


# TEST REPORT

**Application No.:** GZCR2504000575AT  
**Applicant:** Guangzhou Robustel Co., Ltd.  
**Address of Applicant:** 501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, China  
**Manufacturer:** Guangzhou Robustel Co., Ltd.  
**Address of Manufacturer:** 501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, China  
**Factory:** Guangzhou Robustel Co., Ltd.  
**Address of Factory:** 501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, China  
**Product Name:** Industrial LoRaWAN Gateway  
**Model No.:** R1520LG-AD-4L-A35GL, R1520LG-AD-NU ♣  
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.  
**Trade Mark:**   
**Standard(s) :** 47 CFR Part 15, Subpart C 15.247  
**Date of Receipt:** 2025-04-21  
**Date of Test:** 2025-05-30 to 2025-06-16  
**Date of Issue:** 2025-07-18

<b>Test Result:</b>	<b>Pass*</b>
---------------------	--------------

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

*Ricky Liu*

Ricky Liu  
Manager



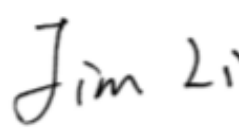
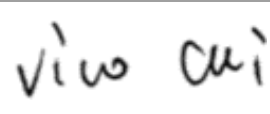
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Revision Record			
Version	Report No.	Date	Remark
01	GZCR250400057503	2025-07-18	Original

Authorized for issue by			
			
		Jim Li/Project Engineer	
			
		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 11.12	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.

### ♣ Declaration of EUT Family Grouping:

**Model No.:** R1520LG-AD-4L-A35GL, R1520LG-AD-NU

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 the model name and LTE module (within in model R1520LG-AD-4L-A35GL but without in model R1520LG-AD-NU).

Therefore only one model **R1520LG-AD-4L-A35GL** with full function was tested in this report.



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### 3 Contents

	Page
1 Cover Page .....	1
2 Test Summary.....	3
3 Contents .....	4
4 General Information.....	6
4.1 Details of E.U.T. ....	6
4.2 Description of Support Units.....	6
4.3 Measurement Uncertainty .....	7
4.4 Test Location .....	7
4.5 Test Facility.....	8
4.6 Deviation from Standards.....	8
4.7 Abnormalities from Standard Conditions .....	8
5 Equipment List .....	9
6 Radio Spectrum Technical Requirement.....	12
6.1 Antenna Requirement .....	12
6.1.1 Test Requirement: .....	12
6.1.2 Conclusion .....	12
7 Radio Spectrum Matter Test Results .....	13
7.1 Conducted Emissions at AC Power Line (150kHz-30MHz) .....	13
7.1.1 E.U.T. Operation .....	13
7.1.2 Test Mode Description .....	13
7.1.3 Test Setup Diagram .....	13
7.1.4 Measurement Procedure and Data.....	14
7.2 Radiated Emissions which fall in the restricted bands .....	17
7.2.1 E.U.T. Operation .....	17
7.2.2 Test Mode Description .....	17
7.2.3 Test Setup Diagram .....	18
7.2.4 Measurement Procedure and Data.....	18
7.3 Radiated Spurious Emissions Below 1GHz.....	27
7.3.1 E.U.T. Operation .....	27
7.3.2 Test Mode Description .....	27
7.3.3 Test Setup Diagram .....	27
7.3.4 Measurement Procedure and Data.....	28
7.4 Radiated Spurious Emissions Above 1GHz .....	33
7.4.1 E.U.T. Operation .....	33
7.4.2 Test Mode Description .....	33
7.4.3 Test Setup Diagram .....	33
7.4.4 Measurement Procedure and Data.....	34
7.5 Conducted Peak Output Power .....	47
7.5.1 E.U.T. Operation .....	47
7.5.2 Test Mode Description .....	47
7.5.3 Test Setup Diagram .....	47



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7.5.4	Measurement Procedure and Data	48
7.6	Minimum 6dB Bandwidth	49
7.6.1	E.U.T. Operation	49
7.6.2	Test Mode Description	49
7.6.3	Test Setup Diagram	49
7.6.4	Measurement Procedure and Data	49
7.7	Power Spectrum Density	50
7.7.1	E.U.T. Operation	50
7.7.2	Test Mode Description	50
7.7.3	Test Setup Diagram	50
7.7.4	Measurement Procedure and Data	50
7.8	Conducted Band Edges Measurement	51
7.8.1	E.U.T. Operation	51
7.8.2	Test Mode Description	51
7.8.3	Test Setup Diagram	51
7.8.4	Measurement Procedure and Data	51
7.9	Conducted Spurious Emissions	52
7.9.1	E.U.T. Operation	52
7.9.2	Test Mode Description	52
7.9.3	Test Setup Diagram	52
7.9.4	Measurement Procedure and Data	52
8	Test Setup Photo	53
9	EUT Constructional Details (EUT Photos)	54
10	Appendix	55



## 4 General Information

### 4.1 Details of E.U.T.

Power supply: Option 1:  
DC 9-60 V powered by AC/DC adapter as below:  
Model: GQ24-120150-AX  
Input: AC 100-240 V, 50/60Hz, 1.0 A Max  
Output: DC 12 V, 1.5 A, 18.0 W  
Option 2:  
PoE-PD: DC 42.5-57V

Cable(s): For main unit:  
DC input ports  
USB ports  
ETH0(PoE) ports  
ETH1 ports  
Signal ports\*6  
For AC/DC adapter:  
AC plugs  
DC output cables (unshielded, 1.0m)

Test Voltage: AC 120 V, 60 Hz  
Operation Frequency: 2402MHz to 2480MHz  
Bluetooth Version: V5.0 Dual mode  
Modulation Type: GFSK  
Number of Channels: 40  
Channel Spacing: 2MHz  
Antenna Type: RP-SMA Connector with dedicated Dipole Antenna or Sucker Antenna  
Antenna Gain: Option 1: Dipole Antenna: 4.55 dBi  
Option 2: Sucker Antenna: 2.7 dBi  
Antenna Number: 4 (one for 2.4GHz Wi-Fi/BT, one for LoRa and two for LTE)

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.
POE System	PROCET	PT-PSE104GB-60	PT2152026009
RJ45 Cable (1.2m length)	/	/	/
Note Book Computer	LENOVO	ThinkPad T490	PF1D1MVJ



### 4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	±3.22dB
Radiated Emissions which fall in the restricted bands	±5.14dB (3m); ±4.90dB (10m); ±4.88dB (1GHz-6GHz); ±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
Radiated Spurious Emissions Below 1GHz	±3.08dB (9kHz to 150kHz); ±3.19dB (150kHz to 30MHz); ±5.14dB (30MHz-1GHz) (3m); ±4.90dB (30MHz-1GHz) (10m)
Radiated Spurious Emissions Above 1GHz	±4.88dB (1GHz-6GHz); ±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 0.274%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
<p>Remark:</p> <p>The <math>U_{lab}</math> (lab Uncertainty) is less than <math>U_{CISPR}</math> (CISPR Uncertainty) or <math>U_{ETSI}</math> (ETSI Uncertainty).</p> <p>Emission decision rule:</p> <ul style="list-style-type: none"> <li>– Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit, marked as Pass in the report.</li> <li>– Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit, marked as Fail in the report.</li> </ul>	

### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,  
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Guangdong, China 510663

Tel: +86 20 82155555

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	2023-08-24	2025-08-23
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	2022-10-16	2025-10-15
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2024-09-02	2025-09-01
EMI Test Receiver (9kHz-3.6GHz)	Rohde & Schwarz	ESR3	EMC2221	2024-12-04	2025-12-03
Test Software E3r	Audix	Ver.6.191211	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
1-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18
Horn Antenna (1-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2025-05-13	2027-05-12
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13
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	2025-03-22	2028-03-21
EMI Test Receiver(1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2229	2024-12-03	2025-12-02
Amplifier(9k-1000MHz)	SONOMA	310	EMC2237	2024-12-03	2025-12-02
Trilog Broadband Antenna (25MHz-2GHz)	Schwarzbeck Mess-Elektronik	VULB 9168	EMC2238	2025-03-24	2027-03-23
Coaxial Cable	Mirco-COAX UTIFLEX ve	LA2-C125-8000	EMC2239	2024-12-04	2026-12-03
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 Spurious Emissions Above 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18
Horn Antenna (1-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2025-05-13	2027-05-12
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2024-10-14	2025-10-13
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13
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	2024-08-19	2025-08-18
Test Software	TST	V2.0	GZE100-82	N/A	N/A
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2024-12-03	2025-12-02



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EMC-TRF-01 Rev 1.1

Report No.: GZCR250400057503

Page: 11 of 67

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2025-06-03	2026-06-02



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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 4.55 dBi for Dipole Antenna and 2.7 dBi for Sucker Antenna.

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: 21.5 °C

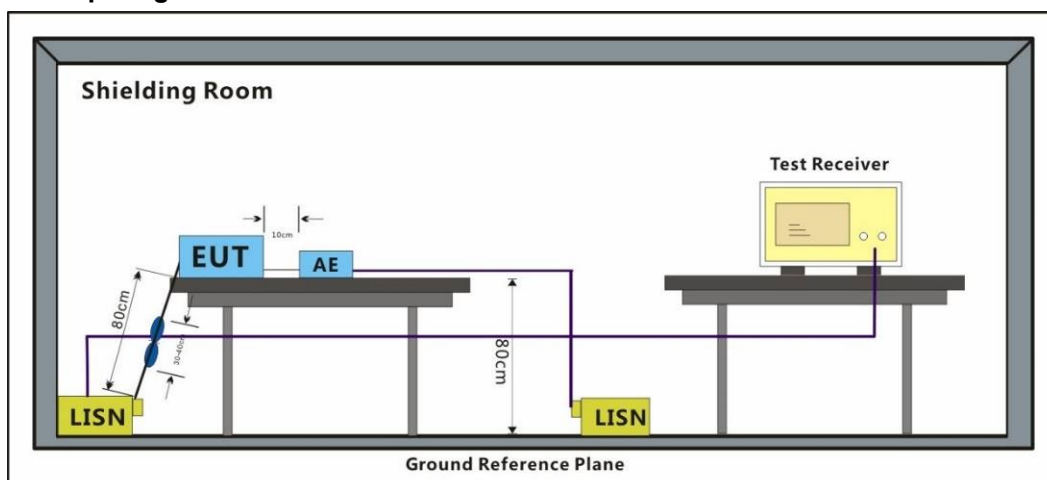
Humidity: 56.3 % RH

Atmospheric Pressure: 1008 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

#### 7.1.3 Test Setup Diagram



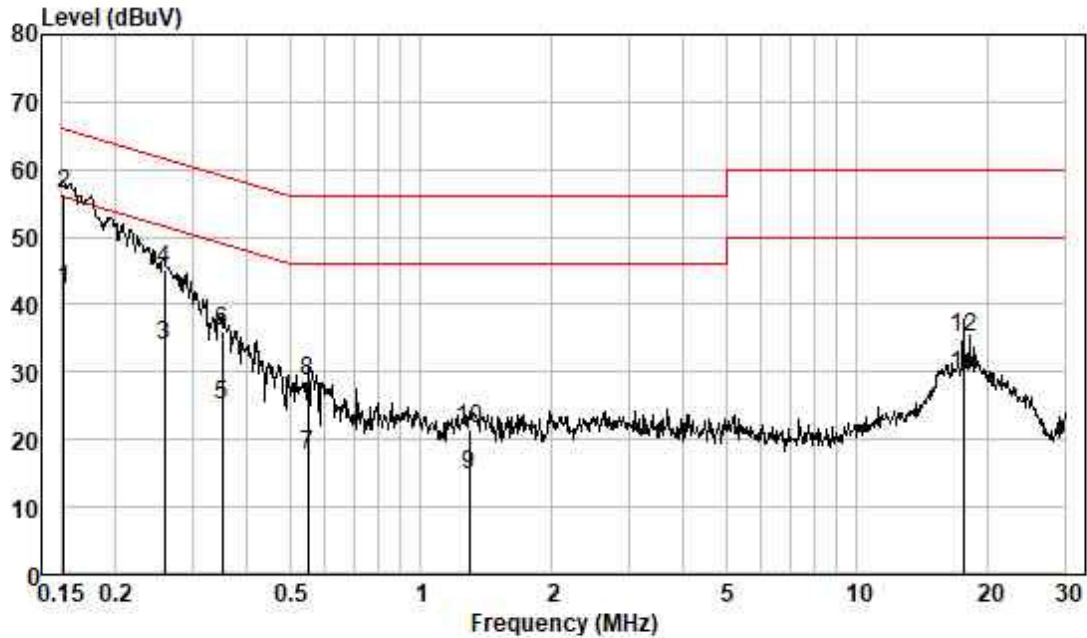
## 7.1.4 Measurement Procedure and Data

- 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



Test Mode: 02; Line: Live line



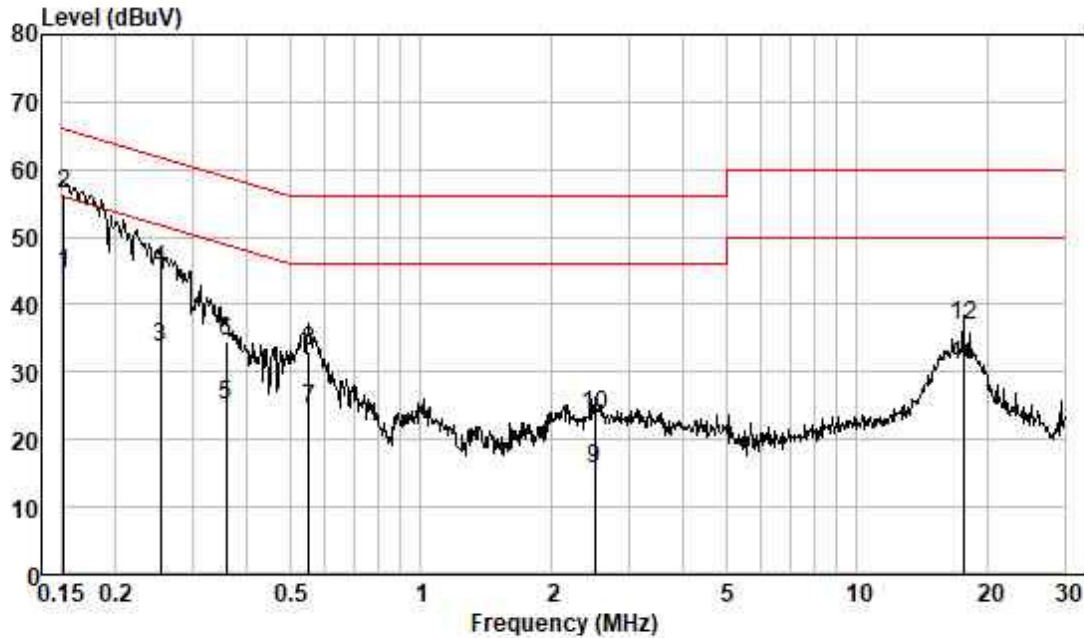
Pol : LINE  
Mode :  
Model :  
Power :

	Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
1	0.152	32.73	0.04	9.57	42.34	55.91	-13.57	Average
2	0.152	46.68	0.04	9.57	56.29	65.91	-9.62	QP
3	0.259	24.29	0.04	9.59	33.92	51.47	-17.55	Average
4	0.259	35.52	0.04	9.59	45.15	61.47	-16.32	QP
5	0.350	15.41	0.05	9.59	25.05	48.96	-23.91	Average
6	0.350	26.40	0.05	9.59	36.04	58.96	-22.92	QP
7	0.549	8.21	0.05	9.56	17.82	46.00	-28.18	Average
8	0.549	19.16	0.05	9.56	28.77	56.00	-27.23	QP
9	1.289	5.18	0.09	9.55	14.82	46.00	-31.18	Average
10	1.289	11.90	0.09	9.55	21.54	56.00	-34.46	QP
11	17.475	19.19	0.36	9.83	29.38	50.00	-20.62	Average
12	17.475	24.88	0.36	9.83	35.07	60.00	-24.93	QP





Test Mode: 02; 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	0.152	35.13	0.04	9.51	44.68	55.91	-11.23	Average
2	0.152	46.88	0.04	9.51	56.43	65.91	-9.48	QP
3	0.253	24.00	0.04	9.53	33.57	51.64	-18.07	Average
4	0.253	35.48	0.04	9.53	45.05	61.64	-16.59	QP
5	0.358	15.59	0.05	9.52	25.16	48.78	-23.62	Average
6	0.358	24.92	0.05	9.52	34.49	58.78	-24.29	QP
7	0.552	15.01	0.05	9.57	24.63	46.00	-21.37	Average
8	0.552	23.56	0.05	9.57	33.18	56.00	-22.82	QP
9	2.500	6.04	0.14	9.58	15.76	46.00	-30.24	Average
10	2.500	13.82	0.14	9.58	23.54	56.00	-32.46	QP
11	17.475	20.86	0.36	9.90	31.12	50.00	-18.88	Average
12	17.475	26.60	0.36	9.90	36.86	60.00	-23.14	QP





### 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:

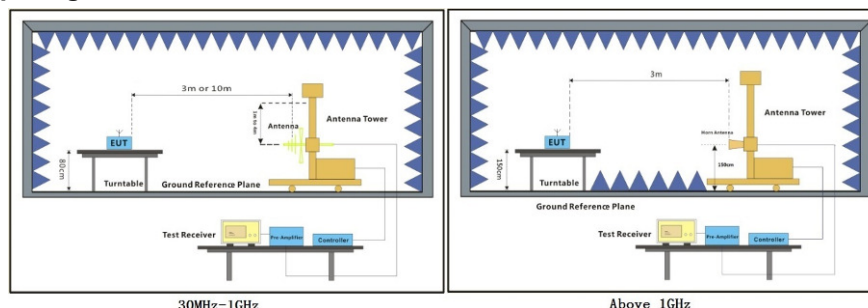
Temperature: 26.3 °C Humidity: 65.2 % RH Atmospheric Pressure: 1004 mbar

#### 7.2.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation for Dipole Antenna.
Final test 09	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation for Sucker Antenna.



### 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

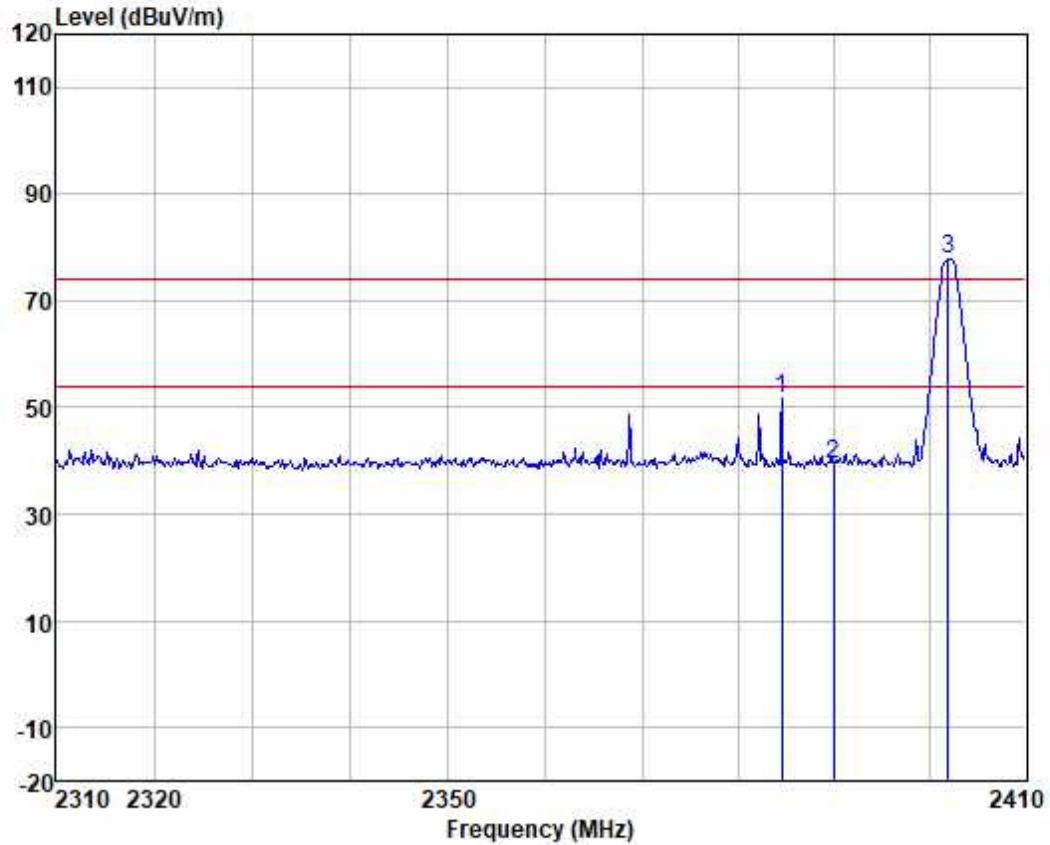
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Remark 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.

Remark 4: For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.



Test Mode: 02; Polarity: Vertical; Modulation: GFSK; Channel: Low

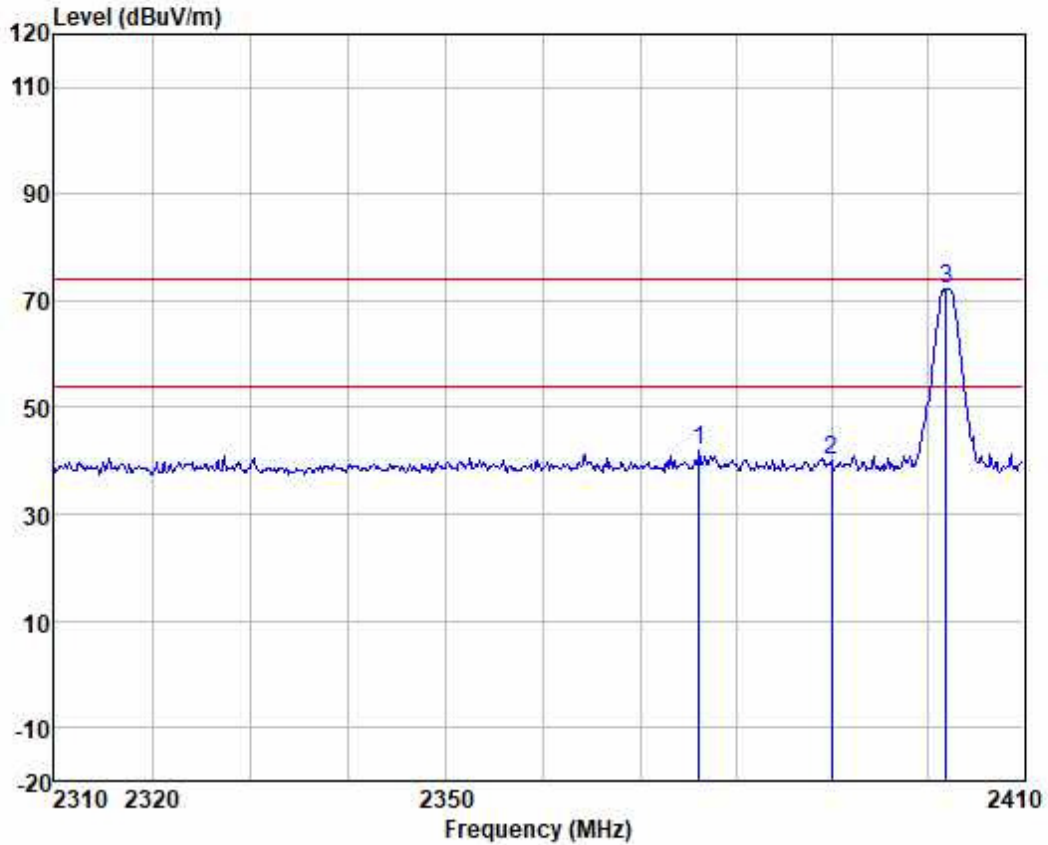


	Read Freq	Antenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2384.500	58.17	27.68	3.44	37.77	51.52	74.00	-22.48	VERTICAL	peak
2	2390.000	46.07	27.68	3.44	37.77	39.42	74.00	-34.58	VERTICAL	peak
3 *	2402.000	84.31	27.71	3.45	37.77	77.70	74.00	3.70	VERTICAL	peak





Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low

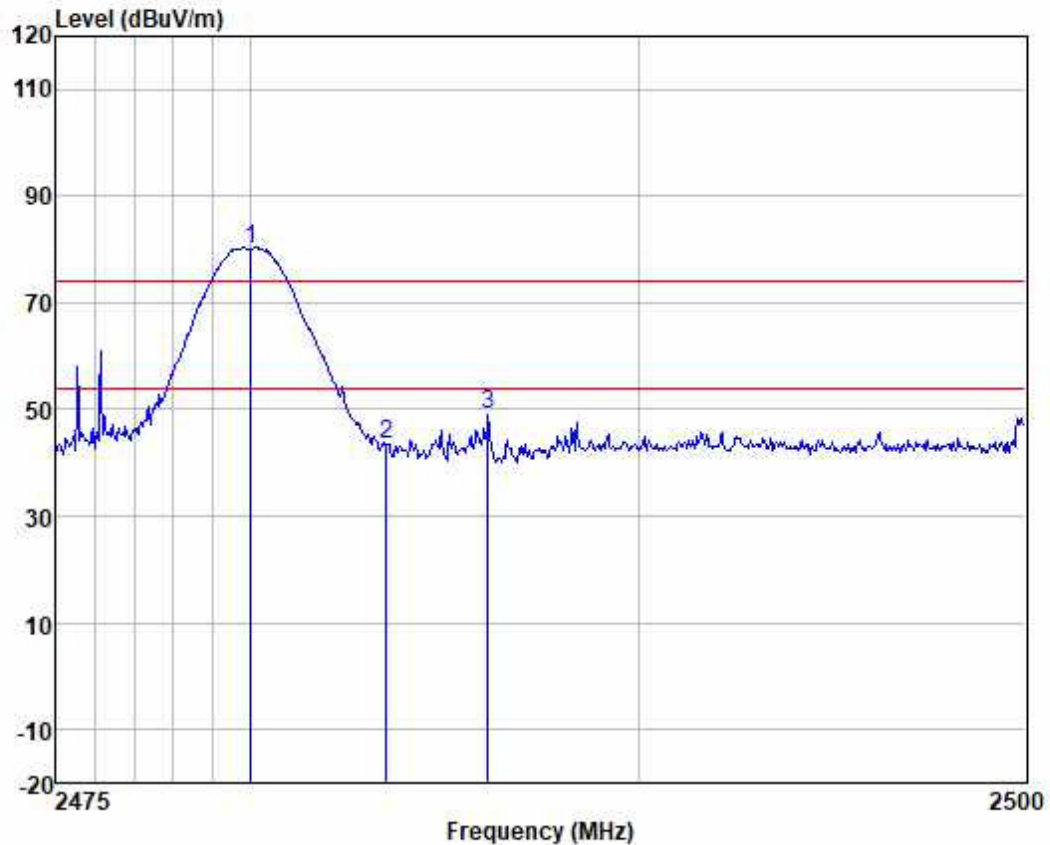


	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2376.127	48.63	27.66	3.44	37.77	41.96	74.00	-32.04 HORIZONTAL
2	2390.000	46.78	27.68	3.44	37.77	40.13	74.00	-33.87 HORIZONTAL
3	2402.000	78.77	27.71	3.45	37.77	72.16	74.00	-1.84 HORIZONTAL





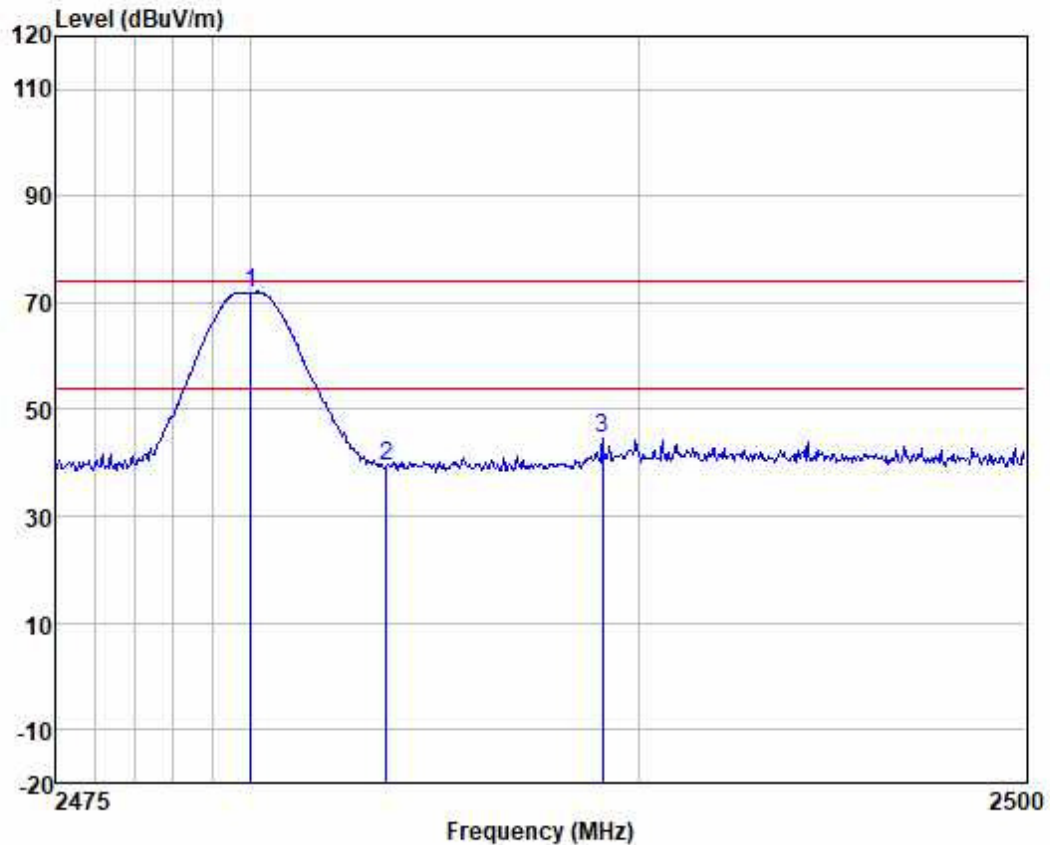
Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



	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 *	2480.000	86.55	27.84	3.48	37.76	80.11	74.00	6.11	VERTICAL peak
2	2483.500	49.84	27.85	3.49	37.76	43.42	74.00	-30.58	VERTICAL peak
3	2486.119	55.41	27.85	3.49	37.76	48.99	74.00	-25.01	VERTICAL peak



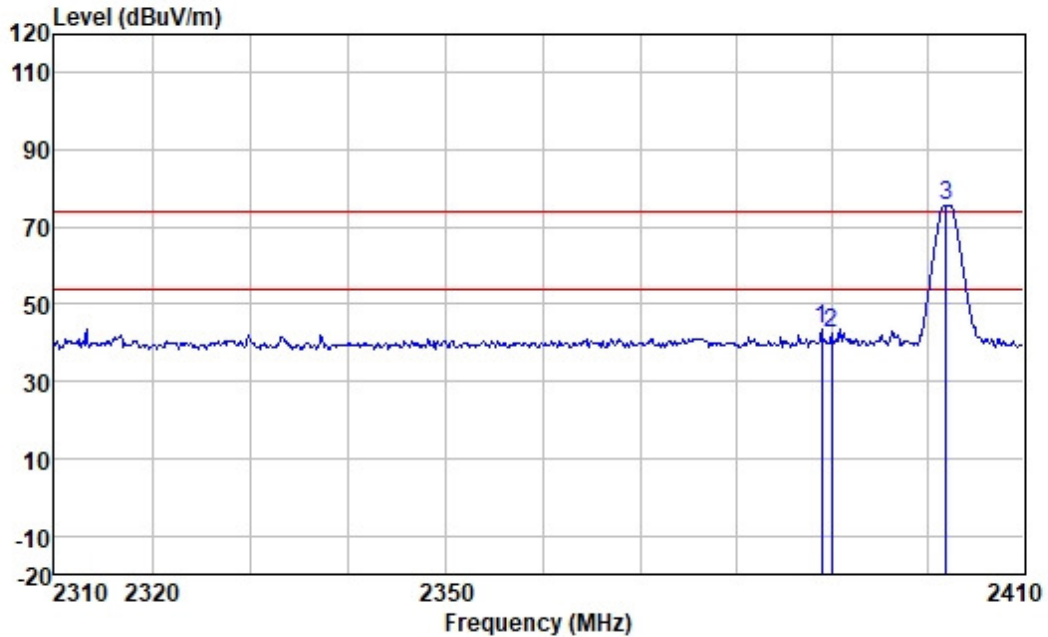
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



	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	2480.000	78.27	27.84	3.48	37.76	71.83	74.00	-2.17	HORIZONTAL	peak
2	2483.500	45.77	27.85	3.49	37.76	39.35	74.00	-34.65	HORIZONTAL	peak
3	2489.069	50.99	27.85	3.49	37.76	44.57	74.00	-29.43	HORIZONTAL	peak



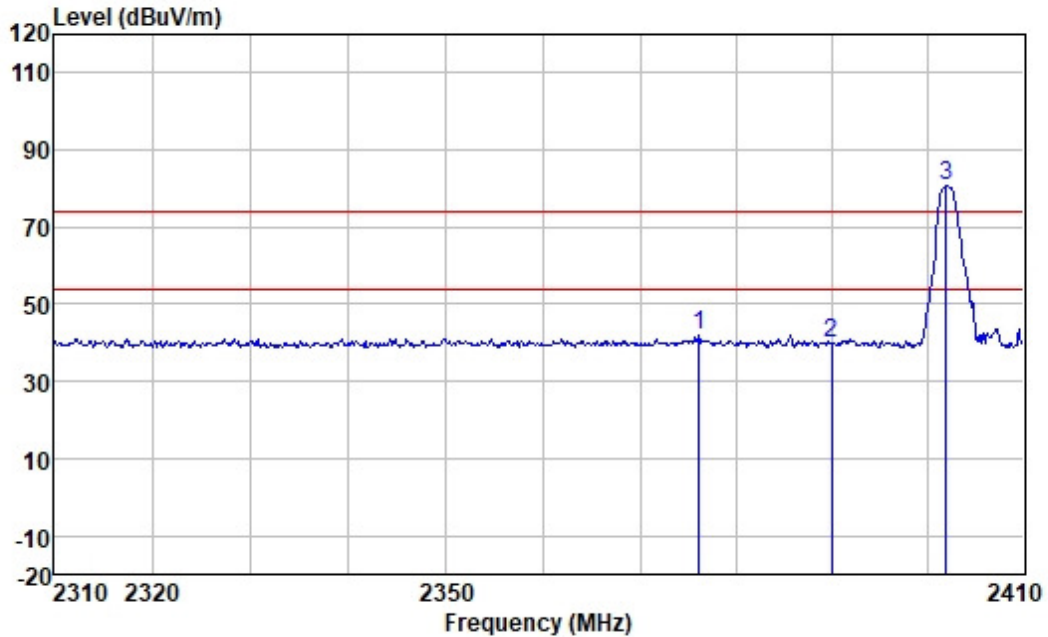
Test Mode: 09; Polarity: Vertical; Modulation: GFSK; Channel: Low



	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2388.951	50.11	27.63	3.44	37.77	43.41	74.00	-30.59	VERTICAL	peak
2	2390.000	49.01	27.63	3.44	37.77	42.31	74.00	-31.69	VERTICAL	peak
3 *	2402.000	82.36	27.65	3.45	37.77	75.69	74.00	1.69	VERTICAL	peak



Test Mode: 09; Polarity: Horizontal; Modulation:GFSK; Channel:Low

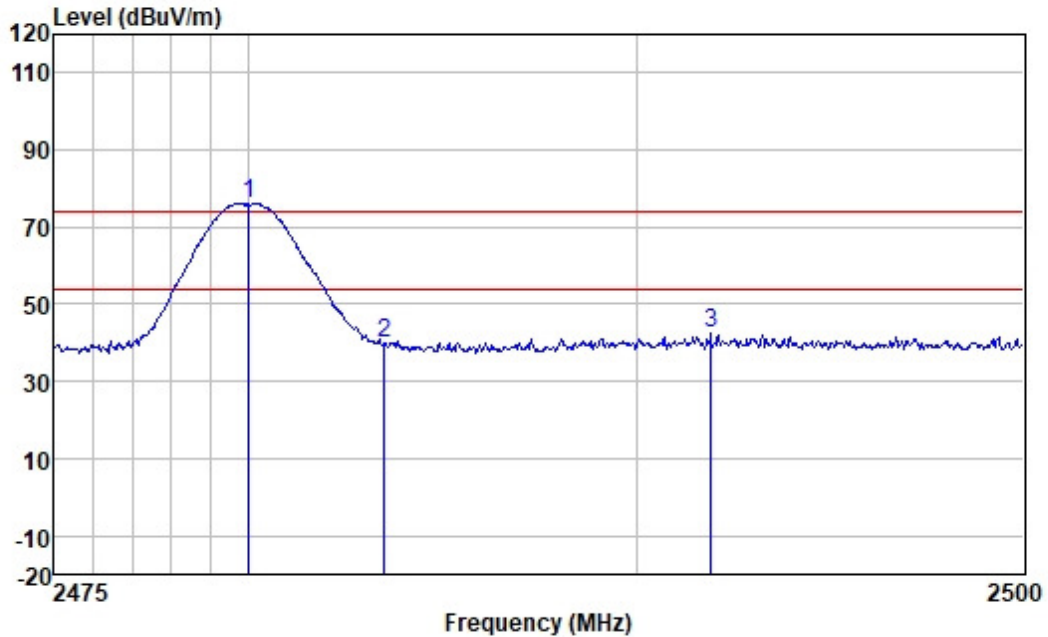


		ReadAntenna		Cable	Preamp		Limit	Over		
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2376.127	48.90	27.61	3.44	37.77	42.18	74.00	-31.82	HORIZONTAL	peak
2	2390.000	46.61	27.63	3.44	37.77	39.91	74.00	-34.09	HORIZONTAL	peak
3 *	2402.000	87.21	27.65	3.45	37.77	80.54	74.00	6.54	HORIZONTAL	peak





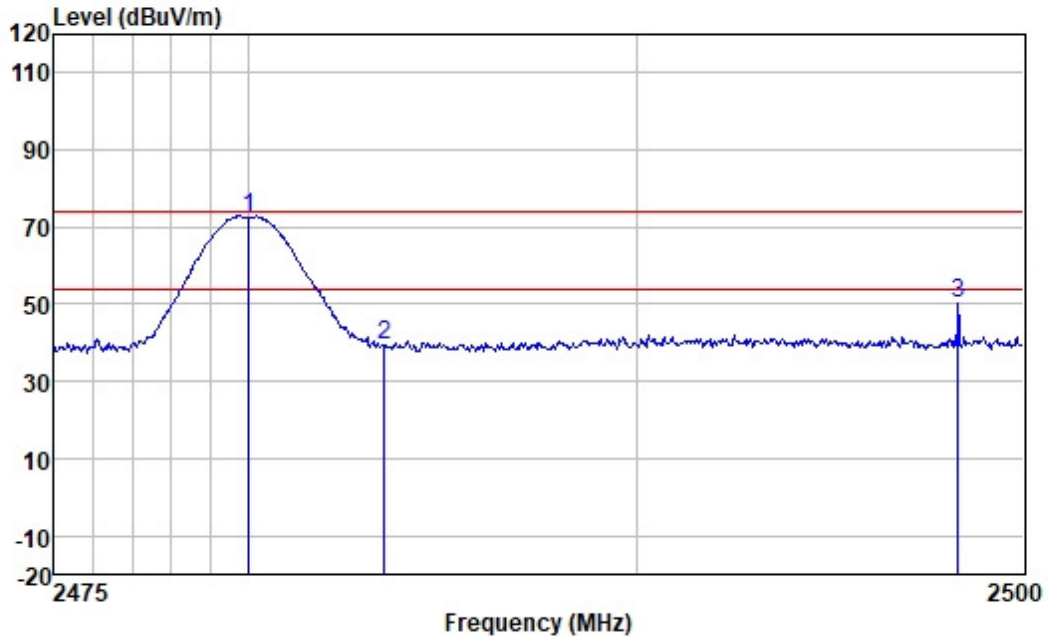
Test Mode: 09; Polarity: Vertical; Modulation:GFSK; Channel:High



	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	82.39	27.75	3.48	37.76	75.86	74.00	1.86	VERTICAL
2	2483.500	46.27	27.76	3.49	37.76	39.76	74.00	-34.24	VERTICAL
3	2491.923	48.91	27.76	3.49	37.76	42.40	74.00	-31.60	VERTICAL



Test Mode: 09; 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	78.84	27.75	3.48	37.76	72.31	74.00	-1.69	HORIZONTAL peak
2	2483.500	45.78	27.76	3.49	37.76	39.27	74.00	-34.73	HORIZONTAL peak
3	2498.342	56.51	27.77	3.49	37.76	50.01	74.00	-23.99	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: 22.1 °C

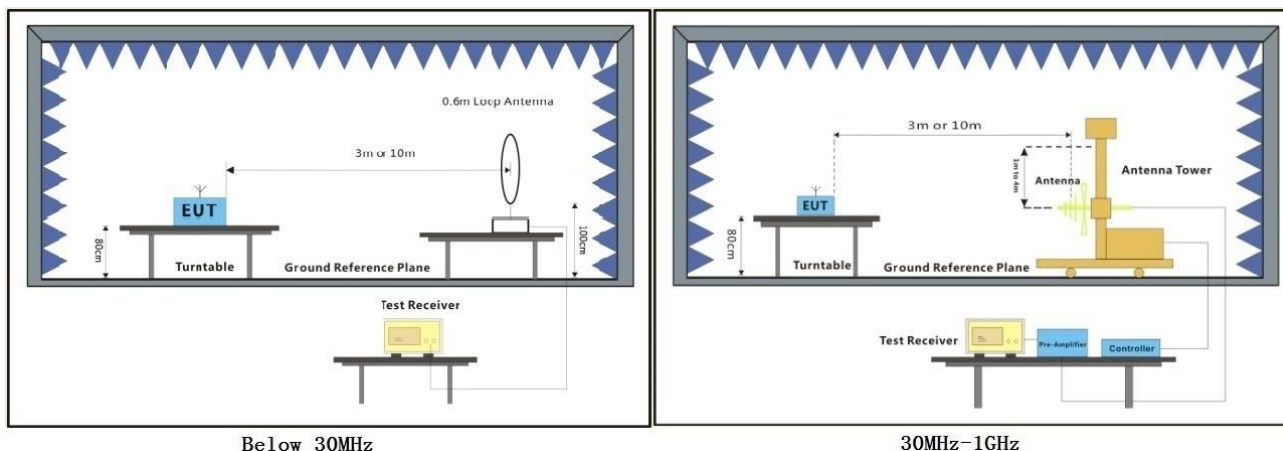
Humidity: 59.5 % RH

Atmospheric Pressure: 1008 mbar

#### 7.3.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation for Dipole Antenna.
Final test 09	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation for Sucker Antenna.

#### 7.3.3 Test Setup Diagram



Below 30MHz

30MHz-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. 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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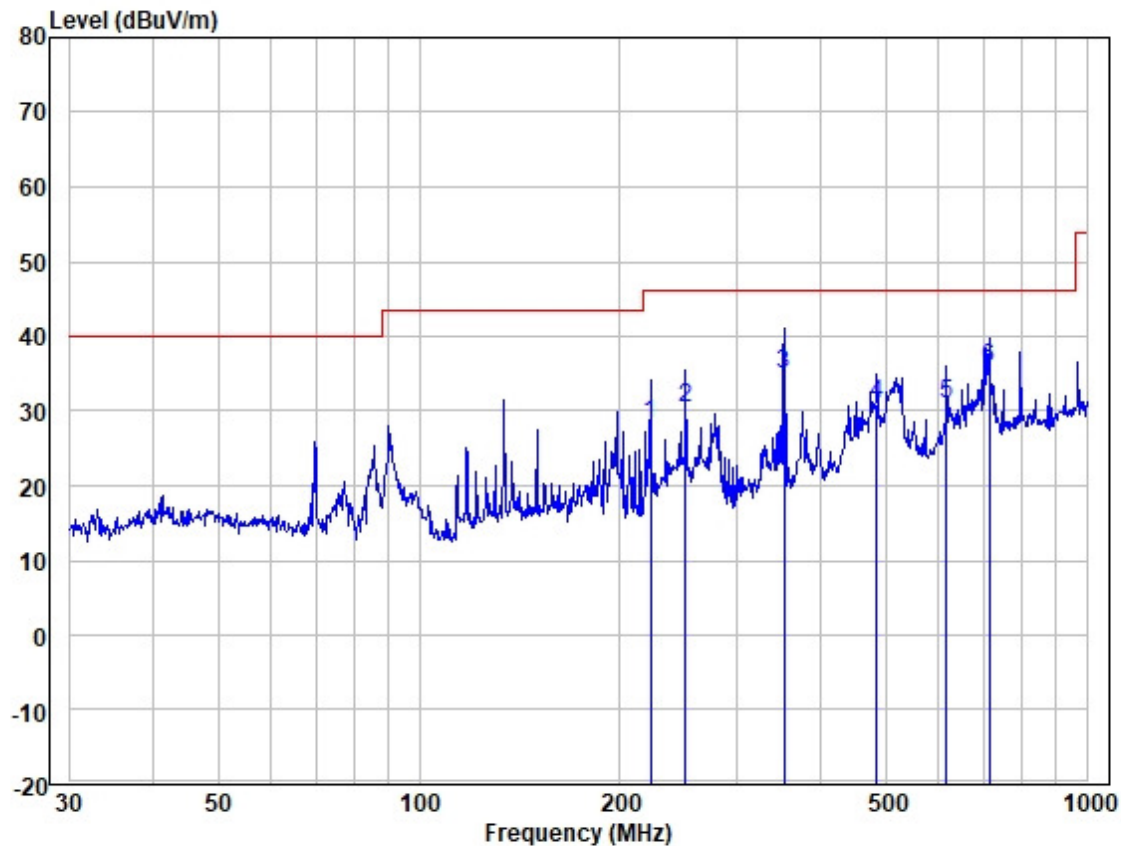
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Test Mode: 02; Polarity: Horizontal



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

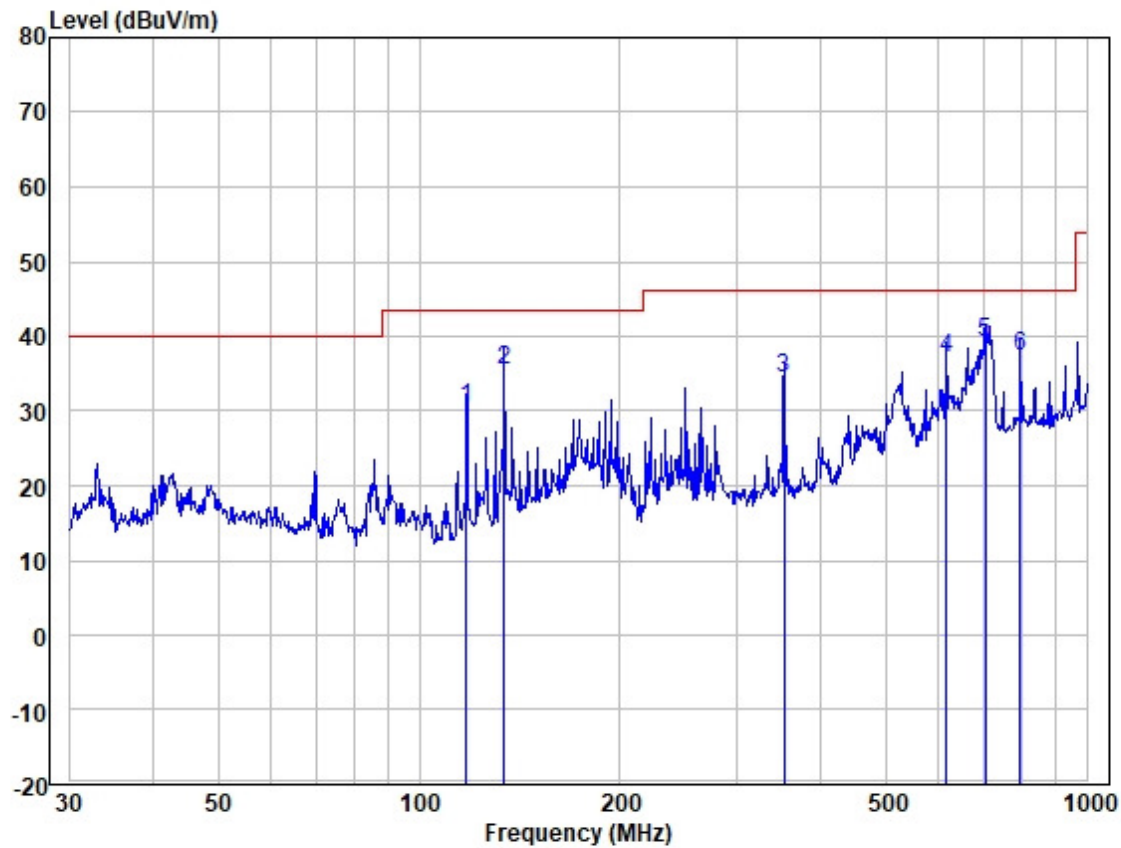
	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	222.170	44.49	15.66	0.81	32.82	28.14	46.02	-17.88	HORIZONTAL	QP
2	250.301	44.76	17.61	0.88	32.84	30.41	46.02	-15.61	HORIZONTAL	QP
3	351.708	46.48	20.25	1.08	32.88	34.93	46.02	-11.09	HORIZONTAL	QP
4	483.910	39.32	23.25	1.28	32.94	30.91	46.02	-15.11	HORIZONTAL	QP
5	616.372	36.31	25.86	1.44	32.63	30.98	46.02	-15.04	HORIZONTAL	QP
6	714.173	38.72	27.27	1.55	31.79	35.75	46.02	-10.27	HORIZONTAL	QP



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Test Mode: 02; Polarity: Vertical

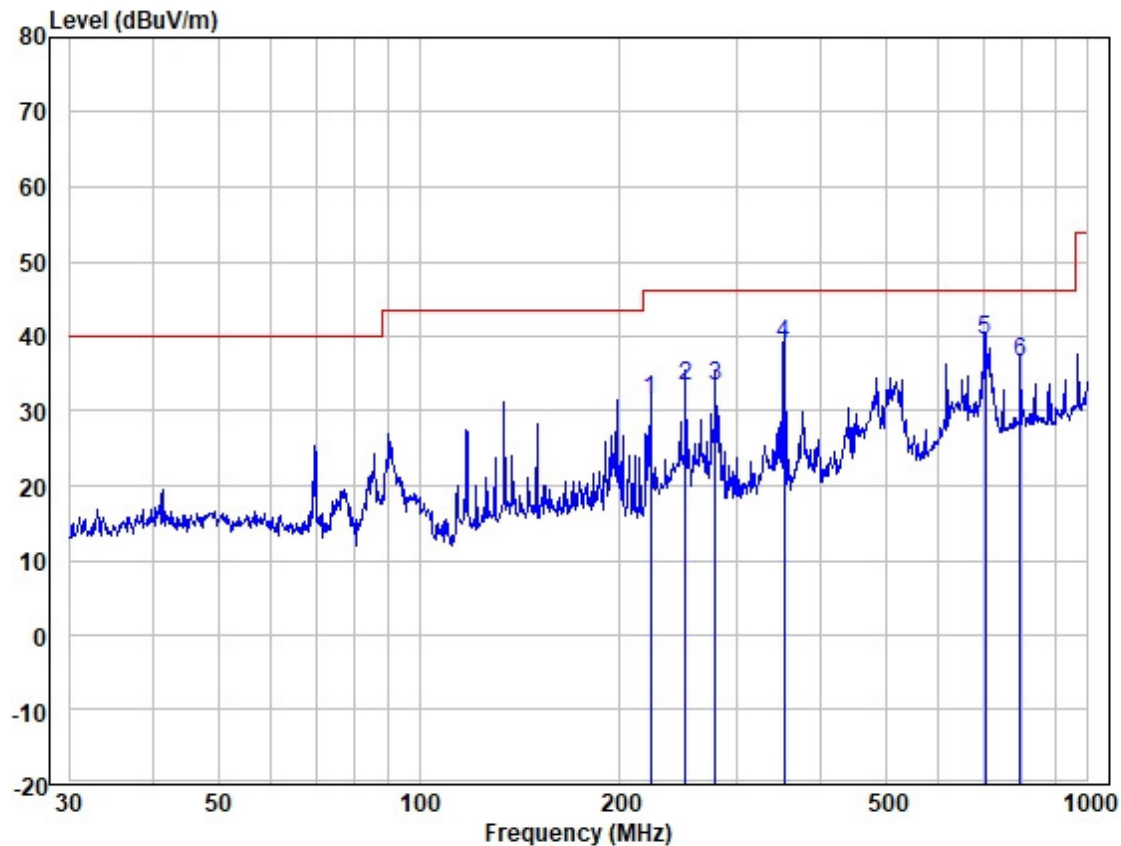


Site : 966 Chamber  
Job :  
Model :  
Power :  
Test Mode :

	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	117.773	45.72	16.71	0.60	32.71	30.32	43.52	-13.20	VERTICAL	QP
2	134.088	49.22	18.24	0.63	32.73	35.36	43.52	-8.16	VERTICAL	QP
3	351.708	45.87	20.25	1.08	32.88	34.32	46.02	-11.70	VERTICAL	QP
4	616.372	42.52	25.86	1.44	32.63	37.19	46.02	-8.83	VERTICAL	QP
5	704.226	42.41	27.20	1.54	31.83	39.32	46.02	-6.70	VERTICAL	QP
6	793.396	38.65	28.65	1.66	31.62	37.34	46.02	-8.68	VERTICAL	QP



Test Mode: 09; Polarity: Horizontal



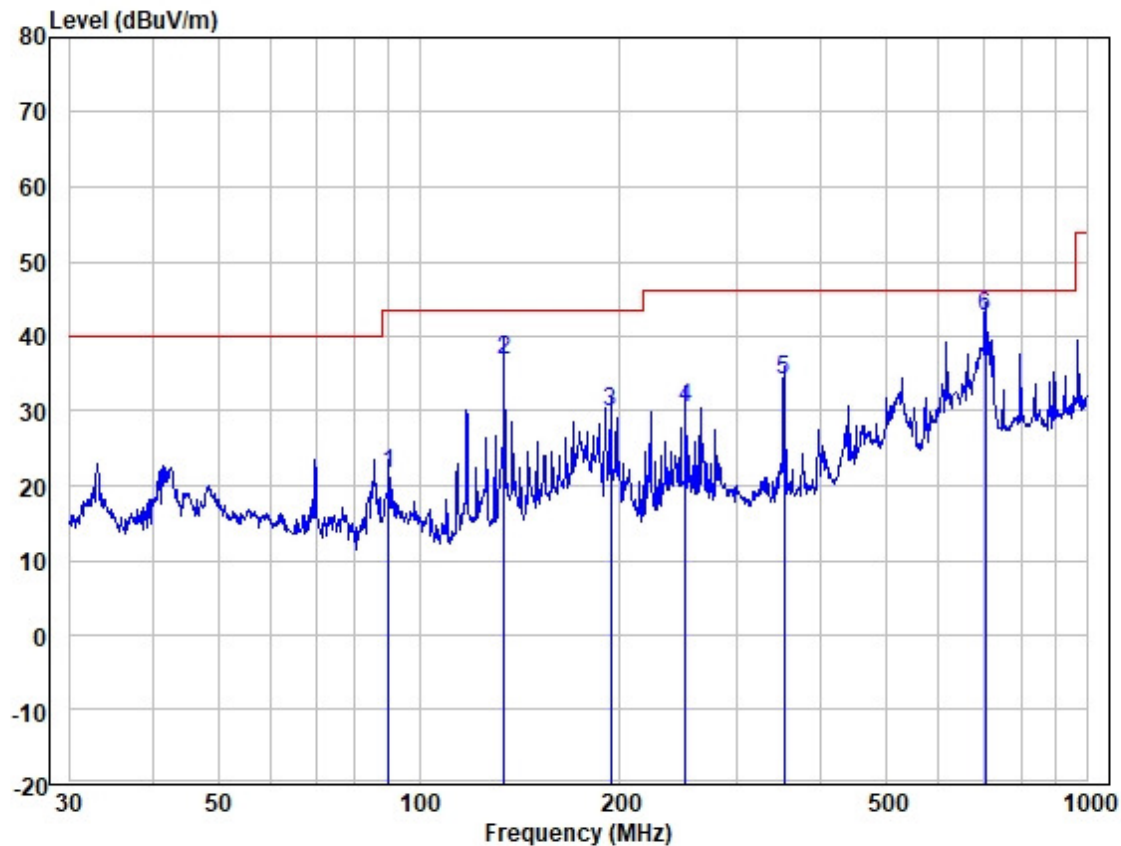
Site : 966 Chamber  
Job :  
Model :  
Power :  
Test Mode :

	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	222.170	47.86	15.66	0.81	32.82	31.51	46.02	-14.51	HORIZONTAL	QP
2	250.301	47.78	17.61	0.88	32.84	33.43	46.02	-12.59	HORIZONTAL	QP
3	278.067	46.64	18.70	0.96	32.86	33.44	46.02	-12.58	HORIZONTAL	QP
4	351.708	50.47	20.25	1.08	32.88	38.92	46.02	-7.10	HORIZONTAL	QP
5	704.226	42.56	27.20	1.54	31.83	39.47	46.02	-6.55	HORIZONTAL	QP
6	793.396	37.83	28.65	1.66	31.62	36.52	46.02	-9.50	HORIZONTAL	QP





Test Mode: 09; 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	89.905	40.07	13.65	0.52	32.71	21.53	43.52	-21.99	VERTICAL	QP
2	134.088	50.75	18.24	0.63	32.73	36.89	43.52	-6.63	VERTICAL	QP
3	193.773	45.83	16.00	0.78	32.81	29.80	43.52	-13.72	VERTICAL	QP
4	250.301	44.68	17.61	0.88	32.84	30.33	46.02	-15.69	VERTICAL	QP
5	351.708	45.61	20.25	1.08	32.88	34.06	46.02	-11.96	VERTICAL	QP
6	704.226	45.75	27.20	1.54	31.83	42.66	46.02	-3.36	VERTICAL	QP





### 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: 26.3 °C

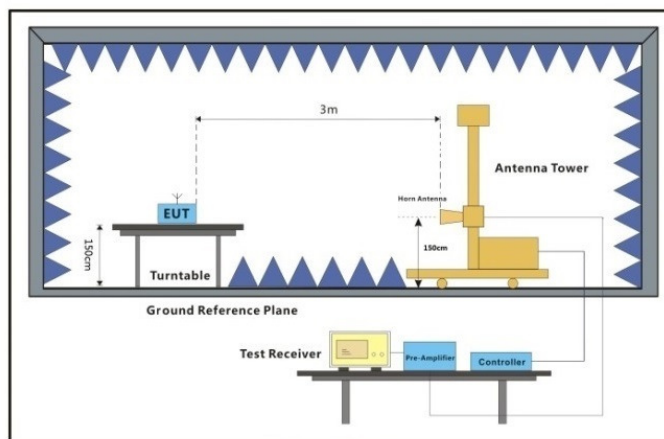
Humidity: 65.2 % RH

Atmospheric Pressure: 1004 mbar

#### 7.4.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation for Dipole Antenna.
Final test 09	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation for Sucker Antenna.

#### 7.4.3 Test Setup Diagram



Above 1GHz



## 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.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.
- 5:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.



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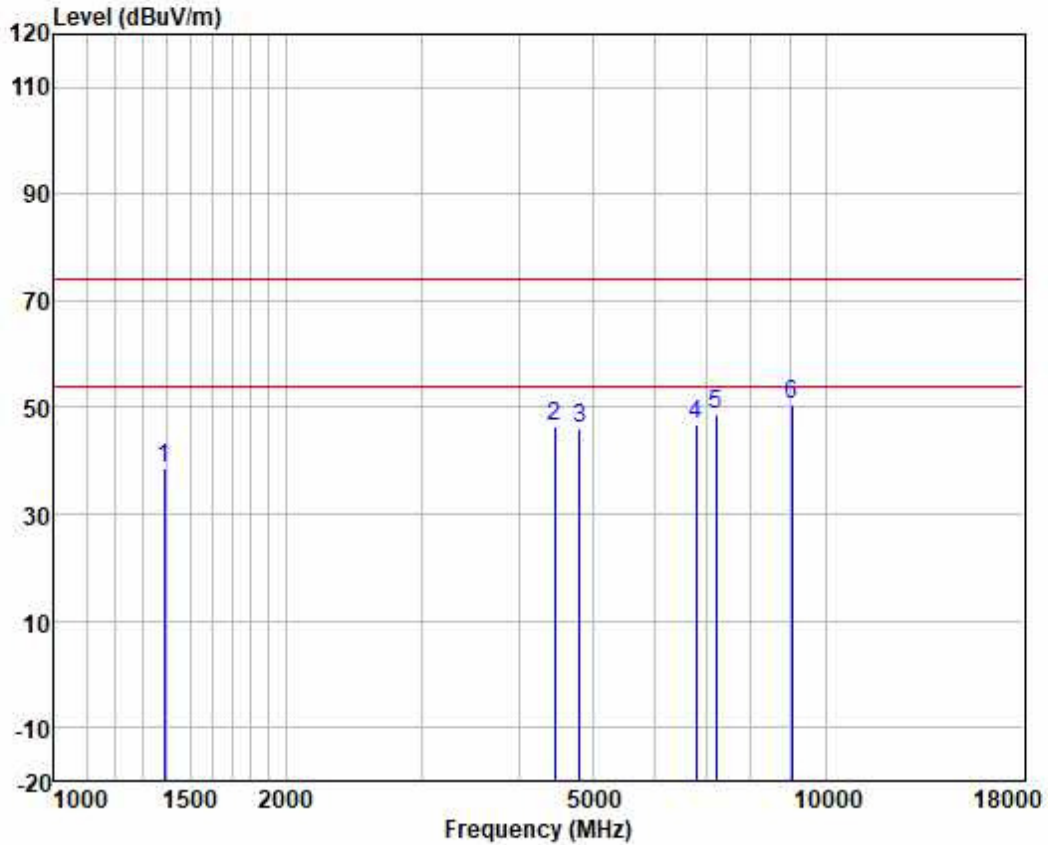
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t (86-20) 82155555 sgs.china@sgs.com

Test Mode: 02; Polarity: Vertical; Modulation: GFSK; Channel: Low

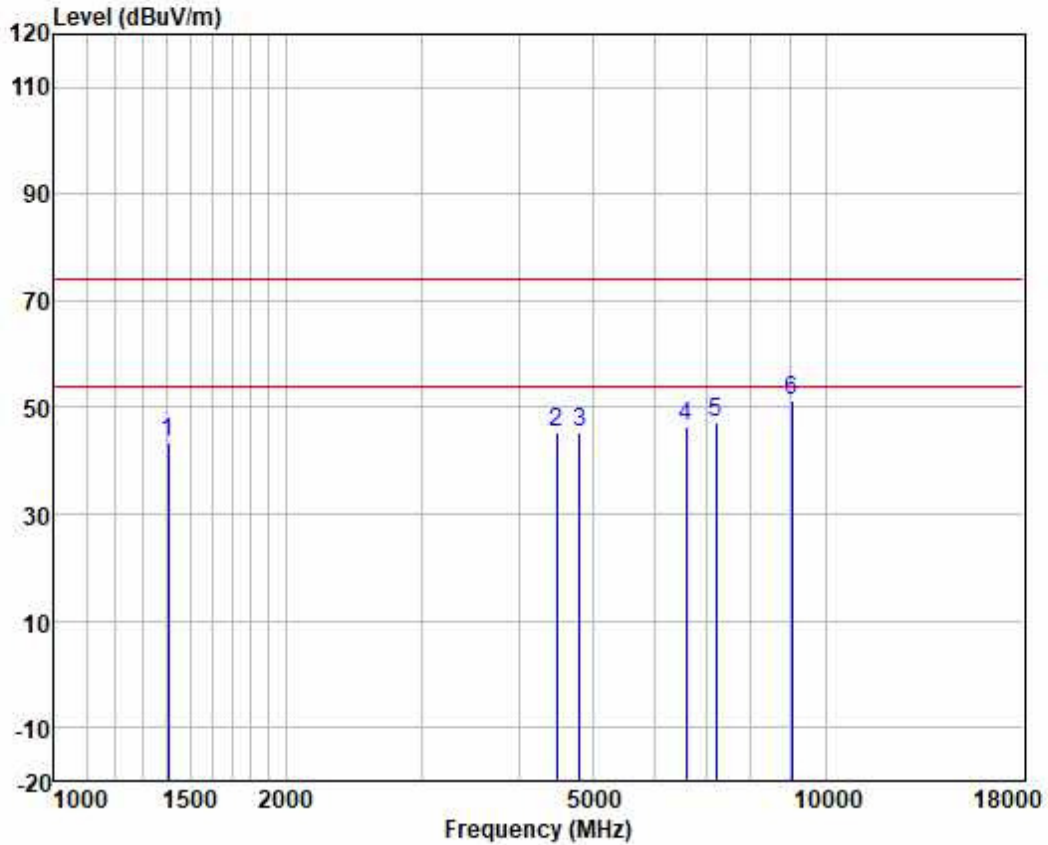


	Freq	ReadAntenna	Cable	Preamp	Limit	Over			
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1390.276	50.08	24.24	2.65	38.49	38.48	74.00	-35.52	VERTICAL peak
2	4456.315	45.24	34.00	4.61	37.45	46.40	74.00	-27.60	VERTICAL peak
3	4804.000	44.42	34.16	4.81	37.38	46.01	74.00	-27.99	VERTICAL peak
4	6795.879	43.63	34.69	5.79	37.13	46.98	74.00	-27.02	VERTICAL peak
5	7206.000	44.13	35.63	5.93	37.17	48.52	74.00	-25.48	VERTICAL peak
6	9047.272	43.46	37.67	6.60	37.14	50.59	74.00	-23.41	VERTICAL peak





Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low

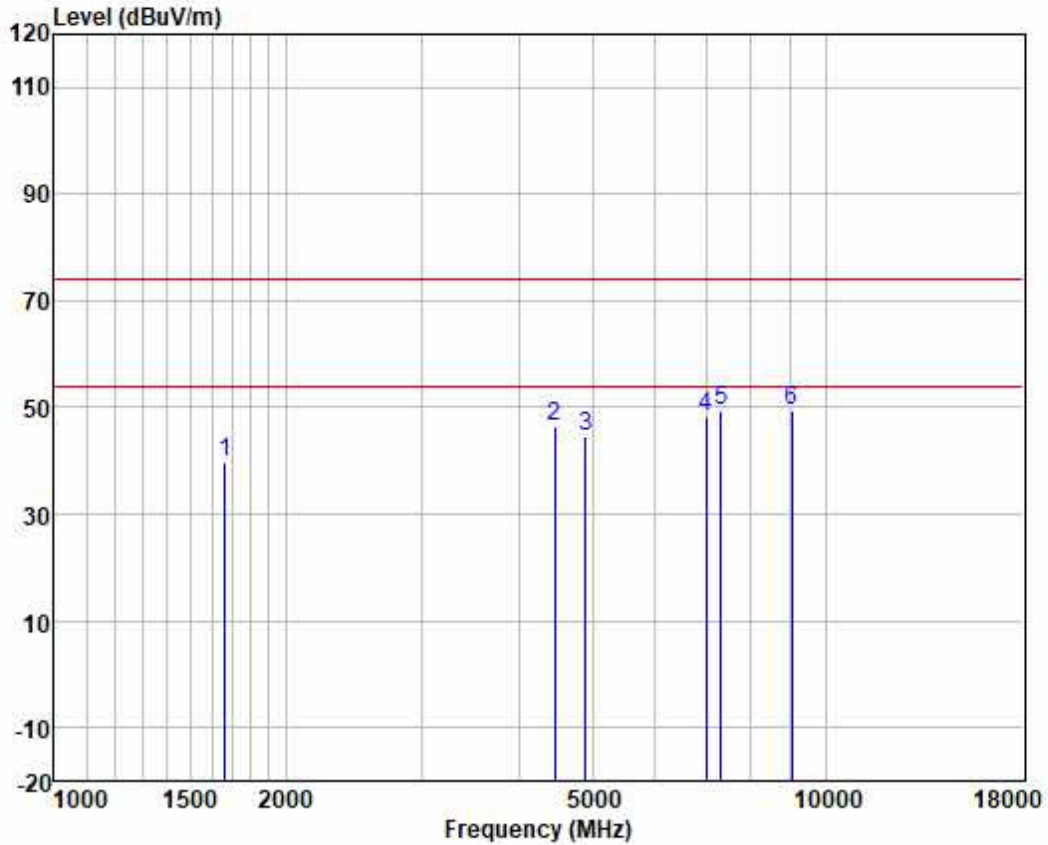


	Freq	ReadAntenna	Cable	Preamp	Limit	Over			
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1406.443	55.16	24.27	2.66	38.47	43.62	74.00	-30.38	HORIZONTAL peak
2	4482.150	44.13	34.12	4.62	37.44	45.43	74.00	-28.57	HORIZONTAL peak
3	4804.000	43.66	34.16	4.81	37.38	45.25	74.00	-28.75	HORIZONTAL peak
4	6602.265	43.98	34.07	5.69	37.12	46.62	74.00	-27.38	HORIZONTAL peak
5	7206.000	42.98	35.63	5.93	37.17	47.37	74.00	-26.63	HORIZONTAL peak
6	9047.272	44.08	37.67	6.60	37.14	51.21	74.00	-22.79	HORIZONTAL peak





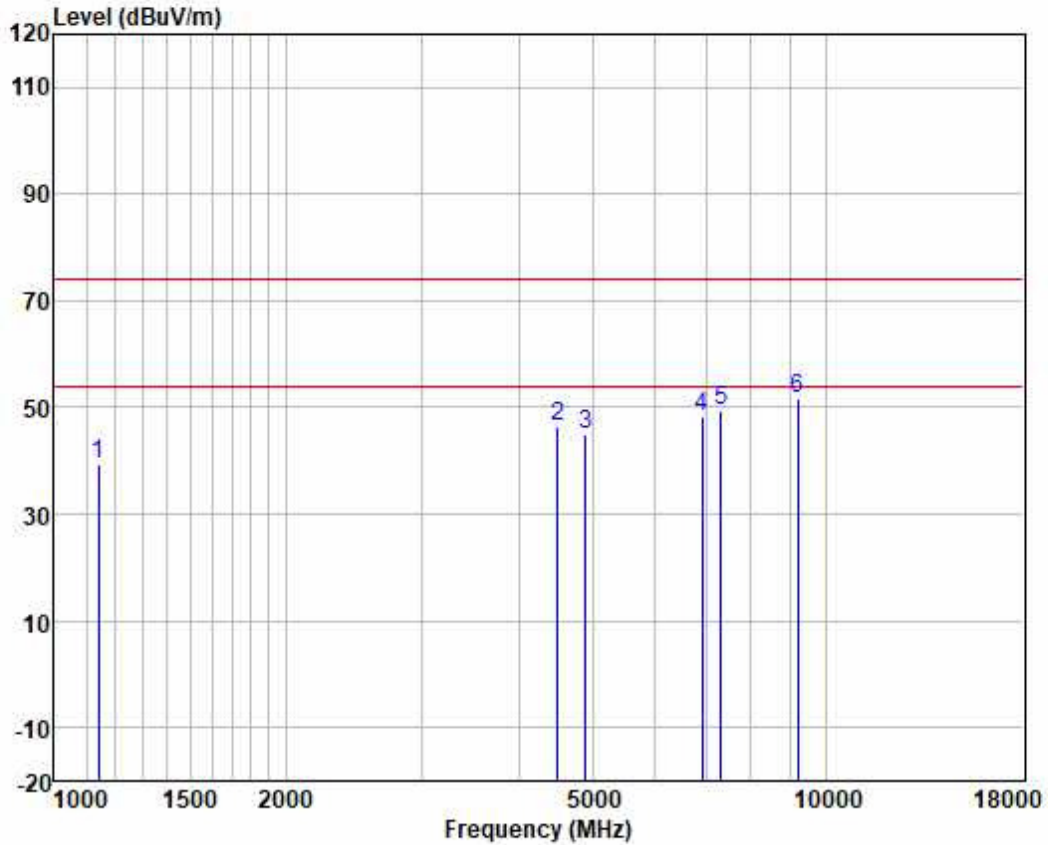
Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:middle



	Read Freq	Antenna Level	Antenna Factor	Cable Loss	Preamplifier Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1663.137	49.92	24.93	2.81	38.06	39.60	74.00	-34.40	VERTICAL	peak
2	4456.315	45.16	34.00	4.61	37.45	46.32	74.00	-27.68	VERTICAL	peak
3	4880.000	43.01	34.15	4.85	37.35	44.66	74.00	-29.34	VERTICAL	peak
4	6995.172	44.47	35.11	5.87	37.15	48.30	74.00	-25.70	VERTICAL	peak
5	7320.000	44.39	36.07	5.98	37.18	49.26	74.00	-24.74	VERTICAL	peak
6	9047.272	42.33	37.67	6.60	37.14	49.46	74.00	-24.54	VERTICAL	peak



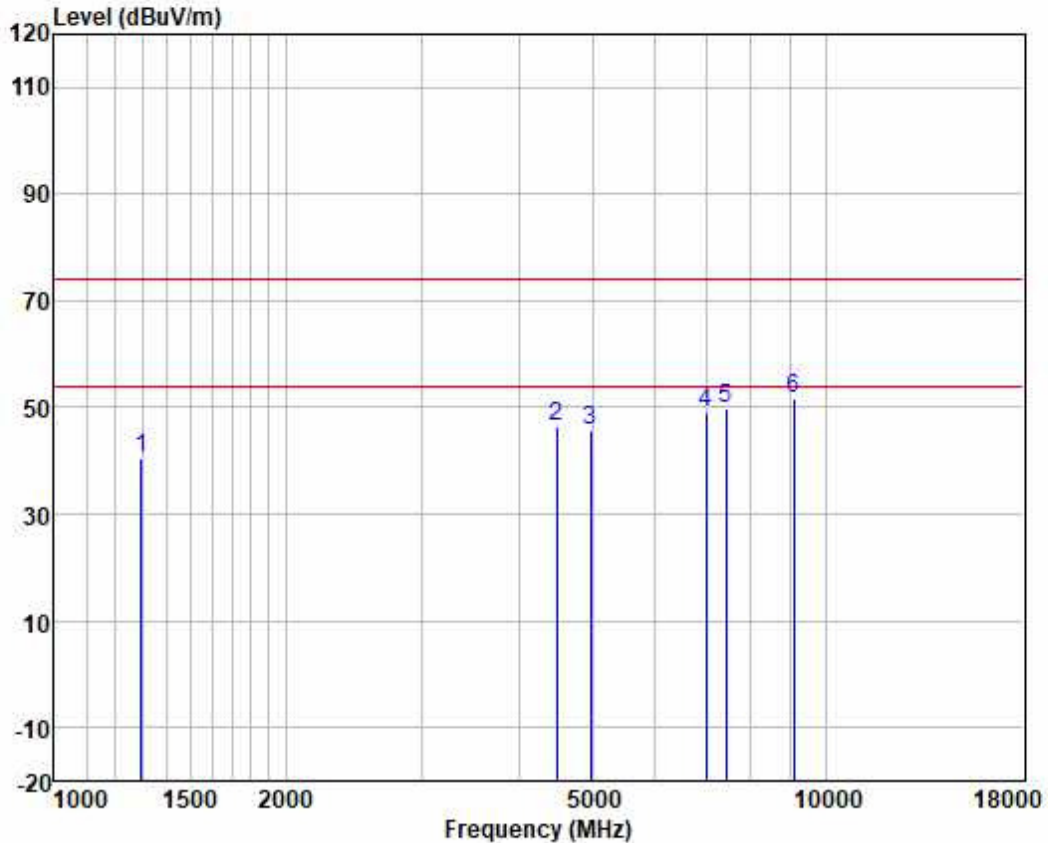
Test Mode: 02; Polarity: Horizontal; Modulation: GFSK; Channel: middle



	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB		
1	1142.201	53.09	22.83	2.31	38.72	39.51	74.00	-34.49	HORIZONTAL peak
2	4495.125	45.11	34.17	4.62	37.44	46.46	74.00	-27.54	HORIZONTAL peak
3	4880.000	43.15	34.15	4.85	37.35	44.80	74.00	-29.20	HORIZONTAL peak
4	6914.763	44.79	34.97	5.84	37.14	48.46	74.00	-25.54	HORIZONTAL peak
5	7320.000	44.73	36.07	5.98	37.18	49.60	74.00	-24.40	HORIZONTAL peak
6	9205.540	44.03	37.97	6.73	37.13	51.60	74.00	-22.40	HORIZONTAL peak



Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High

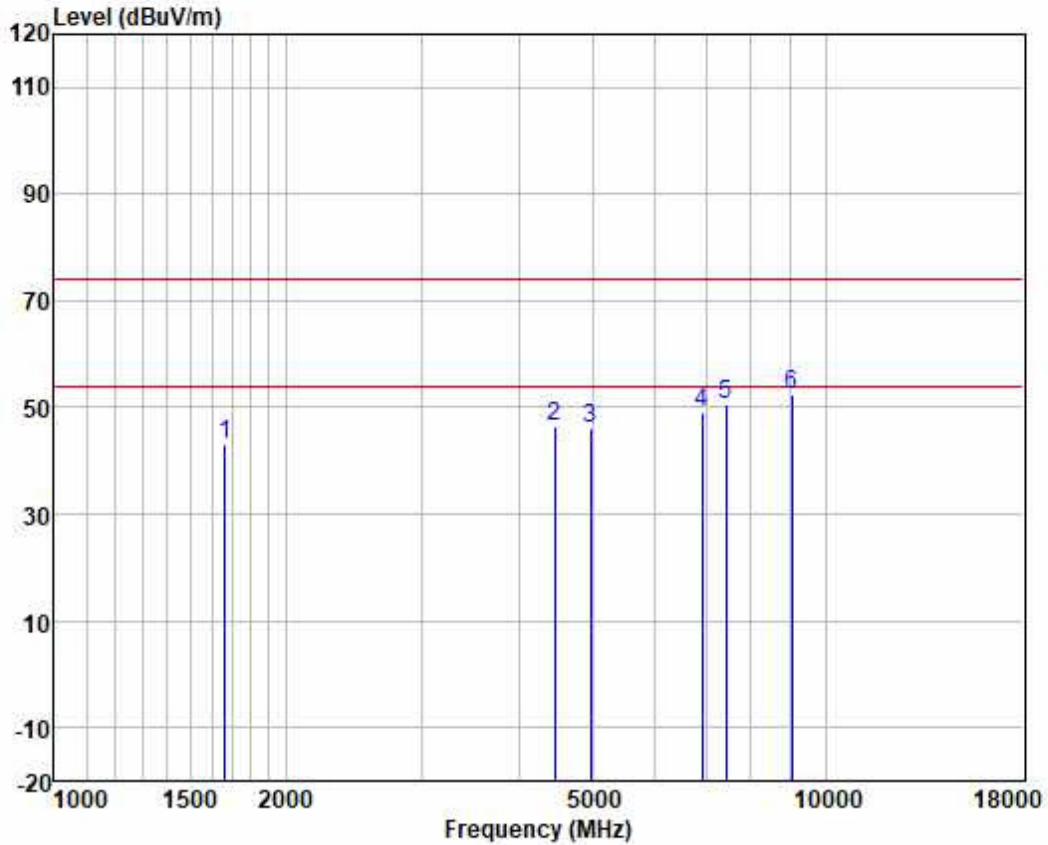


	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
		Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1297.103	52.68	23.96	2.58	38.60	40.62	74.00	-33.38	VERTICAL	peak
2	4482.150	45.33	34.12	4.62	37.44	46.63	74.00	-27.37	VERTICAL	peak
3	4960.000	44.08	34.15	4.89	37.32	45.80	74.00	-28.20	VERTICAL	peak
4	6995.172	45.34	35.11	5.87	37.15	49.17	74.00	-24.83	VERTICAL	peak
5	7440.000	44.66	36.33	6.02	37.18	49.83	74.00	-24.17	VERTICAL	peak
6	9099.724	44.56	37.75	6.64	37.14	51.81	74.00	-22.19	VERTICAL	peak





Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High

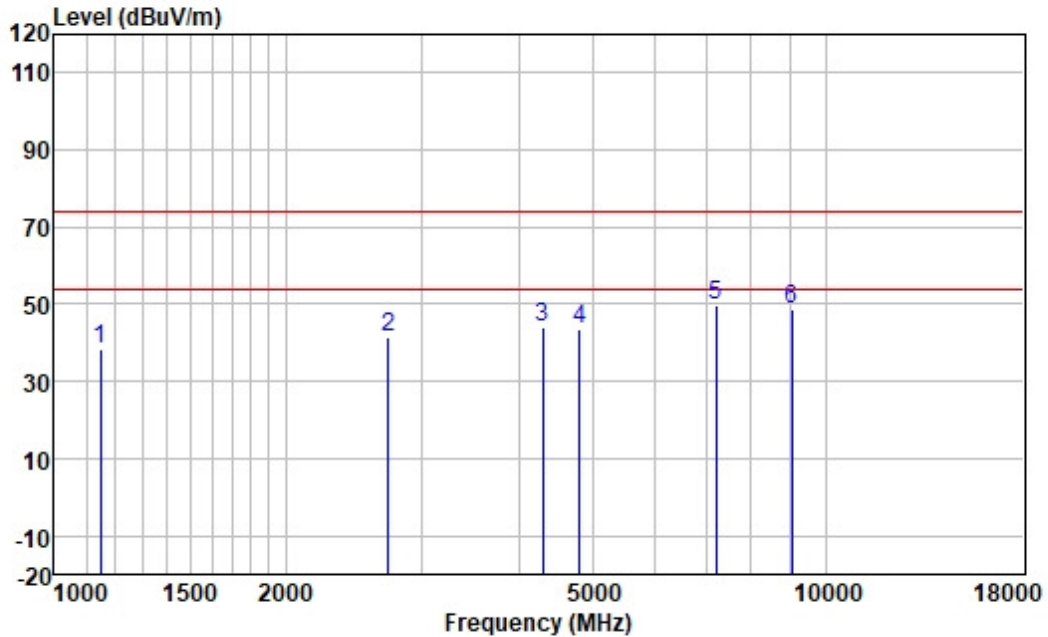


	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1663.137	53.25	24.93	2.81	38.06	42.93	74.00	-31.07	HORIZONTAL peak
2	4456.315	45.18	34.00	4.61	37.45	46.34	74.00	-27.66	HORIZONTAL peak
3	4960.000	44.35	34.15	4.89	37.32	46.07	74.00	-27.93	HORIZONTAL peak
4	6914.763	45.21	34.97	5.84	37.14	48.88	74.00	-25.12	HORIZONTAL peak
5	7440.000	45.29	36.33	6.02	37.18	50.46	74.00	-23.54	HORIZONTAL peak
6	9047.272	45.26	37.67	6.60	37.14	52.39	74.00	-21.61	HORIZONTAL peak





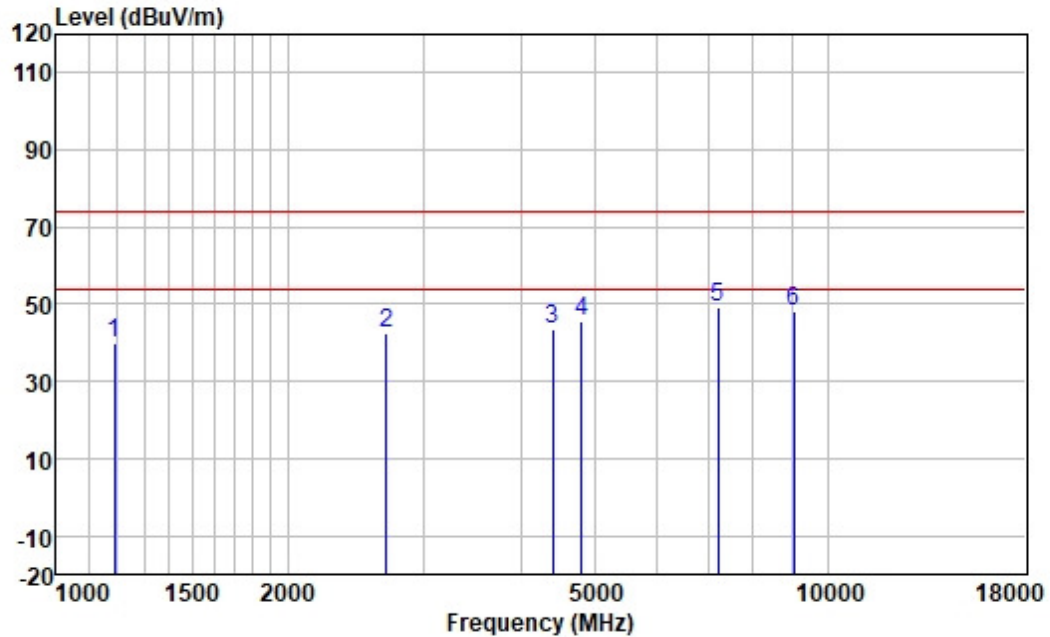
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	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark	
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1148.823	50.06	24.84	2.32	38.71	38.51	74.00	-35.49	VERTICAL	peak
2	2710.622	47.68	28.14	3.62	37.73	41.71	74.00	-32.29	VERTICAL	peak
3	4304.400	46.12	30.62	4.58	37.47	43.85	74.00	-30.15	VERTICAL	peak
4	4804.000	44.58	31.51	4.81	37.38	43.52	74.00	-30.48	VERTICAL	peak
5	7206.000	45.25	35.80	5.93	37.17	49.81	74.00	-24.19	VERTICAL	peak
6	9047.272	41.40	37.68	6.60	37.14	48.54	74.00	-25.46	VERTICAL	peak



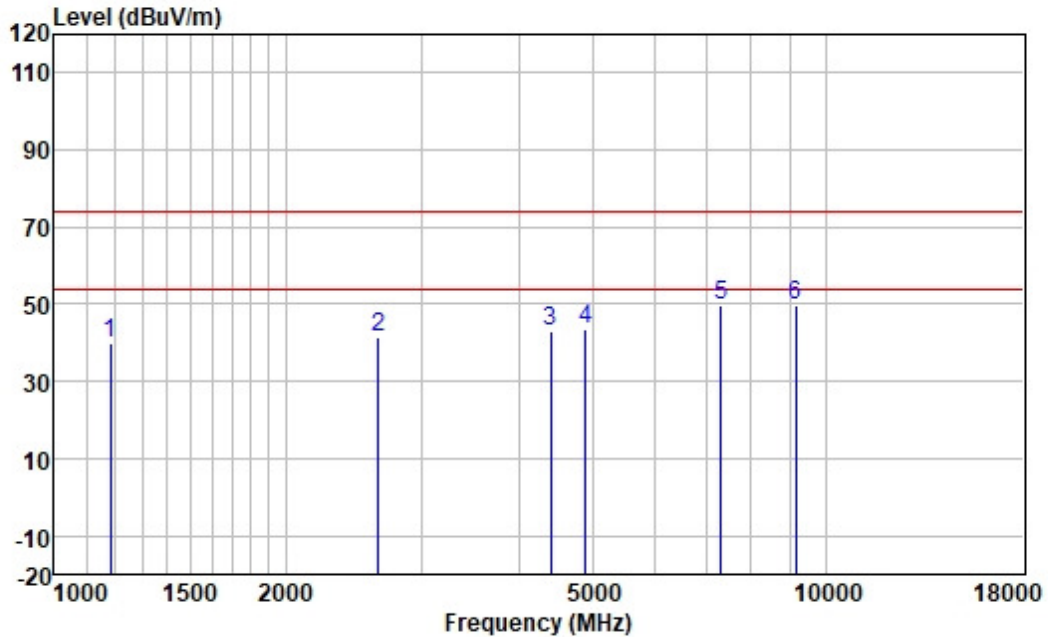
Test Mode: 09; Polarity: Horizontal; Modulation:GFSK; Channel:Low



	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	1189.368	51.01	25.00	2.37	38.68	39.70	74.00	-34.30	HORIZONTAL peak
2	2679.464	48.64	28.06	3.59	37.73	42.56	74.00	-31.44	HORIZONTAL peak
3	4405.090	45.56	30.80	4.61	37.46	43.51	74.00	-30.49	HORIZONTAL peak
4	4804.000	46.67	31.51	4.81	37.38	45.61	74.00	-28.39	HORIZONTAL peak
5	7206.000	44.88	35.80	5.93	37.17	49.44	74.00	-24.56	HORIZONTAL peak
6	9047.272	41.07	37.68	6.60	37.14	48.21	74.00	-25.79	HORIZONTAL peak



Test Mode: 09; Polarity: Vertical; Modulation: GFSK; Channel: middle

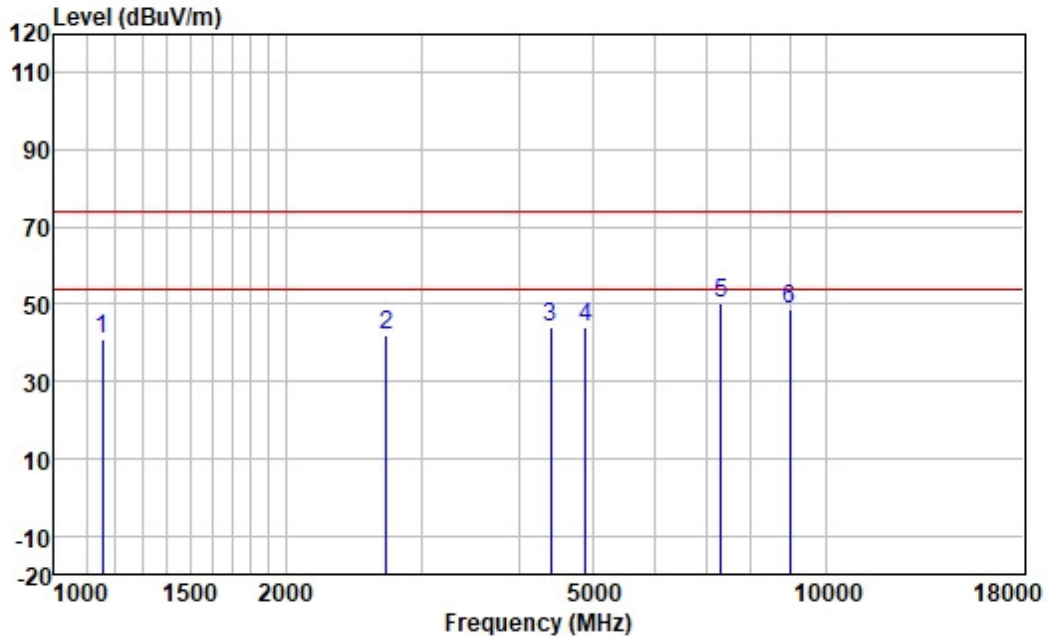


	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
		Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1182.513	51.38	24.97	2.36	38.68	40.03	74.00	-33.97	VERTICAL	peak
2	2633.397	47.50	27.96	3.56	37.74	41.28	74.00	-32.72	VERTICAL	peak
3	4405.090	45.23	30.80	4.61	37.46	43.18	74.00	-30.82	VERTICAL	peak
4	4880.000	44.51	31.63	4.85	37.35	43.64	74.00	-30.36	VERTICAL	peak
5	7320.000	44.84	36.29	5.98	37.18	49.93	74.00	-24.07	VERTICAL	peak
6	9152.479	42.32	37.86	6.68	37.13	49.73	74.00	-24.27	VERTICAL	peak





Test Mode: 09; Polarity: Horizontal; Modulation: GFSK; Channel: middle

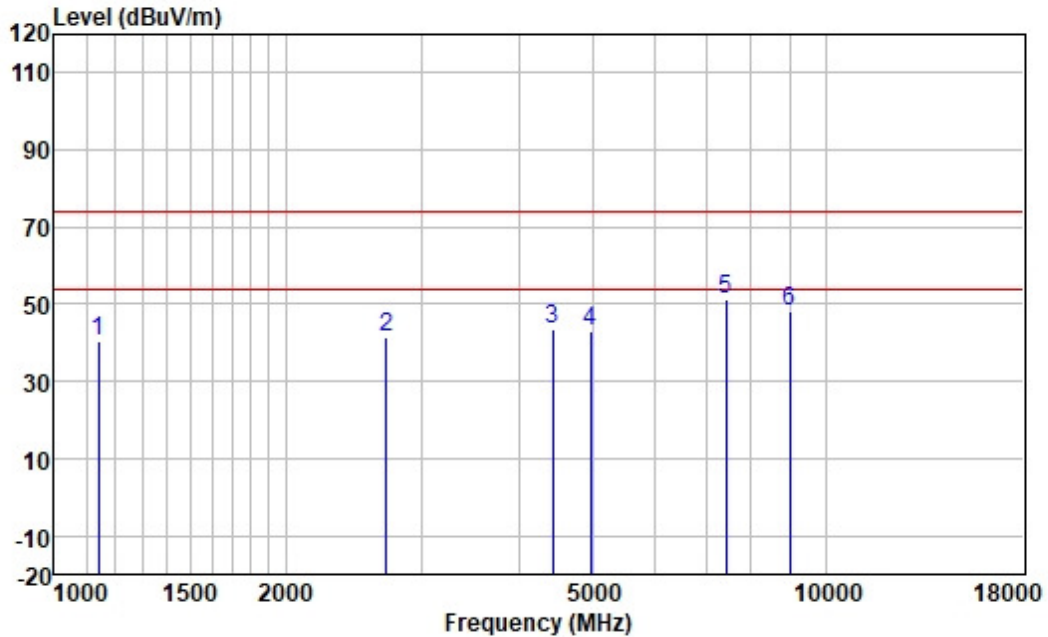


		ReadAntenna		Cable	Preamp		Limit	Over		
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1155.483	52.39	24.86	2.33	38.71	40.87	74.00	-33.13	HORIZONTAL	peak
2	2694.998	48.09	28.10	3.60	37.73	42.06	74.00	-31.94	HORIZONTAL	peak
3	4405.090	45.92	30.80	4.61	37.46	43.87	74.00	-30.13	HORIZONTAL	peak
4	4880.000	45.01	31.63	4.85	37.35	44.14	74.00	-29.86	HORIZONTAL	peak
5	7320.000	45.06	36.29	5.98	37.18	50.15	74.00	-23.85	HORIZONTAL	peak
6	8995.123	41.53	37.60	6.57	37.15	48.55	74.00	-25.45	HORIZONTAL	peak





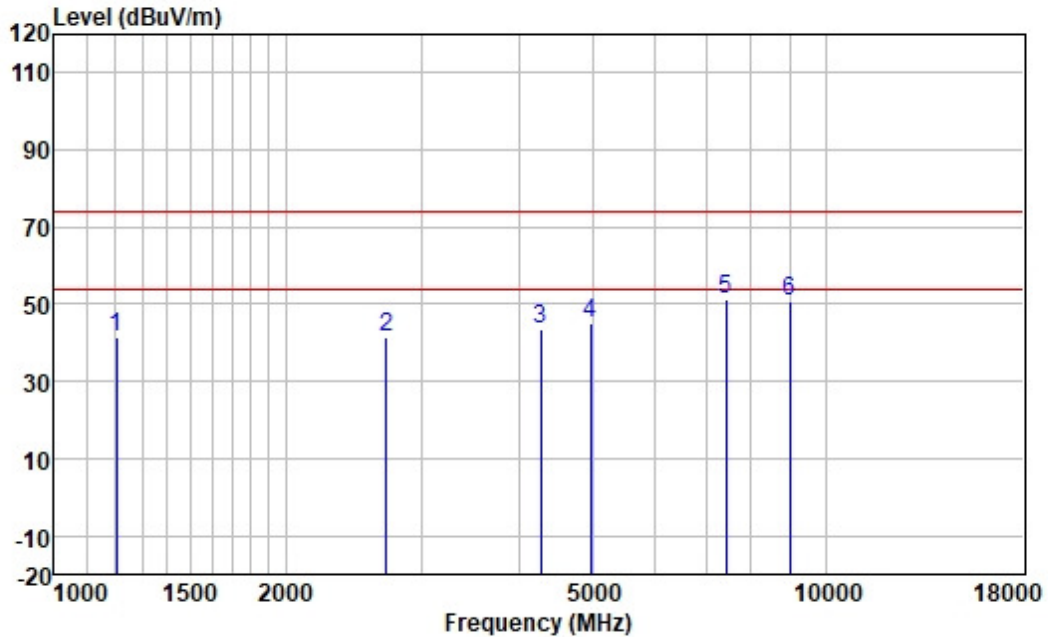
Test Mode: 09; Polarity: Vertical; Modulation:GFSK; Channel:High



	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	1142.201	51.93	24.82	2.31	38.72	40.34	74.00	-33.66	VERTICAL	peak
2	2694.998	47.67	28.10	3.60	37.73	41.64	74.00	-32.36	VERTICAL	peak
3	4430.628	45.37	30.83	4.61	37.45	43.36	74.00	-30.64	VERTICAL	peak
4	4960.000	43.70	31.74	4.89	37.32	43.01	74.00	-30.99	VERTICAL	peak
5	7440.000	46.06	36.57	6.02	37.18	51.47	74.00	-22.53	VERTICAL	peak
6	8995.123	41.05	37.60	6.57	37.15	48.07	74.00	-25.93	VERTICAL	peak



Test Mode: 09; Polarity: Horizontal; Modulation:GFSK; Channel:High



	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	1203.199	52.76	25.07	2.40	38.67	41.56	74.00	-32.44	HORIZONTAL peak
2	2694.998	47.31	28.10	3.60	37.73	41.28	74.00	-32.72	HORIZONTAL peak
3	4279.589	45.88	30.56	4.57	37.47	43.54	74.00	-30.46	HORIZONTAL peak
4	4960.000	45.61	31.74	4.89	37.32	44.92	74.00	-29.08	HORIZONTAL peak
5	7440.000	45.96	36.57	6.02	37.18	51.37	74.00	-22.63	HORIZONTAL peak
6	8995.123	43.56	37.60	6.57	37.15	50.58	74.00	-23.42	HORIZONTAL peak



### 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 $\geq 50$ hopping channels
	0.25 for $25 \leq$ hopping channels $< 50$
	1 for digital modulation
2400-2483.5	1 for $\geq 75$ 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: 22.8 °C

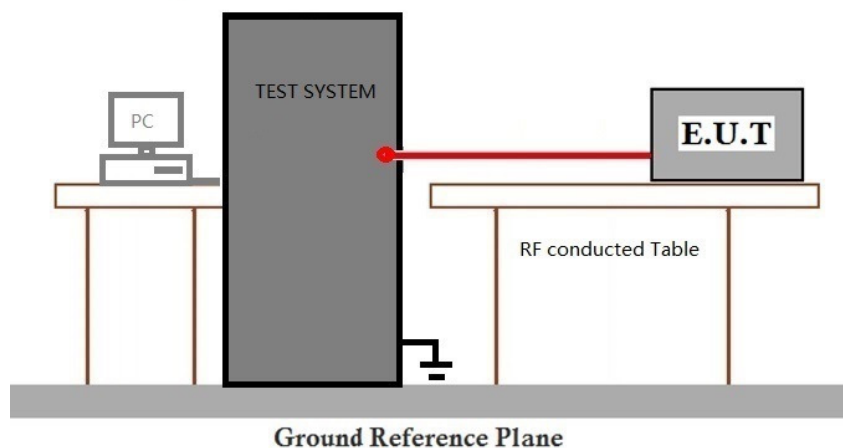
Humidity: 61.1 % RH

Atmospheric Pressure: 1004 mbar

#### 7.5.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	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





### 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

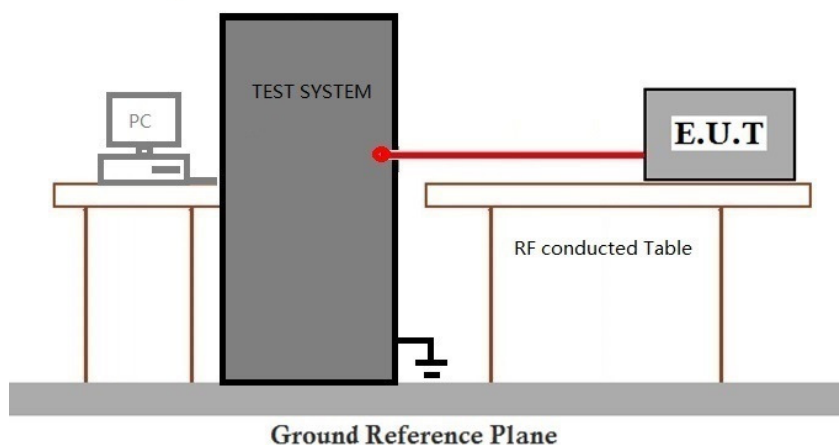
Operating Environment:

Temperature: 22.8 °C Humidity: 61.1 % RH Atmospheric Pressure: 1004 mbar

#### 7.6.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	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: 22.8 °C

Humidity: 61.1 % RH

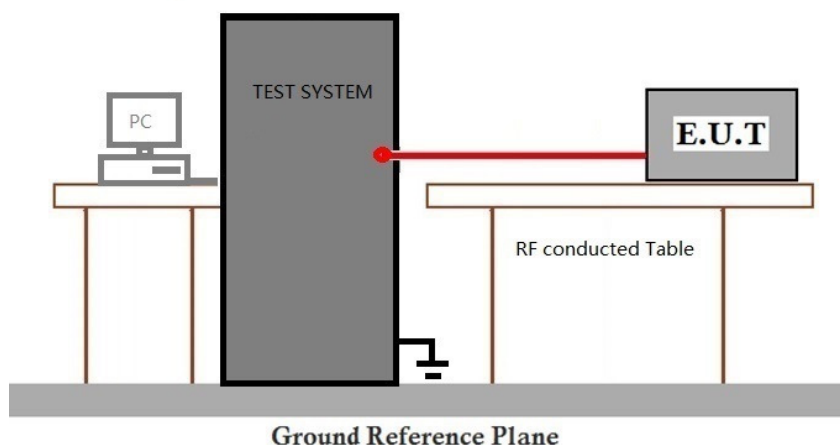
Atmospheric Pressure: 1004 mbar

#### 7.7.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	

Final test	02	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

### 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: 22.8 °C

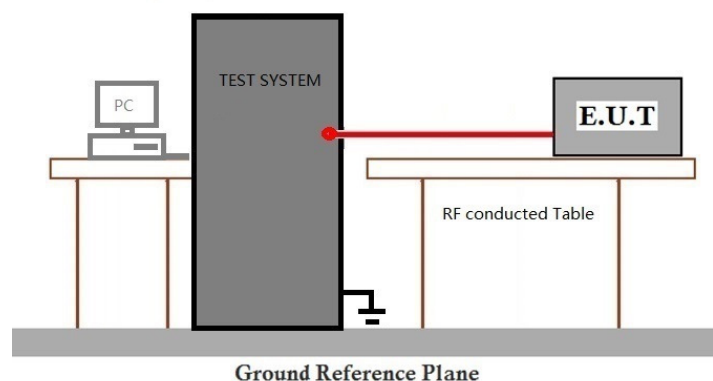
Humidity: 61.1 % RH

Atmospheric Pressure: 1004 mbar

#### 7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	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

### 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: 22.8 °C

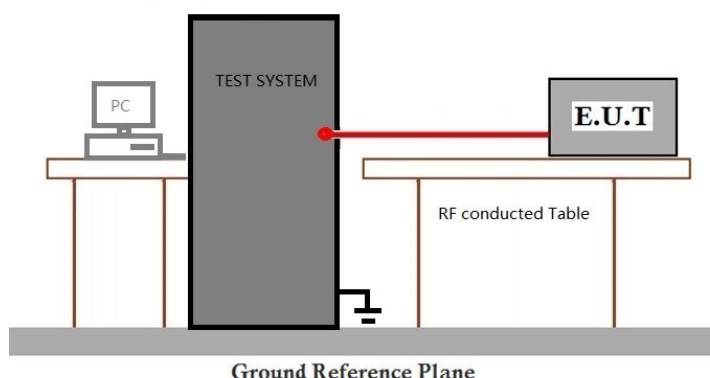
Humidity: 61.1 % RH

Atmospheric Pressure: 1004 mbar

#### 7.9.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	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 GZCR250400057503



## 9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2504000575AT



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## 10 Appendix

### 1. Duty Cycle

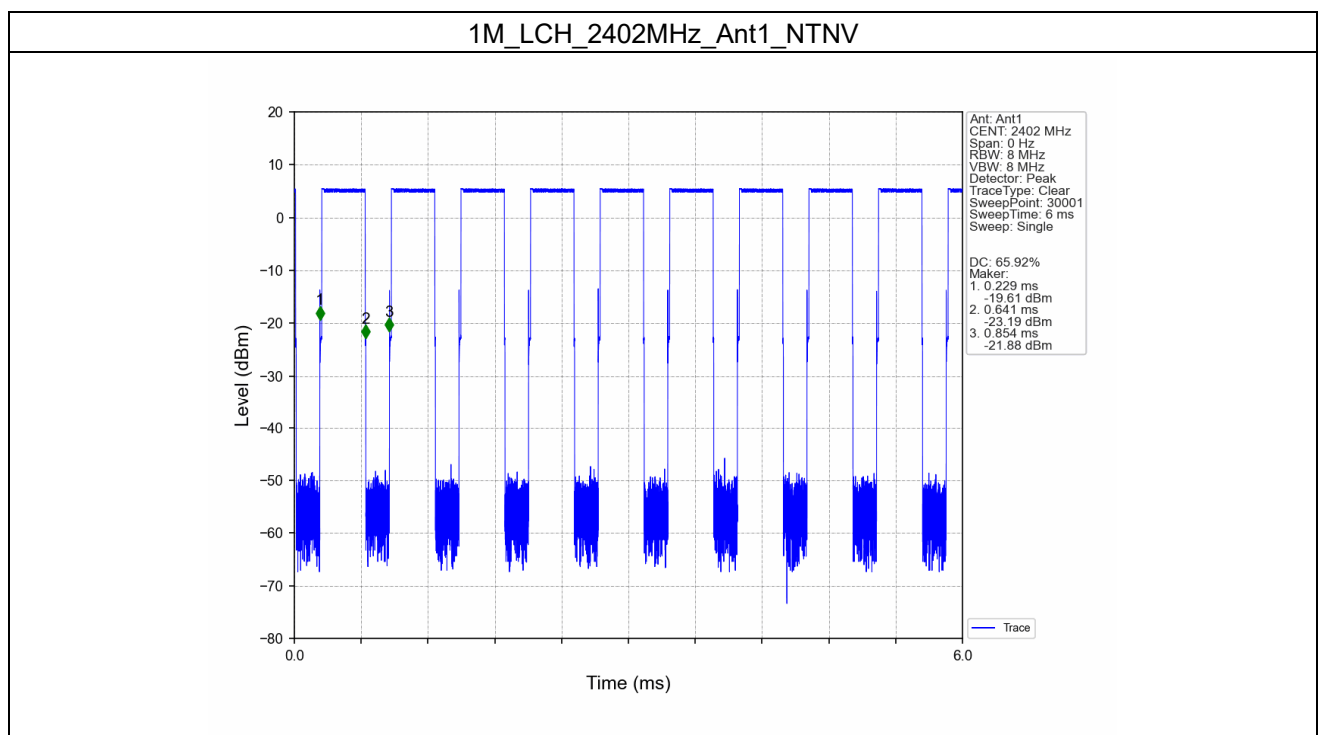
#### 1.1 Test Result

##### 1.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.412	0.625	65.92	1.81	0.03
		2440	0.413	0.625	66.08	1.80	0.02
		2480	0.412	0.625	65.92	1.81	0.03

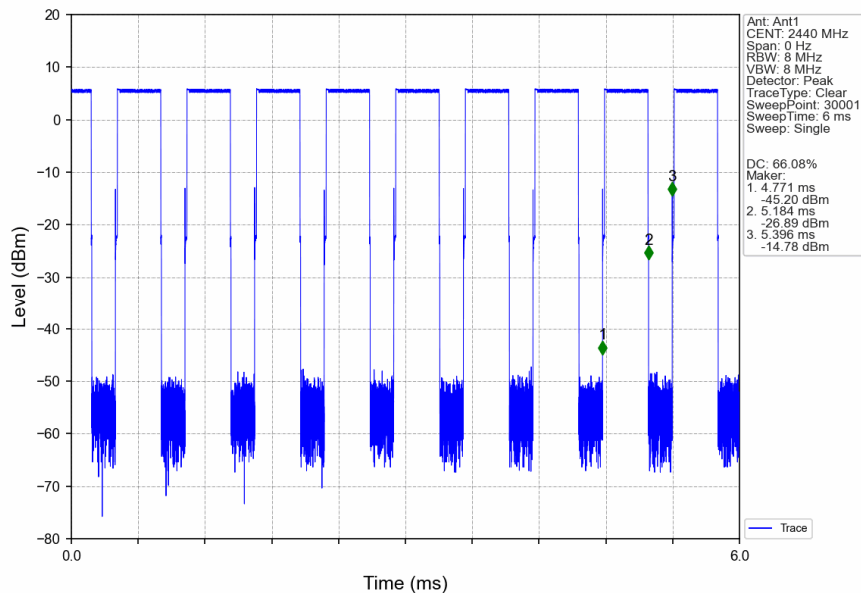
### 1.2 Test Graph

#### 1.2.1 Ant1

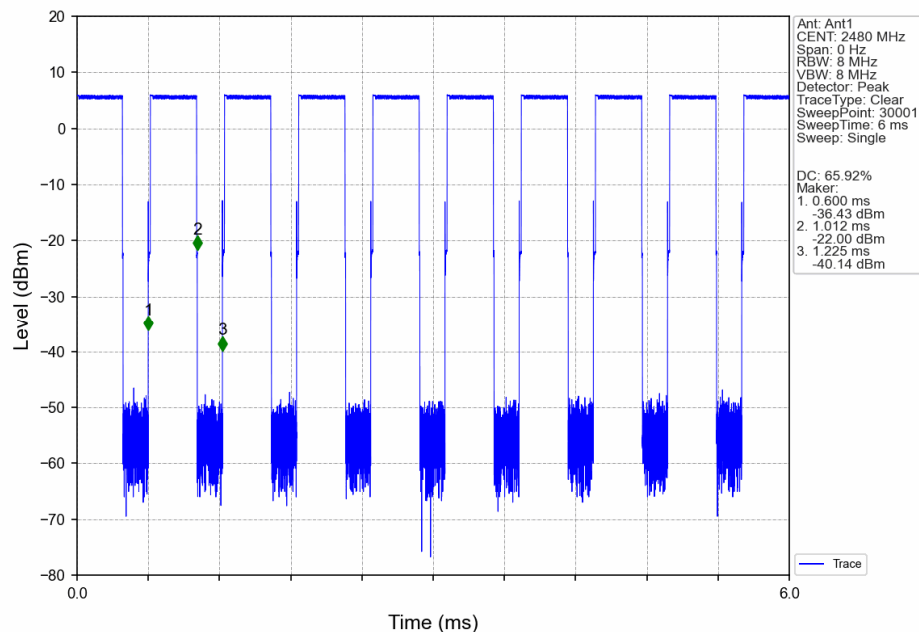




### 1M\_MCH\_2440MHz\_Ant1\_NTNV



### 1M\_HCH\_2480MHz\_Ant1\_NTNV



## 2. Bandwidth

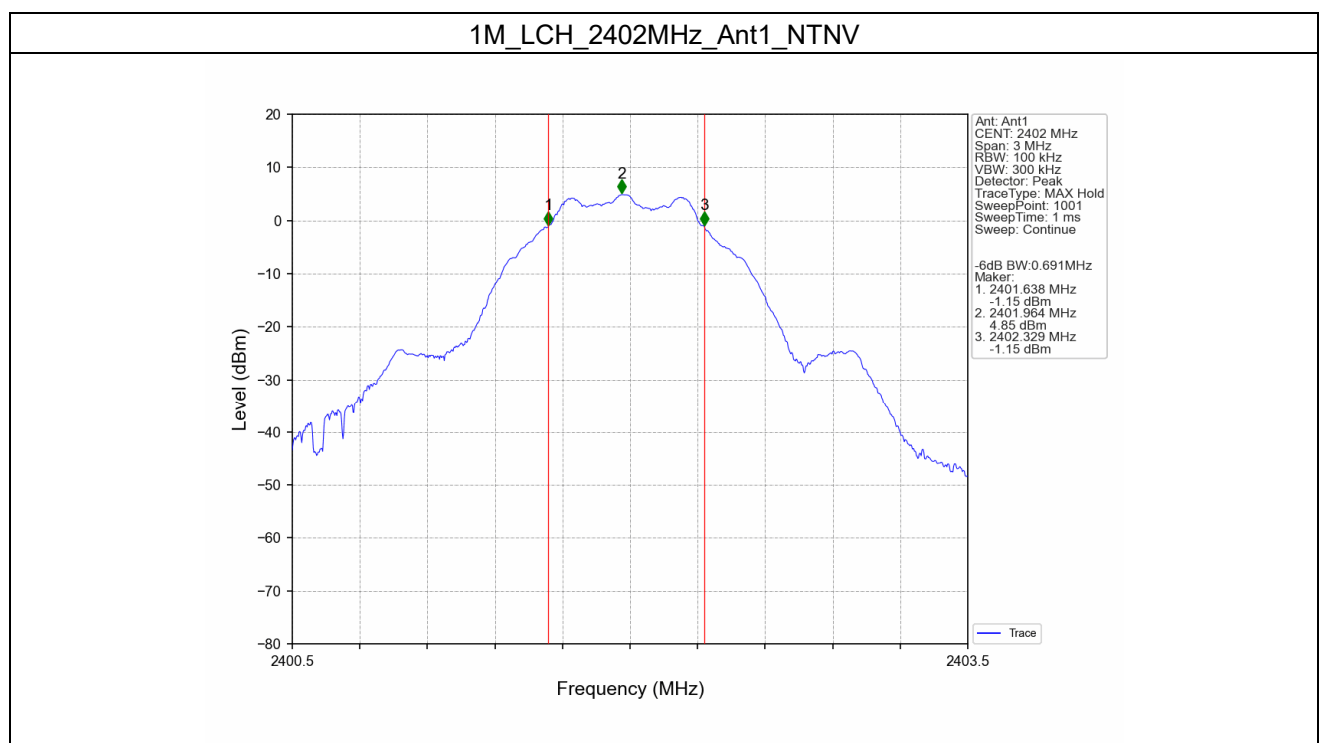
### 2.1 Test Result

#### 2.1.1 6dB BW

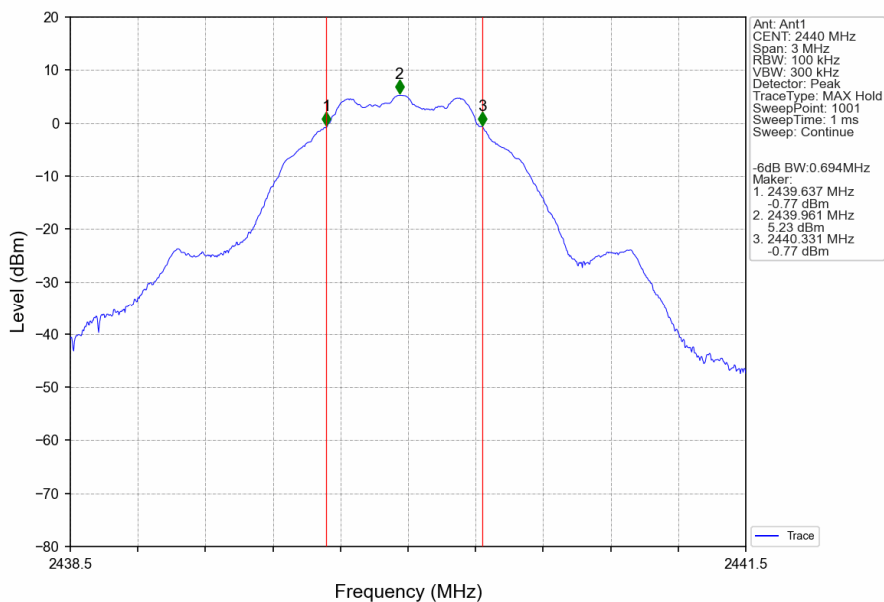
Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.691	$\geq 0.5$	Pass
		2440	1	0.694	$\geq 0.5$	Pass
		2480	1	0.692	$\geq 0.5$	Pass

## 2.2 Test Graph

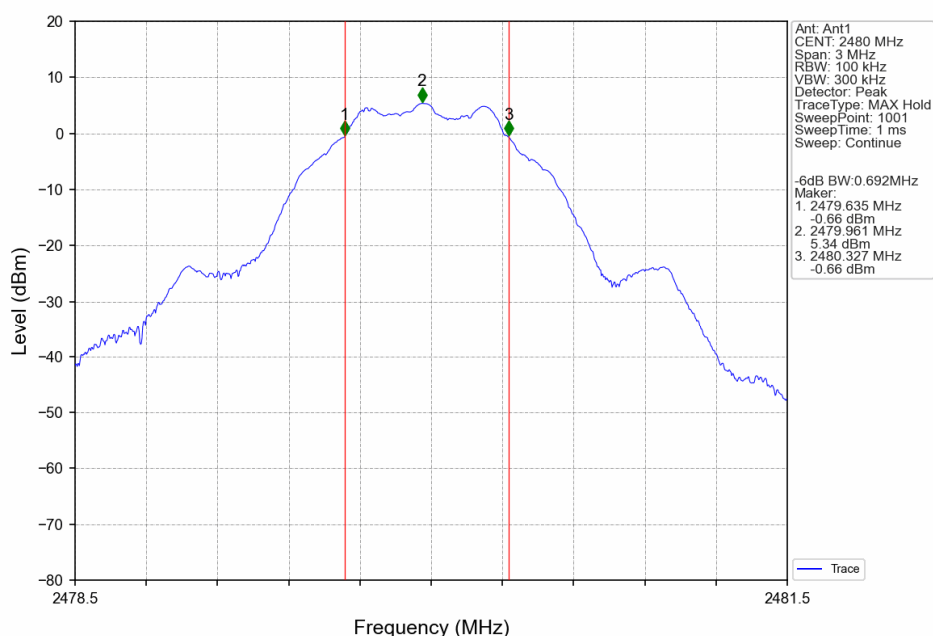
### 2.2.1 6dB BW



### 1M\_MCH\_2440MHz\_Ant1\_NTNV



### 1M\_HCH\_2480MHz\_Ant1\_NTNV



### 3. Maximum Conducted Output Power

#### 3.1 Test Result

##### 3.1.1 Power

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	5.45	<=30	Pass
		2440	5.83	<=30	Pass
		2480	5.96	<=30	Pass



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### 4. Maximum Power Spectral Density

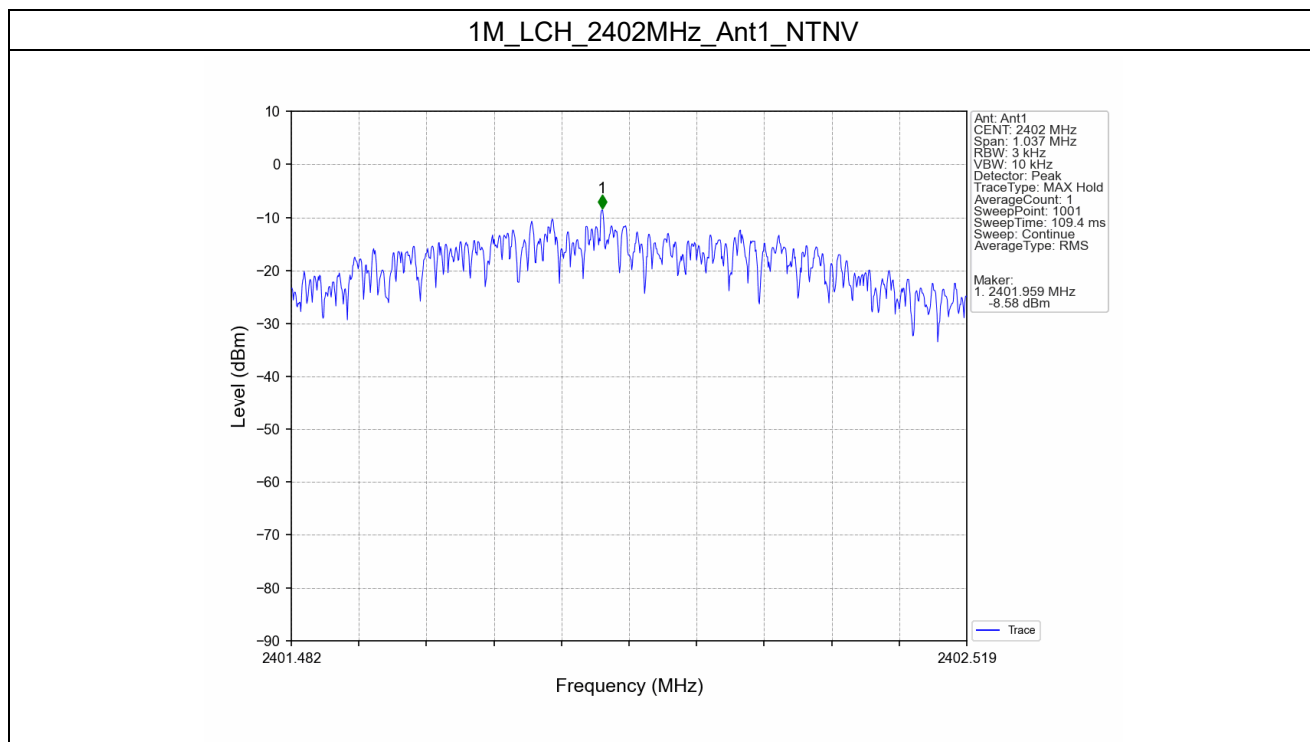
#### 4.1 Test Result

##### 4.1.1 PSD

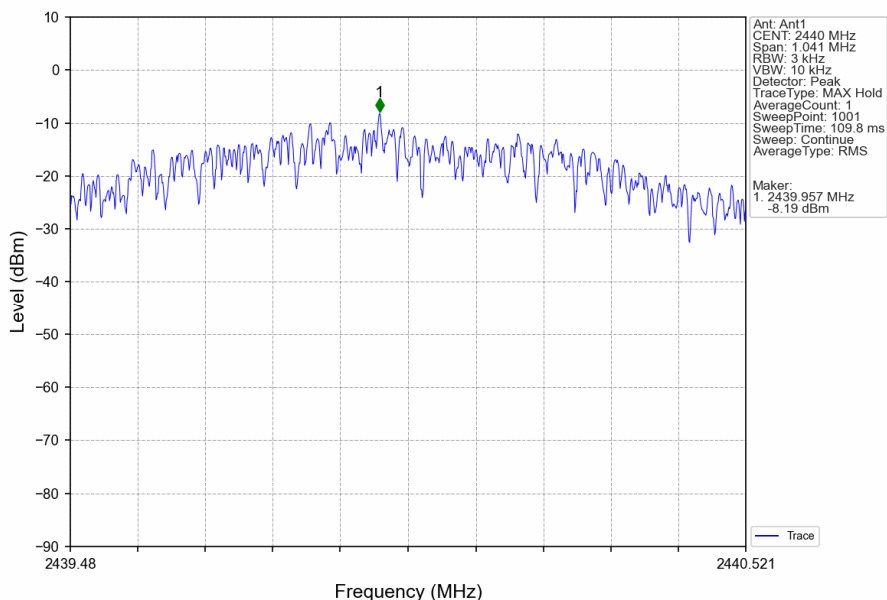
Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-8.58	<=8	Pass
		2440	-8.19	<=8	Pass
		2480	-8.15	<=8	Pass

### 4.2 Test Graph

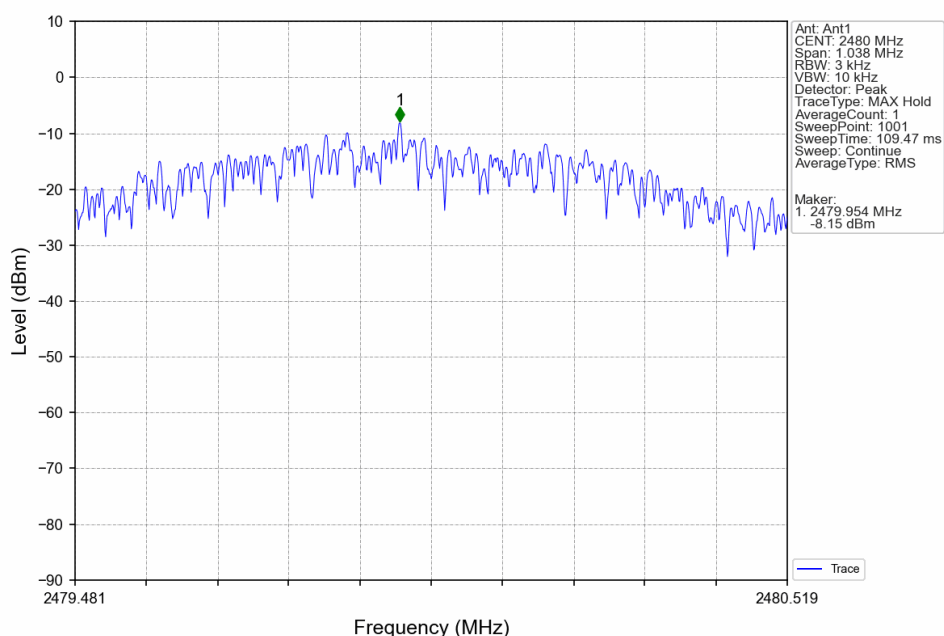
#### 4.2.1 PSD



### 1M\_MCH\_2440MHz\_Ant1\_NTNV



### 1M\_HCH\_2480MHz\_Ant1\_NTNV



## 5. Unwanted Emissions In Non-restricted Frequency Bands

### 5.1 Test Result

#### 5.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	4.79
		2440	1	5.17
		2480	1	5.29

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.

#### 5.1.2 CSE and Band Edges

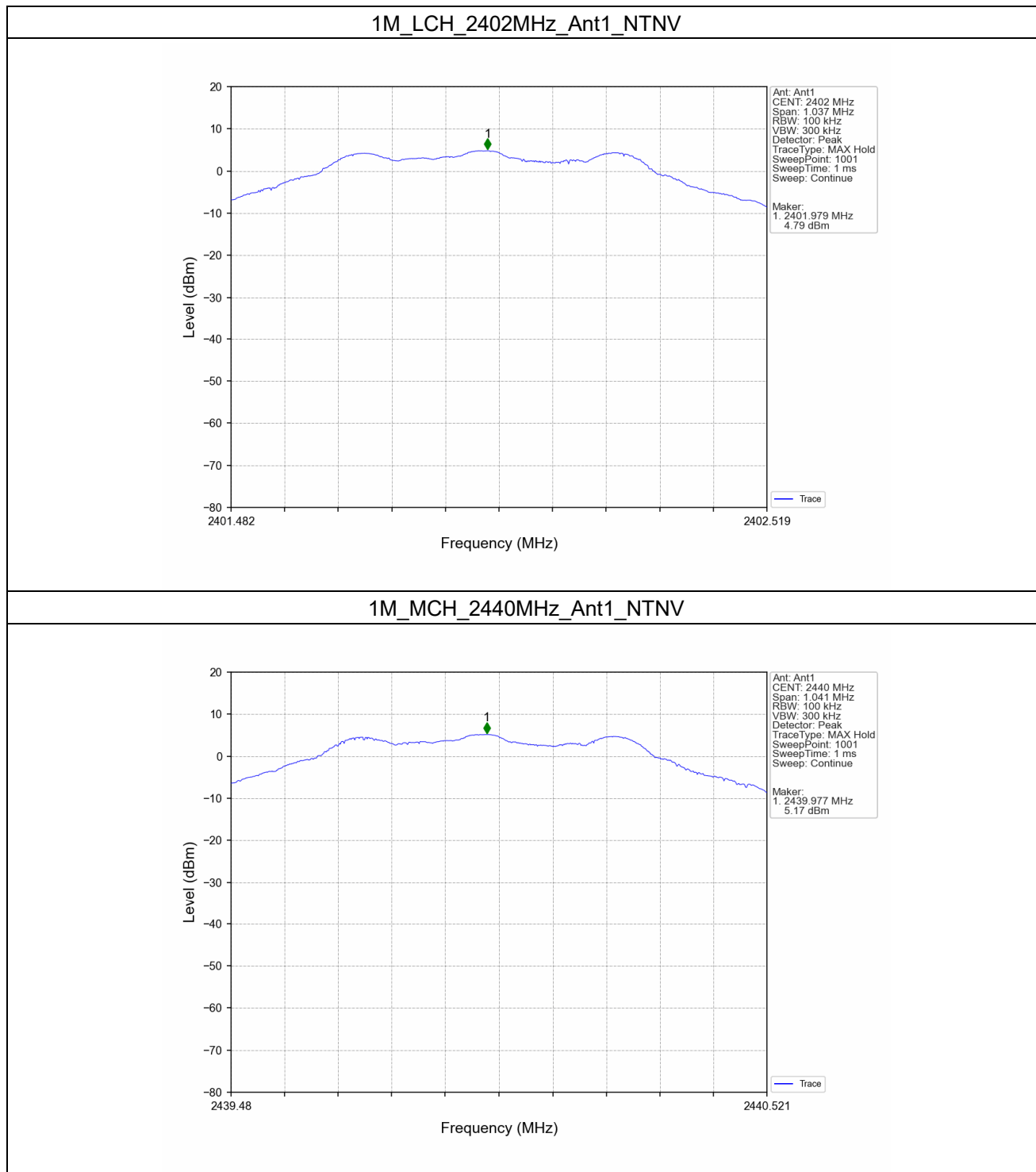
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	5.29	-14.71	Pass
		2440	1	5.29	-14.71	Pass
		2480	1	5.29	-14.71	Pass

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.



### 5.2 Test Graph

#### 5.2.1 Ref



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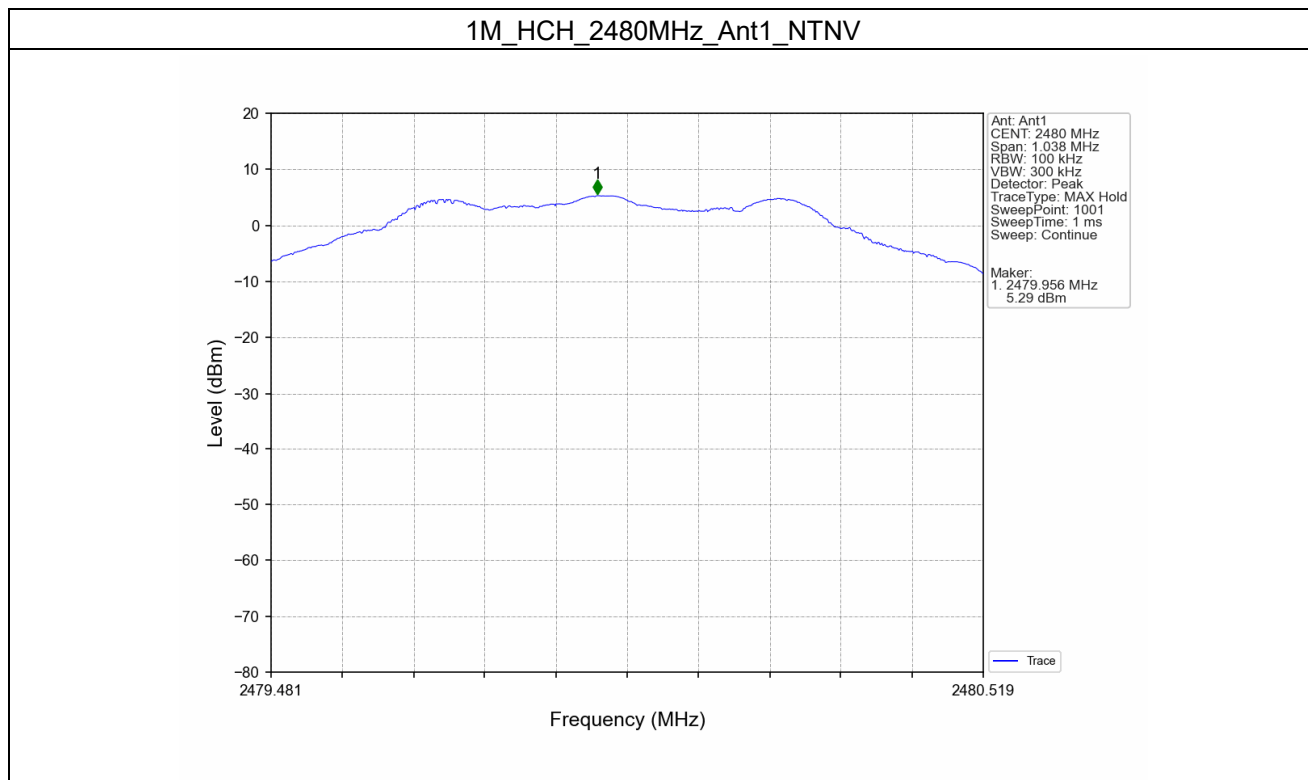
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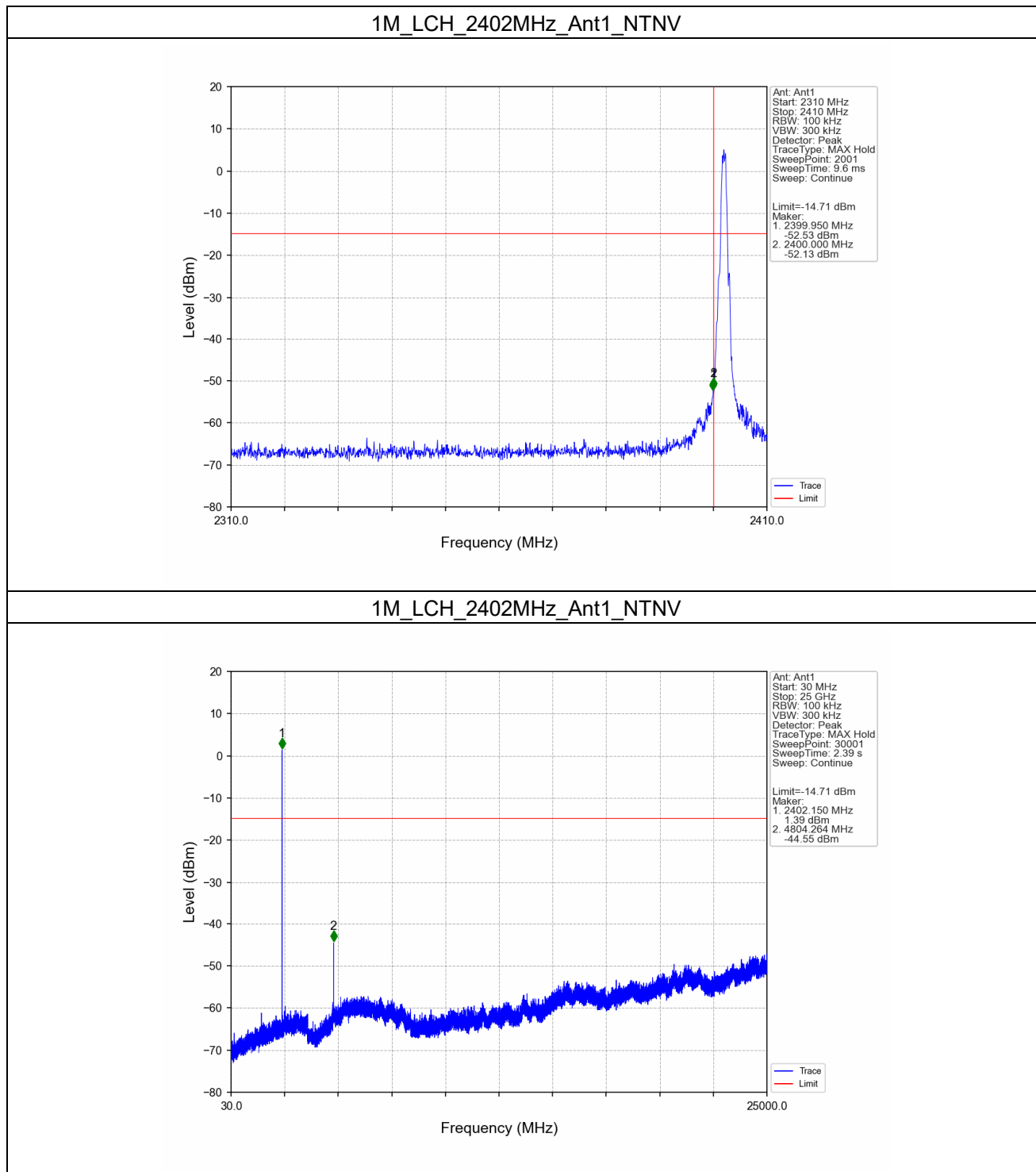
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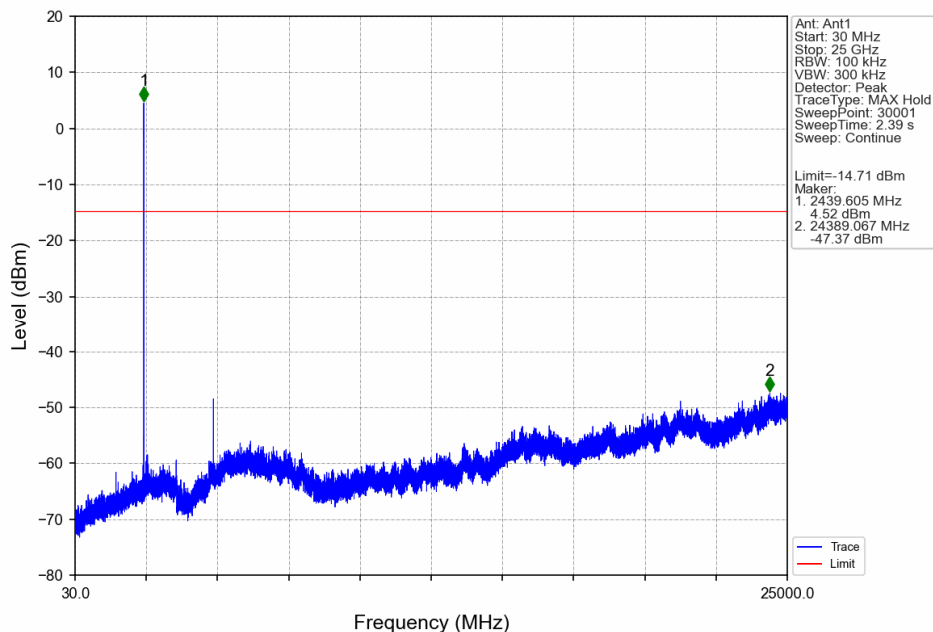




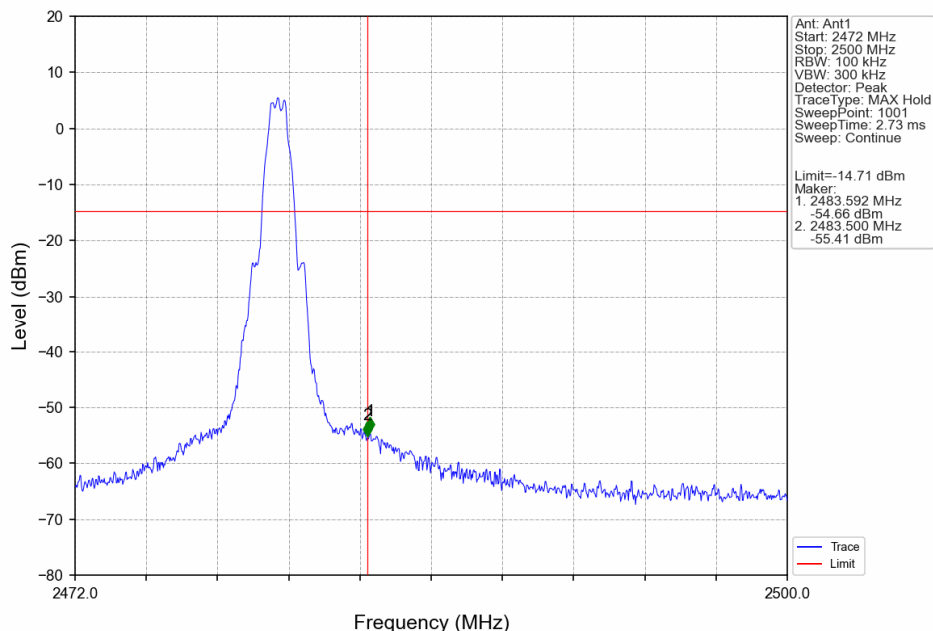
### 5.2.2 CSE and Band Edges

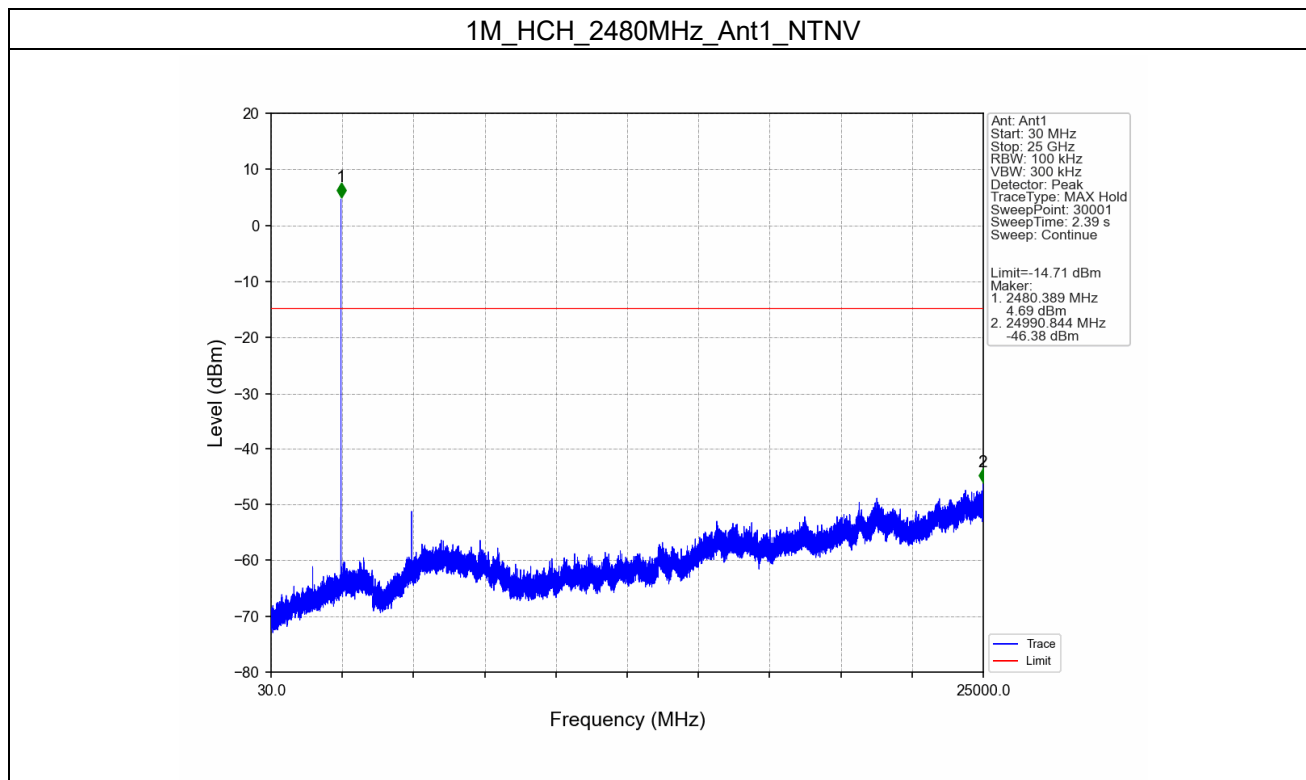


### 1M\_MCH\_2440MHz\_Ant1\_NTNV



### 1M\_HCH\_2480MHz\_Ant1\_NTNV





- End of the Report -



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