

TEST REPORT

Application No.: GZCR2306000645LM
Applicant: Telebrands Corporation.
Address of Applicant: One Bulbhead Way, 79 Two Bridges Road, Fairfield, NJ 07004, USA
Manufacturer: Telebrands Corporation.
Address of Manufacturer: One Bulbhead Way, 79 Two Bridges Road, Fairfield, NJ 07004, USA
Factory: Telebrands Corporation.
Address of Factory: One Bulbhead Way, 79 Two Bridges Road, Fairfield, NJ 07004, USA
Equipment Under Test (EUT):
EUT Name: STARSHOWER ULTRA 9 (2023); STARSHOWER ULTRA 9 WITH REMOTE (2023)
Model No.: 17204, 17205, 16158-AC/DC ♣
 ♣ Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Standard(s) : 47 CFR Part 15, Subpart C 15.249
Date of Receipt: 2023-06-30
Date of Test: 2023-07-07 to 2023-07-11
Date of Issue: 2023-07-12

Test Result:

Pass*

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

Ricky Liu

Ricky Liu
Manager



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Revision Record			
Version	Report No.	Date	Remark
01	GZCR230600064502	2023-07-12	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.

♣ Declaration of EUT Family Grouping:

Model No.: 17204, 17205, 16158-AC/DC

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference on model name.

Therefore only one model 17205 was tested in this report.



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4 General Information

4.1 Details of E.U.T.

Power supply: For laser lamp(Main unit, receiver only).
CLASS 2 POWER SUPPLY
MODEL: RY15K050150US
INPUT: 100-240V~, 50/60Hz, 0.3A
OUTPUT: 5.0V, 1500mA
For wireless remote controller(Transmitter only).
DC 3V = Size "CR2025" Lithium battery x 1pcs

Test voltage: DC 3V for wireless remote controller.

Cable(s): Adapter DC output cable, 2 wires, 0.4m, unshielded.

Operation Frequency: 2403MHz, 2423MHz, 2453MHz

Modulation Type: GFSK

Number of Channels: 3

Antenna Type: PCB Antenna

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)

4.4 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059
No tests were sub-contracted.



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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

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	2023-02-20	2024-02-19

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	2022-12-16	2023-12-15
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15
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	2022-09-08	2023-09-07
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

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	2022-12-16	2023-12-15
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15
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



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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	2023-06-14	2024-06-13
High Pass Filter (915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2022-12-16	2023-12-15
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2022-04-06	2024-04-05
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2023-05-19	2024-05-18
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

Radiated Emissions Above 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15
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	2022-12-16	2023-12-15
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2022-08-24	2023-08-23
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



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

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: 24.4 °C

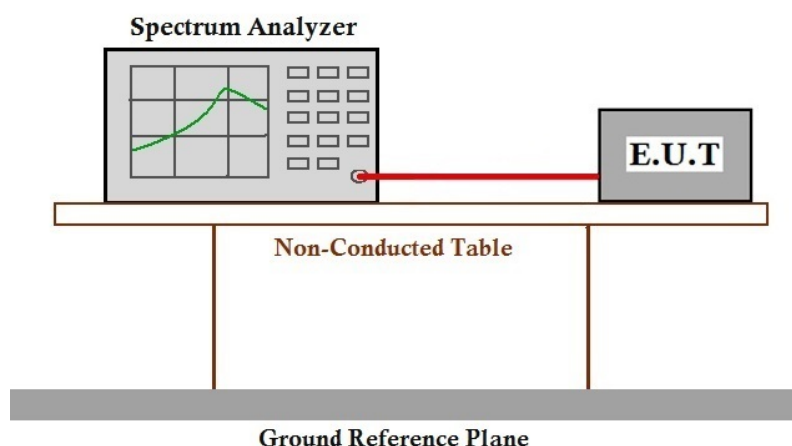
Humidity: 68.5 % RH

Atmospheric Pressure: 1006 mbar

7.1.2 Test Mode Description

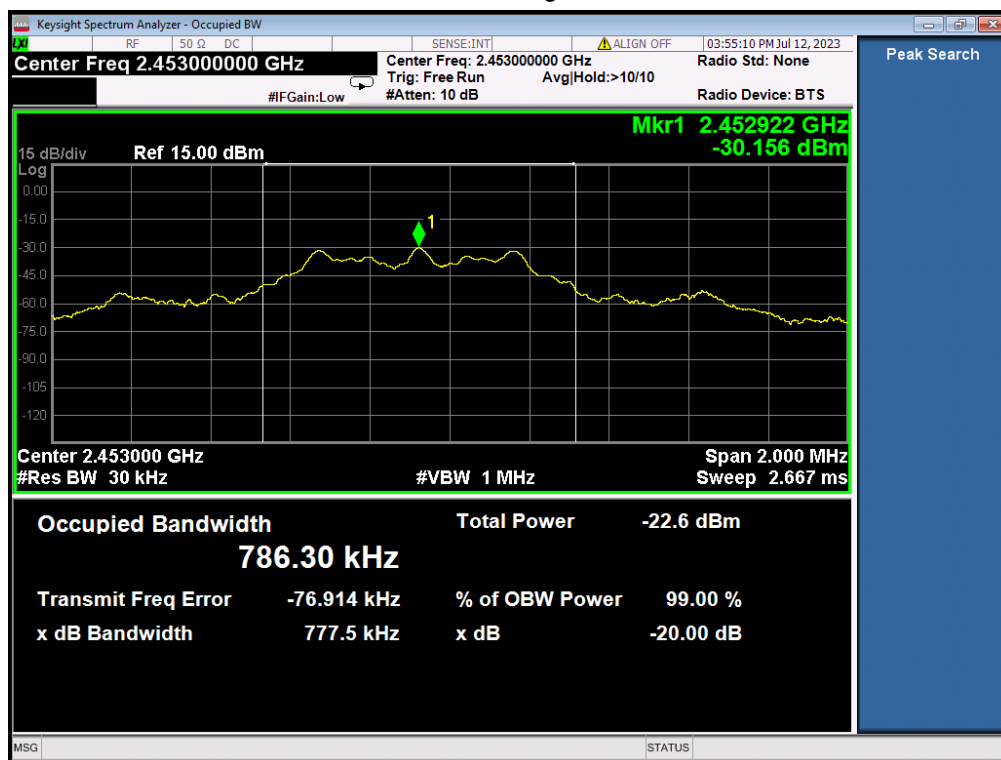
Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Test mode:00; High channel.



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

Test Distance: 3m

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: 25.9 °C

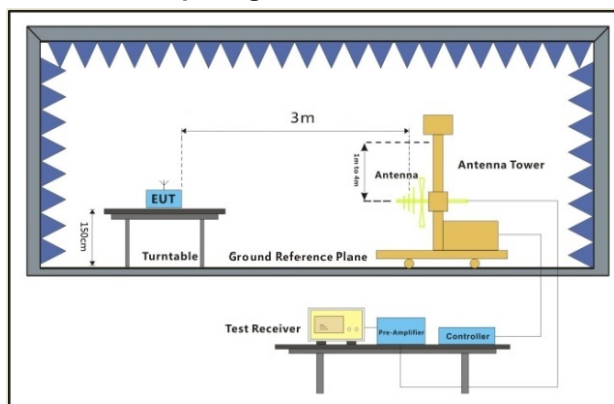
Humidity: 62.3 % RH

Atmospheric Pressure: 1006 mbar

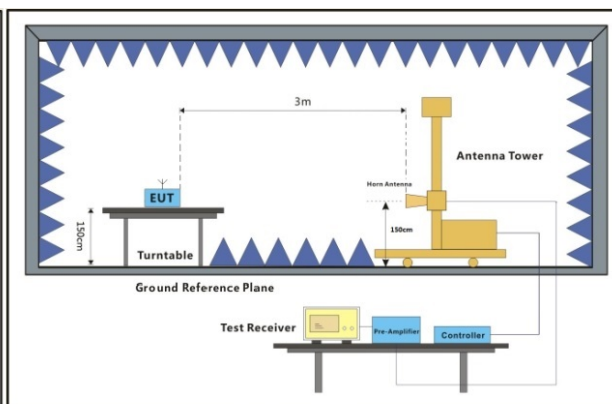
7.2.2 Test Mode Description

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

7.2.3 Test Setup Diagram



30MHz-1GHz

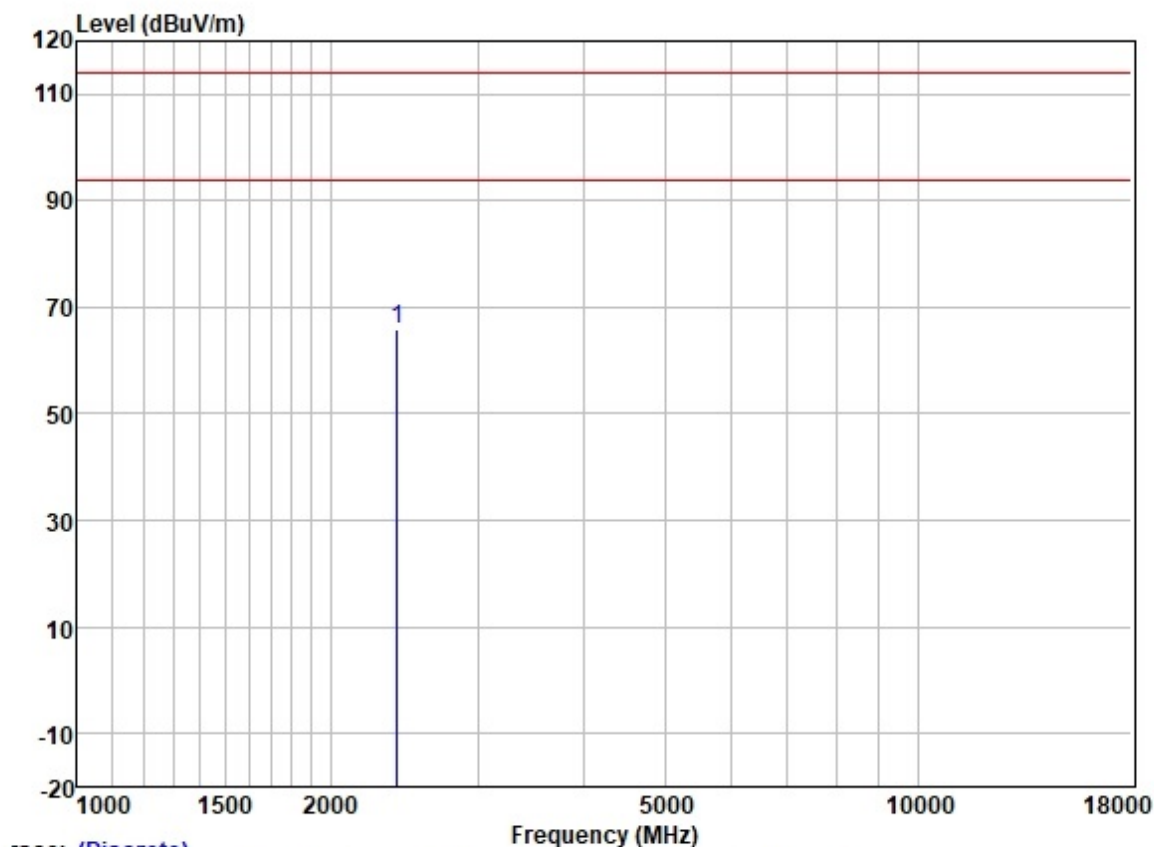


Above 1GHz

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

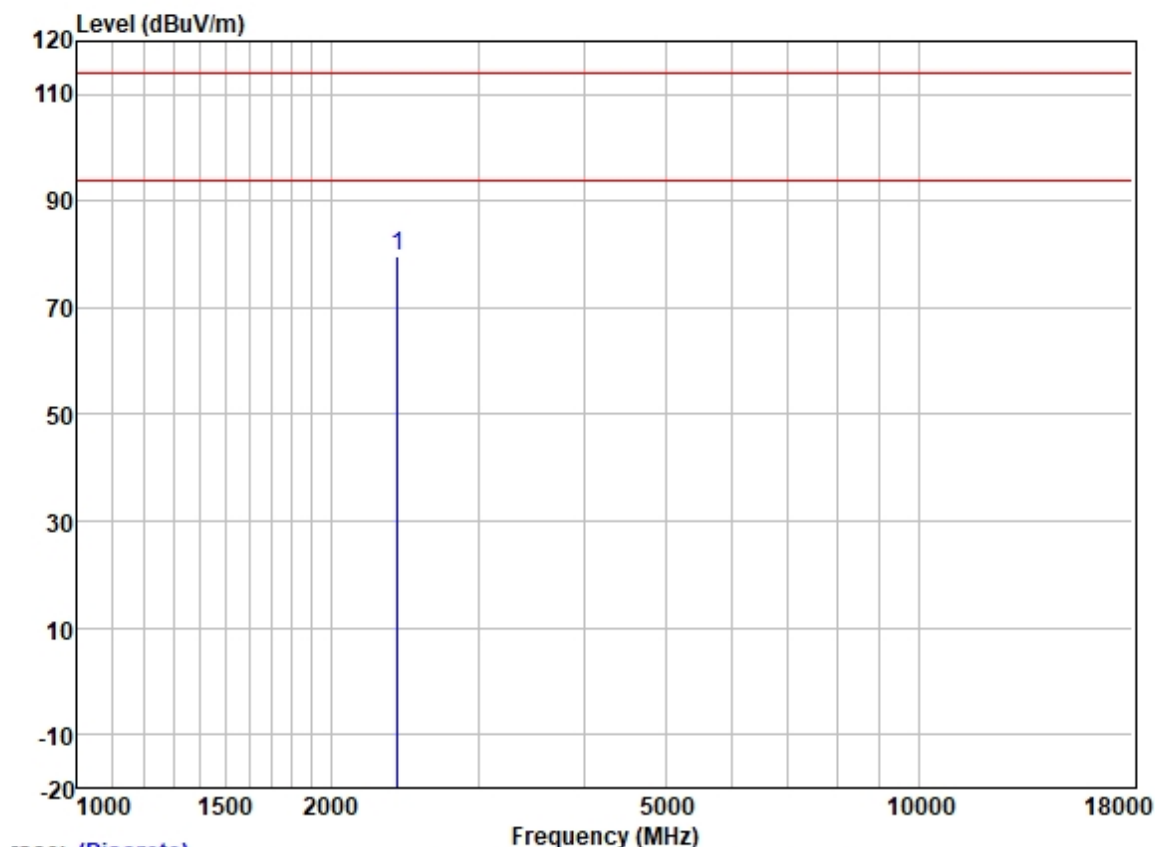
Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: Low



Trace: (Discrete)

	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Remark
1 2403.753	71.89	27.71	4.11	37.76	65.95	114.00	-48.05	HORIZONTAL Peak

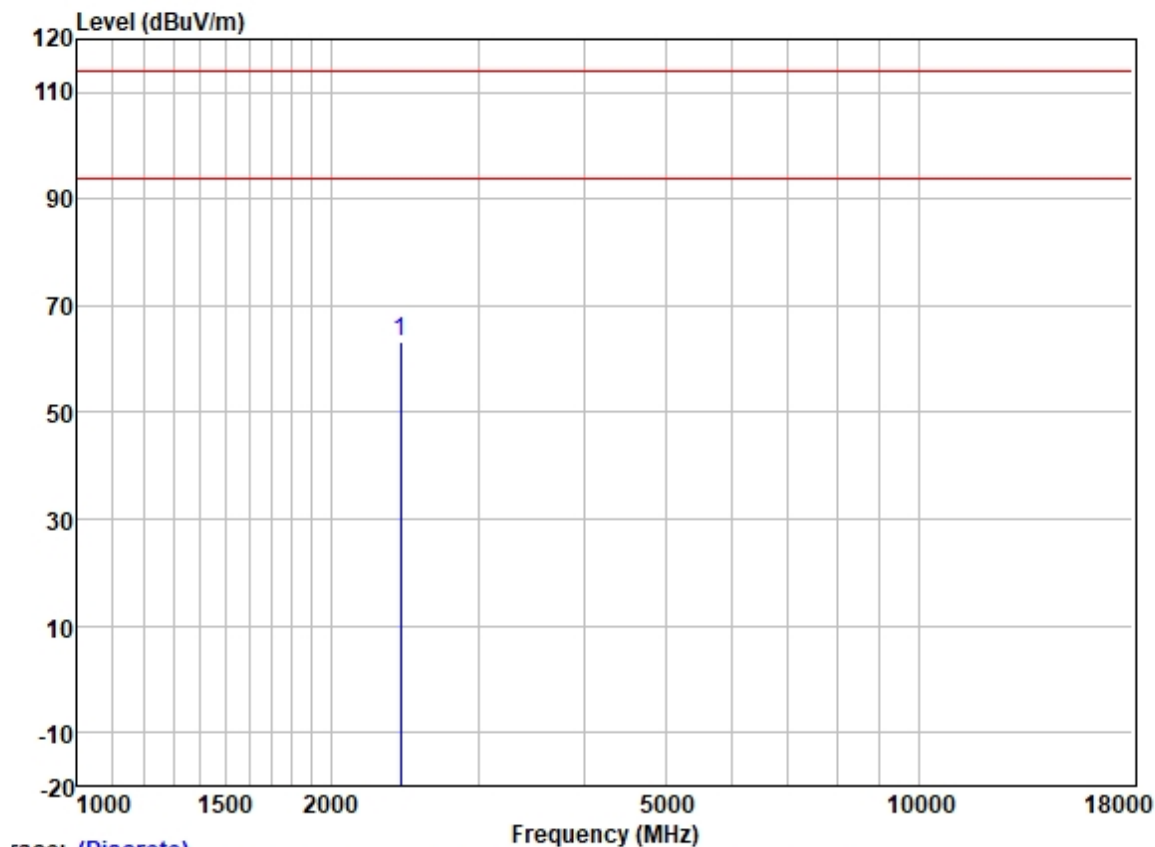
Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel:Low



Trace: (Discrete)

	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2403.753	85.63	27.71	4.11	37.76	79.69	114.00	-34.31 VERTICAL
								Peak

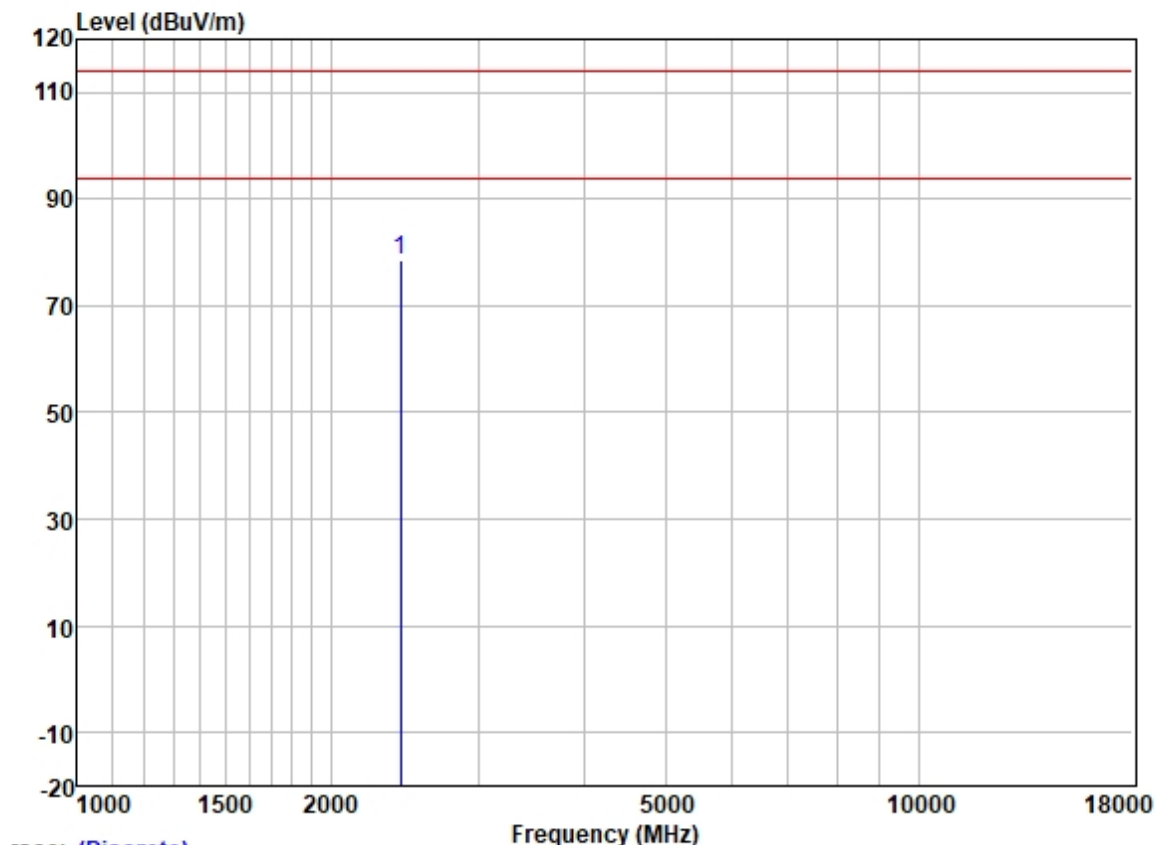
Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel:middle



Trace: (Discrete)

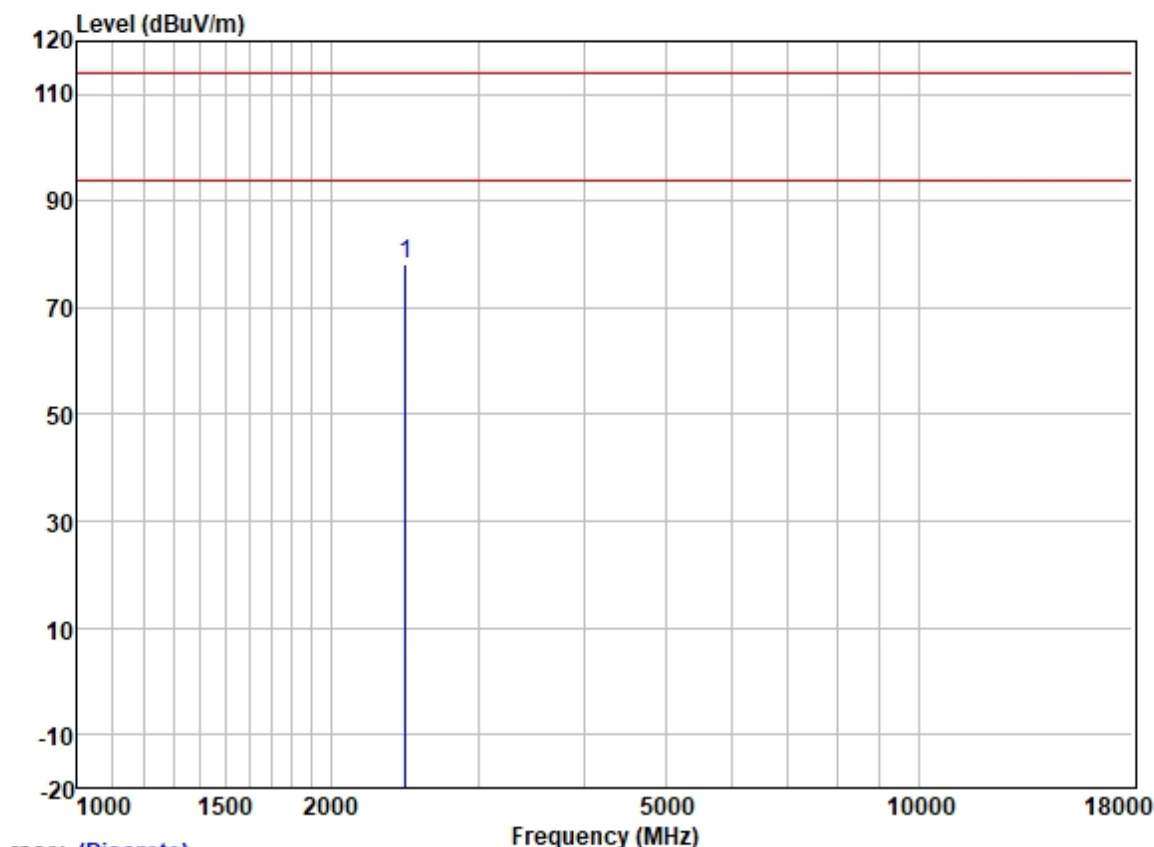
	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2423.672	69.44	27.75	3.98	37.75	63.42	114.00	-50.58 VERTICAL
								Peak

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



	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Remark
1	2423.672	84.68	27.75	3.98	37.75	78.66	114.00	-35.34 HORIZONTAL Peak

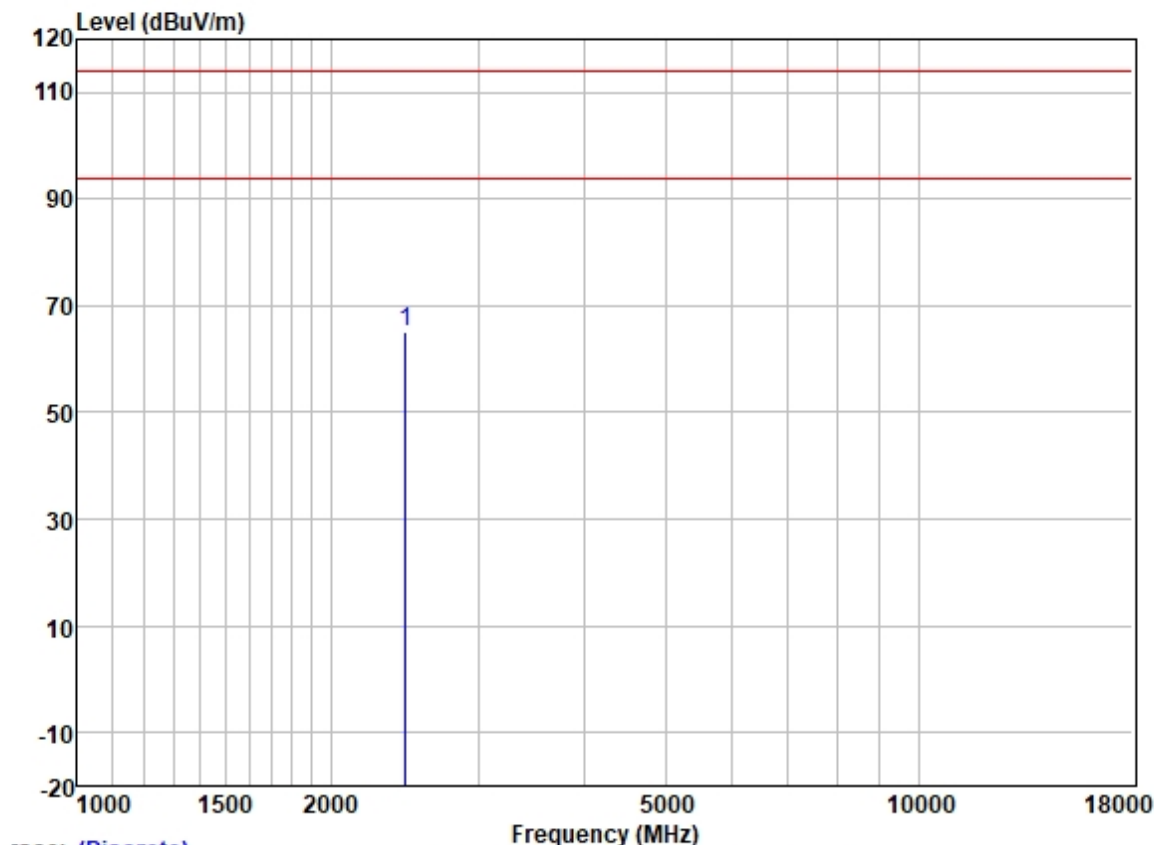
Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: High



Trace: (Discrete)

	Read	Antenna	Cable	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	Remark
1	2453.751	84.47	27.81	3.70	37.74	78.24	114.00	-35.76 HORIZONTAL Peak

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



Trace: (Discrete)

	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2453.751	71.45	27.81	3.70	37.74	65.22	114.00	-48.78 VERTICAL
								Peak

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

Test Distance: 3 m

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: 61.8 % RH

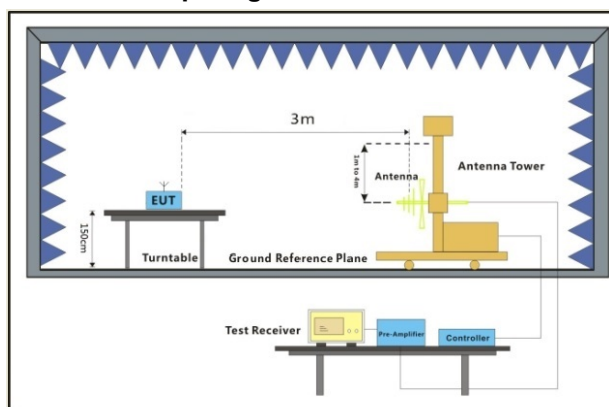
Atmospheric Pressure: 1006 mbar

7.3.2 Test Mode Description

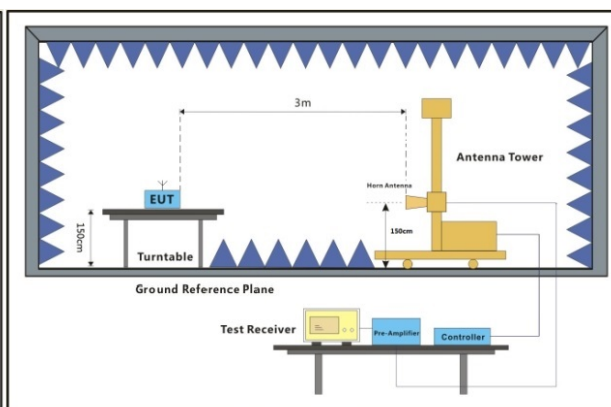
Pre-scan / Mode
Final test Code Description

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

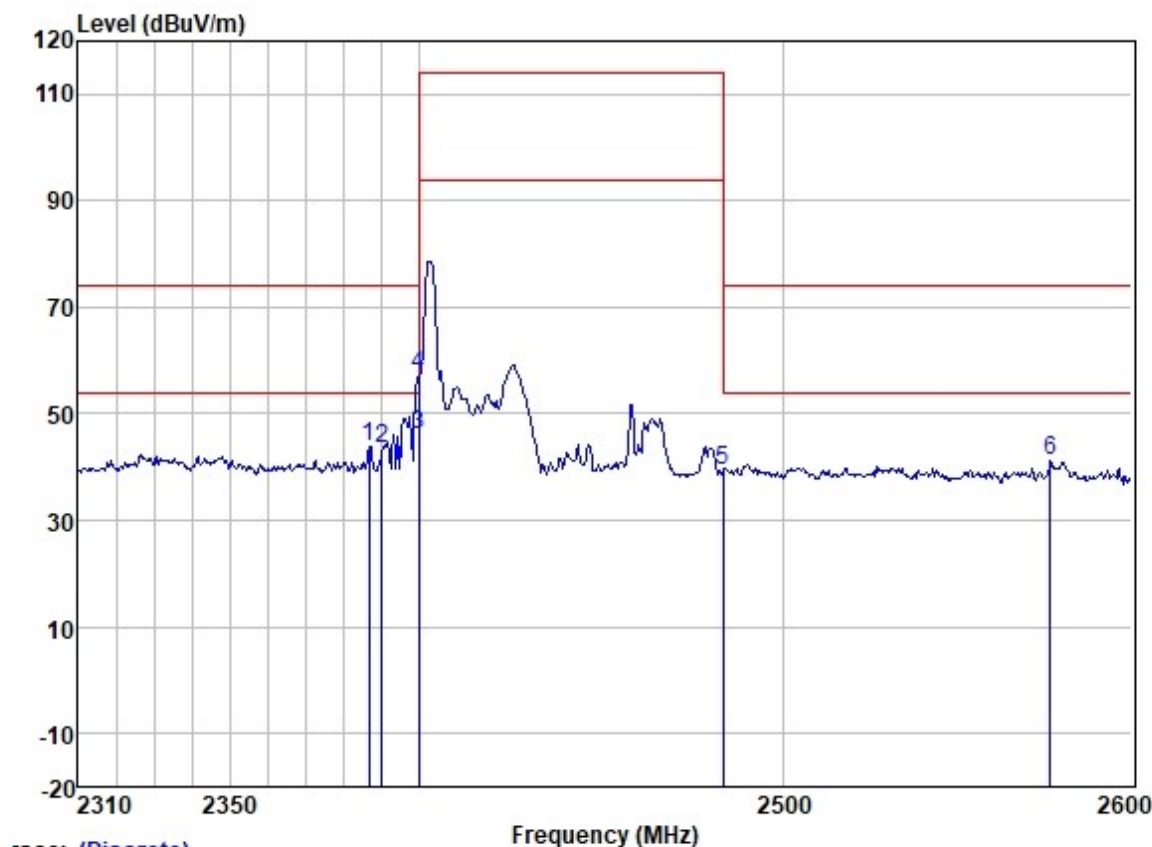
- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 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



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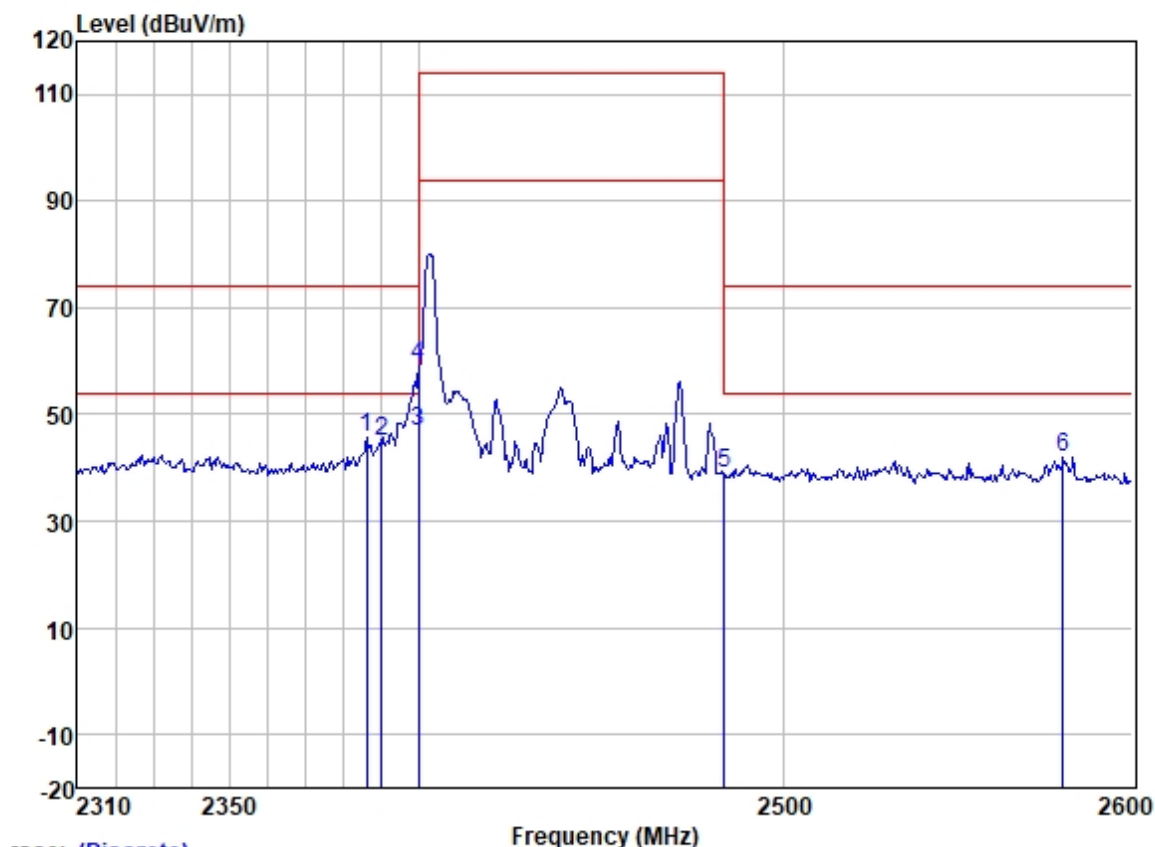
Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: Low



Trace: (Discrete)

		ReadAntenna		Cable	Preamp		Limit	Over		
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2386.645	49.65	27.68	4.22	37.77	43.78	74.00	-30.22	VERTICAL	Peak
2	2390.000	49.26	27.68	4.22	37.76	43.40	74.00	-30.60	VERTICAL	Peak
3	2400.000	51.85	27.71	4.11	37.76	45.91	54.00	-8.09	VERTICAL	Average
4	2400.000	63.36	27.71	4.11	37.76	57.42	74.00	-16.58	VERTICAL	Peak
5	2483.391	45.67	27.85	3.42	37.73	39.21	74.00	-34.79	VERTICAL	Peak
6	2576.126	48.50	27.95	2.54	37.68	41.31	74.00	-32.69	VERTICAL	Peak

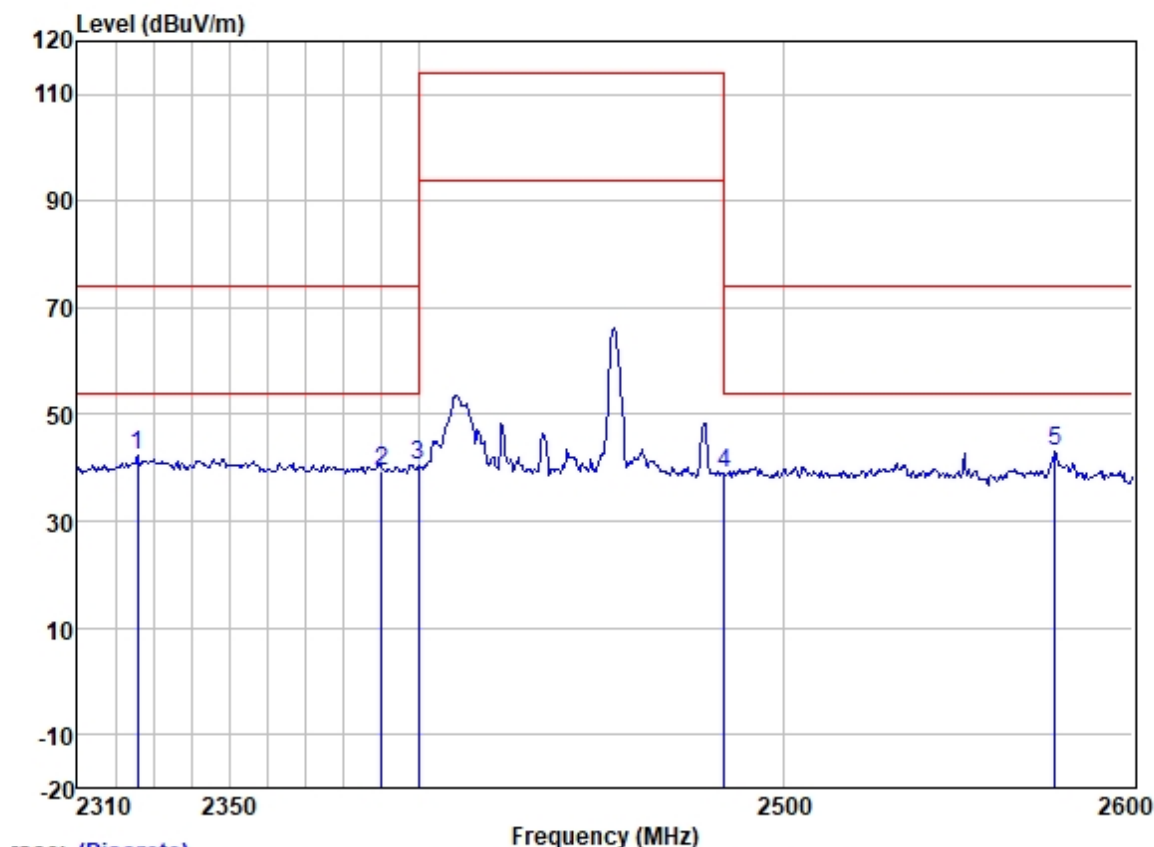
Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel:Low



face: (Discrete)

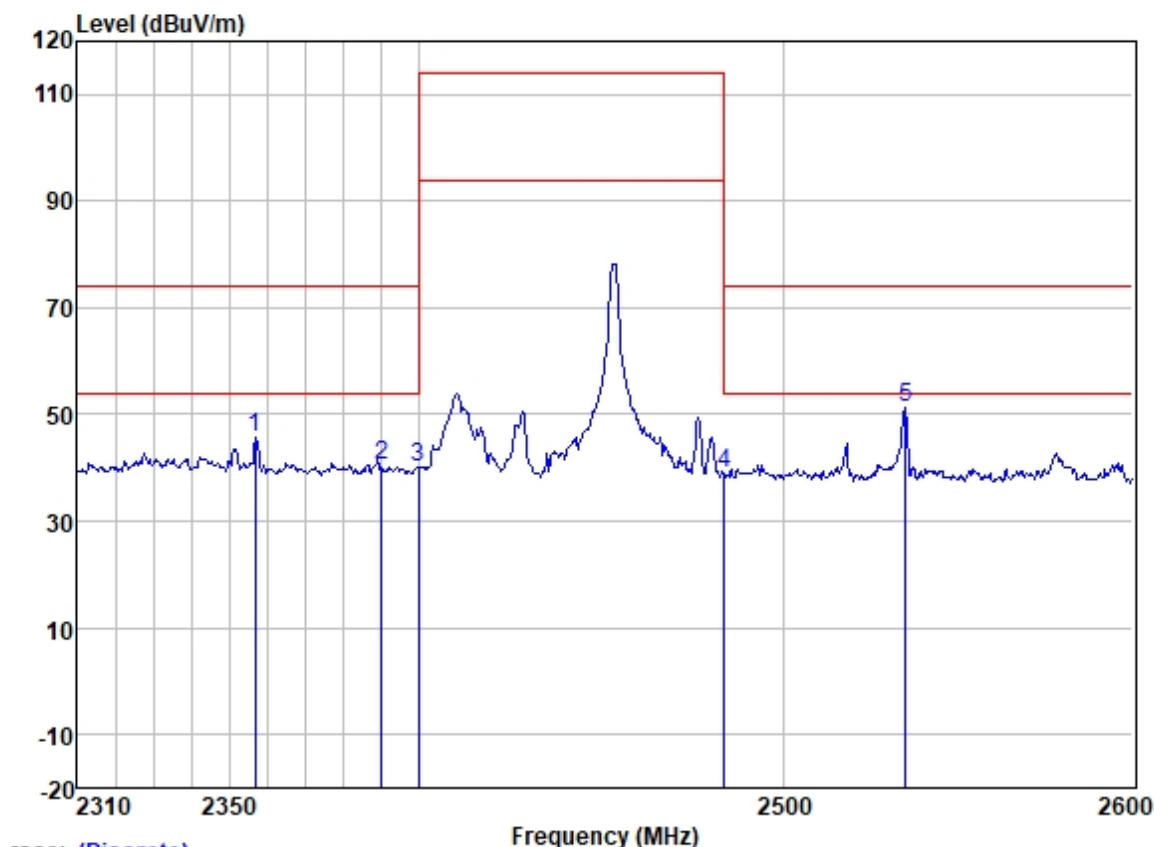
	Freq	ReadAntenna	Cable	Preamp		Limit	Over	Pol/Phase	Remark	
		Level	Factor	Loss	Factor	Level	Line	Limit		
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2386.080	51.51	27.68	4.22	37.77	45.64	74.00	-28.36	VERTICAL	Peak
2	2390.000	50.69	27.68	4.22	37.76	44.83	74.00	-29.17	VERTICAL	Peak
3	2400.000	52.59	27.71	4.11	37.76	46.65	54.00	-7.35	VERTICAL	Average
4	2400.000	65.16	27.71	4.11	37.76	59.22	74.00	-14.78	VERTICAL	Peak
5	2483.500	45.49	27.85	3.42	37.73	39.03	74.00	-34.97	VERTICAL	Peak
6	2579.785	49.11	27.96	2.49	37.68	41.88	74.00	-32.12	VERTICAL	Peak

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



	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2325.625	47.58	27.54	4.85	37.79	42.18	74.00	-31.82	VERTICAL Peak
2	2390.000	45.40	27.68	4.22	37.76	39.54	74.00	-34.46	VERTICAL Peak
3	2400.000	46.29	27.71	4.11	37.76	40.35	74.00	-33.65	VERTICAL Peak
4	2483.500	45.27	27.85	3.42	37.73	38.81	74.00	-35.19	VERTICAL Peak
5	2577.345	50.29	27.96	2.49	37.68	43.06	74.00	-30.94	VERTICAL Peak

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



	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2356.355	51.46	27.62	4.46	37.78	45.76	74.00	-28.24	HORIZONTAL Peak
2	2390.000	46.19	27.68	4.22	37.76	40.33	74.00	-33.67	HORIZONTAL Peak
3	2400.000	46.10	27.71	4.11	37.76	40.16	74.00	-33.84	HORIZONTAL Peak
4	2483.500	45.28	27.85	3.42	37.73	38.82	74.00	-35.18	HORIZONTAL Peak
5	2534.424	58.34	27.91	2.83	37.71	51.37	74.00	-22.63	HORIZONTAL Peak

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:

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

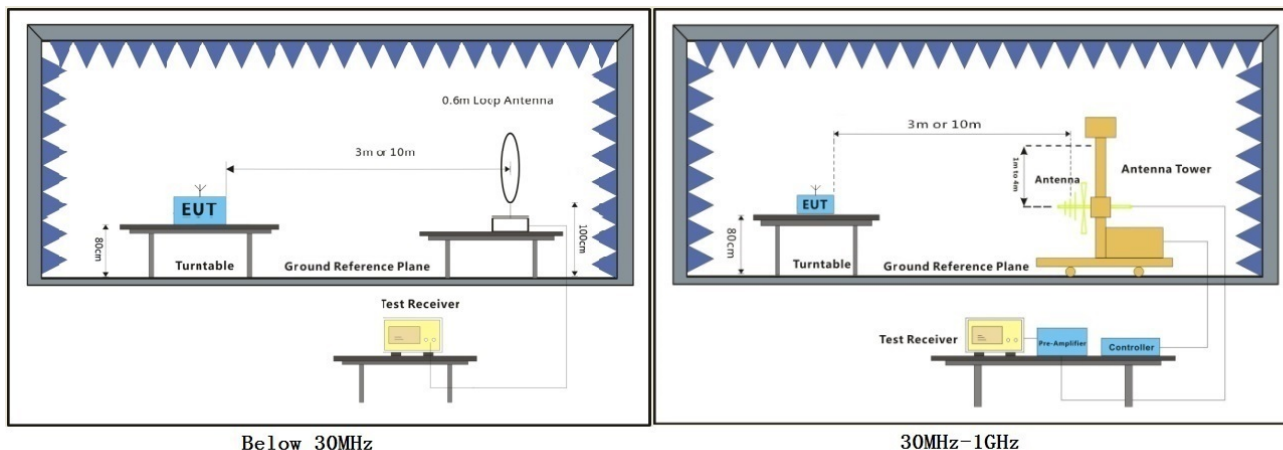
Operating Environment:

Temperature: 23.6 °C Humidity: 56.3 % RH Atmospheric Pressure: 1006 mbar

7.4.2 Test Mode Description

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

7.4.3 Test Setup Diagram



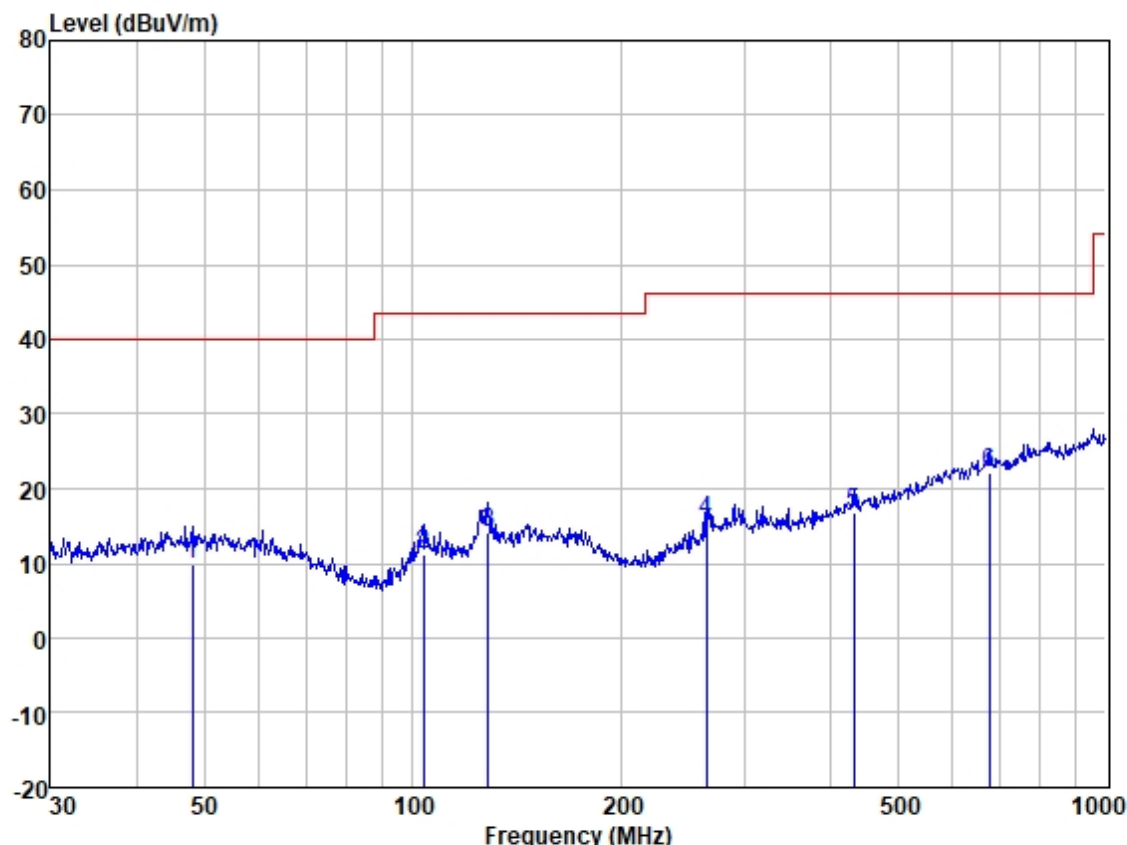
7.4.4 Measurement Procedure and Data

- 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.
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.

Test Mode: 00; Polarity: Horizontal



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

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	47.994	23.65	13.97	0.46	28.10	9.98	40.00	-30.02	HORIZONTAL	QP
2	103.442	29.00	9.56	0.68	28.09	11.15	43.50	-32.35	HORIZONTAL	QP
3	128.563	29.33	12.06	0.75	28.01	14.13	43.50	-29.37	HORIZONTAL	QP
4	264.746	29.85	12.29	1.12	27.45	15.81	46.00	-30.19	HORIZONTAL	QP
5	432.546	27.17	16.54	1.41	28.23	16.89	46.00	-29.11	HORIZONTAL	QP
6	677.580	28.17	20.99	1.77	28.71	22.22	46.00	-23.78	HORIZONTAL	QP



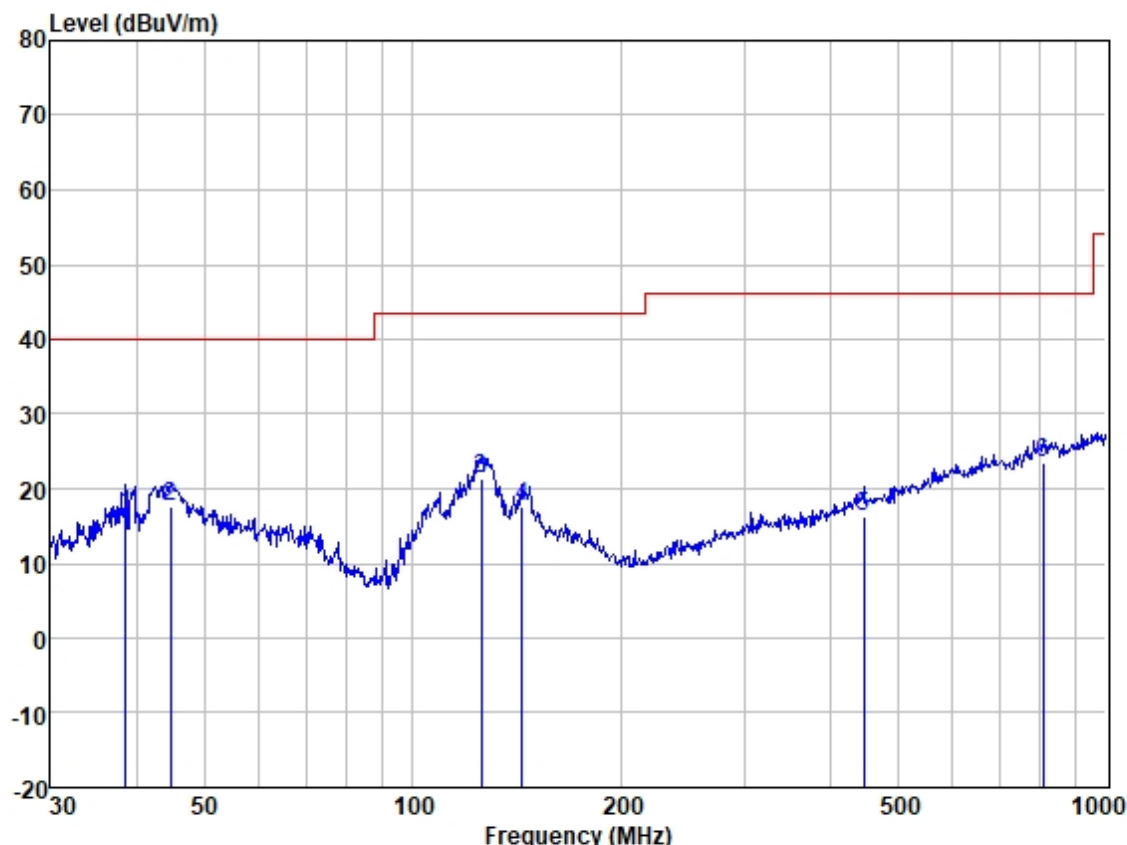
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Test Mode: 00; Polarity: Vertical



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

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	38.481	30.85	13.40	0.42	28.14	16.53	40.00	-23.47	VERTICAL	QP
2	44.743	31.35	13.88	0.45	28.11	17.57	40.00	-22.43	VERTICAL	QP
3	125.446	36.80	11.69	0.74	28.02	21.21	43.50	-22.29	VERTICAL	QP
4	143.830	31.39	13.20	0.80	27.92	17.47	43.50	-26.03	VERTICAL	QP
5	446.414	26.12	16.91	1.45	28.34	16.14	46.00	-29.86	VERTICAL	QP
6	810.265	26.77	23.21	1.94	28.49	23.43	46.00	-22.57	VERTICAL	QP

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

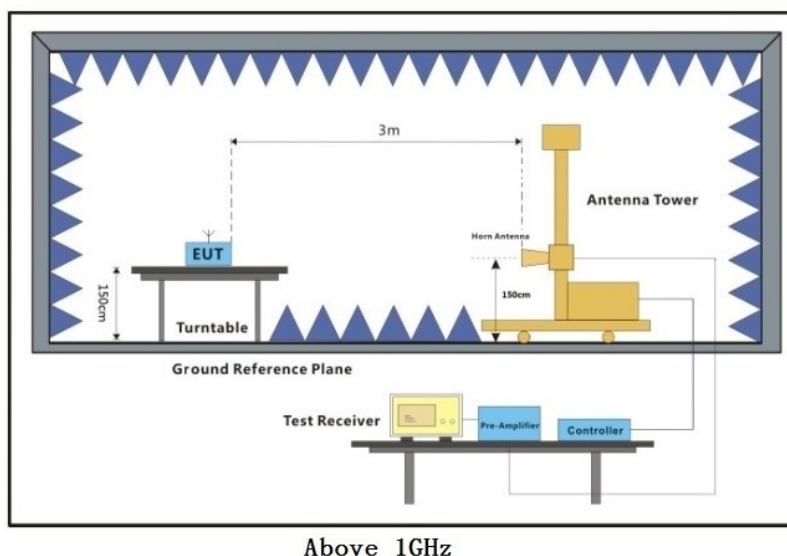
Operating Environment:

Temperature: 25.9 °C Humidity: 61.8 % RH Atmospheric Pressure: 1006 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



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.
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.



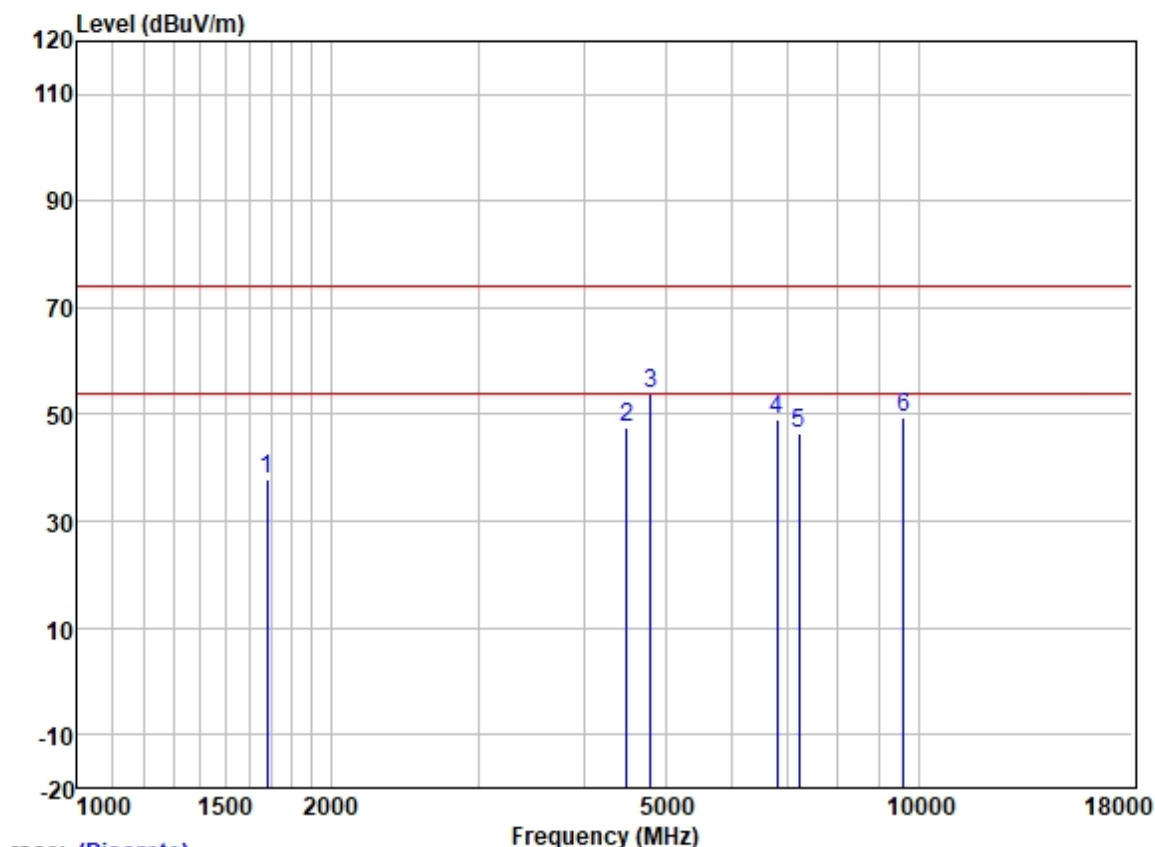
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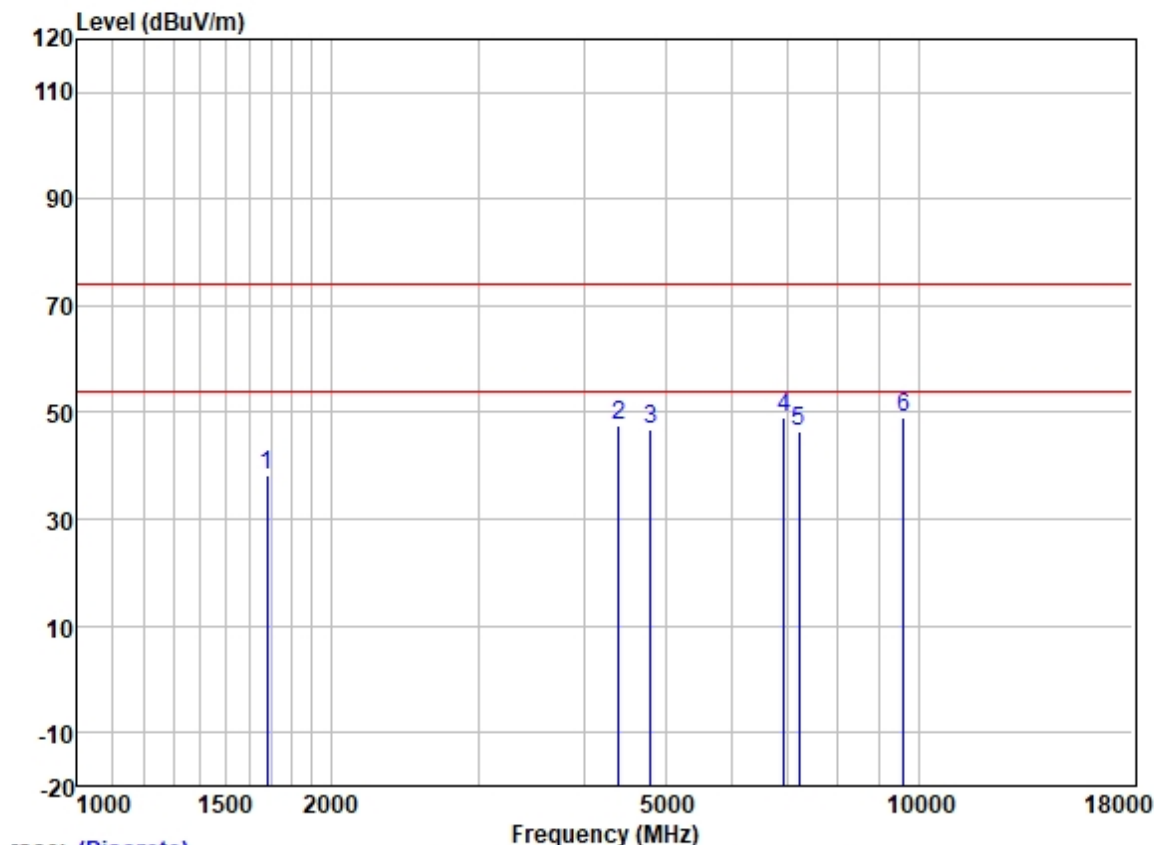
Test Mode:00; Polarity: Vertical; Modulation: GFSK; Channel:Low



Trace: (Discrete)

	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1682.477	47.48	25.03	3.25	37.93	37.83	74.00	-36.17	VERTICAL peak
2	4495.125	44.97	34.17	5.33	36.83	47.64	74.00	-26.36	VERTICAL peak
3	4806.000	51.12	34.16	5.46	36.86	53.88	74.00	-20.12	VERTICAL peak
4	6795.879	45.27	34.69	6.34	37.06	49.24	74.00	-24.76	VERTICAL peak
5	7209.000	41.48	35.63	6.36	37.13	46.34	74.00	-27.66	VERTICAL peak
6	9612.000	39.82	38.68	7.99	37.02	49.47	74.00	-24.53	VERTICAL peak

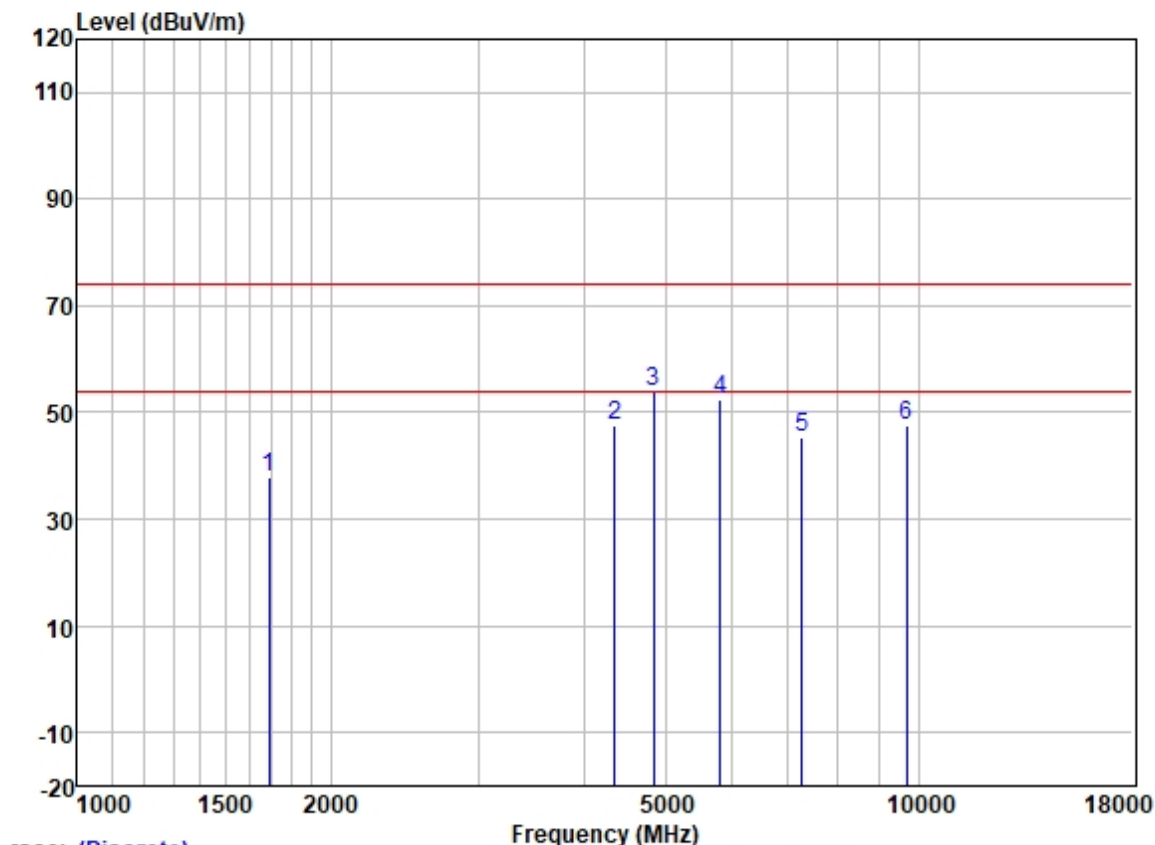
Test Mode:00; Polarity: Horizontal; Modulation: GFSK; Channel:Low



Trace: (Discrete)

	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1682.477	47.81	25.03	3.25	37.93	38.16	74.00	-35.84	HORIZONTAL peak
2	4405.090	45.18	33.74	5.37	36.82	47.47	74.00	-26.53	HORIZONTAL peak
3	4806.000	43.94	34.16	5.46	36.86	46.70	74.00	-27.30	HORIZONTAL peak
4	6914.763	44.70	34.97	6.39	37.08	48.98	74.00	-25.02	HORIZONTAL peak
5	7209.000	41.71	35.63	6.36	37.13	46.57	74.00	-27.43	HORIZONTAL peak
6	9612.000	39.50	38.68	7.99	37.02	49.15	74.00	-24.85	HORIZONTAL peak

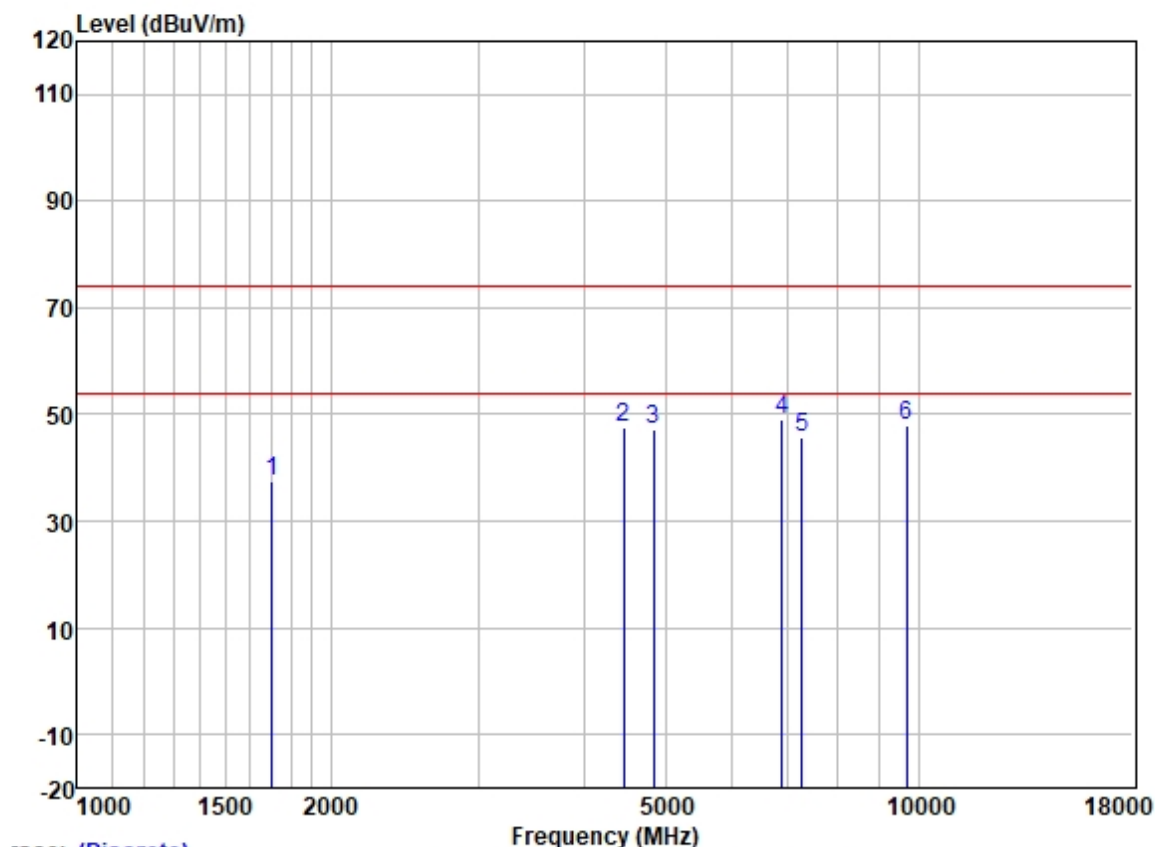
Test Mode:00; Polarity: Vertical; Modulation: GFSK; Channel:middle



Trace: (Discrete)

	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1692.231	47.59	25.09	3.30	37.93	38.05	74.00	-35.95	HORIZONTAL peak
2	4354.454	45.47	33.43	5.34	36.82	47.42	74.00	-26.58	HORIZONTAL peak
3	4846.000	51.14	34.15	5.47	36.87	53.89	74.00	-20.11	HORIZONTAL peak
4	5813.812	51.03	32.67	5.71	36.99	52.42	74.00	-21.58	HORIZONTAL peak
5	7269.000	40.09	35.86	6.34	37.14	45.15	74.00	-28.85	HORIZONTAL peak
6	9692.000	38.32	38.75	7.68	37.02	47.73	74.00	-26.27	HORIZONTAL peak

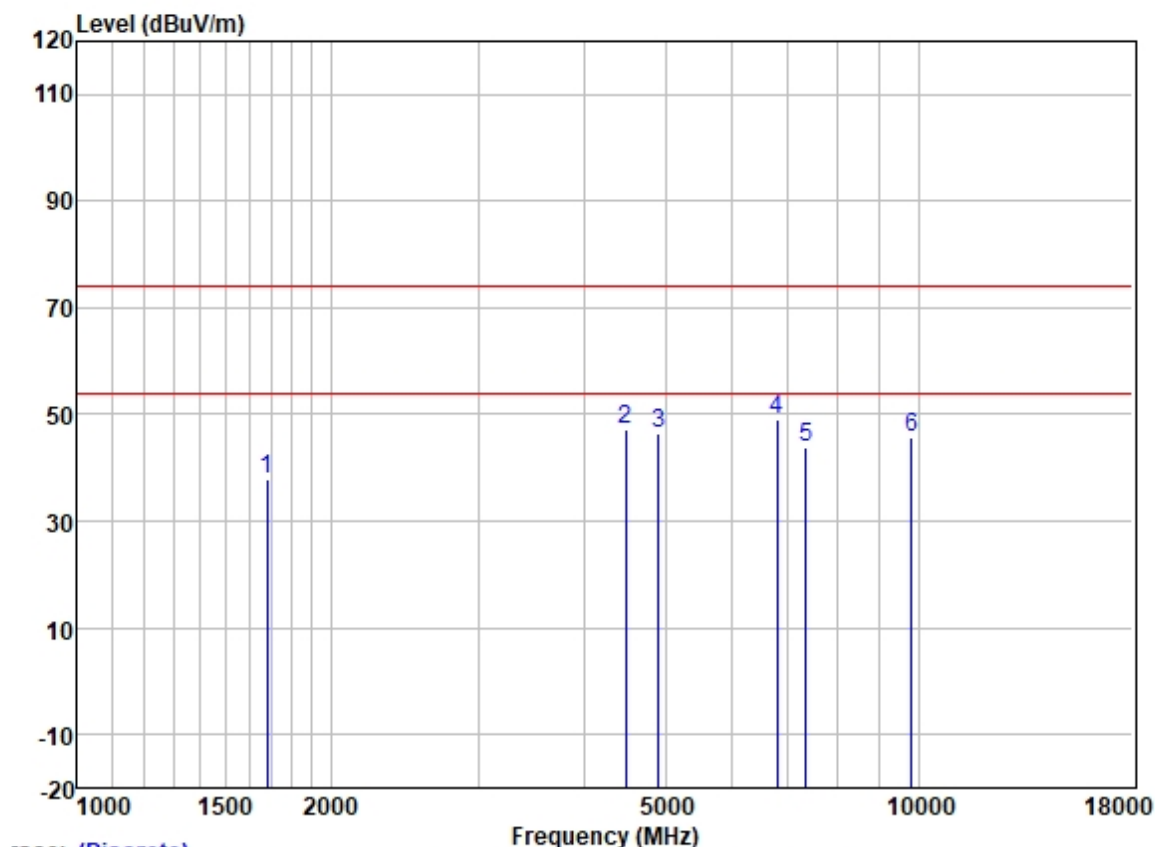
Test Mode:00; Polarity: Horizontal; Modulation: GFSK; Channel:middle



Trace: (Discrete)

	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1702.042	47.05	25.15	3.36	37.92	37.64	74.00	-36.36	VERTICAL peak
2	4456.315	45.00	34.00	5.35	36.83	47.52	74.00	-26.48	VERTICAL peak
3	4846.000	44.53	34.15	5.47	36.87	47.28	74.00	-26.72	VERTICAL peak
4	6874.906	44.82	34.88	6.37	37.07	49.00	74.00	-25.00	VERTICAL peak
5	7269.000	40.67	35.86	6.34	37.14	45.73	74.00	-28.27	VERTICAL peak
6	9692.000	38.40	38.75	7.68	37.02	47.81	74.00	-26.19	VERTICAL peak

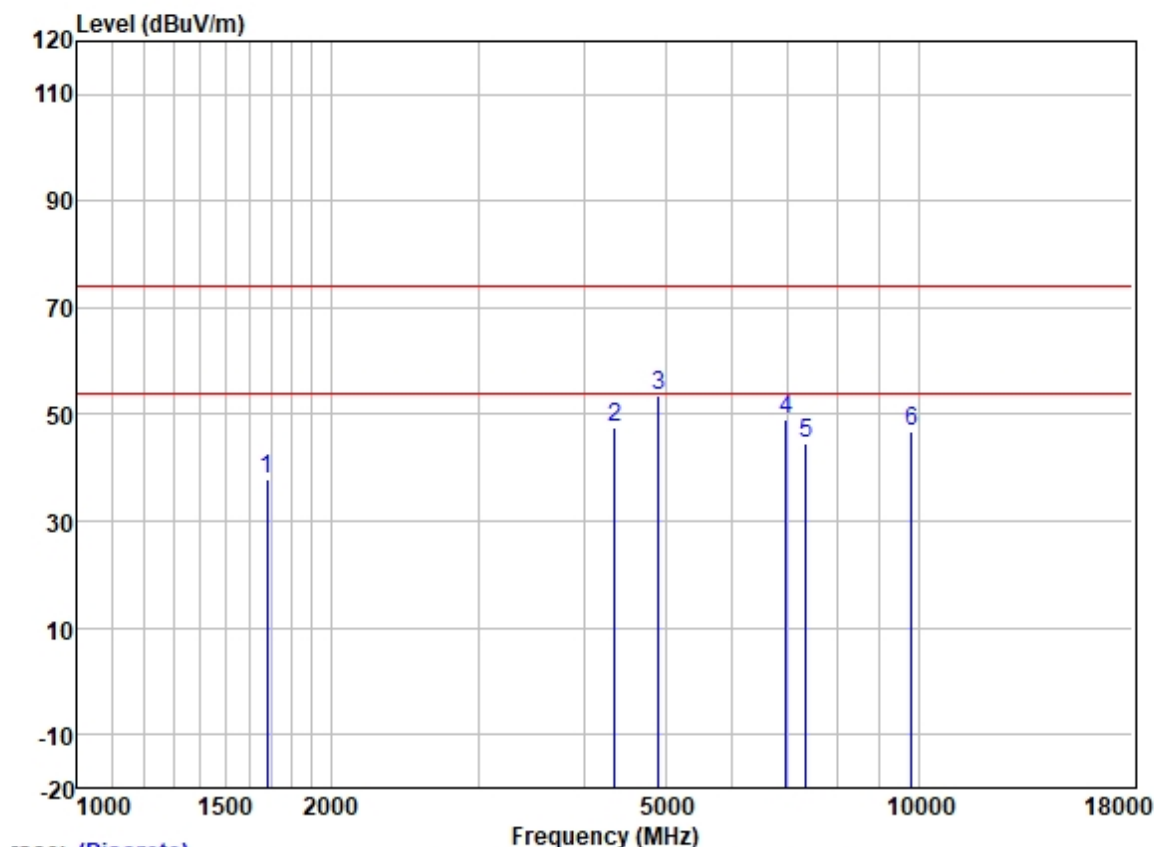
Test Mode:00; Polarity: Vertical; Modulation: GFSK; Channel:High



Trace: (Discrete)

	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark	
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1682.477	47.65	25.03	3.25	37.93	38.00	74.00	-36.00	VERTICAL	peak
2	4482.150	44.48	34.12	5.34	36.83	47.11	74.00	-26.89	VERTICAL	peak
3	4906.000	43.79	34.15	5.50	36.88	46.56	74.00	-27.44	VERTICAL	peak
4	6795.879	44.93	34.69	6.34	37.06	48.90	74.00	-25.10	VERTICAL	peak
5	7359.000	38.50	36.18	6.31	37.15	43.84	74.00	-30.16	VERTICAL	peak
6	9812.000	36.74	38.86	7.17	37.01	45.76	74.00	-28.24	VERTICAL	peak

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



Trace: (Discrete)

	Read Freq	Antenna 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	1682.477	47.64	25.03	3.25	37.93	37.99	74.00	-36.01	HORIZONTAL	peak
2	4354.454	45.63	33.43	5.34	36.82	47.58	74.00	-26.42	HORIZONTAL	peak
3	4906.000	50.69	34.15	5.50	36.88	53.46	74.00	-20.54	HORIZONTAL	peak
4	6954.852	44.87	35.04	6.40	37.09	49.22	74.00	-24.78	HORIZONTAL	peak
5	7359.000	39.33	36.18	6.31	37.15	44.67	74.00	-29.33	HORIZONTAL	peak
6	9812.000	37.97	38.86	7.17	37.01	46.99	74.00	-27.01	HORIZONTAL	peak

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR230600064502



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9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2306000645LM

- End of the Report -