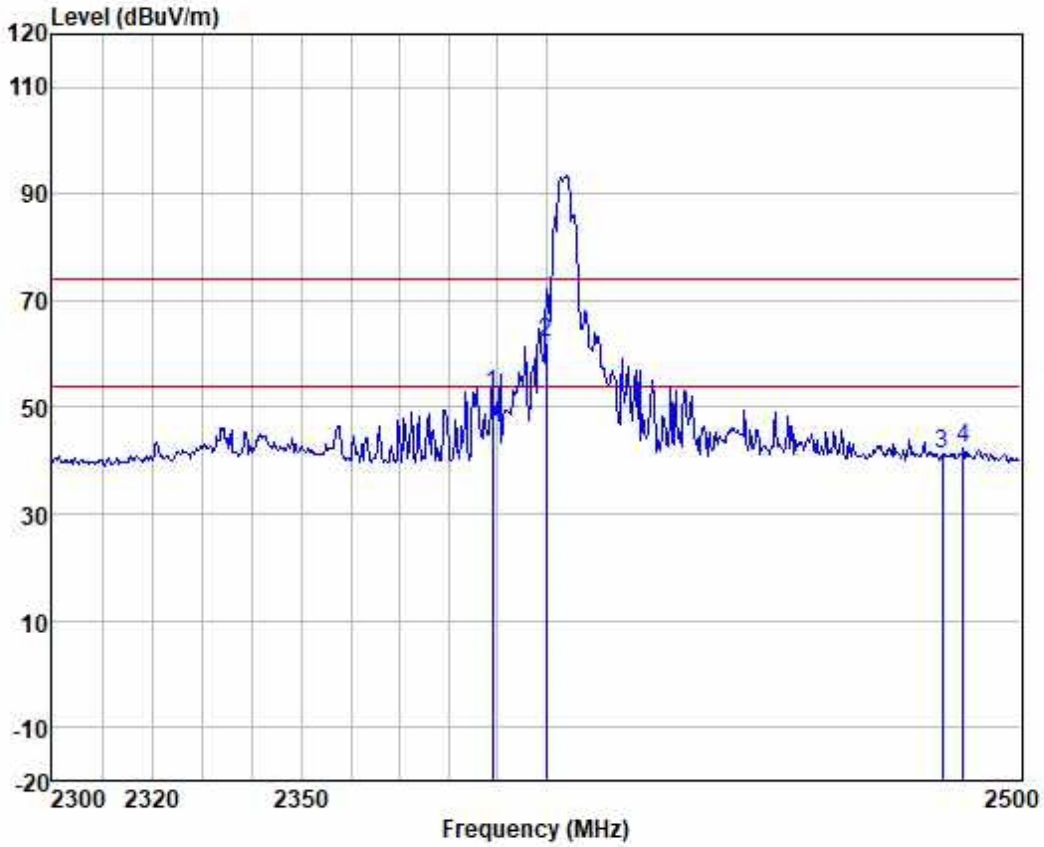
Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2400.000	57.92	None	74.00	-16.08	PK
2400.000	33.48	-24.44	54.00	-20.52	AV

Remark: AV level=PK level+Factor (dB)

Factor (dB)=20*log(Duty cycle)

Duty cycle= 0.06

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



	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	2388.935	58.19	27.68	3.77	37.22	52.42	74.00	-21.58	HORIZONTAL	peak
2	2400.000	68.00	27.71	3.78	37.21	62.28	74.00	-11.72	HORIZONTAL	peak
3	2483.500	46.82	27.85	3.82	37.19	41.30	74.00	-32.70	HORIZONTAL	peak
4	2487.939	47.88	27.85	3.82	37.19	42.36	74.00	-31.64	HORIZONTAL	peak

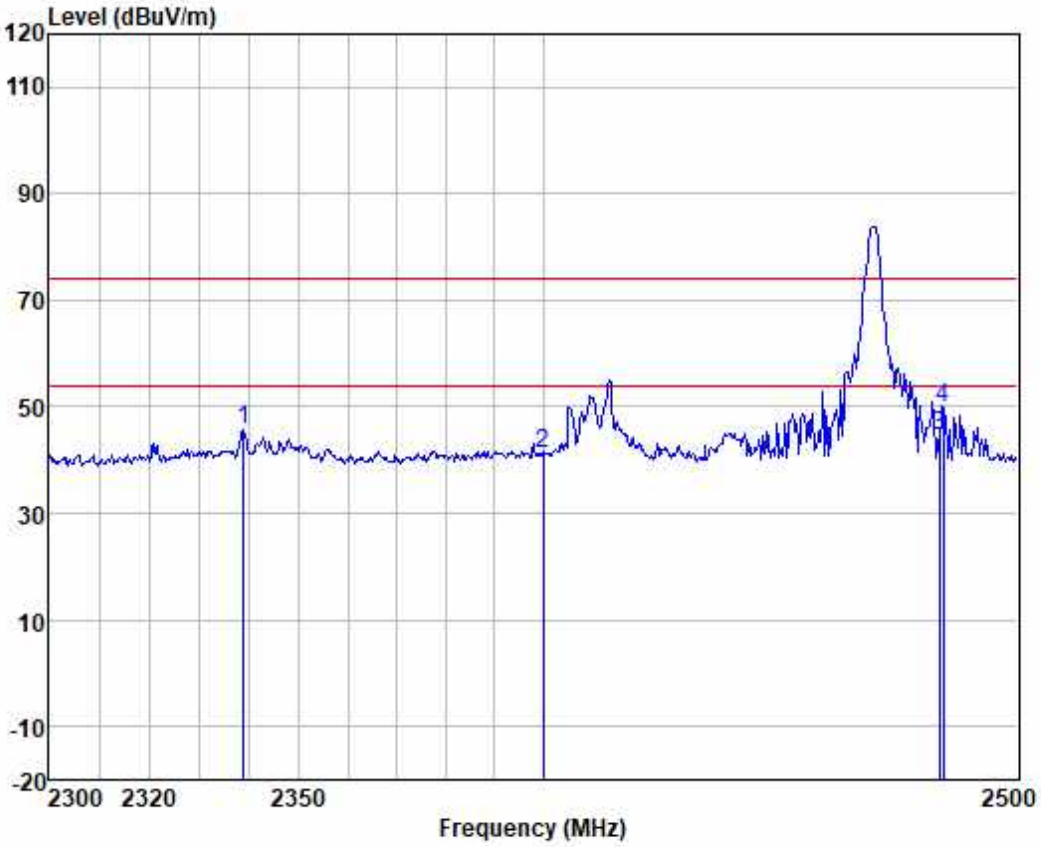
Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2400.000	62.28	None	74.00	-11.72	PK
2400.000	37.84	-24.44	54.00	-16.16	AV

Remark: AV level=PK level+Factor (dB)

Factor (dB)=20*log(Duty cycle)

Duty cycle= 0.06

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



	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	2338.872	51.62	27.57	3.73	37.23	45.69	74.00	-28.31	VERTICAL	peak
2	2400.000	46.99	27.71	3.78	37.21	41.27	74.00	-32.73	VERTICAL	peak
3	2483.500	50.14	27.85	3.82	37.19	44.62	74.00	-29.38	VERTICAL	peak
4	2484.208	55.20	27.85	3.82	37.19	49.68	74.00	-24.32	VERTICAL	Peak

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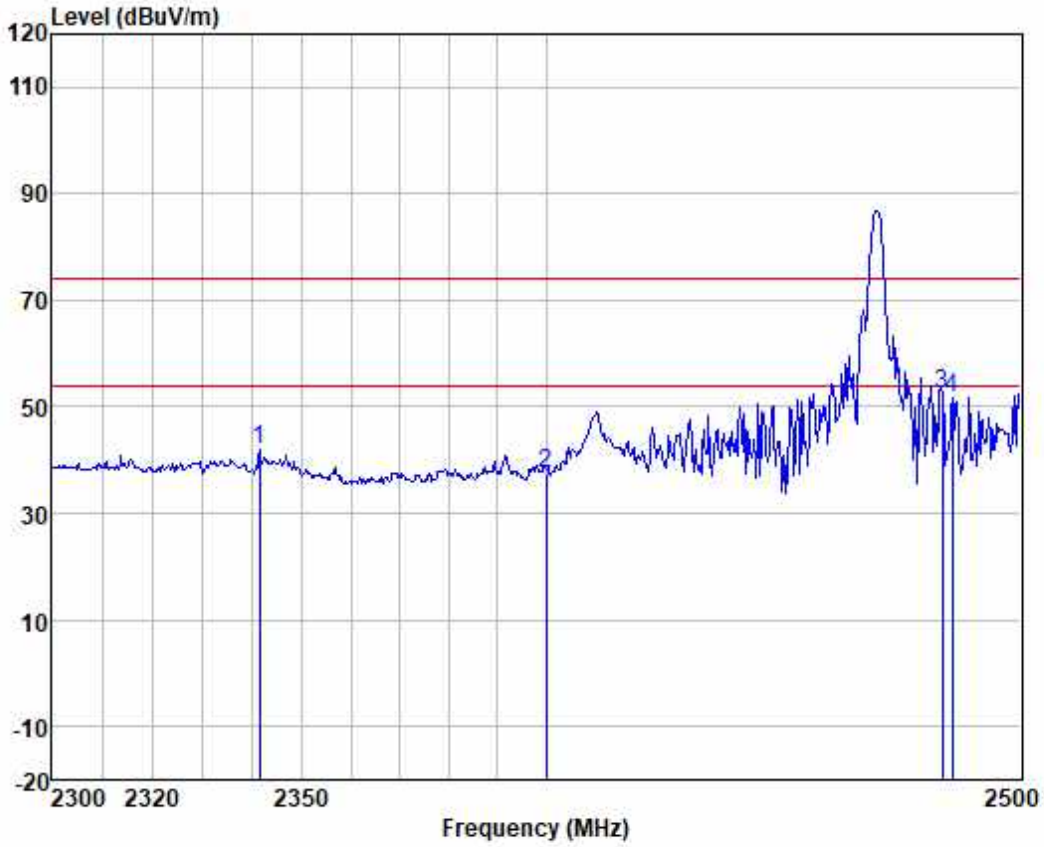
Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel:High



	Freq	ReadAntenna 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	2341.604	48.03	27.57	3.73	37.23	42.10	74.00	-31.90	HORIZONTAL	peak
2	2400.000	43.35	27.71	3.78	37.21	37.63	74.00	-36.37	HORIZONTAL	peak
3	2483.500	57.87	27.85	3.82	37.19	52.35	74.00	-21.65	HORIZONTAL	peak
4	2485.658	57.21	27.85	3.82	37.19	51.69	74.00	-22.31	HORIZONTAL	Peak

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7.4 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

7.4.1 E.U.T. Operation

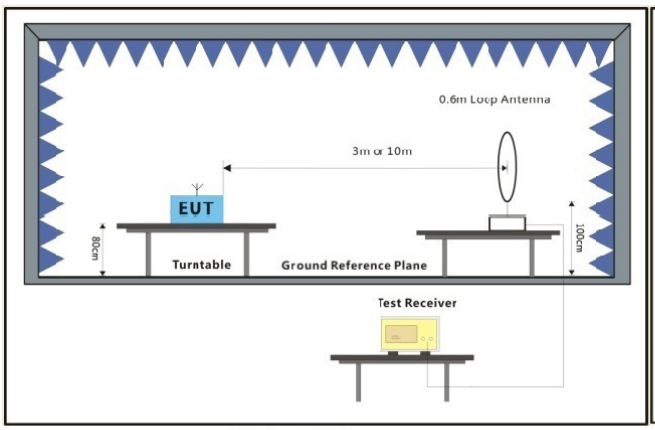
Operating Environment:

Temperature: 19.4 °C Humidity: 55.4 % RH Atmospheric Pressure: 1021 mbar

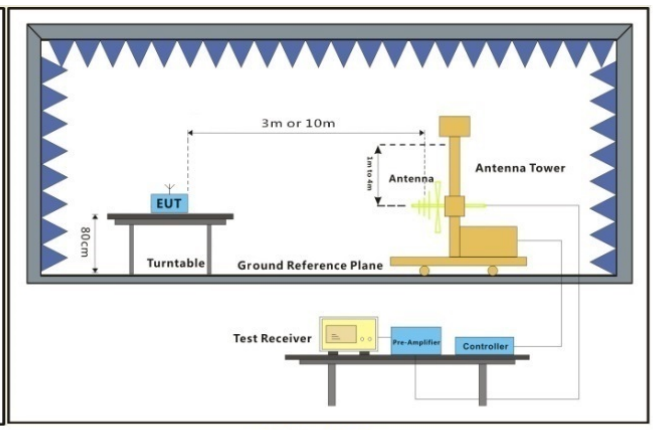
7.4.2 Test Mode Description

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

7.4.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz

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 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.

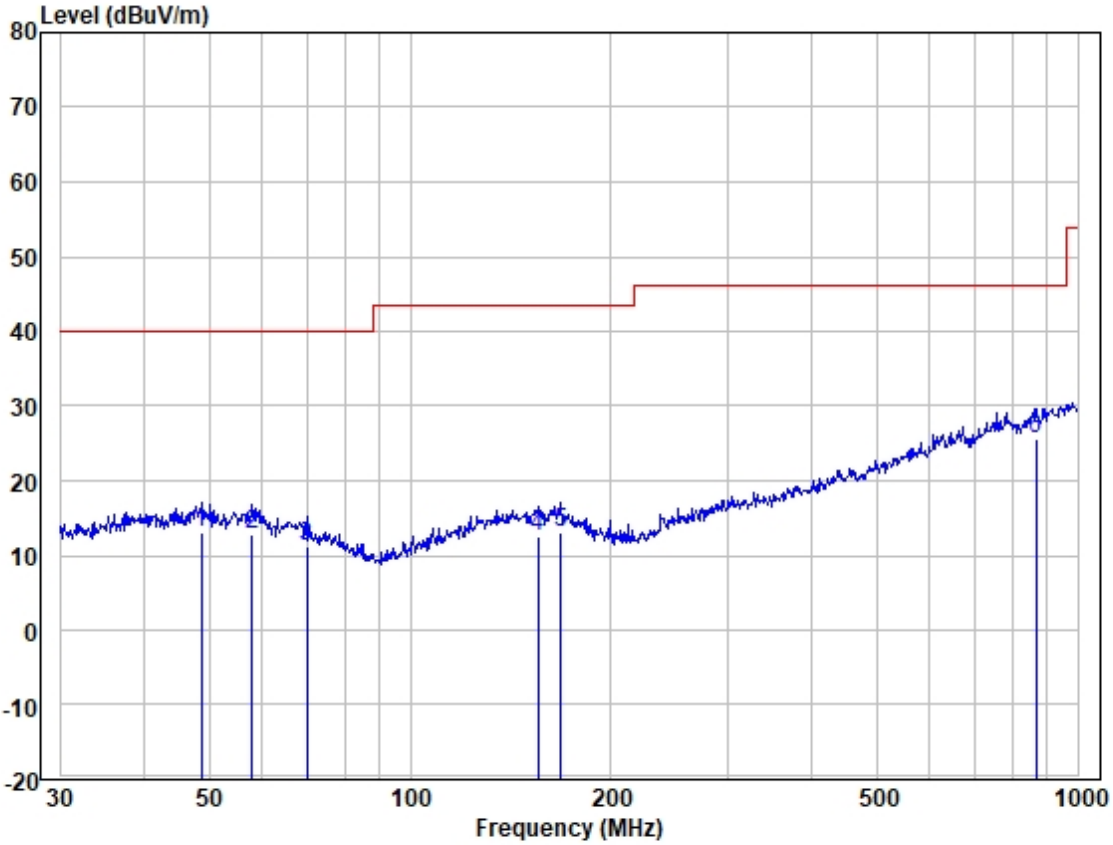
i. Repeat above procedures until all frequencies measured was complete.

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.

Test Mode: 00; Polarity: Horizontal



Site : 966 Chamber
Job :
Model :
Power :
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	48.672	26.03	19.52	0.39	32.80	13.14	40.00	-26.86	HORIZONTAL	QP
2	57.999	26.24	18.99	0.41	32.80	12.84	40.00	-27.16	HORIZONTAL	QP
3	70.090	26.23	17.22	0.46	32.80	11.11	40.00	-28.89	HORIZONTAL	QP
4	155.364	25.48	19.16	0.69	32.80	12.53	43.52	-30.99	HORIZONTAL	QP
5	168.414	26.25	18.82	0.72	32.80	12.99	43.52	-30.53	HORIZONTAL	QP
6	866.088	26.61	29.00	1.74	31.76	25.59	46.02	-20.43	HORIZONTAL	QP

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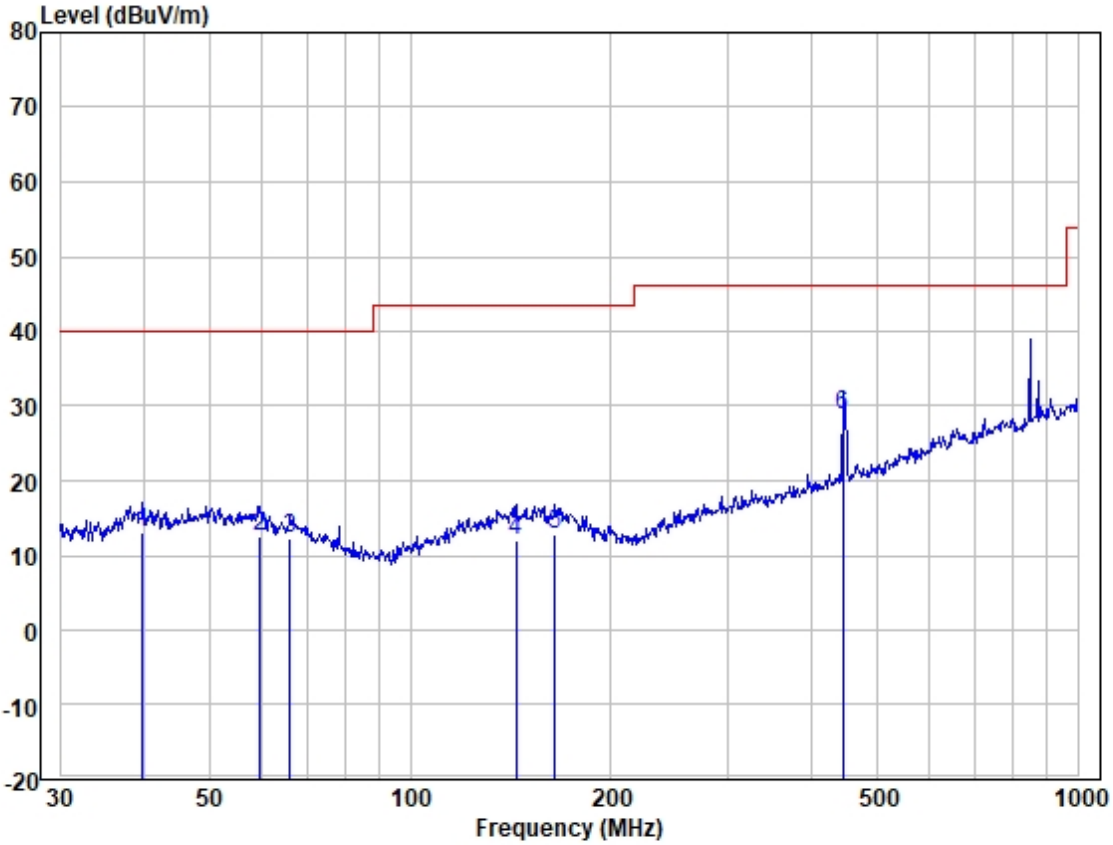
Test Mode: 00; Polarity: Vertical



Site : 966 Chamber
Job :
Model :
Power :
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	39.715	26.34	19.09	0.35	32.83	12.95	40.00	-27.05	VERTICAL	QP
2	59.649	26.22	18.79	0.41	32.80	12.62	40.00	-27.38	VERTICAL	QP
3	66.034	26.74	17.83	0.44	32.80	12.21	40.00	-27.79	VERTICAL	QP
4	144.335	25.23	18.80	0.65	32.80	11.88	43.52	-31.64	VERTICAL	QP
5	164.908	25.93	19.05	0.71	32.80	12.89	43.52	-30.63	VERTICAL	QP
6	444.851	37.85	22.59	1.21	32.84	28.81	46.02	-17.21	VERTICAL	QP

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7.5 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

7.5.1 E.U.T. Operation

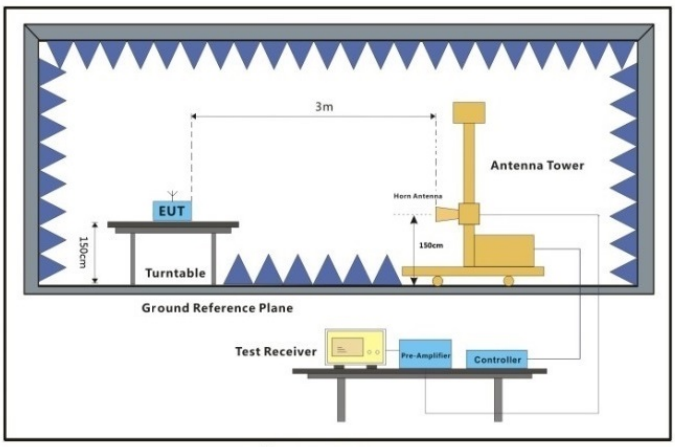
Operating Environment:

Temperature: 25.9 °C Humidity: 59.9 % RH Atmospheric Pressure: 1008 mbar

7.5.2 Test Mode Description

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

7.5.3 Test Setup Diagram



Above 1GHz

7.5.4 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.

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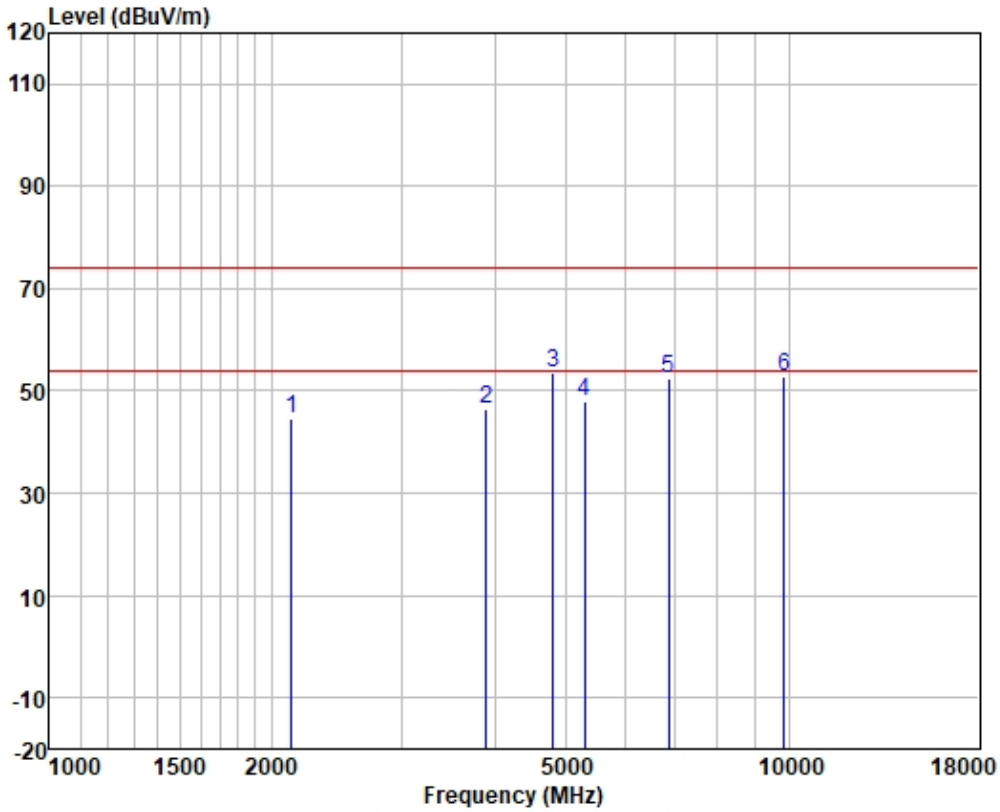
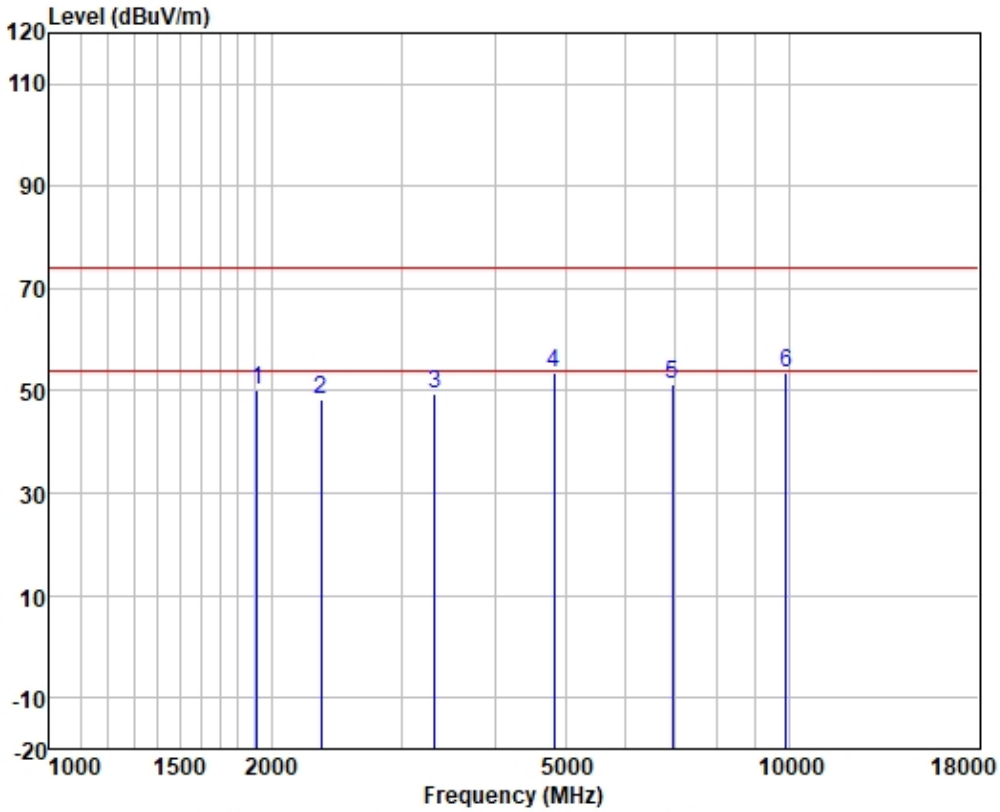
Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: Low



	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	2126.308	51.79	26.65	3.43	37.28	44.59	74.00	-29.41	VERTICAL	Peak
2	3901.516	47.66	30.41	4.86	36.62	46.31	74.00	-27.69	VERTICAL	Peak
3	4804.110	50.79	34.16	5.15	36.66	53.44	74.00	-20.56	VERTICAL	Peak
4	5300.200	45.99	33.17	5.51	36.75	47.92	74.00	-26.08	VERTICAL	Peak
5	6874.906	47.24	34.88	7.04	36.87	52.29	74.00	-21.71	VERTICAL	Peak
6	9866.789	43.19	38.91	7.66	36.81	52.95	74.00	-21.05	VERTICAL	Peak

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



	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	1910.650	57.98	26.21	3.31	37.32	50.18	74.00	-23.82	HORIZONTAL	Peak
2	2332.356	54.28	27.55	3.73	37.23	48.33	74.00	-25.67	HORIZONTAL	Peak
3	3318.471	52.57	28.94	4.55	36.77	49.29	74.00	-24.71	HORIZONTAL	Peak
4	4807.900	50.73	34.16	5.15	36.66	53.38	74.00	-20.62	HORIZONTAL	Peak
5	6954.852	45.93	35.04	7.10	36.89	51.18	74.00	-22.82	HORIZONTAL	Peak
6	9923.991	43.82	38.95	7.67	36.80	53.64	74.00	-20.36	HORIZONTAL	Peak

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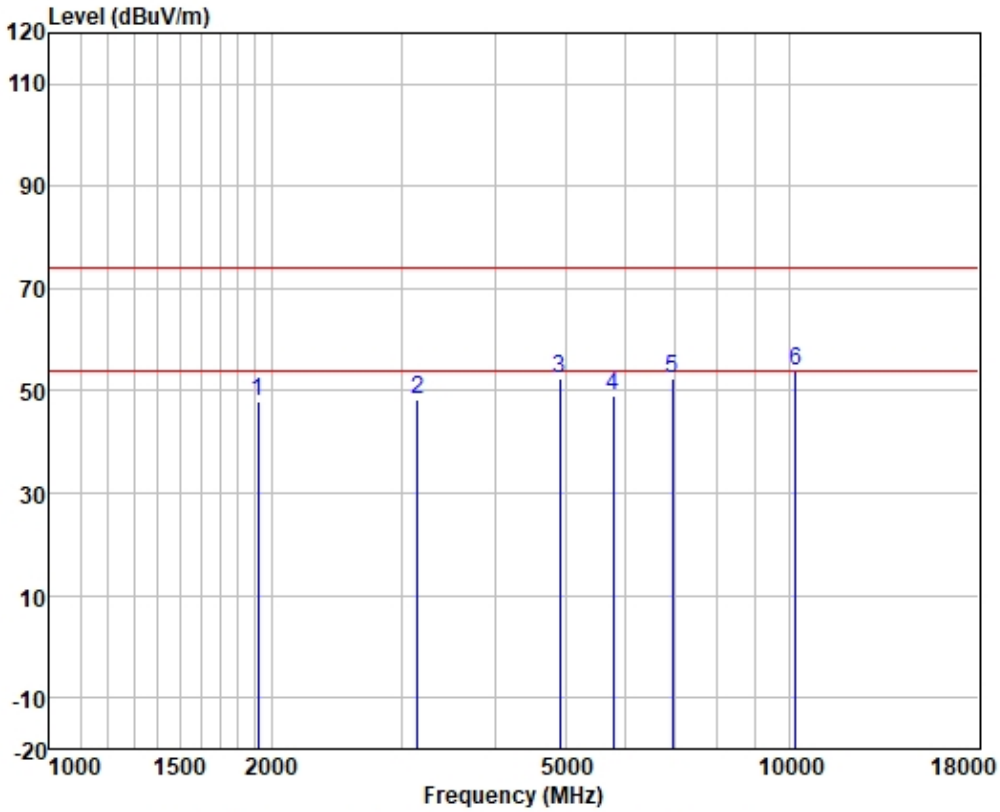
Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: Middle



	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	1916.180	55.63	26.22	3.31	37.32	47.84	74.00	-26.16	VERTICAL	Peak
2	3150.237	51.98	28.77	4.38	36.85	48.28	74.00	-25.72	VERTICAL	Peak
3	4907.900	49.87	34.15	5.24	36.68	52.58	74.00	-21.42	VERTICAL	Peak
4	5780.300	47.58	32.66	5.76	36.79	49.21	74.00	-24.79	VERTICAL	Peak
5	6954.852	47.08	35.04	7.10	36.89	52.33	74.00	-21.67	VERTICAL	Peak
6	10215.020	43.68	39.32	7.71	36.79	53.92	74.00	-20.08	VERTICAL	Peak

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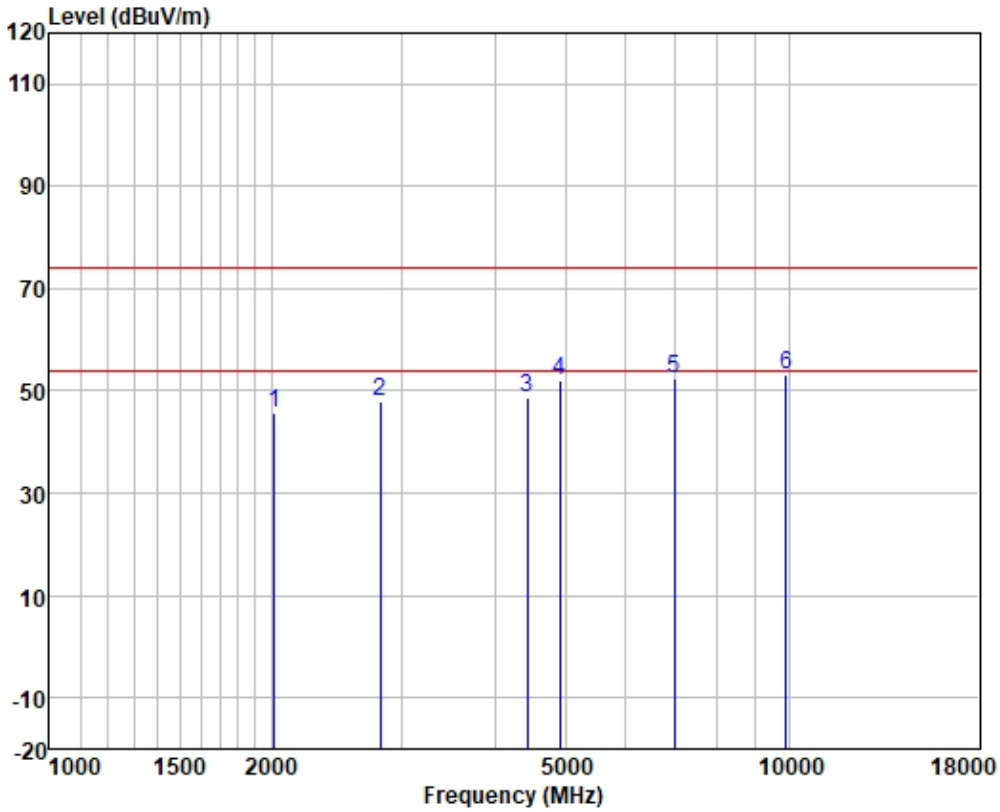
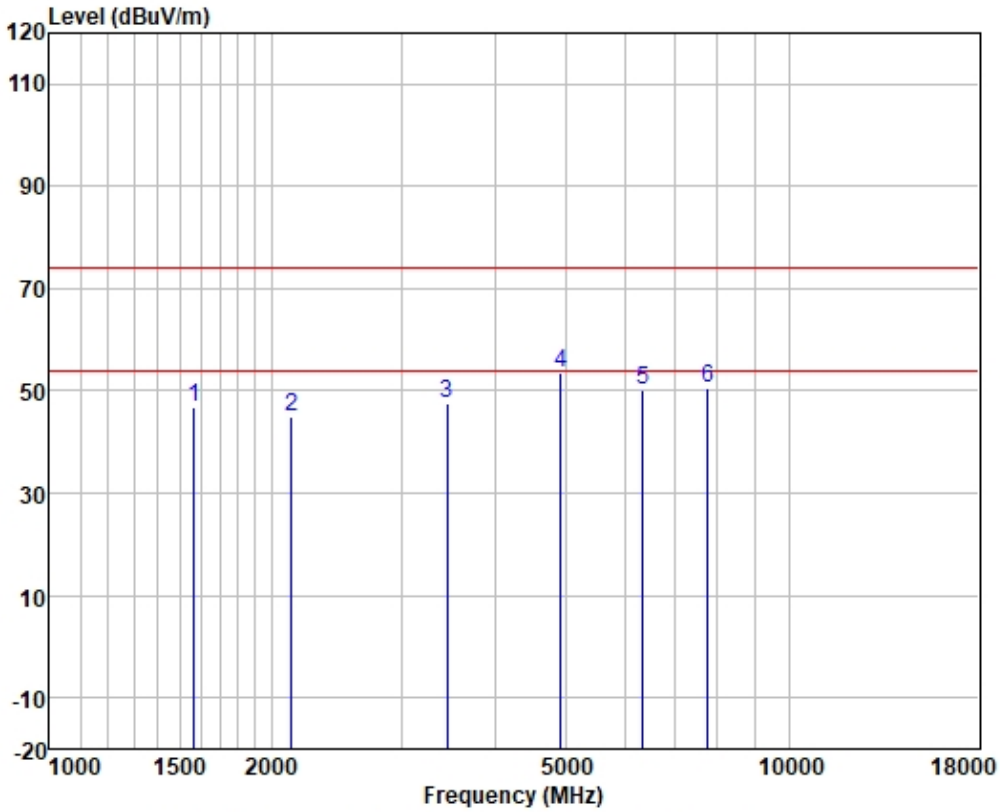
Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: Middle



	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	2012.686	53.38	26.40	3.35	37.30	45.83	74.00	-28.17	HORIZONTAL	Peak
2	2806.288	52.46	28.46	4.16	37.07	48.01	74.00	-25.99	HORIZONTAL	Peak
3	4430.628	46.49	33.87	4.79	36.63	48.52	74.00	-25.48	HORIZONTAL	Peak
4	4907.900	49.43	34.15	5.24	36.68	52.14	74.00	-21.86	HORIZONTAL	Peak
5	6995.172	47.05	35.11	7.13	36.89	52.40	74.00	-21.60	HORIZONTAL	Peak
6	9923.991	43.34	38.95	7.67	36.80	53.16	74.00	-20.84	HORIZONTAL	Peak

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



	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	1569.721	56.83	24.60	2.97	37.47	46.93	74.00	-27.07	VERTICAL	Peak
2	2126.308	52.08	26.65	3.43	37.28	44.88	74.00	-29.12	VERTICAL	Peak
3	3455.508	50.81	29.01	4.62	36.73	47.71	74.00	-26.29	VERTICAL	Peak
4	4916.490	50.73	34.15	5.25	36.68	53.45	74.00	-20.55	VERTICAL	Peak
5	6340.436	47.15	33.56	6.44	36.82	50.33	74.00	-23.67	VERTICAL	Peak
6	7762.260	43.79	36.84	6.90	36.99	50.54	74.00	-23.46	VERTICAL	Peak

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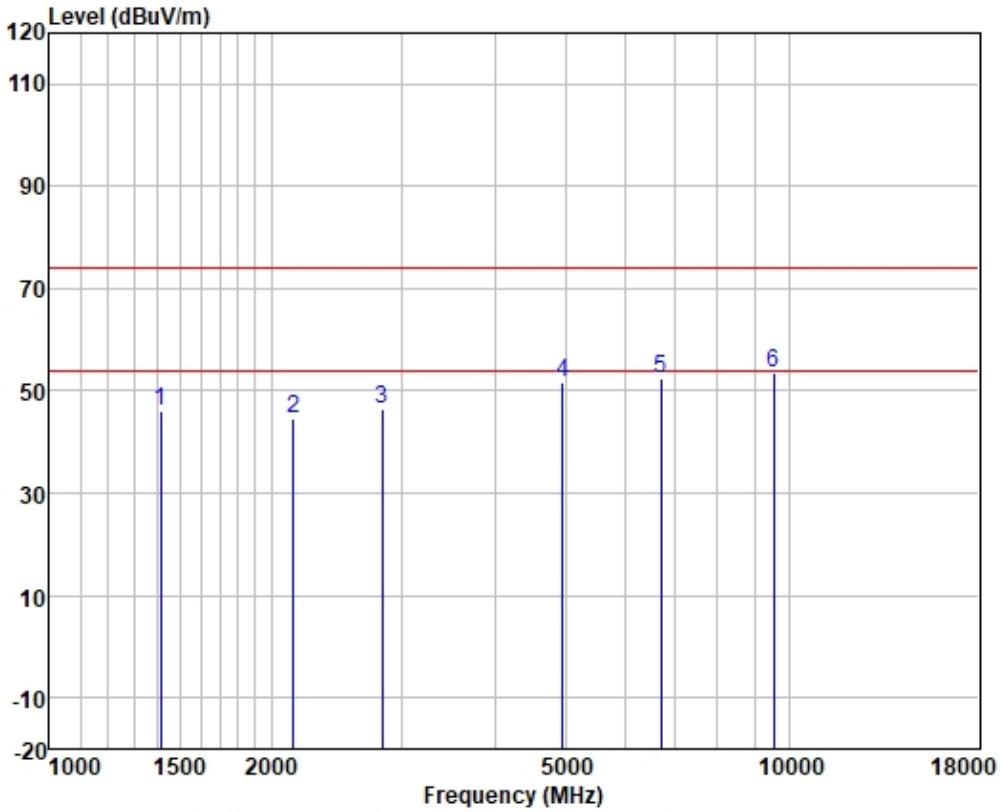
Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: High



	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	1414.597	56.62	24.29	2.90	37.56	46.25	74.00	-27.75	HORIZONTAL	Peak
2	2138.635	51.65	26.69	3.44	37.27	44.51	74.00	-29.49	HORIZONTAL	Peak
3	2822.558	50.88	28.48	4.18	37.07	46.47	74.00	-27.53	HORIZONTAL	Peak
4	4938.000	48.99	34.15	5.27	36.68	51.73	74.00	-22.27	HORIZONTAL	Peak
5	6717.762	47.91	34.42	6.87	36.85	52.35	74.00	-21.65	HORIZONTAL	Peak
6	9530.432	44.08	38.63	7.64	36.83	53.52	74.00	-20.48	HORIZONTAL	Peak

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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR231100126001

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9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2311001260HS

- End of the Report -

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