



## TEST REPORT

**Application No.:** GZCR2204000427AT  
**Applicant:** Harman International Industries, Inc  
**Address of Applicant:** 8500 Balboa Boulevard, Northridge, California, 91329, United States  
**Manufacturer:** Harman International Industries, Inc  
**Address of Manufacturer:** 8500 Balboa Boulevard, Northridge, California, 91329, United States  
**Factory:** Risuntek Inc  
**Address of Factory:** JiuWei Industrial Zone, Qishi Town, Dongguan City, Guangdong Province, China, 523000  
**Equipment Under Test (EUT):**  
**EUT Name:** BLUETOOTH HEADSET  
**Model No.:** VIBE BEAM  
**Trade Mark:** JBL  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.247  
**Date of Receipt:** 2022-04-25  
**Date of Test:** 2022-04-25  
**Date of Issue:** 2022-04-26

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian  
EMC Laboratory Manager



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中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022-04-26		Original

Authorized for issue by				
				
		Curry Wu/Project Engineer		
				
		Ricky Liu/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 Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1.3	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
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions (Below 1GHz)		ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions (Above 1GHz)		ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Duty Cycle		ANSI C63.10 (2013) Section 11.6	KDB 558074 D01 v05r02 section 6	Pass

### Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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## 4 General Information

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

Power supply: Left earbuds: Li-Ion Polymer Battery DC3.85V 48mAh (Charged by travel case)  
Right earbuds: Li-Ion Polymer Battery DC3.85V 48mAh (Charged by travel case)  
travel case with backup battery: Li-Ion Polymer Battery DC3.7V 530mAh (Charged by USB port)

Cable(s): Type-C cable: 21cm unshielded

Operation Frequency: 2402MHz to 2480MHz

Bluetooth Version: V5.2 Dual mode

Data Rate: Only support BLE 1M/bits

Modulation Type: GFSK

Number of Channels: 40

Channel Spacing: 2MHz

Antenna Type: Integral Antenna

Antenna Gain: left earbuds: 0.85dBi; Right earbuds: 0.85dBi

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--
The EUT has been tested as an independent unit.			

### 4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Peak Output Power	$\pm 0.75\text{dB}$
Minimum 6dB Bandwidth	$\pm 3\%$
Power Spectrum Density	$\pm 2.84\text{dB}$
Conducted Band Edges Measurement	$\pm 0.75\text{dB}$
Conducted Spurious Emissions	$\pm 0.75\text{dB}$
Radiated Emissions which fall in the restricted bands	$\pm 5.08\text{dB}$ (1GHz-6GHz); $\pm 5.14\text{dB}$ (above 6GHz)
Radiated Spurious Emissions (Below 1GHz)	$\pm 5.06\text{dB}$ (3m); $\pm 4.46\text{dB}$ (10m)
Radiated Spurious Emissions (Above 1GHz)	$\pm 5.08\text{dB}$ (1GHz-6GHz); $\pm 5.14\text{dB}$ (above 6GHz)
Duty Cycle	$\pm 0.37\%$
Remark: The $U_{\text{lab}}$ (lab Uncertainty) is less than $U_{\text{CISPR}}$ (CISPR Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.	

#### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,  
198 Kezhu Road, Sciotech Park, Guangzhou Economic & Technology Development District,  
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

#### 4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **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.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.





#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None

## 5 Equipment List

Conducted Peak Output Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Power Meter (U2021XA_Ch2)	Agilent Technologies	U2021XA_Ch2	SEM009-02	2021-05-19	2022-05-18
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-04-14	2023-04-13
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Minimum 6dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-04-14	2023-04-13
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Power Spectrum Density					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-04-14	2023-04-13
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Conducted Band Edges Measurement					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-04-14	2023-04-13
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A



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**Conducted Spurious Emissions**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-04-14	2023-04-13
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

**Radiated Emissions which fall in the restricted bands**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver(20Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2021-11-01	2022-10-31
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-16	2022-09-15
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2021-07-29	2022-07-28
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-08-30	2022-08-29



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Radiated Spurious Emissions (Below 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver(10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2022-04-06	2023-04-05
Trilog Broadband Antenna(25MHz-1GHz)-Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2022-02-22	2023-02-21
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
High Pass Filter (915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2021-12-17	2022-12-16
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
EMI Test Receiver(1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2021-05-26	2022-05-25



Radiated Spurious Emissions (Above 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver(20Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2021-11-01	2022-10-31
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-16	2022-09-15
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2021-07-29	2022-07-28
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-08-30	2022-08-29

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2021-07-05	2022-07-05

## 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

15.203 Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of 15.211, 15.213, 15.217, 15.219, 15.221, or 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

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 left earbuds: 0.85dBi; Right earbuds: 0.85dBi.

Antenna location: Refer to internal photo.

## 7 Radio Spectrum Matter Test Results

### 7.1 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 $\geq 50$ 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

#### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C

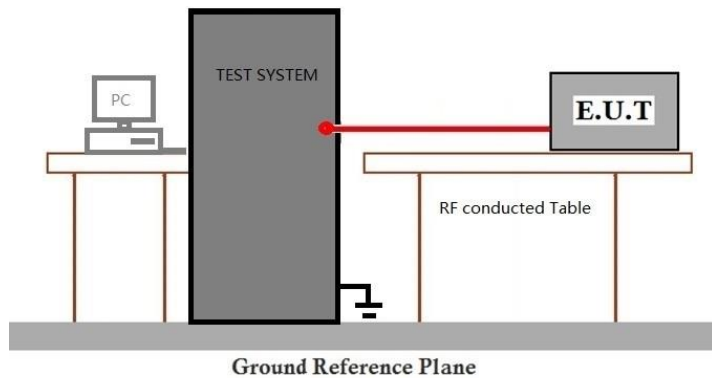
Humidity: 52 % RH

Atmospheric Pressure: 1003 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation

### 7.1.3 Test Setup Diagram



### 7.1.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details



### 7.2 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

#### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C

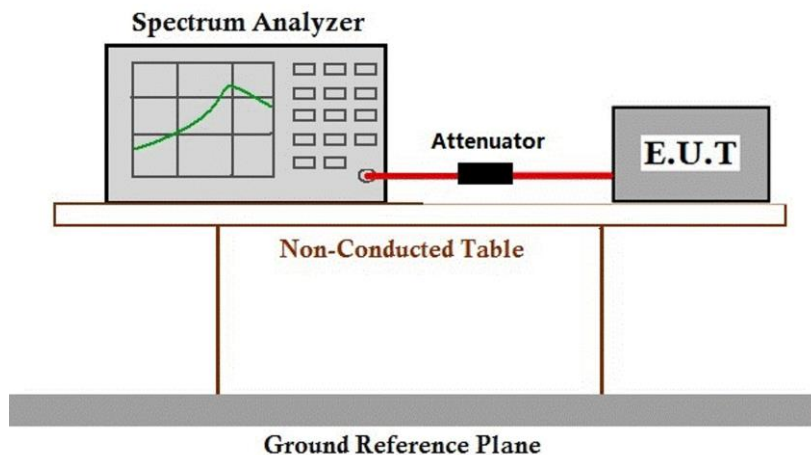
Humidity: 52 % RH

Atmospheric Pressure: 1003 mbar

#### 7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation

#### 7.2.3 Test Setup Diagram



#### 7.2.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

### 7.3 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

#### 7.3.1 E.U.T. Operation

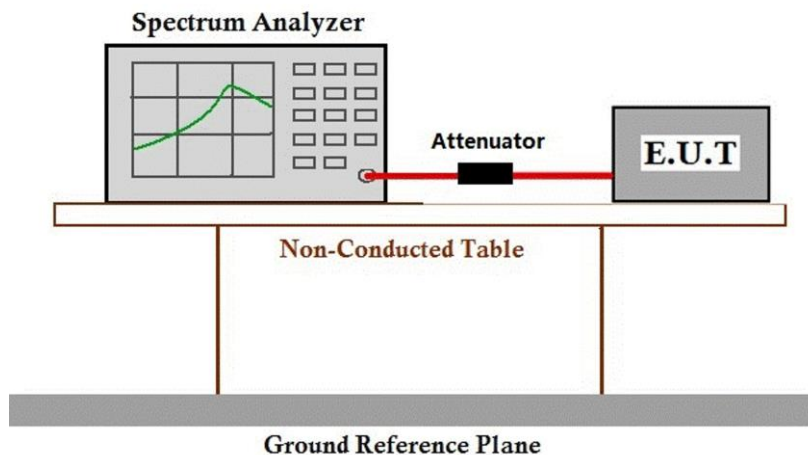
Operating Environment:

Temperature: 25 °C Humidity: 52 % RH Atmospheric Pressure: 1003 mbar

#### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation

#### 7.3.3 Test Setup Diagram



#### 7.3.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

### 7.4 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)).

#### 7.4.1 E.U.T. Operation

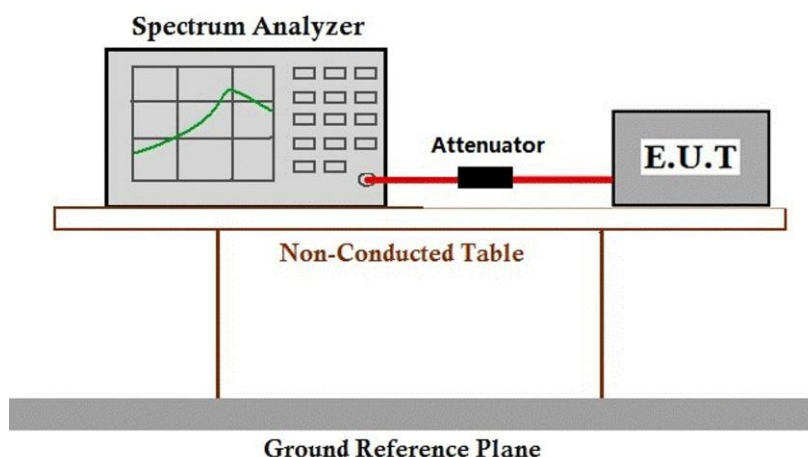
Operating Environment:

Temperature: 25 °C Humidity: 52 % RH Atmospheric Pressure: 1003 mbar

#### 7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation

#### 7.4.3 Test Setup Diagram



#### 7.4.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details



### 7.5 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)).

#### 7.5.1 E.U.T. Operation

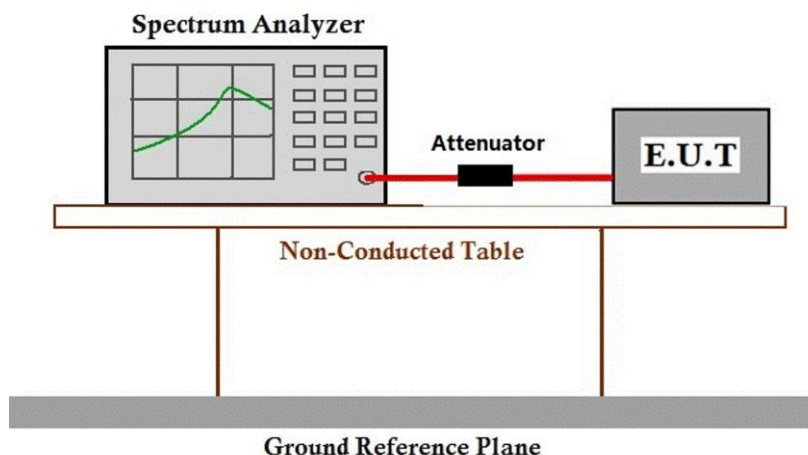
Operating Environment:

Temperature: 25 °C Humidity: 52 % RH Atmospheric Pressure: 1003 mbar

#### 7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation

#### 7.5.3 Test Setup Diagram



#### 7.5.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

**7.6 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  
Measurement Distance: 3m  
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.

**7.6.1 E.U.T. Operation**

Operating Environment:

Temperature: 25 °C Humidity: 52 % RH Atmospheric Pressure: 1003 mbar

**7.6.2 Test Mode Description**

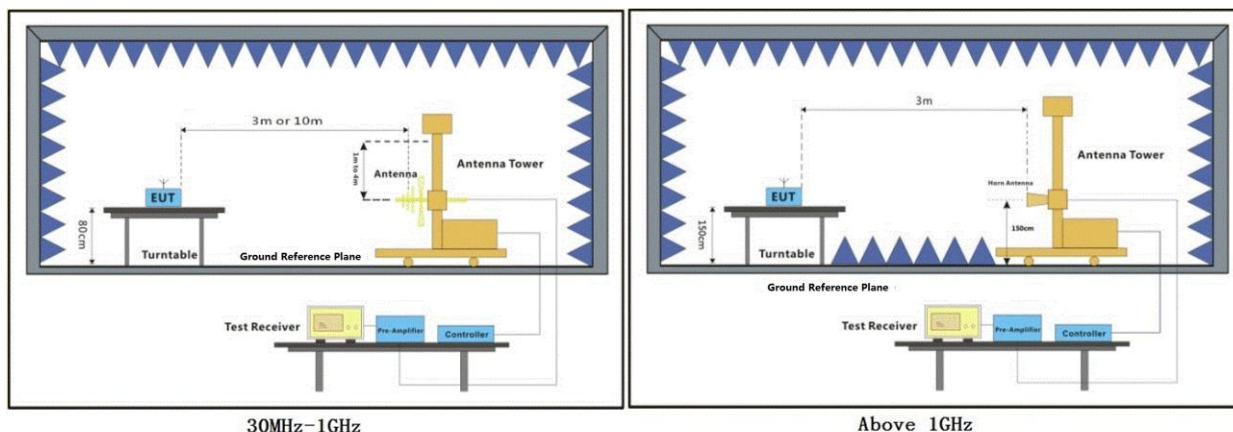
Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation



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### 7.6.3 Test Setup Diagram



### 7.6.4 Measurement Procedure and Data

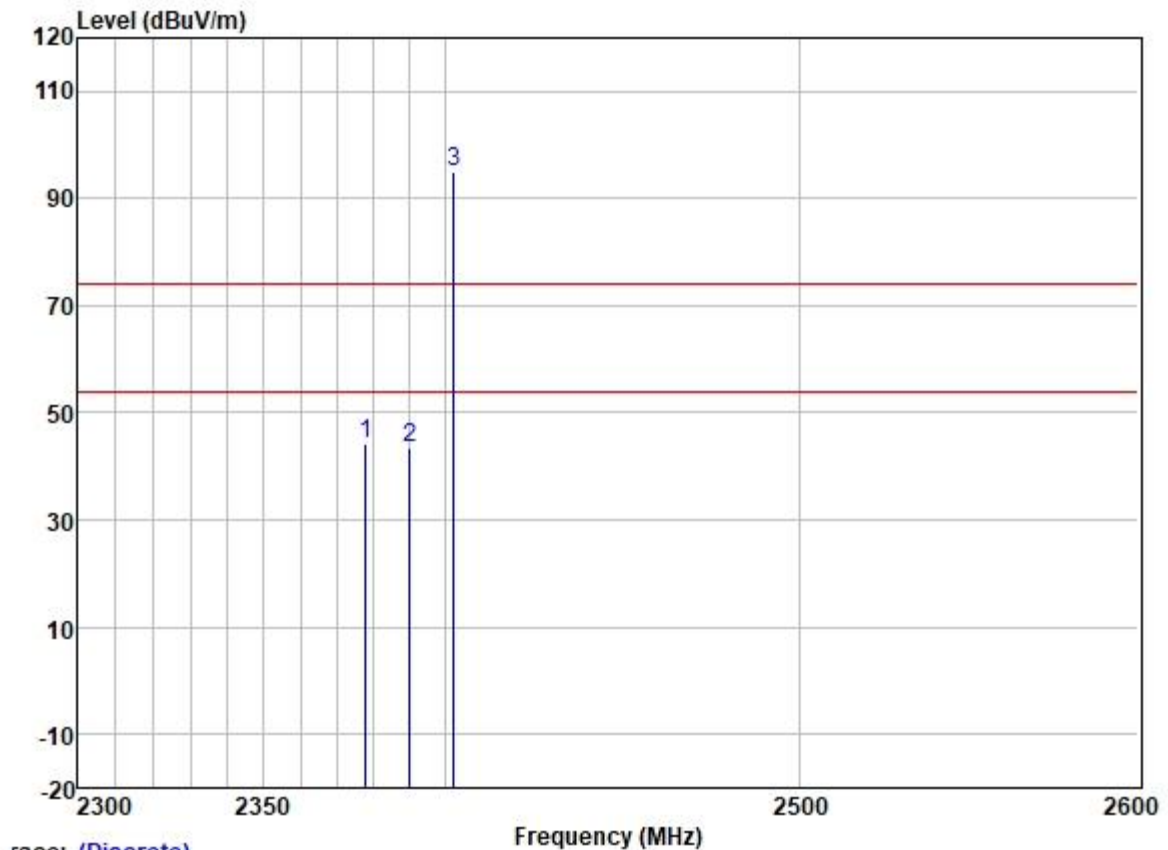
- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters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

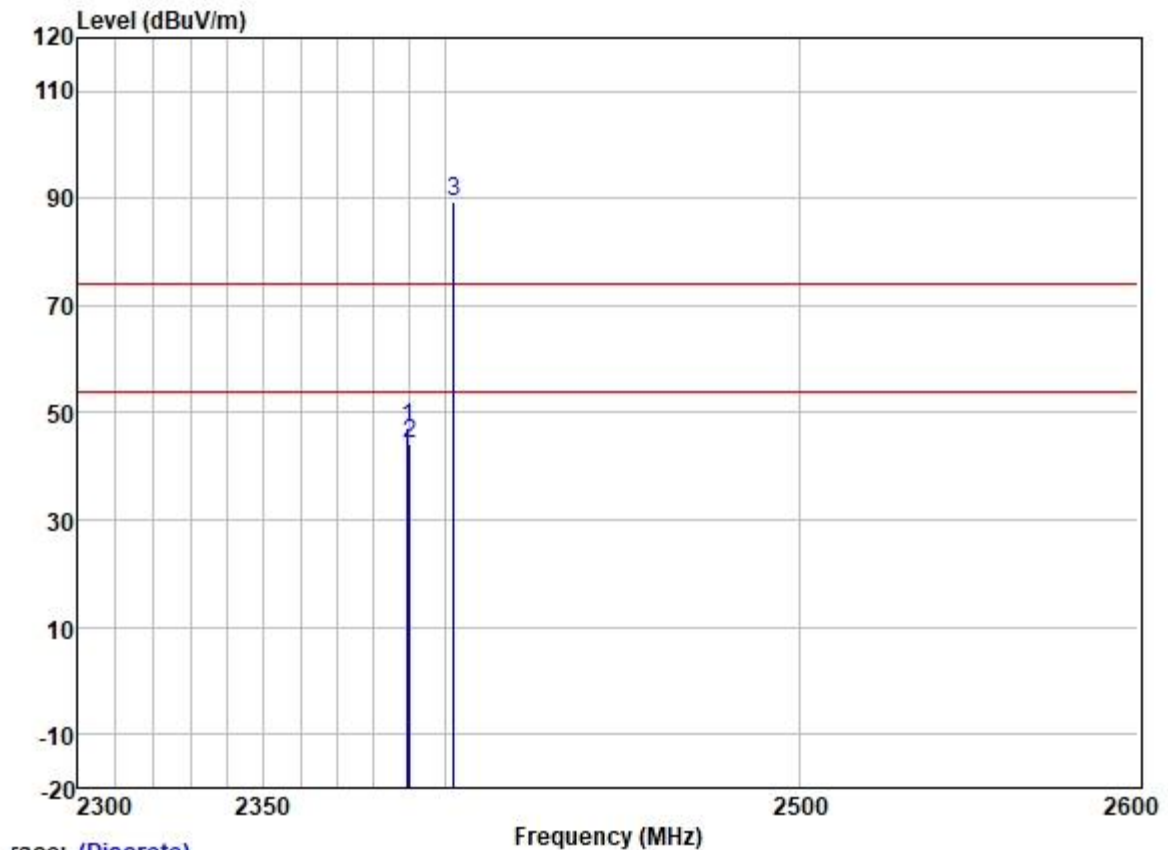


Test Mode: 07; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



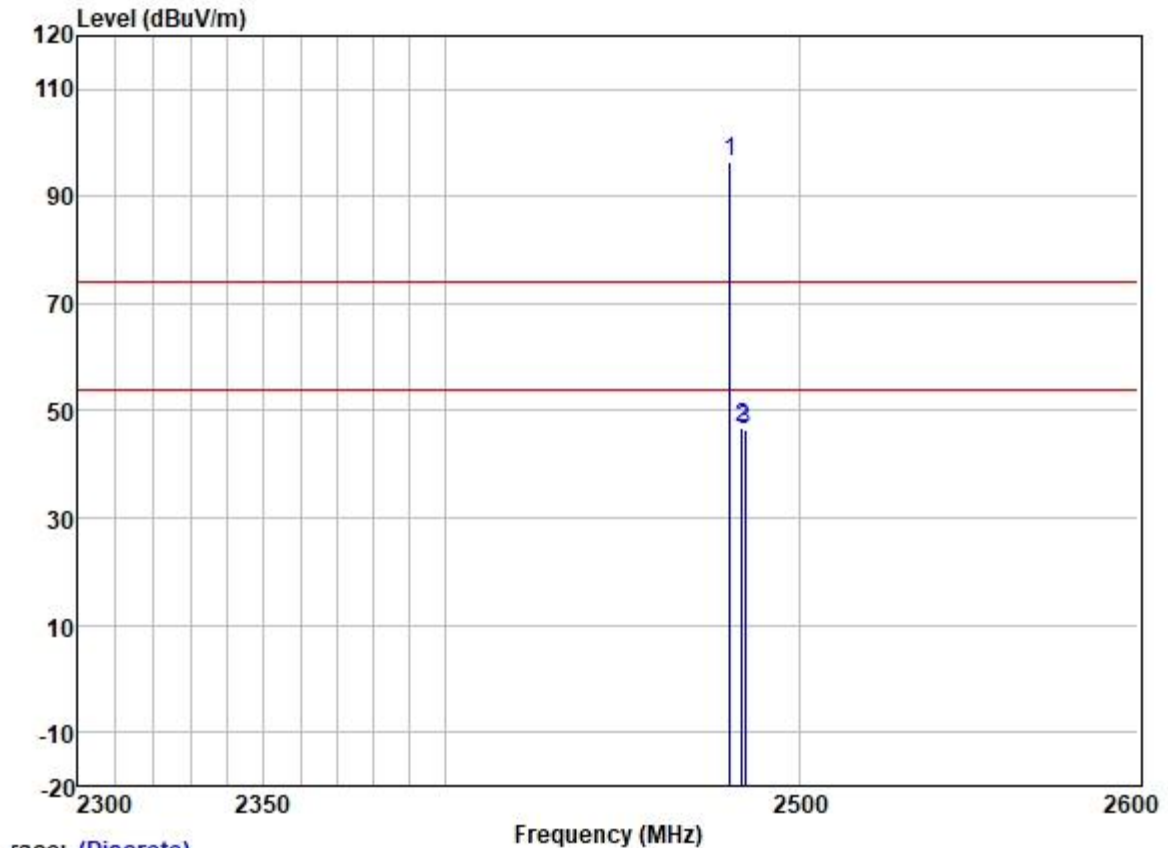
	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2377.840	51.22	27.31	3.46	37.60	44.39	74.00	-29.61	HORIZONTAL	Peak
2	2390.000	50.10	27.33	3.48	37.59	43.32	74.00	-30.68	HORIZONTAL	Peak
3 *	2402.000	101.87	27.35	3.50	37.59	95.13	74.00	21.13	HORIZONTAL	Peak

Test Mode: 07; Polarity: Vertical; Modulation:GFSK; ; Channel:Low



	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit	Over	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2389.356	54.11	27.33	3.48	37.59	47.33	74.00	-26.67	VERTICAL	Peak
2	2390.000	50.84	27.33	3.48	37.59	44.06	74.00	-29.94	VERTICAL	Peak
3 *	2402.000	96.14	27.35	3.50	37.59	89.40	74.00	15.40	VERTICAL	Peak

Test Mode: 07; Polarity: Horizontal; Modulation: GFSK; ; Channel: High



Trace: (Discrete)

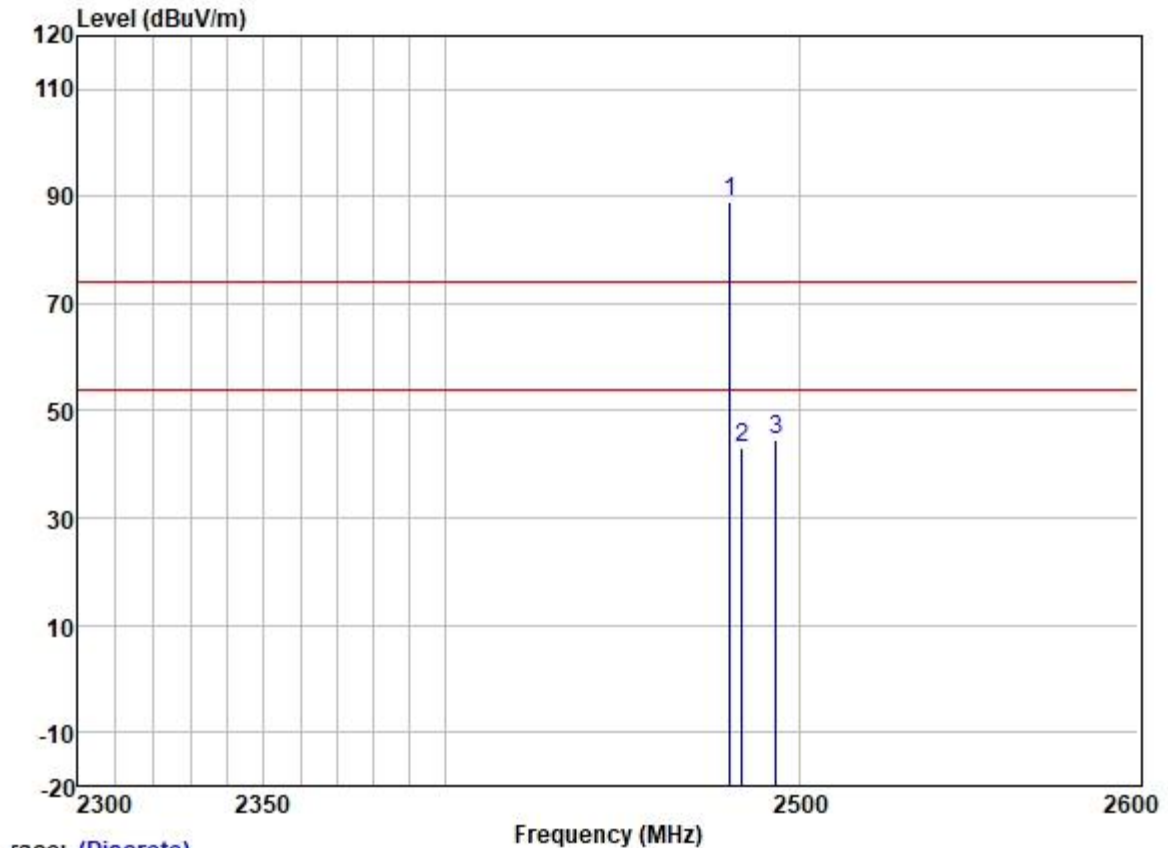
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 *	2480.000	102.87	27.47	3.60	37.57	96.37	74.00	22.37	HORIZONTAL	Peak
2	2483.500	53.37	27.48	3.53	37.57	46.81	74.00	-27.19	HORIZONTAL	Peak
3	2484.296	52.87	27.48	3.53	37.57	46.31	74.00	-27.69	HORIZONTAL	Peak



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Test Mode: 07; Polarity: Vertical; Modulation:GFSK; ; Channel:High



Trace: (Discrete)

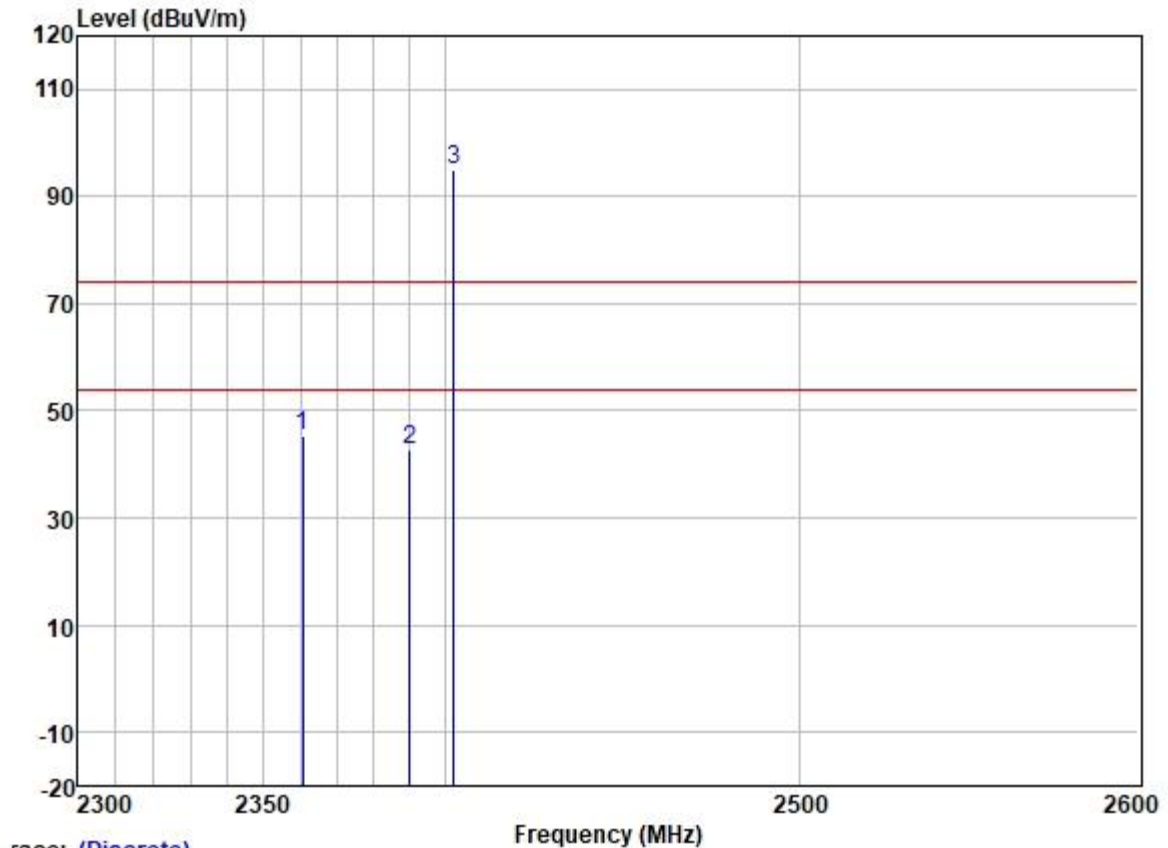
	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
		Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 *	2480.000	95.48	27.47	3.60	37.57	88.98	74.00	14.98	VERTICAL	Peak
2	2483.500	49.81	27.48	3.53	37.57	43.25	74.00	-30.75	VERTICAL	Peak
3	2493.375	51.35	27.49	3.47	37.56	44.75	74.00	-29.25	VERTICAL	Peak



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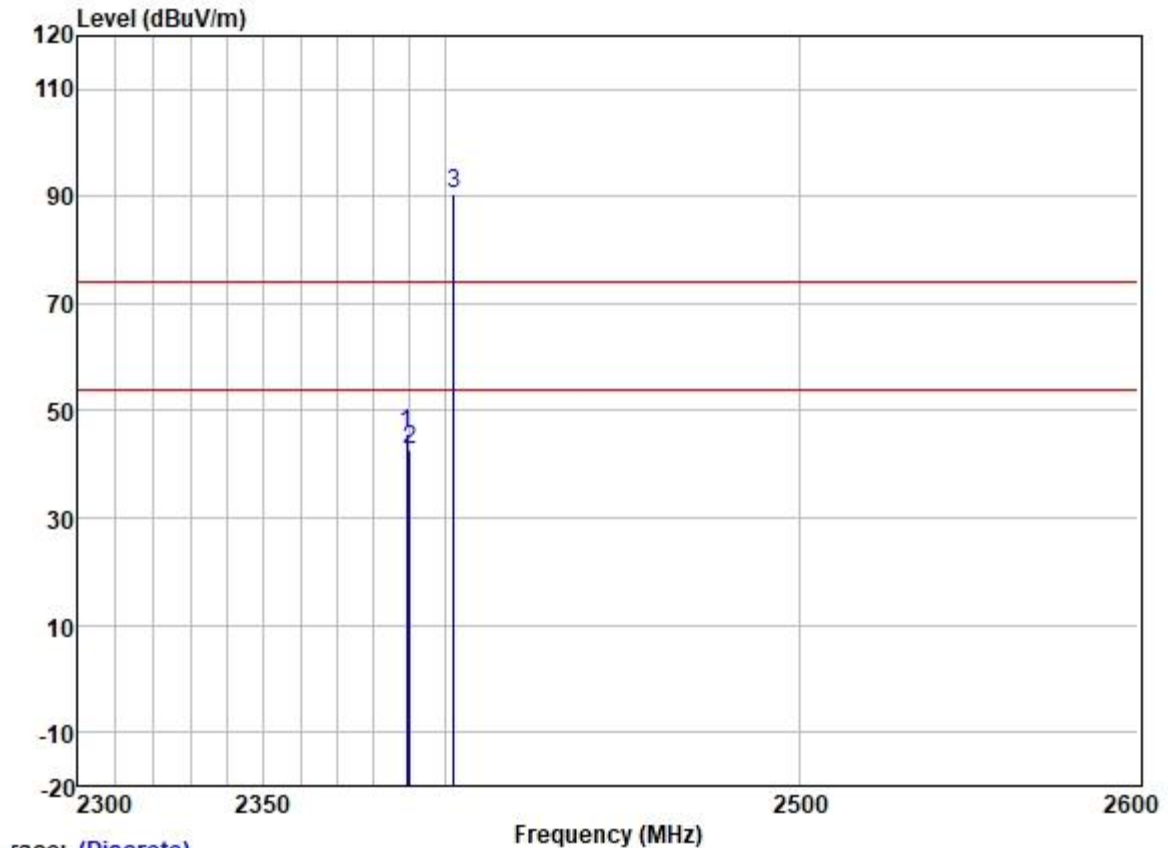


Test Mode: 08; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	Pol/Phase	Remark
		Level	Factor	Loss	Factor	Line	Limit		
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2360.470	52.41	27.27	3.42	37.61	45.49	74.00	-28.51	HORIZONTAL Peak
2	2390.000	49.35	27.33	3.48	37.59	42.57	74.00	-31.43	HORIZONTAL Peak
3 *	2402.000	101.83	27.35	3.50	37.59	95.09	74.00	21.09	HORIZONTAL Peak

Test Mode: 08; Polarity: Vertical; Modulation: GFSK; ; Channel: Low



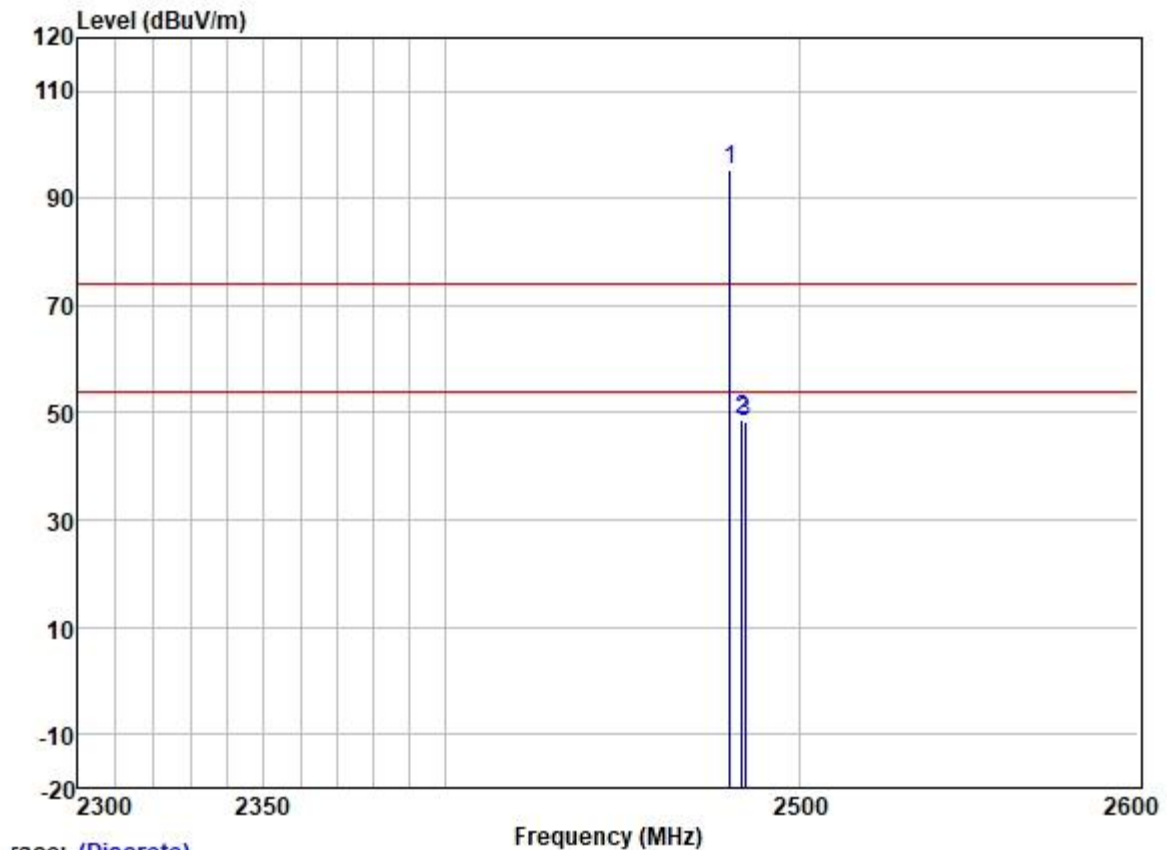
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit	Over	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2388.951	52.62	27.33	3.48	37.59	45.84	74.00	-28.16	VERTICAL	Peak
2	2390.000	49.66	27.33	3.48	37.59	42.88	74.00	-31.12	VERTICAL	Peak
3 *	2402.000	97.09	27.35	3.50	37.59	90.35	74.00	16.35	VERTICAL	Peak



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Test Mode: 08; Polarity: Horizontal; Modulation: GFSK; ; Channel: High



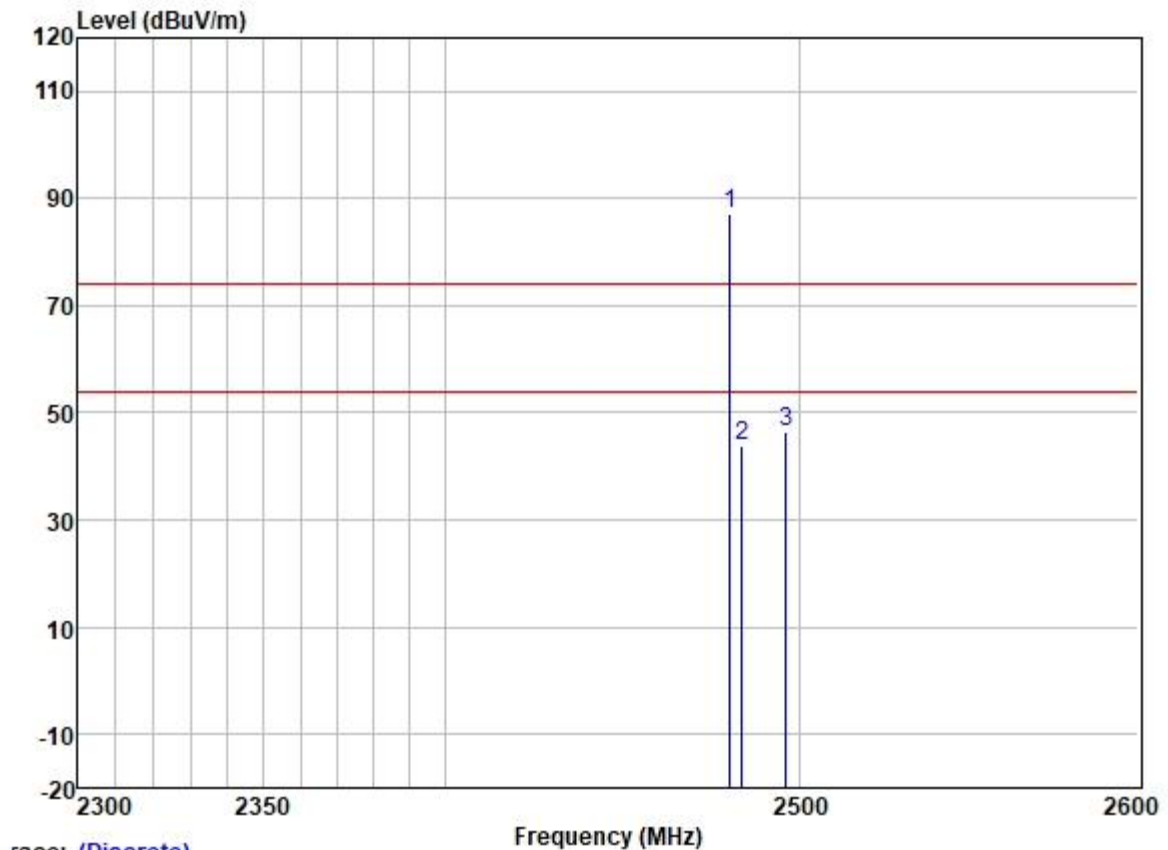
	Freq	ReadAntenna	Cable	Preamp		Limit	Over		
	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2480.000	101.71	27.47	3.60	37.57	95.21	74.00	21.21	HORIZONTAL Peak
2	2483.500	55.21	27.48	3.53	37.57	48.65	74.00	-25.35	HORIZONTAL Peak
3	2484.196	54.86	27.48	3.53	37.57	48.30	74.00	-25.70	HORIZONTAL Peak



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Test Mode: 08; Polarity: Vertical; Modulation: GFSK; ; Channel: High



	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 *	2480.000	93.73	27.47	3.60	37.57	87.23	74.00	13.23	VERTICAL	Peak
2	2483.500	50.32	27.48	3.53	37.57	43.76	74.00	-30.24	VERTICAL	Peak
3	2496.259	53.16	27.49	3.47	37.56	46.56	74.00	-27.44	VERTICAL	Peak



## 7.7 Radiated Spurious Emissions (Below 1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 &amp; 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.

### 7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C

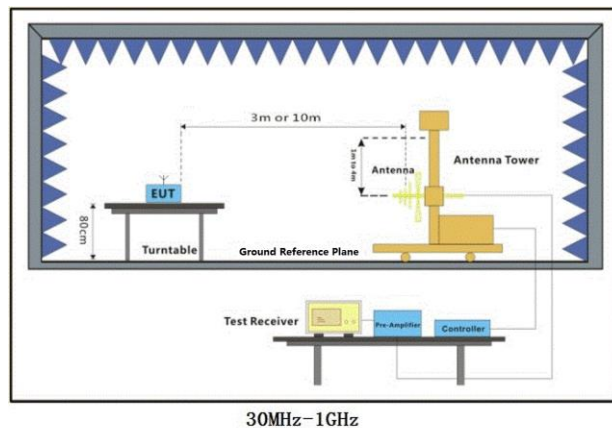
Humidity: 52 % RH

Atmospheric Pressure: 1003 mbar

### 7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation

### 7.7.3 Test Setup Diagram



### 7.7.4 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.
- 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 middle 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) 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.



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The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,  
 $L_3 / L_{10} = D_{10} / D_3$

Note:

L<sub>3</sub>: Level @ 3m distance. Unit: uV/m;

L<sub>10</sub>: Level @ 10m distance. Unit: uV/m;

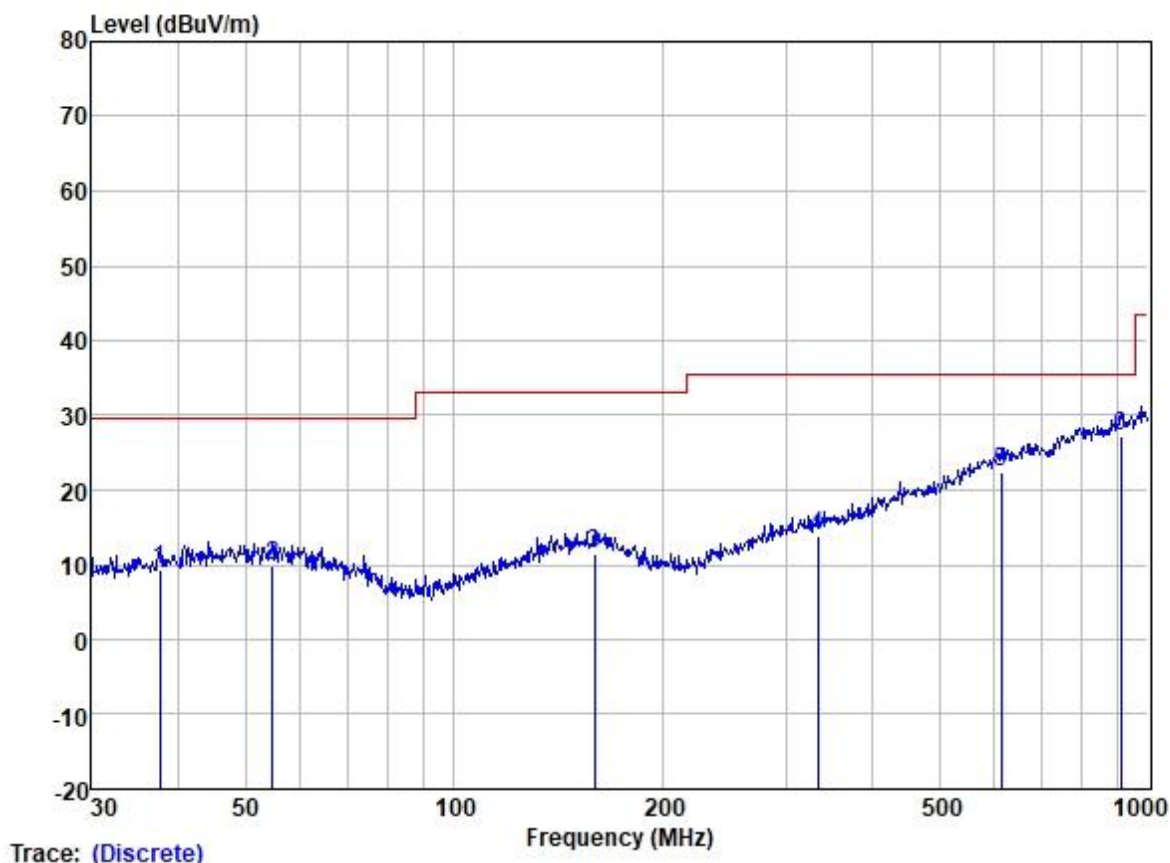
D<sub>3</sub>: 3m distance. Unit: m

D<sub>10</sub>: 10m distance. Unit: m

The level at 3m test distance is below:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
37.680	9.30	2.92	9.72	19.76	40.00	-20.24	H
54.643	9.97	3.15	10.50	20.43	40.00	-19.57	H
159.225	11.52	3.77	12.56	21.98	43.50	-21.52	H
333.687	13.91	4.96	16.53	24.37	46.00	-21.63	H
614.214	22.38	13.15	43.84	32.84	46.00	-13.16	H
912.862	27.17	22.83	76.10	37.63	46.00	-8.37	H
40.845	9.92	3.13	10.44	20.38	40.00	-19.62	V
53.693	10.06	3.18	10.61	20.52	40.00	-19.48	V
159.784	11.17	3.62	12.06	21.63	43.50	-21.87	V
341.979	13.58	4.78	15.92	24.04	46.00	-21.96	V
612.064	23.00	14.13	47.08	33.46	46.00	-12.54	V
925.756	27.54	23.82	79.41	38.00	46.00	-8.00	V

Test Mode: 07; Polarity: Horizontal

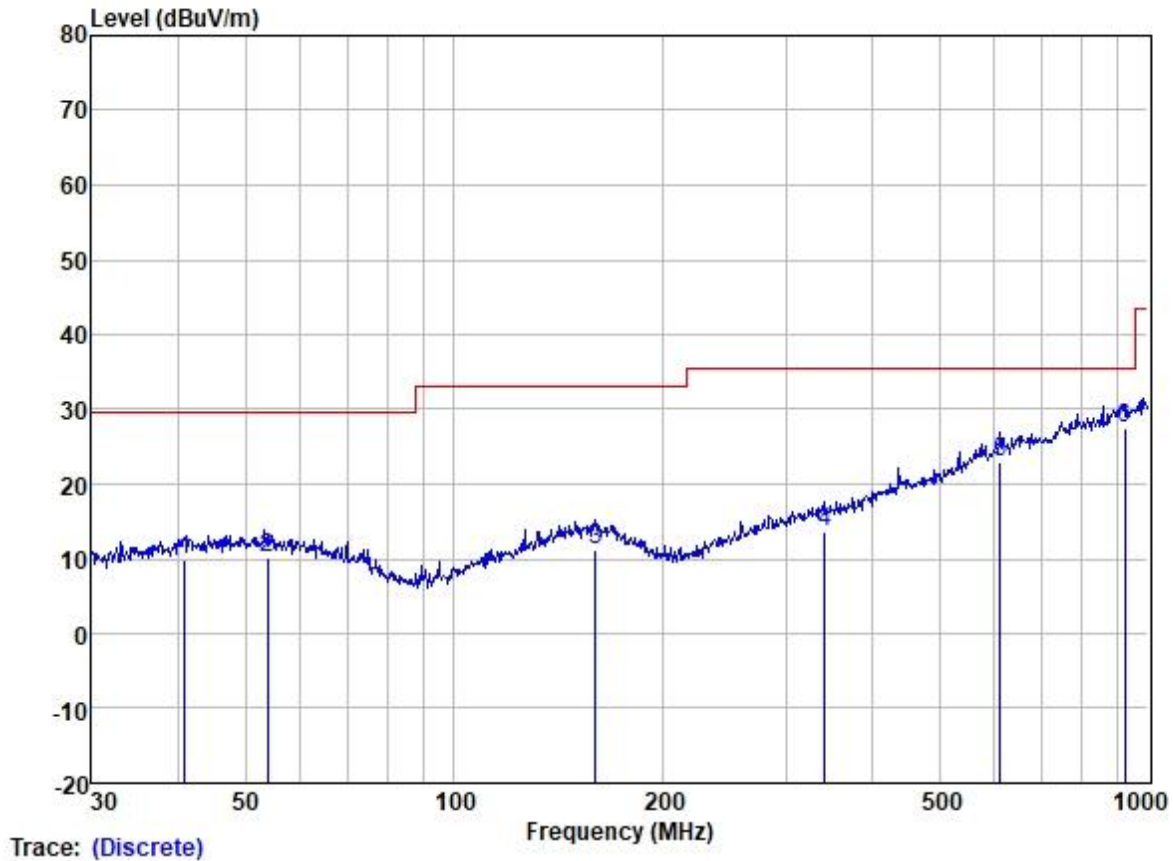


Site : SGS  
Job :  
Model :  
Power :  
Test Mode : 07

	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	37.680	22.60	12.79	1.09	27.18	9.30	29.50	-20.20	HORIZONTAL	QP
2	54.643	22.55	13.39	1.19	27.16	9.97	29.50	-19.53	HORIZONTAL	QP
3	159.225	22.65	13.34	2.33	26.80	11.52	33.10	-21.58	HORIZONTAL	QP
4	333.687	23.04	14.18	3.46	26.77	13.91	35.60	-21.69	HORIZONTAL	QP
5	614.214	25.25	20.10	5.23	28.20	22.38	35.60	-13.22	HORIZONTAL	QP
6	912.862	24.59	23.45	6.96	27.83	27.17	35.60	-8.43	HORIZONTAL	QP



Test Mode: 07; Polarity: Vertical



Site : SGS  
Job :  
Model :  
Power :  
Test Mode : 07

	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	40.845	22.91	13.09	1.10	27.18	9.92	29.50	-19.58	VERTICAL	QP
2	53.693	22.58	13.48	1.17	27.17	10.06	29.50	-19.44	VERTICAL	QP
3	159.784	22.31	13.33	2.33	26.80	11.17	33.10	-21.93	VERTICAL	QP
4	341.979	22.68	14.22	3.55	26.87	13.58	35.60	-22.02	VERTICAL	QP
5	612.064	25.94	20.03	5.23	28.20	23.00	35.60	-12.60	VERTICAL	QP
6	925.756	24.69	23.65	7.01	27.81	27.54	35.60	-8.06	VERTICAL	QP

The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,  
 $L_3 / L_{10} = D_{10} / D_3$

Note:

L<sub>3</sub>: Level @ 3m distance. Unit: uV/m;

L<sub>10</sub>: Level @ 10m distance. Unit: uV/m;

D<sub>3</sub>: 3m distance. Unit: m

D<sub>10</sub>: 10m distance. Unit: m

The level at 3m test distance is below:

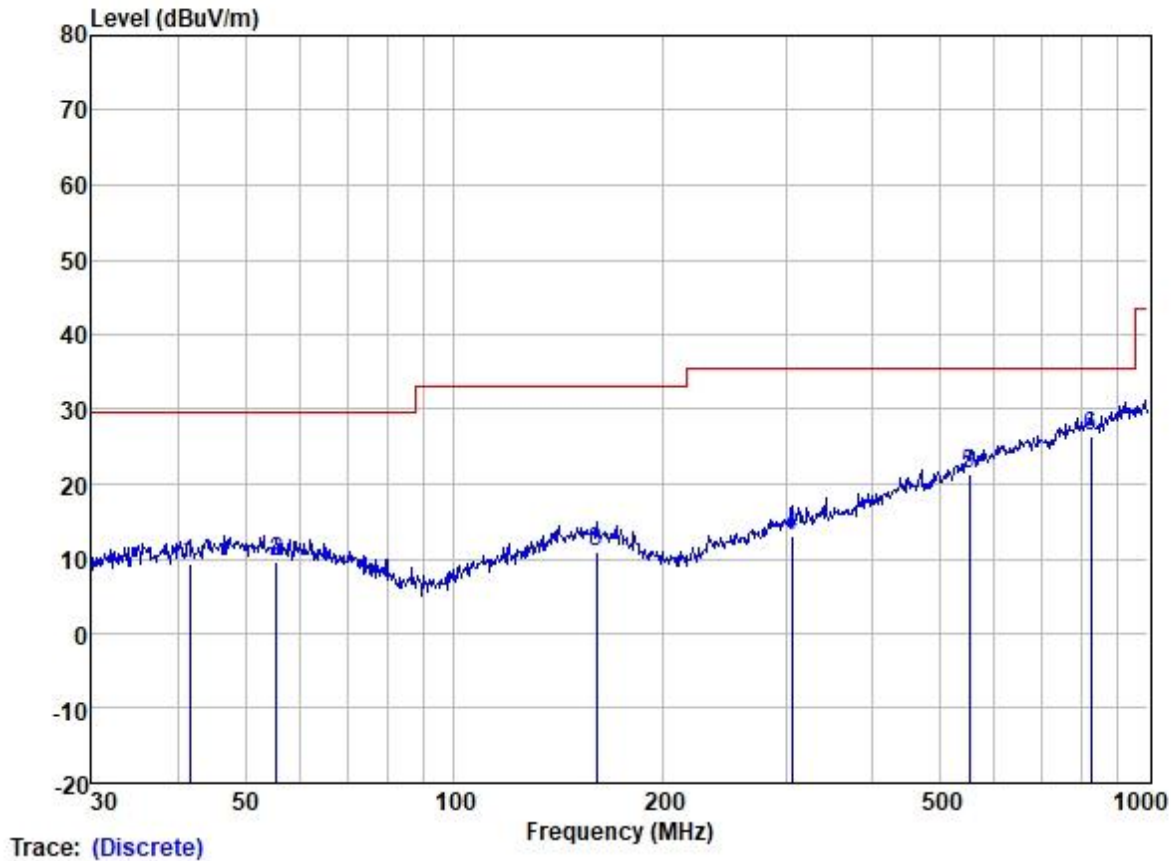
Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
41.567	9.33	2.93	9.76	19.79	40.00	-20.21	H
55.415	9.69	3.05	10.17	20.15	40.00	-19.85	H
160.346	10.83	3.48	11.60	21.29	43.50	-22.21	H
306.754	12.99	4.46	14.87	23.45	46.00	-22.55	H
552.883	21.22	11.51	38.36	31.68	46.00	-14.32	H
827.493	26.45	21.01	70.05	36.91	46.00	-9.09	H
42.750	8.89	2.78	9.28	19.35	40.00	-20.65	V
66.266	9.03	2.83	9.43	19.49	40.00	-20.51	V
149.486	11.61	3.81	12.69	22.07	43.50	-21.43	V
329.039	13.91	4.96	16.53	24.37	46.00	-21.63	V
638.369	22.78	13.77	45.91	33.24	46.00	-12.76	V
935.546	27.62	24.04	80.15	38.08	46.00	-7.92	V



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Test Mode: 08; Polarity: Horizontal

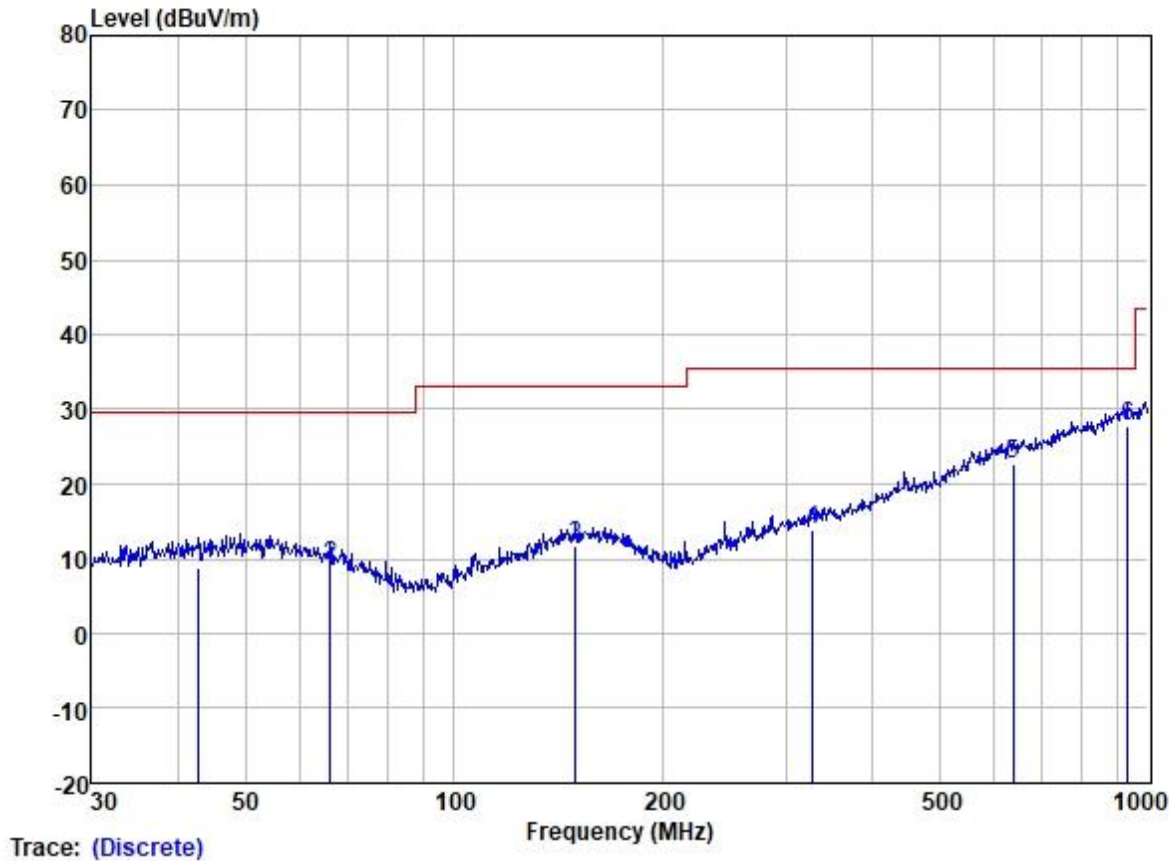


Site : SGS  
Job :  
Model :  
Power :  
Test Mode : 08

	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	41.567	22.18	13.21	1.11	27.17	9.33	29.50	-20.17	HORIZONTAL	QP
2	55.415	22.32	13.33	1.20	27.16	9.69	29.50	-19.81	HORIZONTAL	QP
3	160.346	21.99	13.31	2.33	26.80	10.83	33.10	-22.27	HORIZONTAL	QP
4	306.754	22.96	13.40	3.21	26.58	12.99	35.60	-22.61	HORIZONTAL	QP
5	552.883	26.22	18.29	4.83	28.12	21.22	35.60	-14.38	HORIZONTAL	QP
6	827.493	25.57	22.49	6.38	27.99	26.45	35.60	-9.15	HORIZONTAL	QP



Test Mode: 08; Polarity: Vertical



Site : SGS  
Job :  
Model :  
Power :  
Test Mode : 08

	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	42.750	21.64	13.31	1.11	27.17	8.89	29.50	-20.61	VERTICAL	QP
2	66.266	22.86	11.95	1.36	27.14	9.03	29.50	-20.47	VERTICAL	QP
3	149.486	22.91	13.32	2.22	26.84	11.61	33.10	-21.49	VERTICAL	QP
4	329.039	23.20	14.06	3.38	26.73	13.91	35.60	-21.69	VERTICAL	QP
5	638.369	25.45	20.13	5.39	28.19	22.78	35.60	-12.82	VERTICAL	QP
6	935.546	24.72	23.62	7.06	27.78	27.62	35.60	-7.98	VERTICAL	QP



## 7.8 Radiated Spurious Emissions (Above 1GHz)

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

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

Measurement Distance: 3m

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.

### 7.8.1 E.U.T. Operation

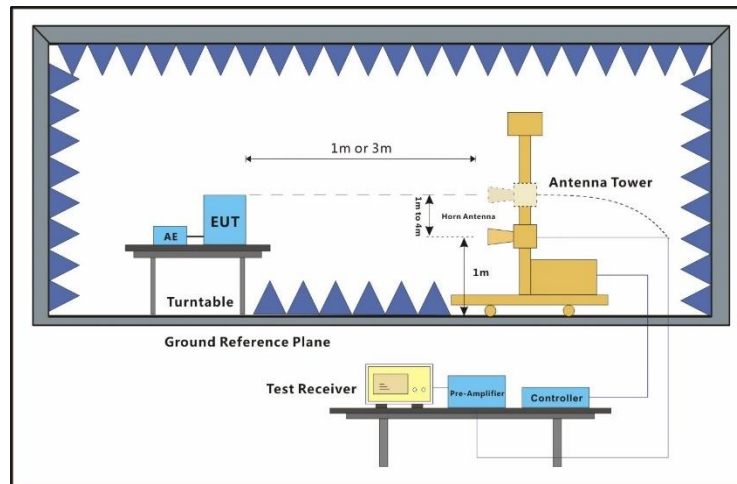
Operating Environment:

Temperature: 25 °C Humidity: 52 % RH Atmospheric Pressure: 1003 mbar

### 7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation

### 7.8.3 Test Setup Diagram



#### 7.8.4 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:

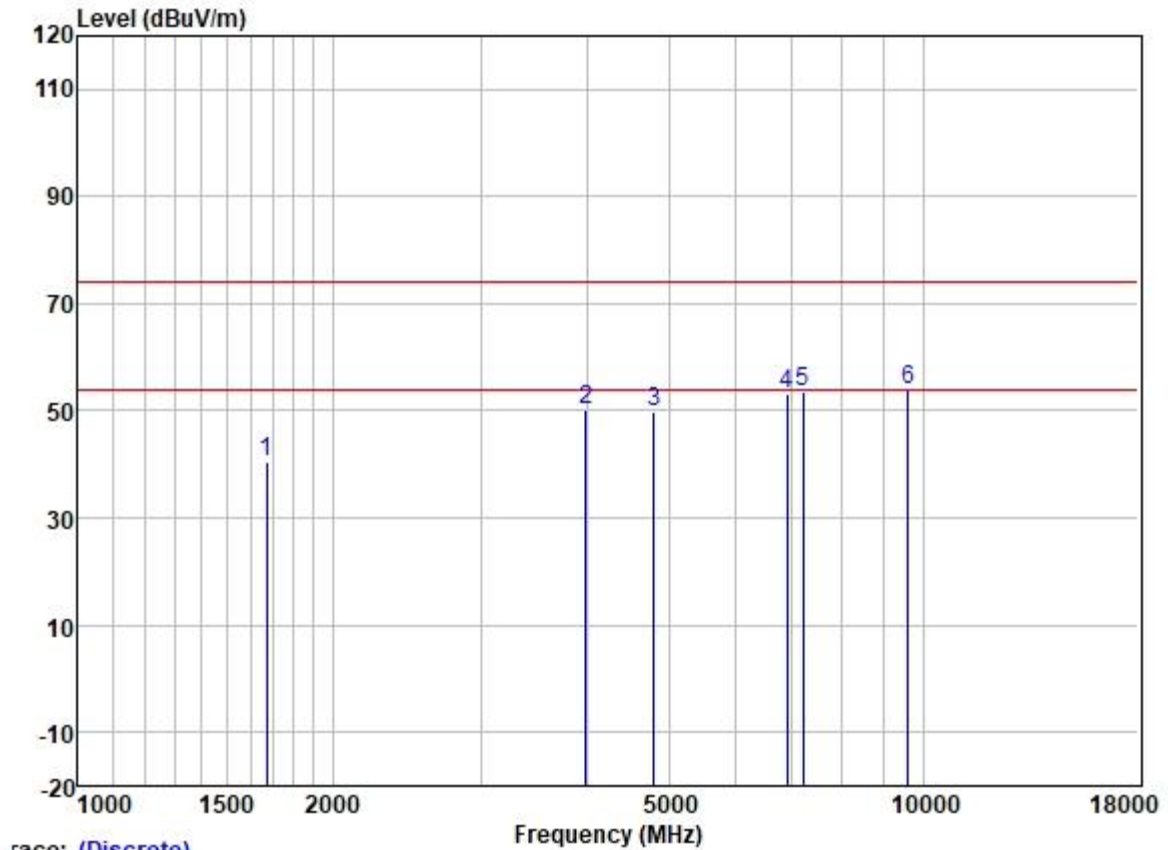
1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

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.

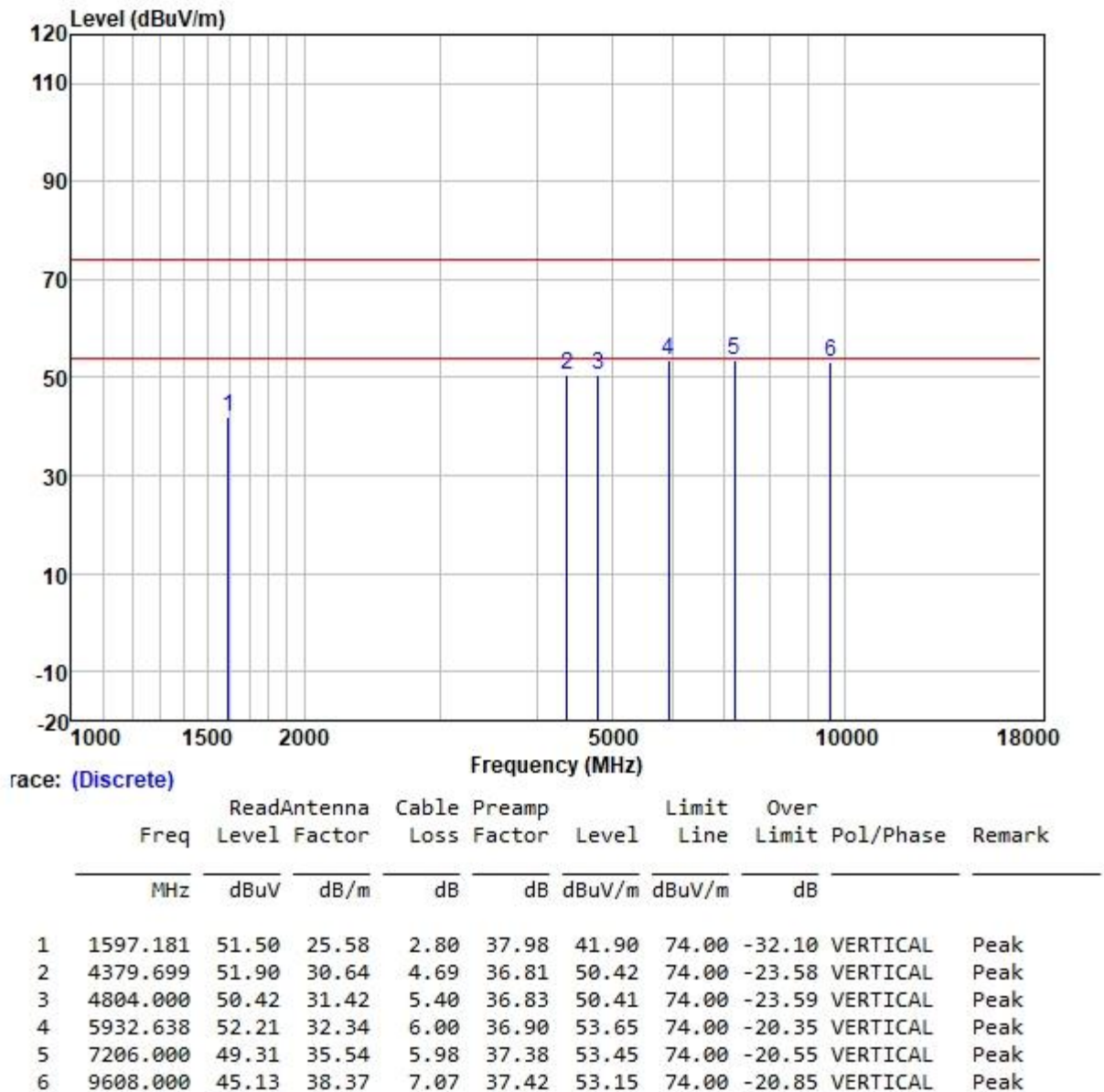
Test Mode: 07; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



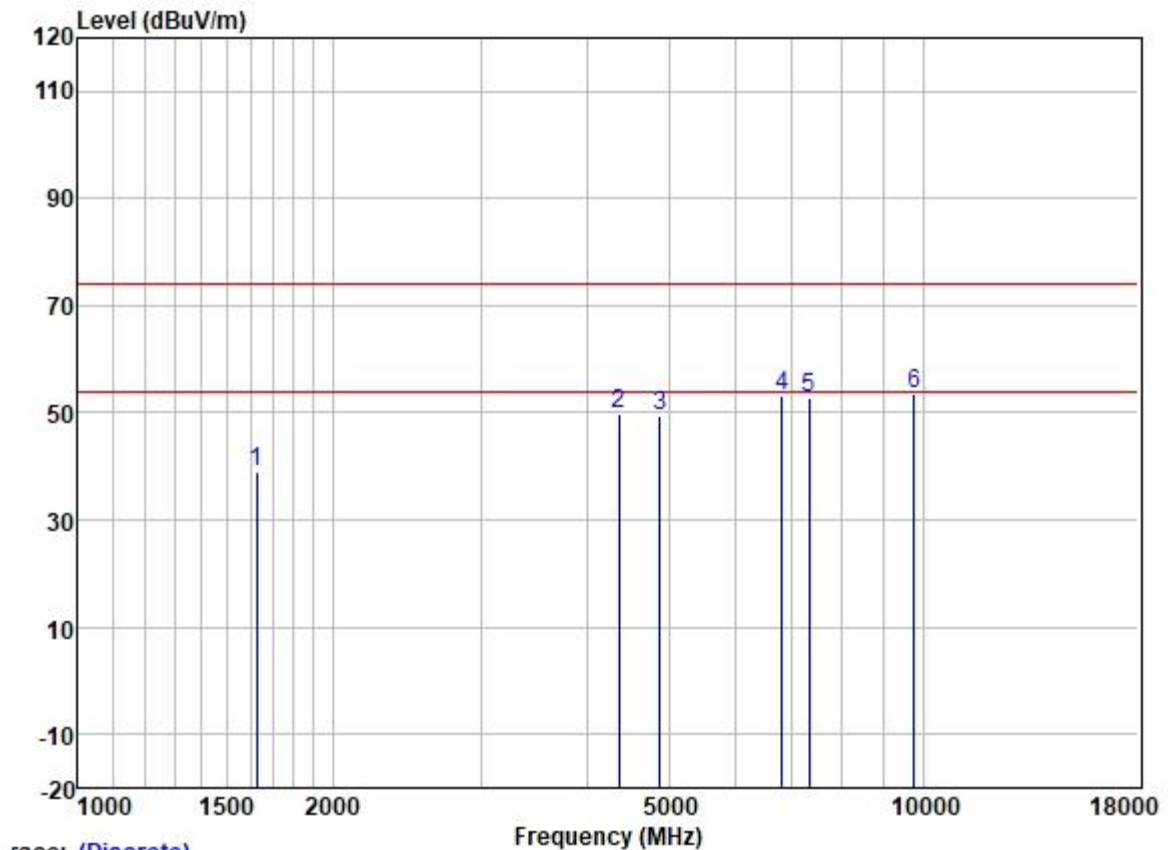
	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1672.779	49.76	25.67	2.80	37.91	40.32	74.00	-33.68	HORIZONTAL Peak
2	3992.781	52.46	29.79	4.60	36.80	50.05	74.00	-23.95	HORIZONTAL Peak
3	4804.000	49.99	31.42	5.40	36.83	49.98	74.00	-24.02	HORIZONTAL Peak
4	6894.806	49.79	34.85	5.81	37.18	53.27	74.00	-20.73	HORIZONTAL Peak
5	7206.000	49.53	35.54	5.98	37.38	53.67	74.00	-20.33	HORIZONTAL Peak
6	9608.000	45.90	38.37	7.07	37.42	53.92	74.00	-20.08	HORIZONTAL Peak



Test Mode: 07; Polarity: Vertical; Modulation:GFSK; ; Channel:Low

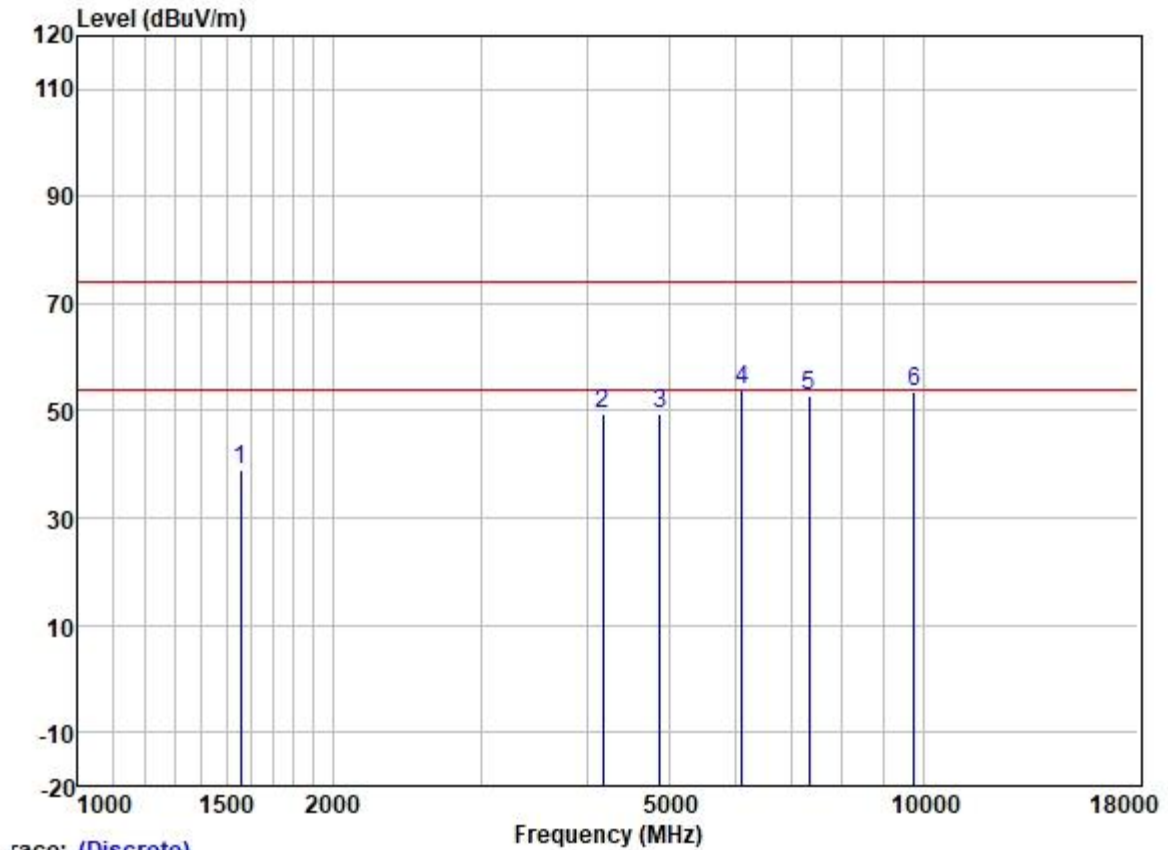


Test Mode: 07; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle



	Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Preamp Factor	Level	Limit	Over	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1625.121	48.66	25.61	2.80	37.95	39.12	74.00	-34.88	HORIZONTAL	Peak
2	4367.058	51.16	30.62	4.68	36.81	49.65	74.00	-24.35	HORIZONTAL	Peak
3	4880.000	49.30	31.54	5.50	36.84	49.50	74.00	-24.50	HORIZONTAL	Peak
4	6815.551	49.72	34.70	5.82	37.13	53.11	74.00	-20.89	HORIZONTAL	Peak
5	7320.000	48.03	36.00	6.13	37.43	52.73	74.00	-21.27	HORIZONTAL	Peak
6	9760.000	45.42	38.50	7.02	37.41	53.53	74.00	-20.47	HORIZONTAL	Peak

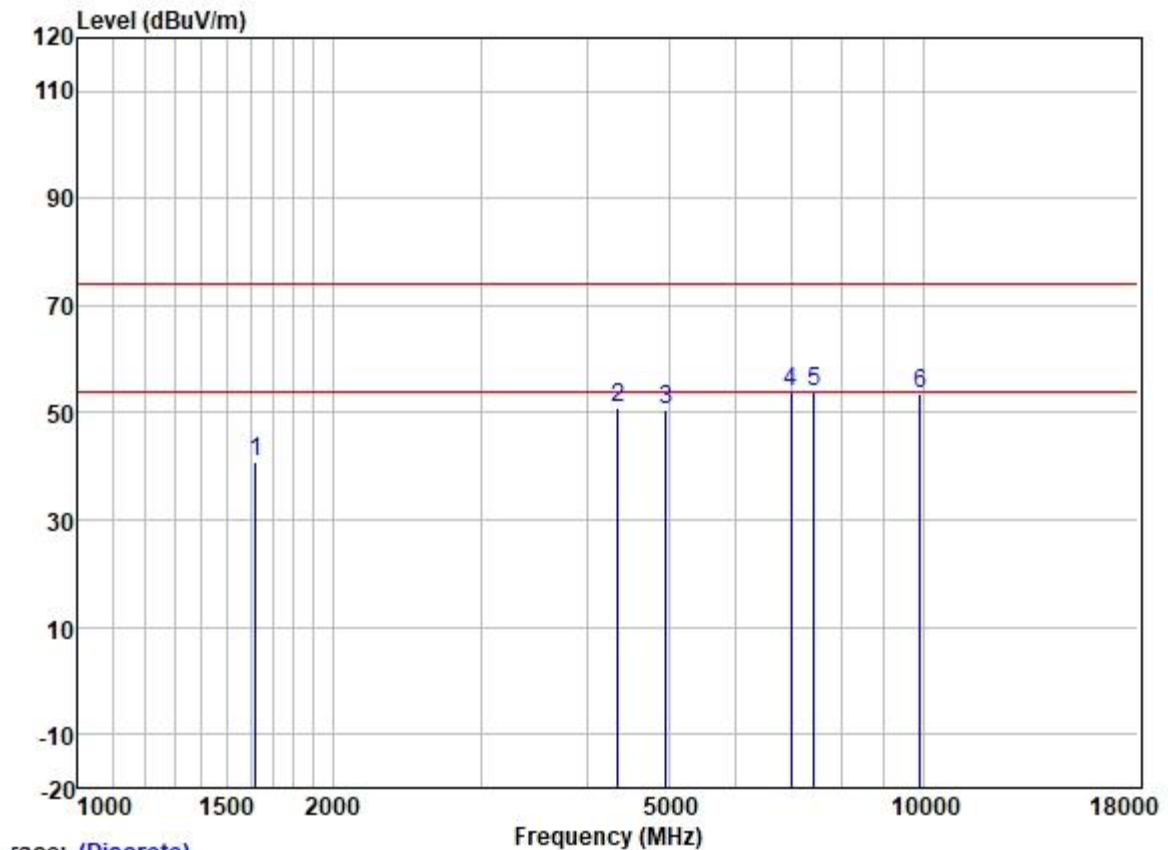
Test Mode: 07; Polarity: Vertical; Modulation:GFSK; ; Channel:middle



	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	1556.169	48.64	25.54	2.80	38.03	38.95	74.00	-35.05	VERTICAL	Peak
2	4181.768	51.68	30.12	4.60	36.80	49.60	74.00	-24.40	VERTICAL	Peak
3	4880.000	49.07	31.54	5.50	36.84	49.27	74.00	-24.73	VERTICAL	Peak
4	6106.616	51.88	32.66	6.14	36.92	53.76	74.00	-20.24	VERTICAL	Peak
5	7320.000	47.96	36.00	6.13	37.43	52.66	74.00	-21.34	VERTICAL	Peak
6	9760.000	45.50	38.50	7.02	37.41	53.61	74.00	-20.39	VERTICAL	Peak



Test Mode: 07; Polarity: Horizontal; Modulation:GFSK; ; Channel:High

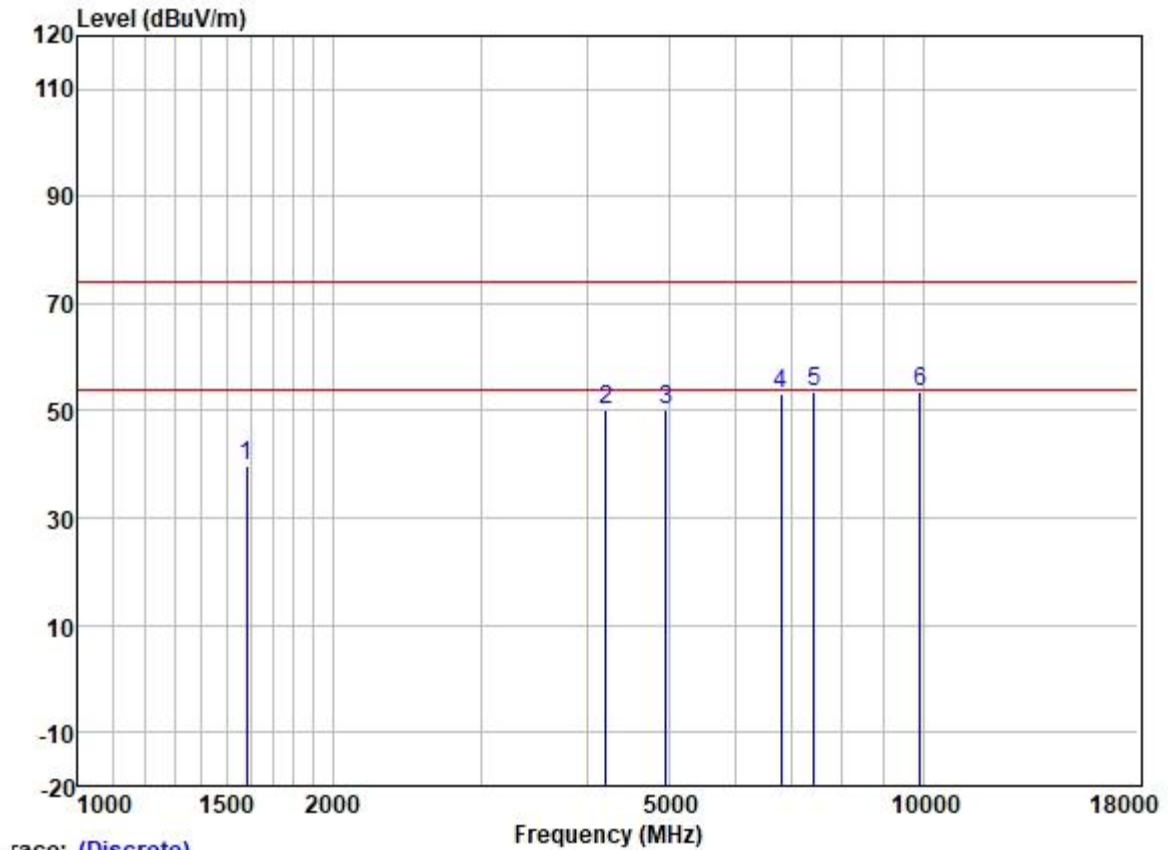


Trace: (Discrete)

	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	1620.431	50.55	25.60	2.80	37.95	41.00	74.00	-33.00	HORIZONTAL Peak
2	4354.454	52.30	30.59	4.68	36.81	50.76	74.00	-23.24	HORIZONTAL Peak
3	4960.000	49.95	31.65	5.65	36.84	50.41	74.00	-23.59	HORIZONTAL Peak
4	6974.982	50.22	34.97	5.81	37.23	53.77	74.00	-20.23	HORIZONTAL Peak
5	7440.000	48.91	36.27	6.22	37.47	53.93	74.00	-20.07	HORIZONTAL Peak
6	9920.000	45.35	38.65	6.96	37.40	53.56	74.00	-20.44	HORIZONTAL Peak

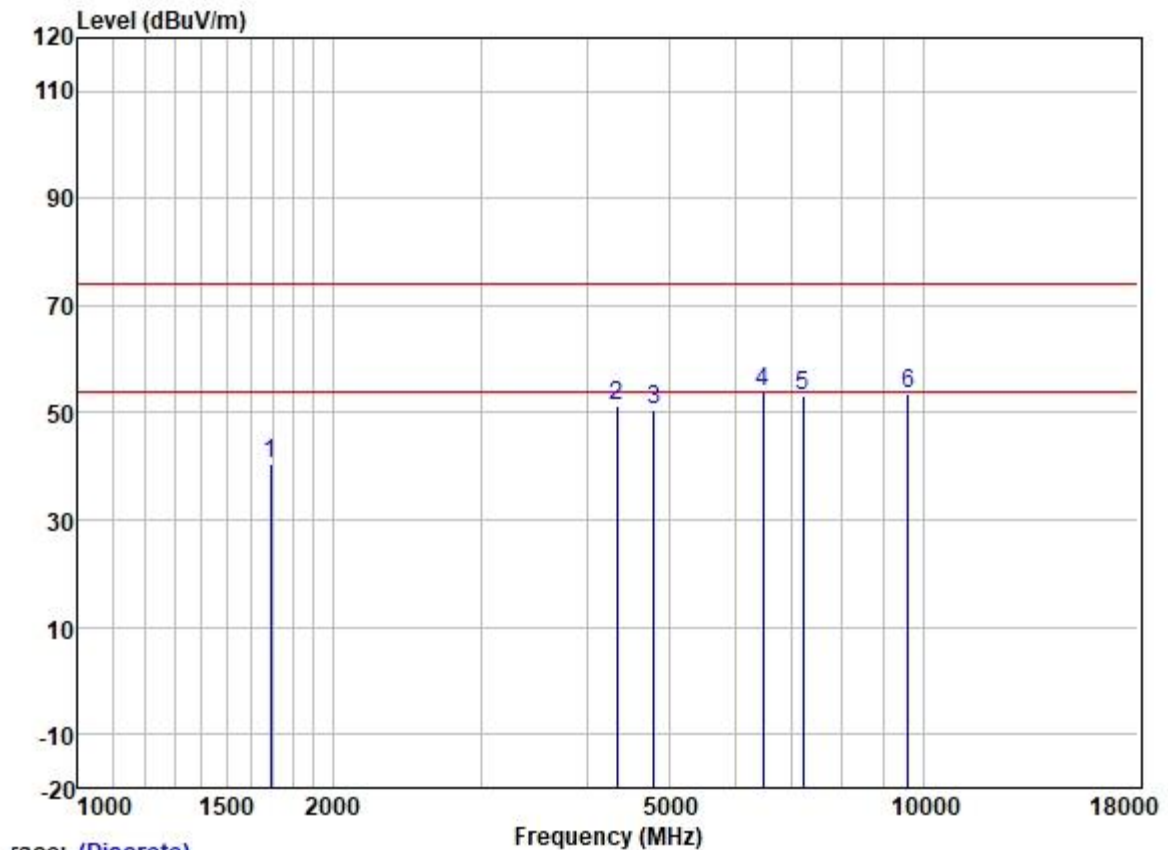


Test Mode: 07; Polarity: Vertical; Modulation: GFSK; ; Channel: High



	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	1583.392	49.43	25.56	2.80	38.00	39.79	74.00	-34.21	VERTICAL	Peak
2	4218.186	52.21	30.22	4.60	36.81	50.22	74.00	-23.78	VERTICAL	Peak
3	4960.000	49.85	31.65	5.65	36.84	50.31	74.00	-23.69	VERTICAL	Peak
4	6795.879	49.84	34.66	5.82	37.12	53.20	74.00	-20.80	VERTICAL	Peak
5	7440.000	48.55	36.27	6.22	37.47	53.57	74.00	-20.43	VERTICAL	Peak
6	9920.000	45.18	38.65	6.96	37.40	53.39	74.00	-20.61	VERTICAL	Peak

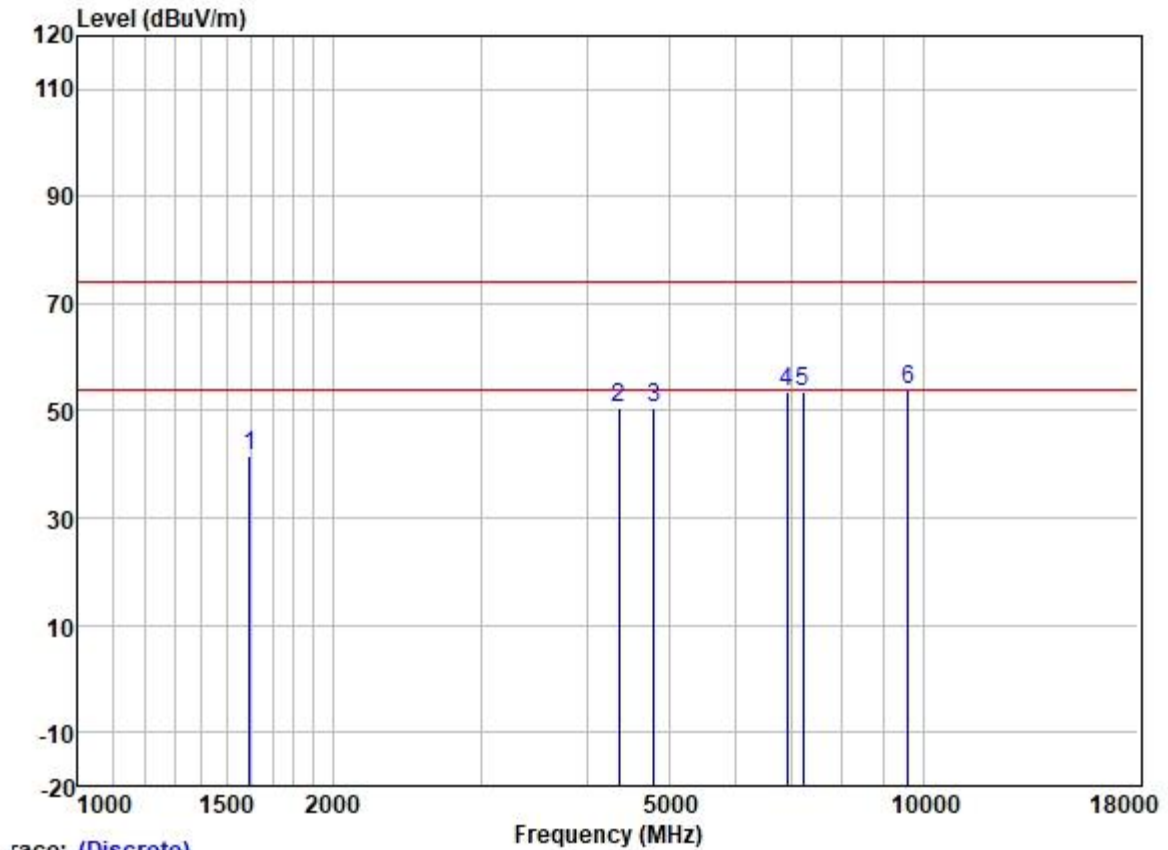
Test Mode: 08; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



Trace: (Discrete)

	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	1692.231	50.01	25.70	2.80	37.89	40.62	74.00	-33.38	HORIZONTAL	Peak
2	4341.886	52.80	30.57	4.67	36.81	51.23	74.00	-22.77	HORIZONTAL	Peak
3	4804.000	50.43	31.42	5.40	36.83	50.42	74.00	-23.58	HORIZONTAL	Peak
4	6470.026	51.22	33.92	5.86	37.00	54.00	74.00	-20.00	HORIZONTAL	Peak
5	7206.000	48.95	35.54	5.98	37.38	53.09	74.00	-20.91	HORIZONTAL	Peak
6	9608.000	45.55	38.37	7.07	37.42	53.57	74.00	-20.43	HORIZONTAL	Peak

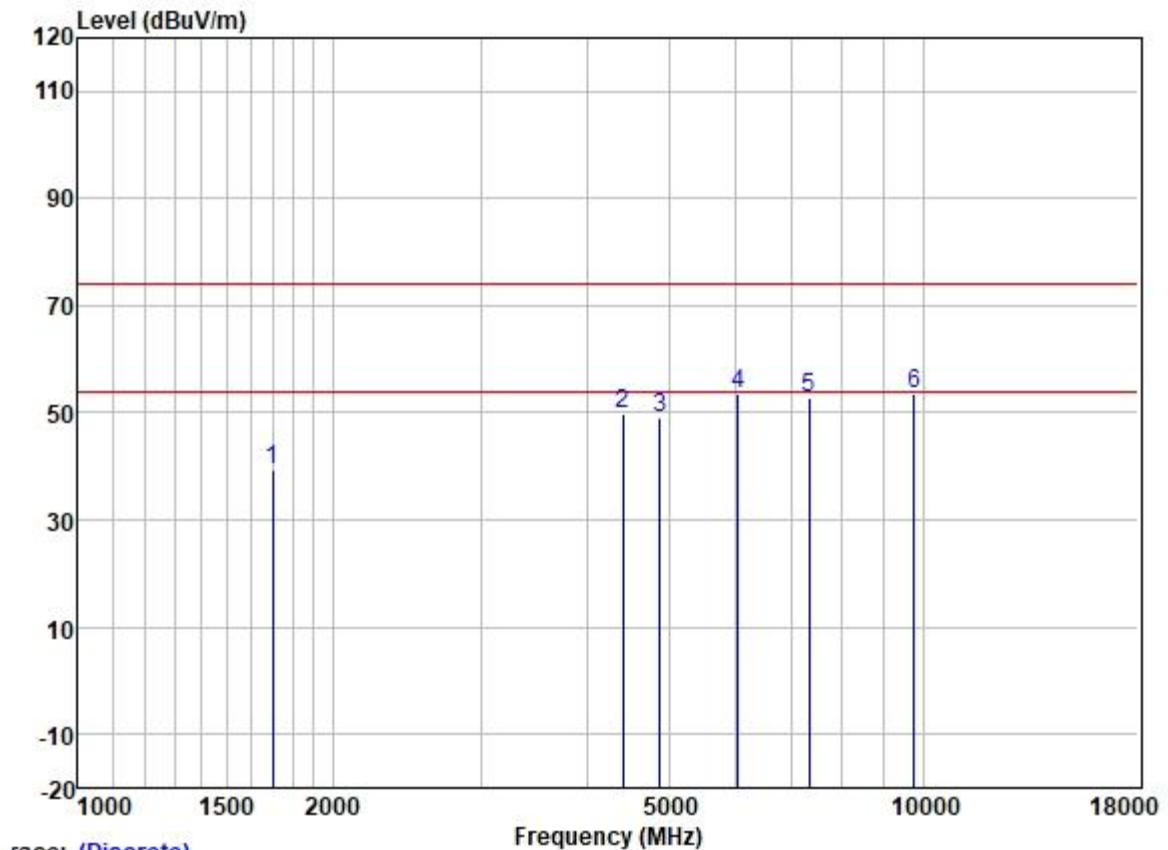
Test Mode: 08; Polarity: Vertical; Modulation:GFSK; ; Channel:Low



	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	1597.181	51.03	25.58	2.80	37.98	41.43	74.00	-32.57	VERTICAL	Peak
2	4367.058	52.02	30.62	4.68	36.81	50.51	74.00	-23.49	VERTICAL	Peak
3	4804.000	50.41	31.42	5.40	36.83	50.40	74.00	-23.60	VERTICAL	Peak
4	6894.806	49.90	34.85	5.81	37.18	53.38	74.00	-20.62	VERTICAL	Peak
5	7206.000	49.46	35.54	5.98	37.38	53.60	74.00	-20.40	VERTICAL	Peak
6	9608.000	45.96	38.37	7.07	37.42	53.98	74.00	-20.02	VERTICAL	Peak



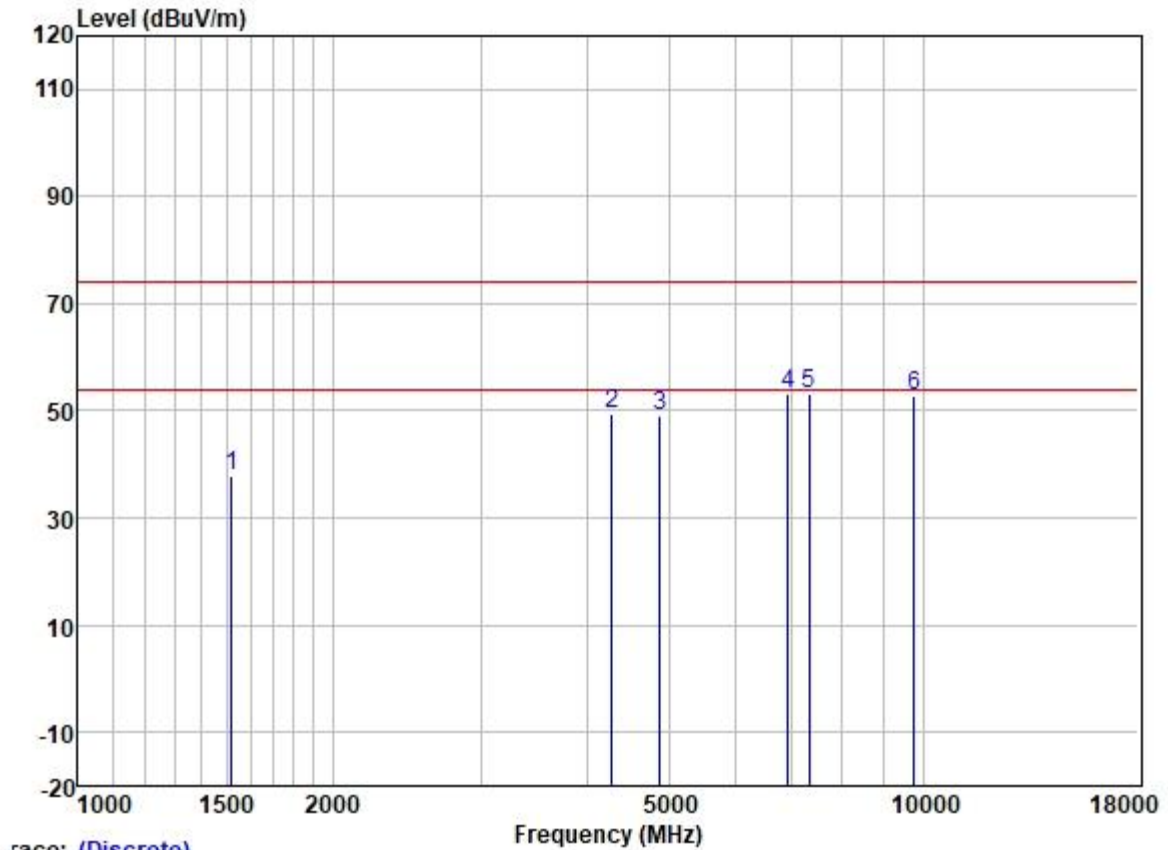
Test Mode: 08; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle



	Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Preamp Factor	Level	Limit	Over	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1697.129	48.90	25.71	2.80	37.89	39.52	74.00	-34.48	HORIZONTAL	Peak
2	4417.841	51.22	30.70	4.74	36.81	49.85	74.00	-24.15	HORIZONTAL	Peak
3	4880.000	49.01	31.54	5.50	36.84	49.21	74.00	-24.79	HORIZONTAL	Peak
4	6036.421	51.93	32.48	6.18	36.90	53.69	74.00	-20.31	HORIZONTAL	Peak
5	7320.000	48.20	36.00	6.13	37.43	52.90	74.00	-21.10	HORIZONTAL	Peak
6	9760.000	45.47	38.50	7.02	37.41	53.58	74.00	-20.42	HORIZONTAL	Peak

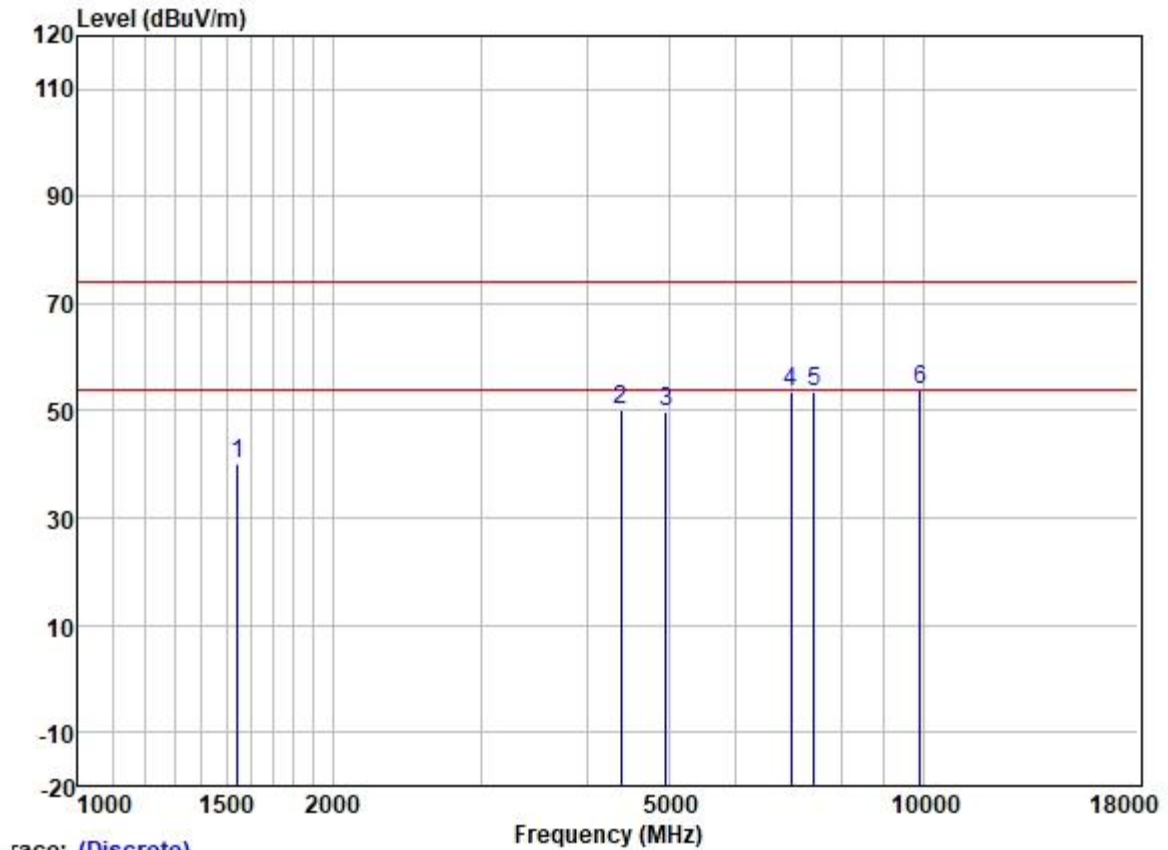


Test Mode: 08; Polarity: Vertical; Modulation: GFSK; ; Channel: middle



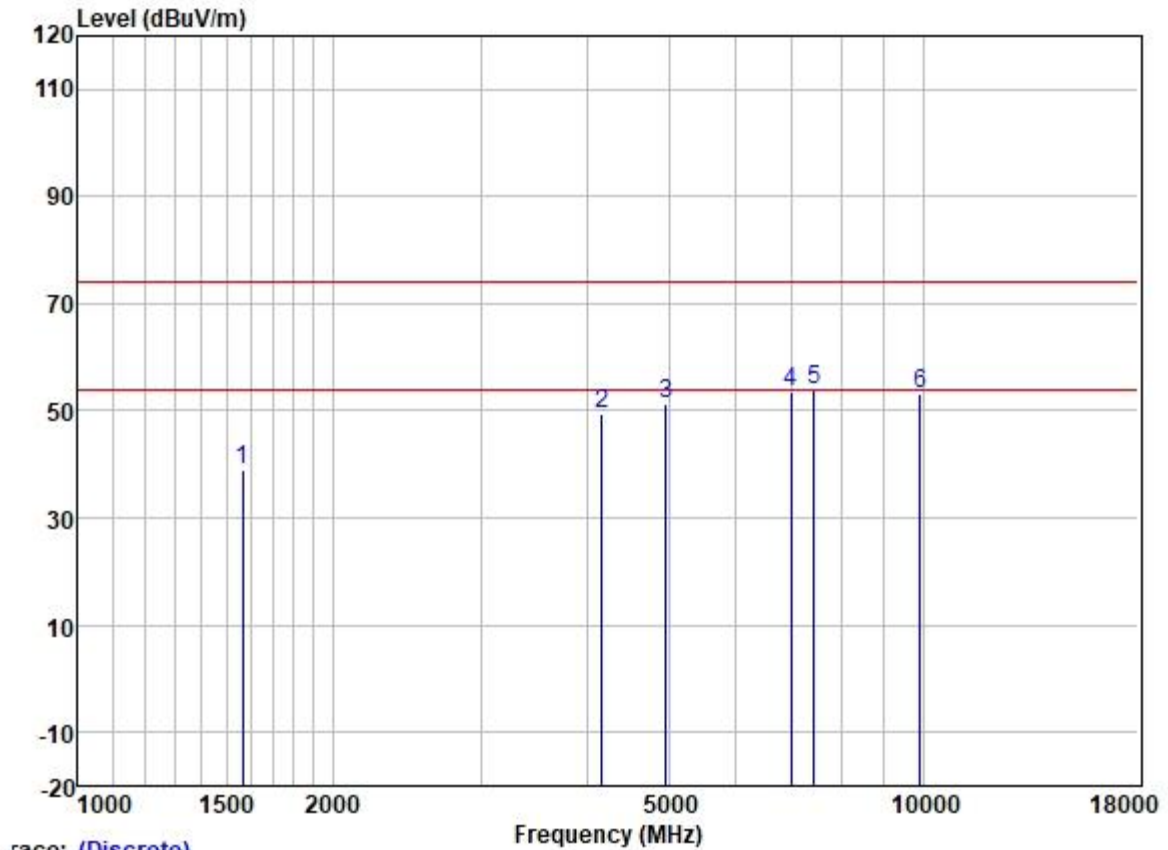
	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1520.598	47.78	25.51	2.80	38.07	38.02	74.00	-35.98	VERTICAL Peak
2	4279.589	51.26	30.42	4.63	36.81	49.50	74.00	-24.50	VERTICAL Peak
3	4880.000	48.78	31.54	5.50	36.84	48.98	74.00	-25.02	VERTICAL Peak
4	6914.763	49.79	34.89	5.81	37.19	53.30	74.00	-20.70	VERTICAL Peak
5	7320.000	48.63	36.00	6.13	37.43	53.33	74.00	-20.67	VERTICAL Peak
6	9760.000	44.77	38.50	7.02	37.41	52.88	74.00	-21.12	VERTICAL Peak

Test Mode: 08; Polarity: Horizontal; Modulation:GFSK; ; Channel:High



	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	1542.733	49.95	25.53	2.80	38.03	40.25	74.00	-33.75	HORIZONTAL	Peak
2	4392.376	51.58	30.66	4.70	36.81	50.13	74.00	-23.87	HORIZONTAL	Peak
3	4960.000	49.23	31.65	5.65	36.84	49.69	74.00	-24.31	HORIZONTAL	Peak
4	6974.982	50.02	34.97	5.81	37.23	53.57	74.00	-20.43	HORIZONTAL	Peak
5	7440.000	48.54	36.27	6.22	37.47	53.56	74.00	-20.44	HORIZONTAL	Peak
6	9920.000	45.62	38.65	6.96	37.40	53.83	74.00	-20.17	HORIZONTAL	Peak

Test Mode: 08; Polarity: Vertical; Modulation: GFSK; ; Channel: High



	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	1565.191	48.48	25.55	2.80	38.00	38.83	74.00	-35.17	VERTICAL Peak
2	4169.698	51.44	30.09	4.60	36.80	49.33	74.00	-24.67	VERTICAL Peak
3	4960.000	50.96	31.65	5.65	36.84	51.42	74.00	-22.58	VERTICAL Peak
4	6974.982	50.18	34.97	5.81	37.23	53.73	74.00	-20.27	VERTICAL Peak
5	7440.000	48.95	36.27	6.22	37.47	53.97	74.00	-20.03	VERTICAL Peak
6	9920.000	44.94	38.65	6.96	37.40	53.15	74.00	-20.85	VERTICAL Peak



## 7.9 Duty Cycle

Test Requirement KDB 558074 D01 v05r02 section 6

### 7.9.1 E.U.T. Operation

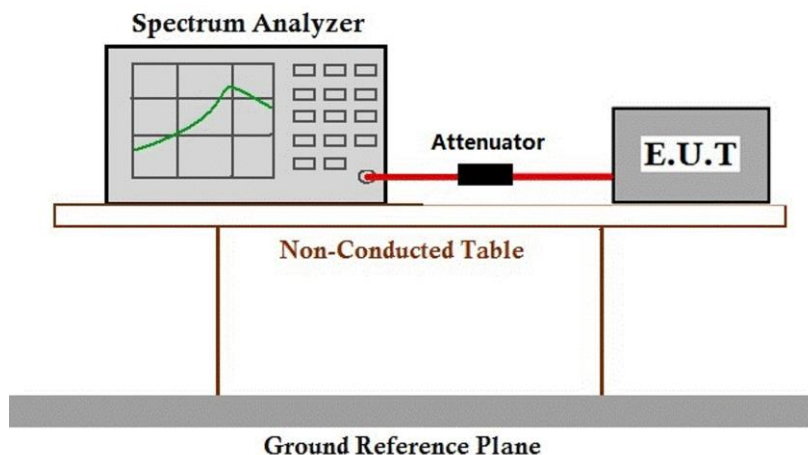
Operating Environment:

Temperature: 25 °C Humidity: 52 % RH Atmospheric Pressure: 1003 mbar

### 7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	07	TX mode(Left earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation
Final test	08	TX mode(Right earbuds of BLE 1M/bit)_Keep the EUT in continuously transmitting mode with GFSK modulation

### 7.9.3 Test Setup Diagram



### 7.9.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details



## 8 Test Setup Photo

Refer to Appendix – SetupPhoto for GZCR2204000427AT

## 9 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for GZCR2204000427AT

## 10 Appendix

For right earbud:

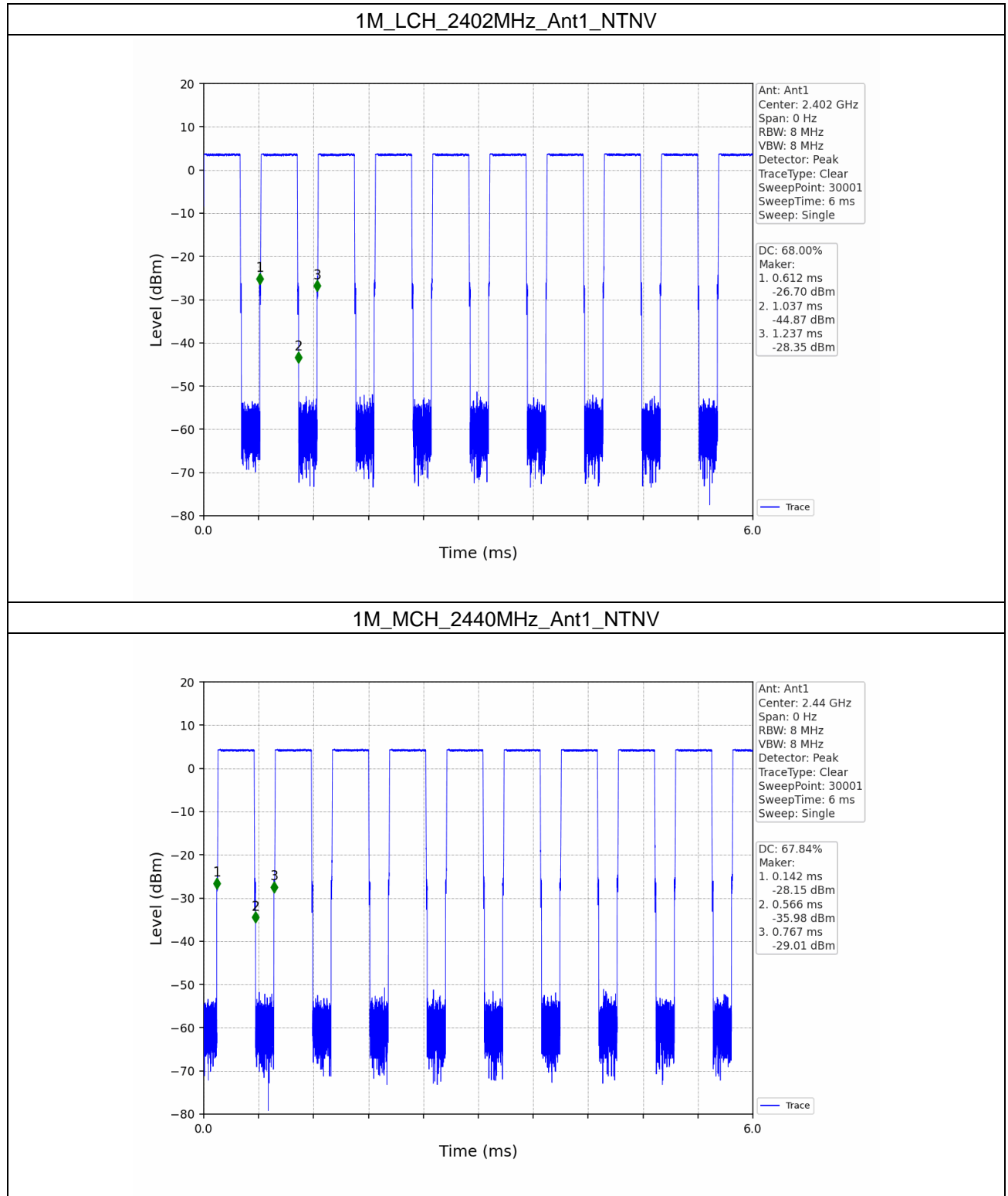
### 1. Duty Cycle

#### 1.1 Ant1

##### 1.1.1 Test Result

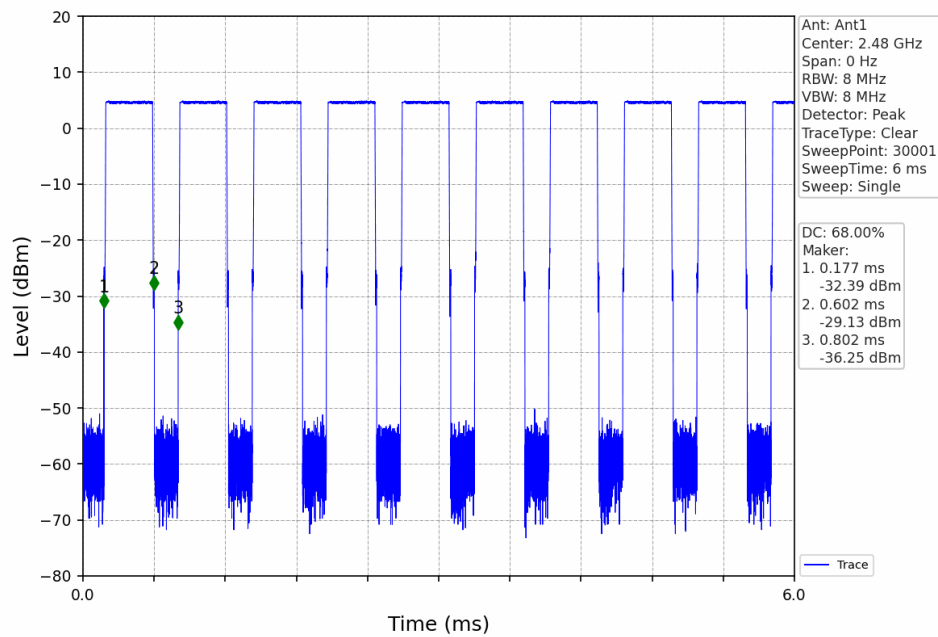
Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.425	0.625	68.00	1.67	0.00
		2440	0.424	0.625	67.84	1.69	0.00
		2480	0.425	0.625	68.00	1.67	0.03

### 1.1.2 Test Graph





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



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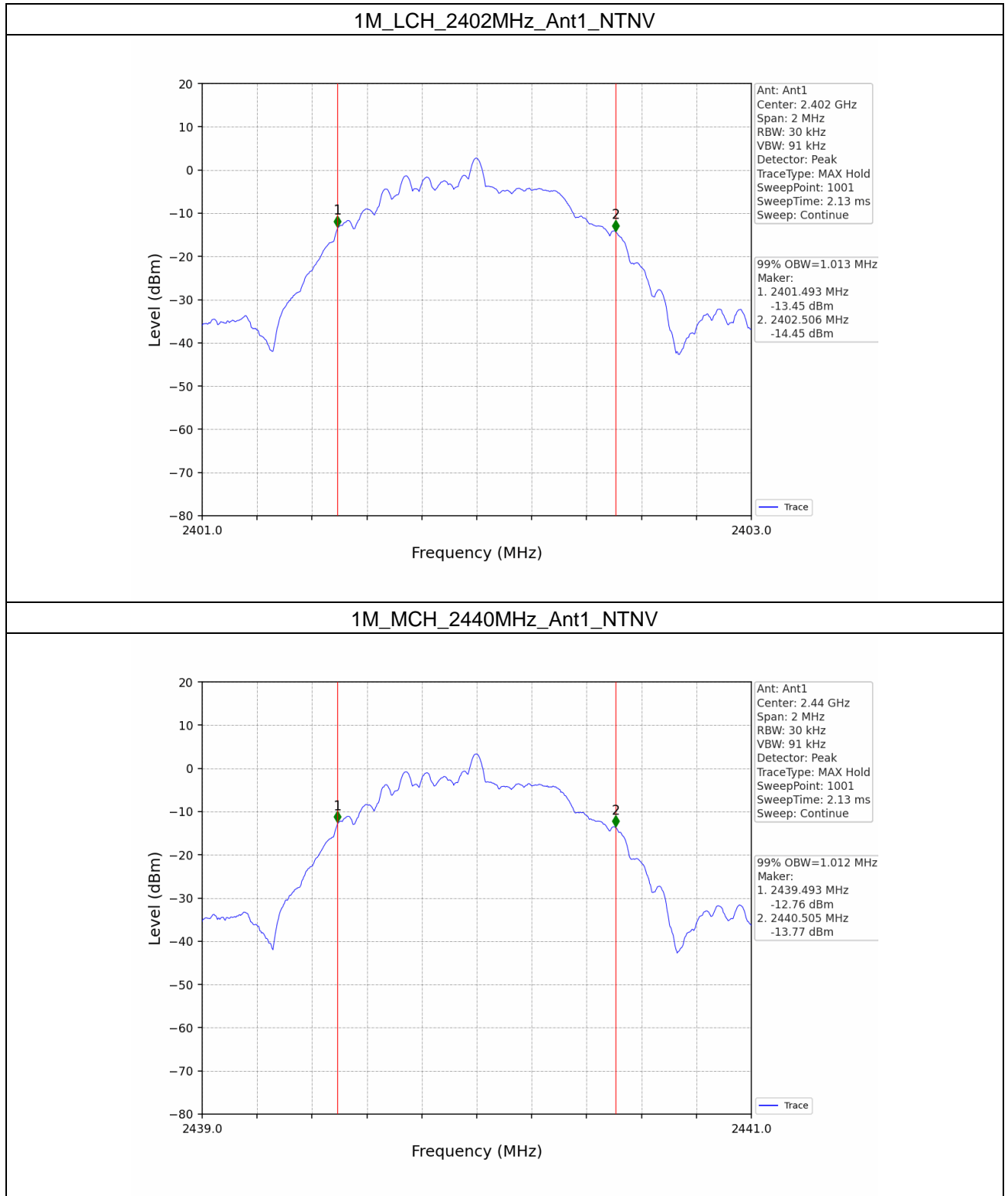
## 2. Bandwidth

### 2.1 OBW

#### 2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)	Verdict
				Result	
1M	SISO	2402	1	1.013	Pass
		2440	1	1.012	Pass
		2480	1	1.012	Pass

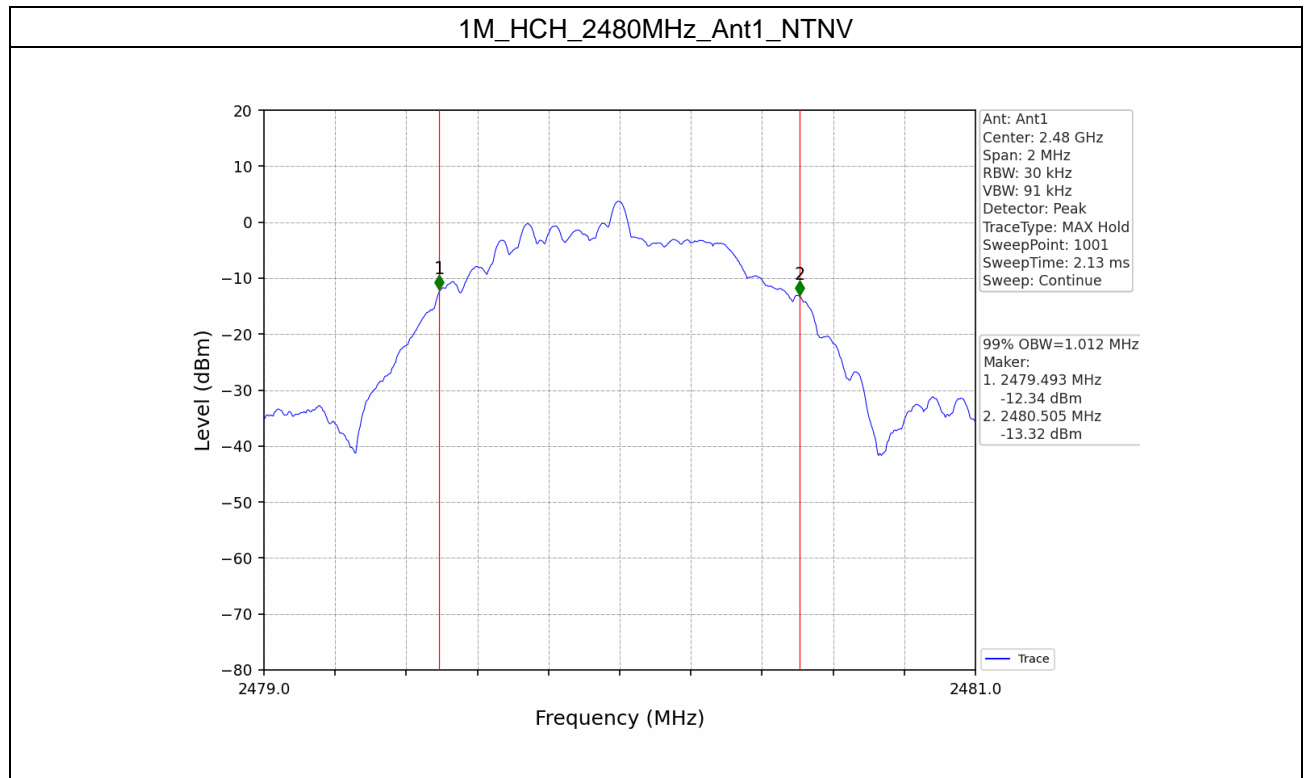
### 2.1.2 Test Graph



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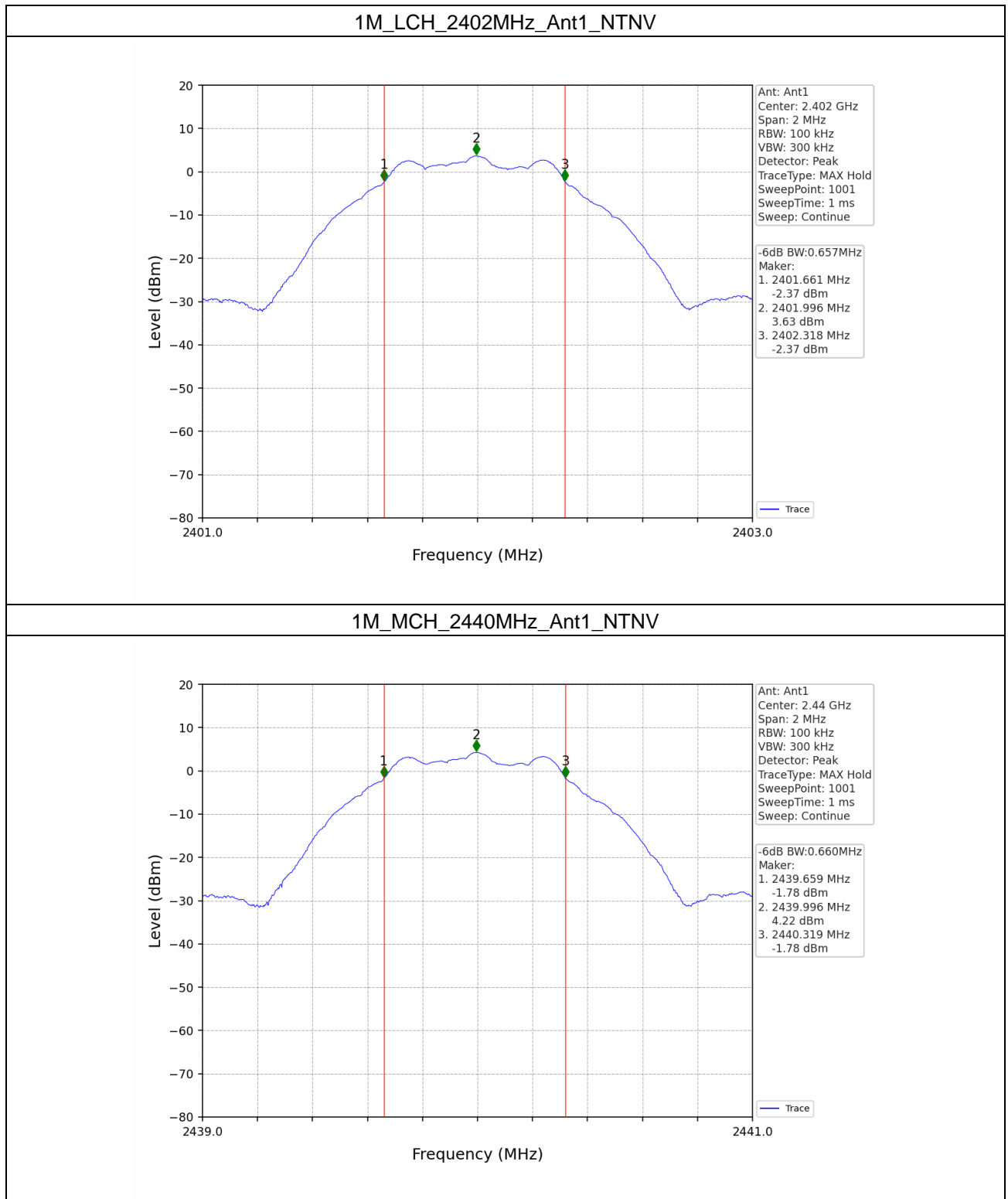


## 2.2 6dB BW

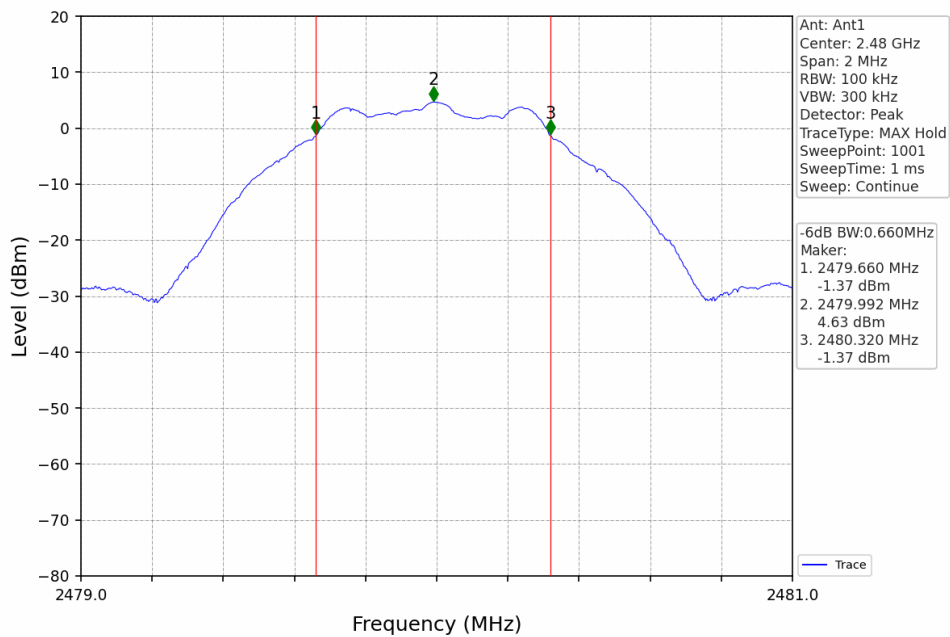
## 2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.657	$\geq 0.5$	Pass
		2440	1	0.660	$\geq 0.5$	Pass
		2480	1	0.660	$\geq 0.5$	Pass

## 2.2.2 Test Graph



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



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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	3.70	<=30	Pass
		2440	4.31	<=30	Pass
		2480	4.78	<=30	Pass



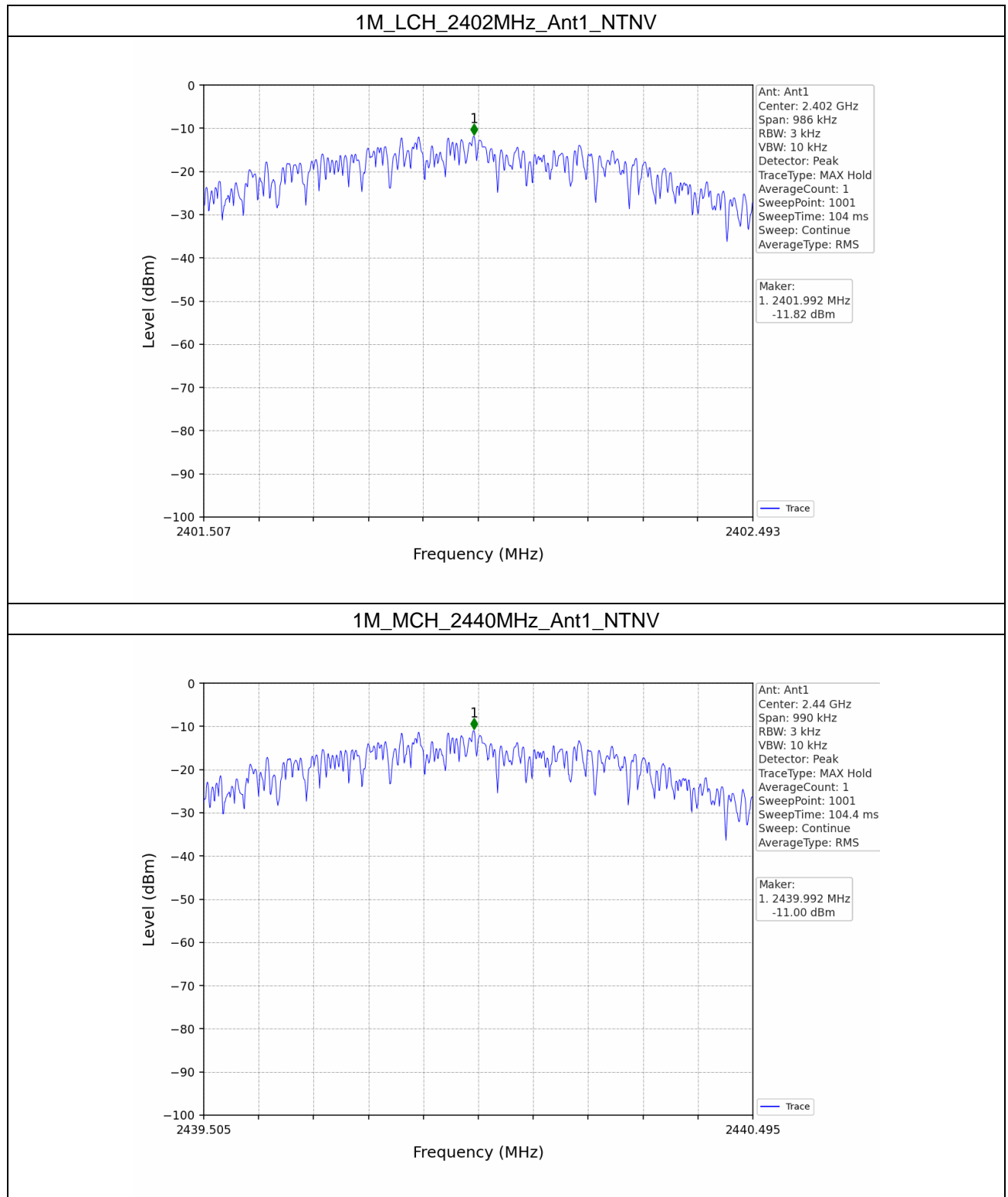
## 4. Maximum Power Spectral Density

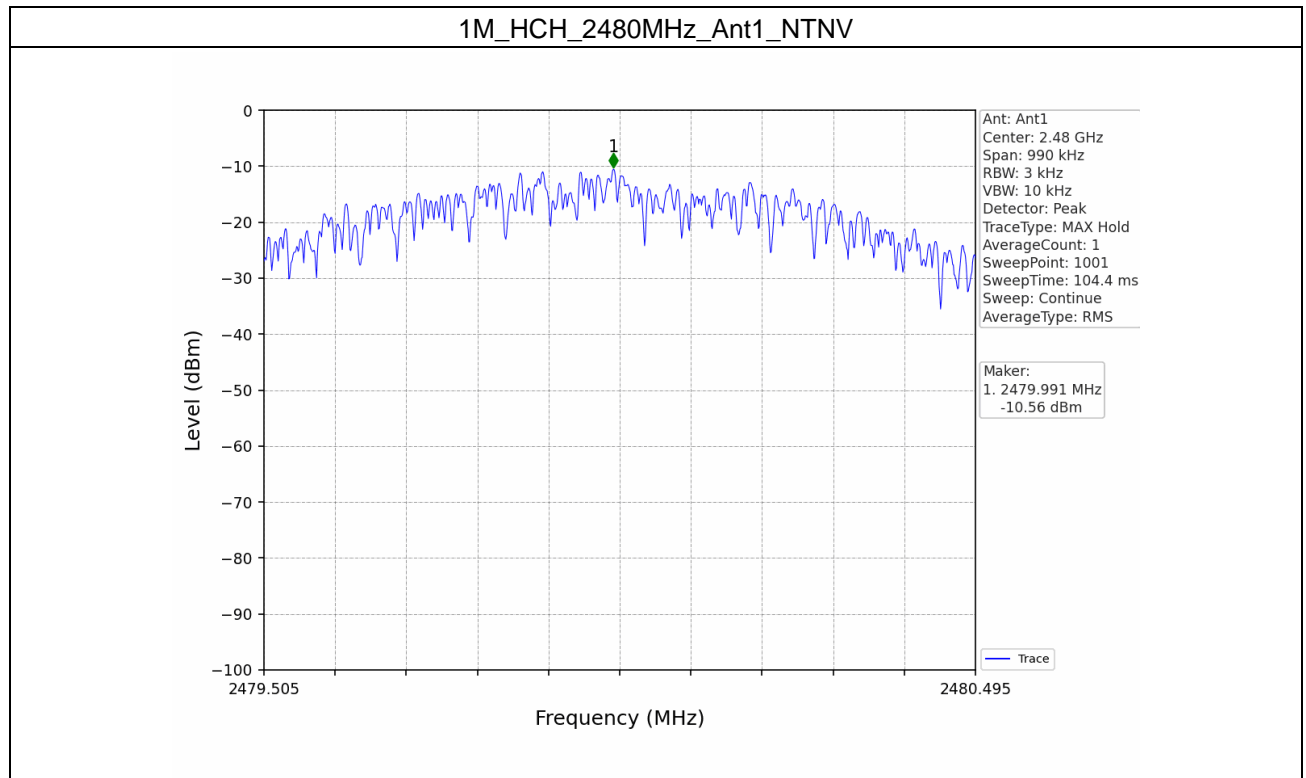
### 4.1 PSD

#### 4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-11.82	<=8	Pass
		2440	-11.00	<=8	Pass
		2480	-10.56	<=8	Pass

### 4.1.2 Test Graph





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

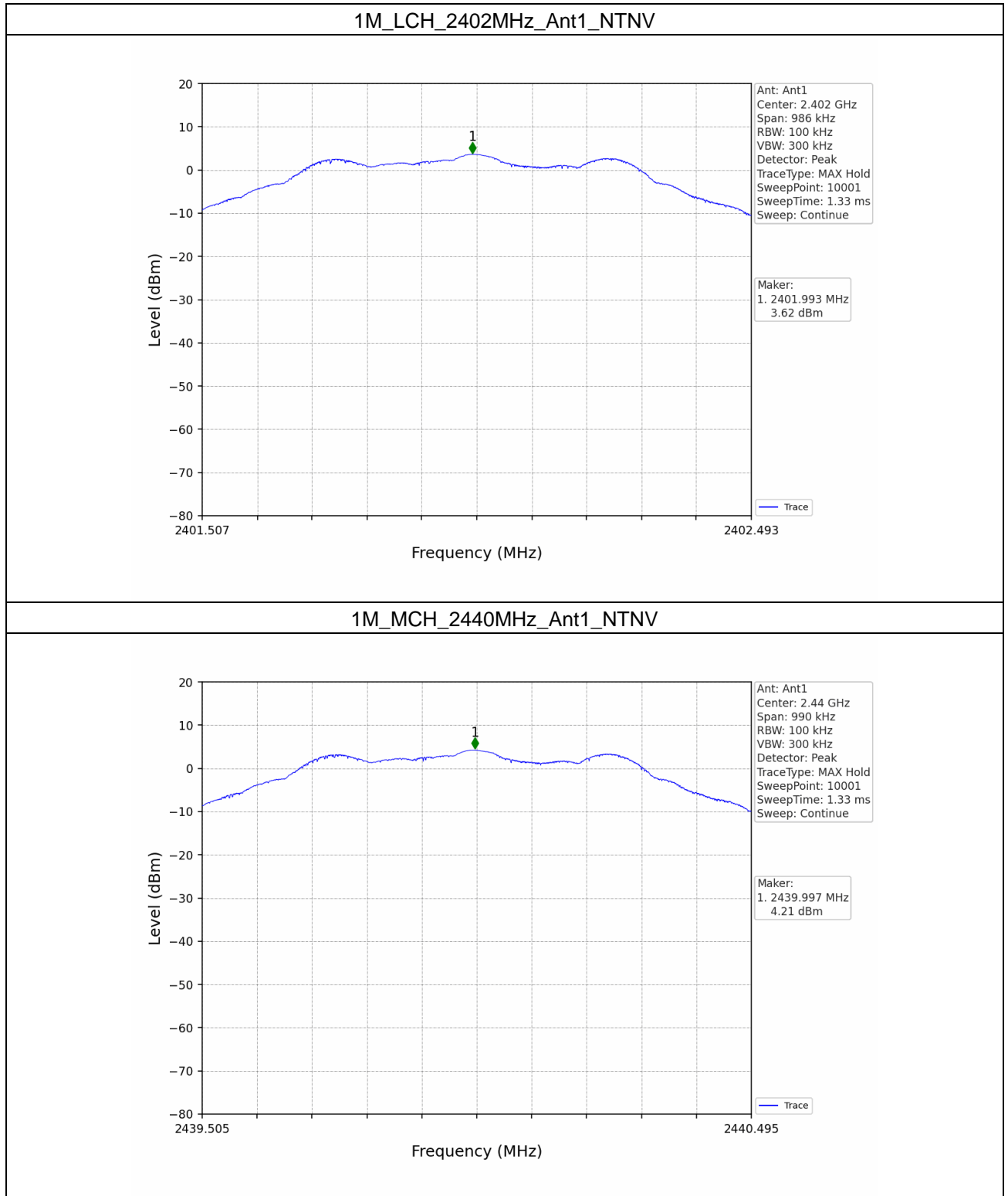
### 5.1 Ref

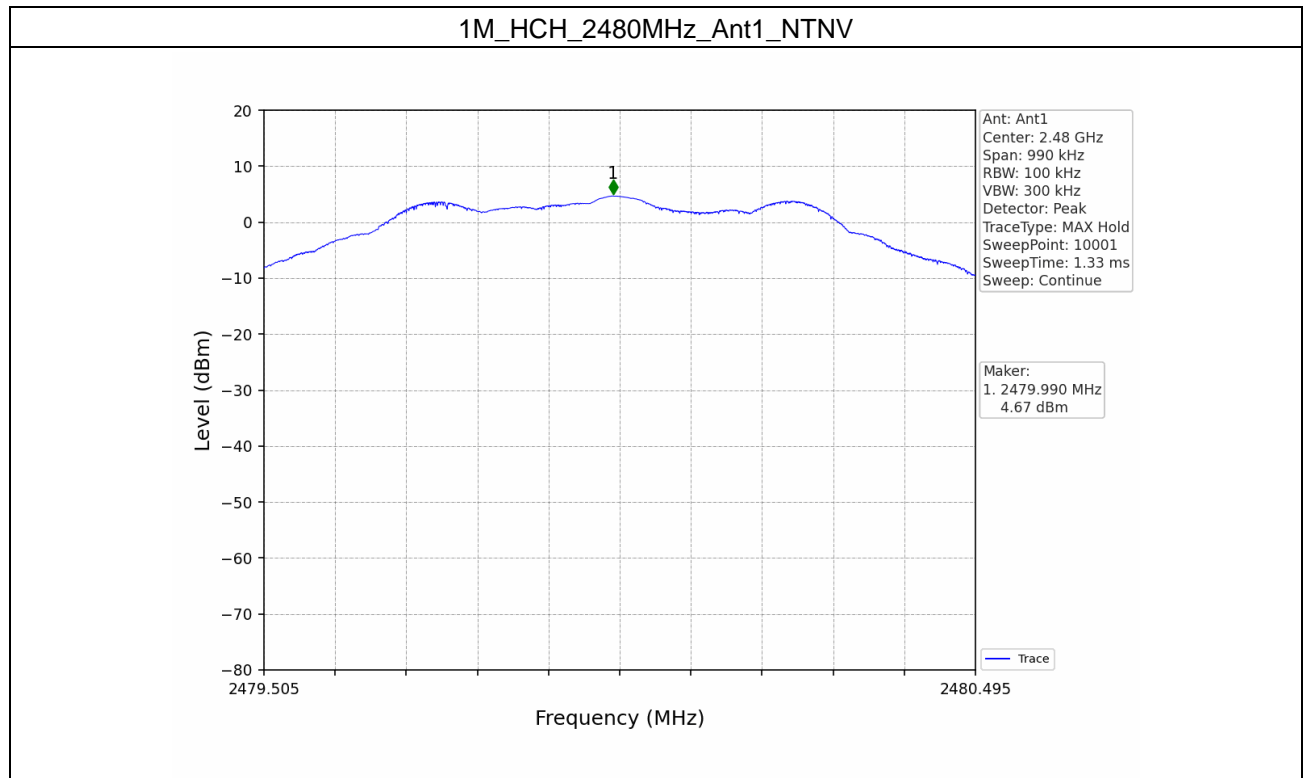
#### 5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	3.62
		2440	1	4.21
		2480	1	4.67



### 5.1.2 Test Graph



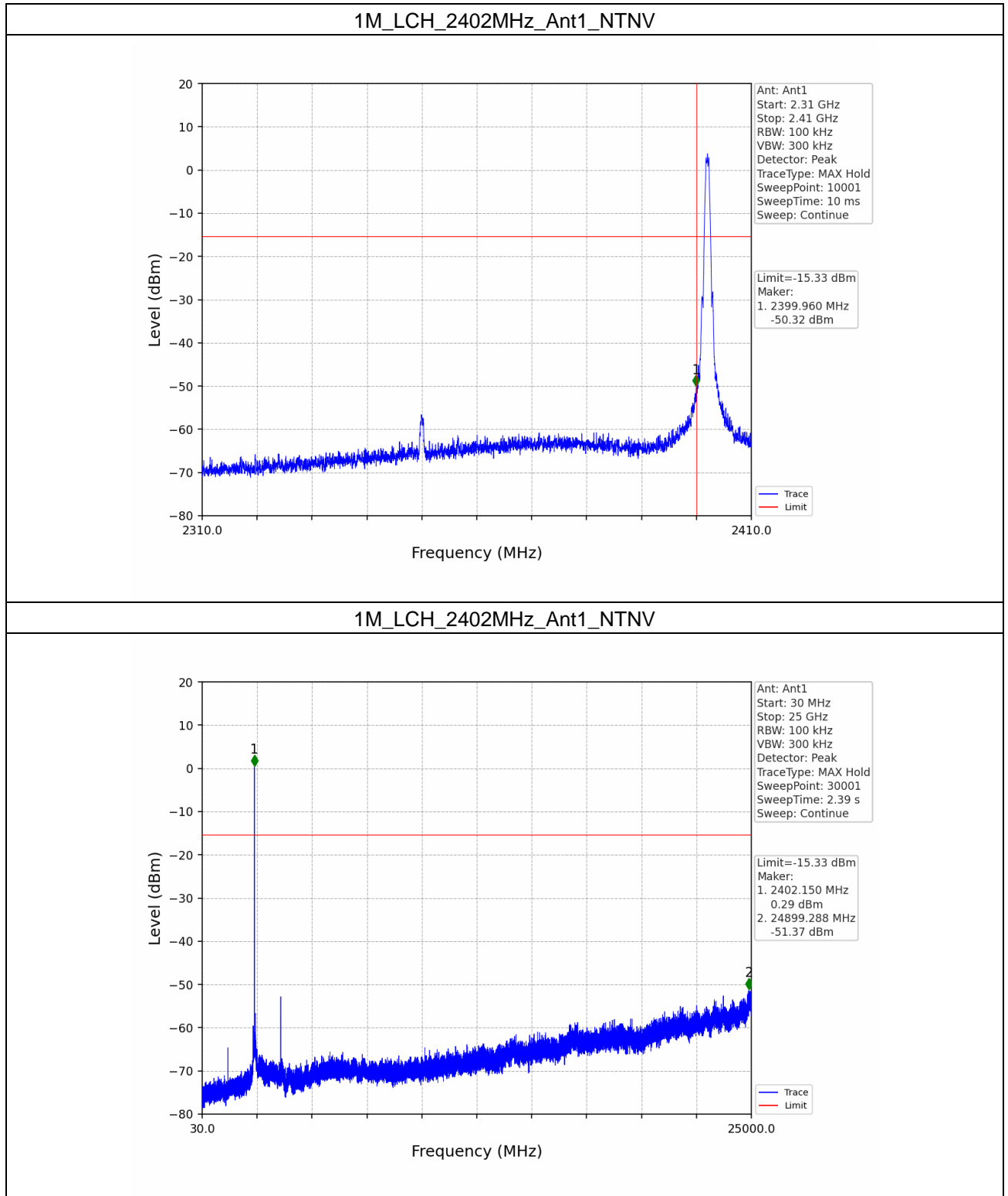


## 5.2 CSE

## 5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	4.67	-15.33	Pass
		2440	1	4.67	-15.33	Pass
		2480	1	4.67	-15.33	Pass

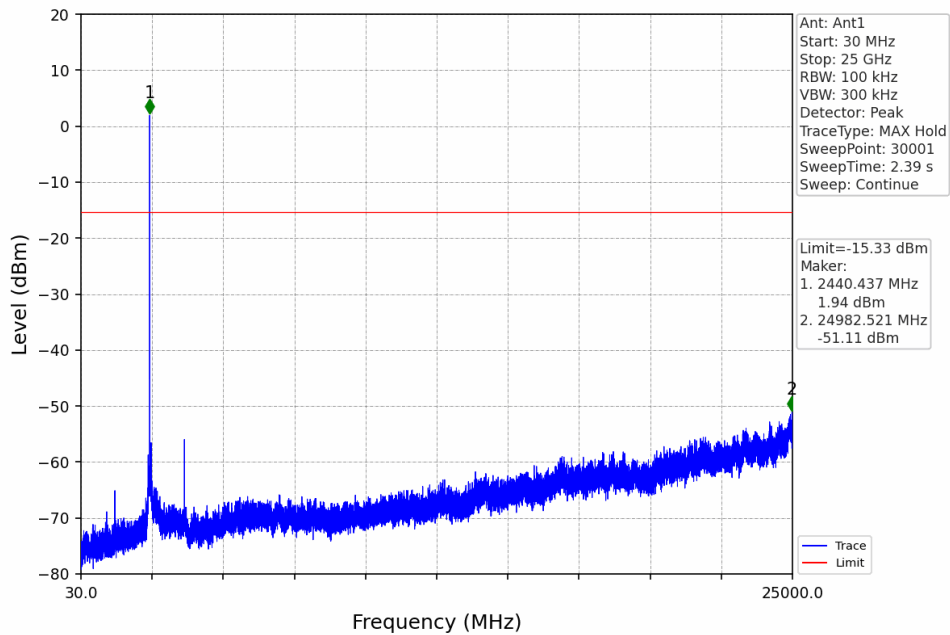
### 5.2.2 Test Graph



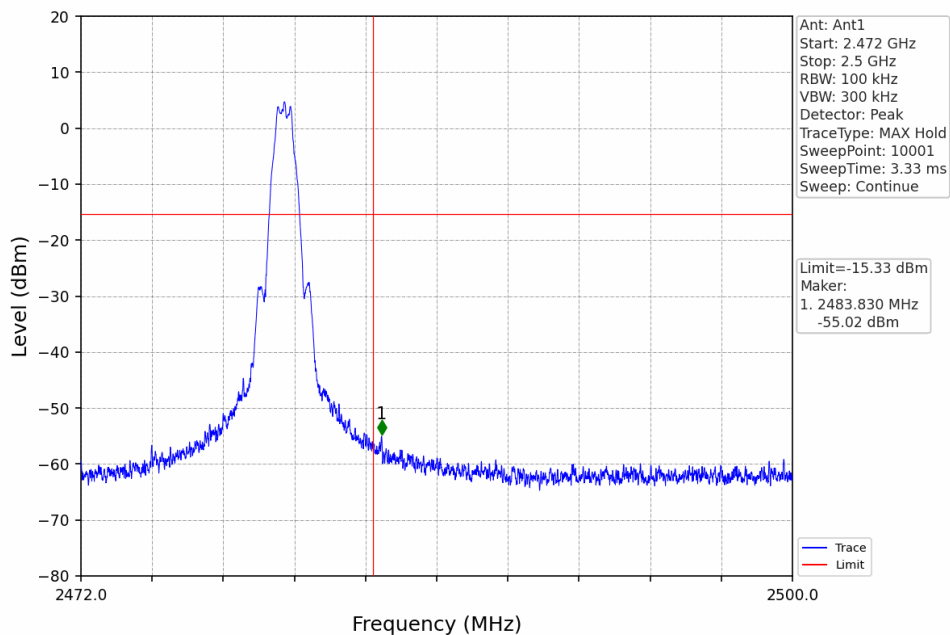
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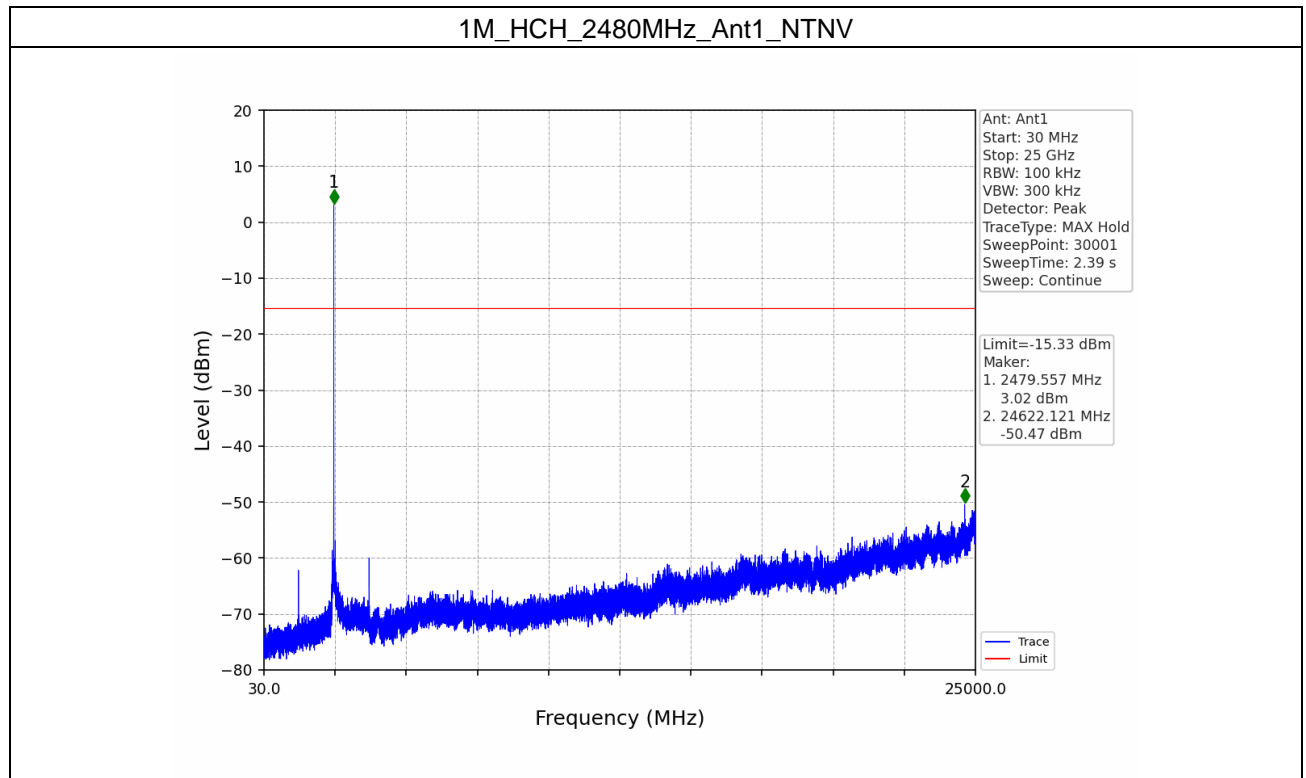


1M\_MCH\_2440MHz\_Ant1\_NTNV



1M\_HCH\_2480MHz\_Ant1\_NTNV





For left earbud:

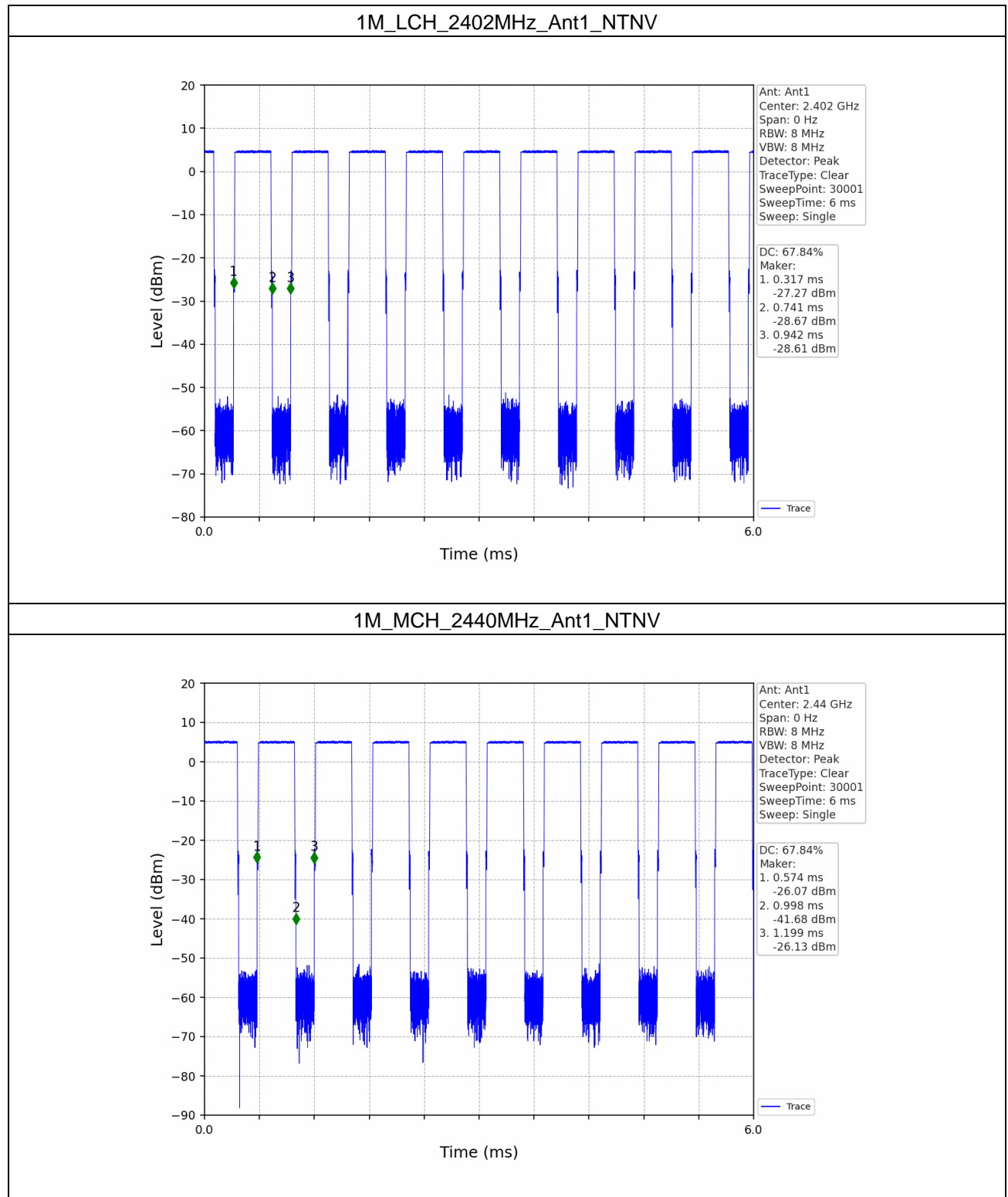
## 1. Duty Cycle

## 1.1 Ant1

## 1.1.1 Test Result

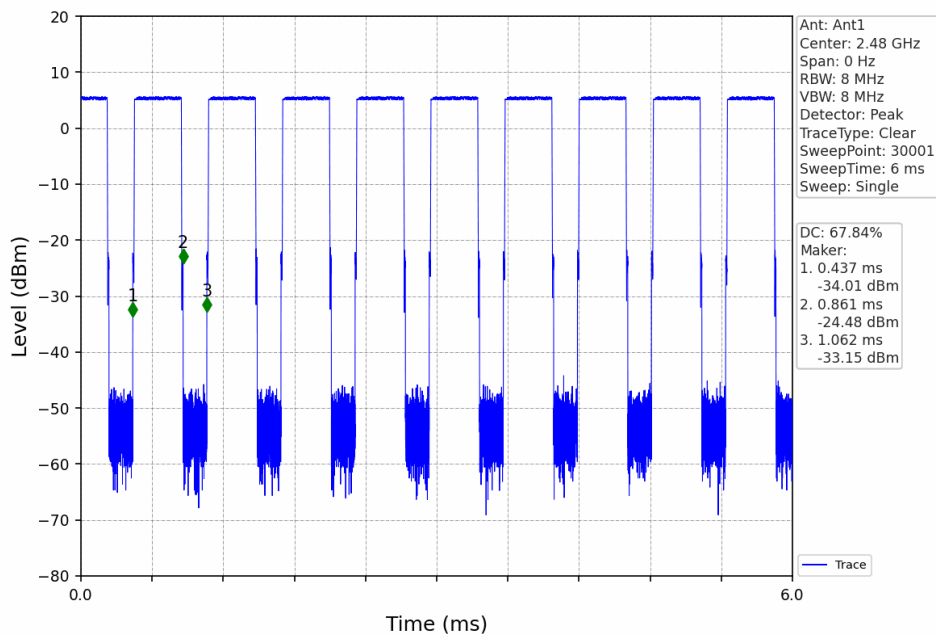
Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.424	0.625	67.84	1.69	0.03
		2440	0.424	0.625	67.84	1.69	0.00
		2480	0.424	0.625	67.84	1.69	0.03

## 1.1.2 Test Graph





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



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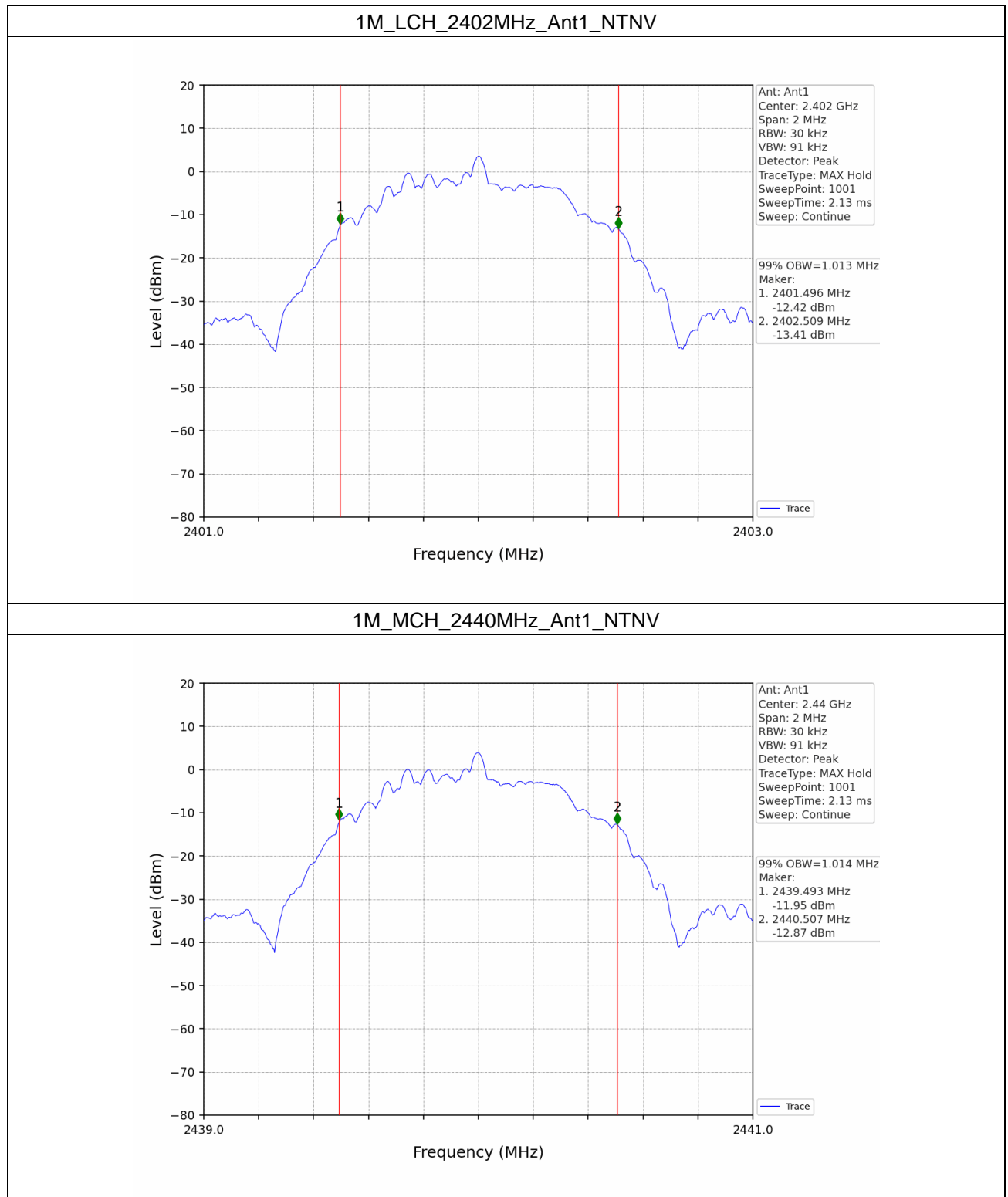
## 2. Bandwidth

### 2.1 OBW

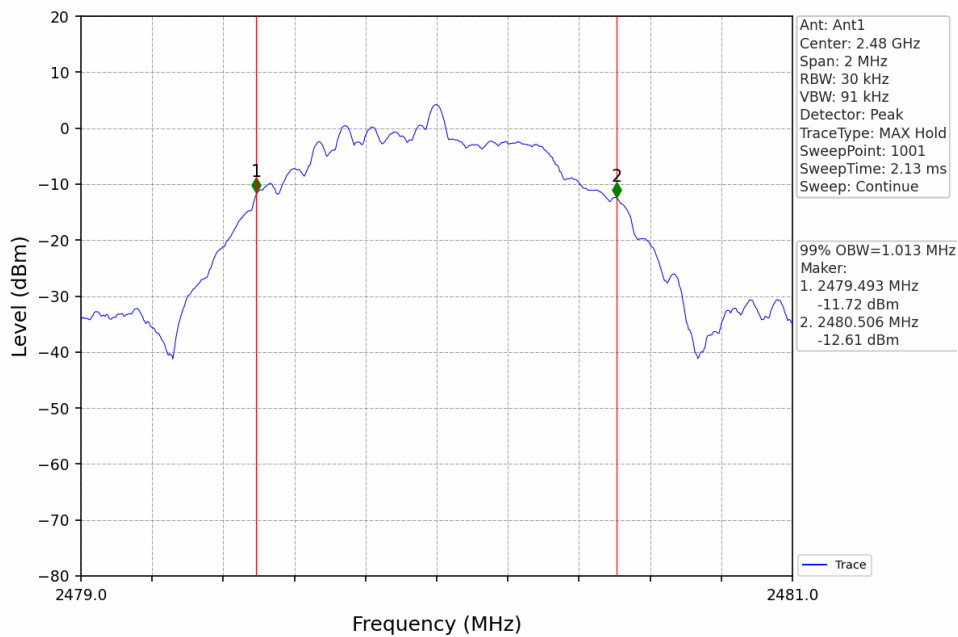
#### 2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)	Verdict
				Result	
1M	SISO	2402	1	1.013	Pass
		2440	1	1.014	Pass
		2480	1	1.013	Pass

## 2.1.2 Test Graph



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



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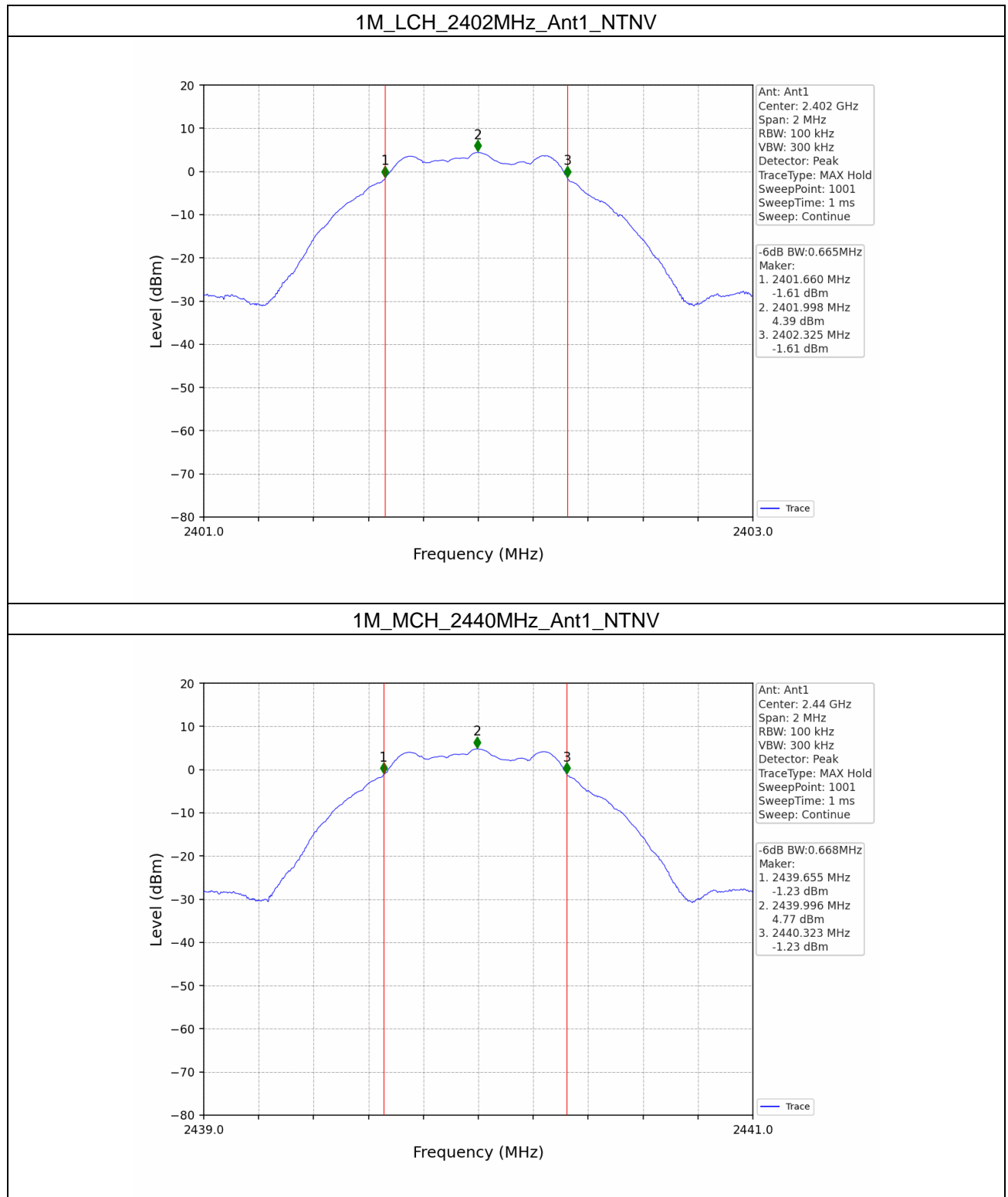


## 2.2 6dB BW

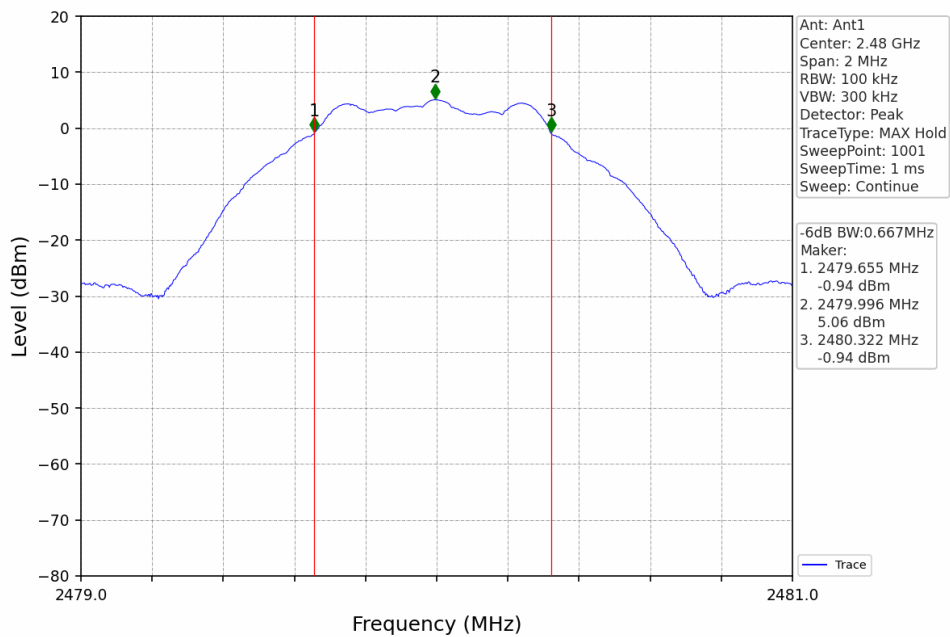
## 2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.665	$\geq 0.5$	Pass
		2440	1	0.668	$\geq 0.5$	Pass
		2480	1	0.667	$\geq 0.5$	Pass

### 2.2.2 Test Graph



1M\_HCH\_2480MHz\_Ant1\_NTNV



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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	4.72	<=30	Pass
		2440	5.22	<=30	Pass
		2480	5.54	<=30	Pass



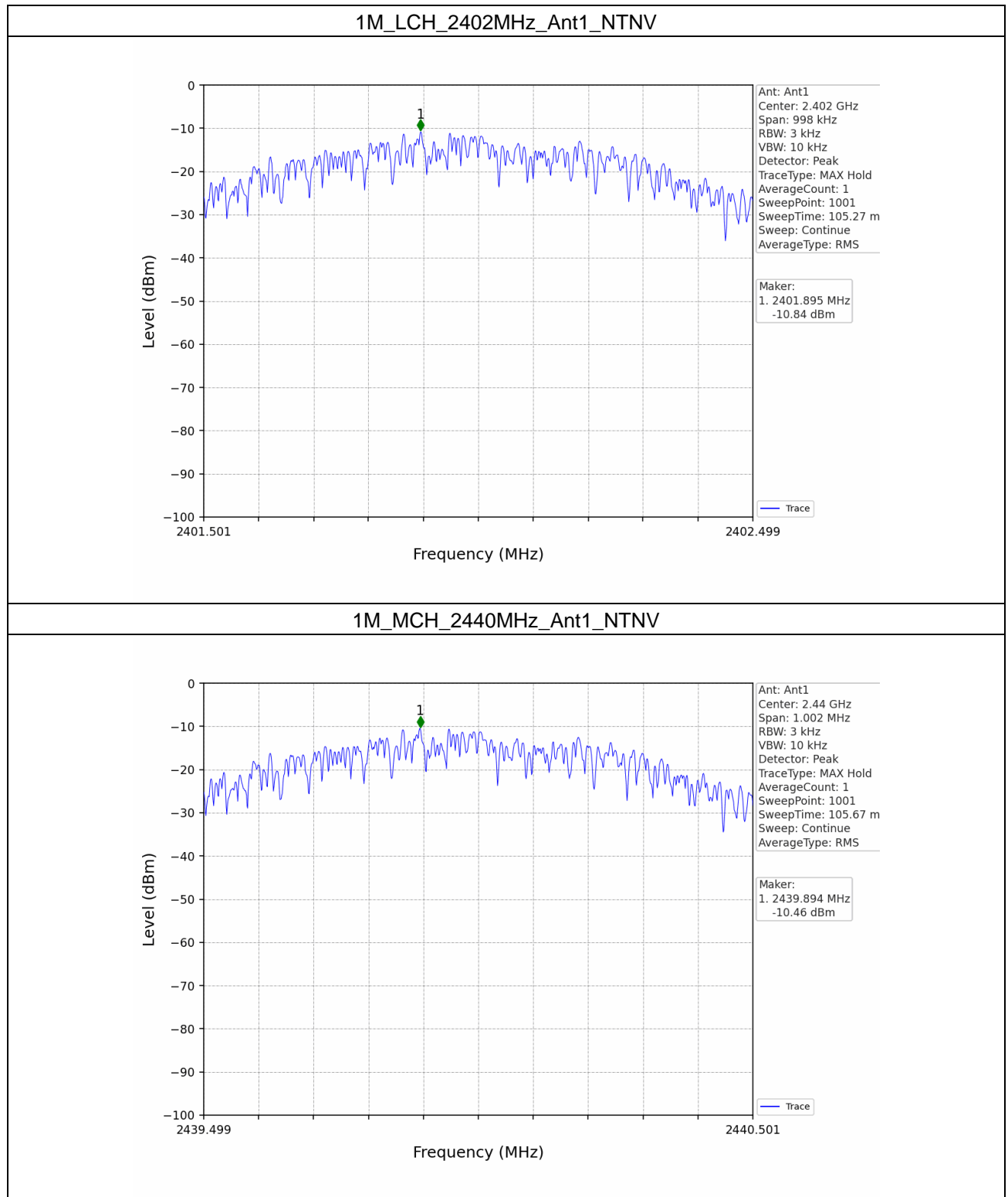
## 4. Maximum Power Spectral Density

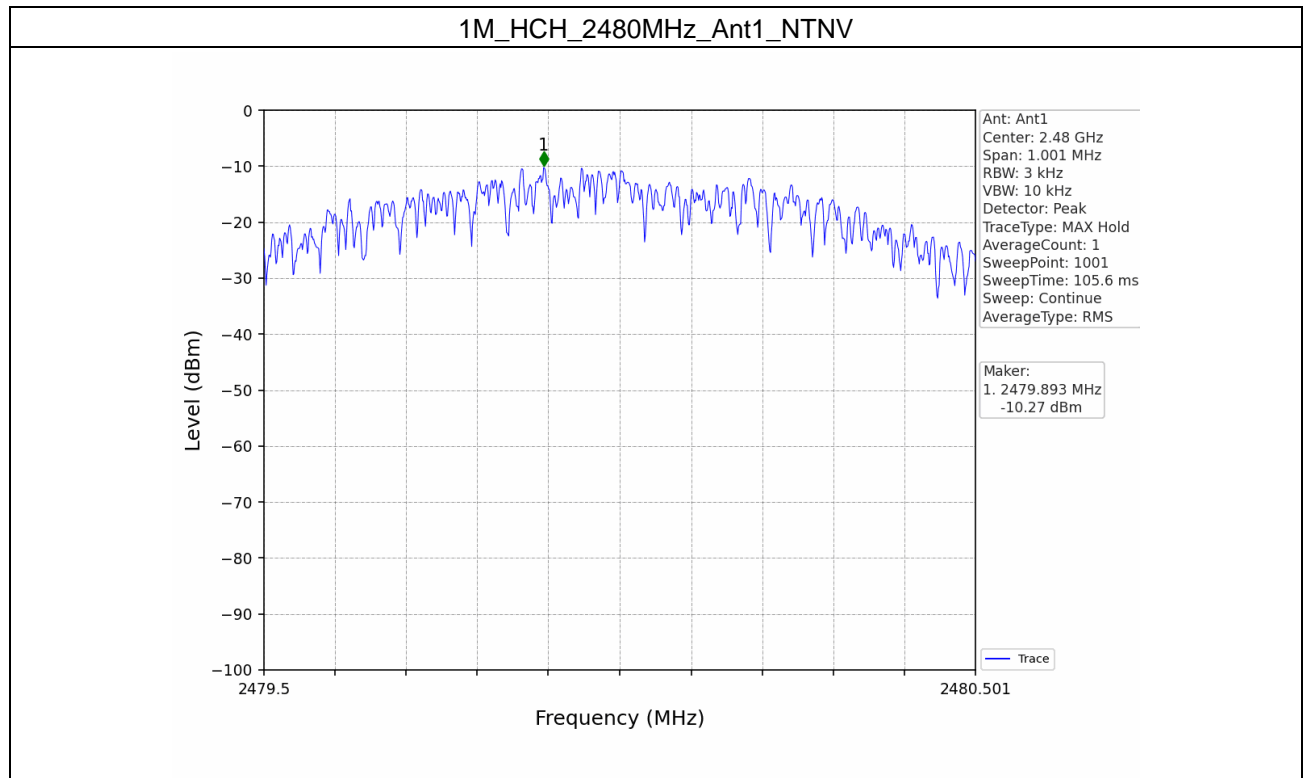
### 4.1 PSD

#### 4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-10.84	<=8	Pass
		2440	-10.46	<=8	Pass
		2480	-10.27	<=8	Pass

### 4.1.2 Test Graph





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

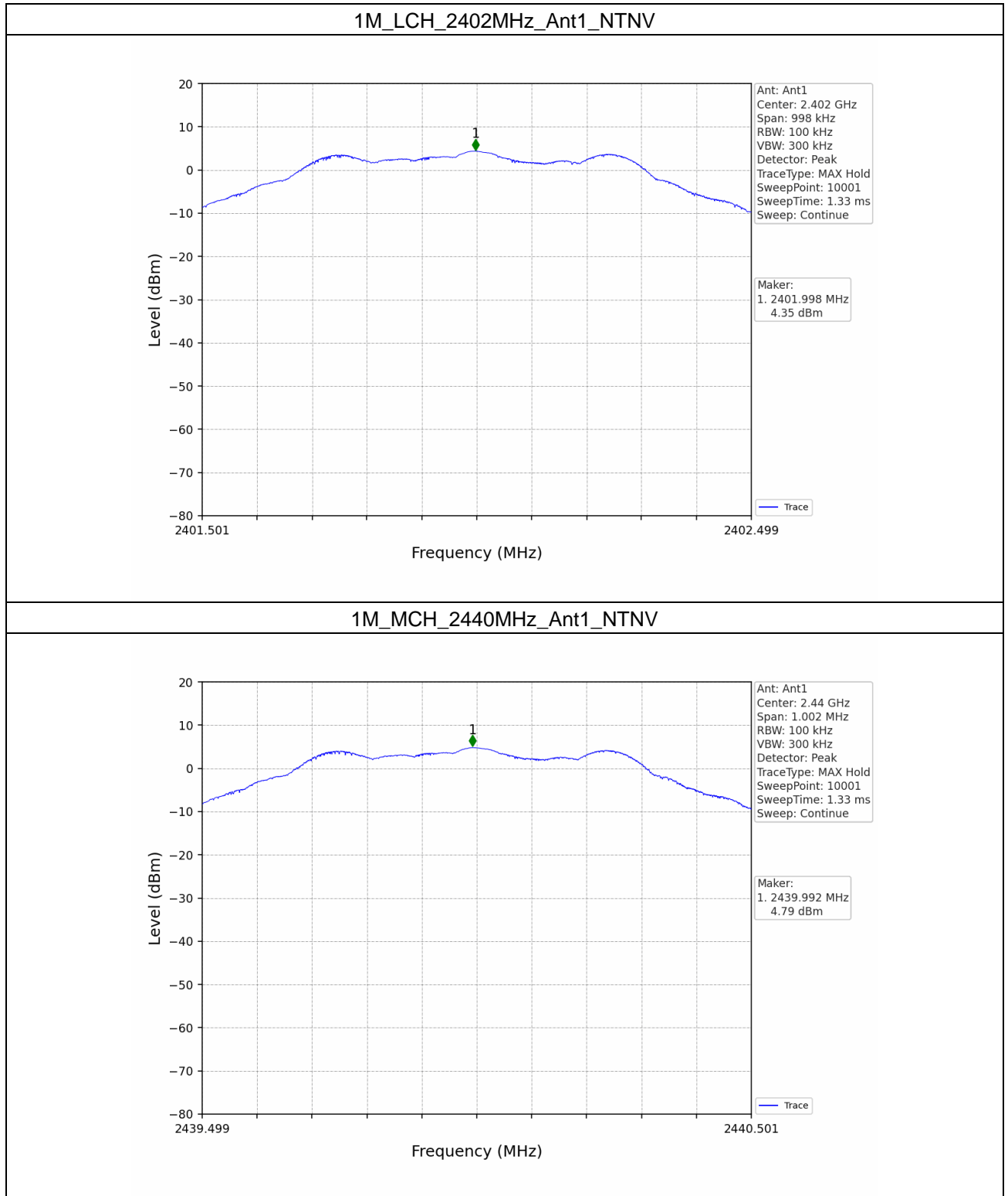
### 5.1 Ref

#### 5.1.1 Test Result

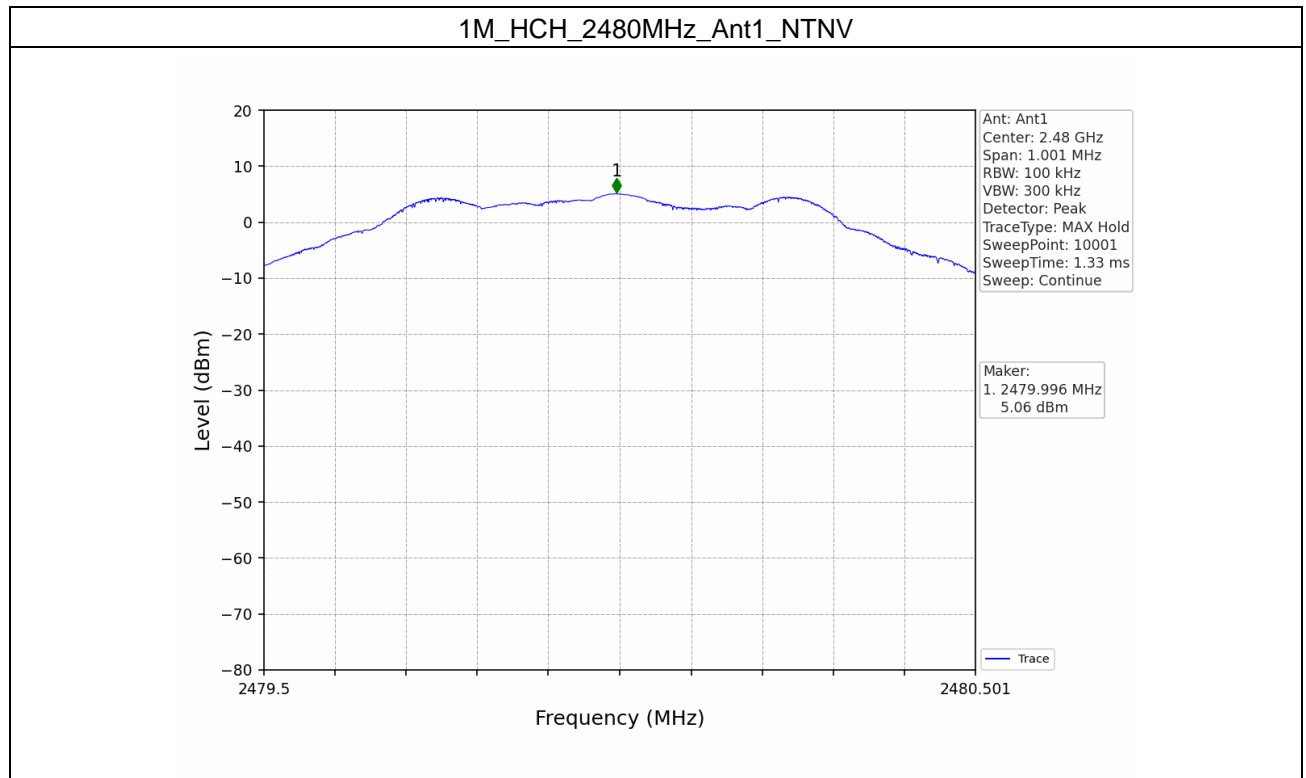
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	4.35
		2440	1	4.79
		2480	1	5.06



### 5.1.2 Test Graph



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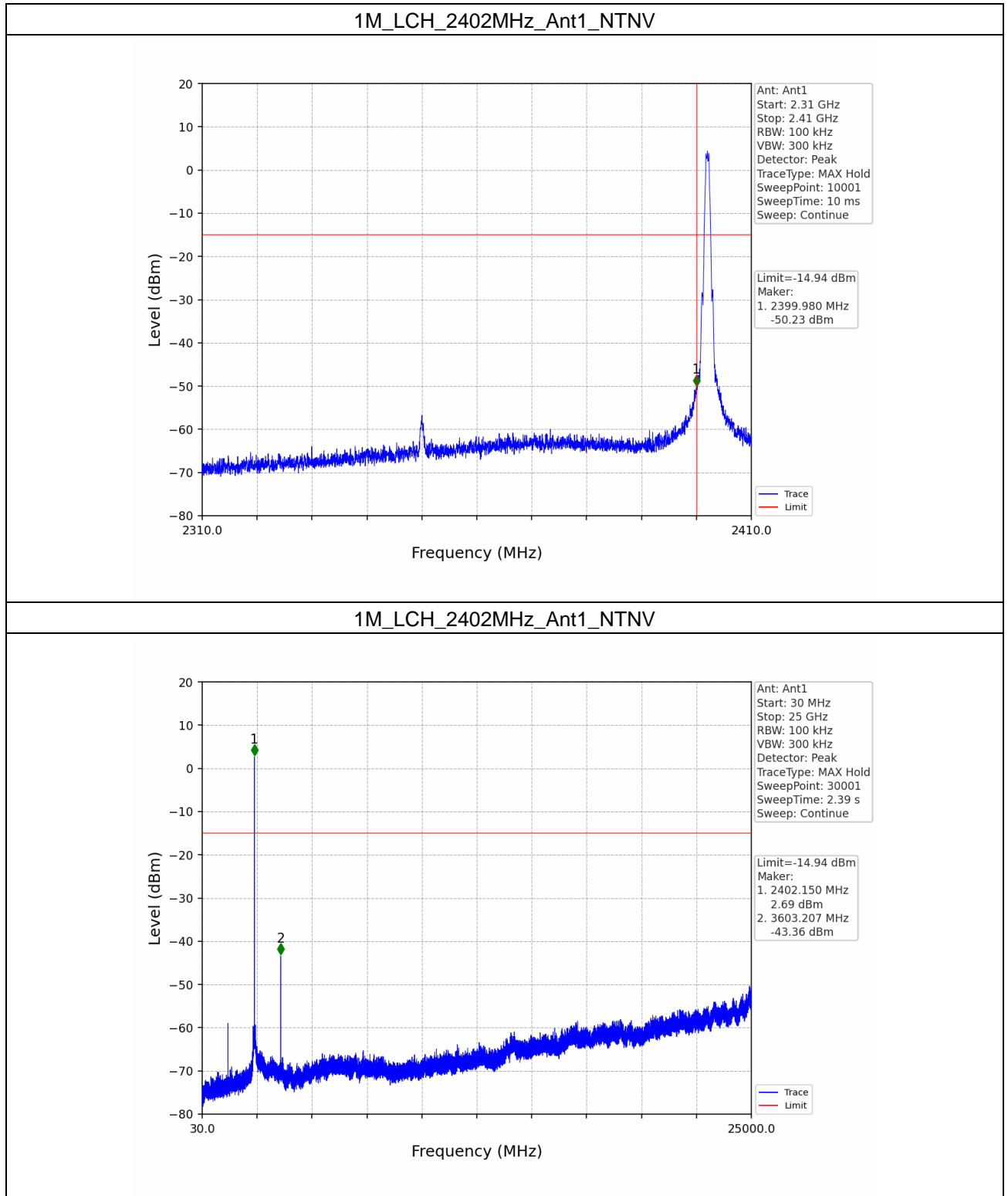


## 5.2 CSE

## 5.2.1 Test Result

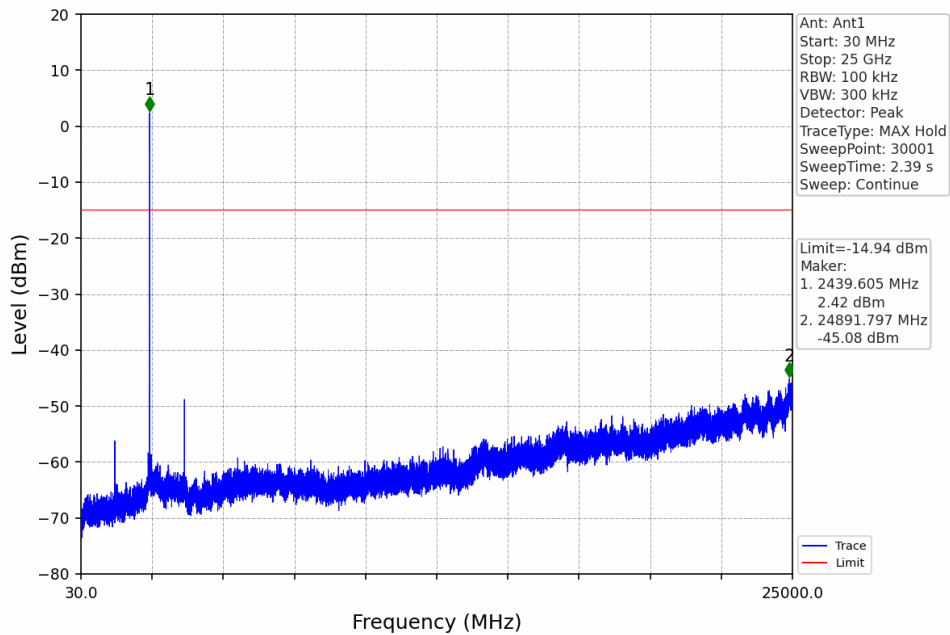
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	5.06	-14.94	Pass
		2440	1	5.06	-14.94	Pass
		2480	1	5.06	-14.94	Pass

### 5.2.2 Test Graph

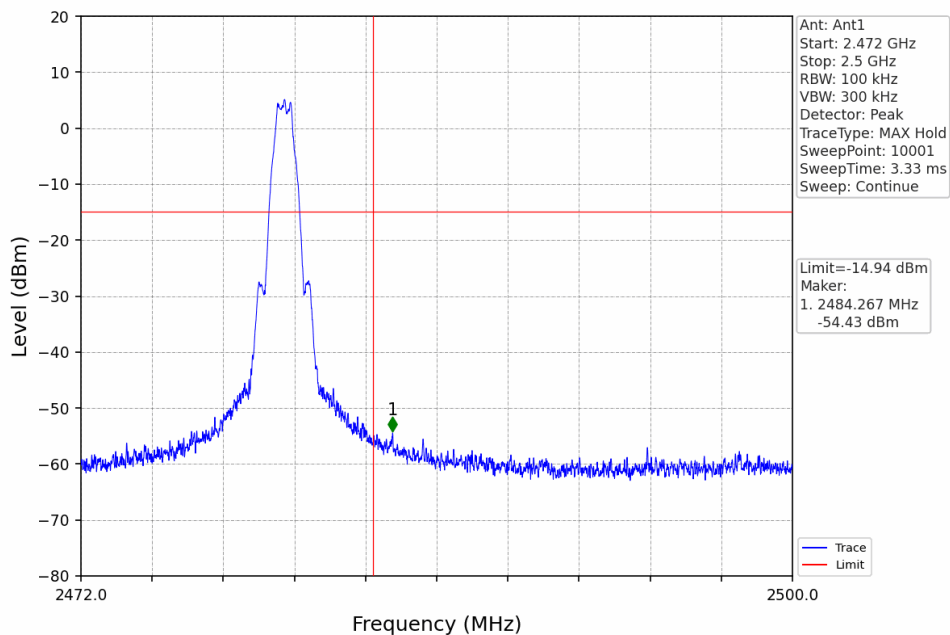


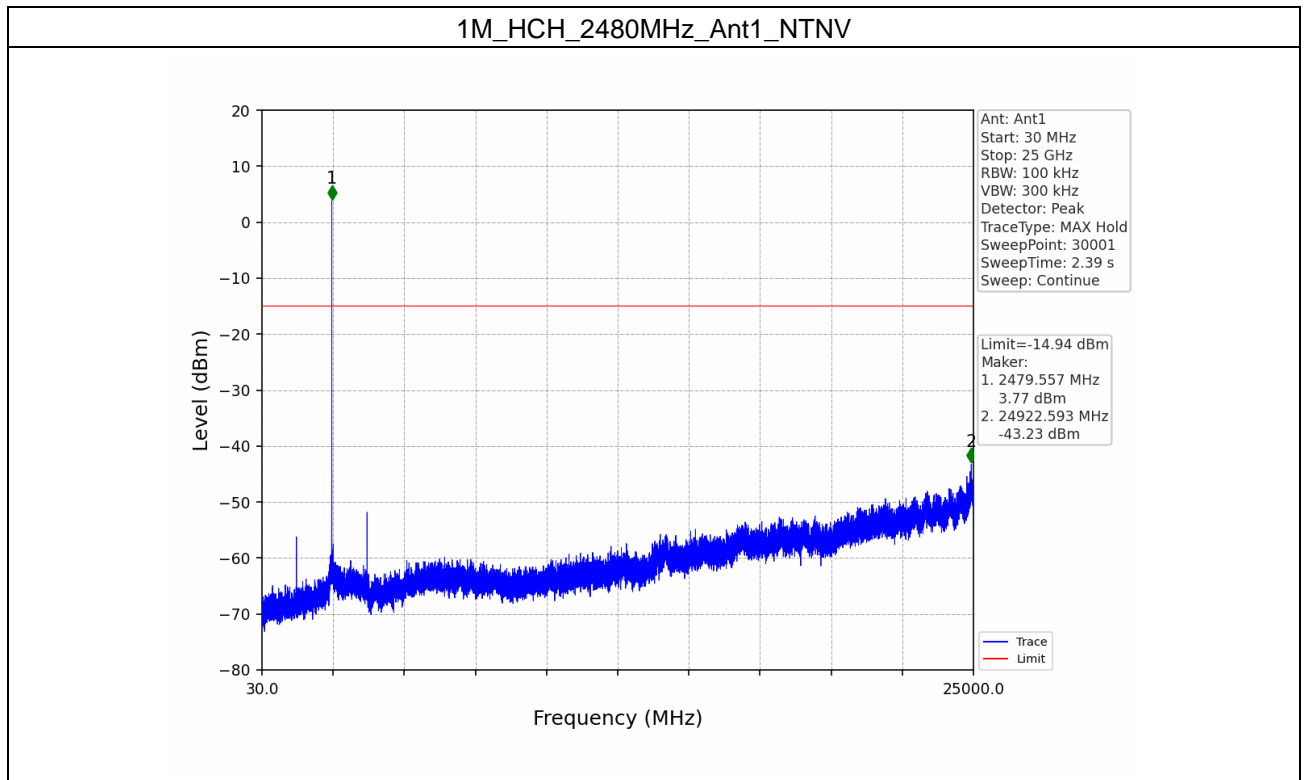


### 1M\_MCH\_2440MHz\_Ant1\_NTNV



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





- End of the Report -



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