

TEST REPORT

Application No.: GZCR2405000581HS
Applicant: Comefresh(Xiamen) Electronic Co., Ltd.
Address of Applicant: F2-4, No.35, Xiangyue Road, Xiang'an District, Xiamen, Fujian, P.R.China
Manufacturer: Comefresh(Xiamen) Electronic Co., Ltd.
Address of Manufacturer: F2-4, No.35, Xiangyue Road, Xiang'an District, Xiamen, Fujian, P.R.China
Factory: Comefresh(Xiamen) Electronic Co., Ltd.
Address of Factory: F2-4, No.35, Xiangyue Road, Xiang'an District, Xiamen, Fujian, P.R.China
Product Name: Humidifier
Model No.: CF-2130TS
Trade Mark: Comefresh
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2024-05-31
Date of Test: 2024-06-06 to 2024-06-13
Date of Issue: 2025-02-14

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

Ricky Liu

Ricky Liu
Manager



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

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Revision Record			
Version	Report No.	Date	Remark
01	GZCR240500058102	2025-02-14	Original

Authorized for issue by:			
		Pank Feng	
		Pank Feng/Project Engineer	
		Vico Cui	
		Vico Cui/Reviewer	



2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 12.13	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Conducted Peak Output Power		ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(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: AC 120V 60Hz 25W
 Ultrasonic operating frequency: 1.7MHz
 Cable: AC mains
 Test Voltage: AC 120V 60Hz
 Operation Frequency: 2402MHz to 2480MHz
 Bluetooth Version: V4.2 LE
 Modulation Type: GFSK
 Number of Channels: 40
 Channel Spacing: 2MHz
 Antenna Type: PCB Antenna
 Antenna Gain: 2.54dBi 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

Description	Manufacturer	Model No.	Serial No.
Note Book PC	LENOVO	Lenovo Xiaoxinchao 5000	PF0TNMG8



4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	±2.76dB
Radiated Emissions which fall in the restricted bands	±5.00dB (30MHz-1GHz; 3m); ±4.38dB (30MHz-1GHz; 10m); ±5.12dB (1GHz-6GHz); ±5.38dB (6GHz-18GHz); ±5.61dB (18GHz-40GHz)
Radiated Spurious Emissions Below 1GHz	±5.00dB (3m); ±4.38dB (10m)
Radiated Spurious Emissions Above 1GHz	±5.12dB (1GHz-6GHz); ±5.38dB (6GHz-18GHz); ±5.61dB (18GHz-40GHz)
Conducted Peak Output Power	±0.75dB
Minimum 6dB Bandwidth	±3%
Power Spectrum Density	±2.84dB
Conducted Band Edges Measurement	±0.75dB
Conducted Spurious Emissions	±0.75dB
<p>Remark:</p> <p>The U_{lab} (lab Uncertainty) is less than U_{cisp} (CISPR Uncertainty), so the test results</p> <ul style="list-style-type: none"> – 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,
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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	2023-08-04	2024-08-03
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	2022-10-16	2025-10-15
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2023-09-08	2024-09-07
EMI Test Receiver (9kHz-3.6GHz)	Rohde & Schwarz	ESR3	EMC2221	2024-05-13	2025-05-12
Test Software E3r	Audix	Ver.6.11812	GZE100-77	N/A	N/A

Radiated Emissions which fall in the restricted bands					
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
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2023-08-23	2024-08-22
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2023-10-20	2024-10-19
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

Radiated Spurious 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



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Radiated Spurious 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
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2023-10-20	2024-10-19
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

RF Conducted Test					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2136	2023-11-02	2025-11-01
4X4 Power sensor Unit	TST	TSPS2023R	EMC2257	2023-08-23	2024-08-22
MXG Vector Signal Generator	Keysight	N5182B	EMC2258	2023-08-23	2024-08-22
Test Software	TST	V2.0	GZE100-82	N/A	N/A
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2023-06-14	2024-06-13

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



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard 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. 15.247(b) (4) requirement:

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

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.54 dBi.

Antenna location: Refer to internal photo.



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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: 24.8 °C

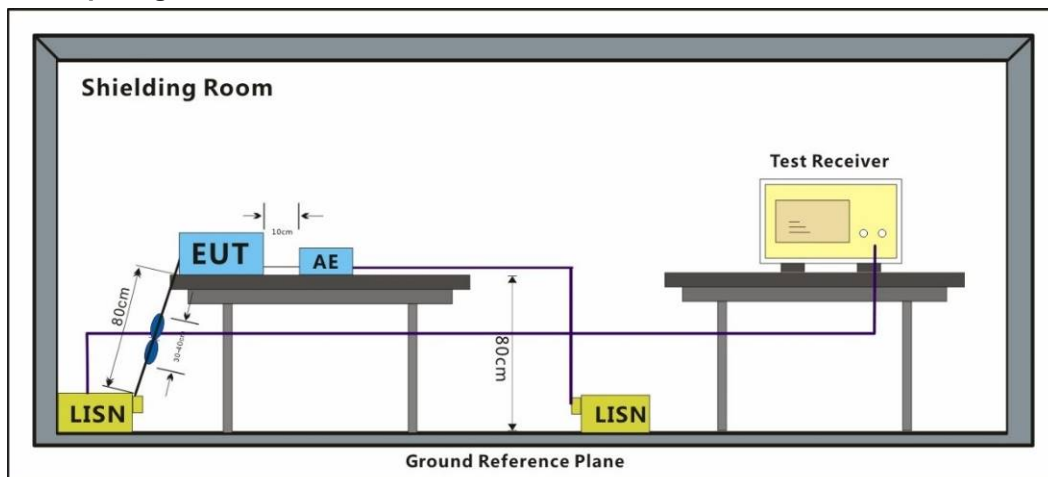
Humidity: 50.7 % RH

Atmospheric Pressure: 1003 mbar

7.1.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.1.3 Test Setup Diagram



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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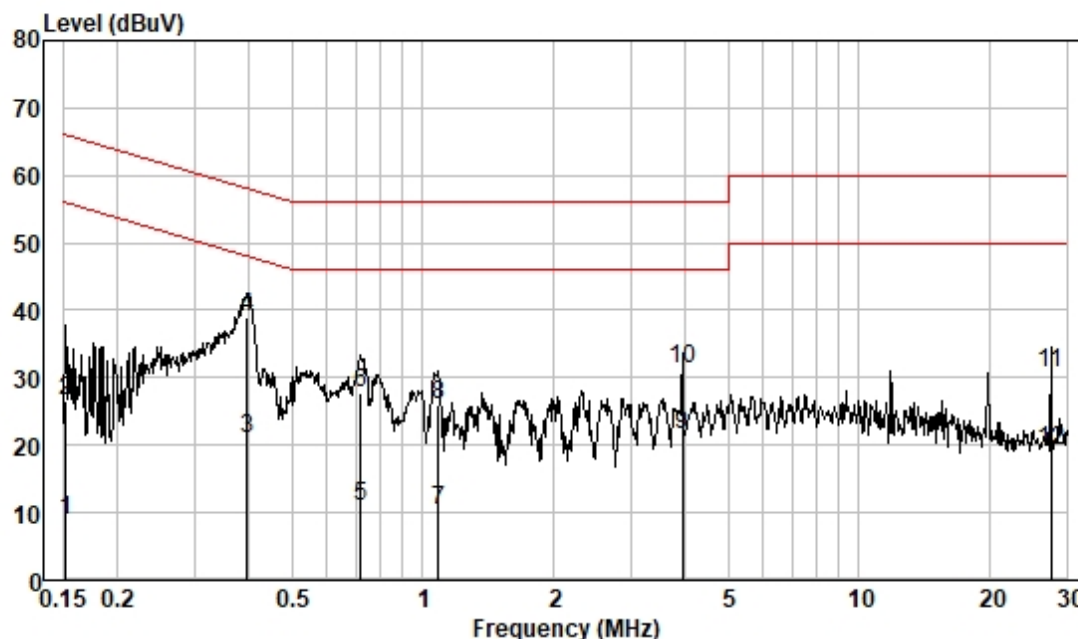
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Test Mode: 01; Line: Live line

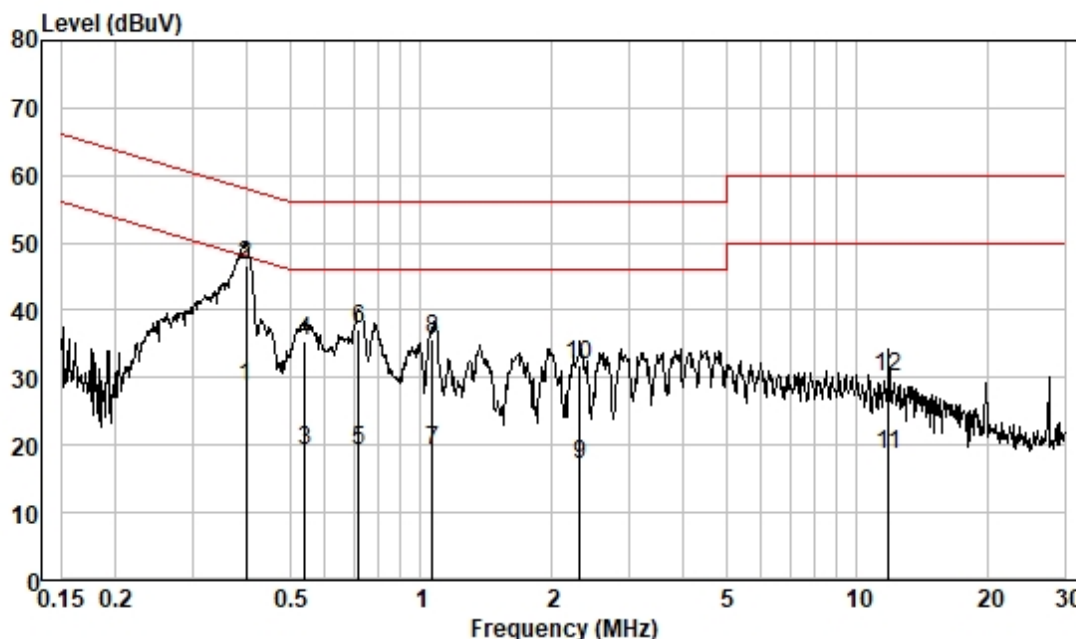


Pol : LINE
Mode :
Model :
Power :

	Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
1	0.152	-0.84	0.04	9.55	8.75	55.91	-47.16	Average
2	0.152	17.05	0.04	9.55	26.64	65.91	-39.27	QP
3	0.396	11.39	0.05	9.56	21.00	47.95	-26.95	Average
4	0.396	29.32	0.05	9.56	38.93	57.95	-19.02	QP
5	0.720	1.37	0.06	9.57	11.00	46.00	-35.00	Average
6	0.720	18.02	0.06	9.57	27.65	56.00	-28.35	QP
7	1.082	0.73	0.08	9.57	10.38	46.00	-35.62	Average
8	1.082	16.42	0.08	9.57	26.07	56.00	-29.93	QP
9	3.943	11.69	0.18	9.60	21.47	46.00	-24.53	Average
10	3.943	21.49	0.18	9.60	31.27	56.00	-24.73	QP
11	27.562	20.38	0.45	9.87	30.70	60.00	-29.30	QP
12	27.574	9.01	0.45	9.87	19.33	50.00	-30.67	Average



Test Mode: 01; Line: Neutral Line



Pol : NEUTRAL
Mode :
Model :
Power :

	Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
1	0.398	19.08	0.05	9.54	28.67	47.90	-19.23	Average
2	0.398	37.14	0.05	9.54	46.73	57.90	-11.17	QP
3	0.541	9.71	0.05	9.54	19.30	46.00	-26.70	Average
4	0.541	25.74	0.05	9.54	35.33	56.00	-20.67	QP
5	0.720	9.70	0.06	9.55	19.31	46.00	-26.69	Average
6	0.720	27.51	0.06	9.55	37.12	56.00	-18.88	QP
7	1.065	9.59	0.08	9.55	19.22	46.00	-26.78	Average
8	1.065	26.19	0.08	9.55	35.82	56.00	-20.18	QP
9	2.309	7.56	0.14	9.56	17.26	46.00	-28.74	Average
10	2.309	22.18	0.14	9.56	31.88	56.00	-24.12	QP
11	11.807	8.53	0.28	9.80	18.61	50.00	-31.39	Average
12	11.807	19.98	0.28	9.80	30.06	60.00	-29.94	QP



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7.2 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 11.12

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
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 59.1 % RH Atmospheric Pressure: 1003 mbar

7.2.2 Test Mode Description

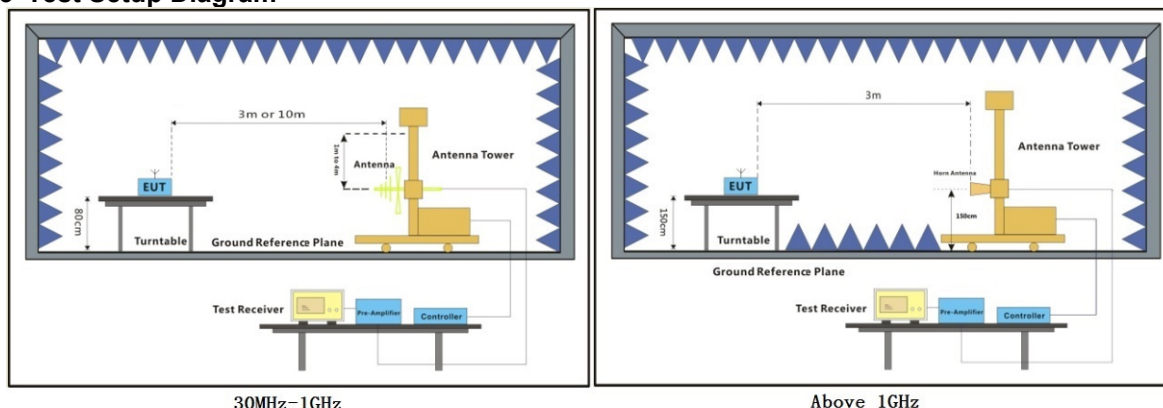
Pre-scan / Mode	Description
Final test Code	
Final test 01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.



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7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

- 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.
- 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.
- 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.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- Test the EUT in the lowest channel, the Highest channel.
- 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.
- Repeat above procedures until all frequencies measured was complete.

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

Remark 2: 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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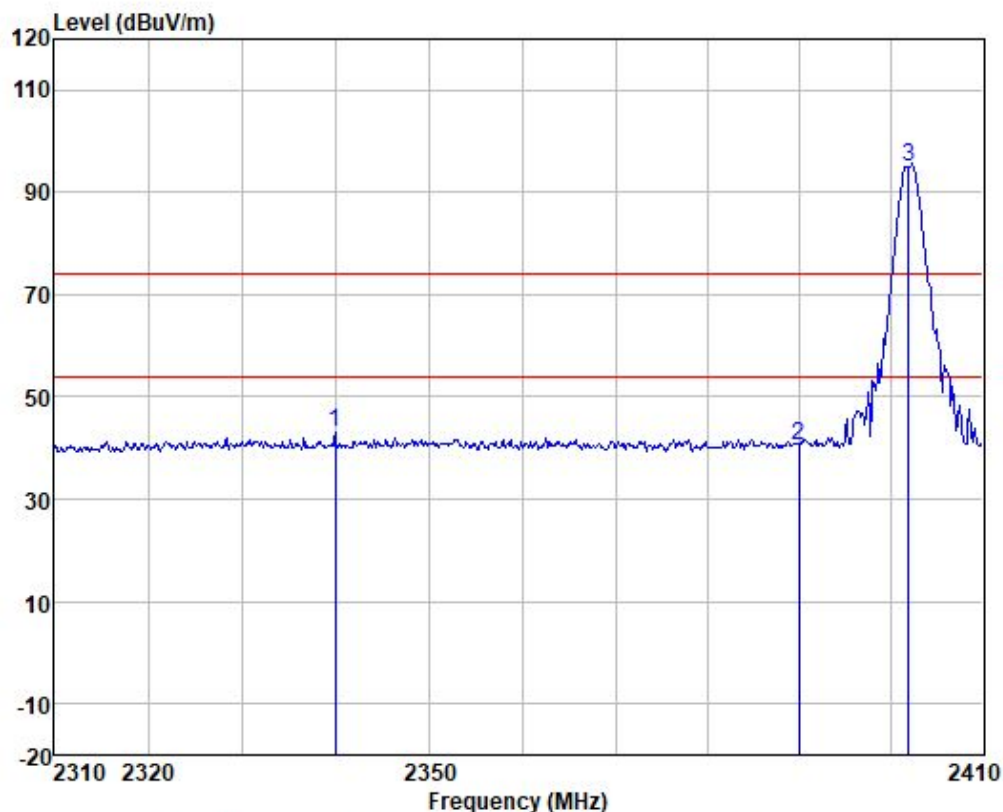
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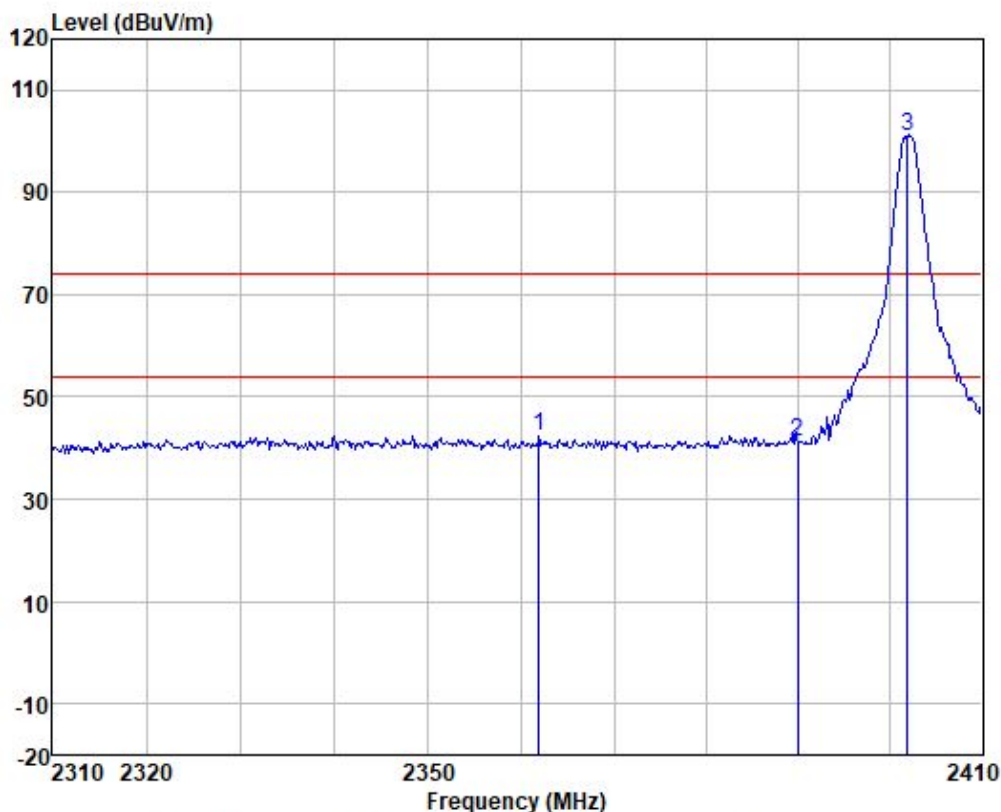
Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2339.854	48.93	27.57	3.73	37.23	43.00	74.00	-31.00	VERTICAL
2	2390.000	46.42	27.68	3.77	37.21	40.66	74.00	-33.34	VERTICAL
3 *	2402.000	100.85	27.71	3.78	37.21	95.13	74.00	21.13	VERTICAL



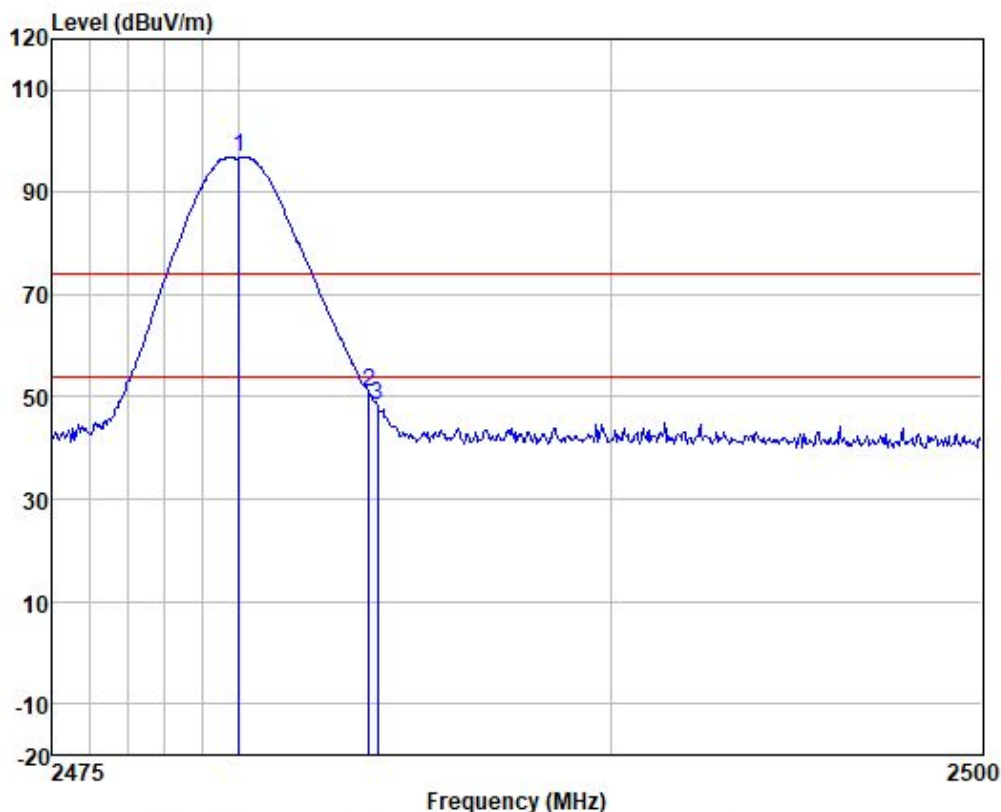
Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



	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	2361.871	48.37	27.62	3.75	37.23	42.51	74.00	-31.49	HORIZONTAL	peak
2	2390.000	46.83	27.68	3.77	37.21	41.07	74.00	-32.93	HORIZONTAL	peak
3 *	2402.000	106.86	27.71	3.78	37.21	101.14	74.00	27.14	HORIZONTAL	peak



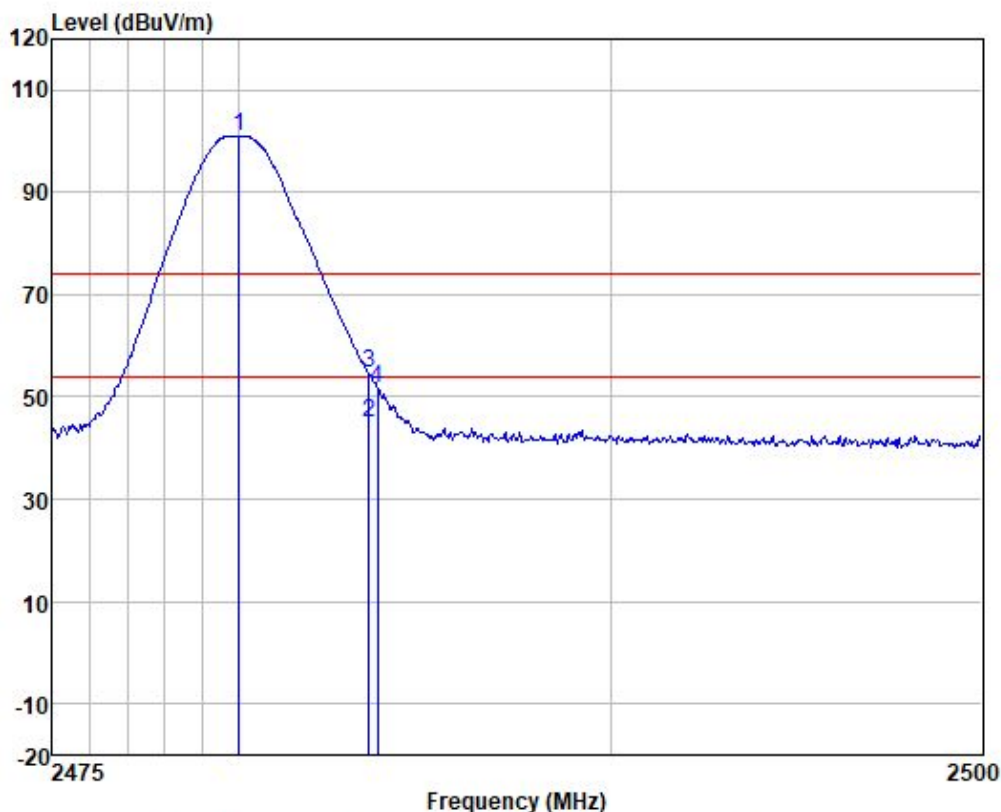
Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2480.000	102.23	27.84	3.82	37.19	96.70	74.00	22.70	VERTICAL
2	2483.500	56.34	27.85	3.82	37.19	50.82	74.00	-23.18	VERTICAL
3	2483.721	53.92	27.85	3.82	37.19	48.40	74.00	-25.60	VERTICAL



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High



	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2480.000	106.46	27.84	3.82	37.19	100.93	74.00	26.93	HORIZONTAL peak
2	2483.500	50.63	27.85	3.82	37.19	45.11	54.00	-8.89	HORIZONTAL Average
3	2483.500	60.06	27.85	3.82	37.19	54.54	74.00	-19.46	HORIZONTAL peak
4	2483.721	57.30	27.85	3.82	37.19	51.78	74.00	-22.22	HORIZONTAL peak



7.3 Radiated Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

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

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C

Humidity: 52.7 % RH

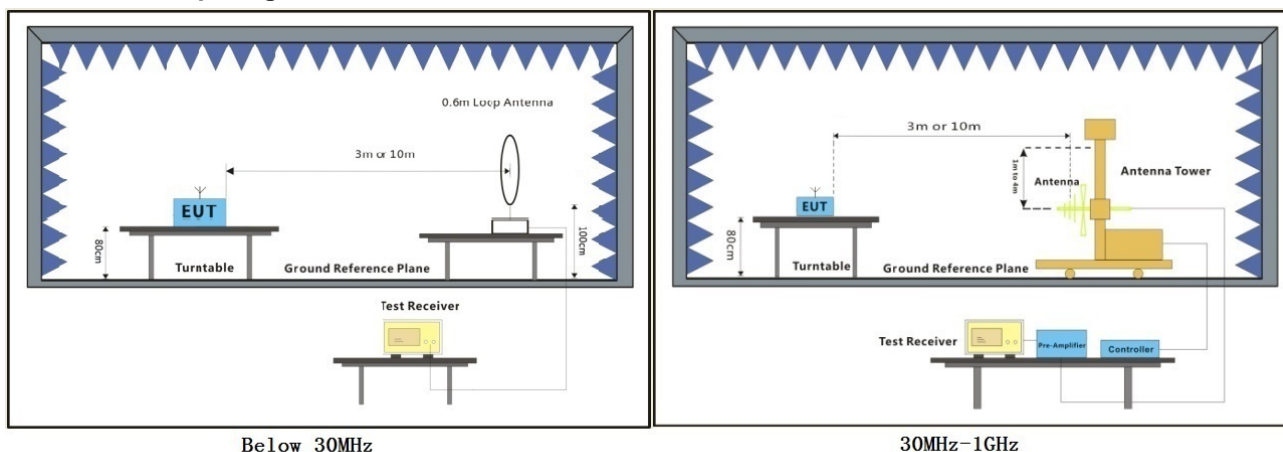
Atmospheric Pressure: 1003 mbar

7.3.2 Test Mode Description

Pre-scan / Mode Description
Final test Code

Final test 01 TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram



Below 30MHz

30MHz-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. 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.



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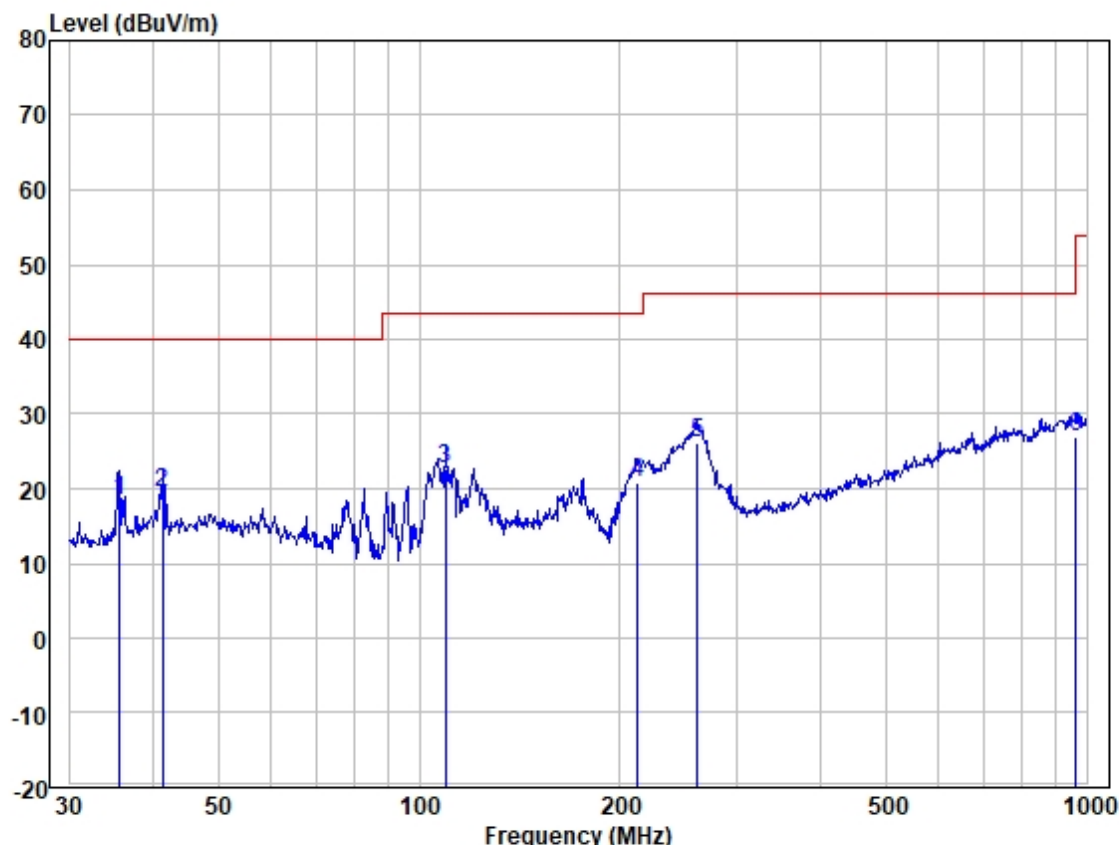
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Test Mode: 01; Polarity: Horizontal



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

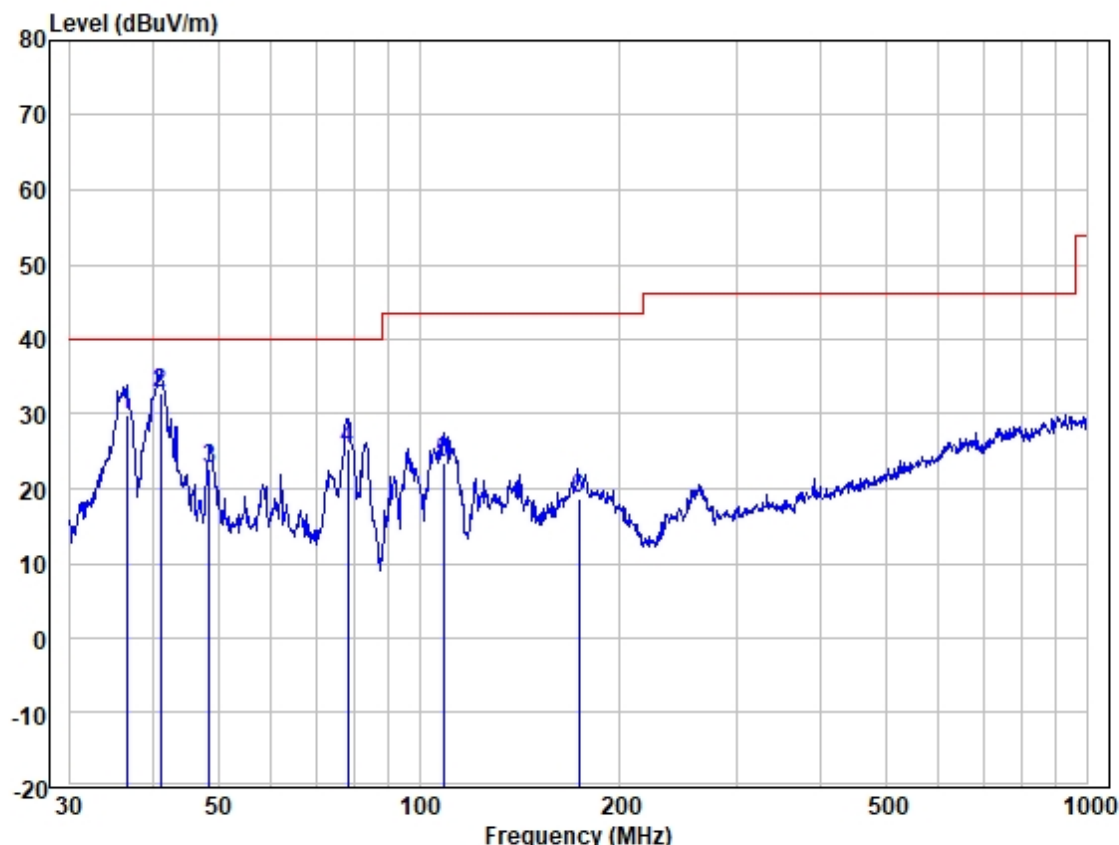
	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	35.624	32.65	18.39	0.33	32.86	18.51	40.00	-21.49	HORIZONTAL	QP
2	41.277	32.86	19.23	0.35	32.87	19.57	40.00	-20.43	HORIZONTAL	QP
3	109.412	38.91	16.07	0.57	32.80	22.75	43.52	-20.77	HORIZONTAL	QP
4	212.270	37.30	15.65	0.80	32.84	20.91	43.52	-22.61	HORIZONTAL	QP
5	261.058	40.29	17.82	0.92	32.87	26.16	46.02	-19.86	HORIZONTAL	QP
6	962.162	27.08	29.75	1.82	31.71	26.94	53.98	-27.04	HORIZONTAL	QP



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Test Mode: 01; Polarity: Vertical



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

	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	36.509	43.89	18.59	0.34	32.86	29.96	40.00	-10.04	VERTICAL	QP
2	40.988	46.23	19.16	0.35	32.87	32.87	40.00	-7.13	VERTICAL	QP
3	48.502	35.72	19.52	0.38	32.88	22.74	40.00	-17.26	VERTICAL	QP
4	78.139	42.20	15.53	0.49	32.83	25.39	40.00	-14.61	VERTICAL	QP
5	108.647	39.74	15.92	0.57	32.80	23.43	43.52	-20.09	VERTICAL	QP
6	173.205	32.47	18.40	0.73	32.83	18.77	43.52	-24.75	VERTICAL	QP



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7.4 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

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

Limit:

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

7.4.1 E.U.T. Operation

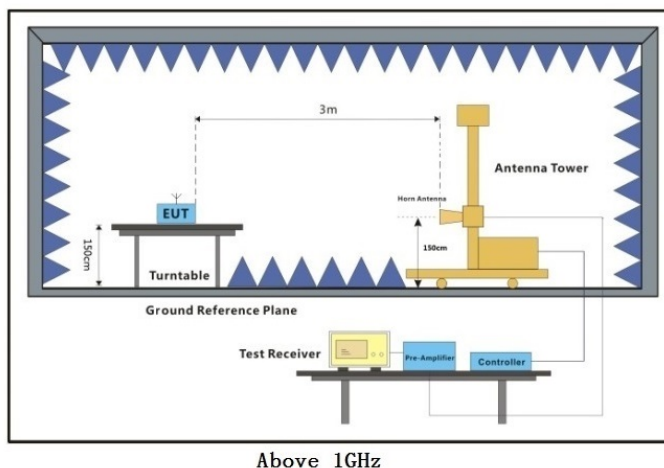
Operating Environment:

Temperature: 25.1 °C Humidity: 59.1 % RH Atmospheric Pressure: 1003 mbar

7.4.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.3 Test Setup Diagram



7.4.4 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 1GHz to 25GHz, 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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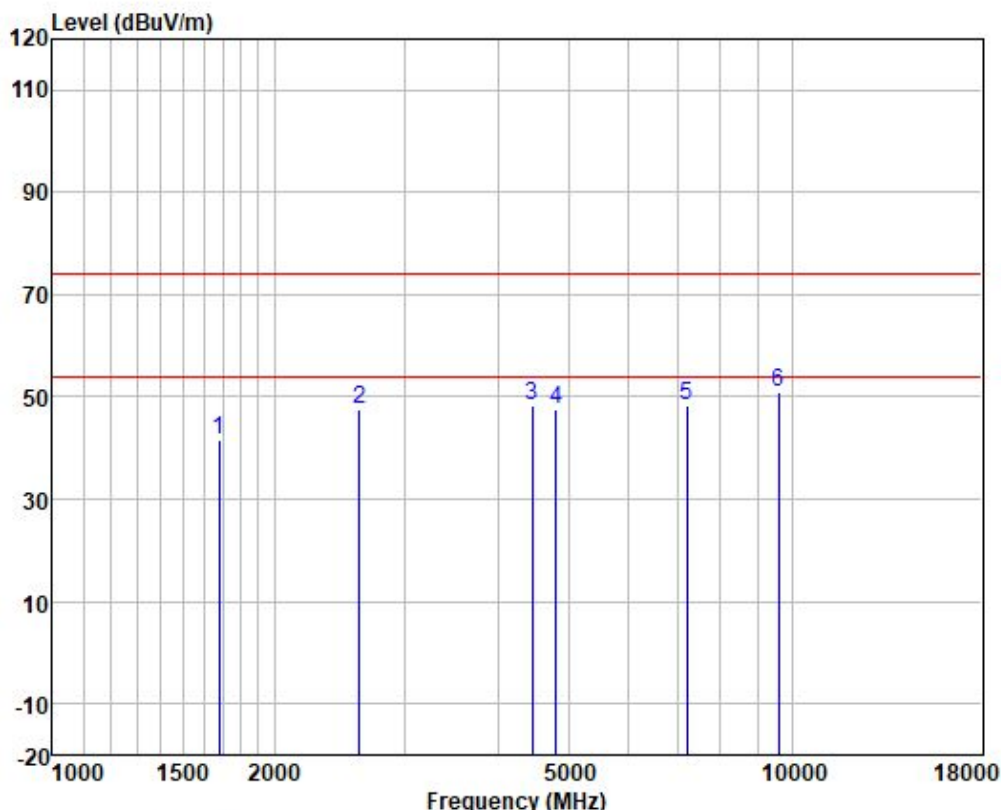
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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



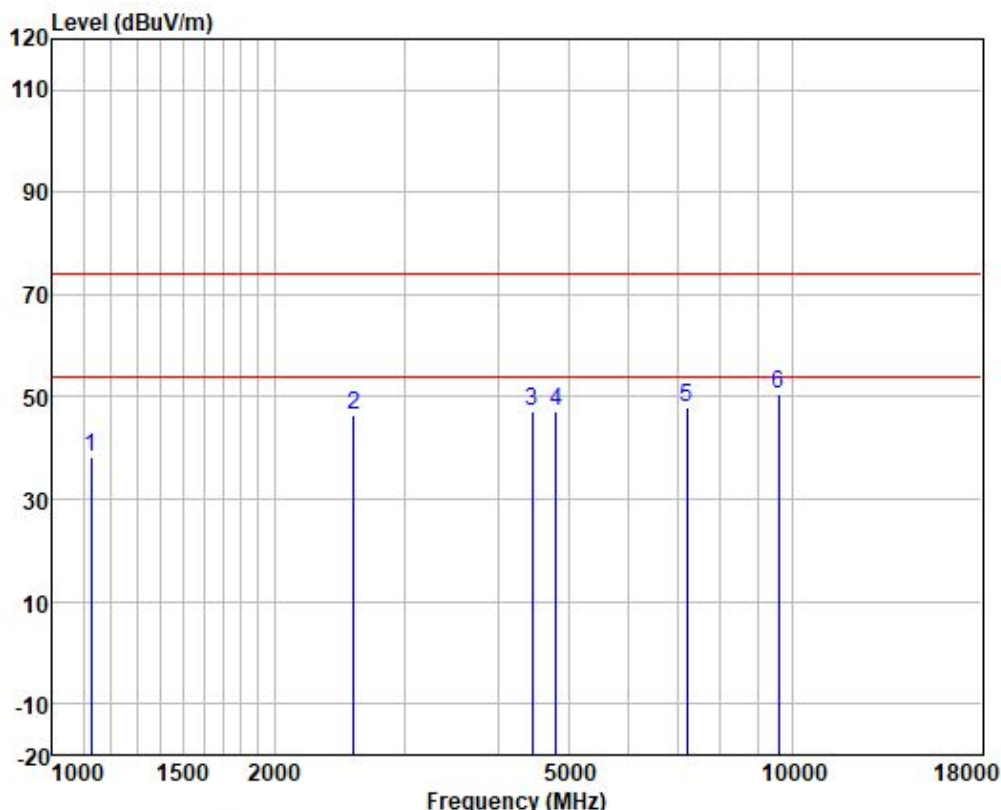
	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1682.477	50.77	25.03	3.06	37.40	41.46	74.00	-32.54	VERTICAL
2	2603.126	52.92	27.99	3.90	37.15	47.66	74.00	-26.34	VERTICAL
3	4456.315	46.04	34.00	4.79	36.63	48.20	74.00	-25.80	VERTICAL
4	4804.000	44.79	34.16	5.15	36.66	47.44	74.00	-26.56	VERTICAL
5	7206.000	42.70	35.63	6.96	36.93	48.36	74.00	-25.64	VERTICAL
6	9608.000	41.53	38.68	7.65	36.82	51.04	74.00	-22.96	VERTICAL



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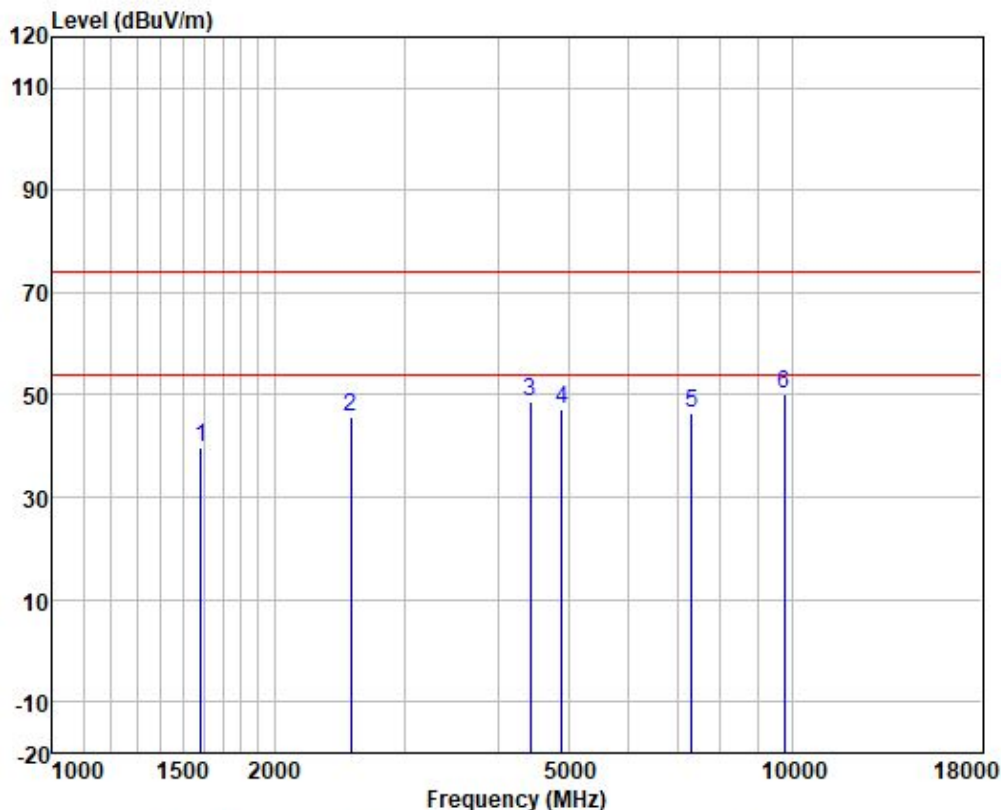
Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1129.072	50.81	22.78	2.44	37.67	38.36	74.00	-35.64	HORIZONTAL peak
2	2558.371	51.64	27.93	3.87	37.17	46.27	74.00	-27.73	HORIZONTAL peak
3	4456.315	45.15	34.00	4.79	36.63	47.31	74.00	-26.69	HORIZONTAL peak
4	4804.000	44.49	34.16	5.15	36.66	47.14	74.00	-26.86	HORIZONTAL peak
5	7206.000	42.15	35.63	6.96	36.93	47.81	74.00	-26.19	HORIZONTAL peak
6	9608.000	41.11	38.68	7.65	36.82	50.62	74.00	-23.38	HORIZONTAL peak



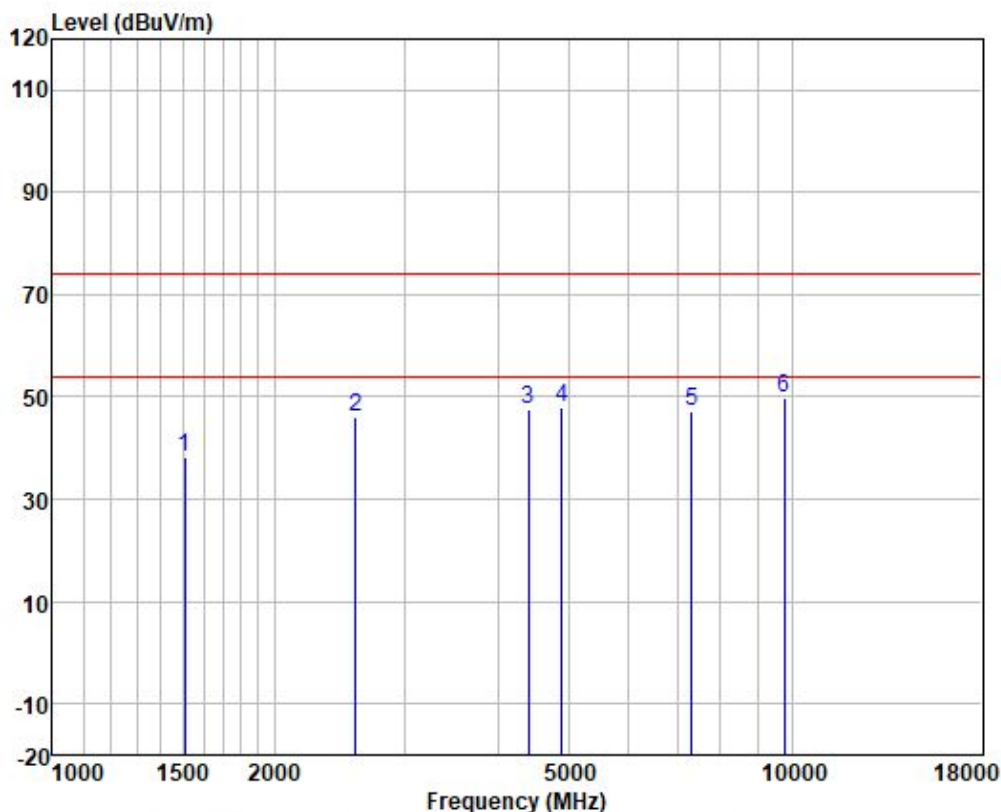
Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:middle



		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	1587.975	49.43	24.65	2.99	37.45	39.62	74.00	-34.38	VERTICAL	peak
2	2528.963	51.15	27.90	3.85	37.18	45.72	74.00	-28.28	VERTICAL	peak
3	4430.628	46.55	33.87	4.79	36.63	48.58	74.00	-25.42	VERTICAL	peak
4	4880.000	44.46	34.15	5.22	36.67	47.16	74.00	-26.84	VERTICAL	peak
5	7320.000	40.50	36.07	6.81	36.95	46.43	74.00	-27.57	VERTICAL	peak
6	9760.000	40.48	38.81	7.65	36.81	50.13	74.00	-23.87	VERTICAL	peak



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:middle



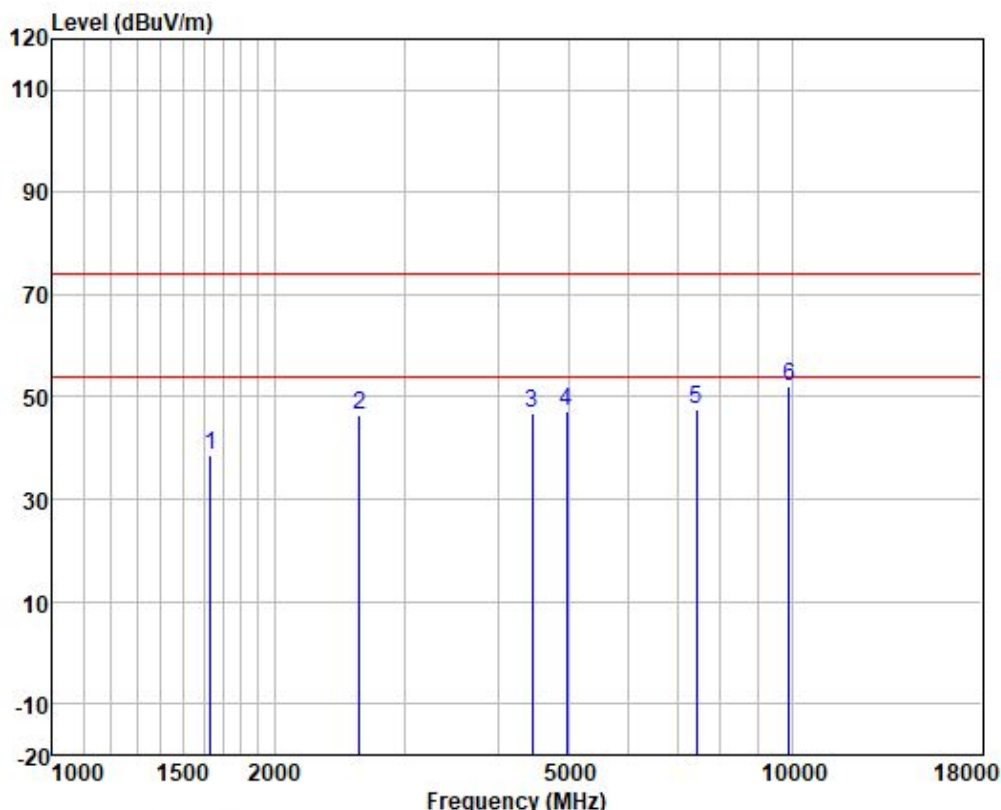
	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1507.470	48.47	24.45	2.94	37.50	38.36	74.00	-35.64	HORIZONTAL	peak
2573.203	51.44	27.95	3.88	37.16	46.11	74.00	-27.89	HORIZONTAL	peak
4405.090	45.81	33.74	4.79	36.62	47.72	74.00	-26.28	HORIZONTAL	peak
4880.000	45.10	34.15	5.22	36.67	47.80	74.00	-26.20	HORIZONTAL	peak
7320.000	41.31	36.07	6.81	36.95	47.24	74.00	-26.76	HORIZONTAL	peak
9760.000	40.30	38.81	7.65	36.81	49.95	74.00	-24.05	HORIZONTAL	peak



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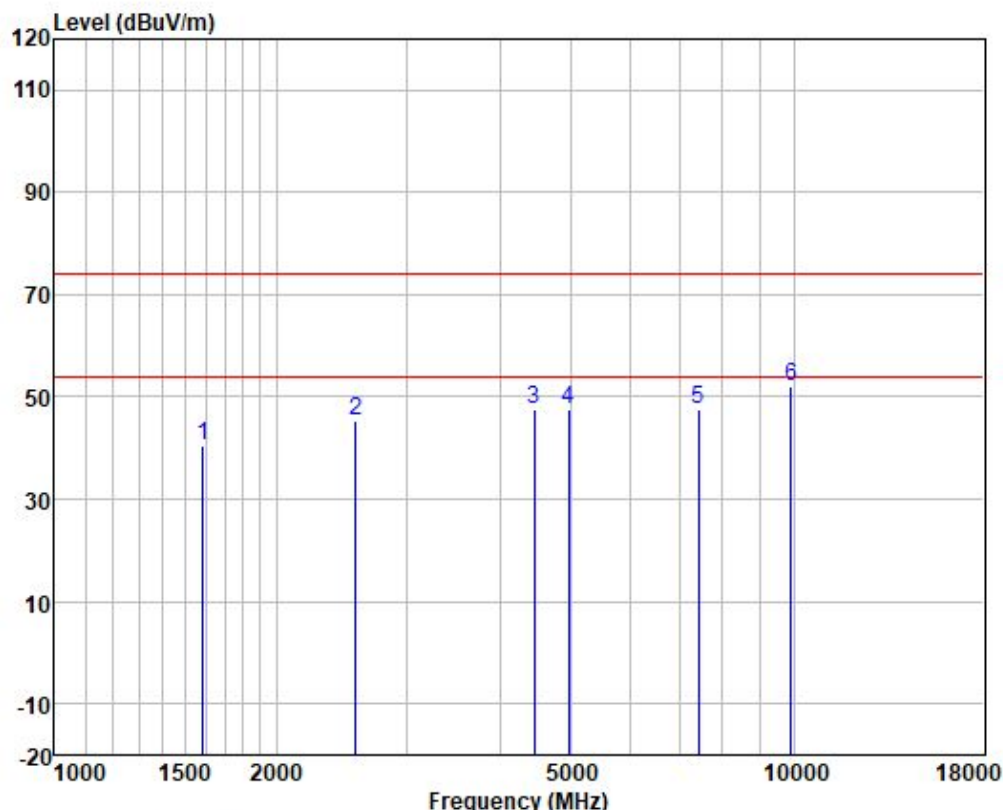
Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



		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	1634.543	48.03	24.81	3.02	37.42	38.44	74.00	-35.56	VERTICAL	peak
2	2603.126	51.69	27.99	3.90	37.15	46.43	74.00	-27.57	VERTICAL	peak
3	4456.315	44.71	34.00	4.79	36.63	46.87	74.00	-27.13	VERTICAL	peak
4	4960.000	44.31	34.15	5.28	36.69	47.05	74.00	-26.95	VERTICAL	peak
5	7440.000	41.32	36.33	6.72	36.96	47.41	74.00	-26.59	VERTICAL	peak
6	9920.000	42.17	38.95	7.67	36.80	51.99	74.00	-22.01	VERTICAL	peak



Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High



	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	1587.975	50.35	24.65	2.99	37.45	40.54	74.00	-33.46	HORIZONTAL peak
2	2558.371	50.84	27.93	3.87	37.17	45.47	74.00	-28.53	HORIZONTAL peak
3	4456.315	45.40	34.00	4.79	36.63	47.56	74.00	-26.44	HORIZONTAL peak
4	4960.000	44.97	34.15	5.28	36.69	47.71	74.00	-26.29	HORIZONTAL peak
5	7440.000	41.34	36.33	6.72	36.96	47.43	74.00	-26.57	HORIZONTAL peak
6	9920.000	42.08	38.95	7.67	36.80	51.90	74.00	-22.10	HORIZONTAL peak



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7.5 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C

Humidity: 69.6 % RH

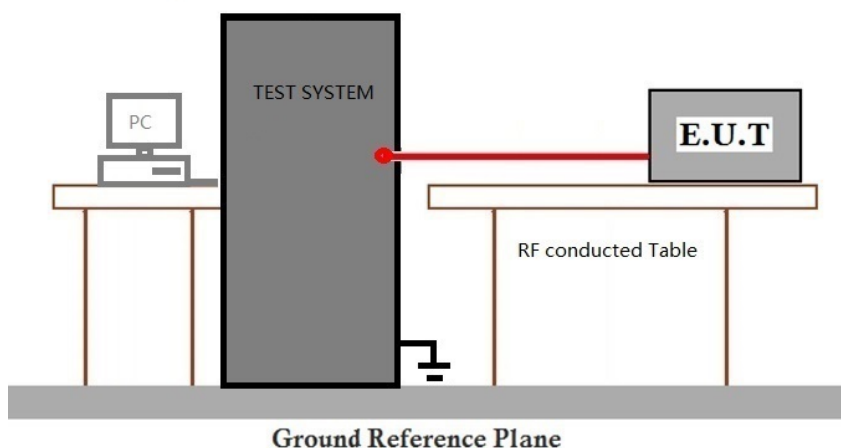
Atmospheric Pressure: 1003 mbar

7.5.2 Test Mode Description

Pre-scan / Mode
Final test Code Description

Final test 01 TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details



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7.6 Minimum 6dB Bandwidth

Test Requirement	47 CFR Part 15, Subpart C 15.247a(2)
Test Method:	ANSI C63.10 (2013) Section 11.8.1
Limit:	≥500 kHz

7.6.1 E.U.T. Operation

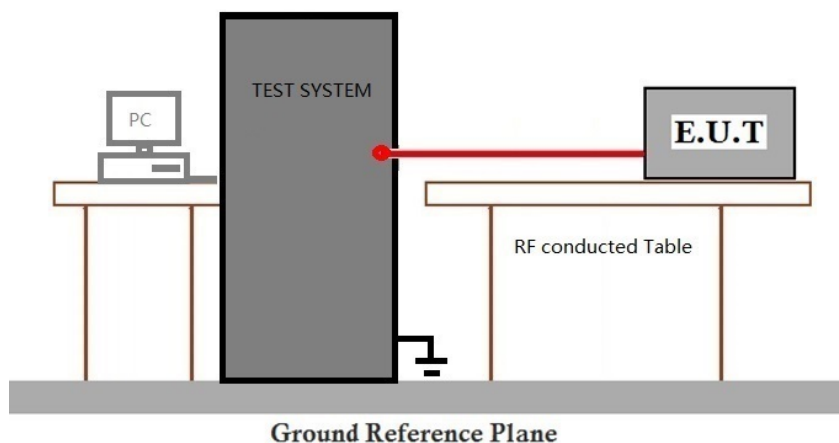
Operating Environment:

Temperature: 23.2 °C Humidity: 69.6 % RH Atmospheric Pressure: 1003 mbar

7.6.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.6.3 Test Setup Diagram



7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.7 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)

Test Method: ANSI C63.10 (2013) Section 11.10.2

Limit:

≤8dBm in any 3 kHz band during any time interval of continuous transmission

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C

Humidity: 69.6 % RH

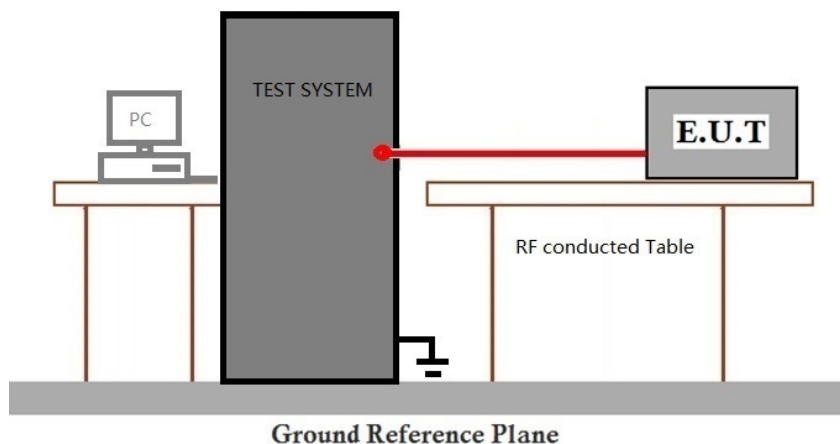
Atmospheric Pressure: 1003 mbar

7.7.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	

Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
------------	----	---

7.7.3 Test Setup Diagram



7.7.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.8 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.8.1 E.U.T. Operation

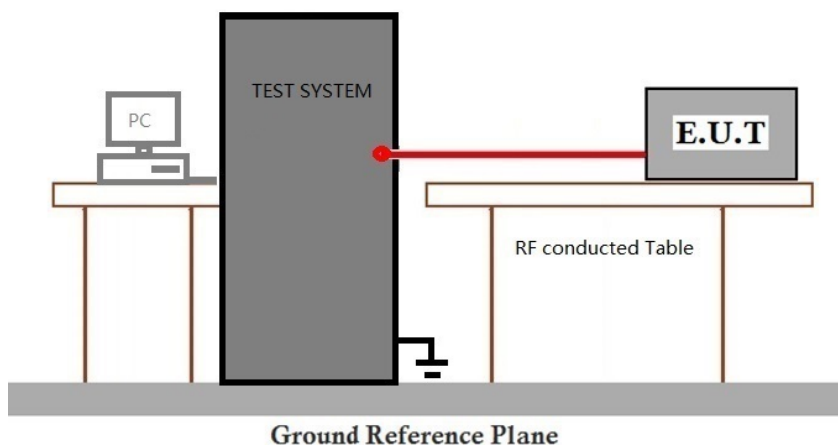
Operating Environment:

Temperature: 23.2 °C Humidity: 69.6 % RH Atmospheric Pressure: 1003 mbar

7.8.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.8.3 Test Setup Diagram



7.8.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.9 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.11

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C

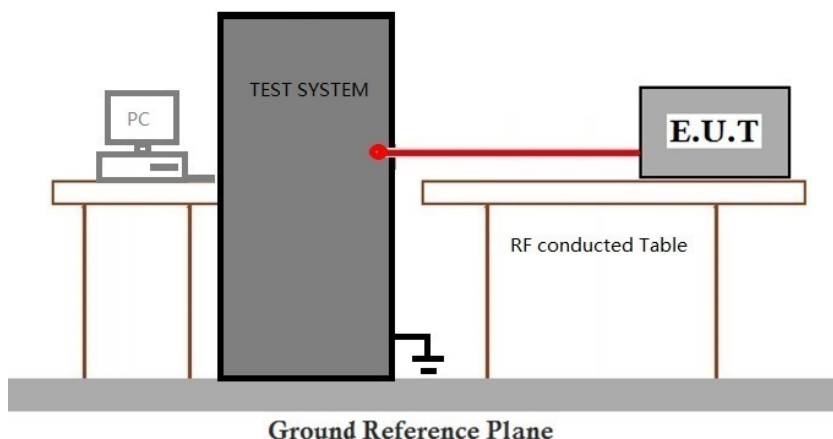
Humidity: 69.6 % RH

Atmospheric Pressure: 1003 mbar

7.9.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.9.3 Test Setup Diagram



7.9.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR240500058102



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9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2405000581HS



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10 Appendix

1. Duty Cycle

1.1 Ant1

1.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	T _{on} (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.403	0.625	64.48	1.91	0.03
		2440	0.403	0.625	64.48	1.91	0.03
		2480	0.403	0.625	64.48	1.91	0.00



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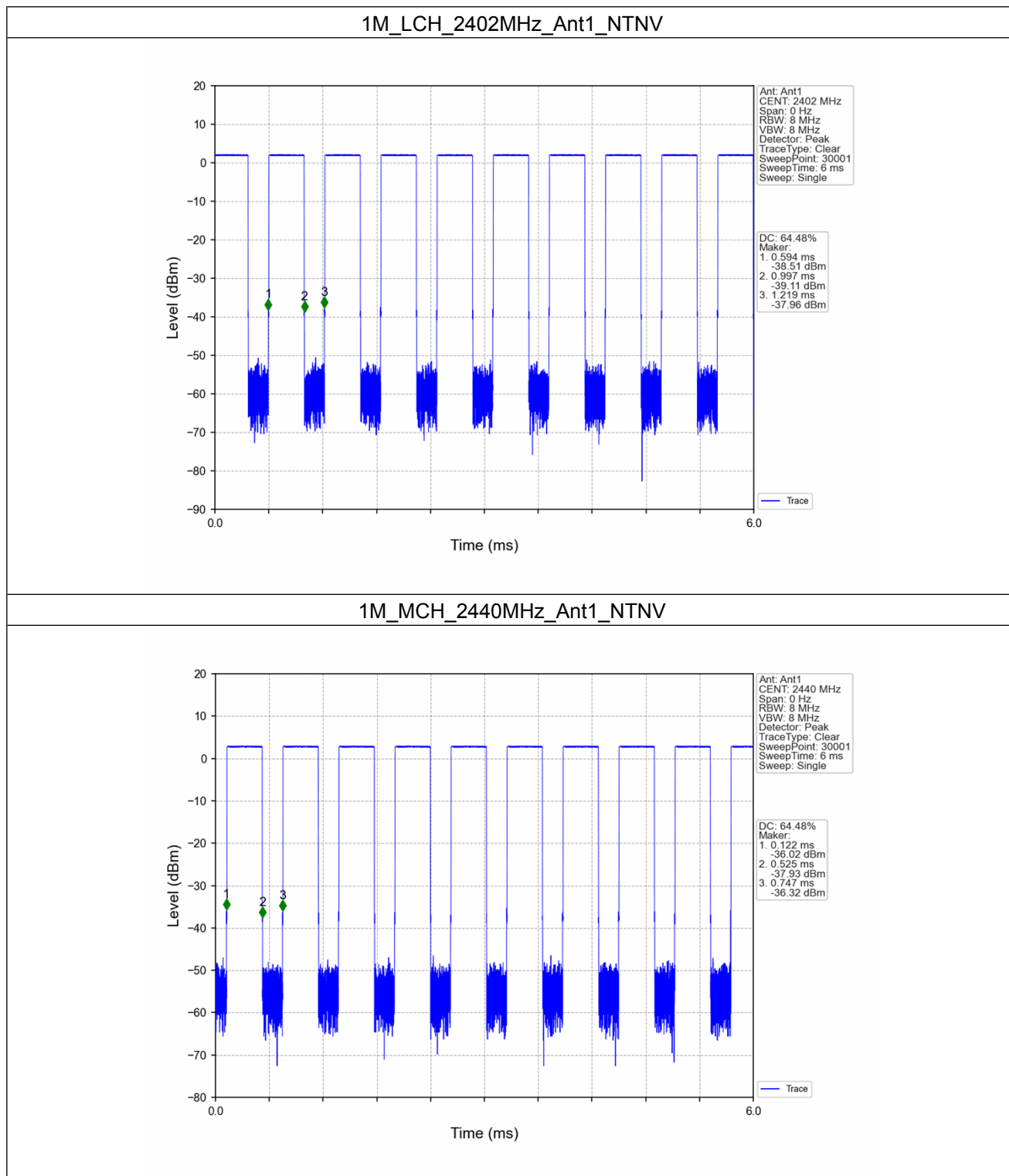
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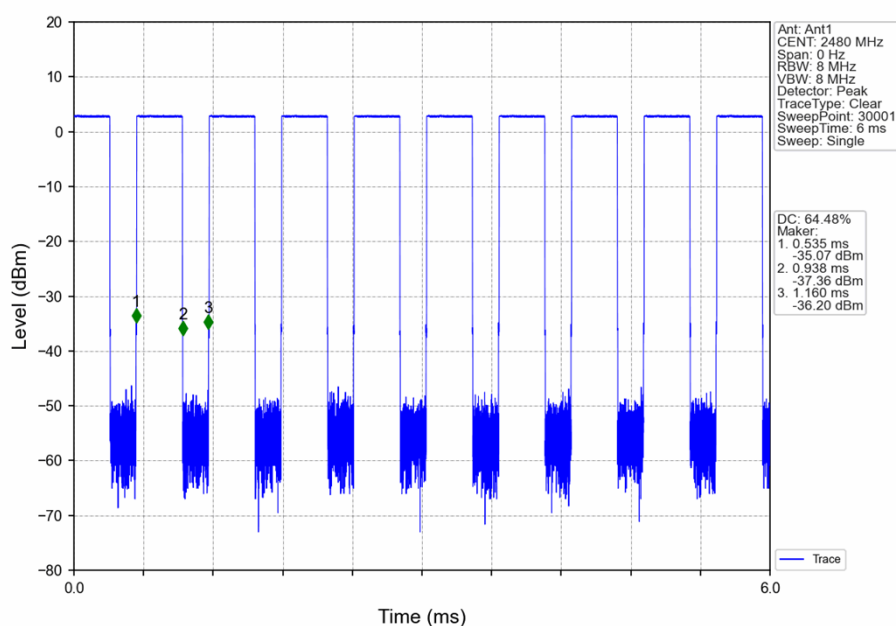
1.1.2 Test Graph



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1M_HCH_2480MHz_Ant1_NTNV



2. Bandwidth

2.1 6dB BW

2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.660	≥ 0.5	Pass
		2440	1	0.663	≥ 0.5	Pass
		2480	1	0.650	≥ 0.5	Pass



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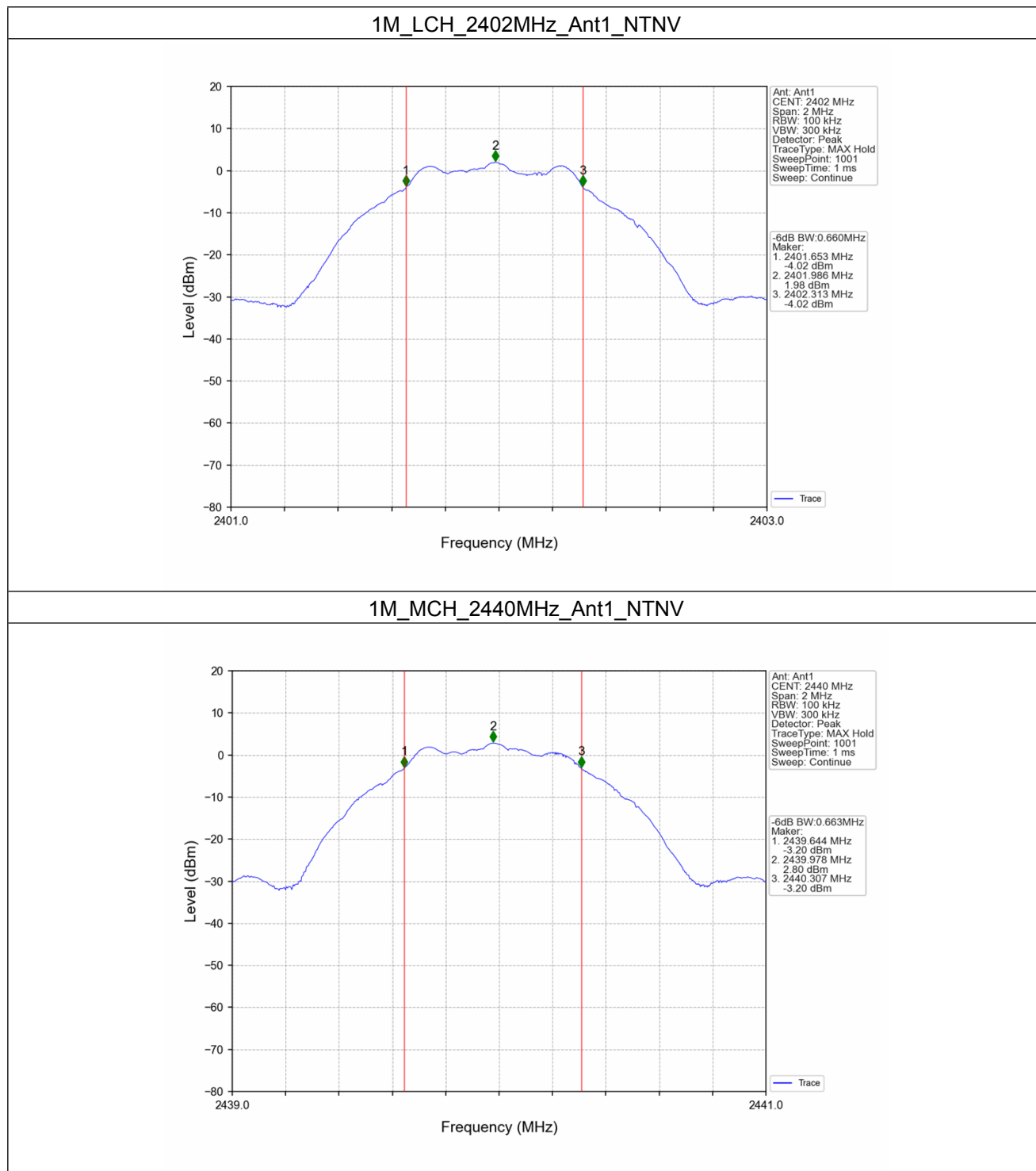
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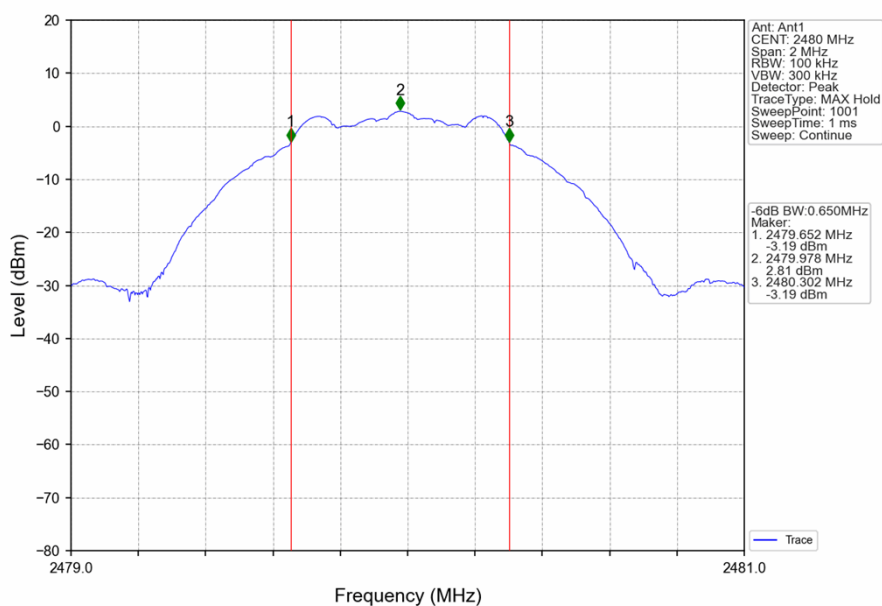
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2.1.2 Test Graph



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3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	2.02	<=30	Pass
		2440	2.90	<=30	Pass
		2480	2.88	<=30	Pass
Note1: Antenna Gain: Ant1: 2.54dBi;					



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4. Maximum Power Spectral Density

4.1 PSD

4.1.1 Test Result

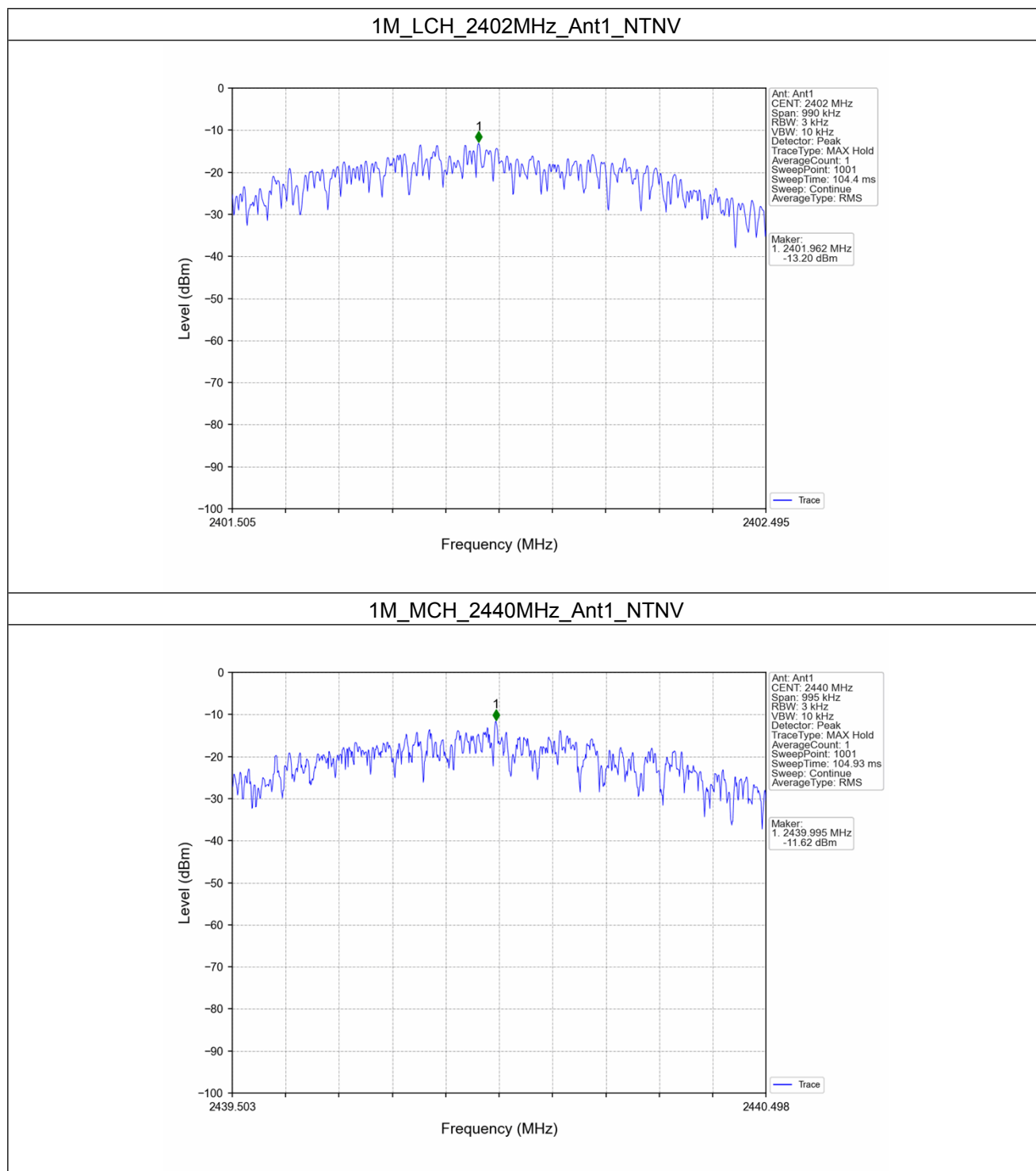
Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-13.20	<=8	Pass
		2440	-11.62	<=8	Pass
		2480	-12.18	<=8	Pass
Note1: Antenna Gain: Ant1: 2.54 dBi;					



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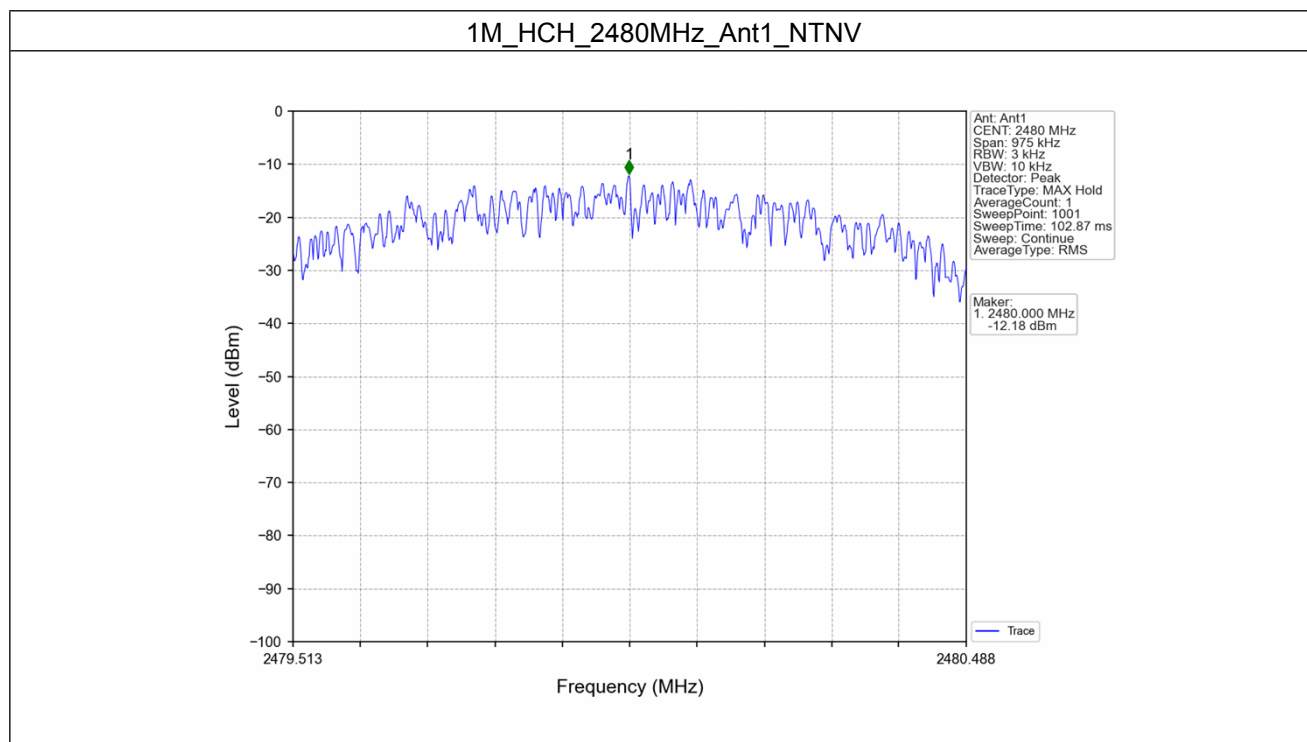
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4.1.2 Test Graph



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5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Ref

5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	2.40
		2440	1	2.80
		2480	1	2.80

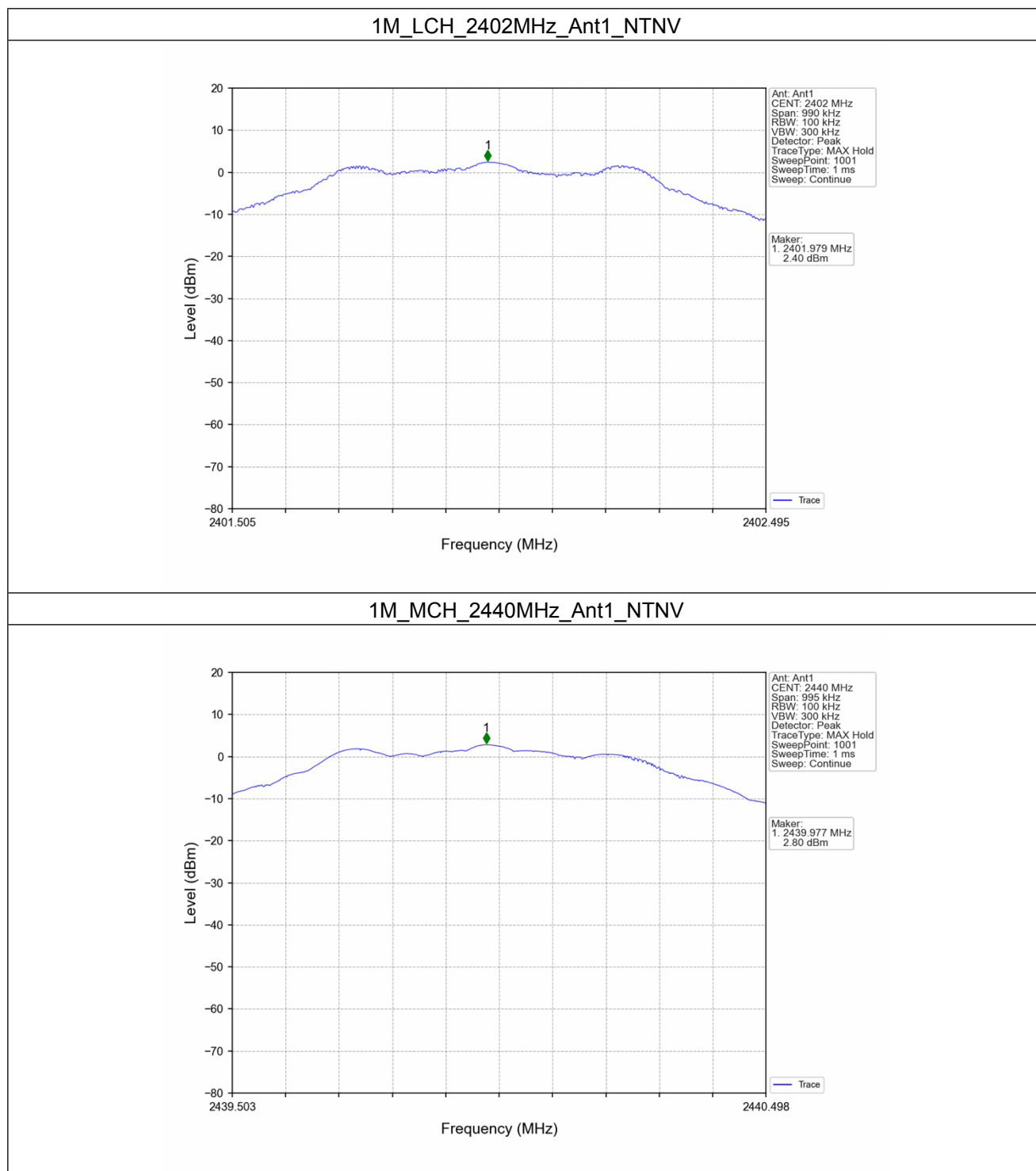
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.



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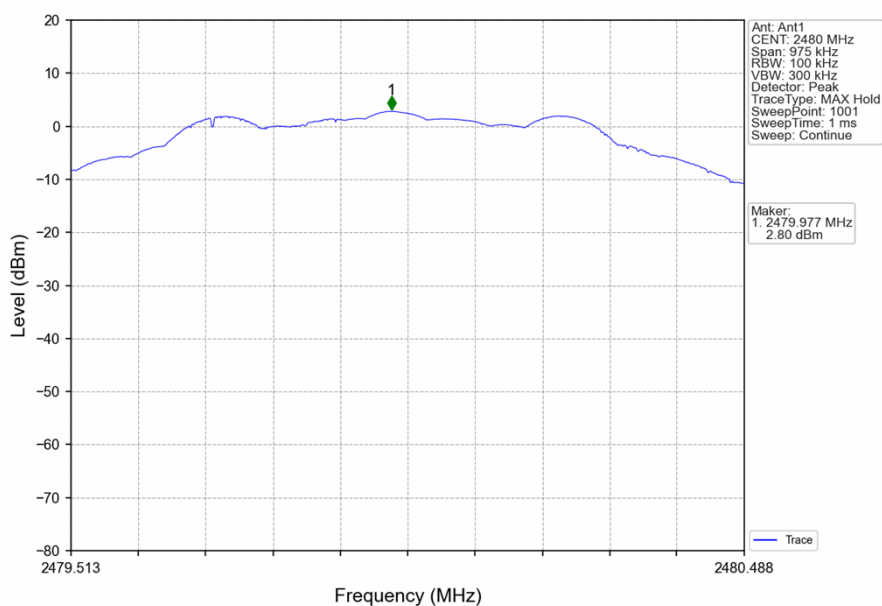
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1M_HCH_2480MHz_Ant1_NTNV



5.2 CSE and Band Edges

5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	2.80	-17.20	Pass
		2440	1	2.80	-17.20	Pass
		2480	1	2.80	-17.20	Pass

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.



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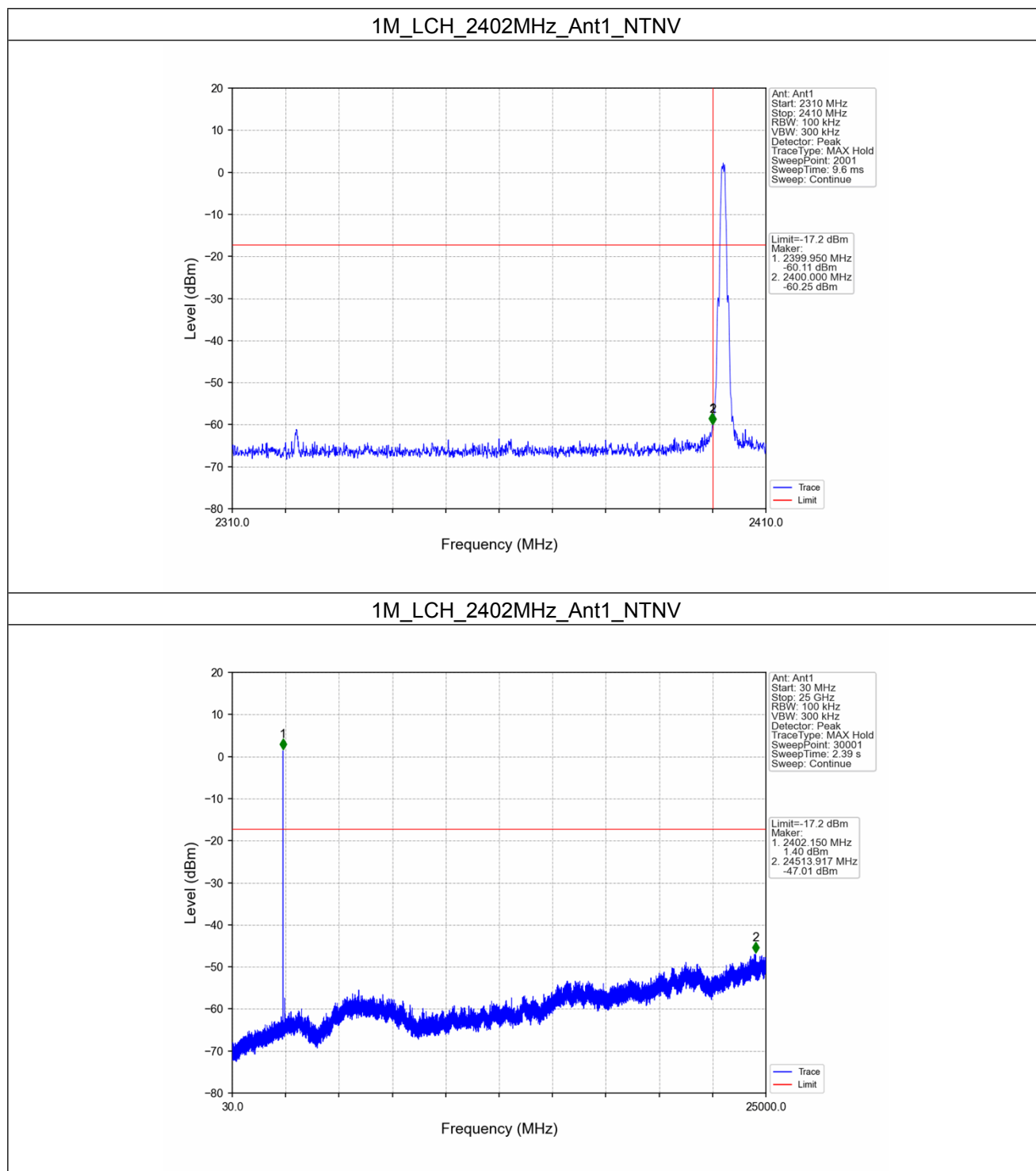
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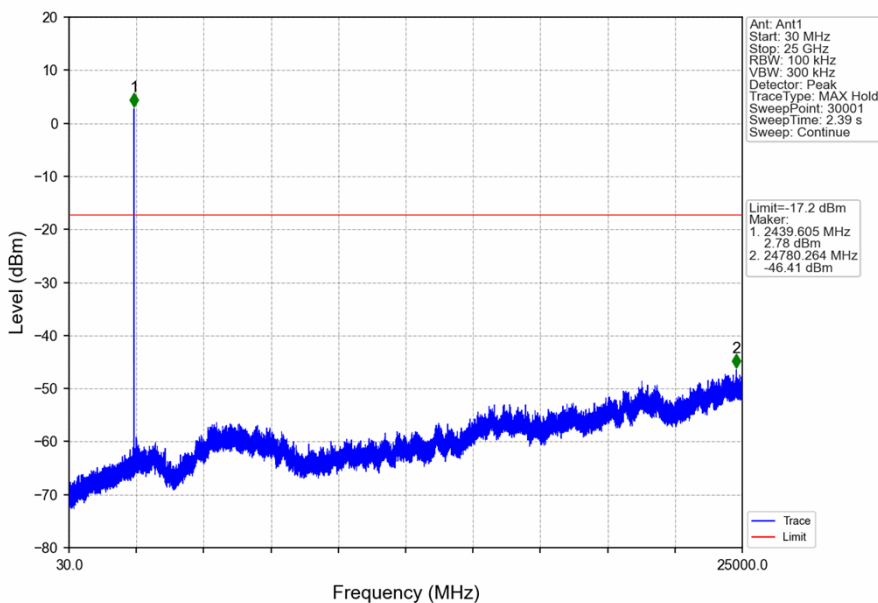
5.2.2 Test Graph



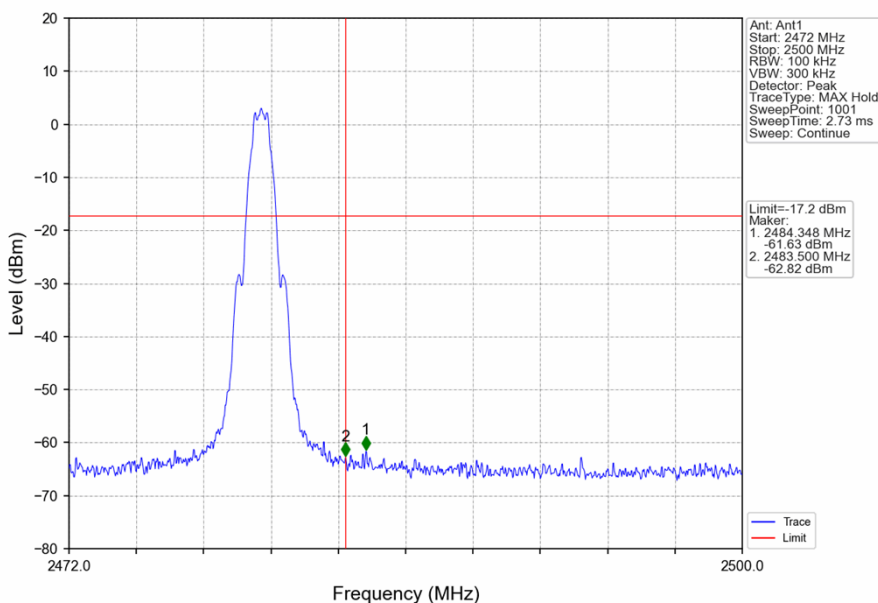
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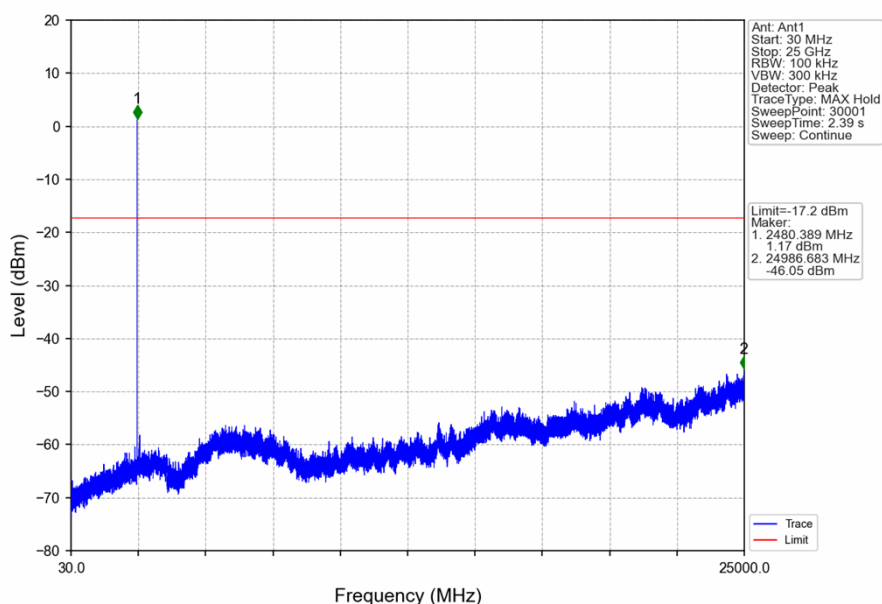
1M_HCH_2480MHz_Ant1_NTNV



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1M_HCH_2480MHz_Ant1_NTNV



- End of the Report -

