

# Appendix

## Data for GZCR2107020703HS



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## 3 Radio Spectrum Technical Requirement

### 3.1 Antenna Requirement

#### 3.1.1 Test Requirement:

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

#### 3.1.2 Conclusion

Standard Requirement: Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer. 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 XX dBi. Please refer to internal photos.



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# 4 Radio Spectrum Matter Test Results

## 4.1 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		

### 4.1.1 E.U.T. Operation

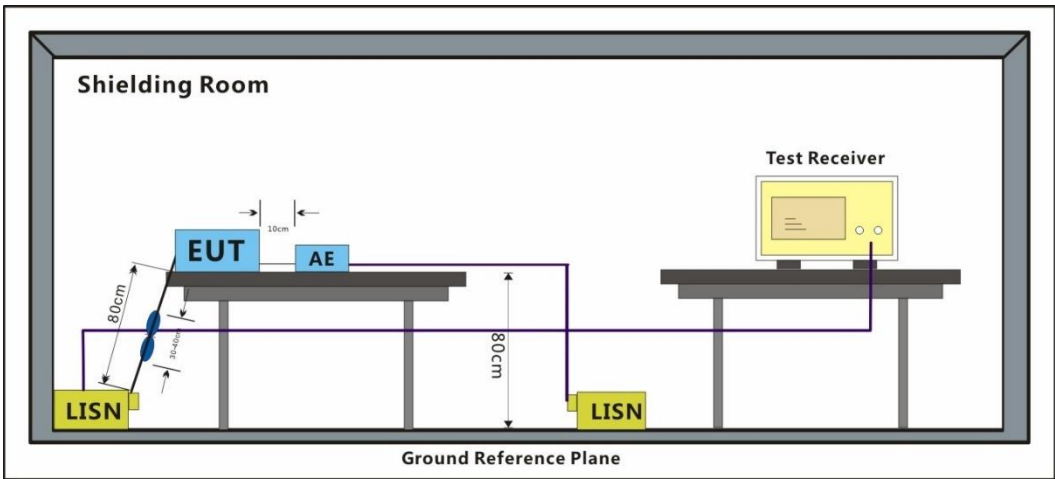
Operating Environment:

Temperature: 26.1 °C Humidity: 52 % RH Atmospheric Pressure: 1008 mbar

### 4.1.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 03	Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

### 4.1.3 Test Setup Diagram





#### 4.1.4 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.

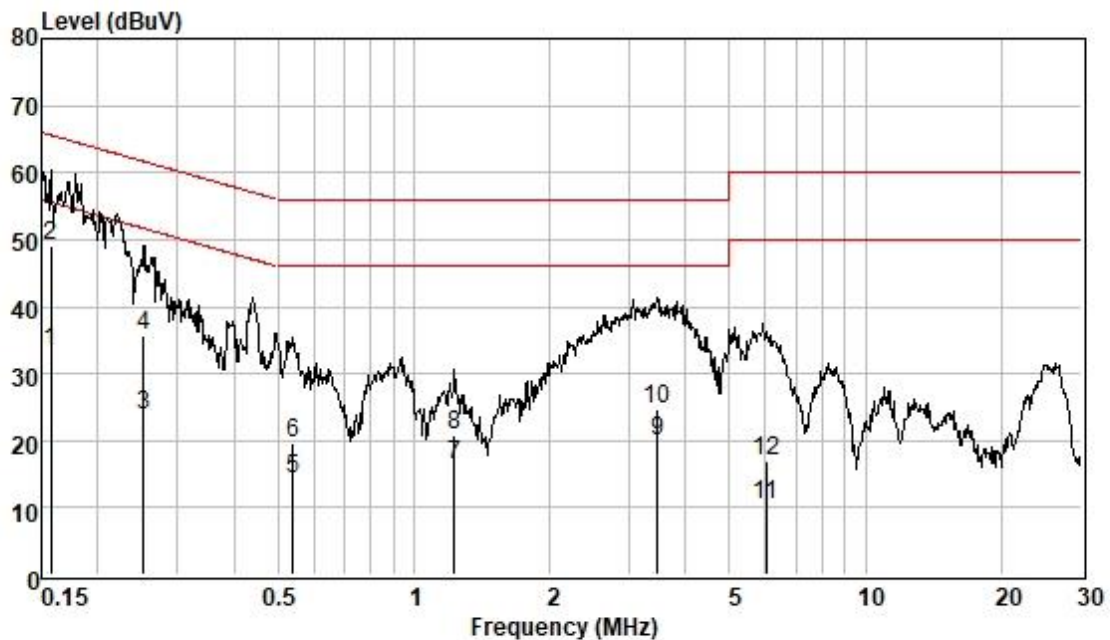
Remark: Measured Level=Read Level+ Cable Loss+ LISN Factor



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Pol :LINE  
Mode :5514  
Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.16	23.49	0.06	9.62	33.17	55.60	-22.43	Average
0.16	39.41	0.06	9.62	49.09	65.60	-16.51	QP
0.25	14.06	0.06	9.62	23.74	51.69	-27.95	Average
0.25	26.06	0.06	9.62	35.74	61.69	-25.95	QP
0.54	4.44	0.07	9.63	14.14	46.00	-31.86	Average
0.54	10.07	0.07	9.63	19.77	56.00	-36.23	QP
1.23	6.57	0.08	9.61	16.26	46.00	-29.74	Average
1.23	11.10	0.08	9.61	20.79	56.00	-35.21	QP
3.45	10.19	0.16	9.62	19.97	46.00	-26.03	Average
3.45	15.03	0.16	9.62	24.81	56.00	-31.19	QP
6.02	0.64	0.20	9.67	10.51	50.00	-39.49	Average
6.02	7.01	0.20	9.67	16.88	60.00	-43.12	QP



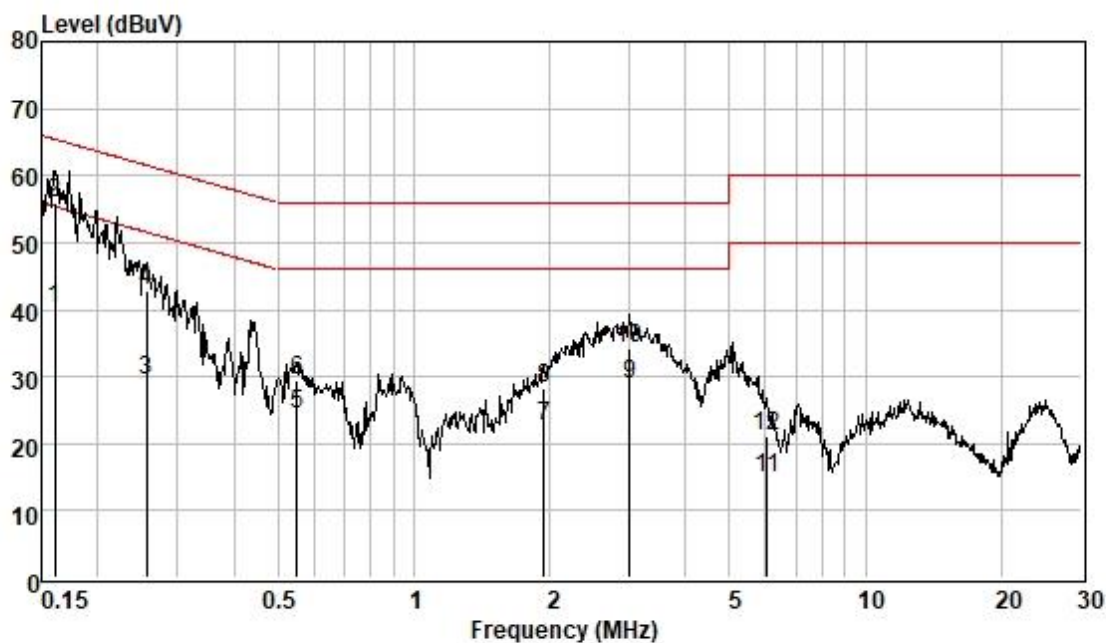
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Test Mode: 03; Line: Live line



```
Pol      : LINE
Mode     : 5512
Model    :
```

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.16	30.58	0.06	9.62	40.26	55.43	-15.17	Average
0.16	46.16	0.06	9.62	55.84	65.43	-9.59	QP
0.26	19.69	0.06	9.62	29.37	51.56	-22.19	Average
0.26	33.19	0.06	9.62	42.87	61.56	-18.69	QP
0.55	14.71	0.07	9.63	24.41	46.00	-21.59	Average
0.55	19.65	0.07	9.63	29.35	56.00	-26.65	QP
1.94	12.95	0.12	9.62	22.69	46.00	-23.31	Average
1.94	18.42	0.12	9.62	28.16	56.00	-27.84	QP
3.01	19.22	0.15	9.62	28.99	46.00	-17.01	Average
3.01	24.33	0.15	9.62	34.10	56.00	-21.90	QP
6.06	4.94	0.20	9.67	14.81	50.00	-35.19	Average
6.06	11.22	0.20	9.67	21.09	60.00	-38.91	QP

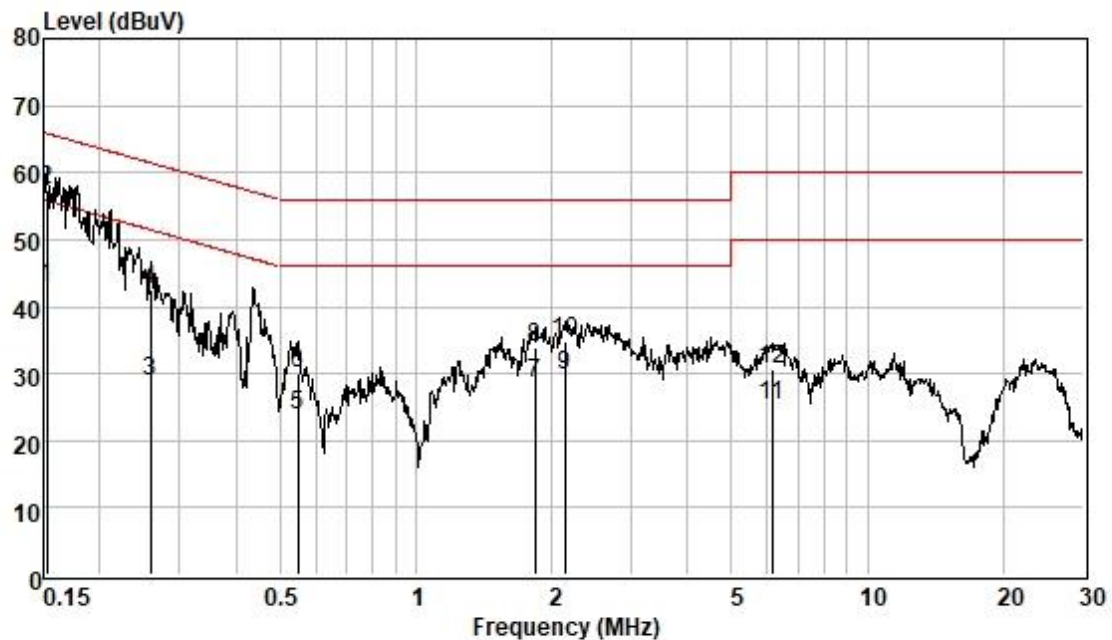


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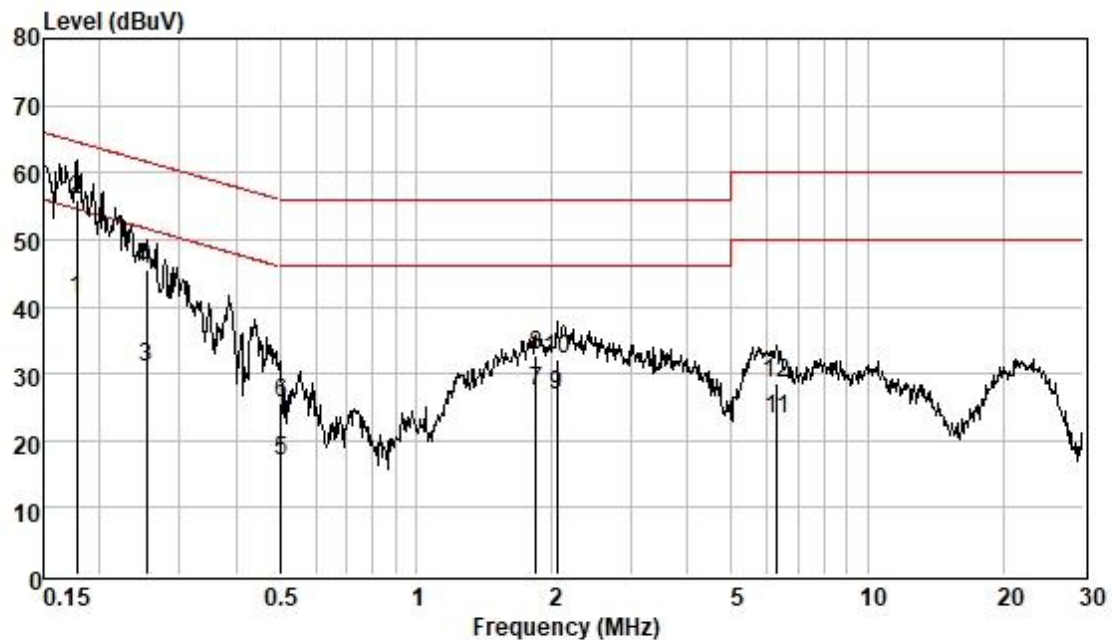
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Pol : NEUTRAL  
 Mode : 5514  
 Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.15	33.09	0.06	9.55	42.70	55.87	-13.17	Average
0.15	47.88	0.06	9.55	57.49	65.87	-8.38	QP
0.26	19.17	0.06	9.55	28.78	51.47	-22.69	Average
0.26	32.95	0.06	9.55	42.56	61.47	-18.91	QP
0.55	14.31	0.07	9.54	23.92	46.00	-22.08	Average
0.55	20.34	0.07	9.54	29.95	56.00	-26.05	QP
1.84	18.84	0.11	9.54	28.49	46.00	-17.51	Average
1.84	24.22	0.11	9.54	33.87	56.00	-22.13	QP
2.13	19.95	0.12	9.54	29.61	46.00	-16.39	Average
2.13	25.05	0.12	9.54	34.71	56.00	-21.29	QP
6.15	15.65	0.20	9.57	25.42	50.00	-24.58	Average
6.15	20.77	0.20	9.57	30.54	60.00	-29.46	QP



Pol : NEUTRAL  
 Mode : 5512  
 Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.18	31.30	0.06	9.55	40.91	54.59	-13.68	Average
0.18	46.19	0.06	9.55	55.80	64.59	-8.79	QP
0.25	21.38	0.06	9.55	30.99	51.64	-20.65	Average
0.25	36.03	0.06	9.55	45.64	61.64	-16.00	QP
0.50	7.43	0.07	9.55	17.05	46.00	-28.95	Average
0.50	15.96	0.07	9.55	25.58	56.00	-30.42	QP
1.85	17.75	0.11	9.54	27.40	46.00	-18.60	Average
1.85	23.02	0.11	9.54	32.67	56.00	-23.33	QP
2.05	17.18	0.12	9.54	26.84	46.00	-19.16	Average
2.05	22.44	0.12	9.54	32.10	56.00	-23.90	QP
6.29	13.46	0.20	9.57	23.23	50.00	-26.77	Average
6.29	18.70	0.20	9.57	28.47	60.00	-31.53	QP

4.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)  
Test Method: ANSI C63.10 (2013) Section 11.9.1.3  
Limit:

Frequency range (MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ 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

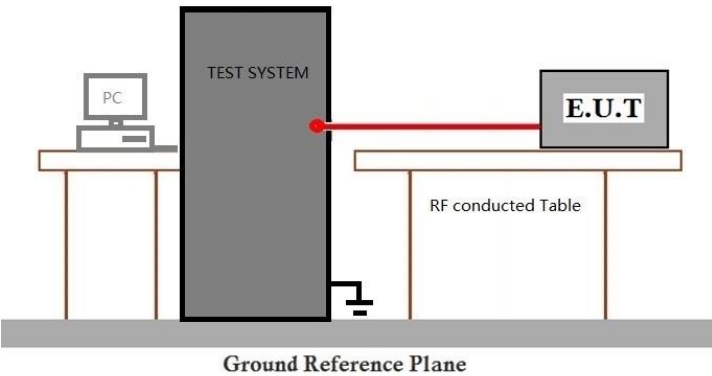
4.2.1 E.U.T. Operation

Operating Environment:  
Temperature: 24.3 °C Humidity: 61.0 % RH Atmospheric Pressure: 1008 mbar

4.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

4.2.3 Test Setup Diagram



4.2.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

4.3 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

4.3.1 E.U.T. Operation

Operating Environment:  
Temperature: 24.3 °C Humidity: 61.0 % RH Atmospheric Pressure: 1008 mbar

4.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

4.3.3 Test Setup Diagram

4.3.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details



4.4 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

4.4.1 E.U.T. Operation

Operating Environment:  
Temperature: 24.3 °C Humidity: 61.0 % RH Atmospheric Pressure: 1008 mbar

4.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

4.4.3 Test Setup Diagram

4.4.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

## 4.5 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)).

### 4.5.1 E.U.T. Operation

Operating Environment:

Temperature: 24.3 °C Humidity: 61.0 % RH Atmospheric Pressure: 1008 mbar

### 4.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 4.5.3 Test Setup Diagram

### 4.5.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details



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## 4.6 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)).

### 4.6.1 E.U.T. Operation

Operating Environment:

Temperature: 24.3 °C Humidity: 61.0 % RH Atmospheric Pressure: 1008 mbar

### 4.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 4.6.3 Test Setup Diagram

### 4.6.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details



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#### 4.7 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 6.10.5

Limit:

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.

##### 4.7.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

Humidity: 55 % RH

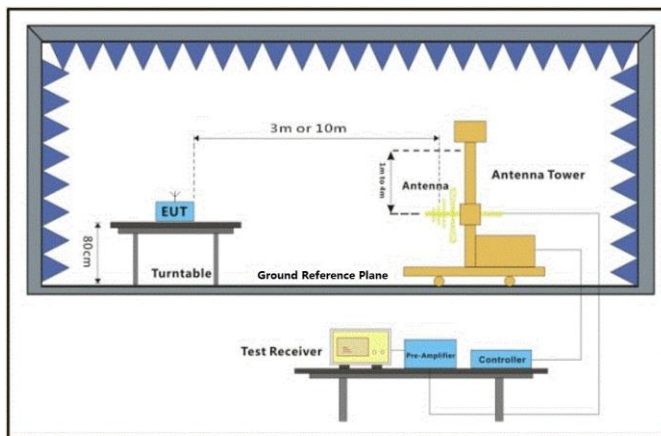
Atmospheric Pressure: 1008 mbar

##### 4.7.2 Test Mode Description

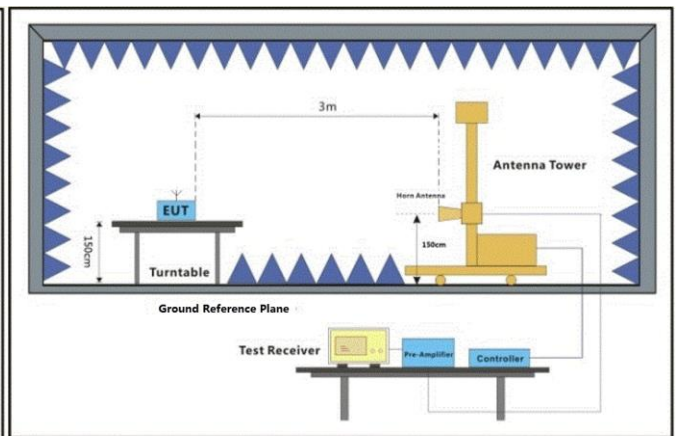
Pre-scan / Final test	Mode Code	Description
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Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.
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##### 4.7.3 Test Setup Diagram



30MHz-1GHz



Above 1GHz



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#### 4.7.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 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.

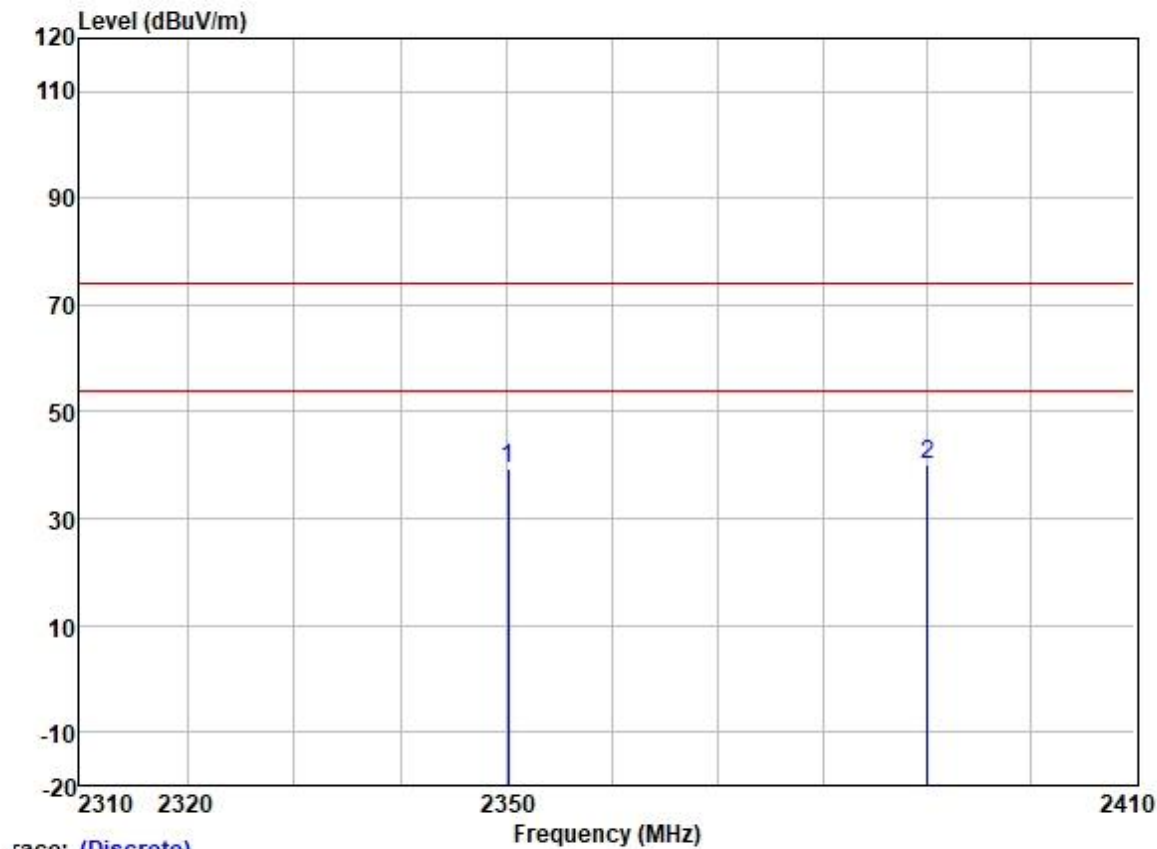
The red line show in graphic is the limit in standard used in this section.



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	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2350.090	46.22	27.25	3.40	37.61	39.26	74.00	-34.74	VERTICAL Peak
2	2390.000	46.95	27.33	3.48	37.59	40.17	74.00	-33.83	VERTICAL Peak

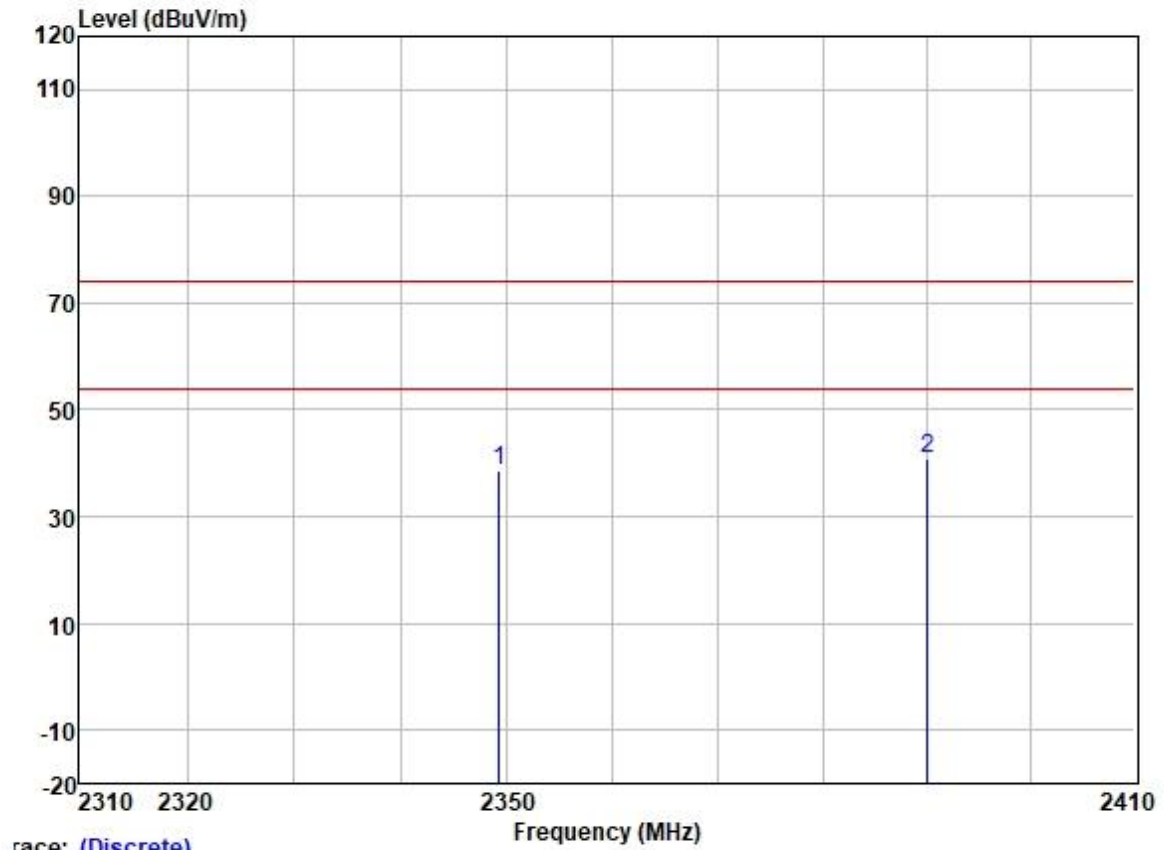


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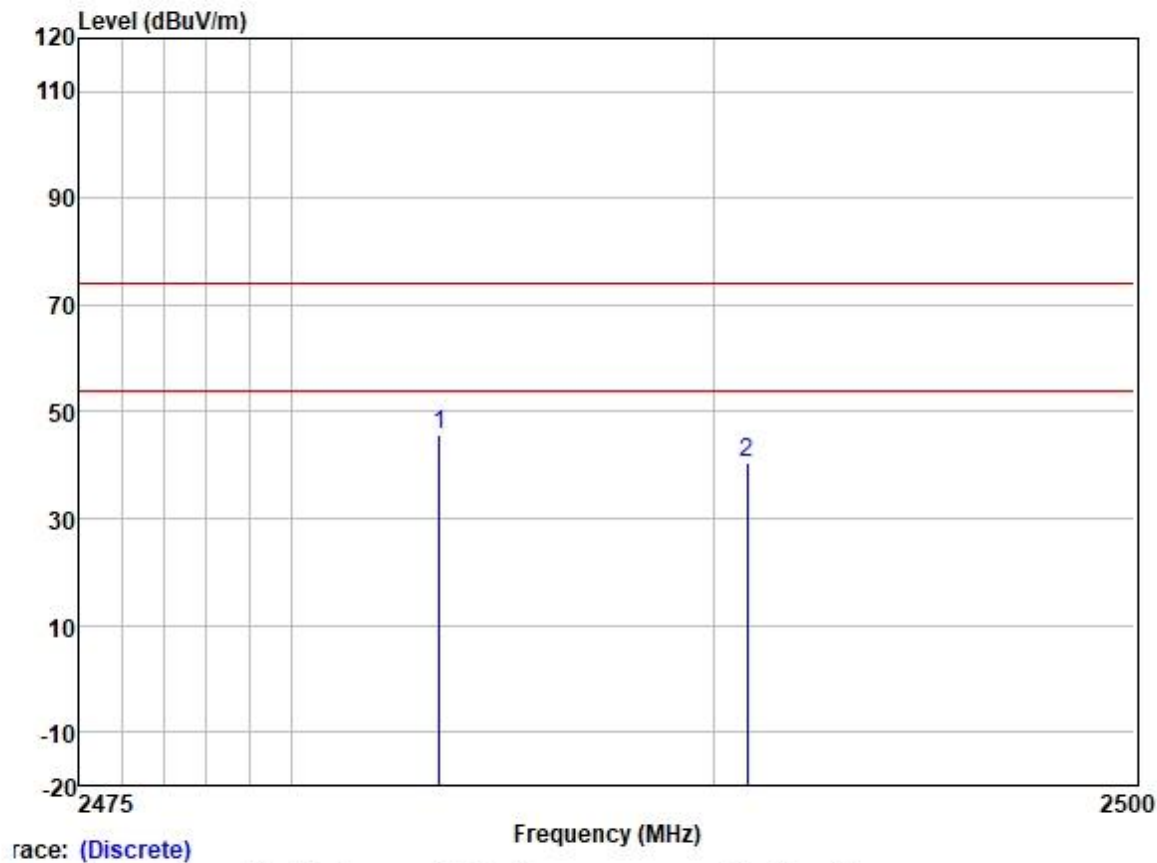
	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2349.293	45.66	27.25	3.40	37.61	38.70	74.00	-35.30	HORIZONTAL Peak
2	2390.000	47.54	27.33	3.48	37.59	40.76	74.00	-33.24	HORIZONTAL Peak



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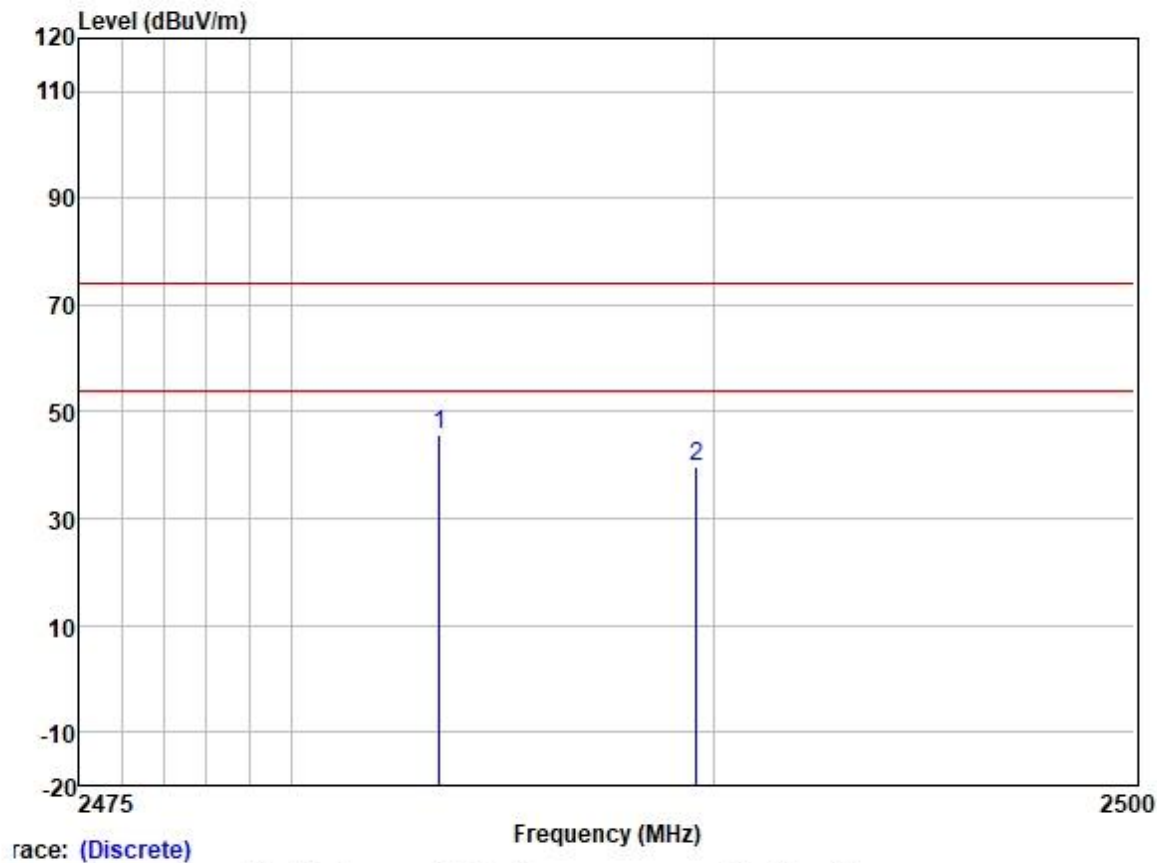
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	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2483.500	52.14	27.48	3.53	37.57	45.58	74.00	-28.42	VERTICAL	Peak
2	2490.796	46.92	27.49	3.47	37.56	40.32	74.00	-33.68	VERTICAL	Peak





	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	2483.500	52.14	27.48	3.53	37.57	45.58	74.00	-28.42	HORIZONTAL
2	2489.570	46.45	27.49	3.47	37.56	39.85	74.00	-34.15	HORIZONTAL

4.8 Radiated Spurious Emissions (Below 1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209  
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6  
Limit:

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.

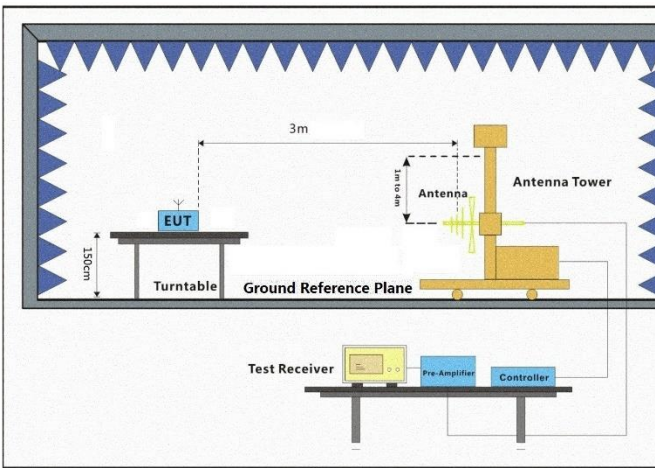
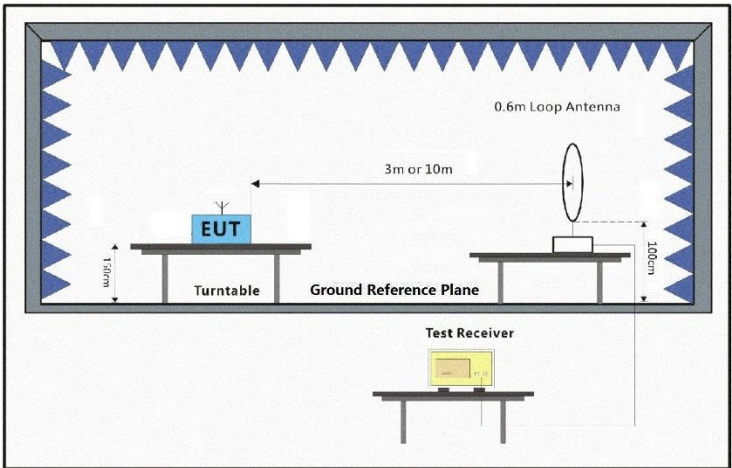
4.8.1 E.U.T. Operation

Operating Environment:  
Temperature: 22.3 °C Humidity: 52.1 % RH Atmospheric Pressure: 1008 mbar

4.8.2 Test Mode Description

Pre-scan / Mode	Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

4.8.3 Test Setup Diagram



#### 4.8.4 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 peak, quasi-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) Through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

3) Scan from 9kHz to 1 GHz, 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.

The red line show in graphic is the limit in standard used in this section.

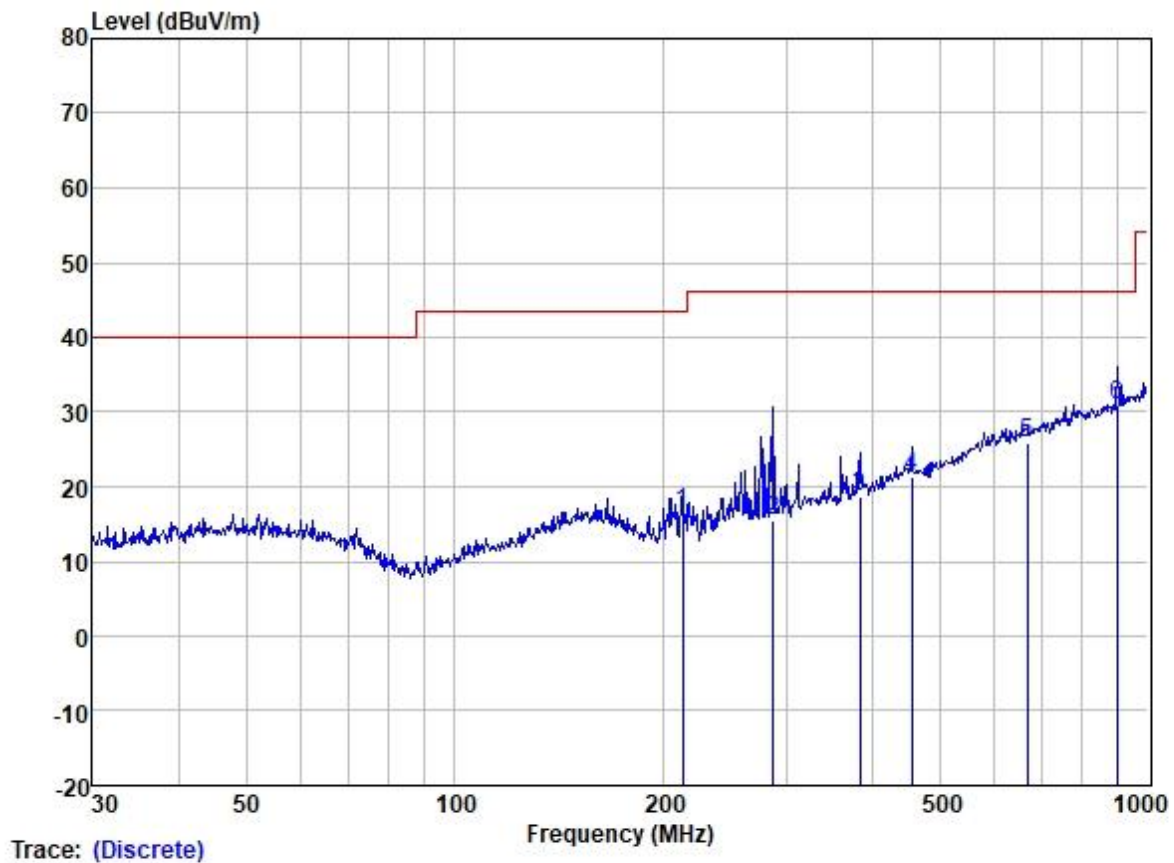


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Site : SGS  
 Job :  
 Model : 5514  
 Power :  
 Test Mode :

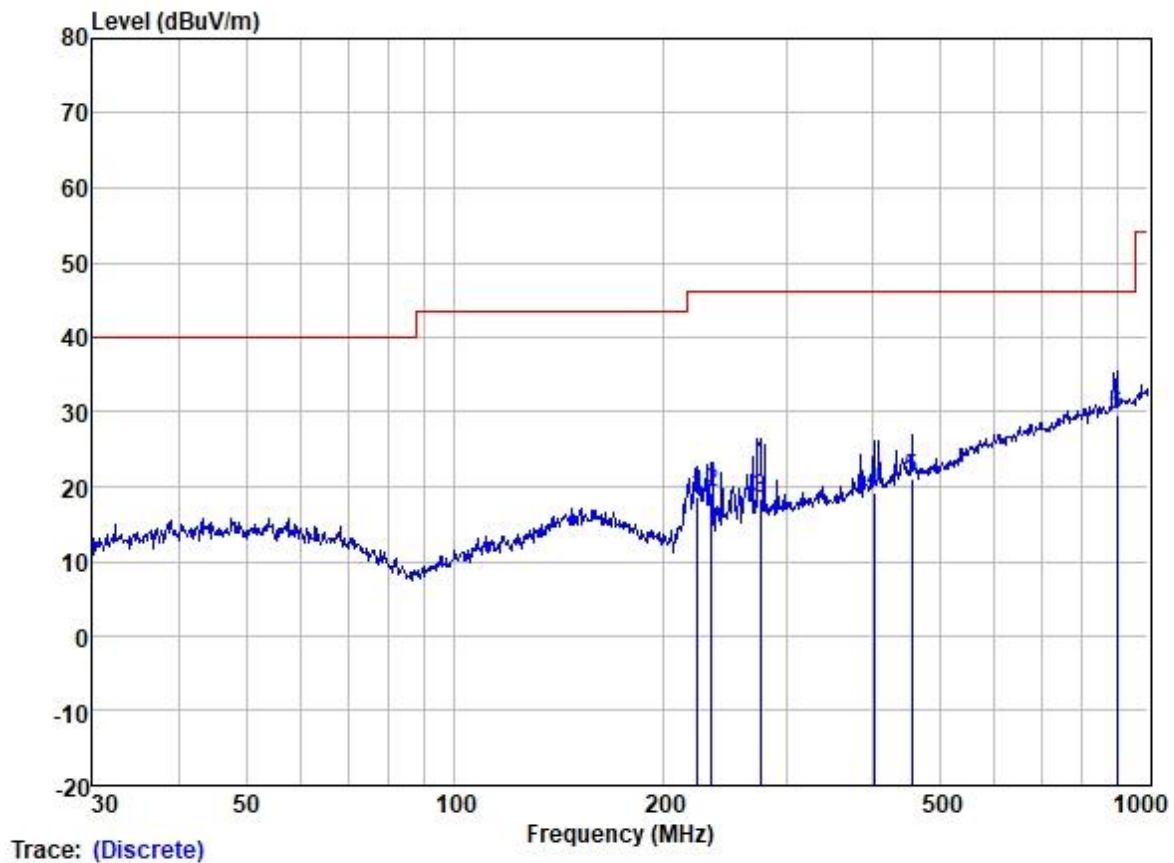
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	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	213.02	30.72	9.80	2.60	26.71	16.41	43.50	-27.09	HORIZONTAL	QP
2	287.99	25.63	13.37	3.12	26.56	15.56	46.00	-30.44	HORIZONTAL	QP
3	383.93	26.46	15.50	3.87	27.26	18.57	46.00	-27.43	HORIZONTAL	QP
4	455.91	27.38	17.42	4.22	27.75	21.27	46.00	-24.73	HORIZONTAL	QP
5	668.14	27.77	20.68	5.61	28.17	25.89	46.00	-20.11	HORIZONTAL	QP
6	900.15	28.65	23.30	6.92	27.85	31.02	46.00	-14.98	HORIZONTAL	QP



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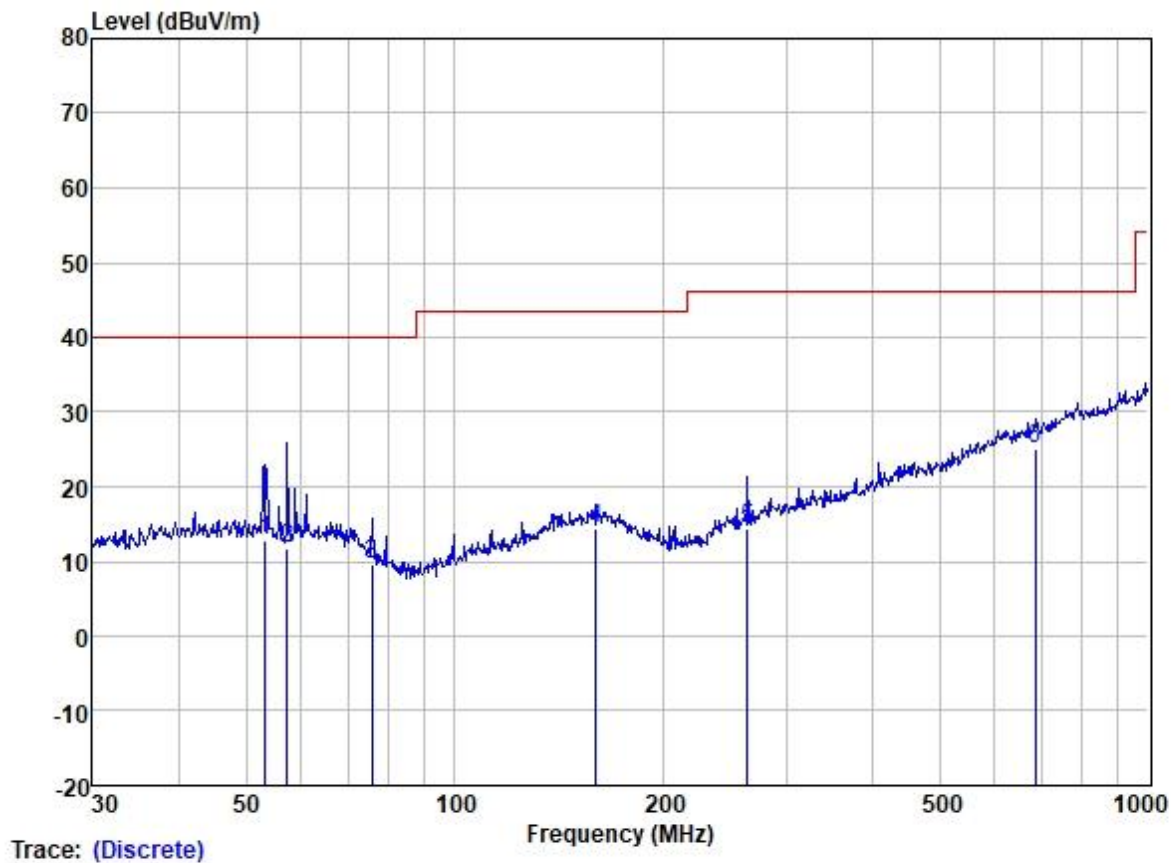
Site : SGS  
 Job :  
 Model : 5512  
 Power :  
 Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	223.73	32.78	9.87	2.67	26.70	18.62	46.00	-27.38	HORIZONTAL	QP
2	234.17	31.78	11.26	2.76	26.68	19.12	46.00	-26.88	HORIZONTAL	QP
3	276.12	28.94	13.05	3.07	26.57	18.49	46.00	-27.51	HORIZONTAL	QP
4	401.84	26.92	15.73	3.95	27.34	19.26	46.00	-26.74	HORIZONTAL	QP
5	455.91	27.06	17.42	4.22	27.75	20.95	46.00	-25.05	HORIZONTAL	QP
6	900.15	27.17	23.30	6.92	27.85	29.54	46.00	-16.46	HORIZONTAL	QP



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Site : SGS  
 Job :  
 Model : 5514  
 Power :  
 Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	53.32	25.07	13.86	1.17	27.17	12.93	40.00	-27.07	VERTICAL	QP
2	57.19	24.06	13.64	1.22	27.16	11.76	40.00	-28.24	VERTICAL	QP
3	75.98	25.02	10.30	1.45	27.10	9.67	40.00	-30.33	VERTICAL	QP
4	159.78	25.37	13.60	2.33	26.80	14.50	43.50	-29.00	VERTICAL	QP
5	263.82	25.65	12.37	3.00	26.59	14.43	46.00	-31.57	VERTICAL	QP
6	687.15	26.44	20.95	5.73	28.16	24.96	46.00	-21.04	VERTICAL	QP

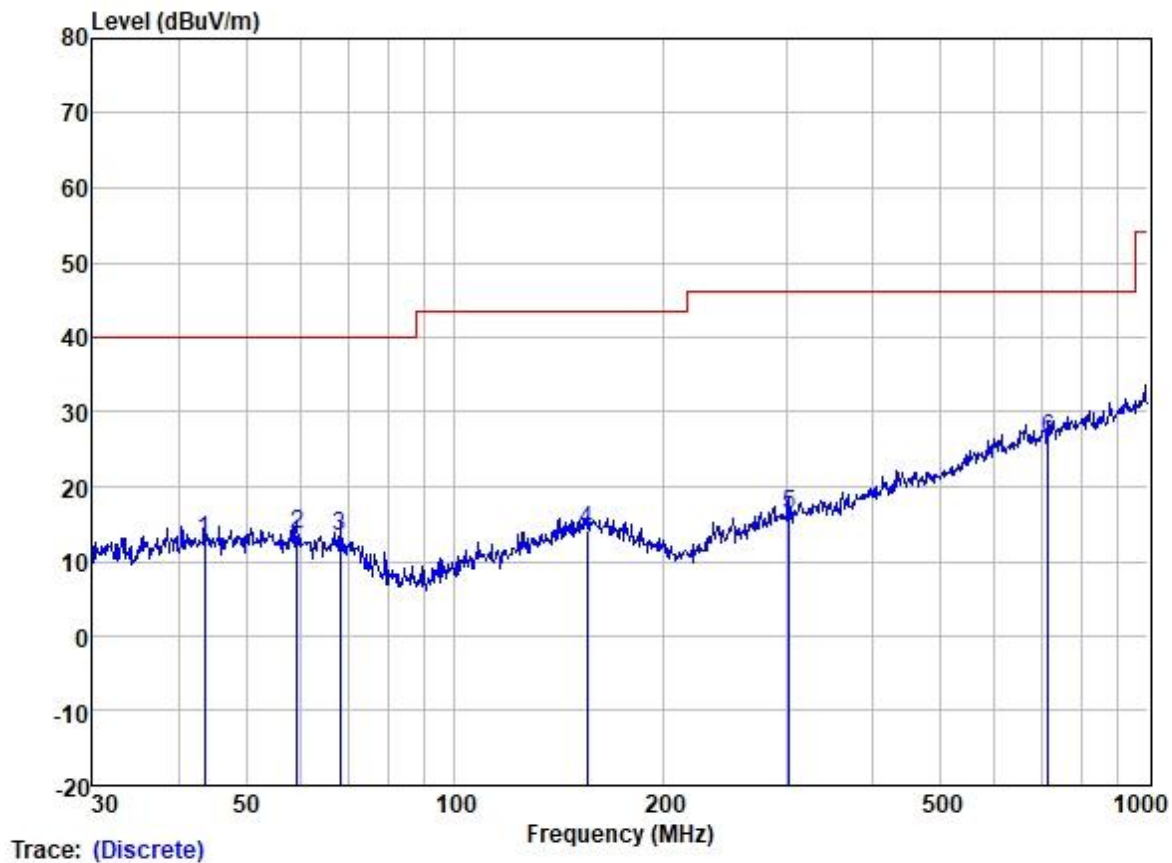


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Site : SGS  
 Job :  
 Model : 5512  
 Power :  
 Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	43.51	25.05	13.78	1.12	27.17	12.78	40.00	-27.22	VERTICAL	QP
2	59.23	25.97	13.48	1.25	27.16	13.54	40.00	-26.46	VERTICAL	QP
3	68.15	27.00	12.17	1.39	27.14	13.42	40.00	-26.58	VERTICAL	QP
4	154.82	24.91	13.75	2.28	26.81	14.13	43.50	-29.37	VERTICAL	QP
5	303.54	26.05	13.68	3.18	26.57	16.34	46.00	-29.66	VERTICAL	QP
6	716.68	27.34	21.43	5.83	28.14	26.46	46.00	-19.54	VERTICAL	QP



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## 4.9 Radiated Spurious Emissions (Above 1GHz)

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

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Limit:

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.

### 4.9.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C

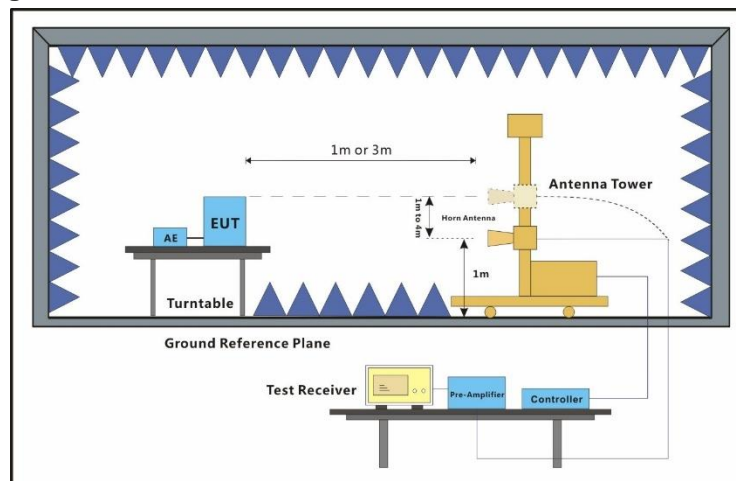
Humidity: 55.7 % RH

Atmospheric Pressure: 1008 mbar

### 4.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 4.9.3 Test Setup Diagram





#### 4.9.4 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 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, quasi-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) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

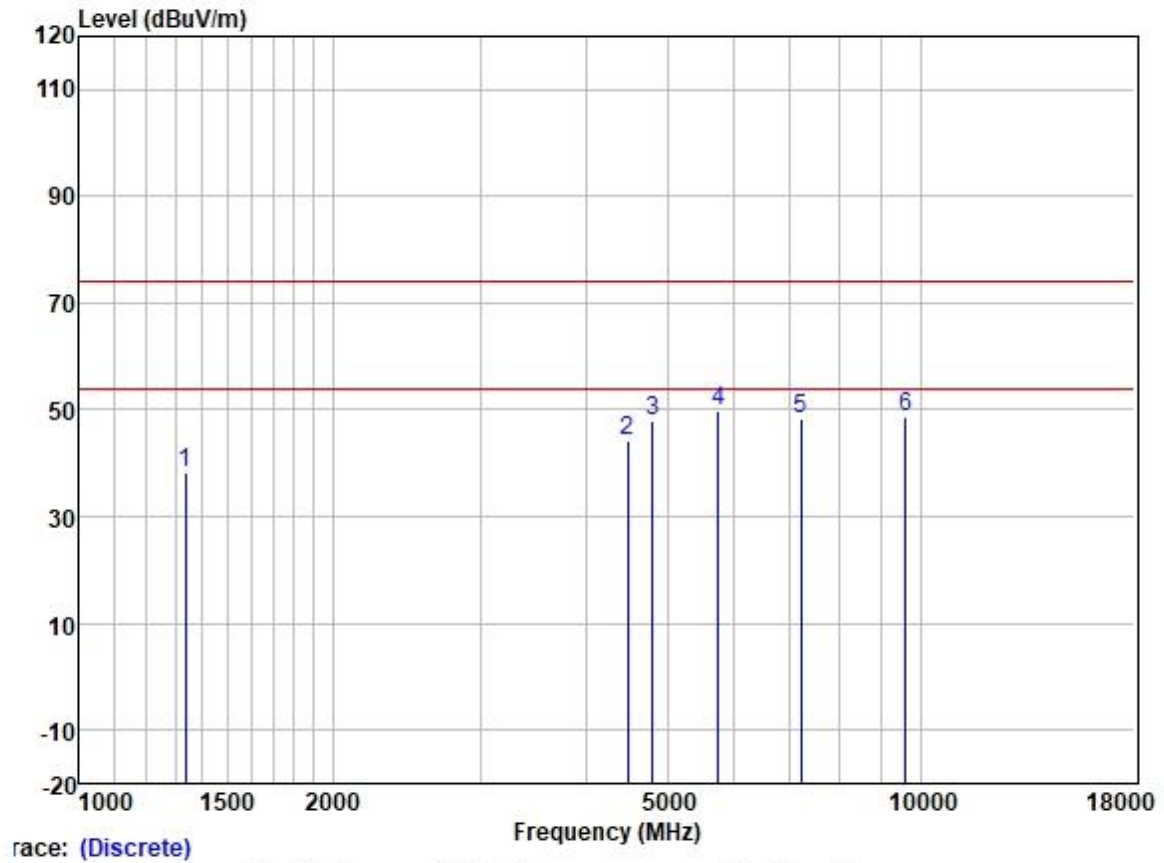
2) Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) 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.

The red line show in graphic is the limit in standard used in this section.



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	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	1335.141	48.71	25.28	2.60	38.29	38.30	74.00	-35.70	VERTICAL	peak
2	4482.150	45.26	30.78	4.99	36.81	44.22	74.00	-29.78	VERTICAL	peak
3	4804.000	47.87	31.42	5.40	36.83	47.86	74.00	-26.14	VERTICAL	peak
4	5746.982	48.22	32.10	6.20	36.89	49.63	74.00	-24.37	VERTICAL	peak
5	7206.000	44.08	35.54	5.98	37.38	48.22	74.00	-25.78	VERTICAL	peak
6	9608.000	40.83	38.37	7.07	37.42	48.85	74.00	-25.15	VERTICAL	peak

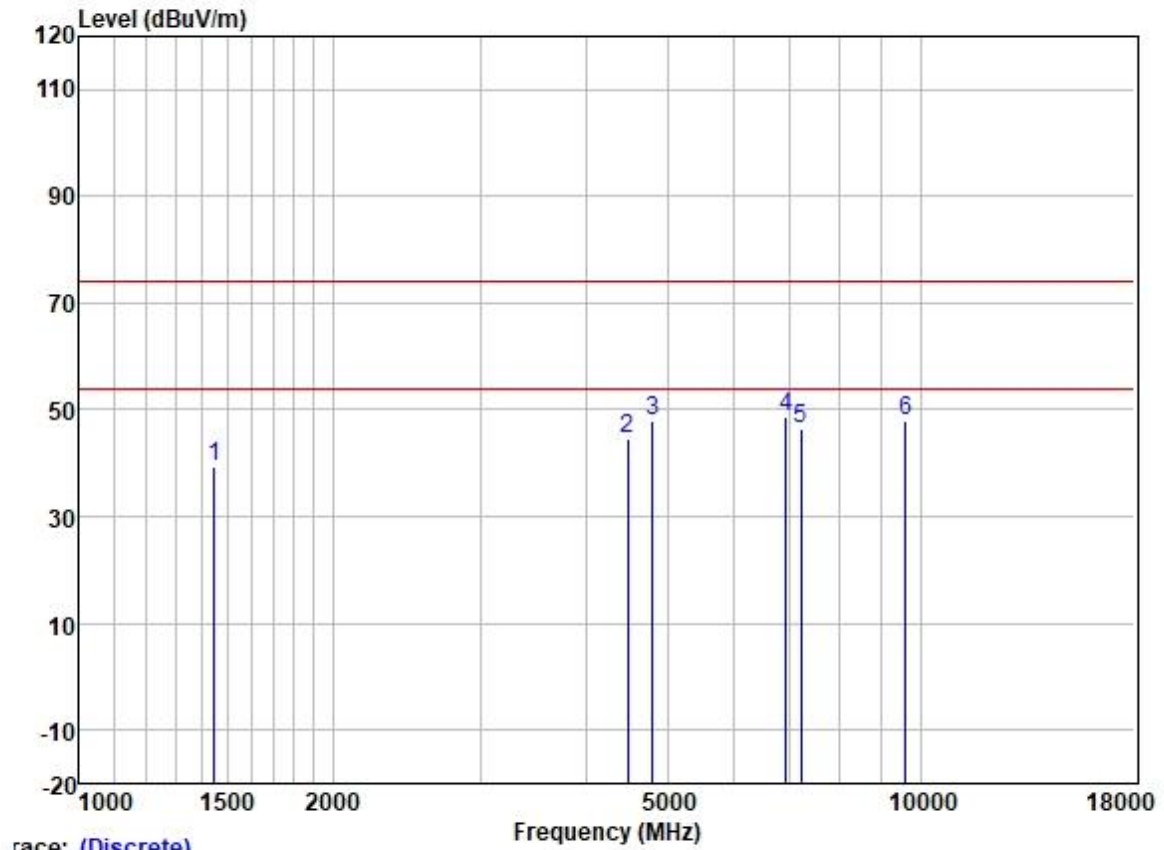


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	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1447.688	49.32	25.45	2.70	38.17	39.30	74.00	-34.70	HORIZONTAL peak
2	4482.150	45.76	30.78	4.99	36.81	44.72	74.00	-29.28	HORIZONTAL peak
3	4804.000	48.04	31.42	5.40	36.83	48.03	74.00	-25.97	HORIZONTAL peak
4	6914.763	45.22	34.89	5.81	37.19	48.73	74.00	-25.27	HORIZONTAL peak
5	7206.000	42.47	35.54	5.98	37.38	46.61	74.00	-27.39	HORIZONTAL peak
6	9608.000	40.08	38.37	7.07	37.42	48.10	74.00	-25.90	HORIZONTAL peak

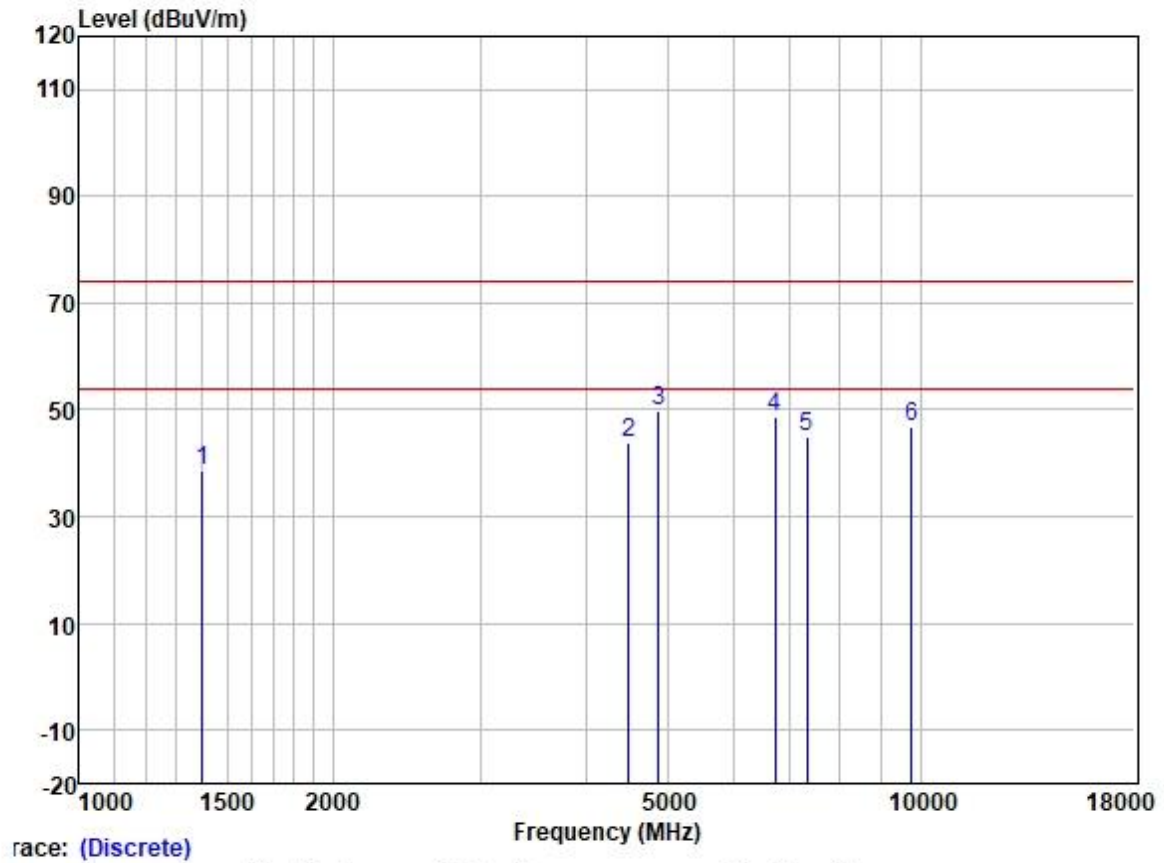


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	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1398.336	48.98	25.39	2.60	38.22	38.75	74.00	-35.25	VERTICAL peak
2	4495.125	44.76	30.80	5.05	36.82	43.79	74.00	-30.21	VERTICAL peak
3	4880.000	49.67	31.54	5.50	36.84	49.87	74.00	-24.13	VERTICAL peak
4	6717.762	45.53	34.44	5.83	37.09	48.71	74.00	-25.29	VERTICAL peak
5	7320.000	40.34	36.00	6.13	37.43	45.04	74.00	-28.96	VERTICAL peak
6	9760.000	38.64	38.50	7.02	37.41	46.75	74.00	-27.25	VERTICAL peak



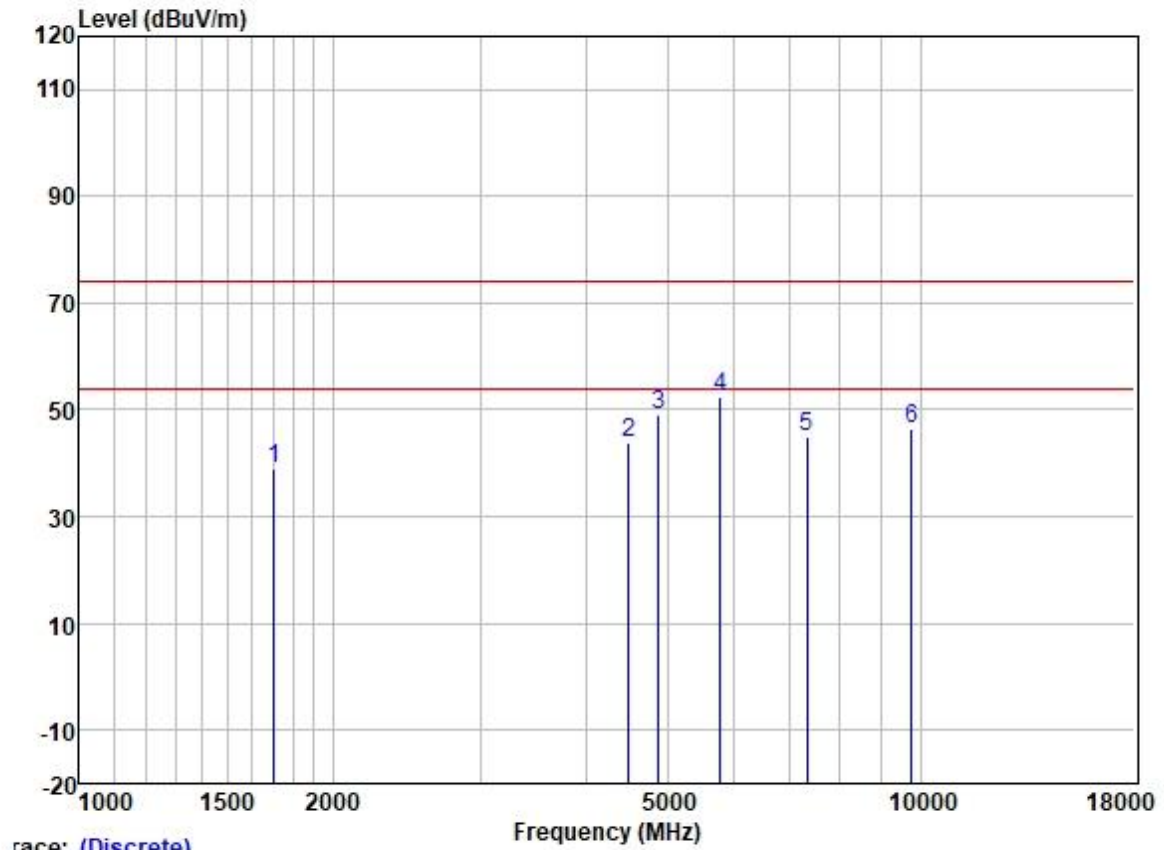
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	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1702.042	48.41	25.72	2.80	37.89	39.04	74.00	-34.96	HORIZONTAL	peak
2	4495.125	44.90	30.80	5.05	36.82	43.93	74.00	-30.07	HORIZONTAL	peak
3	4880.000	48.77	31.54	5.50	36.84	48.97	74.00	-25.03	HORIZONTAL	peak
4	5780.300	51.08	32.16	6.10	36.89	52.45	74.00	-21.55	HORIZONTAL	peak
5	7320.000	40.08	36.00	6.13	37.43	44.78	74.00	-29.22	HORIZONTAL	peak
6	9760.000	38.24	38.50	7.02	37.41	46.35	74.00	-27.65	HORIZONTAL	peak

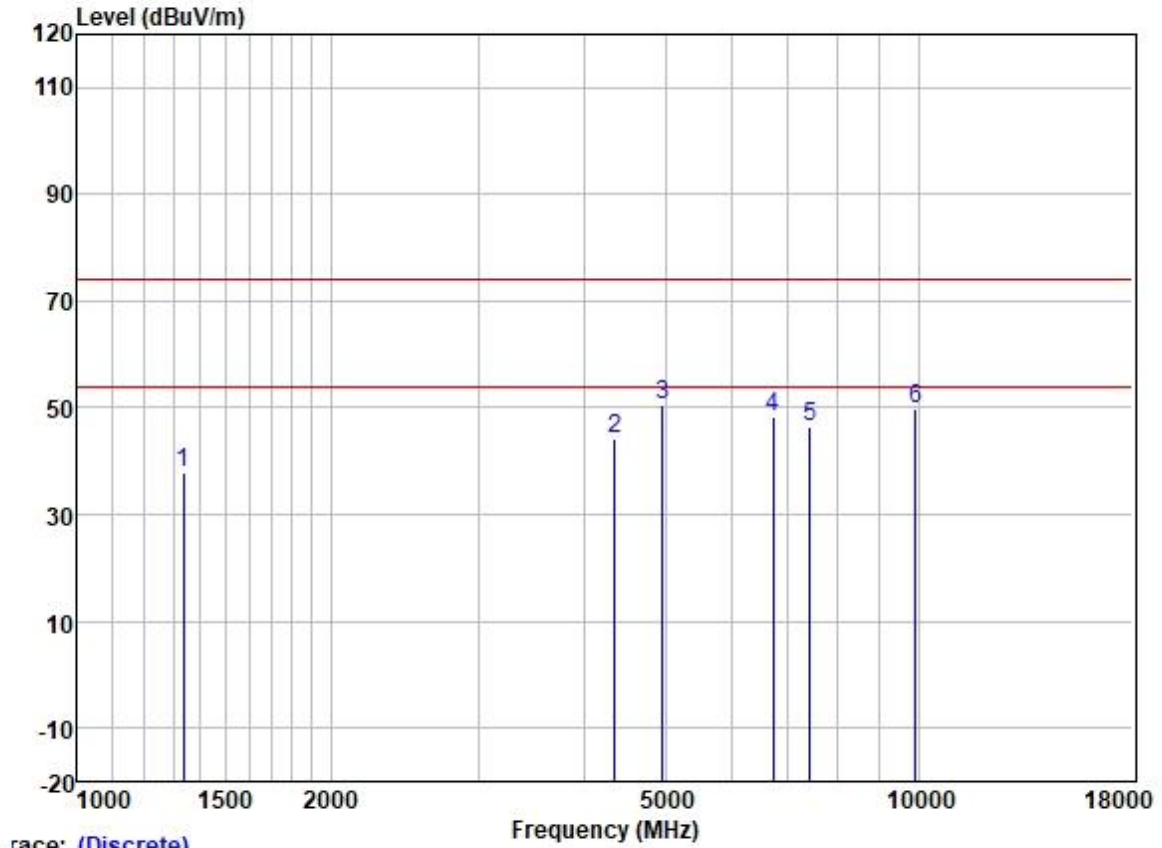


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	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1335.141	48.43	25.28	2.60	38.29	38.02	74.00	-35.98	VERTICAL peak
2	4354.454	45.68	30.59	4.68	36.81	44.14	74.00	-29.86	VERTICAL peak
3	4960.000	49.93	31.65	5.65	36.84	50.39	74.00	-23.61	VERTICAL peak
4	6717.762	45.30	34.44	5.83	37.09	48.48	74.00	-25.52	VERTICAL peak
5	7440.000	41.61	36.27	6.22	37.47	46.63	74.00	-27.37	VERTICAL peak
6	9920.000	41.48	38.65	6.96	37.40	49.69	74.00	-24.31	VERTICAL peak





# 5 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR2107020703HS



## 6 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2107020703HS



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# 7 Appendix

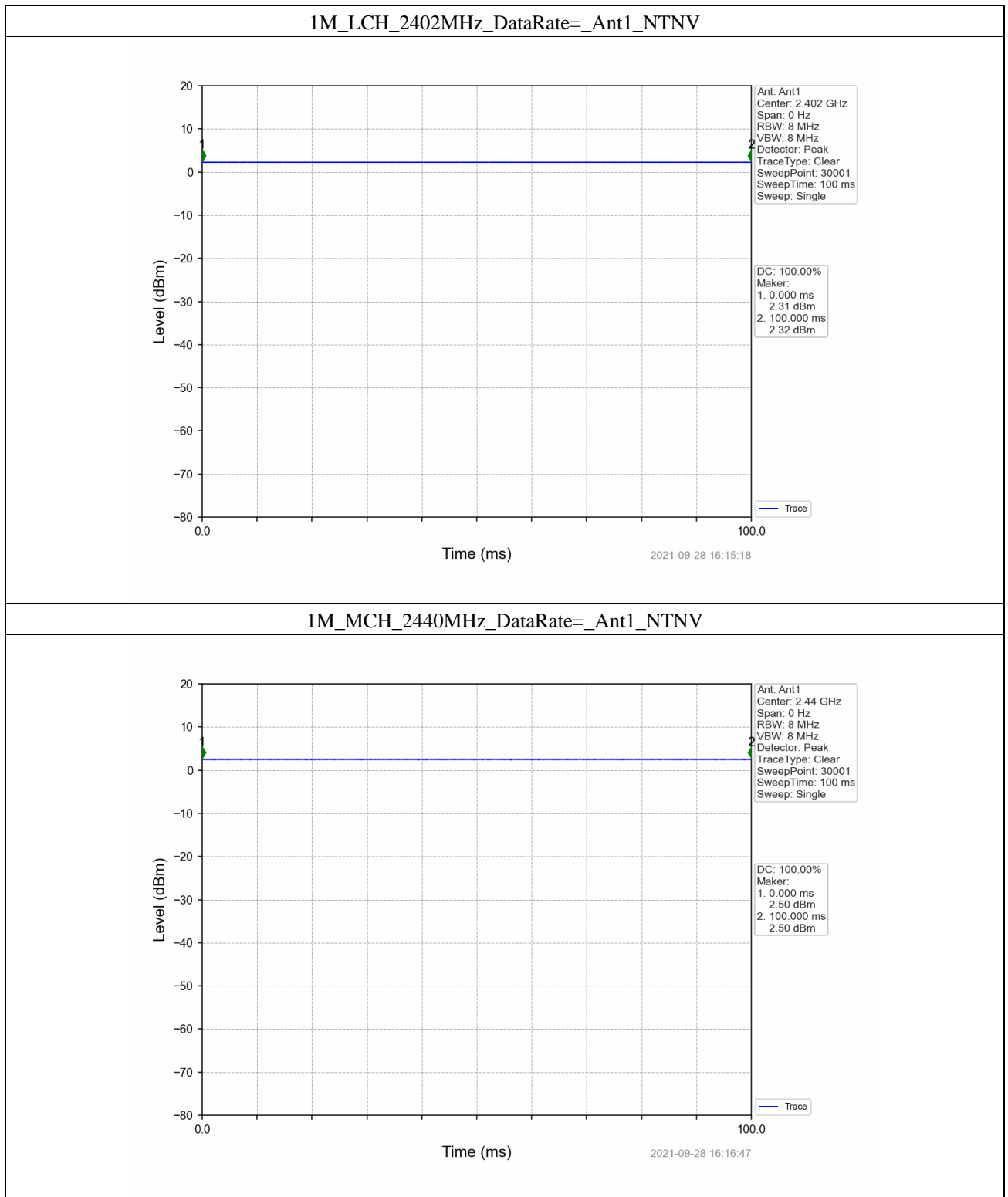
## 1. Duty Cycle

### 1.1 Ant1

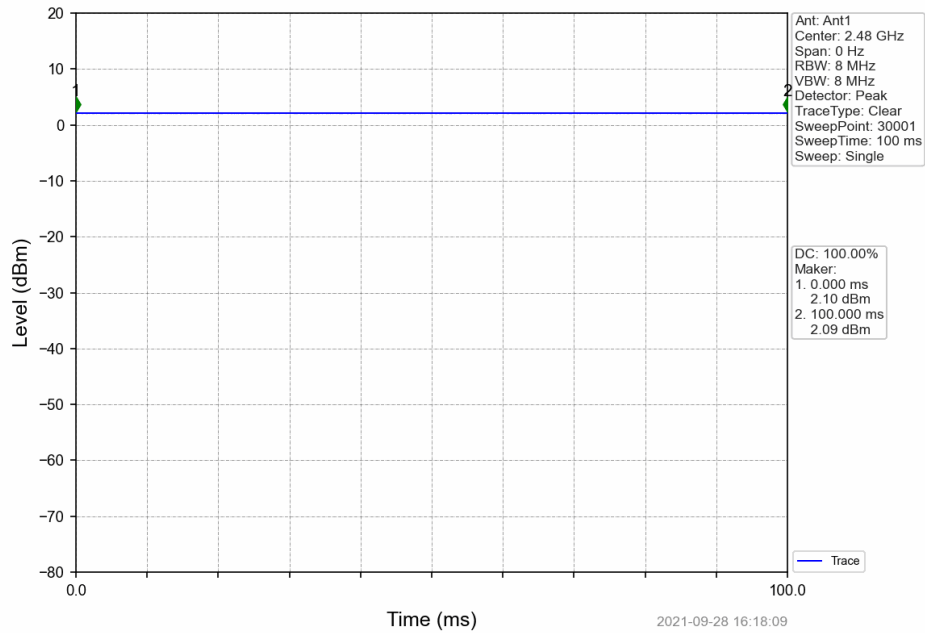
#### 1.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	100.000	100.000	100.00	0.00	0.00
		2440	100.000	100.000	100.00	0.00	0.00
		2480	100.000	100.000	100.00	0.00	0.00

## 1.1.2 Test Graph



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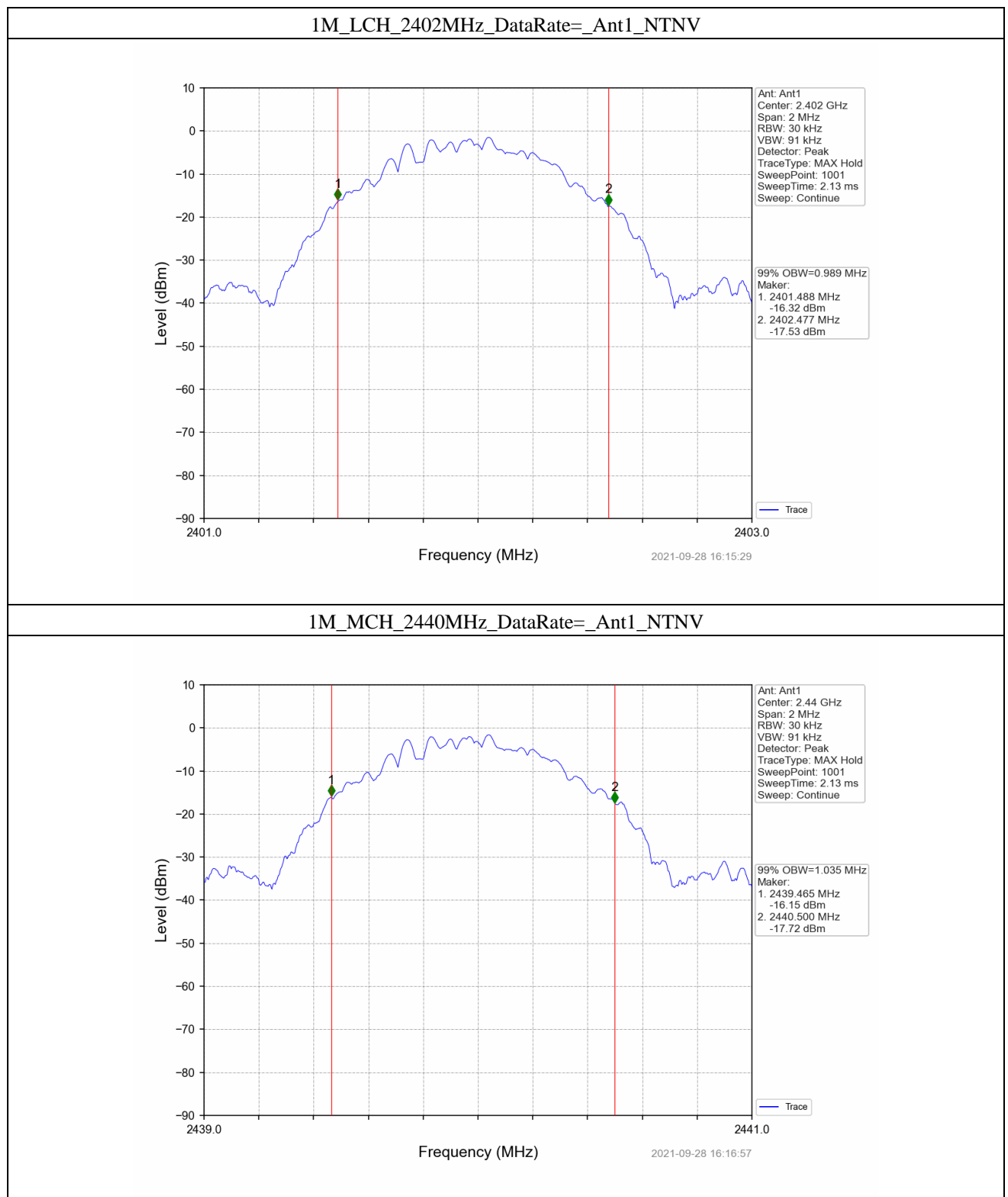
2. Bandwidth

2.1 OBW

2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Ant	99% Occupied Bandwidth (MHz)	Verdict
				Result	
1M	SISO	2402	1	0.989	Pass
		2440	1	1.035	Pass
		2480	1	1.035	Pass

## 2.1.2 Test Graph

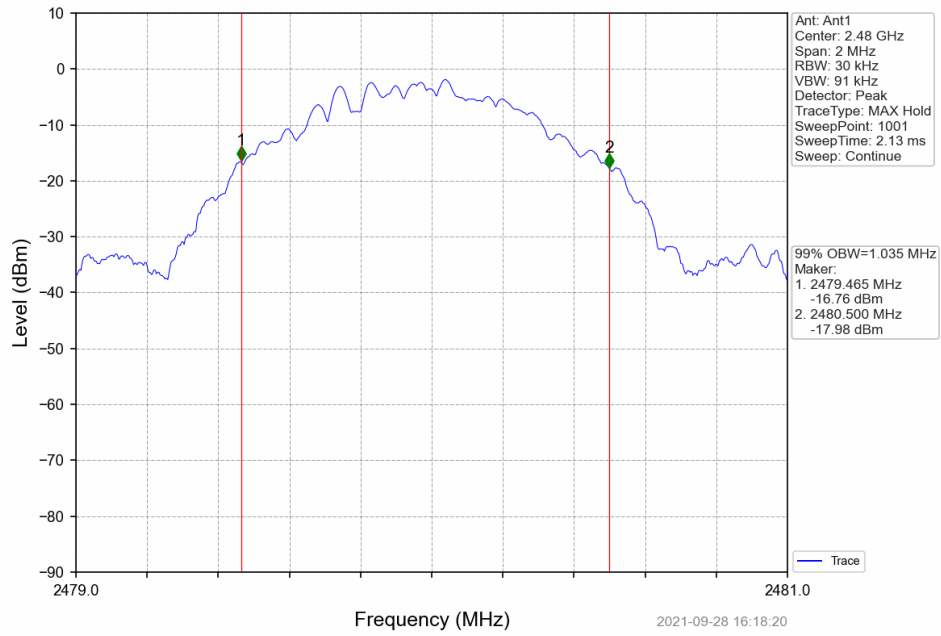


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2.2 6dB BW

2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Ant	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.639	>=0.5	Pass
		2440	1	0.643	>=0.5	Pass
		2480	1	0.641	>=0.5	Pass



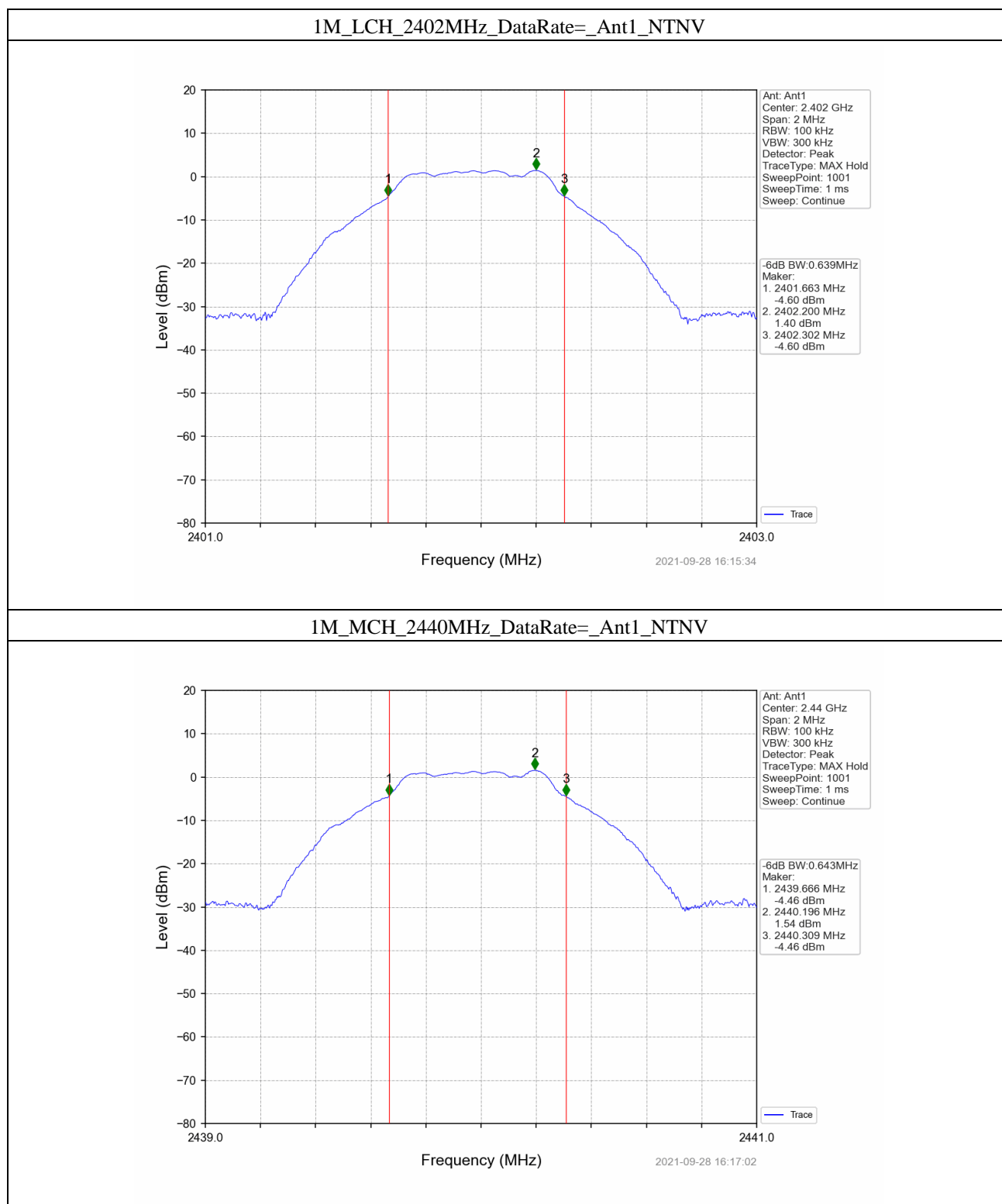
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## 2.2.2 Test Graph

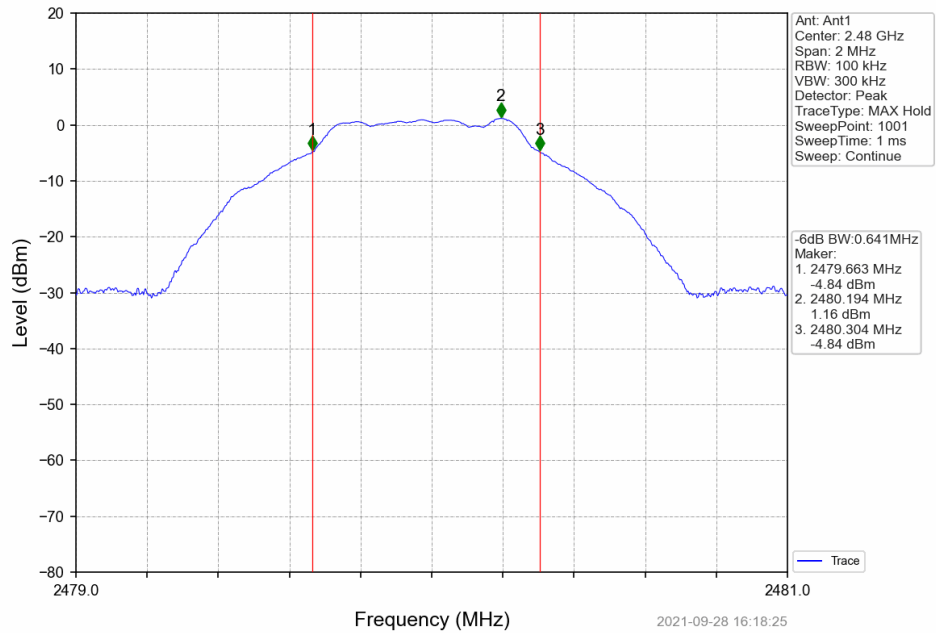


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3. Maximum Conducted Output Power

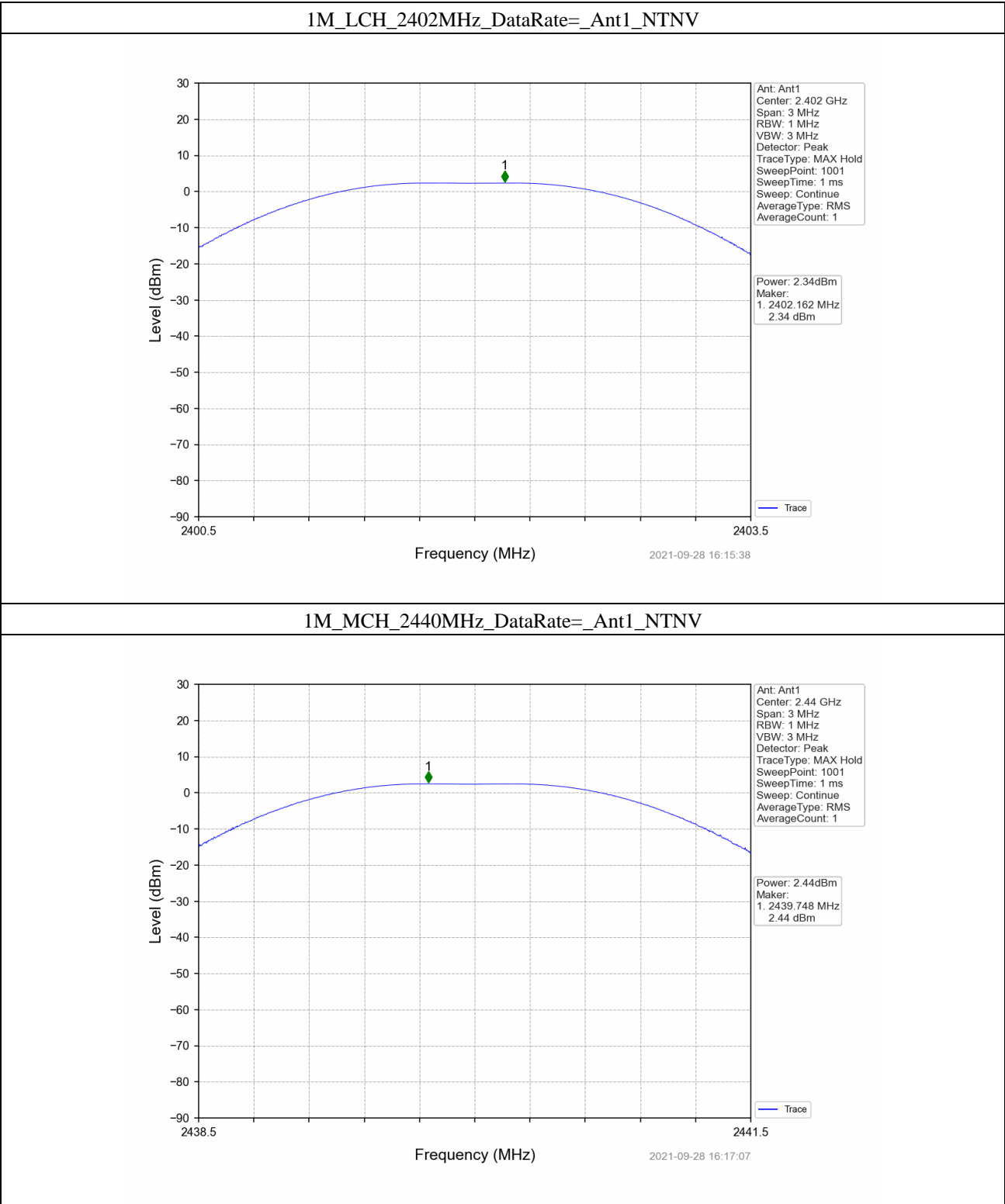
3.1 Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			Ant1	Limit	
1M	SISO	2402	2.34	<=30	Pass
		2440	2.44	<=30	Pass
		2480	2.05	<=30	Pass

Note1: Antenna Gain: Ant1: 0.00dBi;

3.1.2 Test Graph



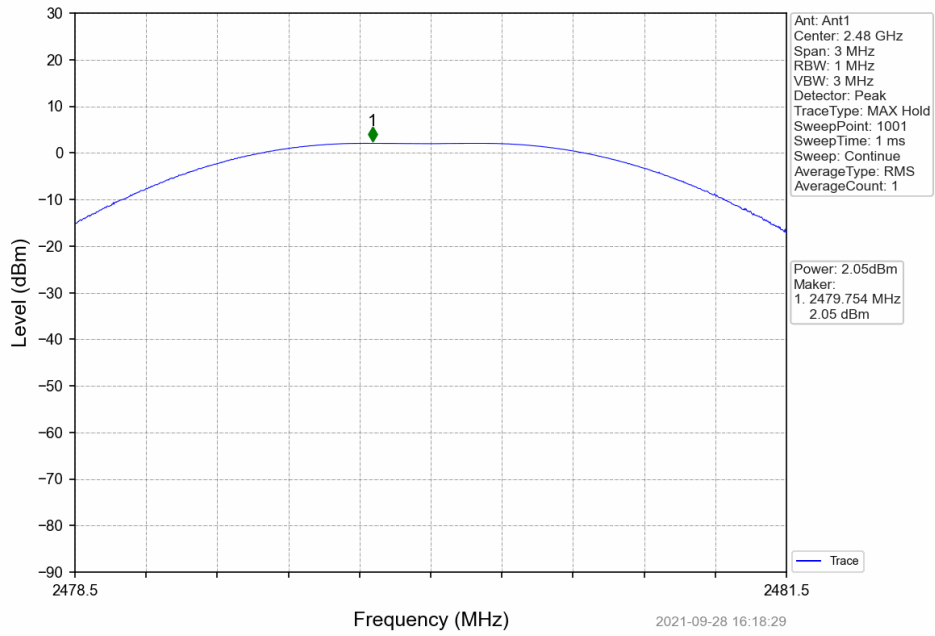
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4. Maximum Power Spectral Density

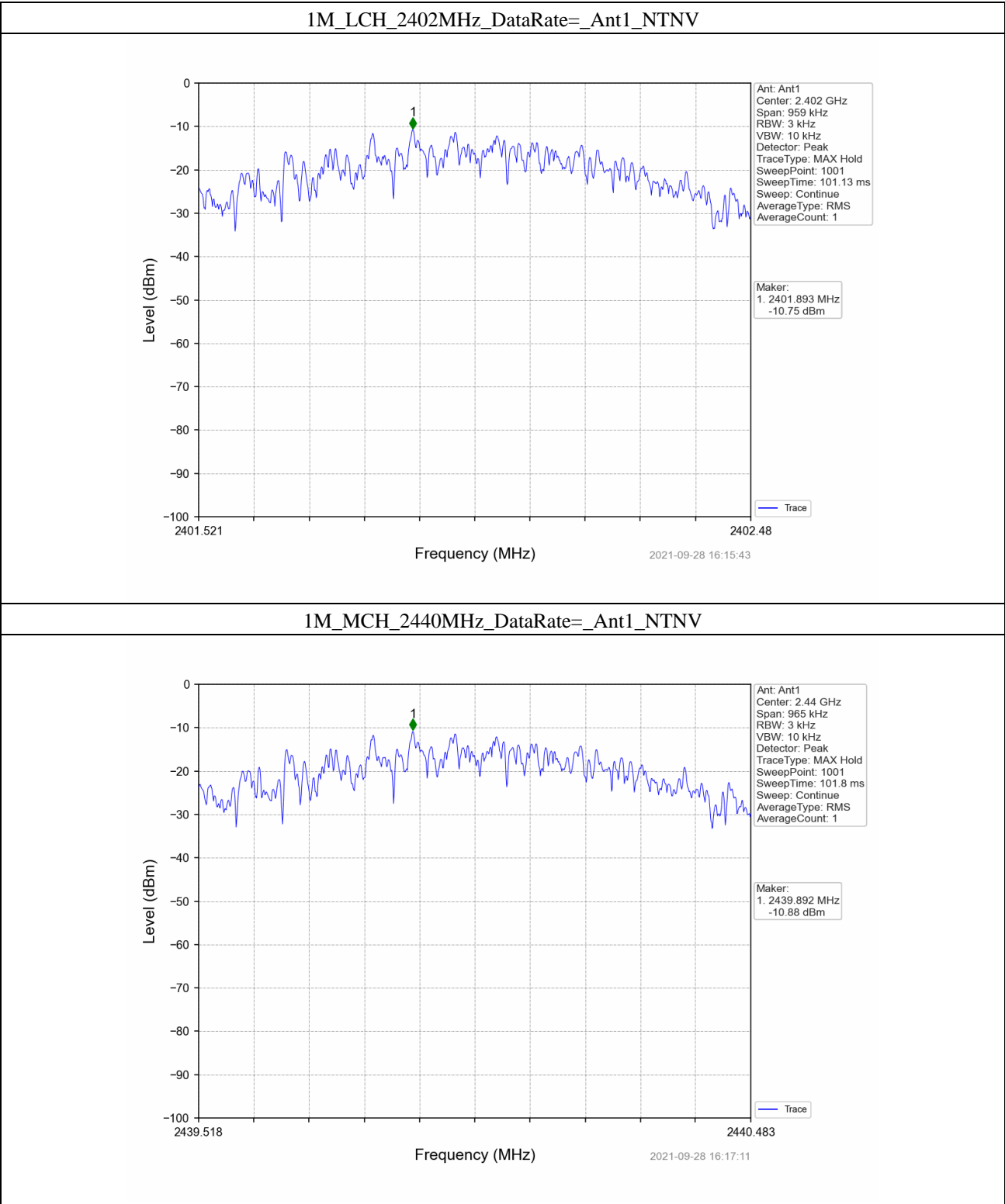
4.1 PSD

4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			Ant1	Limit	
1M	SISO	2402	-10.75	<=8	Pass
		2440	-10.88	<=8	Pass
		2480	-11.30	<=8	Pass

Note1: Antenna Gain: Ant1: 0.00dBi;

4.1.2 Test Graph

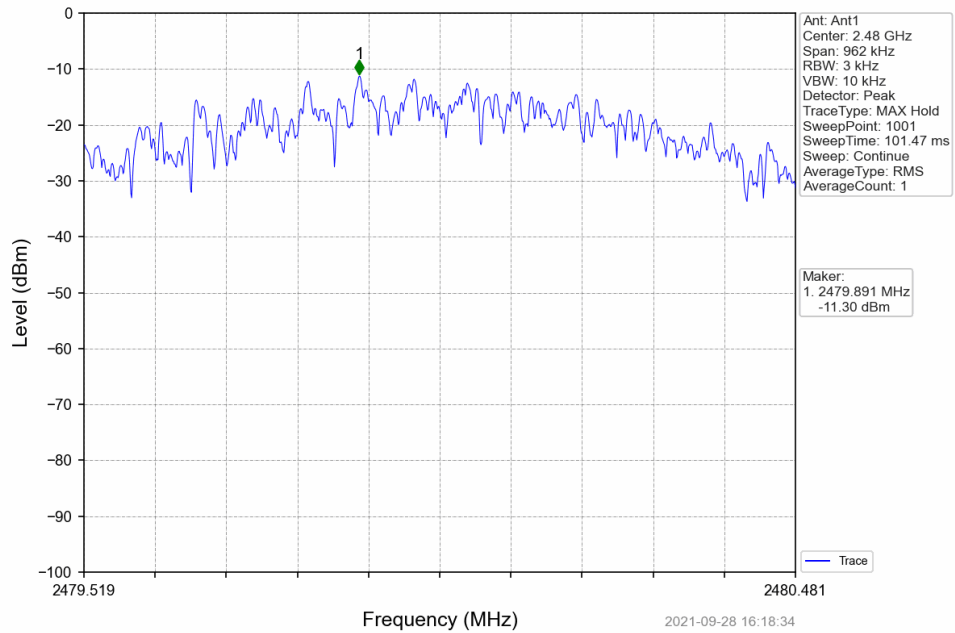


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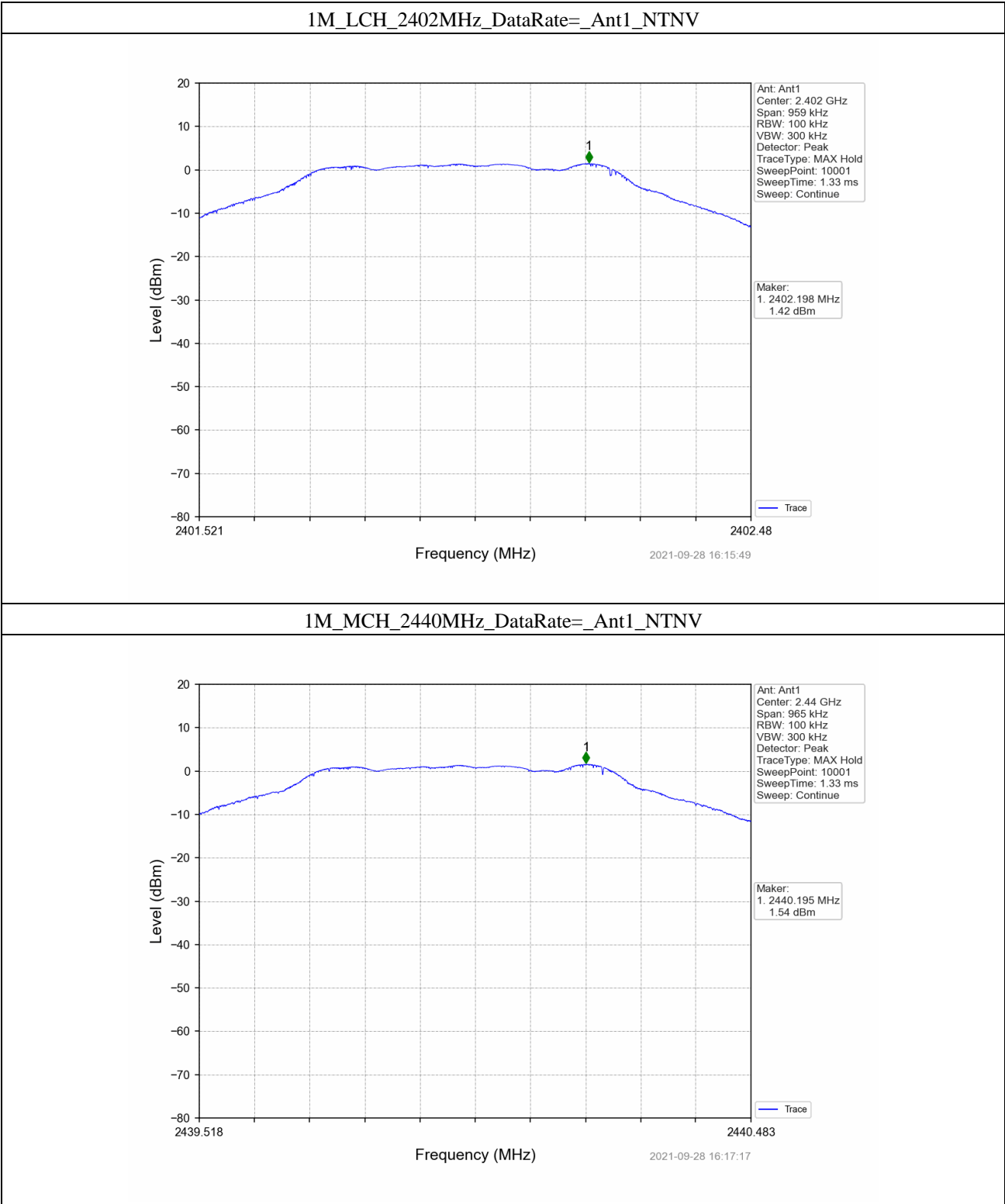
5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Ref

5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Ant	Level of Reference (dBm)
1M	SISO	2402	1	1.42
		2440	1	1.54
		2480	1	1.16
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 Test Graph



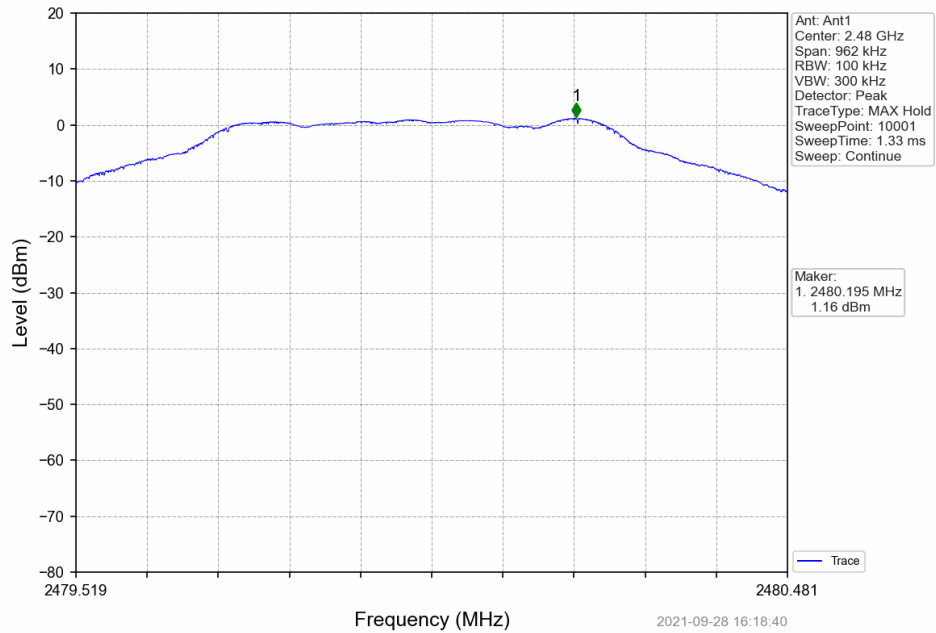
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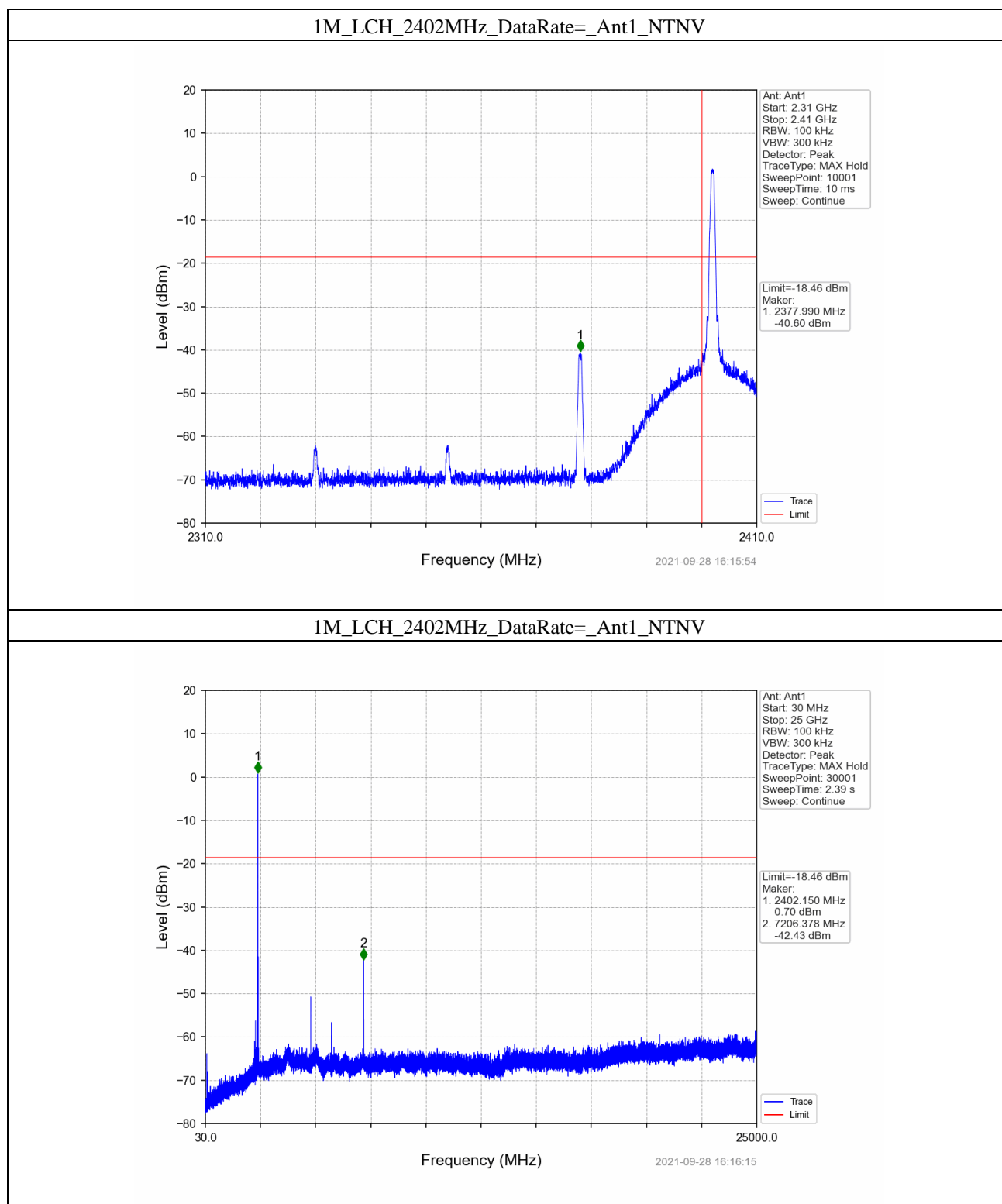
5.2 CSE

5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Ant	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	1.54	-18.46	Pass
		2440	1	1.54	-18.46	Pass
		2480	1	1.54	-18.46	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.						



## 5.2.2 Test Graph



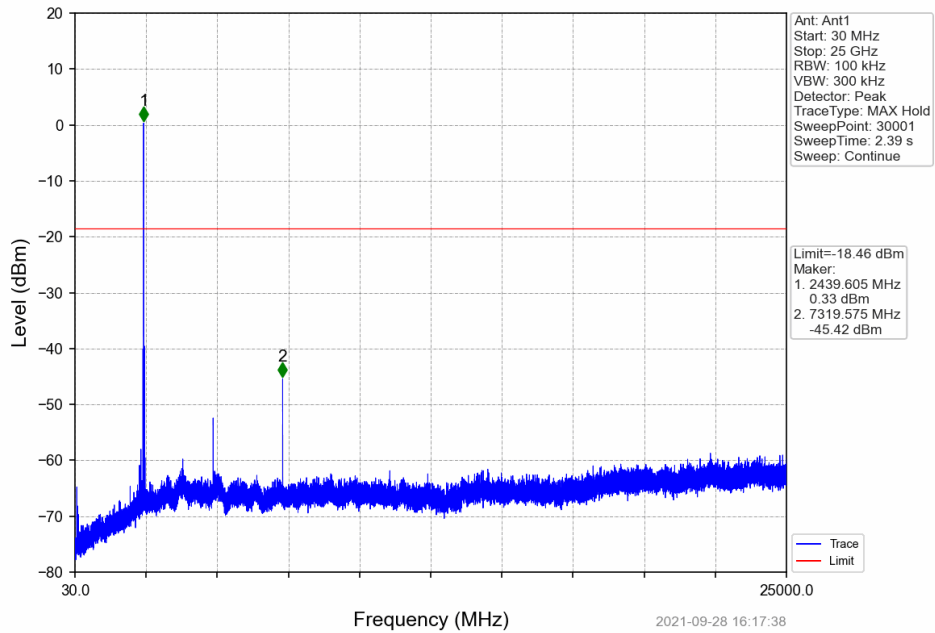
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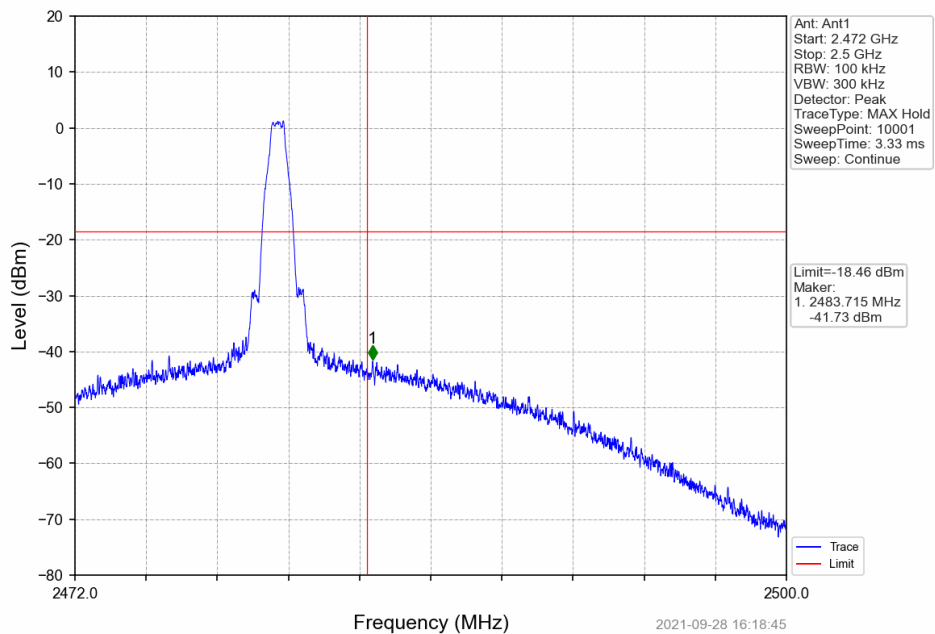
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# 1M\_MCH\_2440MHz\_DataRate=\_Ant1\_NTNV



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

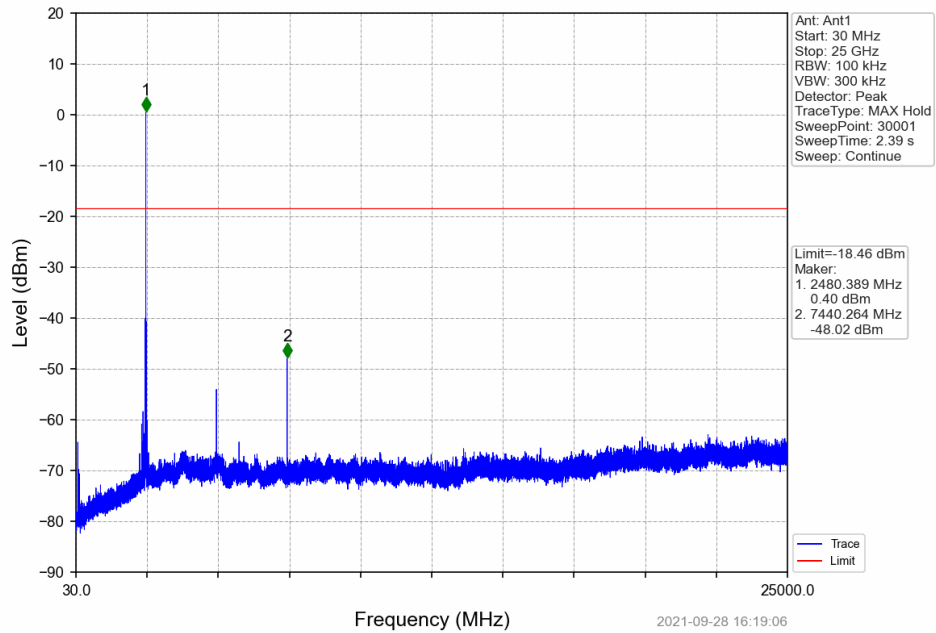


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# 1M\_HCH\_2480MHz\_DataRate=\_Ant1\_NTNV



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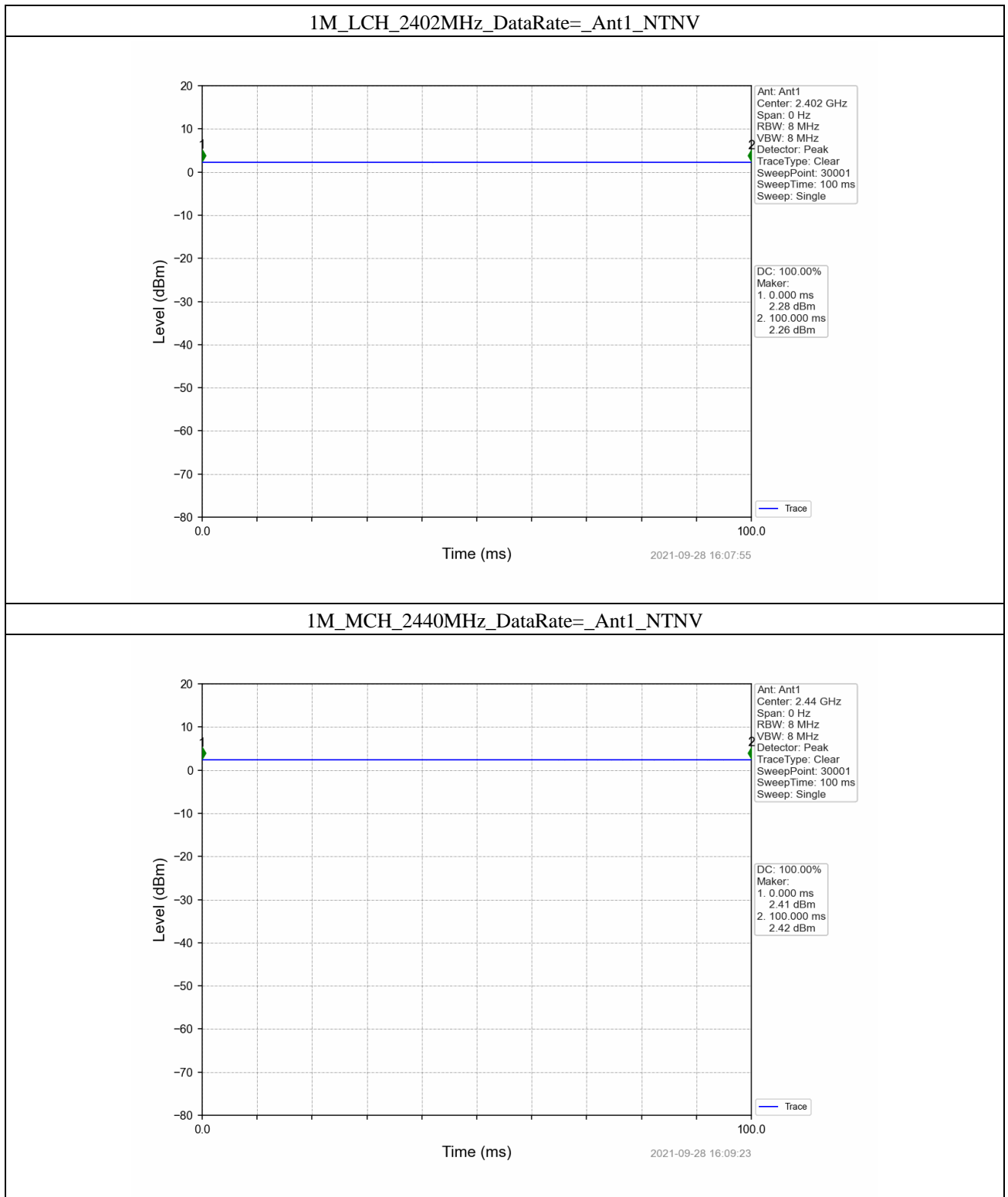
# 1. Duty Cycle

## 1.1 Ant1

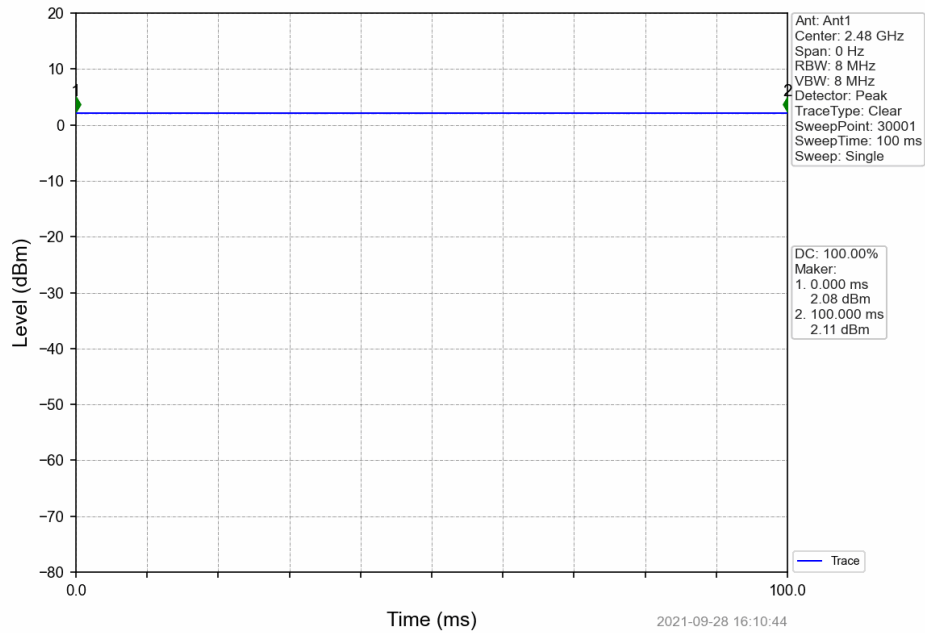
### 1.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	100.000	100.000	100.00	0.00	0.00
		2440	100.000	100.000	100.00	0.00	0.00
		2480	100.000	100.000	100.00	0.00	0.00

## 1.1.2 Test Graph



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



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2. Bandwidth

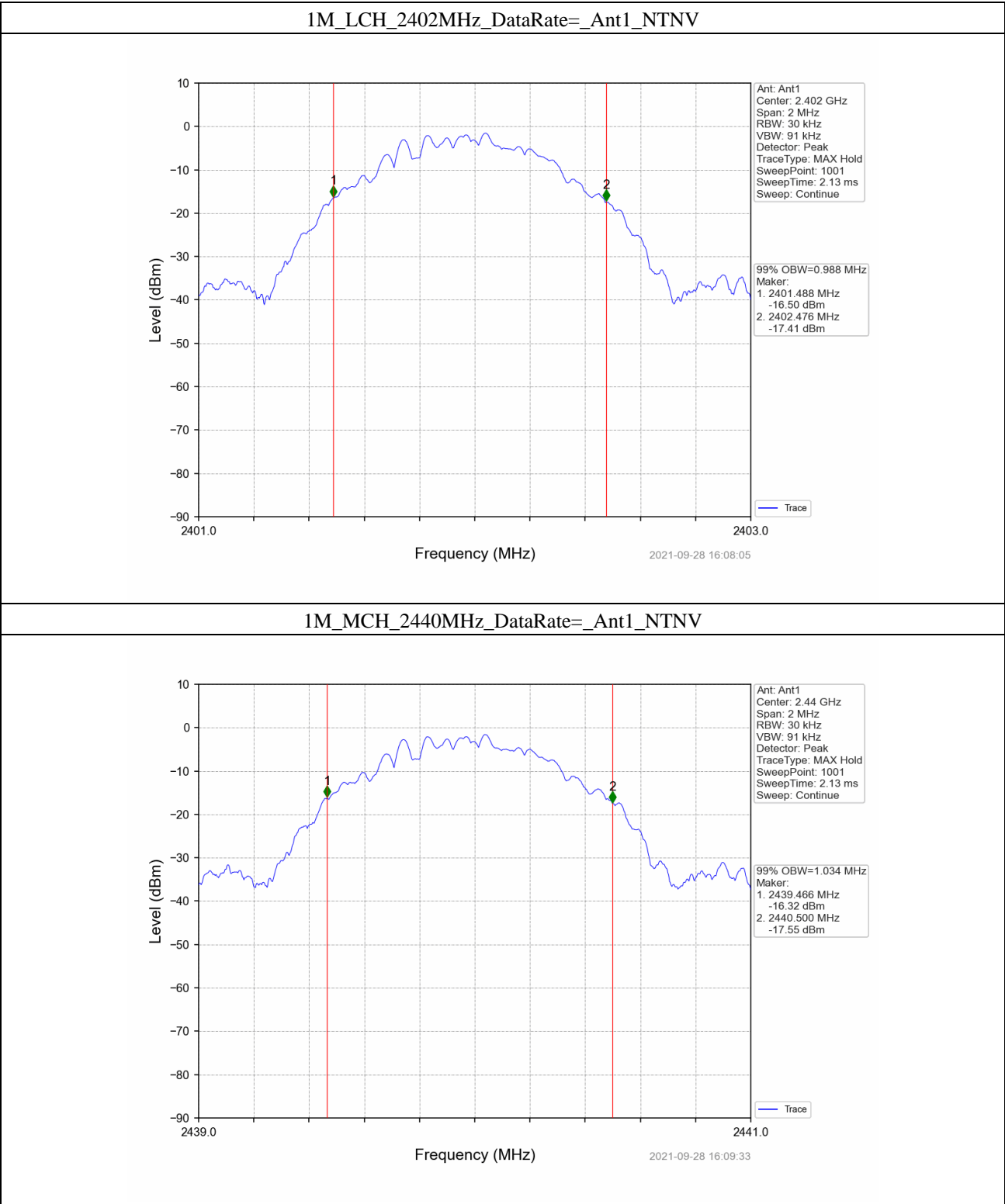
2.1 OBW

2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Ant	99% Occupied Bandwidth (MHz)	Verdict
				Result	
1M	SISO	2402	1	0.988	Pass
		2440	1	1.034	Pass
		2480	1	1.035	Pass



2.1.2 Test Graph

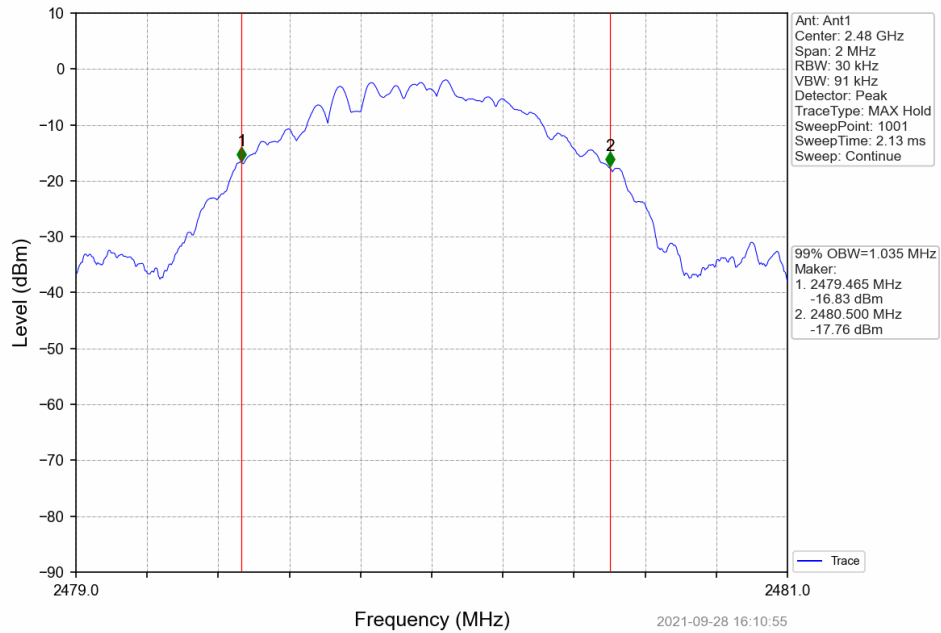


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2.2 6dB BW

2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Ant	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.640	>=0.5	Pass
		2440	1	0.641	>=0.5	Pass
		2480	1	0.640	>=0.5	Pass

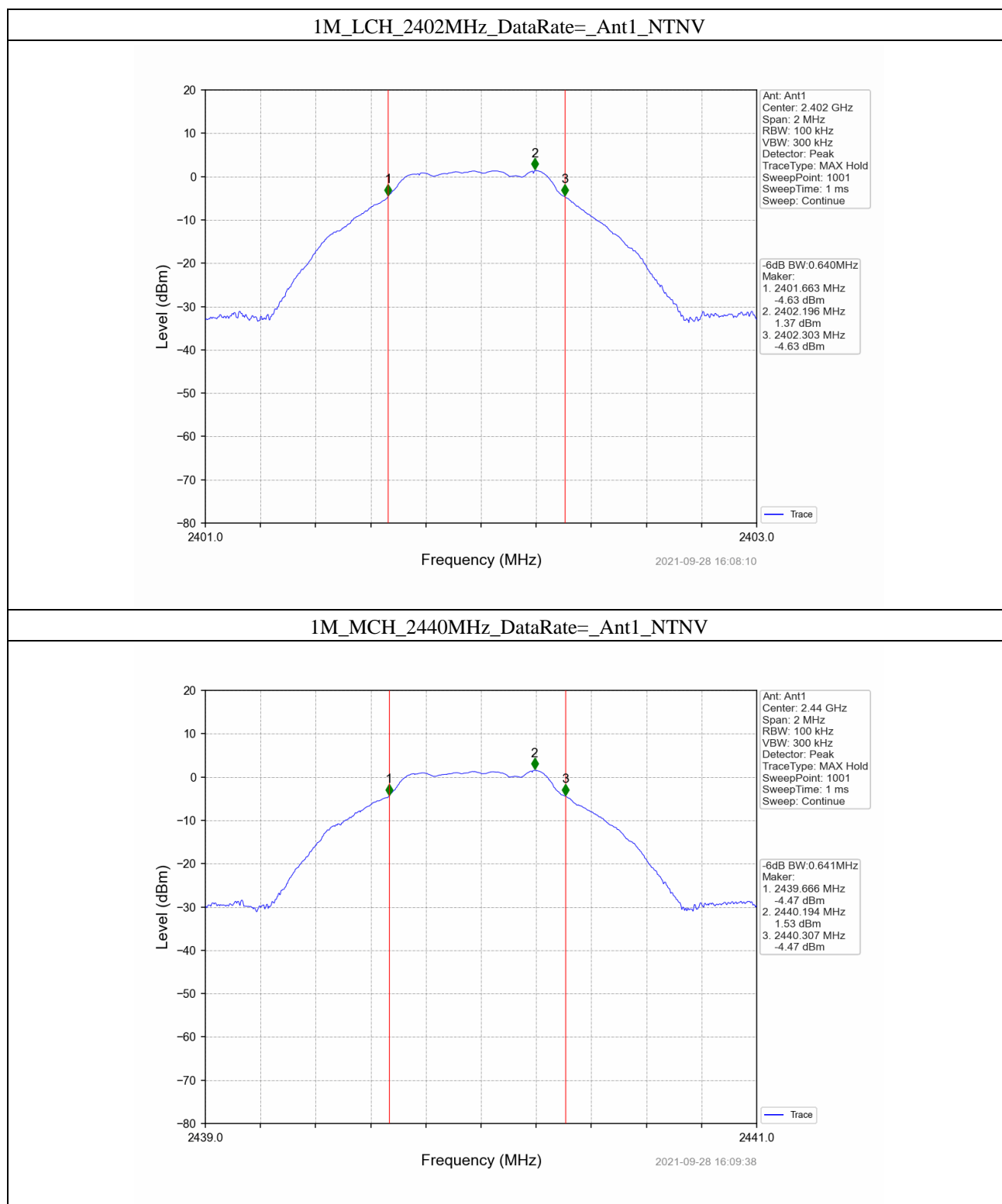


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## 2.2.2 Test Graph



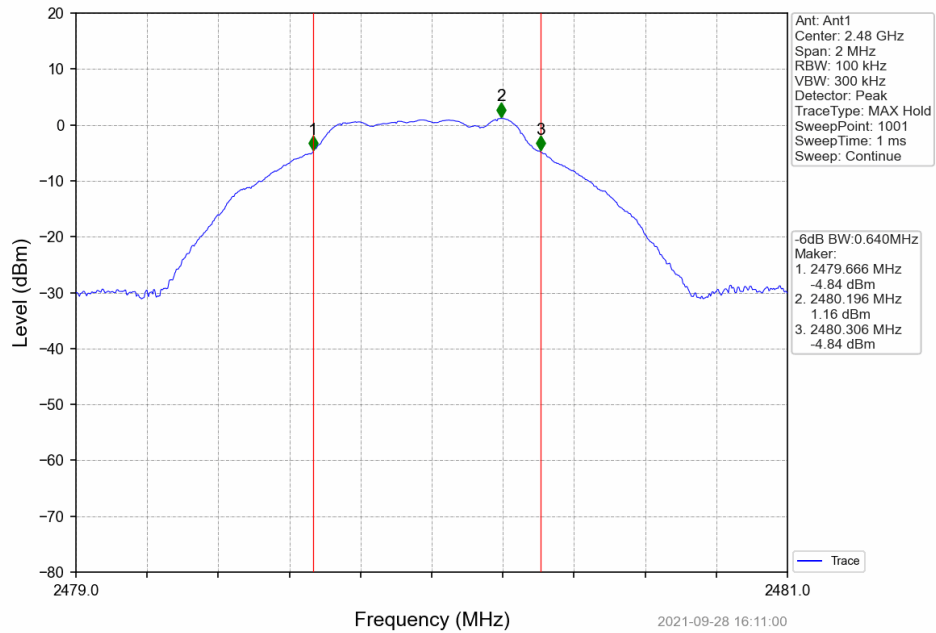
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3. Maximum Conducted Output Power

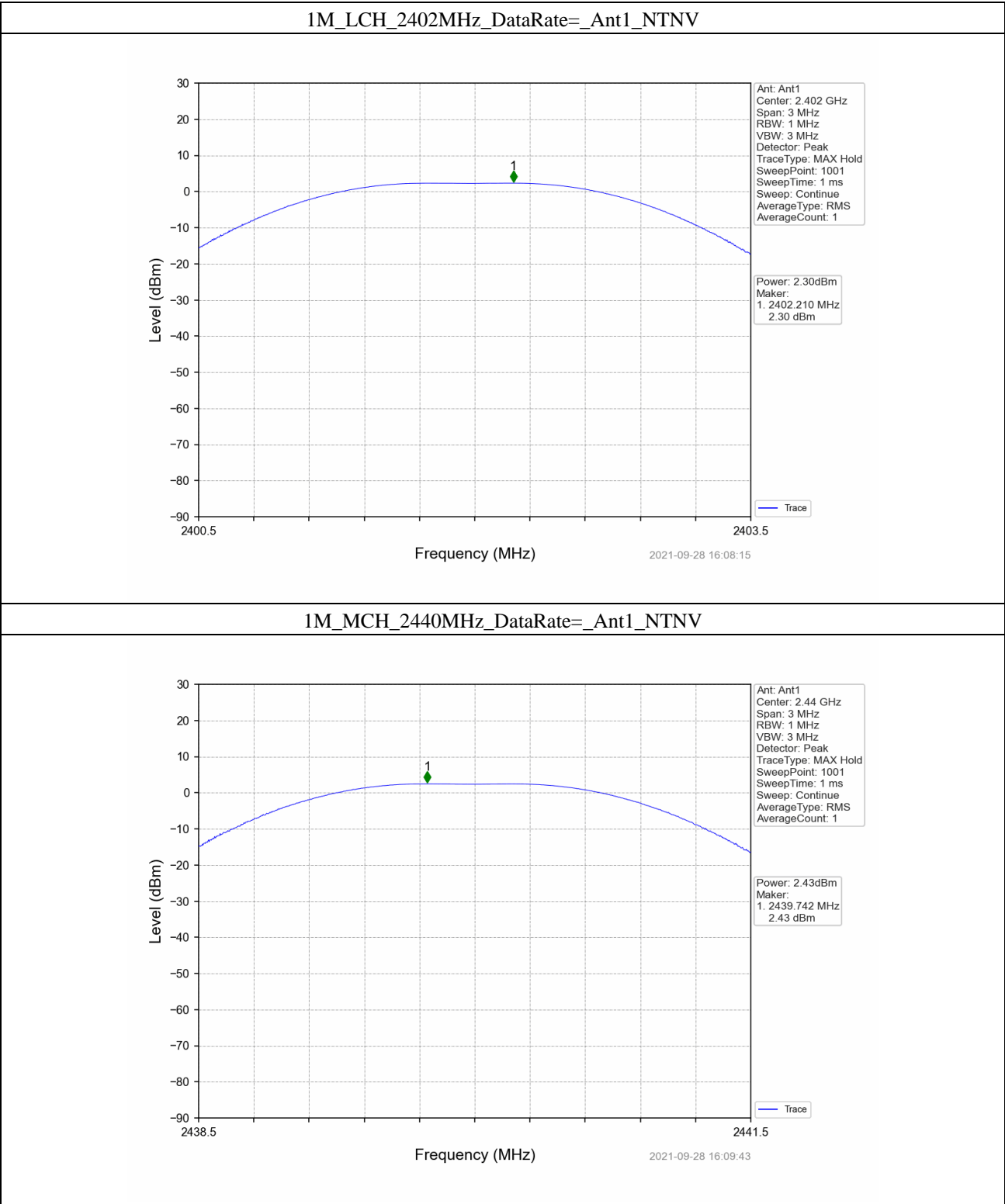
3.1 Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			Ant1	Limit	
1M	SISO	2402	2.30	<=30	Pass
		2440	2.43	<=30	Pass
		2480	2.05	<=30	Pass

Note1: Antenna Gain: Ant1: 0.00dBi;

3.1.2 Test Graph



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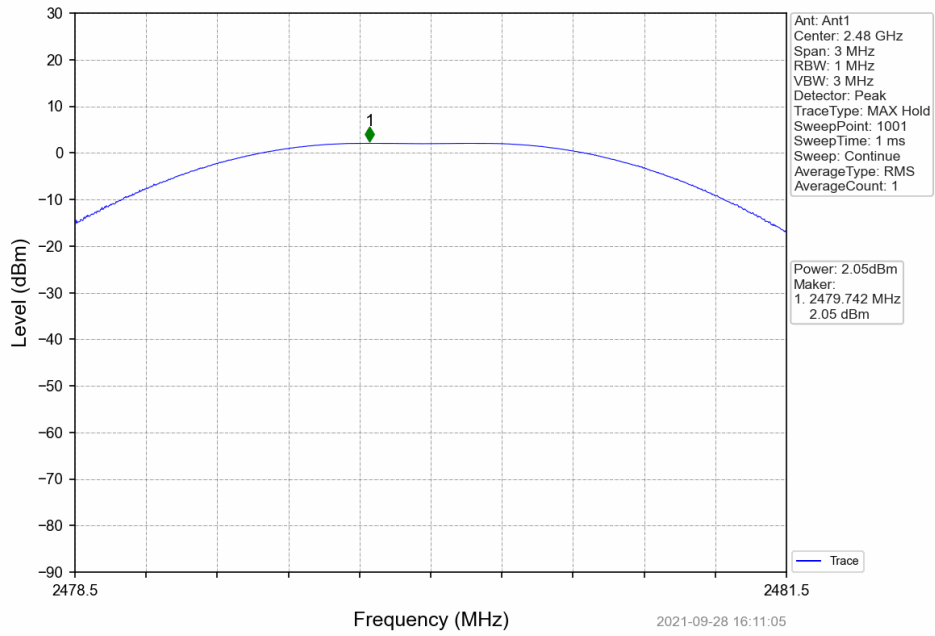
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4. Maximum Power Spectral Density

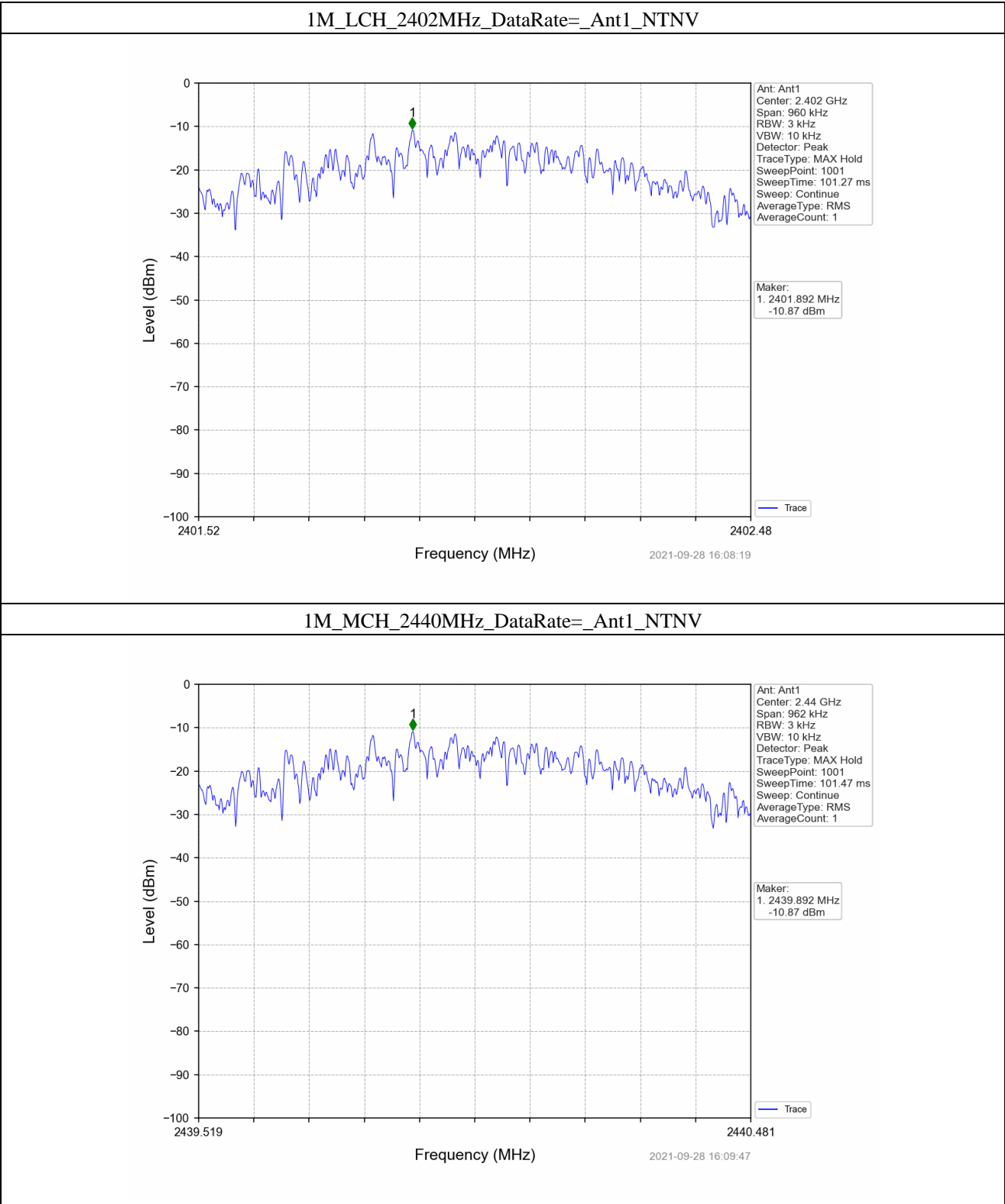
4.1 PSD

4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			Ant1	Limit	
1M	SISO	2402	-10.87	<=8	Pass
		2440	-10.87	<=8	Pass
		2480	-11.33	<=8	Pass

Note1: Antenna Gain: Ant1: 0.00dBi;

4.1.2 Test Graph

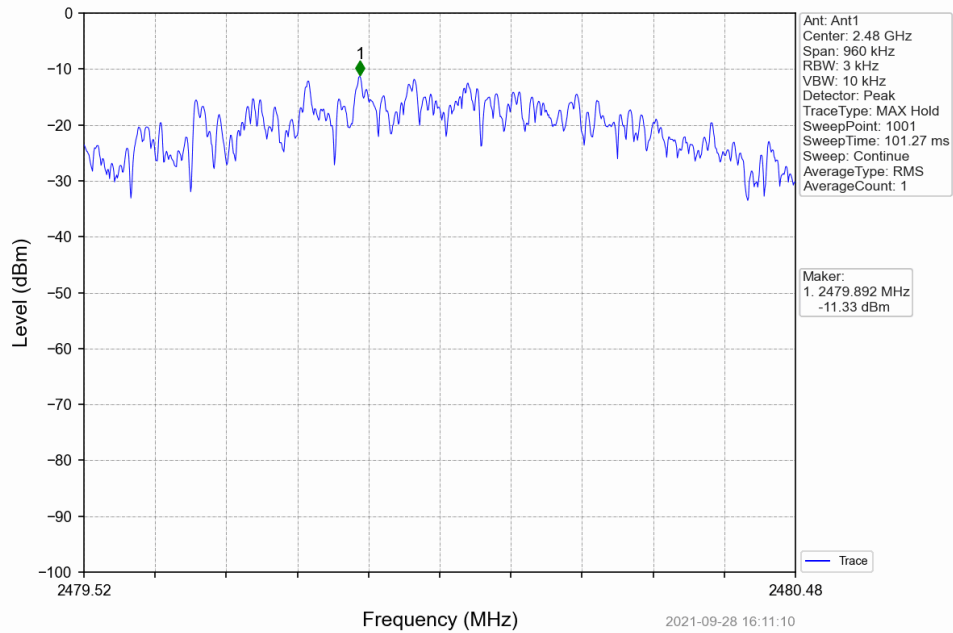


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# 1M\_HCH\_2480MHz\_DataRate=\_Ant1\_NTNV



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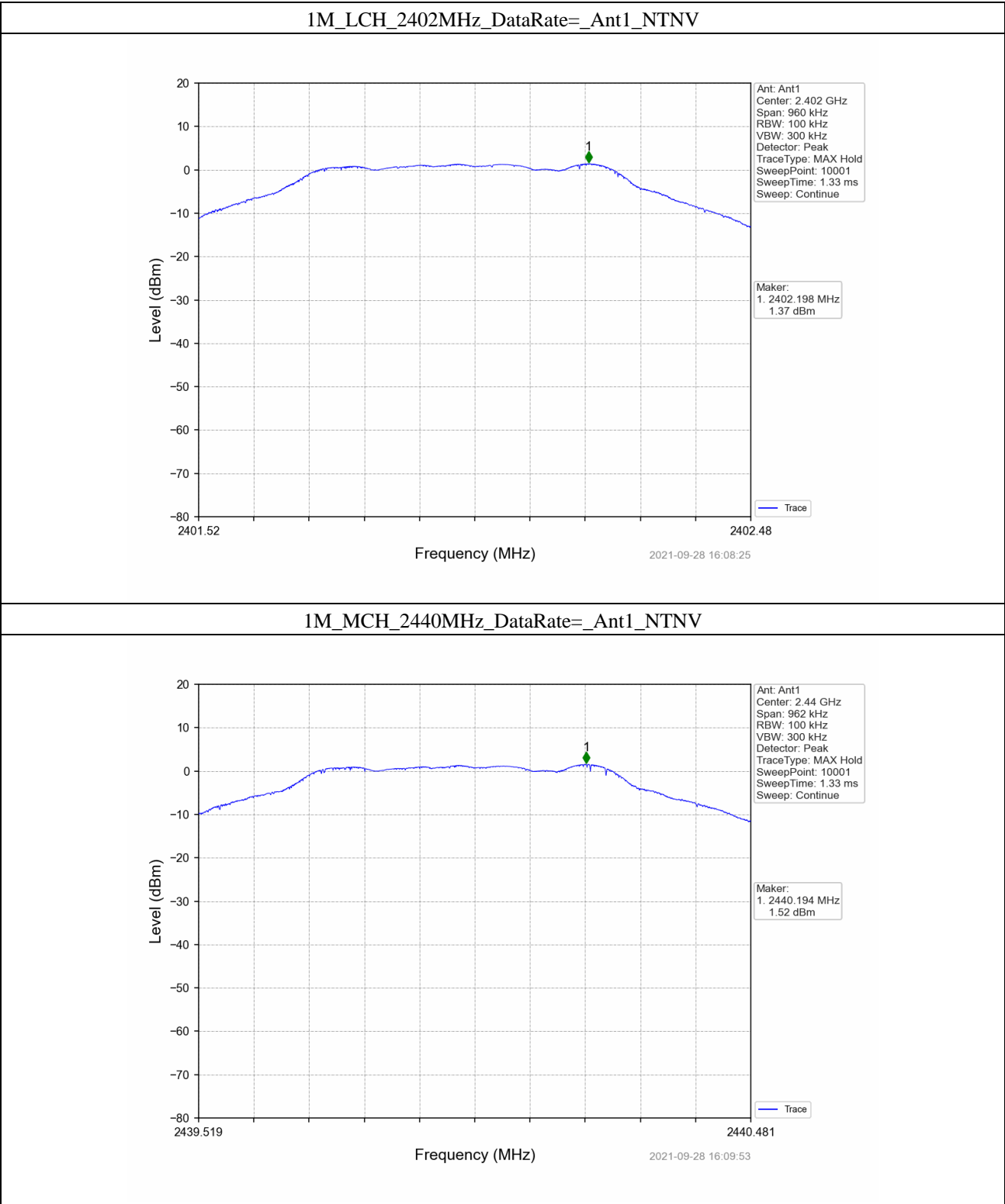
5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Ref

5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Ant	Level of Reference (dBm)
1M	SISO	2402	1	1.37
		2440	1	1.52
		2480	1	1.15
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 Test Graph



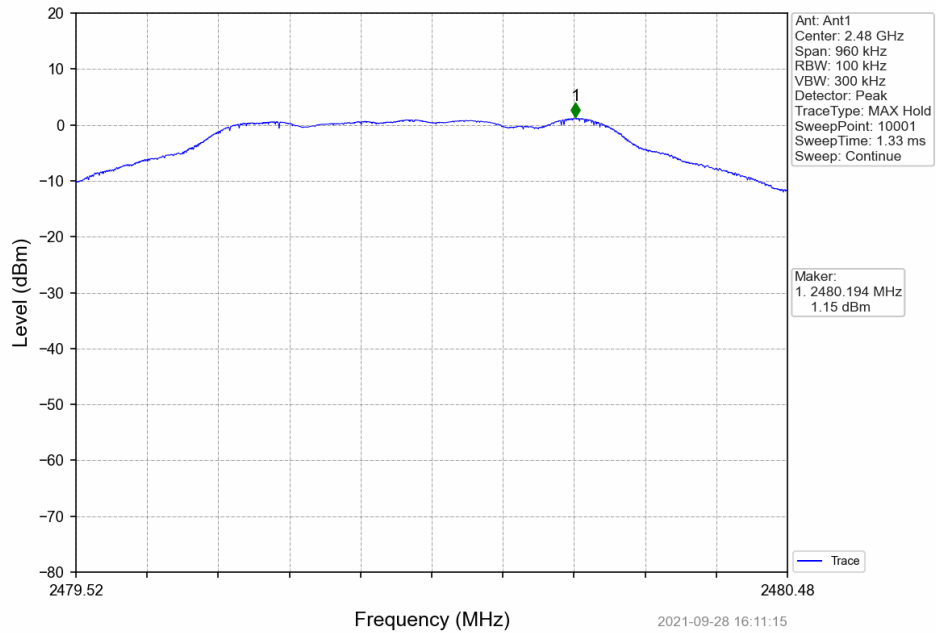
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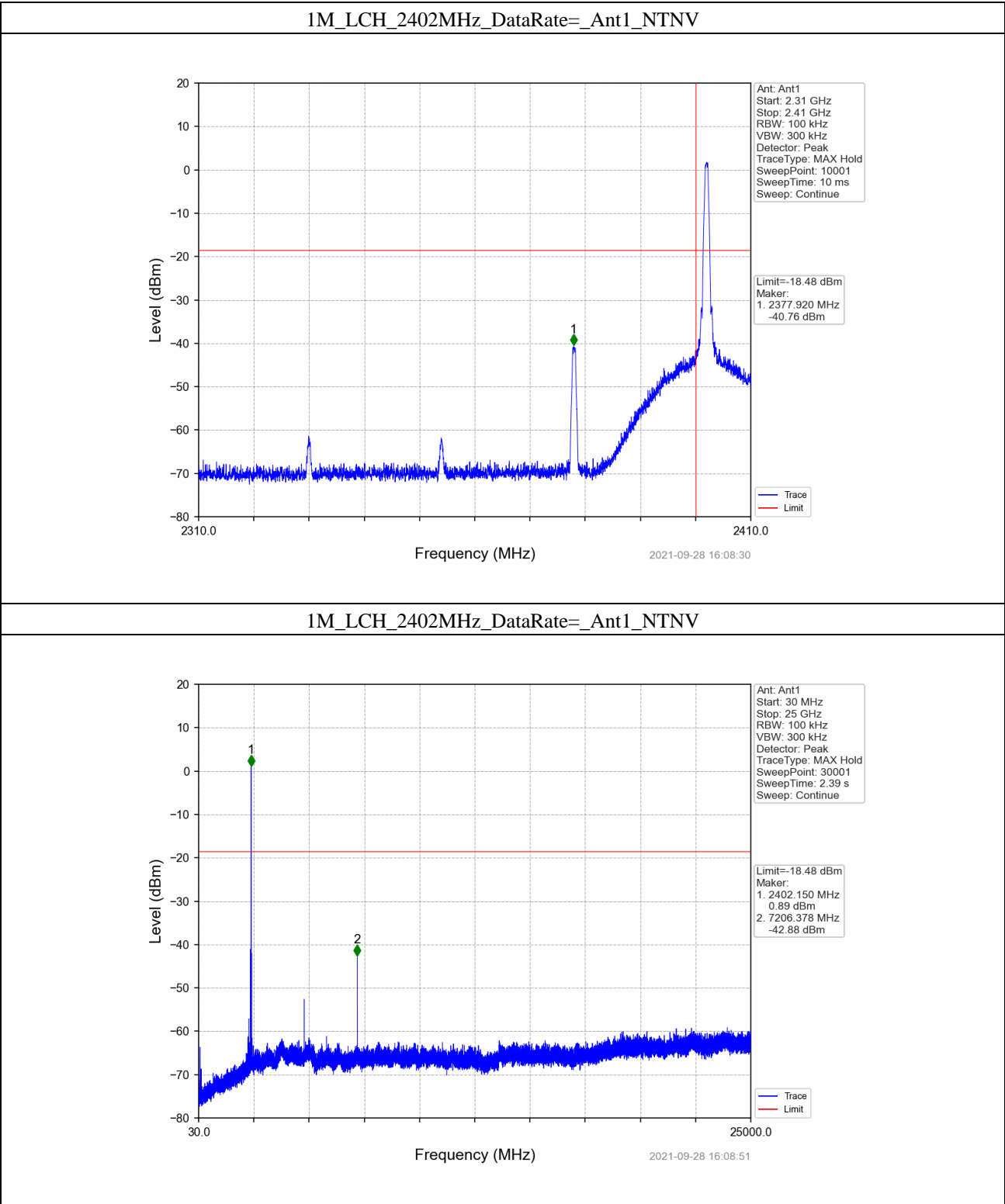
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5.2 CSE

5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Ant	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	1.52	-18.48	Pass
		2440	1	1.52	-18.48	Pass
		2480	1	1.52	-18.48	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.						

5.2.2 Test Graph

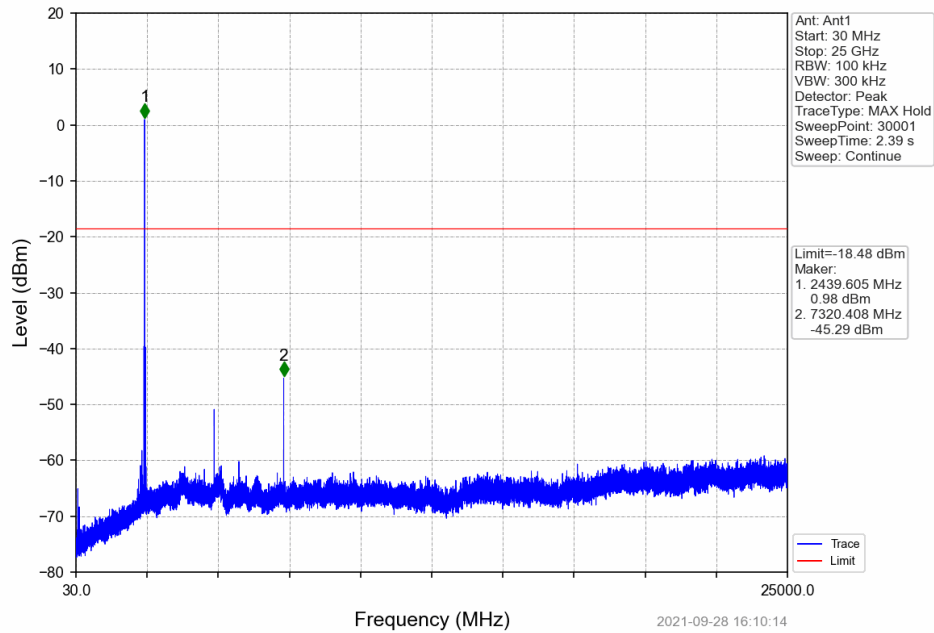


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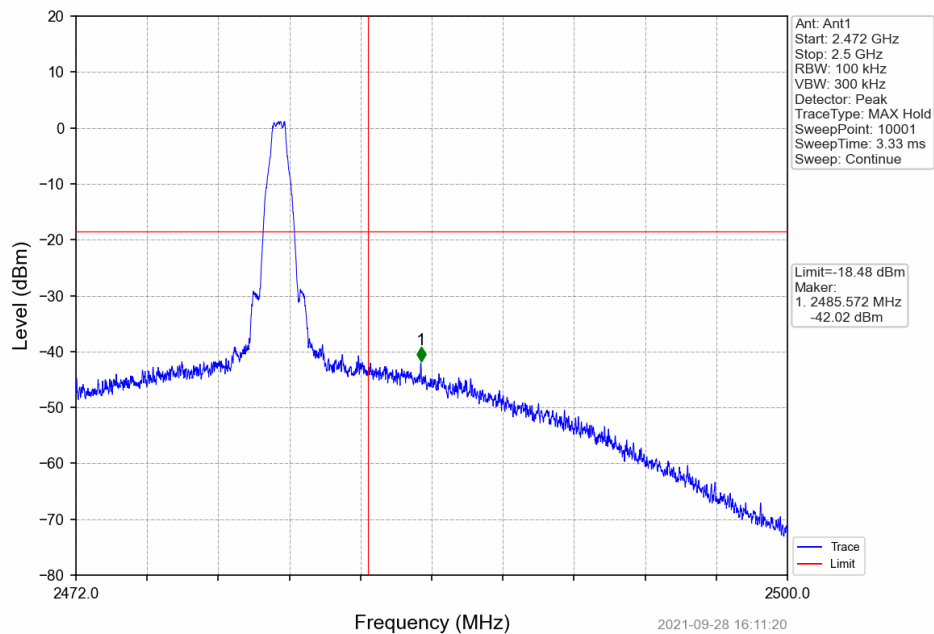
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# 1M\_HCH\_2480MHz\_DataRate=\_Ant1\_NTNV

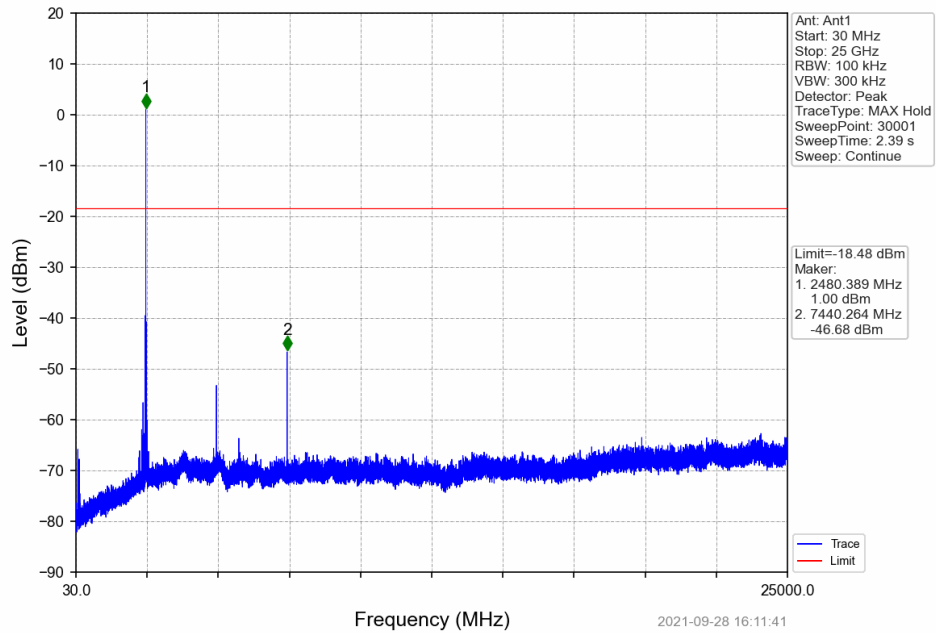


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