



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 1 of 129

TEST REPORT

Application No.: SHCR2307001498AT
FCC ID: POTCFIZWE1
IC: 4773A-CFIZWE1
Applicant: Inventec Appliances Corp.
Address of Applicant: No.37, Wugong 5th Road, New Taipei industrial Park, Wugu District, New Taipei City, Taiwan.
Manufacturer: Inventec Appliances Corp.
Address of Manufacturer: No.37, Wugong 5th Road, New Taipei industrial Park, Wugu District, New Taipei City, Taiwan.
Equipment Under Test (EUT):
EUT Name: Wireless Earbuds
Model No.: CFI-ZWE1
HVIN: Left: CFI-ZWE1-L; Right: CFI-ZWE1-R
Trade Mark: SONY
Standard(s) : 47 CFR Part 15, Subpart C 15.247
RSS-247 Issue 2, February 2017
RSS-Gen Issue 5 Amendment 2 (February 2021)
Date of Receipt: 2023-07-26
Date of Test: 2023-08-05 to 2023-09-04
Date of Issue: 2023-09-04

Test Result:

Pass*

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

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 2 of 129

<i>Revision Record</i>			
Version	Description	Date	Remark
00	Original	2023-09-04	/

Authorized for issue by:			
Tested By			
	<hr/> Micheal Niu /Project Engineer		
Approved By			
	<hr/> Parlam Zhan /Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	FCC Requirement	IC Requirement	Method	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	RSS-Gen Clause 6.8	N/A	Customer Declaration

N/A: Not applicable

Radio Spectrum Matter Part				
Item	FCC Requirement	IC Requirement	Method	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.207	RSS-Gen Section 8.8	ANSI C63.10 (2013) Section 6.2	Pass
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247a(2)	RSS-247 Clause 5.2(a)	ANSI C63.10 (2013) Section 11.8.1	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247(b)(3)	RSS-247 Clause 5.4(d)	ANSI C63.10 (2013) Section 11.9.1	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247(e)	RSS-247 Clause 5.2(b)	ANSI C63.10 (2013) Section 11.10.2	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247(d)	RSS-247 Clause 5.5	ANSI C63.10 (2013) Section 11.13.3.2	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247(d)	RSS-247 Clause 5.5	ANSI C63.10 (2013) Section 11.11	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	RSS-247 Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.10.5	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	RSS-247 Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.4,6.5,6.6	Pass
99% Bandwidth	-	RSS-Gen Section 6.7	ANSI C63.10 Section 6.9.3	Pass

3 Contents

	Page
1 COVER PAGE	1
2 Test Summary	3
3 Contents	4
4 General Information	5
4.1 Details of E.U.T.	5
4.2 Power level setting using in test:.....	5
4.3 Description of Support Units	5
4.4 Measurement Uncertainty	6
4.5 Test Location.....	7
4.6 Test Facility	7
4.7 Deviation from Standards.....	7
4.8 Abnormalities from Standard Conditions	7
5 Equipment List	8
6 Radio Spectrum Technical Requirement	10
6.1 Antenna Requirement	10
7 Radio Spectrum Matter Test Results	11
7.1 Conducted Emissions at AC Power Line (150kHz-30MHz).....	11
7.2 Conducted Peak Output Power.....	15
7.3 Minimum 6dB Bandwidth	16
7.4 Power Spectrum Density.....	17
7.5 Conducted Band Edges Measurement	18
7.6 Conducted Spurious Emissions	19
7.7 Radiated Emissions which fall in the restricted bands	20
7.8 Radiated Spurious Emissions Below 1GHz	38
7.9 Radiated Spurious Emissions Above 1GHz.....	42
7.10 99% Bandwidth	68
8 Test Setup Photo	69
9 EUT Constructional Details (EUT Photos)	69
10 Appendix	70

4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3.85V by battery Charging case Battery Model: 541963 Nominal Voltage: 3.85V Rated capacity: 780mAh Earbuds Battery Model: 1454 Nominal Voltage: 3.85V Rated capacity: 105mAh
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 Dual mode
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	Monopole Antenna
Antenna Gain:	Left 2.08dBi (Provided by the manufacturer) Right -0.06dBi (Provided by the manufacturer)

4.2 Power level setting using in test:

Left

Channel	BLE 1M	BLE 2M
0	45	45
19	45	45
39	45	45

Right

Channel	BLE 1M	BLE 2M
0	50	50
19	50	50
39	50	50

4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Notebook	LENOVO	K27	EB24537645

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4 x 10 ⁻⁸
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	RF Radiated Power	5.2dB (Below 1GHz)
		5.9dB (Above 1GHz)
9	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

No tests were sub-contracted.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc) is provided by the applicant. (if applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).

4.6 Test Facility

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

• **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

• **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

• **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.
Company Number: 8617A

• **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Conducted Test					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2022-12-20	2023-12-19
Spectrum Analyzer	Keysight	N9020B	SHEM241-1	2022-12-20	2023-12-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2023-08-02	2024-08-01
Signal Generator	R&S	SMR20	SHEM006-1	2023-08-02	2024-08-01
Signal Generator	Agilent	N5182A	SHEM182-1	2023-08-02	2024-08-01
Communication Tester	R&S	CMW270	SHEM183-1	2023-06-01	2024-05-31
Communication Tester	R&S	CMW500	SHEM268-1	2023-06-01	2024-05-31
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2023-08-02	2024-08-01
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2022-11-08	2024-11-07
AC Power Stabilizer	APC	KDF-31020T-V0-F0	SHEM216-1	2022-12-20	2023-12-19
DC Power Supply	MCH	MCH-303A	SHEM210-1	2022-12-20	2023-12-19
Conducted test Cable	/	RF01~RF04	/	2022-12-20	2023-12-19
Switcher	Tonscend	JS0806	SHEM184-1	2023-08-02	2024-08-01
Test software	Tonscend	JS Tonscend BT/WIFI System	Version: 2.6	/	/
Coaxial Cable	TST		SHEM263-1	2023-08-02	2024-08-01
Test software	TST	TST PASS	Version: 2.0	/	/
RF Radiated Test					
EMI test Receiver	R&S	ESU40	SHEM051-1	2022-12-20	2023-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2022-12-20	2023-12-19
Communication Tester	R&S	CMW500	SHEM268-1	2023-06-01	2024-05-31
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2022-12-20	2023-12-19
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2021-09-11	2023-09-10
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM202-1	2022-05-07	2024-05-06
Horn Antenna (1-18GHz)	Schwarzbeck	HF906	SHEM009-1	2022-08-11	2024-08-10
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2021-09-18	2023-09-17
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2021-09-18	2023-09-17
Pre-Amplifier	HP	8447D	SHEM236-1	2023-08-02	2024-08-01
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2022-12-20	2023-12-19
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2021-05-25	2024-05-24
RE test Cable	/	RE01, RE02, RE06	/	2023-01-07	2024-01-06
Test software	ESE	E3	Version: 6.111221a	/	/



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 9 of 129

Conducted Emissions at AC Mains Power Port (150kHz-30MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2022/12/20	2023/12/19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2022/12/20	2023/12/19
Line impedance stabilization network	EMCO	3816_2	SHEM019-1	2022/12/20	2023/12/19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2022/12/20	2023/12/19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020/12/20	2023/12/19
CE test Cable	/	/	SHEM172-1	2022/12/20	2023/12/19
Test Software	ESE	e3	Version: 6.191211	N/A	N/A

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

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

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

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

EUT Antenna:

The antenna is Monopole Antenna and no consideration of replacement. The best case gain of the Left antenna is 2.08dBi, Right antenna 0 is -0.06dBi.

Antenna location: Refer to internal photo.

7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.
 Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

7.1.1 E.U.T. Operation

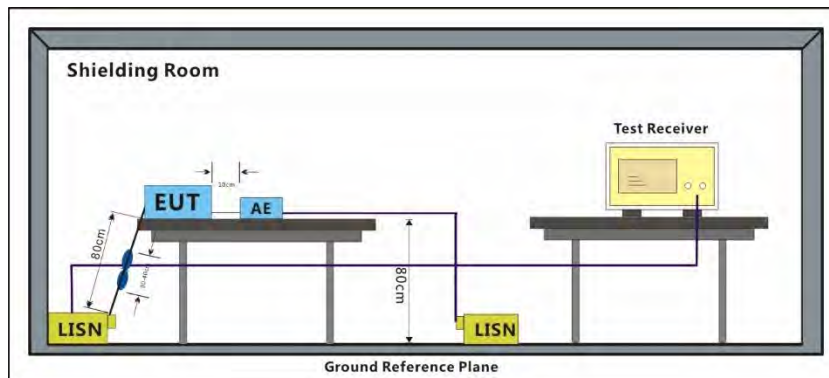
Operating Environment:

Temperature: 24.5 °C Humidity: 48.5 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	Charge + TX mode(1Mbps)_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.
Final test	05	Charge + TX mode(2Mbps)_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

7.1.3 Test Setup Diagram

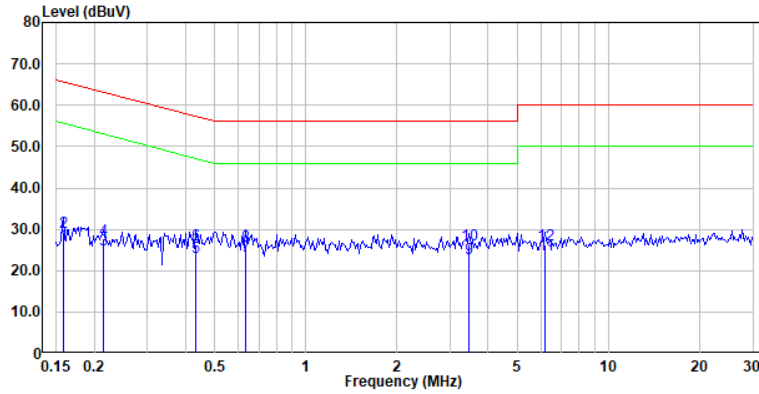


7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

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

Test Mode: 04; Line: Live line

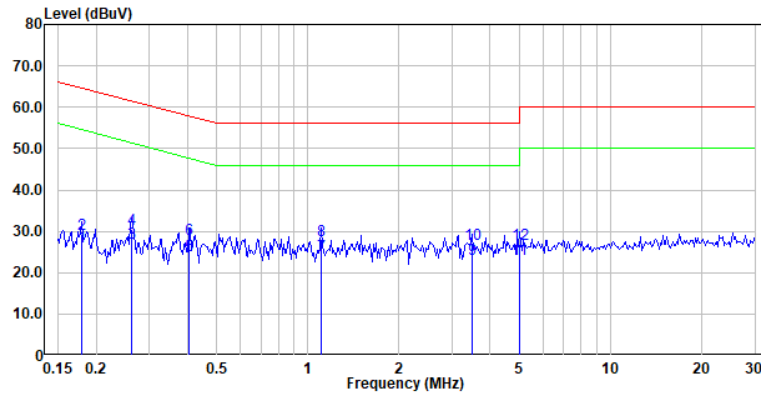


Site: Chamber
 Condition :
 Mode:

No.	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.16	6.77	19.56	0.00	26.33	55.56	-29.23	Average
2	0.16	9.71	19.56	0.00	29.27	65.56	-36.29	QP
3	0.22	5.38	19.56	0.00	24.94	53.01	-28.07	Average
4	0.22	7.80	19.56	0.00	27.36	63.01	-35.65	QP
5	0.43	3.68	19.57	0.00	23.25	47.20	-23.95	Average
6	0.43	6.69	19.57	0.00	26.26	57.20	-30.94	QP
7	0.63	3.82	19.58	0.00	23.40	46.00	-22.60	Average
8	0.63	6.53	19.58	0.00	26.11	56.00	-29.89	QP
9	3.45	3.43	19.62	0.00	23.05	46.00	-22.95	Average
10	3.45	6.51	19.62	0.00	26.13	56.00	-29.87	QP
11	6.19	4.13	19.70	0.00	23.83	50.00	-26.17	Average
12	6.19	6.51	19.70	0.00	26.21	60.00	-33.79	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss

Test Mode: 04; Line: Neutral Line



Site: Chamber
 Condition :
 Mode:

No.	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.18	6.74	19.56	0.00	26.30	54.50	-28.20	Average
2	0.18	9.82	19.56	0.00	29.38	64.50	-35.12	QP
3	0.26	7.64	19.57	0.00	27.21	51.34	-24.13	Average
4	0.26	10.93	19.57	0.00	30.50	61.34	-30.84	QP
5	0.41	4.56	19.57	0.00	24.13	47.73	-23.60	Average
6	0.41	8.37	19.57	0.00	27.94	57.73	-29.79	QP
7	1.11	4.57	19.58	0.00	24.15	46.00	-21.85	Average
8	1.11	8.11	19.58	0.00	27.69	56.00	-28.31	QP
9	3.49	3.74	19.62	0.00	23.36	46.00	-22.64	Average
10	3.49	7.10	19.62	0.00	26.72	56.00	-29.28	QP
11	5.01	3.70	19.67	0.00	23.37	50.00	-26.63	Average
12	5.01	7.15	19.67	0.00	26.82	60.00	-33.18	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss

7.2 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

Limit:

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

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.5 °C

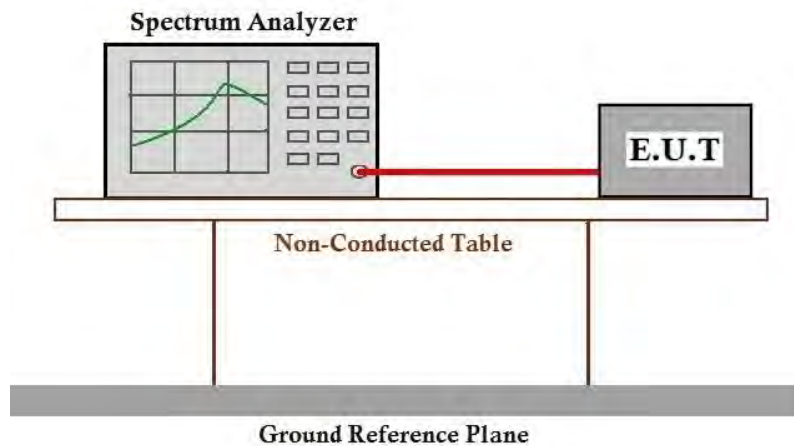
Humidity: 48.5 % RH

Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

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

Please Refer to Appendix for Details

7.3 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

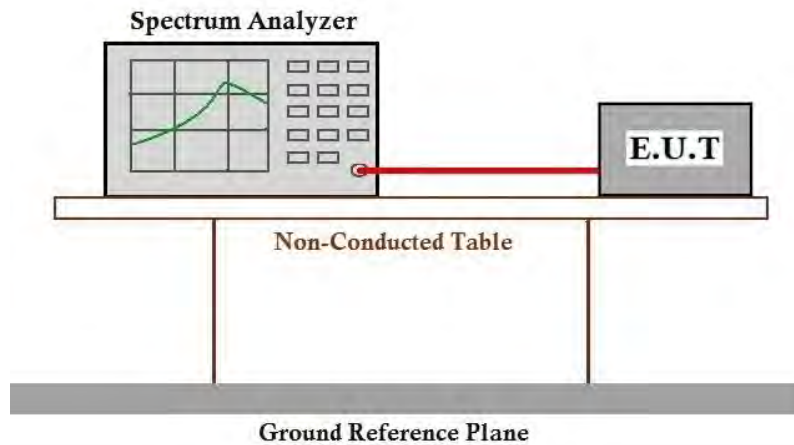
7.3.1 E.U.T. Operation

Operating Environment:
 Temperature: 24.5 °C Humidity: 48.5 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.4 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

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24.5 °C

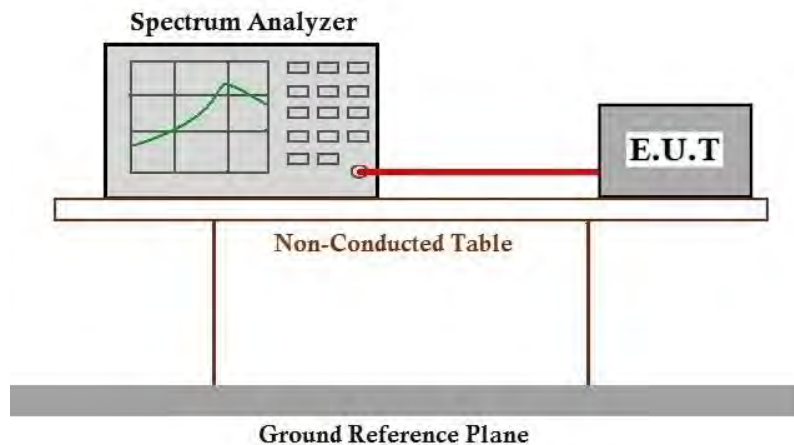
Humidity: 48.5 % RH

Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.5 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)).

7.5.1 E.U.T. Operation

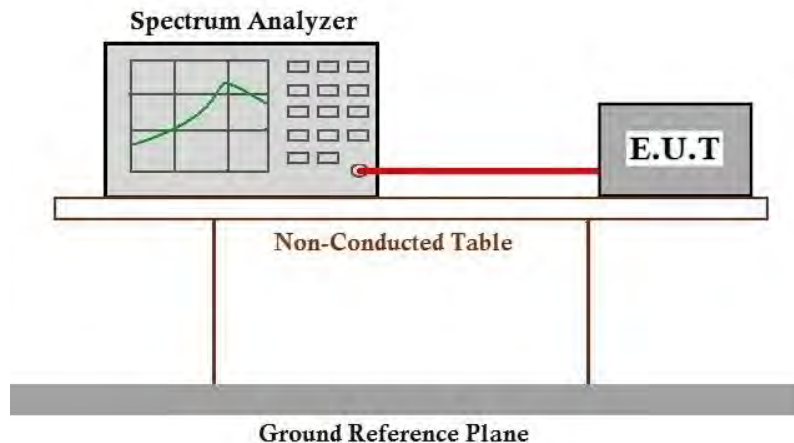
Operating Environment:

Temperature: 24.5 °C Humidity: 48.5 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.6 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 §1 5.205(c).

7.6.1 E.U.T. Operation

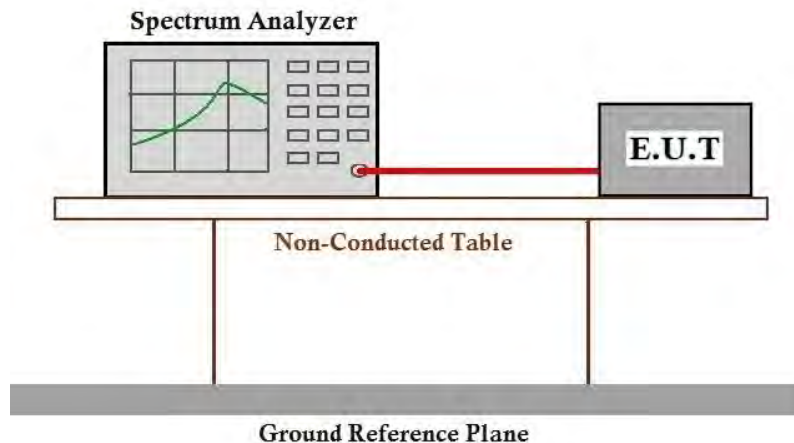
Operating Environment:

Temperature: 24.5 °C Humidity: 48.5 % RH Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.6.3 Test Setup Diagram



7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.7 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.

7.7.1 E.U.T. Operation

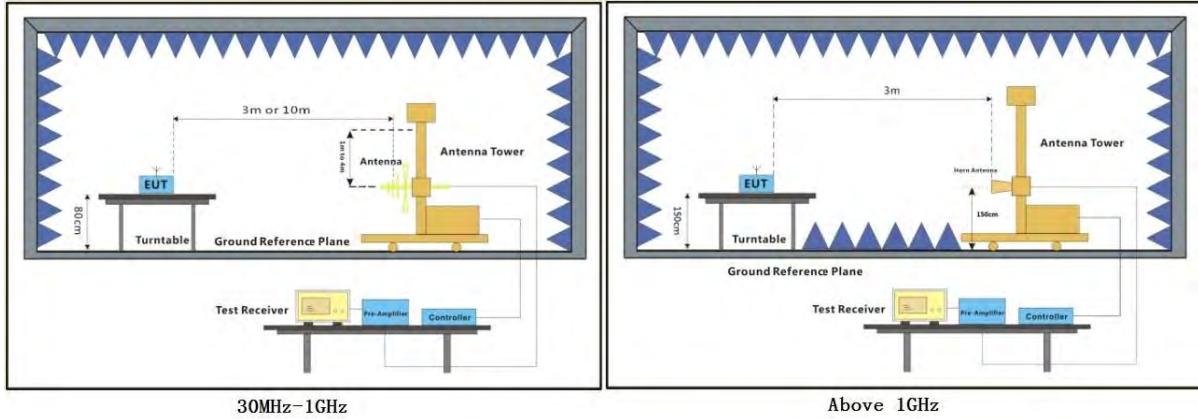
Operating Environment:

Temperature: 25.3 °C Humidity: 46.4 % RH Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.7.3 Test Setup Diagram



7.7.4 Measurement Procedure and Data

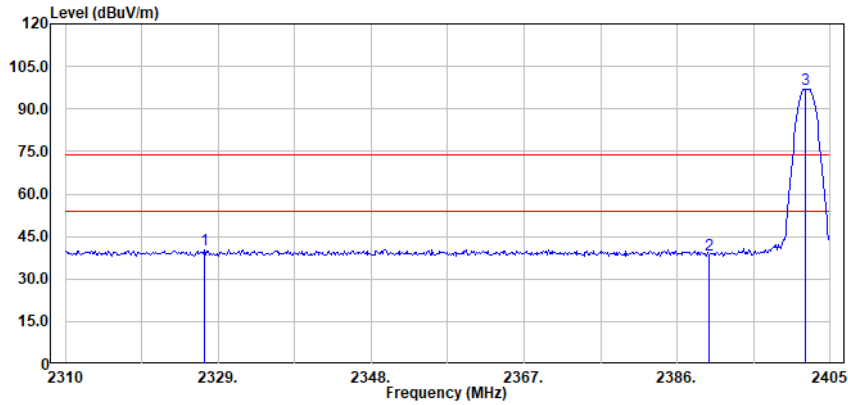
- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 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 middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 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.

Left

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

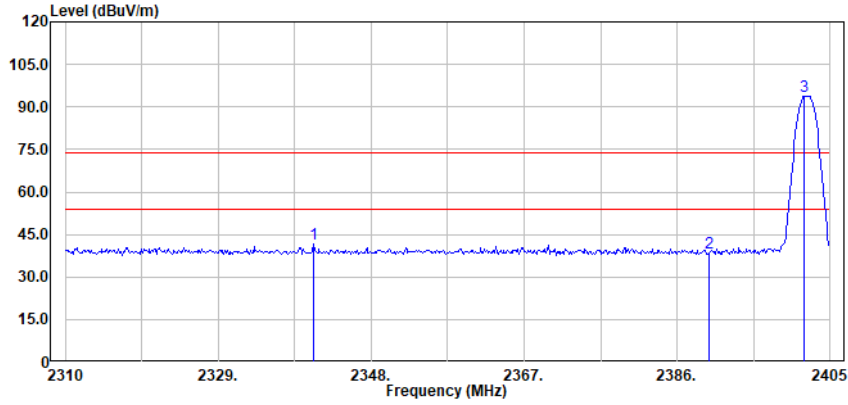


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2327.21	60.52	27.51	2.64	50.20	40.47	74.00	-33.53	Peak
	2390.00	58.50	27.55	2.66	50.13	38.58	74.00	-35.42	Peak
	2401.97	117.00	27.55	2.67	50.11	97.11	74.00	23.11	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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

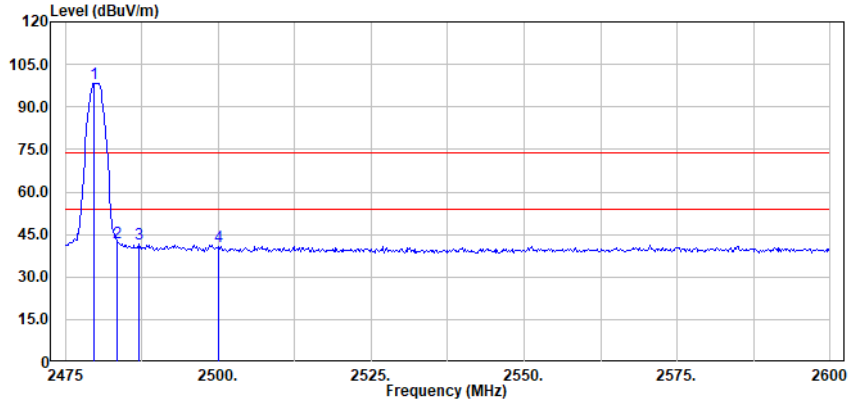


Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2340.84	61.61	27.52	2.64	50.19	41.58	74.00	-32.42	Peak
	2390.00	58.48	27.55	2.66	50.13	38.56	74.00	-35.44	Peak
	2401.83	113.73	27.55	2.67	50.11	93.84	74.00	19.84	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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

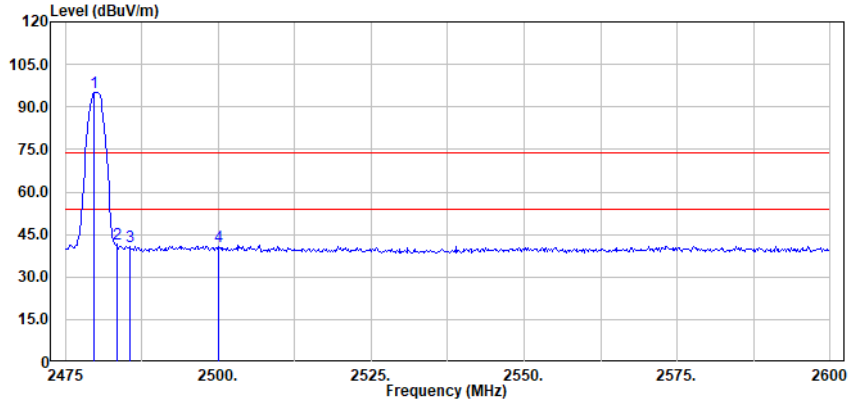


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
	2479.71	117.88	27.58	2.73	49.90	98.29	74.00	24.29	Peak
	2483.50	61.53	27.58	2.73	49.90	41.94	74.00	-32.06	Peak
	2486.96	61.45	27.58	2.73	49.91	41.85	74.00	-32.15	Peak
	2500.00	60.17	27.59	2.74	49.94	40.56	74.00	-33.44	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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

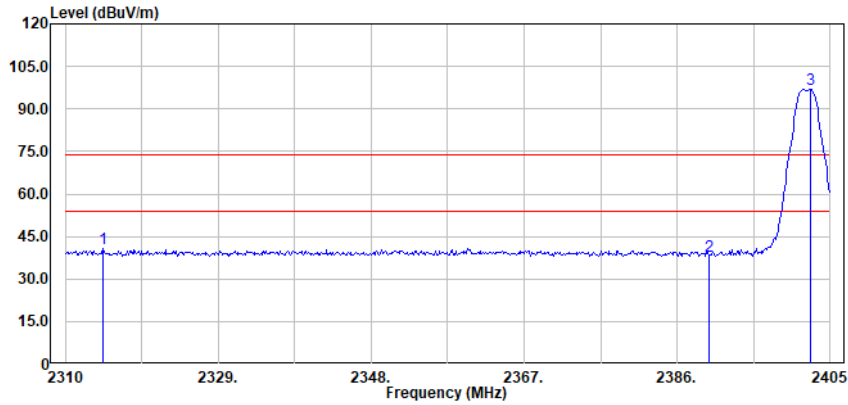


Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
	2479.71	114.55	27.58	2.73	49.90	94.96	74.00	20.96	Peak
	2483.50	61.07	27.58	2.73	49.90	41.48	74.00	-32.52	Peak
	2485.51	60.56	27.58	2.73	49.91	40.96	74.00	-33.04	Peak
	2500.00	60.30	27.59	2.74	49.94	40.69	74.00	-33.31	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low

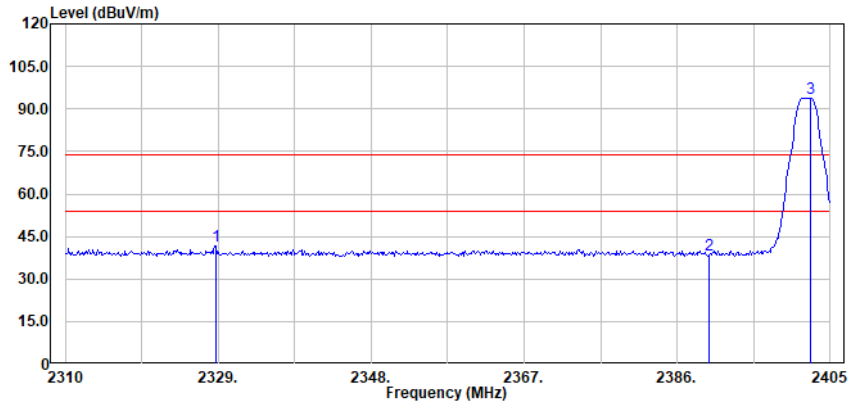


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
	2314.68	60.91	27.49	2.65	50.22	40.83	74.00	-33.17	Peak
	2390.00	58.17	27.55	2.66	50.13	38.25	74.00	-35.75	Peak
	2402.66	116.78	27.56	2.67	50.10	96.91	74.00	22.91	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2328.73	61.92	27.51	2.64	50.20	41.87	74.00	-32.13	Peak
	2390.00	58.47	27.55	2.66	50.13	38.55	74.00	-35.45	Peak
	2402.66	113.77	27.56	2.67	50.10	93.90	74.00	19.90	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



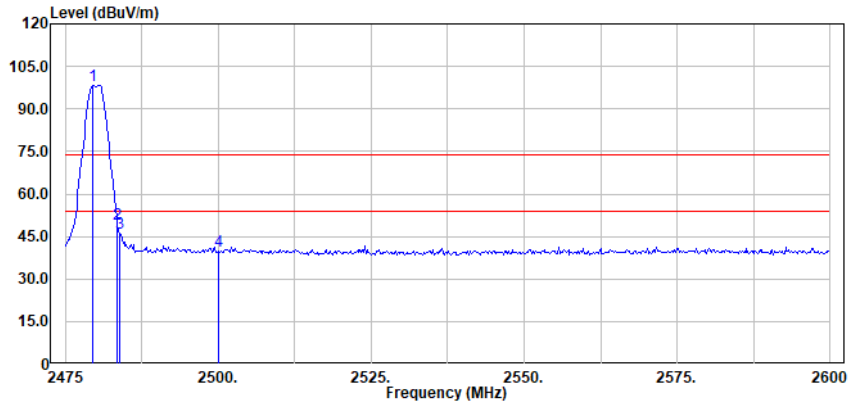
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 28 of 129

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High

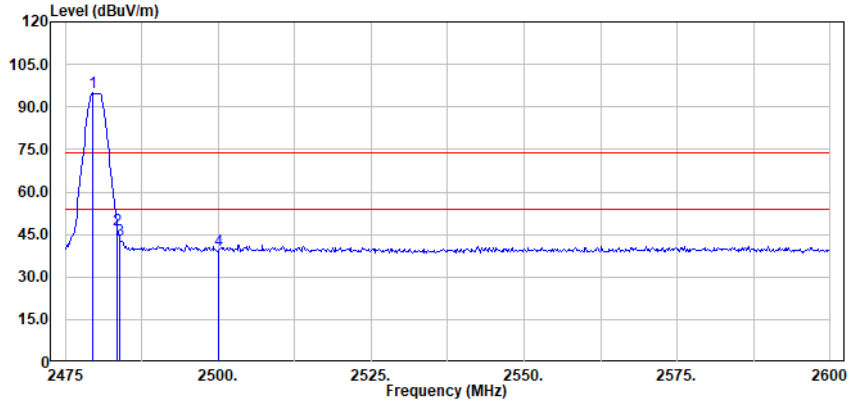


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2479.53	117.87	27.58	2.73	49.89	98.29	74.00	24.29	Peak
	2483.50	68.92	27.58	2.73	49.90	49.33	74.00	-24.67	Peak
	2483.88	65.95	27.58	2.73	49.90	46.36	74.00	-27.64	Peak
	2500.00	59.51	27.59	2.74	49.94	39.90	74.00	-34.10	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



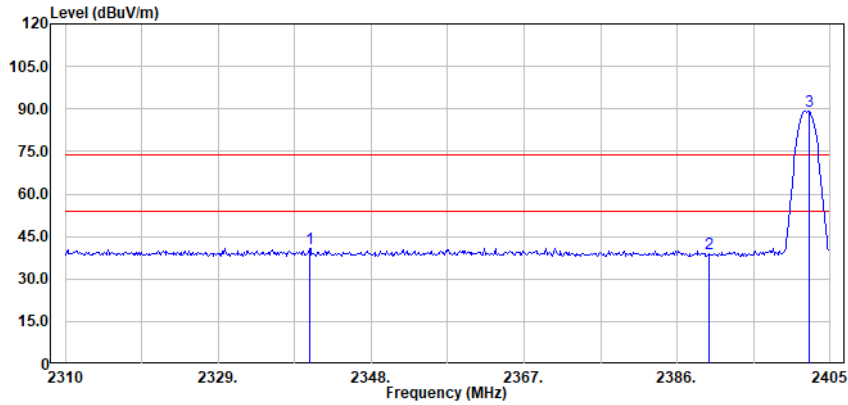
Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
	2479.53	114.54	27.58	2.73	49.89	94.96	74.00	20.96	Peak
	2483.50	66.21	27.58	2.73	49.90	46.62	74.00	-27.38	Peak
	2483.88	62.56	27.58	2.73	49.90	42.97	74.00	-31.03	Peak
	2500.00	59.17	27.59	2.74	49.94	39.56	74.00	-34.44	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Right

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

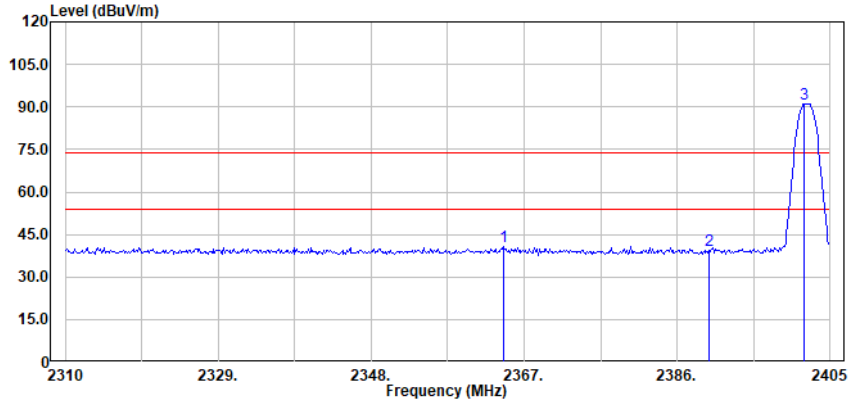


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2340.29	60.92	27.52	2.64	50.19	40.89	74.00	-33.11	Peak
	2390.00	58.79	27.55	2.66	50.13	38.87	74.00	-35.13	Peak
	2402.38	108.97	27.56	2.67	50.11	89.09	74.00	15.09	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2364.38	60.94	27.54	2.64	50.16	40.96	74.00	-33.04	Peak
	2390.00	59.17	27.55	2.66	50.13	39.25	74.00	-34.75	Peak
	2401.83	111.11	27.55	2.67	50.11	91.22	74.00	17.22	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



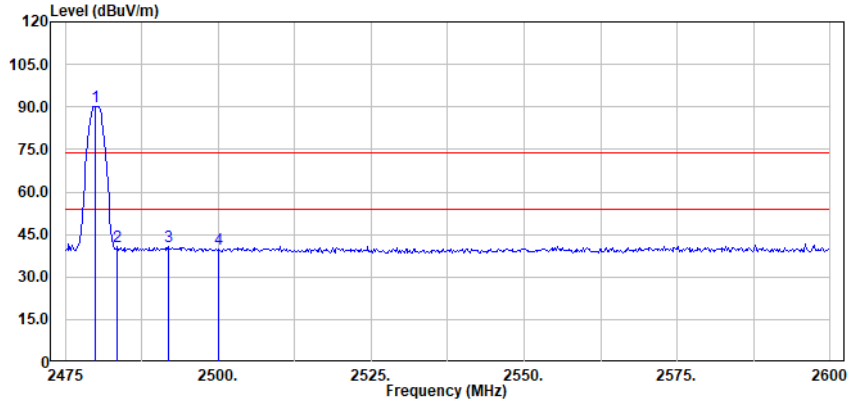
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 32 of 129

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

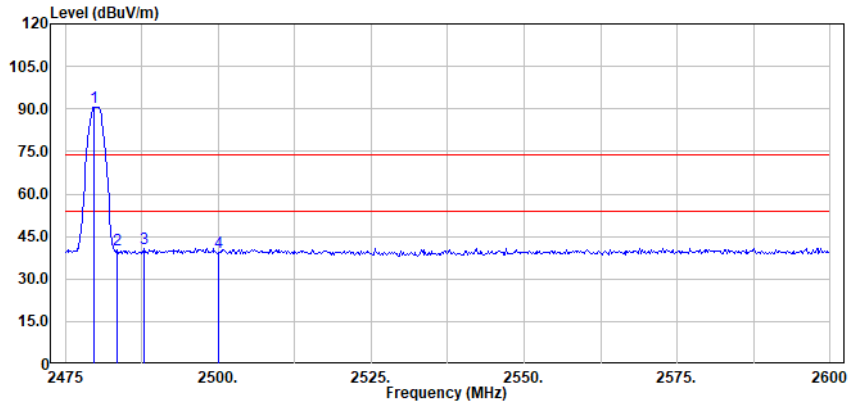


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
	2479.89	109.71	27.58	2.73	49.90	90.12	74.00	16.12	Peak
	2483.50	60.54	27.58	2.73	49.90	40.95	74.00	-33.05	Peak
	2491.85	60.55	27.59	2.74	49.92	40.96	74.00	-33.04	Peak
	2500.00	59.54	27.59	2.74	49.94	39.93	74.00	-34.07	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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

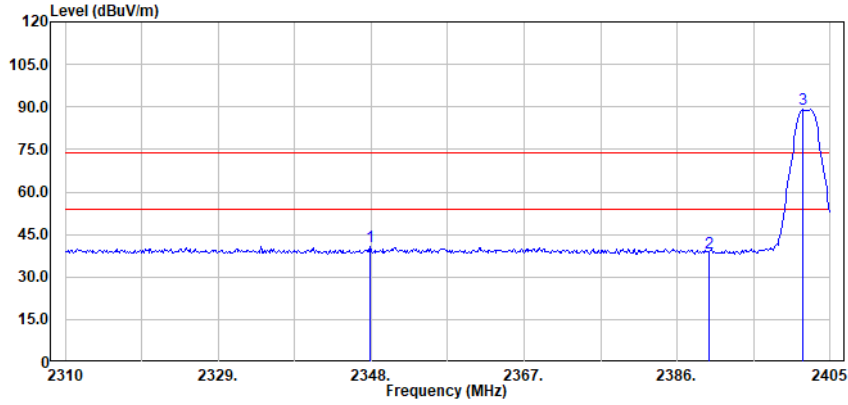


Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2479.71	110.13	27.58	2.73	49.90	90.54	74.00	16.54	Peak
	2483.50	59.80	27.58	2.73	49.90	40.21	74.00	-33.79	Peak
	2487.86	60.23	27.58	2.73	49.91	40.63	74.00	-33.37	Peak
	2500.00	59.12	27.59	2.74	49.94	39.51	74.00	-34.49	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low

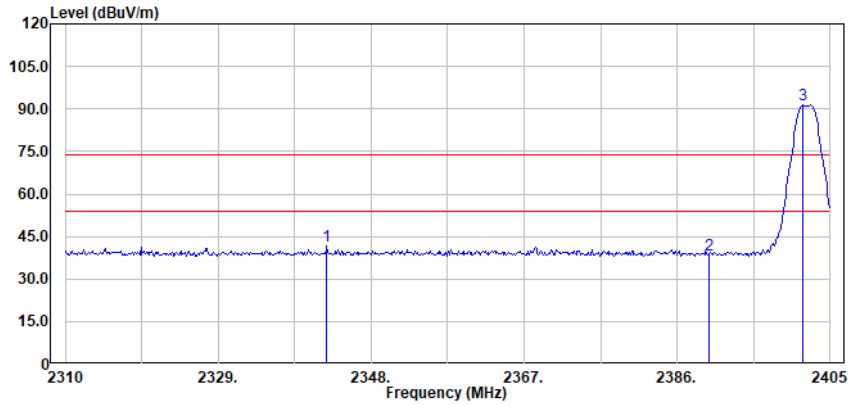


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2347.86	60.82	27.53	2.63	50.18	40.80	74.00	-33.20	Peak
	2390.00	58.56	27.55	2.66	50.13	38.64	74.00	-35.36	Peak
	2401.70	109.11	27.55	2.67	50.11	89.22	74.00	15.22	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2342.49	61.74	27.52	2.64	50.19	41.71	74.00	-32.29	Peak
	2390.00	58.57	27.55	2.66	50.13	38.65	74.00	-35.35	Peak
	2401.70	111.23	27.55	2.67	50.11	91.34	74.00	17.34	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



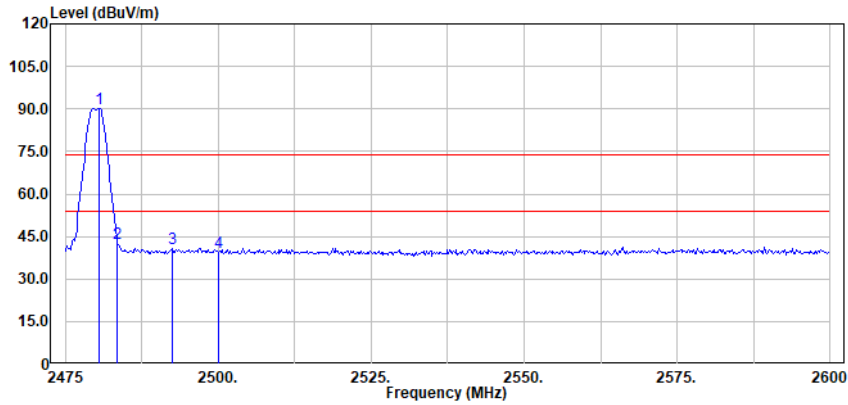
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 36 of 129

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High



Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
	2480.44	109.76	27.58	2.73	49.90	90.17	74.00	16.17	Peak
	2483.50	62.35	27.58	2.73	49.90	42.76	74.00	-31.24	Peak
	2492.39	60.40	27.59	2.74	49.92	40.81	74.00	-33.19	Peak
	2500.00	58.84	27.59	2.74	49.94	39.23	74.00	-34.77	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



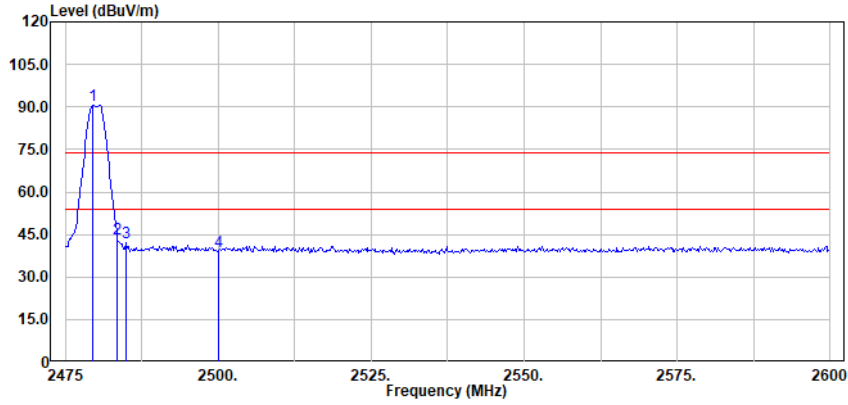
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 37 of 129

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	2479.53	110.20	27.58	2.73	49.89	90.62	74.00	16.62	Peak
	2483.50	63.22	27.58	2.73	49.90	43.63	74.00	-30.37	Peak
	2484.96	61.63	27.58	2.73	49.91	42.03	74.00	-31.97	Peak
	2500.00	58.65	27.59	2.74	49.94	39.04	74.00	-34.96	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

7.8 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

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
960-1000	500	3

7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 25.3 °C

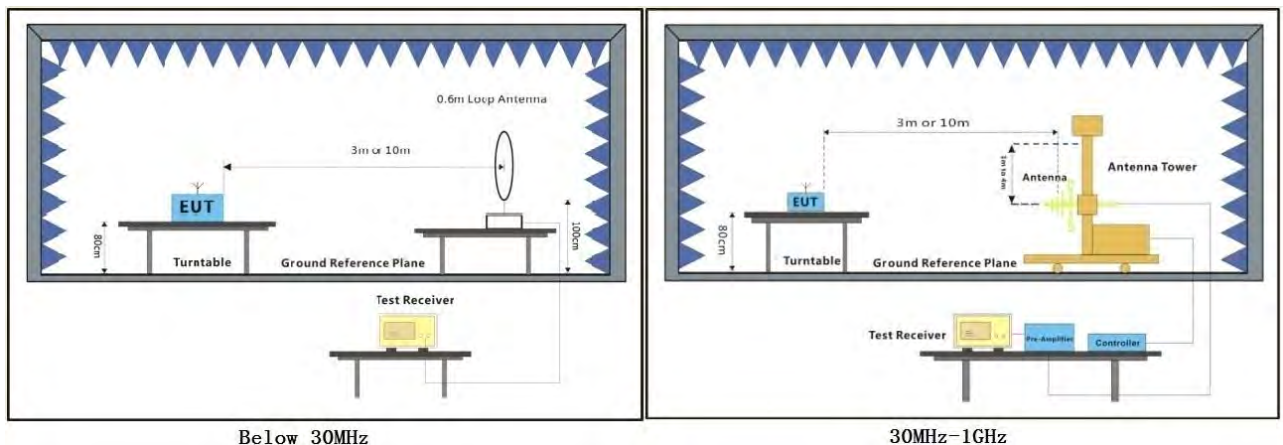
Humidity: 46.3 % RH

Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Pre-scan	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.8.3 Test Setup Diagram



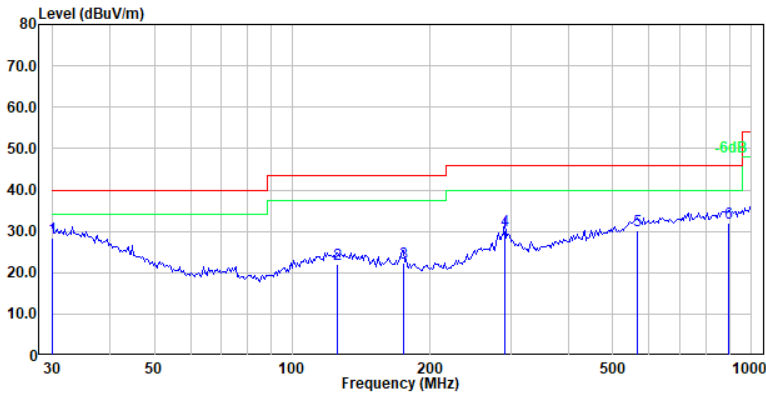
7.8.4 Measurement Procedure and Data

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

Remark:

1. $Level = Read\ Level + Cable\ Loss + Antenna\ Factor - Preamp\ Factor$
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

Test Mode: 02; Polarity: Horizontal;

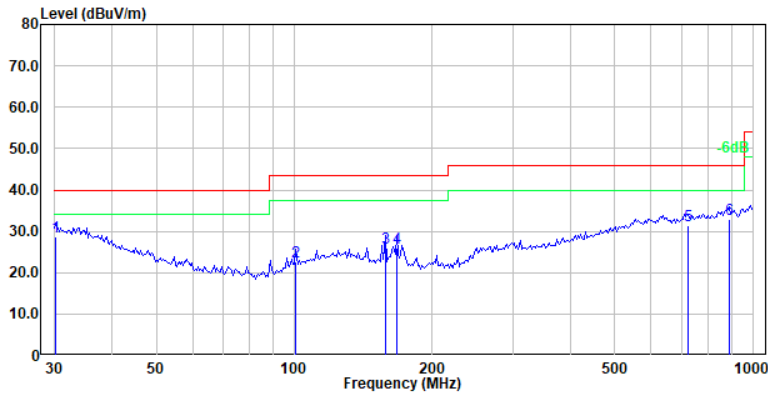


Site: Chamber
 Condition :
 Mode:

No.	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	30.00	3.00	25.04	0.21	28.25	40.00	-11.75	QP
2	125.45	2.44	18.51	0.95	21.90	43.50	-21.60	QP
3	174.42	5.69	15.66	1.12	22.47	43.50	-21.03	QP
4	291.04	9.58	19.18	1.31	30.07	46.00	-15.93	QP
5	566.62	2.78	25.13	2.24	30.15	46.00	-15.85	QP
6	893.86	2.49	27.13	2.41	32.03	46.00	-13.97	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss

Test Mode: 02; Polarity: Vertical;



Site: Chamber
Condition :
Mode:

No.	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	30.21	3.51	25.01	0.21	28.73	40.00	-11.27	QP
2	100.93	5.33	16.45	0.78	22.56	43.50	-20.94	QP
3	158.11	8.30	16.42	1.12	25.84	43.50	-17.66	QP
4	167.24	8.80	16.01	1.12	25.93	43.50	-17.57	QP
5	724.26	3.34	25.49	2.42	31.25	46.00	-14.75	QP
6	887.61	3.40	27.02	2.37	32.79	46.00	-13.21	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss

7.9 Radiated Spurious Emissions Above 1GHz

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

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

Limit:

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

7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 25.3 °C

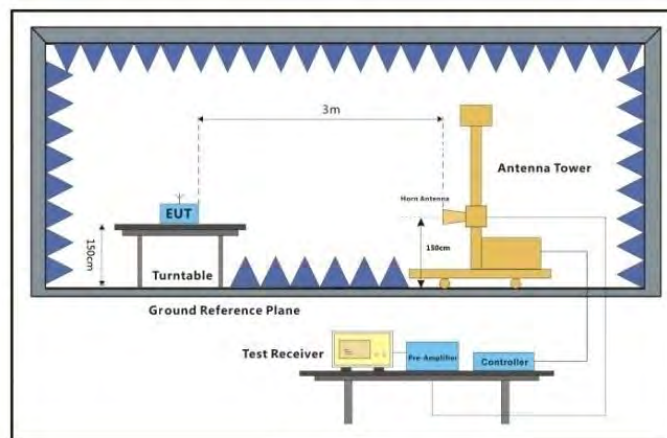
Humidity: 46.2 % RH

Atmospheric Pressure: 1010 mbar

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.9.3 Test Setup Diagram



Above 1GHz

7.9.4 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$
2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

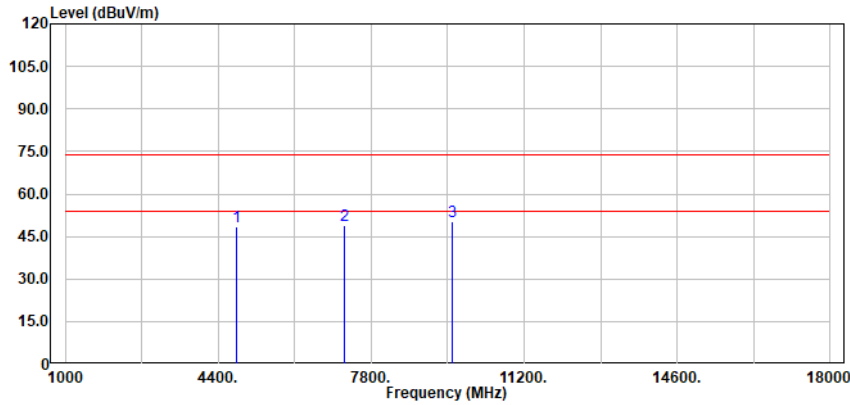
SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 44 of 129

Left

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

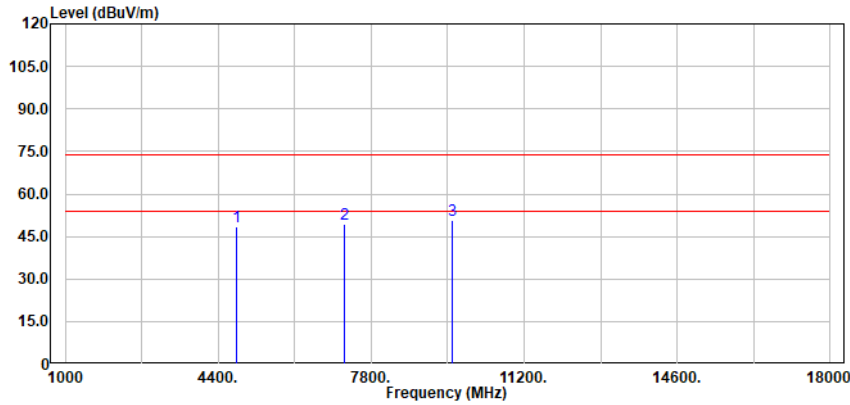


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4804.00	61.00	31.26	4.14	47.81	48.59	74.00	-25.41	Peak
	7206.00	54.61	35.74	5.33	46.59	49.09	74.00	-24.91	Peak
	9608.00	52.46	38.20	5.71	46.17	50.20	74.00	-23.80	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4804.00	60.77	31.26	4.14	47.81	48.36	74.00	-25.64	Peak
	7206.00	54.84	35.74	5.33	46.59	49.32	74.00	-24.68	Peak
	9608.00	52.82	38.20	5.71	46.17	50.56	74.00	-23.44	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



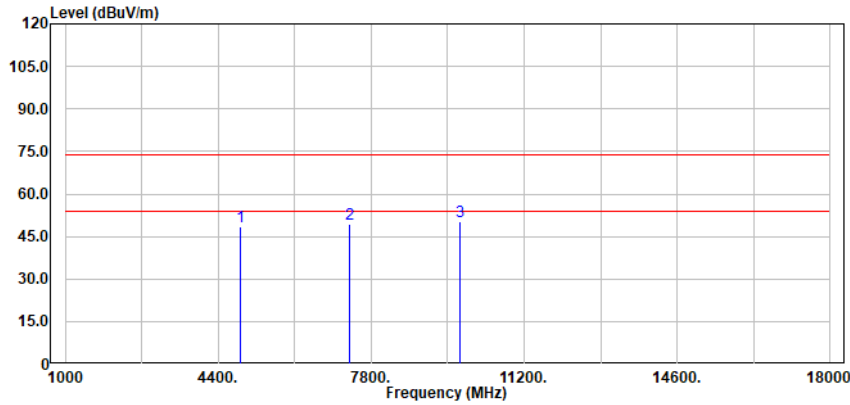
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 46 of 129

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

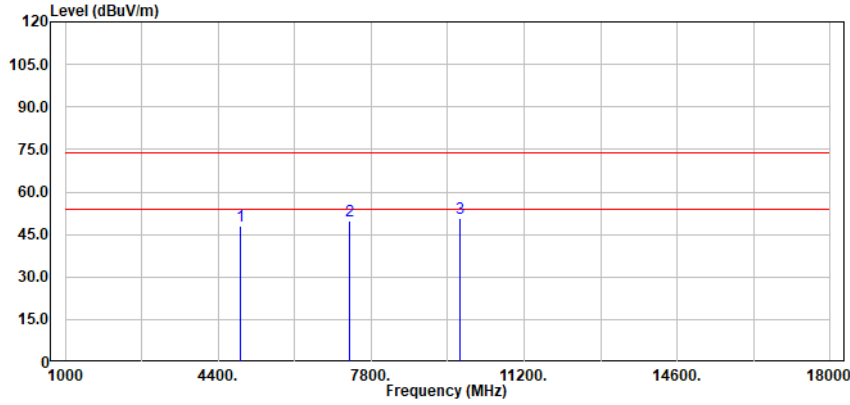


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4880.00	60.68	31.42	4.17	47.77	48.50	74.00	-25.50	Peak
	7320.00	54.36	36.08	5.43	46.71	49.16	74.00	-24.84	Peak
	9760.00	52.28	38.35	5.75	46.10	50.28	74.00	-23.72	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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

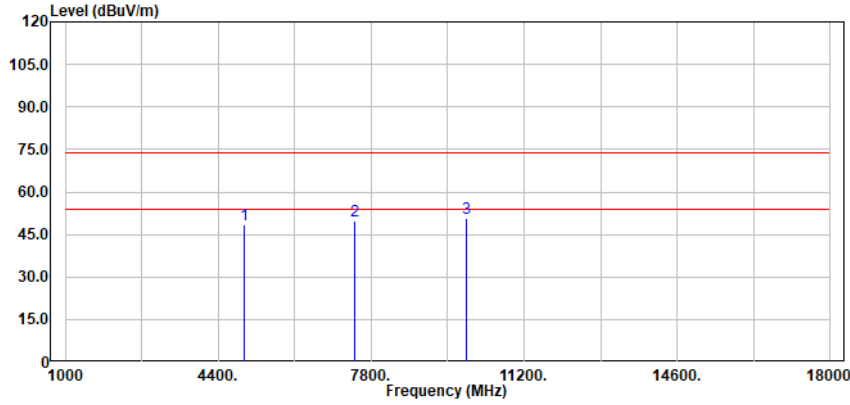


Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4880.00	60.26	31.42	4.17	47.77	48.08	74.00	-25.92	Peak
	7320.00	54.91	36.08	5.43	46.71	49.71	74.00	-24.29	Peak
	9760.00	52.87	38.35	5.75	46.10	50.87	74.00	-23.13	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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

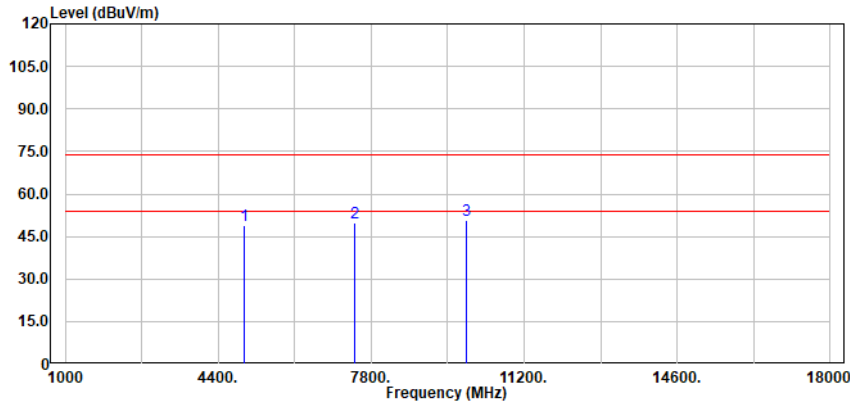


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4960.00	60.59	31.58	4.21	47.72	48.66	74.00	-25.34	Peak
	7440.00	55.00	36.35	5.48	46.84	49.99	74.00	-24.01	Peak
	9920.00	52.61	38.51	5.81	46.03	50.90	74.00	-23.10	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4960.00	60.88	31.58	4.21	47.72	48.95	74.00	-25.05	Peak
	7440.00	54.93	36.35	5.48	46.84	49.92	74.00	-24.08	Peak
	9920.00	52.55	38.51	5.81	46.03	50.84	74.00	-23.16	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



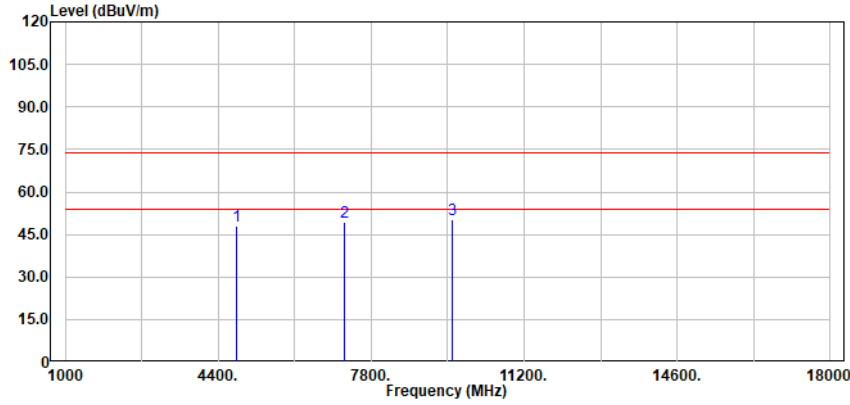
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 50 of 129

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
	4804.00	60.60	31.26	4.14	47.81	48.19	74.00	-25.81	Peak
	7206.00	55.09	35.74	5.33	46.59	49.57	74.00	-24.43	Peak
	9608.00	52.75	38.20	5.71	46.17	50.49	74.00	-23.51	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



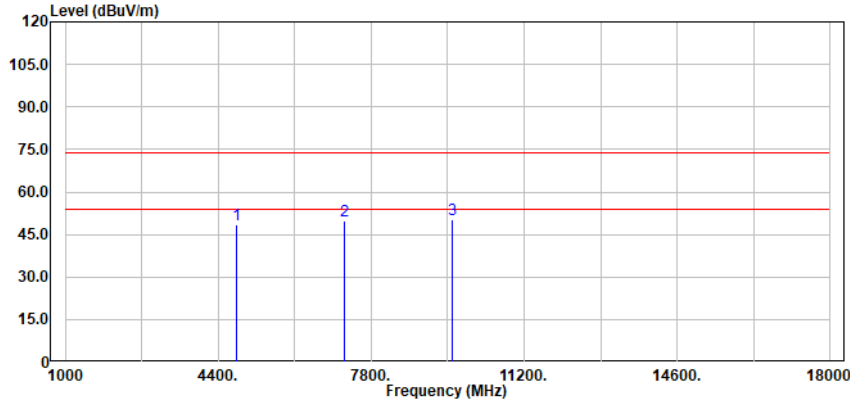
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 51 of 129

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low

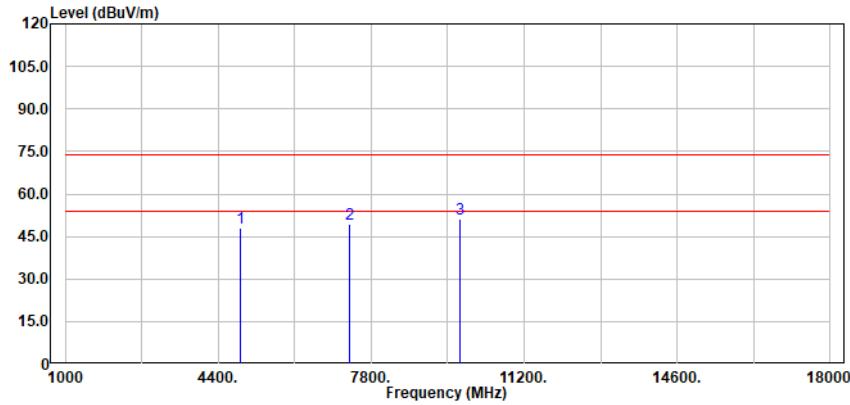


Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4804.00	61.00	31.26	4.14	47.81	48.59	74.00	-25.41	Peak
	7206.00	55.41	35.74	5.33	46.59	49.89	74.00	-24.11	Peak
	9608.00	52.40	38.20	5.71	46.17	50.14	74.00	-23.86	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4880.00	60.35	31.42	4.17	47.77	48.17	74.00	-25.83	Peak
	7320.00	54.74	36.08	5.43	46.71	49.54	74.00	-24.46	Peak
	9760.00	52.95	38.35	5.75	46.10	50.95	74.00	-23.05	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



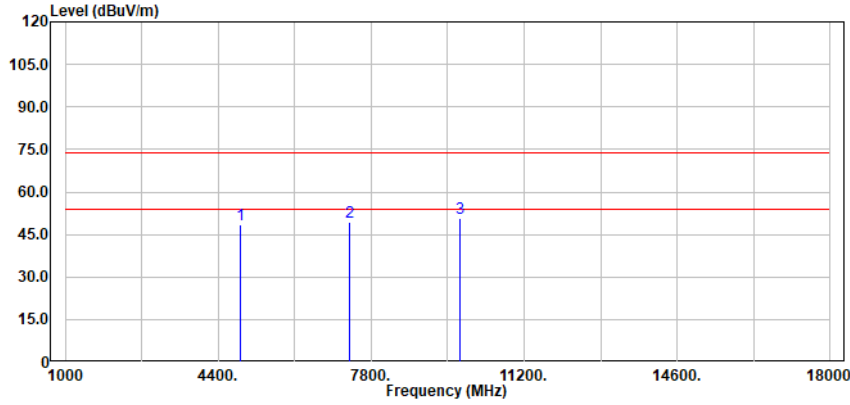
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 53 of 129

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:middle



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4880.00	60.85	31.42	4.17	47.77	48.67	74.00	-25.33	Peak
	7320.00	54.66	36.08	5.43	46.71	49.46	74.00	-24.54	Peak
	9760.00	52.88	38.35	5.75	46.10	50.88	74.00	-23.12	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



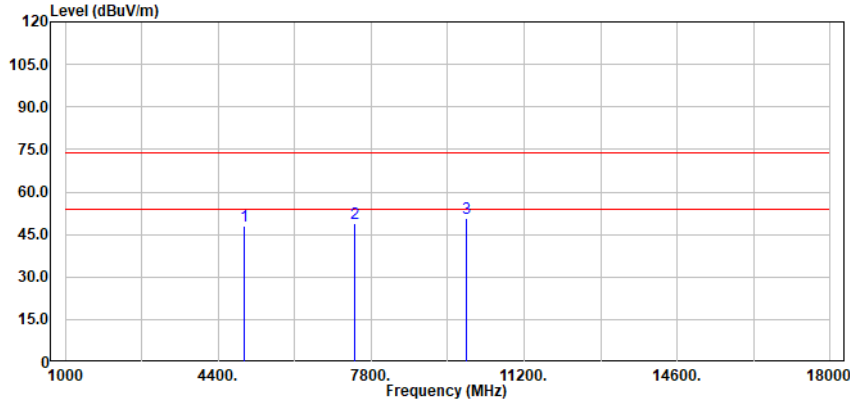
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 54 of 129

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High



Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4960.00	60.14	31.58	4.21	47.72	48.21	74.00	-25.79	Peak
	7440.00	54.02	36.35	5.48	46.84	49.01	74.00	-24.99	Peak
	9920.00	52.65	38.51	5.81	46.03	50.94	74.00	-23.06	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



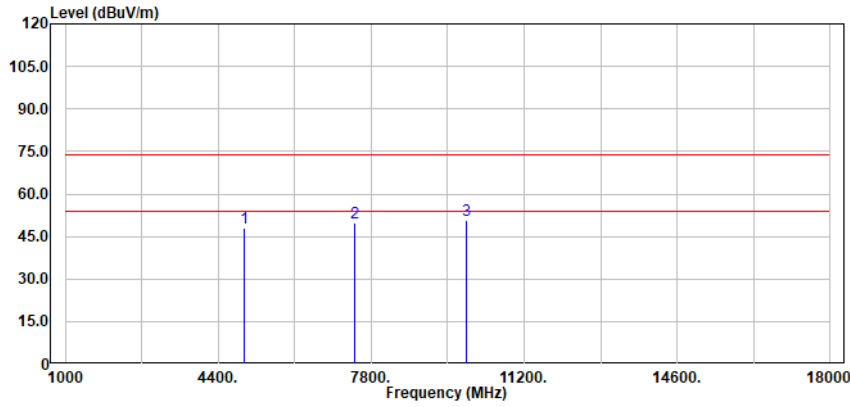
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 55 of 129

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4960.00	60.13	31.58	4.21	47.72	48.20	74.00	-25.80	Peak
	7440.00	54.85	36.35	5.48	46.84	49.84	74.00	-24.16	Peak
	9920.00	52.52	38.51	5.81	46.03	50.81	74.00	-23.19	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

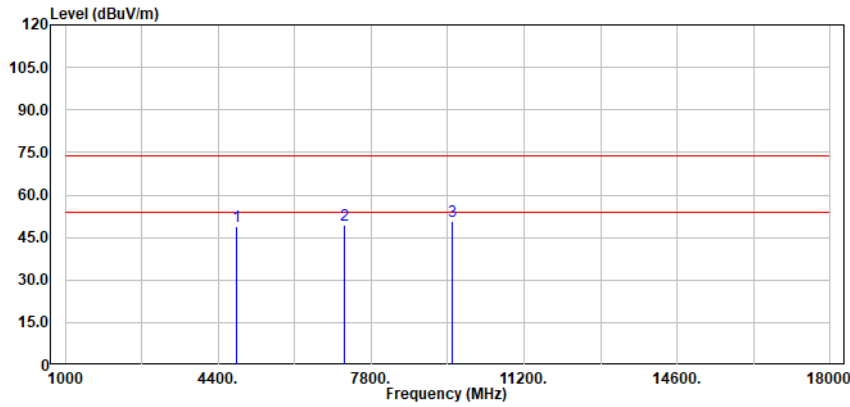
SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 56 of 129

Right

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

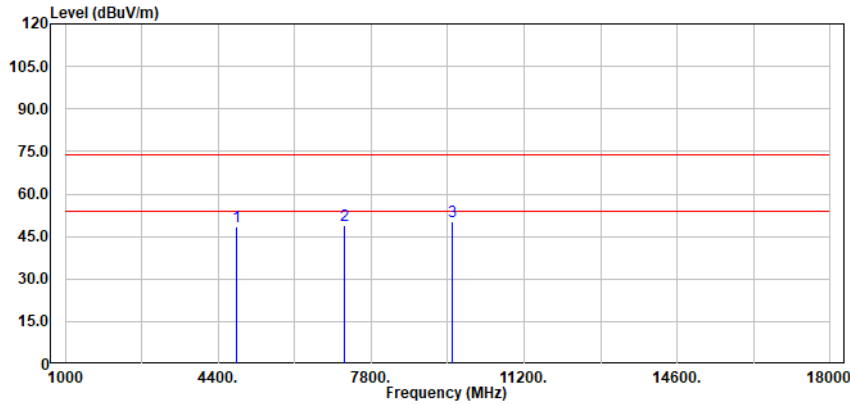


Antenna Polarity :Horizontal

No.	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4804.00	61.37	31.26	4.14	47.81	48.96	74.00	-25.04	Peak
7206.00	55.00	35.74	5.33	46.59	49.48	74.00	-24.52	Peak
9608.00	53.16	38.20	5.71	46.17	50.90	74.00	-23.10	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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

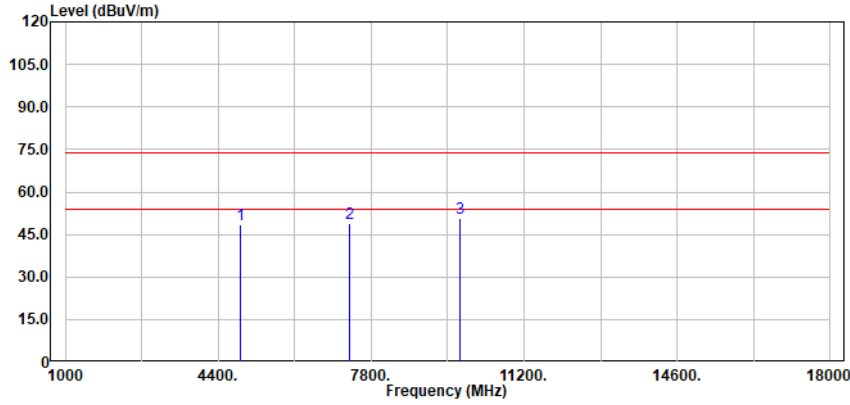


Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4804.00	60.84	31.26	4.14	47.81	48.43	74.00	-25.57	Peak
	7206.00	54.62	35.74	5.33	46.59	49.10	74.00	-24.90	Peak
	9608.00	52.70	38.20	5.71	46.17	50.44	74.00	-23.56	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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



Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4880.00	60.83	31.42	4.17	47.77	48.65	74.00	-25.35	Peak
	7320.00	54.24	36.08	5.43	46.71	49.04	74.00	-24.96	Peak
	9760.00	52.50	38.35	5.75	46.10	50.50	74.00	-23.50	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



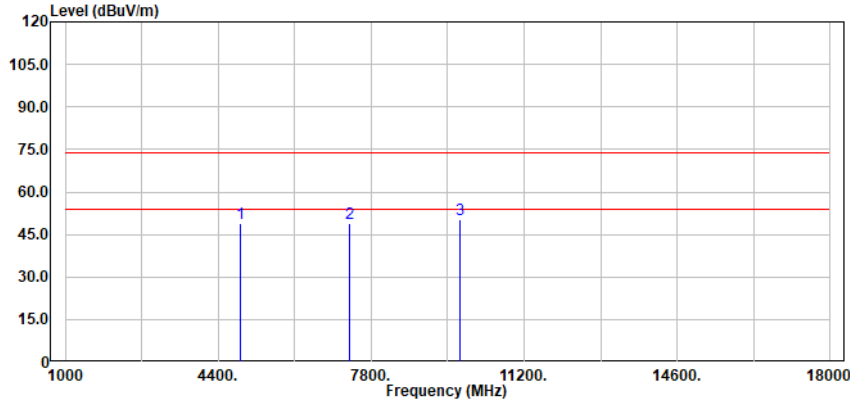
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 59 of 129

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

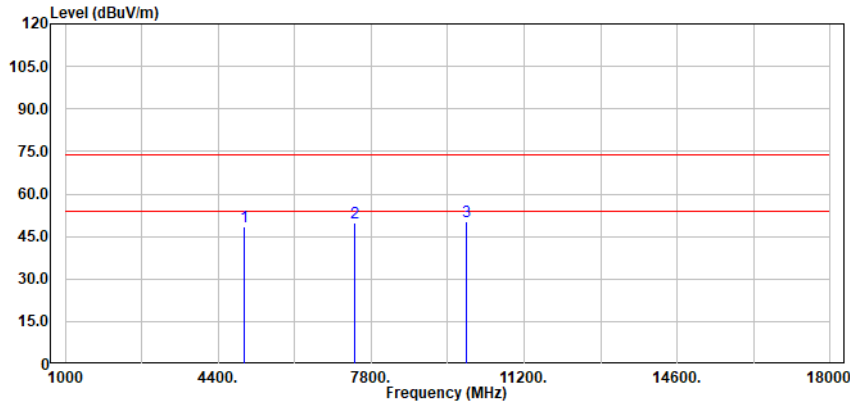


Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4880.00	61.05	31.42	4.17	47.77	48.87	74.00	-25.13	Peak
	7320.00	54.32	36.08	5.43	46.71	49.12	74.00	-24.88	Peak
	9760.00	52.19	38.35	5.75	46.10	50.19	74.00	-23.81	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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



Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4960.00	60.16	31.58	4.21	47.72	48.23	74.00	-25.77	Peak
	7440.00	54.83	36.35	5.48	46.84	49.82	74.00	-24.18	Peak
	9920.00	51.95	38.51	5.81	46.03	50.24	74.00	-23.76	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



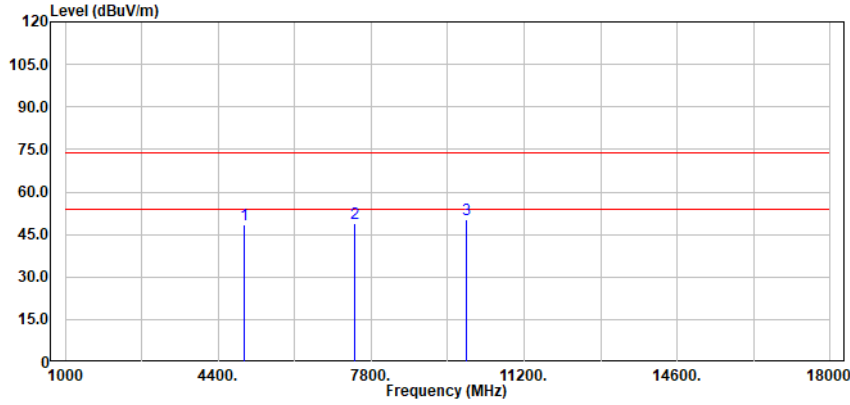
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 61 of 129

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



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4960.00	60.53	31.58	4.21	47.72	48.60	74.00	-25.40	Peak
	7440.00	54.11	36.35	5.48	46.84	49.10	74.00	-24.90	Peak
	9920.00	51.88	38.51	5.81	46.03	50.17	74.00	-23.83	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



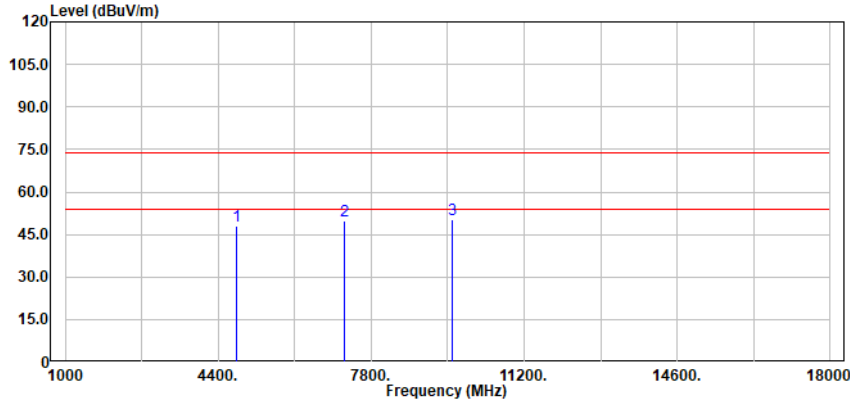
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 62 of 129

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4804.00	60.57	31.26	4.14	47.81	48.16	74.00	-25.84	Peak
	7206.00	55.47	35.74	5.33	46.59	49.95	74.00	-24.05	Peak
	9608.00	52.66	38.20	5.71	46.17	50.40	74.00	-23.60	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



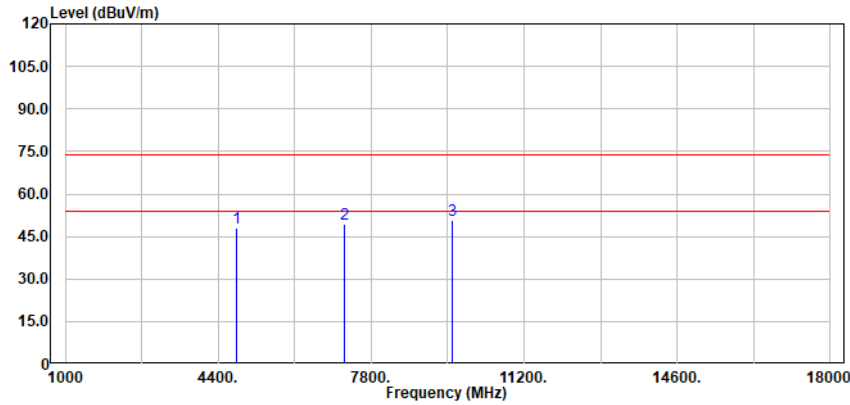
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 63 of 129

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4804.00	60.56	31.26	4.14	47.81	48.15	74.00	-25.85	Peak
	7206.00	55.03	35.74	5.33	46.59	49.51	74.00	-24.49	Peak
	9608.00	52.86	38.20	5.71	46.17	50.60	74.00	-23.40	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



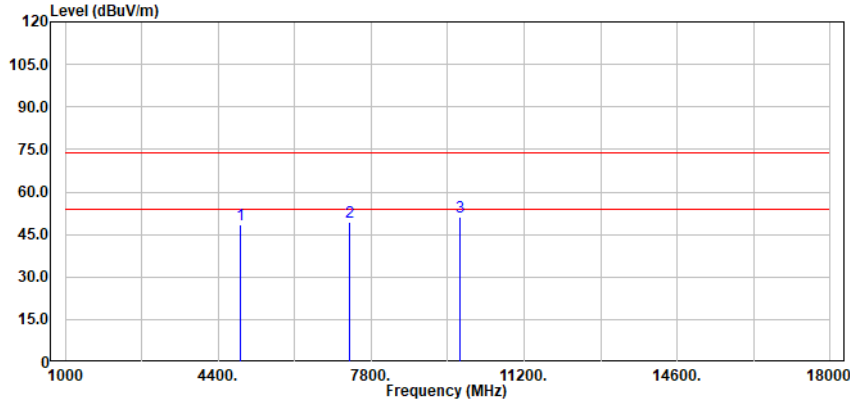
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 64 of 129

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:middle

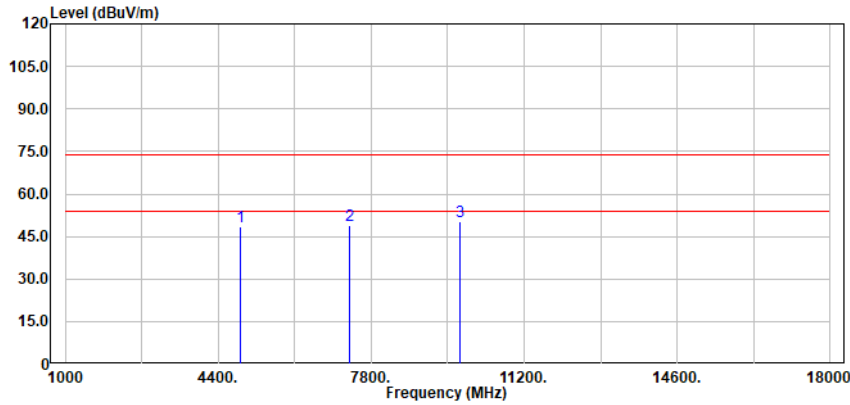


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4880.00	60.45	31.42	4.17	47.77	48.27	74.00	-25.73	Peak
	7320.00	54.40	36.08	5.43	46.71	49.20	74.00	-24.80	Peak
	9760.00	52.95	38.35	5.75	46.10	50.95	74.00	-23.05	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:middle



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4880.00	60.77	31.42	4.17	47.77	48.59	74.00	-25.41	Peak
	7320.00	54.21	36.08	5.43	46.71	49.01	74.00	-24.99	Peak
	9760.00	52.46	38.35	5.75	46.10	50.46	74.00	-23.54	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



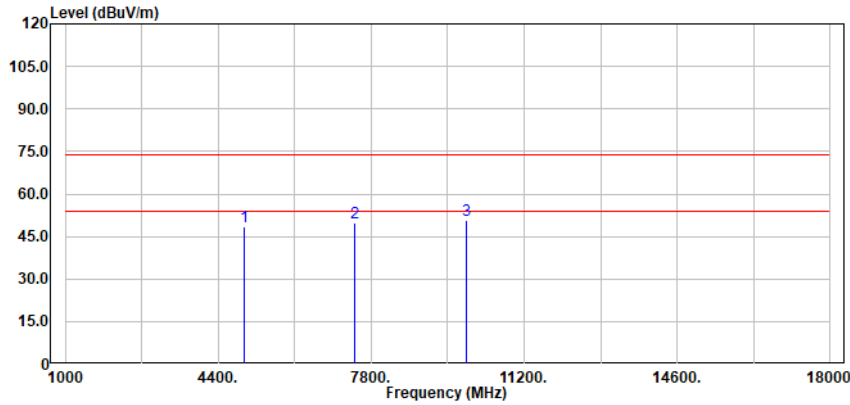
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 66 of 129

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High

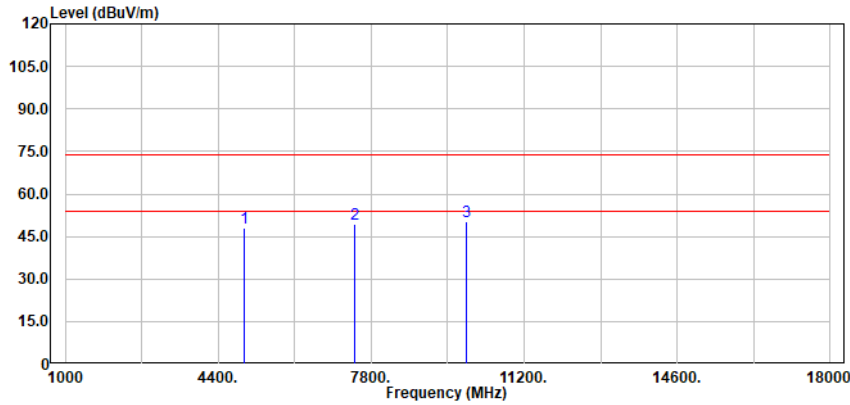


Antenna Polarity :Horizontal

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4960.00	60.45	31.58	4.21	47.72	48.52	74.00	-25.48	Peak
	7440.00	54.98	36.35	5.48	46.84	49.97	74.00	-24.03	Peak
	9920.00	52.28	38.51	5.81	46.03	50.57	74.00	-23.43	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



Antenna Polarity :Vertical

No.	Read Freq	Read level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
	4960.00	60.08	31.58	4.21	47.72	48.15	74.00	-25.85	Peak
	7440.00	54.56	36.35	5.48	46.84	49.55	74.00	-24.45	Peak
	9920.00	52.19	38.51	5.81	46.03	50.48	74.00	-23.52	Peak

Notes: Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

7.10 99% Bandwidth

Test Requirement RSS-Gen Section 6.7
 Test Method: ANSI C63.10 (2013) Section 6.9.3

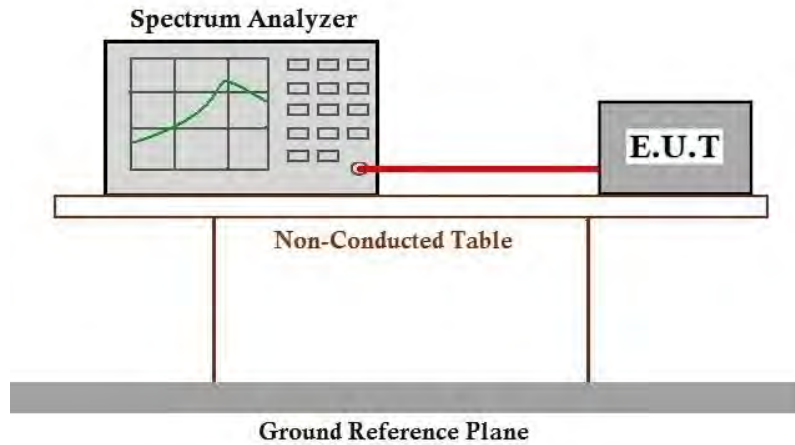
7.10.1 E.U.T. Operation

Operating Environment:
 Temperature: 24.5 °C Humidity: 48.5 % RH Atmospheric Pressure: 1010 mbar

7.10.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.10.3 Test Setup Diagram



7.10.4 Measurement Procedure and Data

Please Refer to Appendix for Details



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 69 of 129

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SHCR2307001498AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for SHCR2307001498AT

10 Appendix

Left

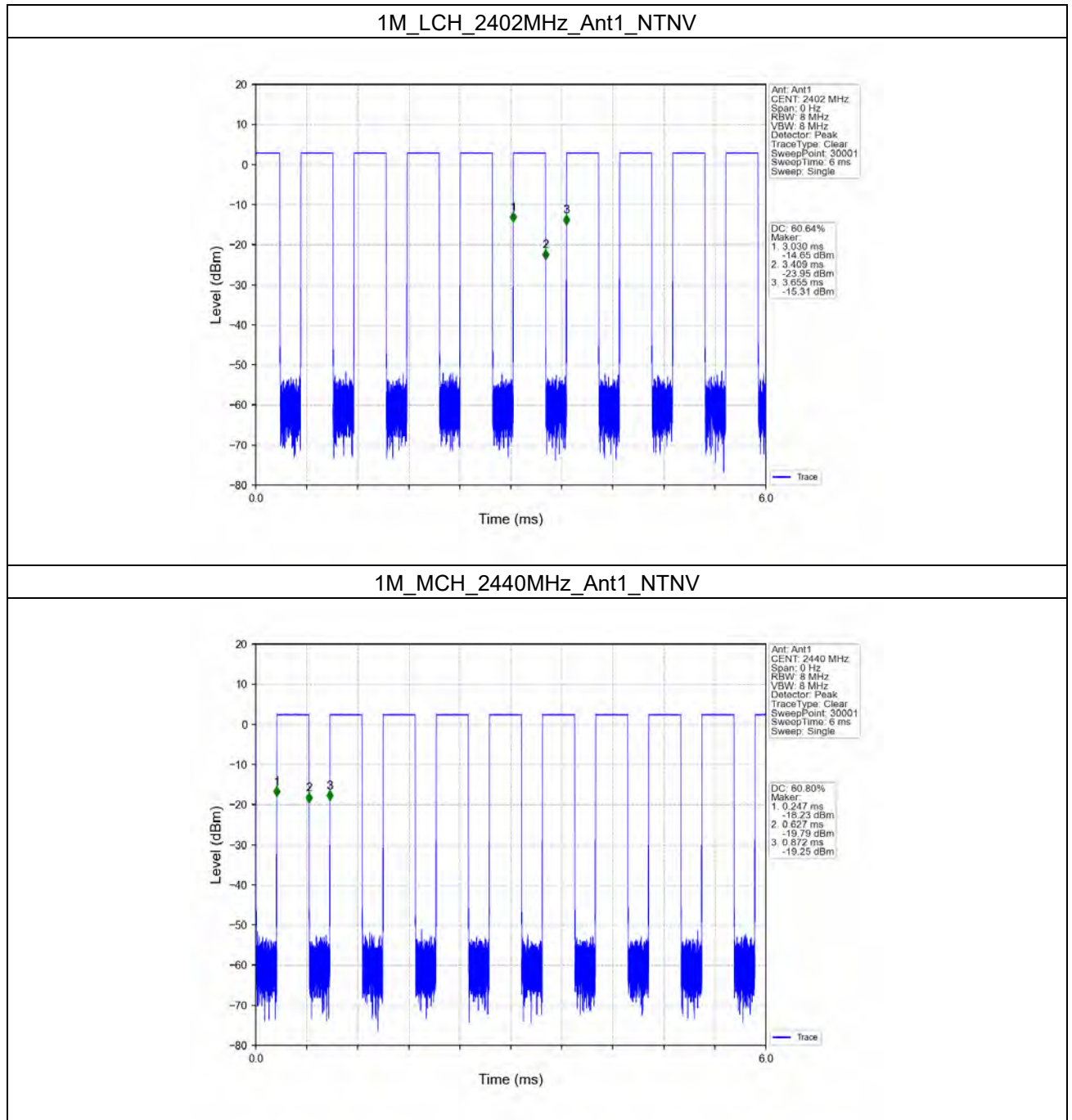
1. Duty Cycle

1.1 Ant1

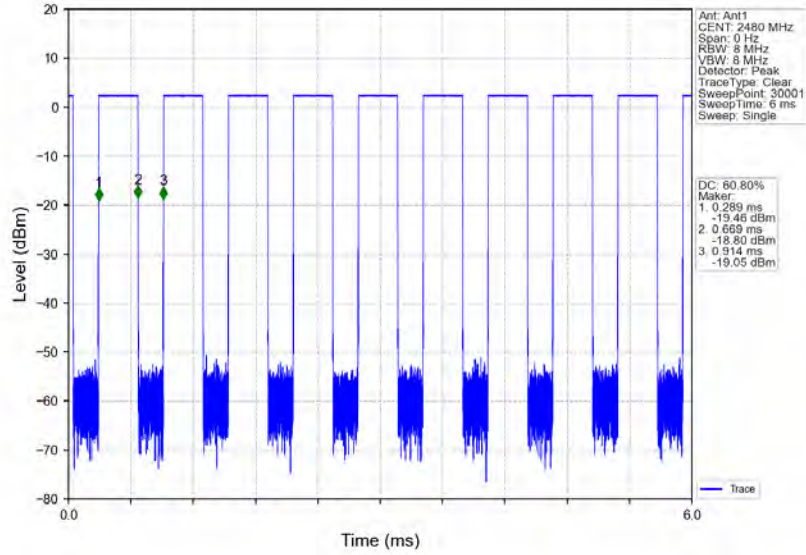
1.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.379	0.625	60.64	2.17	0.03
		2440	0.380	0.625	60.80	2.16	0.00
		2480	0.380	0.625	60.80	2.16	0.00
2M	SISO	2402	0.201	0.625	32.16	4.93	0.04
		2440	0.196	0.625	31.36	5.04	0.02
		2480	0.195	0.625	31.20	5.06	0.03

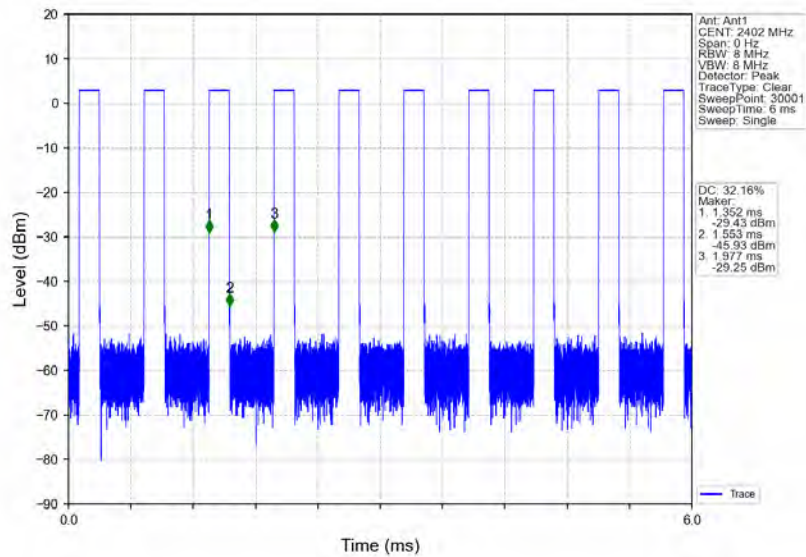
1.1.2 Test Graph



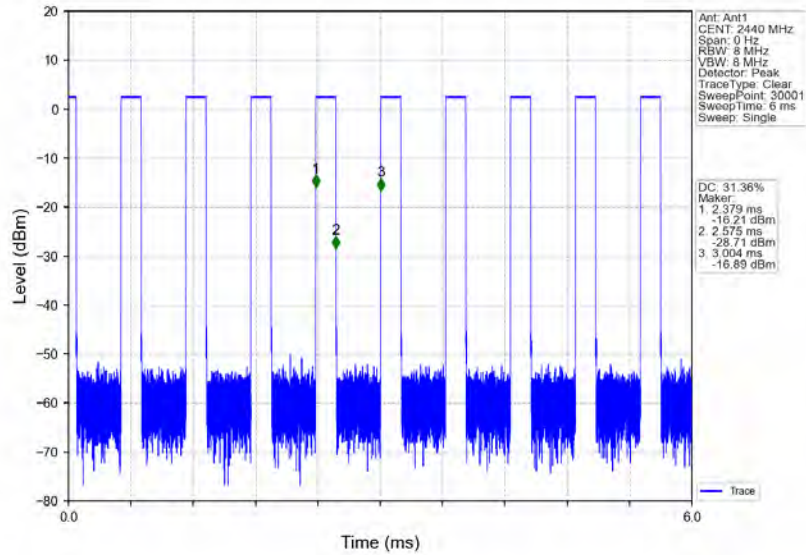
1M_HCH_2480MHz_Ant1_NTNV



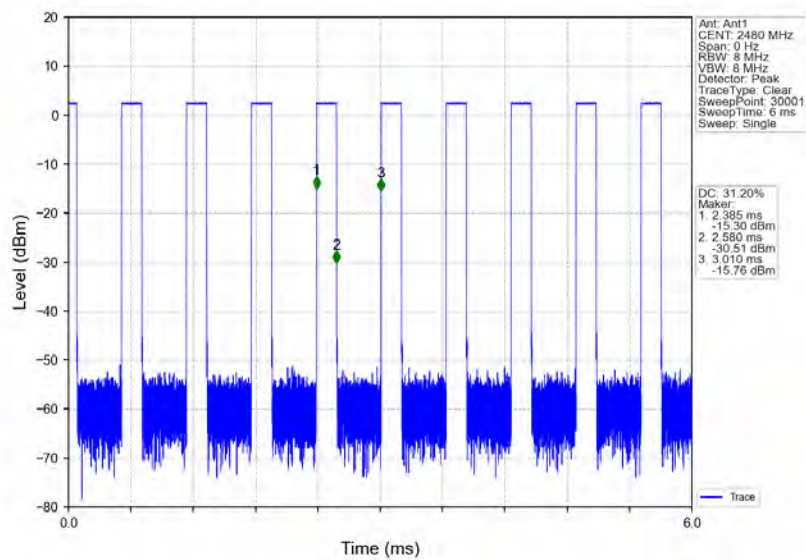
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



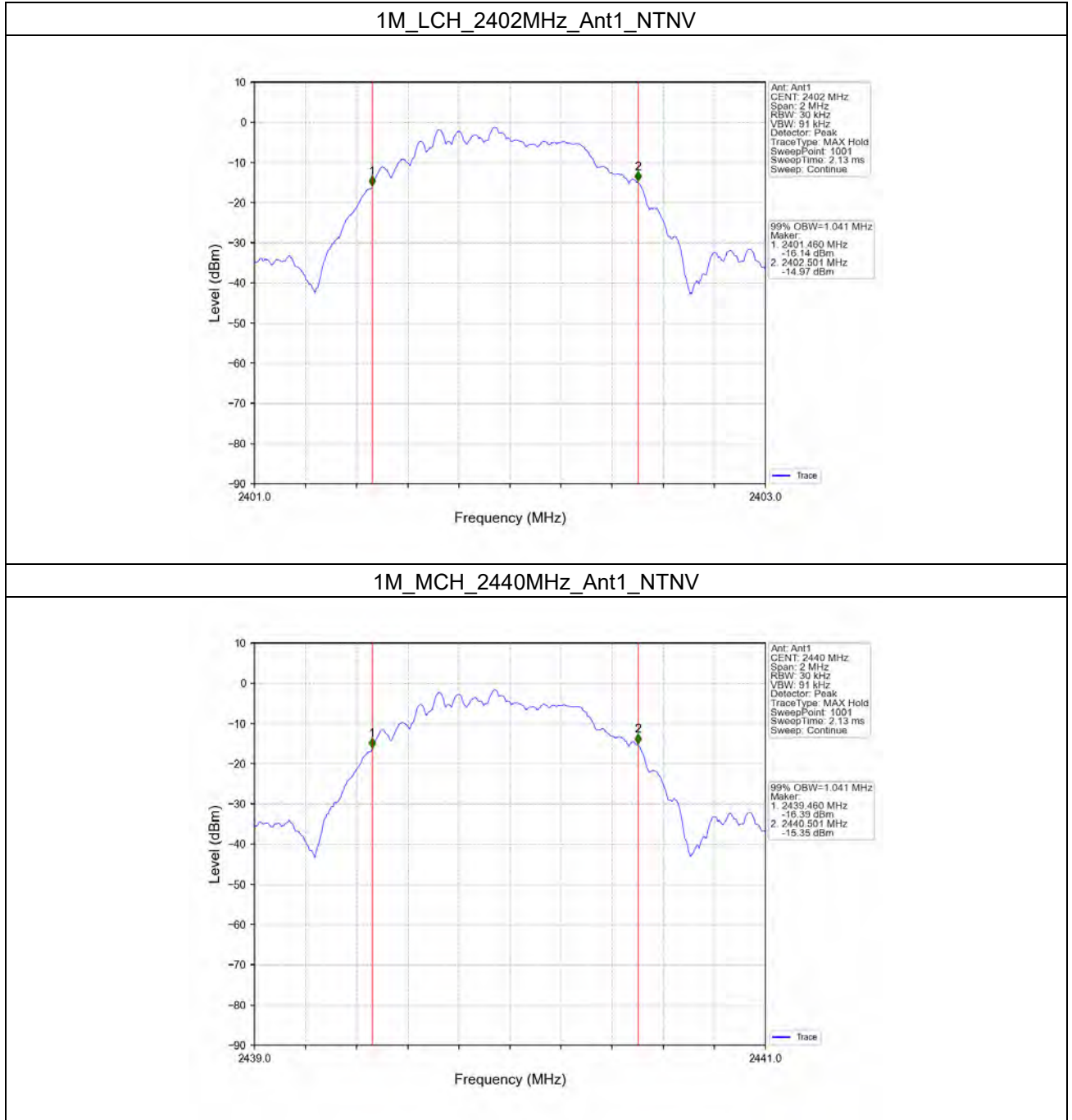
2. Bandwidth

2.1 OBW

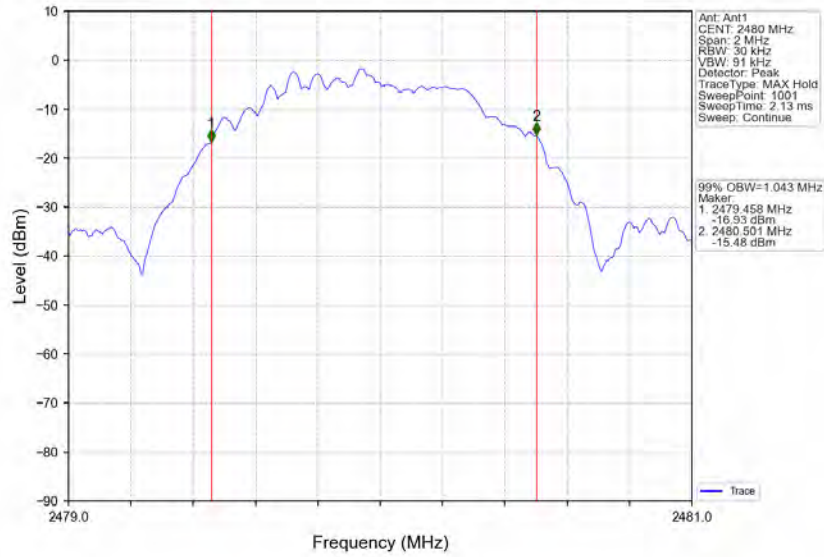
2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)	Verdict
				Result	
1M	SISO	2402	1	1.041	Pass
		2440	1	1.041	Pass
		2480	1	1.043	Pass
2M	SISO	2402	1	2.078	Pass
		2440	1	2.080	Pass
		2480	1	2.079	Pass

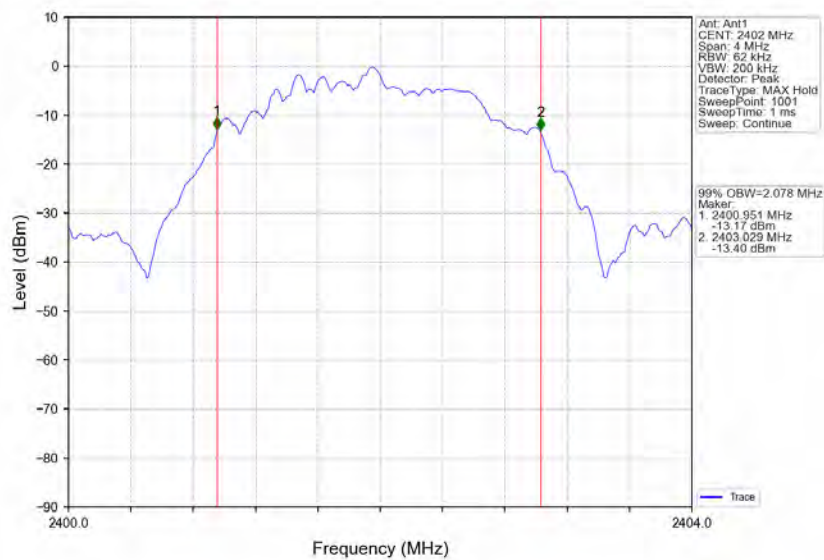
2.1.2 Test Graph



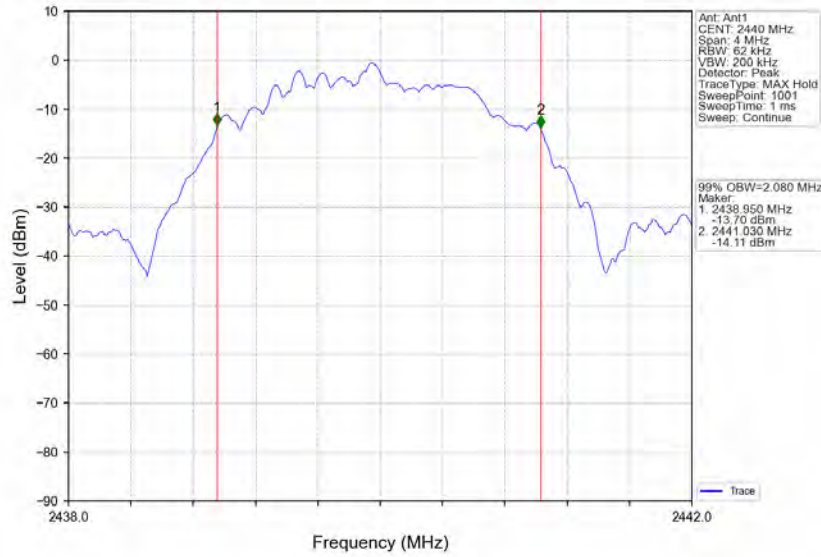
1M_HCH_2480MHz_Ant1_NTNV



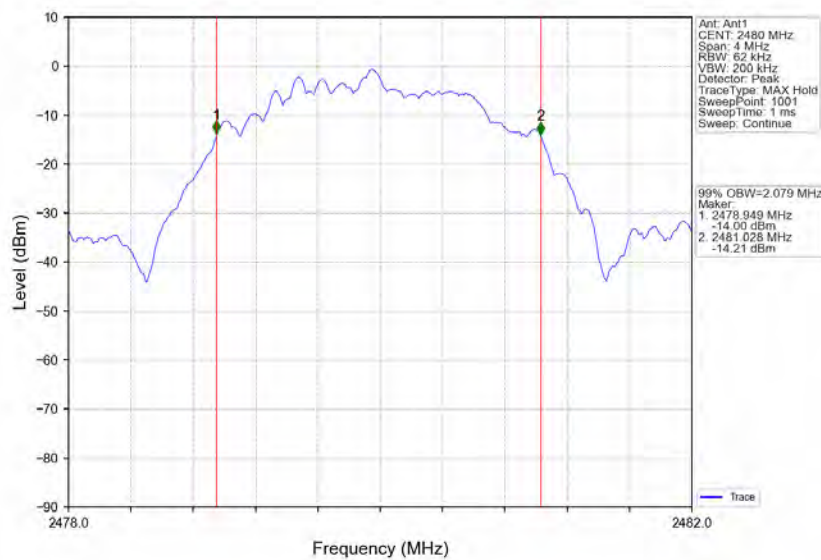
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV





SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

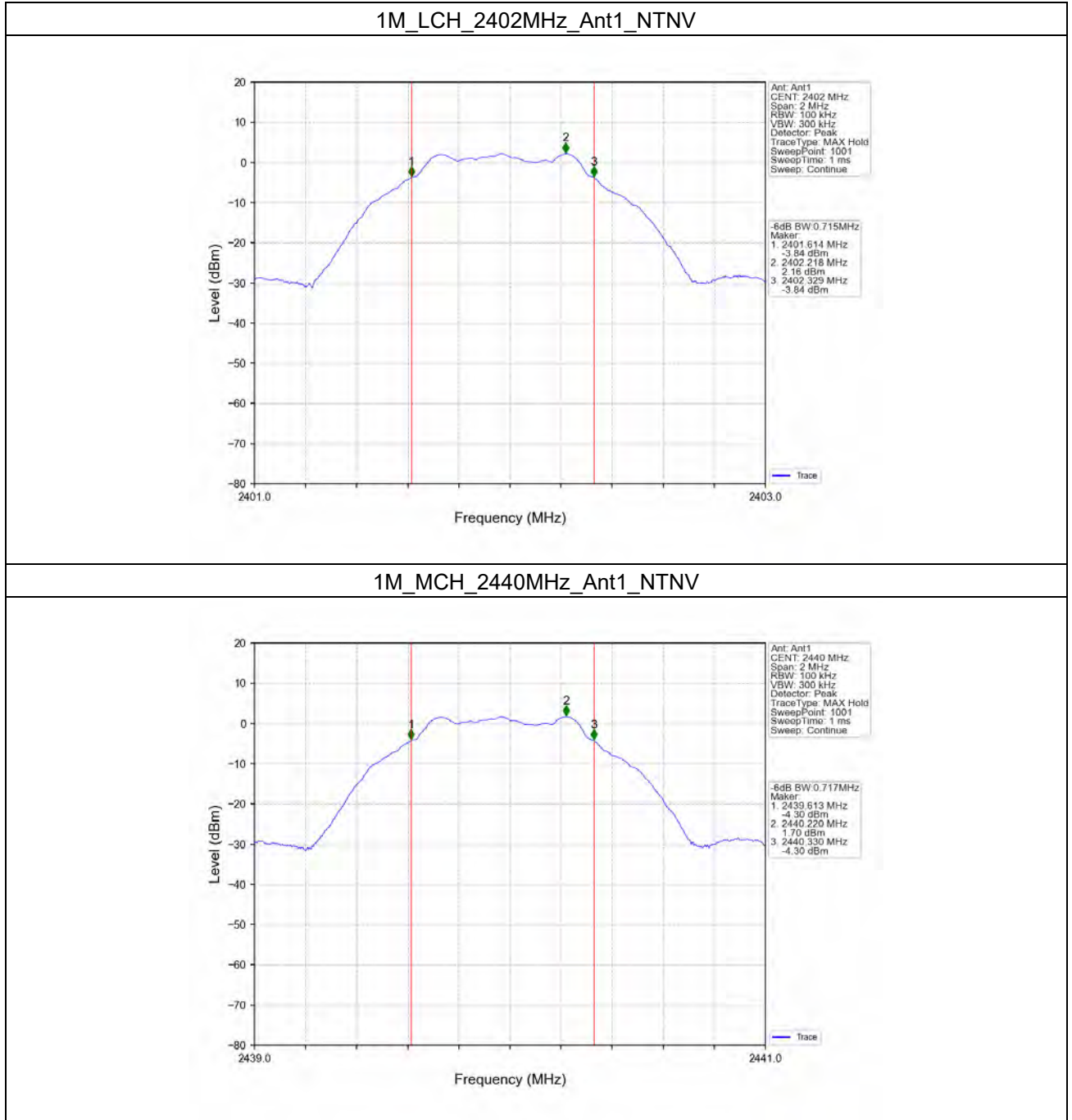
Page: 78 of 129

2.2 6dB BW

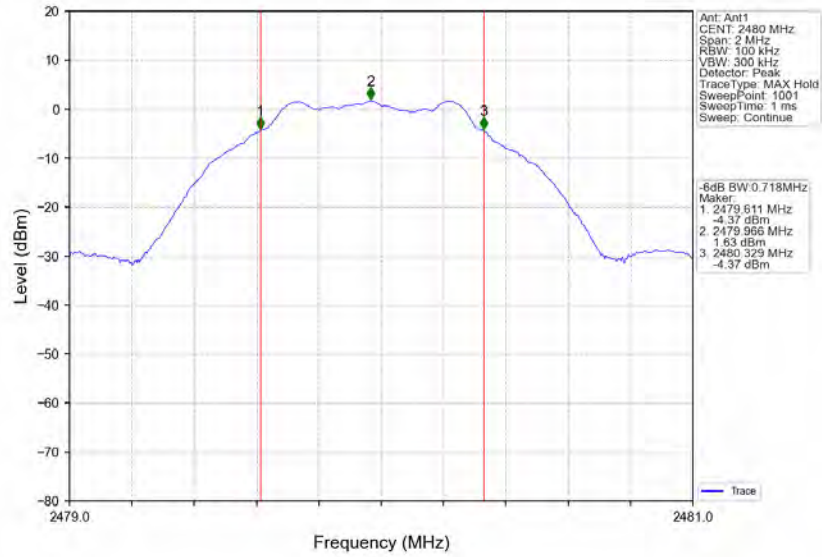
2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.715	≥ 0.5	Pass
		2440	1	0.717	≥ 0.5	Pass
		2480	1	0.718	≥ 0.5	Pass
2M	SISO	2402	1	1.255	≥ 0.5	Pass
		2440	1	1.249	≥ 0.5	Pass
		2480	1	1.257	≥ 0.5	Pass

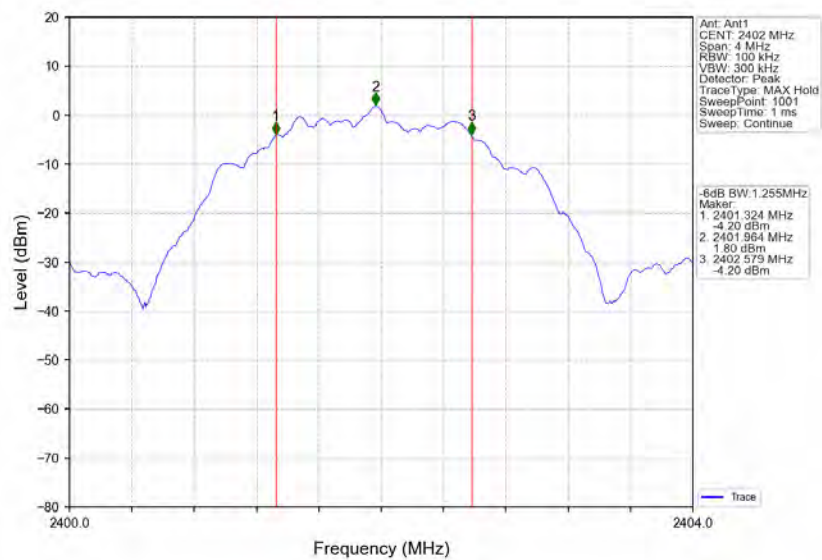
2.2.2 Test Graph



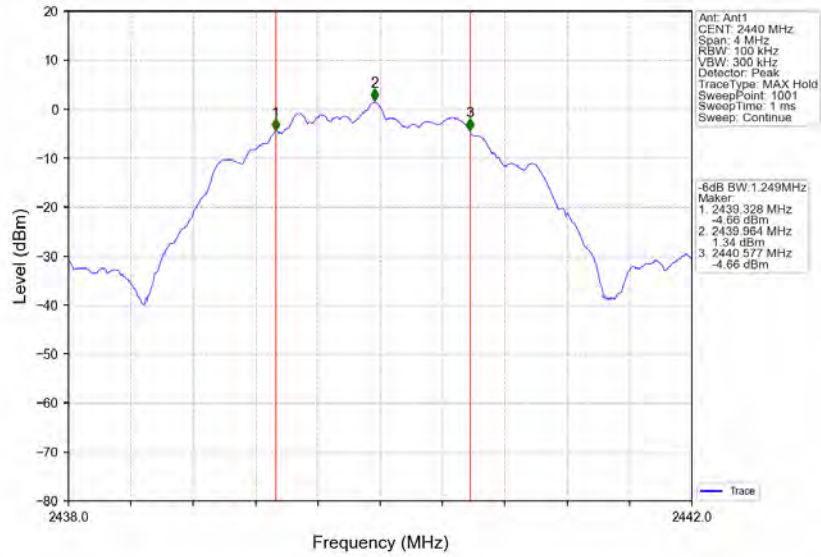
1M_HCH_2480MHz_Ant1_NTNV



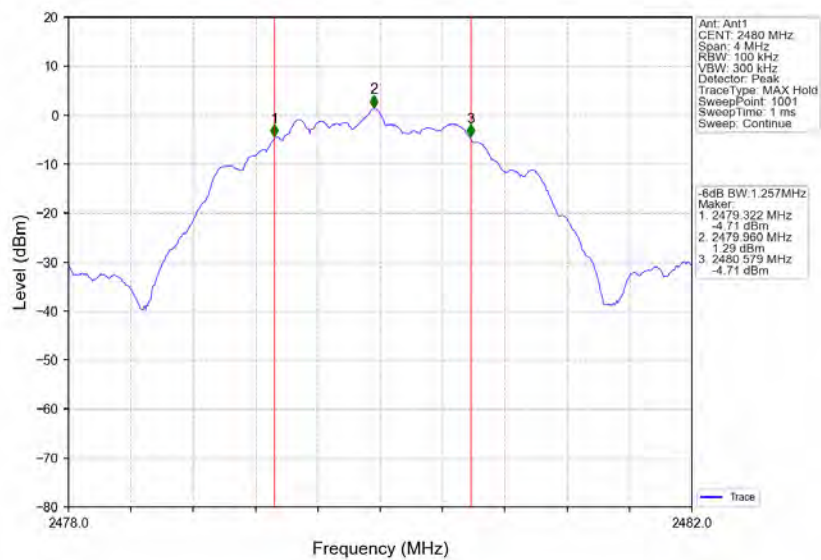
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 82 of 129

3. Maximum Conducted Output Power

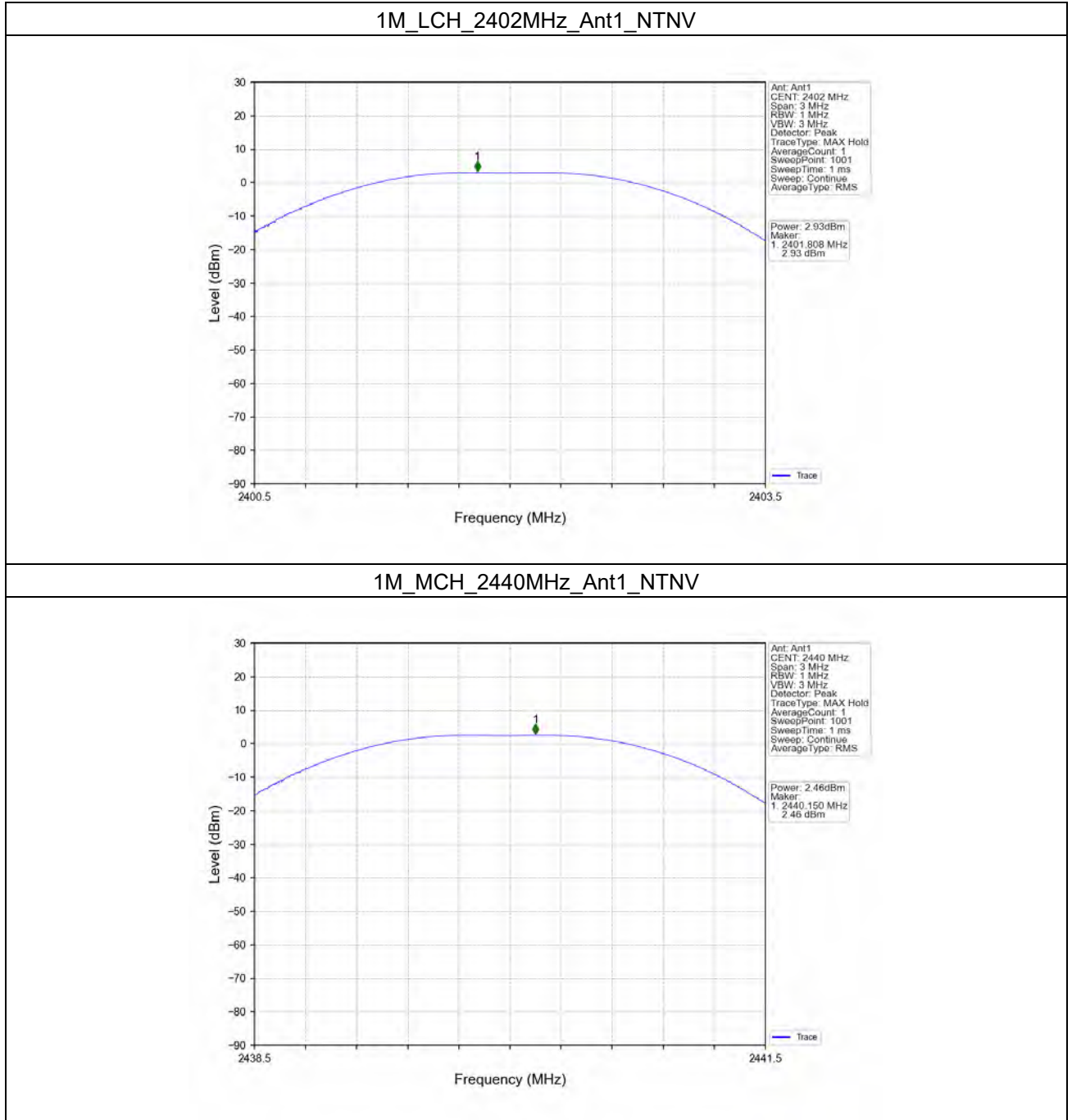
3.1 Power

3.1.1 Test Result

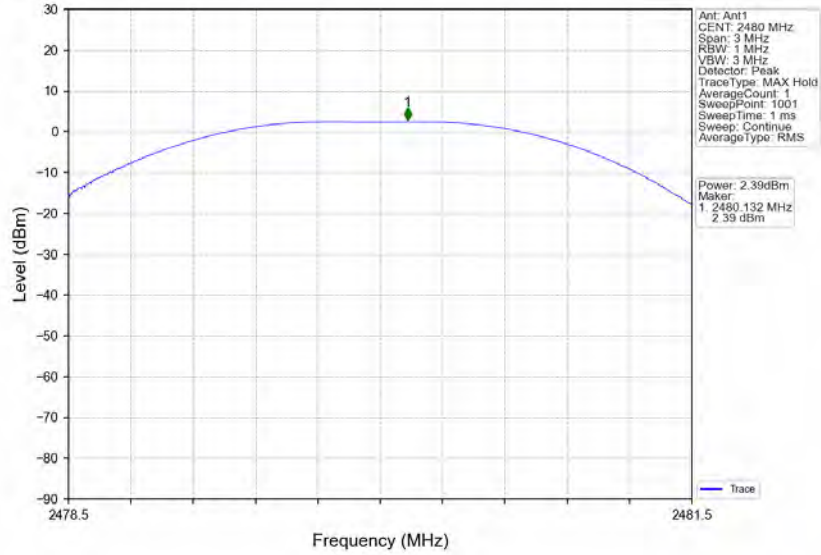
Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	2.93	<=30	Pass
		2440	2.46	<=30	Pass
		2480	2.39	<=30	Pass
2M	SISO	2402	2.96	<=30	Pass
		2440	2.50	<=30	Pass
		2480	2.43	<=30	Pass

Note1: Antenna Gain: Ant1: 2.08dBi;

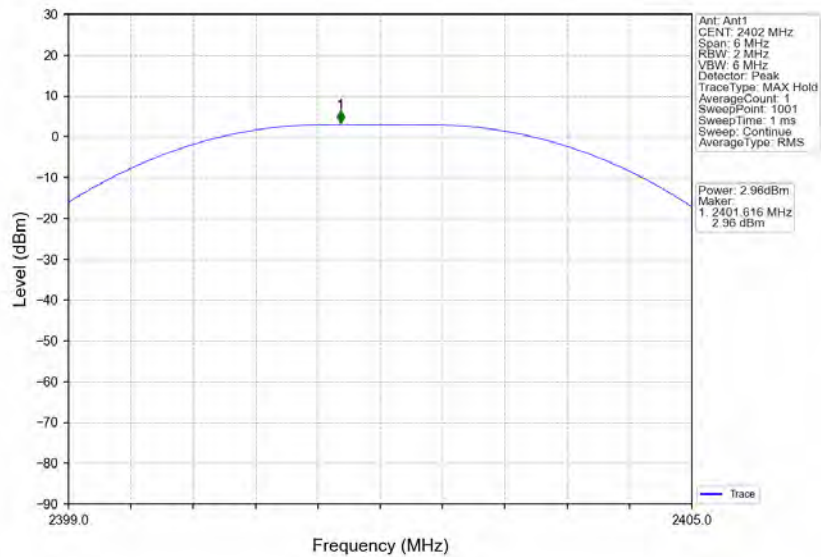
3.1.2 Test Graph



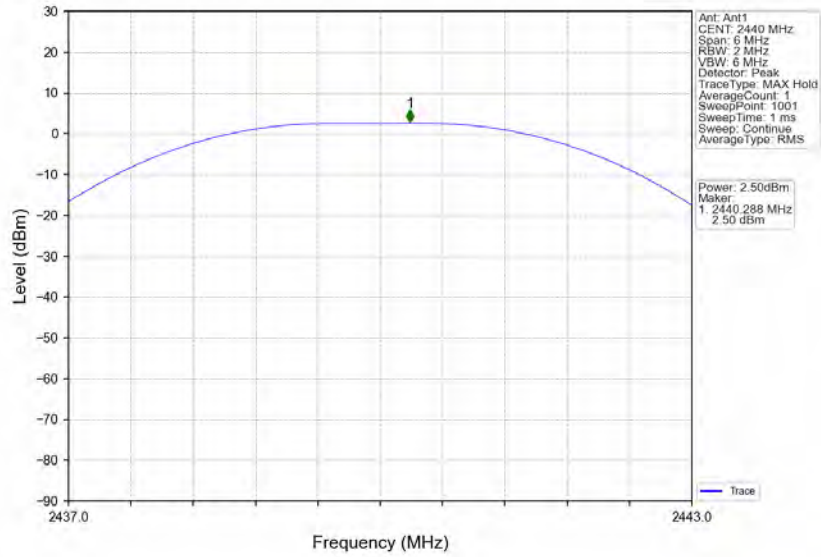
1M_HCH_2480MHz_Ant1_NTNV



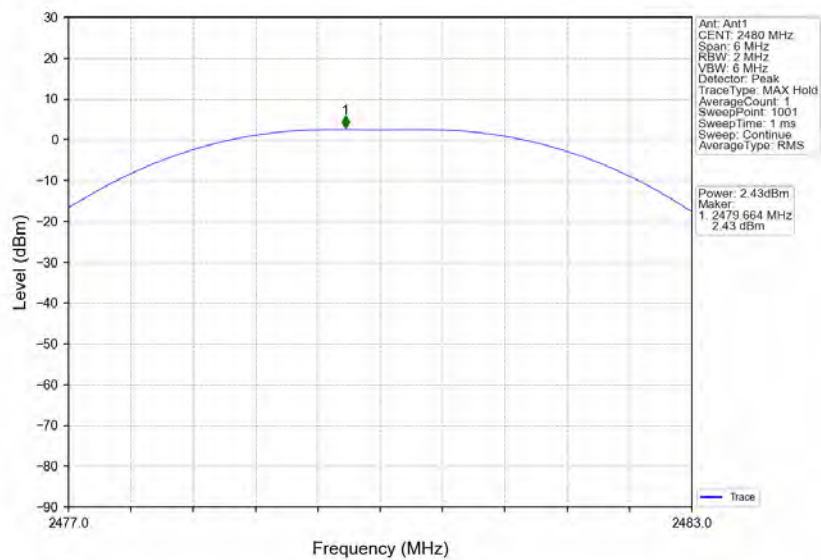
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



4. Maximum Power Spectral Density

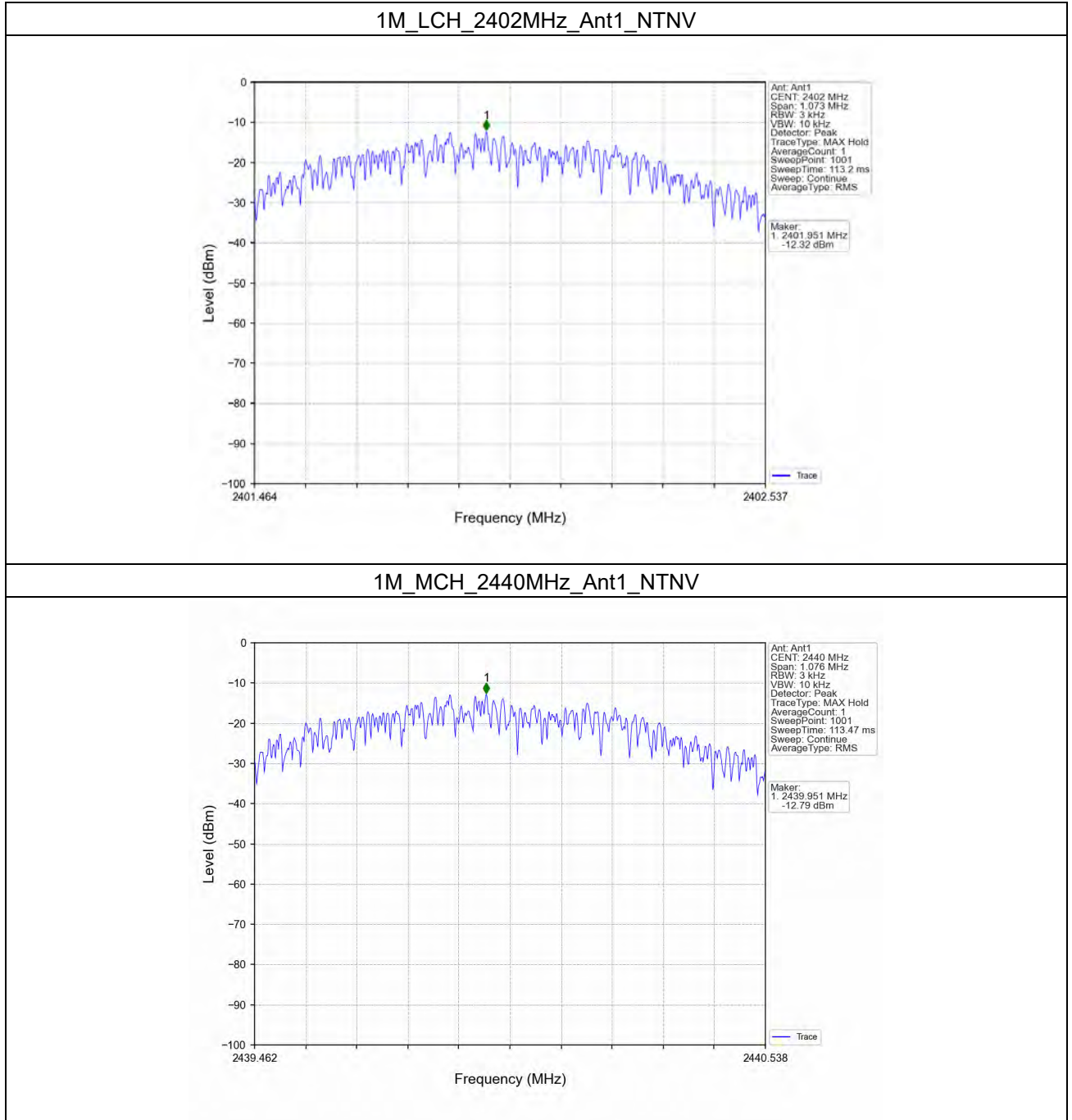
4.1 PSD

4.1.1 Test Result

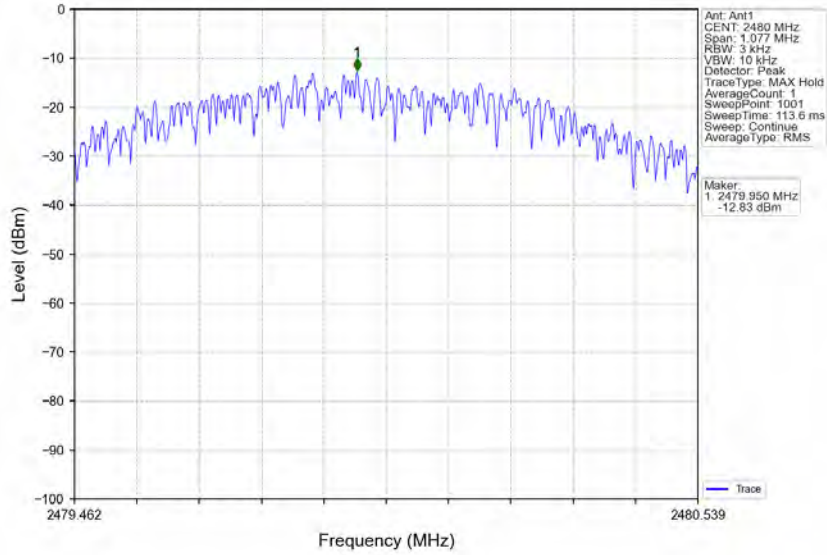
Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-12.32	<=8	Pass
		2440	-12.79	<=8	Pass
		2480	-12.83	<=8	Pass
2M	SISO	2402	-14.53	<=8	Pass
		2440	-14.91	<=8	Pass
		2480	-14.99	<=8	Pass

Note1: Antenna Gain: Ant1: 2.08dBi;

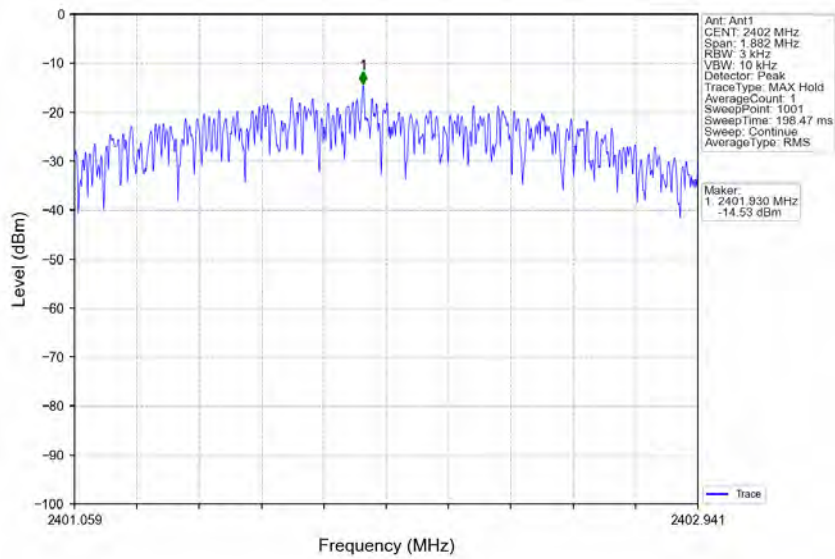
4.1.2 Test Graph



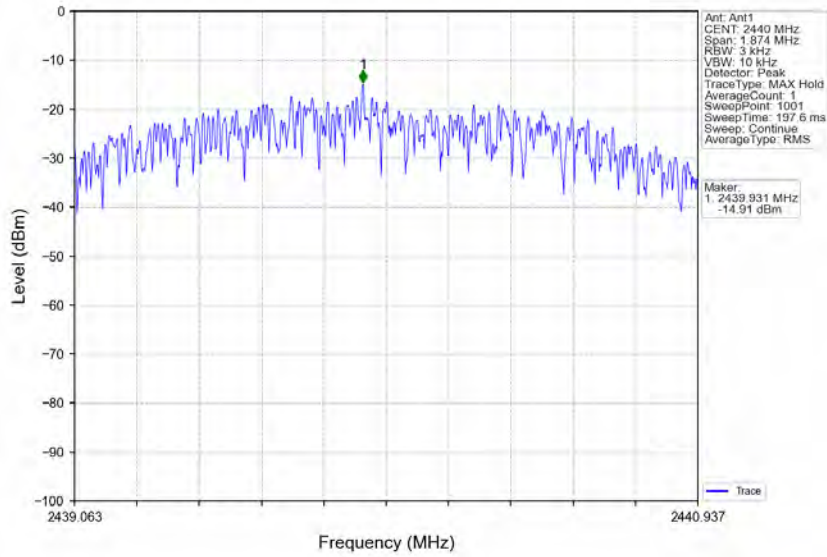
1M_HCH_2480MHz_Ant1_NTNV



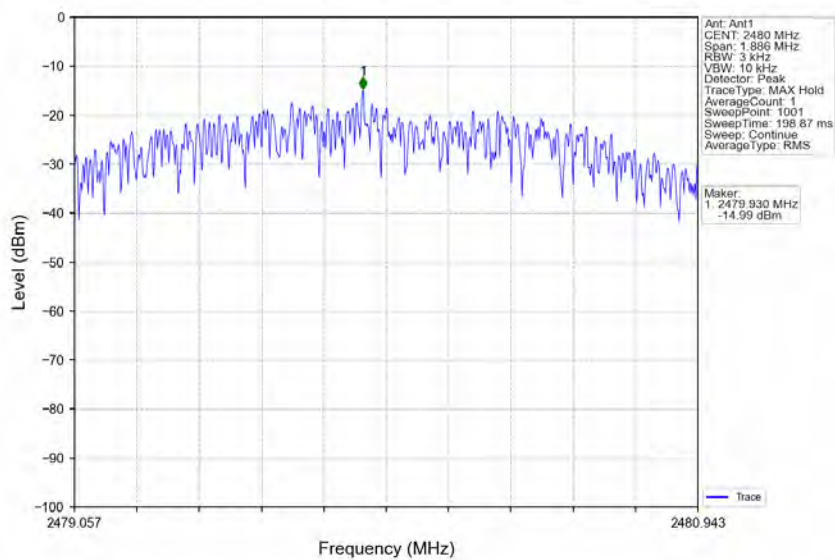
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



5. Unwanted Emissions In Non-restricted Frequency Bands

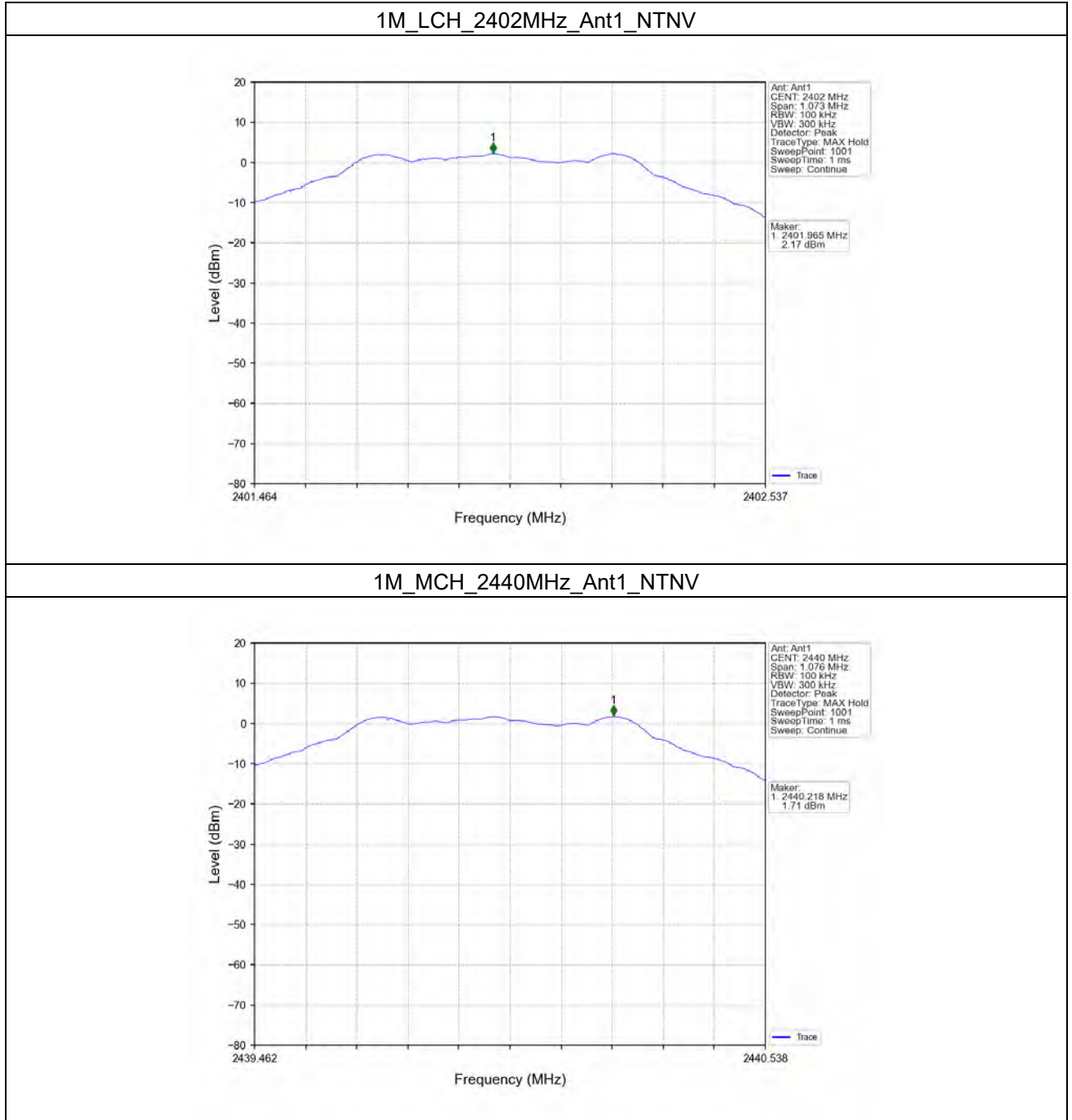
5.1 Ref

5.1.1 Test Result

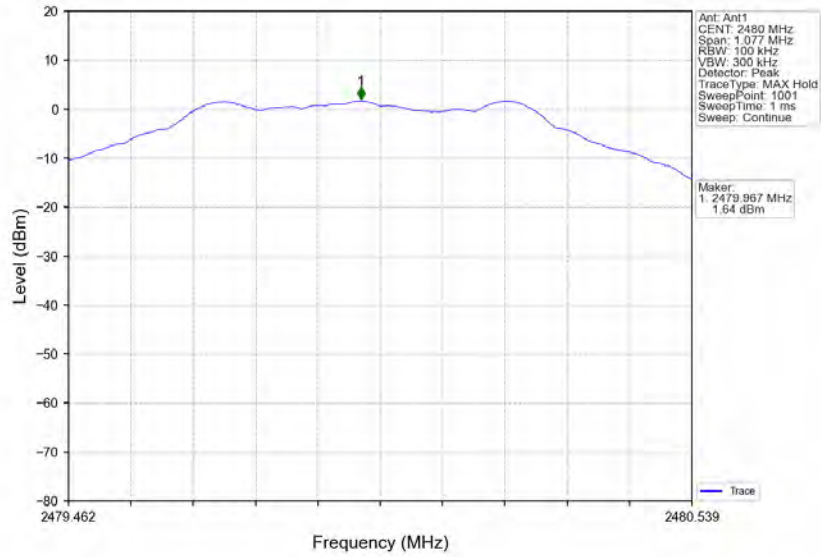
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	2.17
		2440	1	1.71
		2480	1	1.64
2M	SISO	2402	1	1.79
		2440	1	1.37
		2480	1	1.28

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.

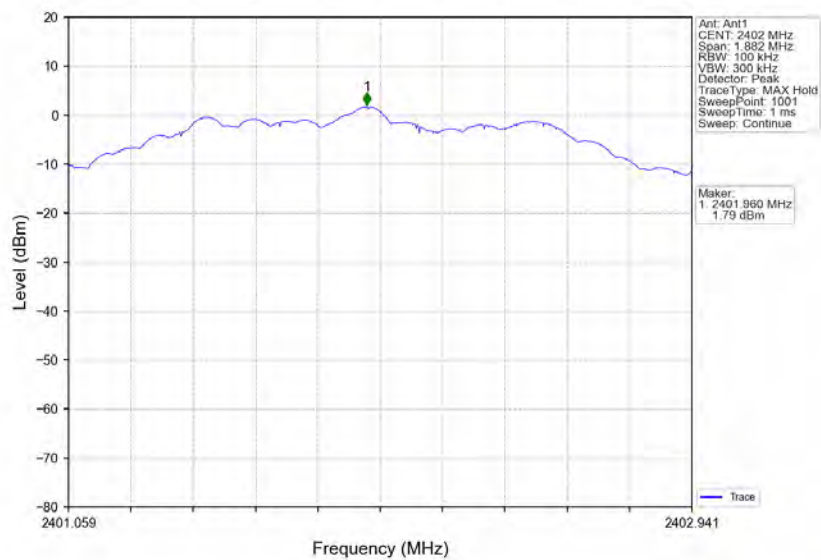
5.1.2 Test Graph



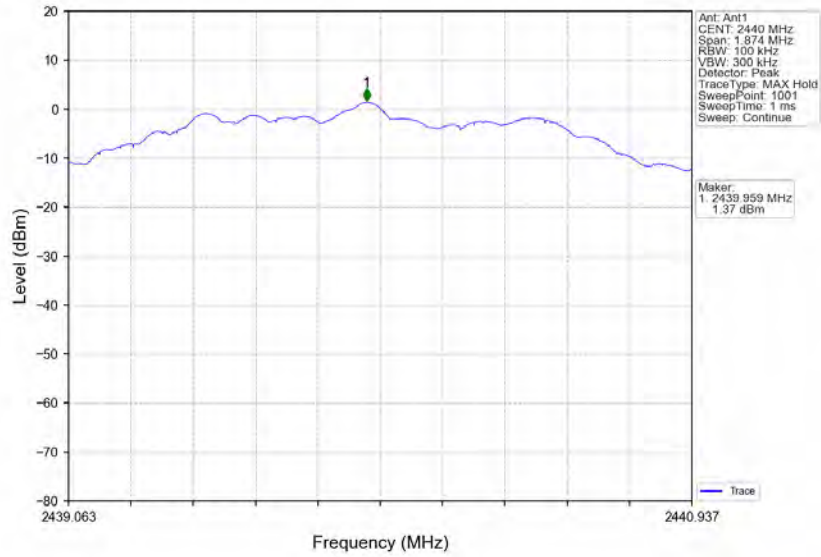
1M_HCH_2480MHz_Ant1_NTNV



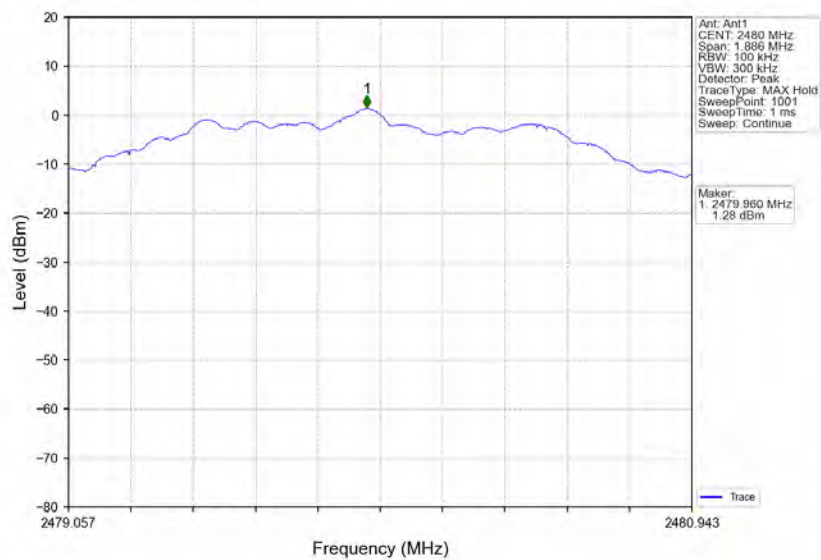
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV





SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 94 of 129

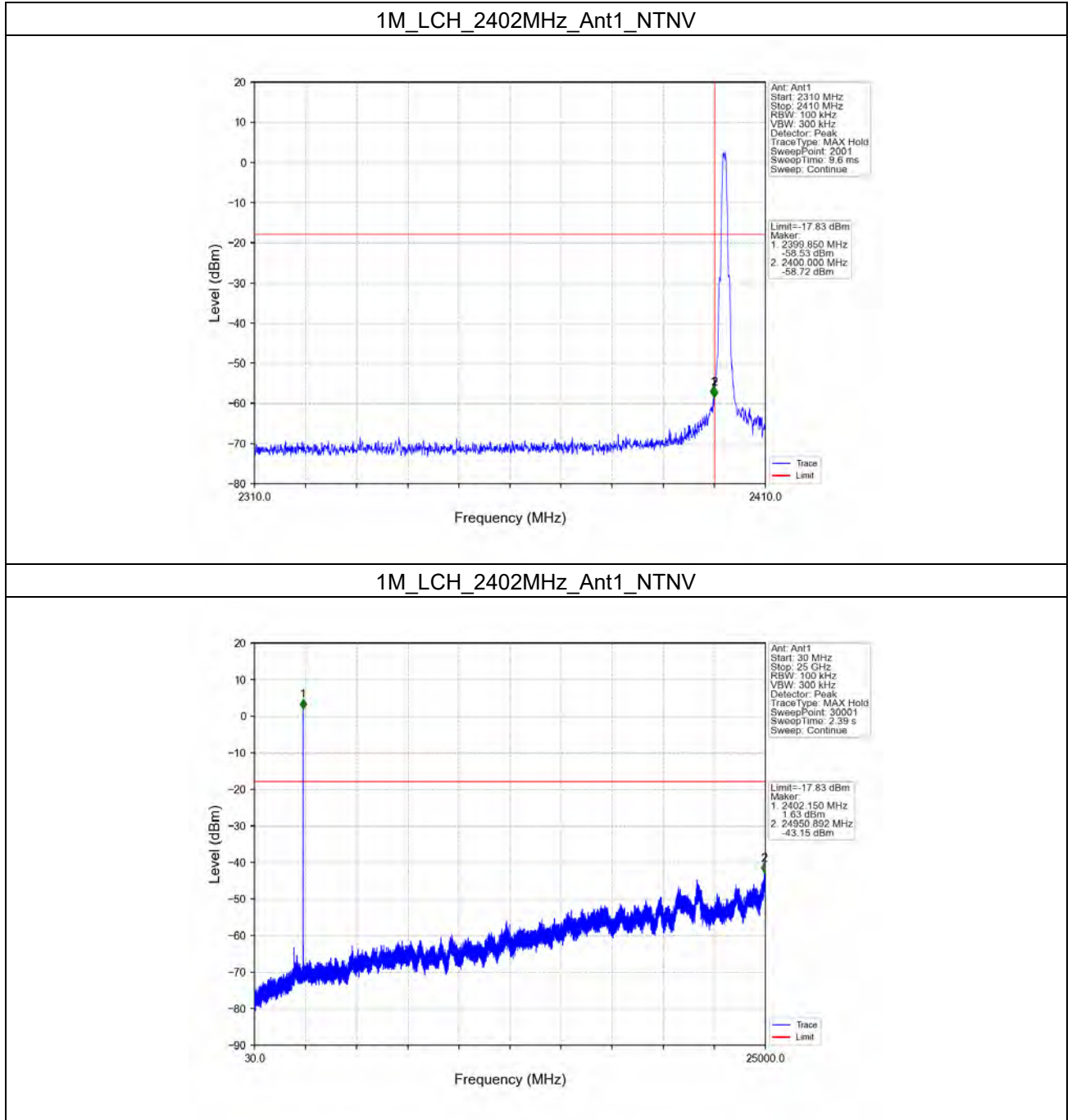
5.2 CSE

5.2.1 Test Result

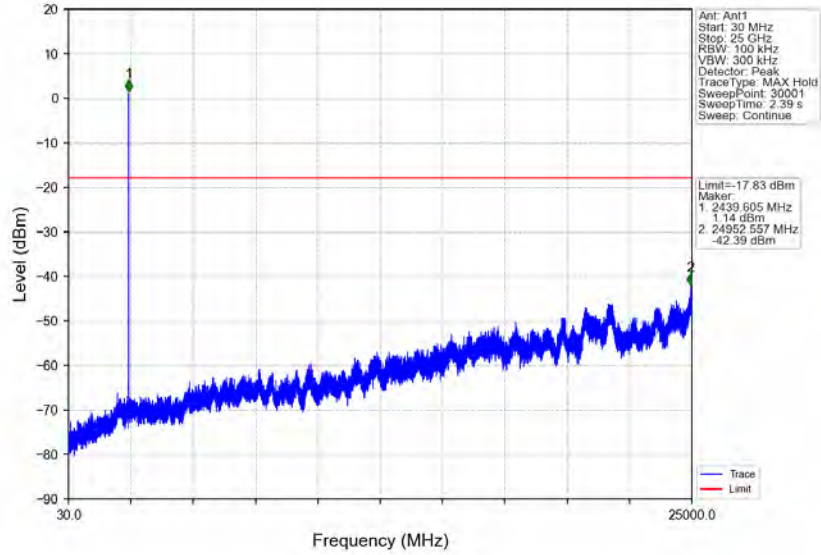
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	2.17	-17.83	Pass
		2440	1	2.17	-17.83	Pass
		2480	1	2.17	-17.83	Pass
2M	SISO	2402	1	1.79	-18.21	Pass
		2440	1	1.79	-18.21	Pass
		2480	1	1.79	-18.21	Pass

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.

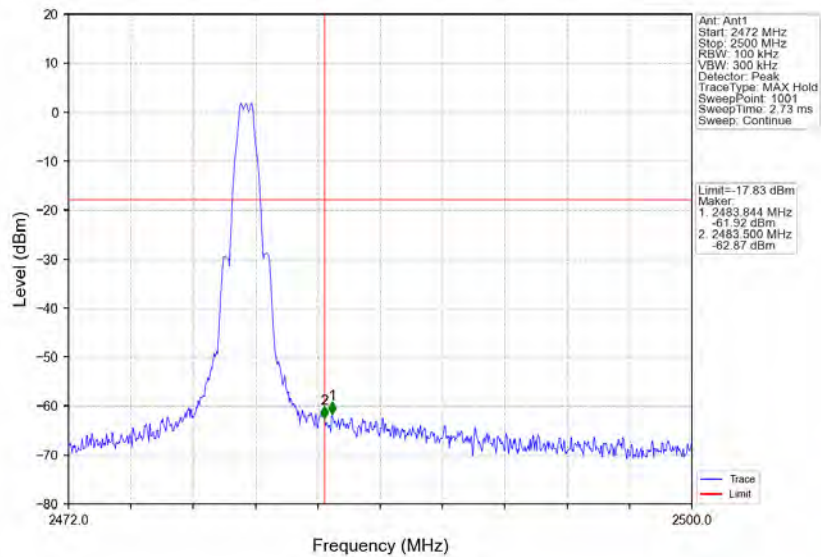
5.2.2 Test Graph



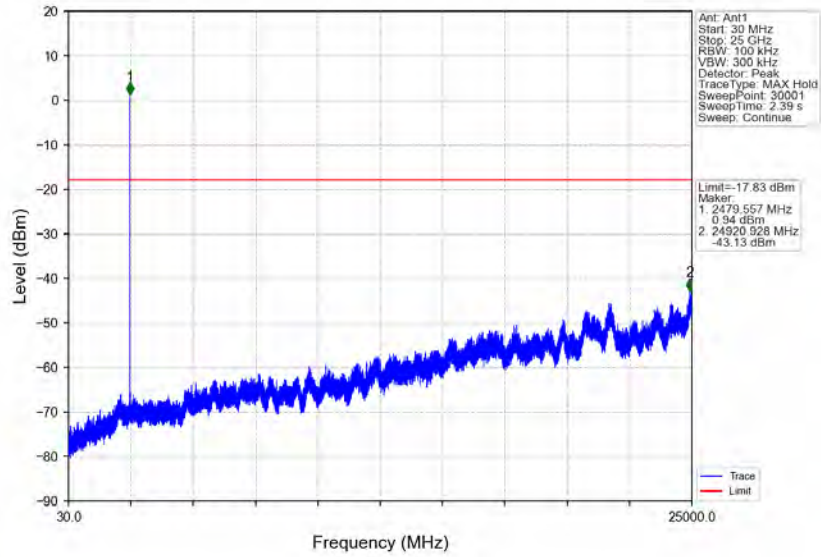
1M_MCH_2440MHz_Ant1_NTNV



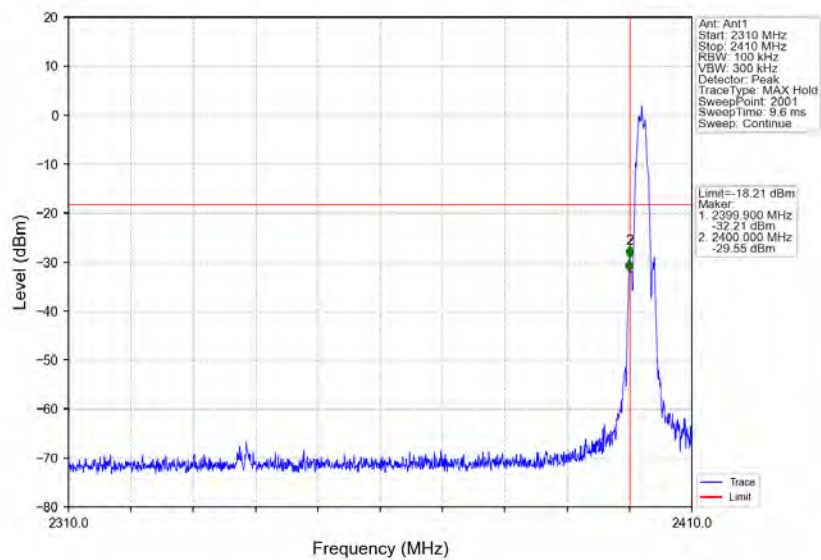
1M_HCH_2480MHz_Ant1_NTNV



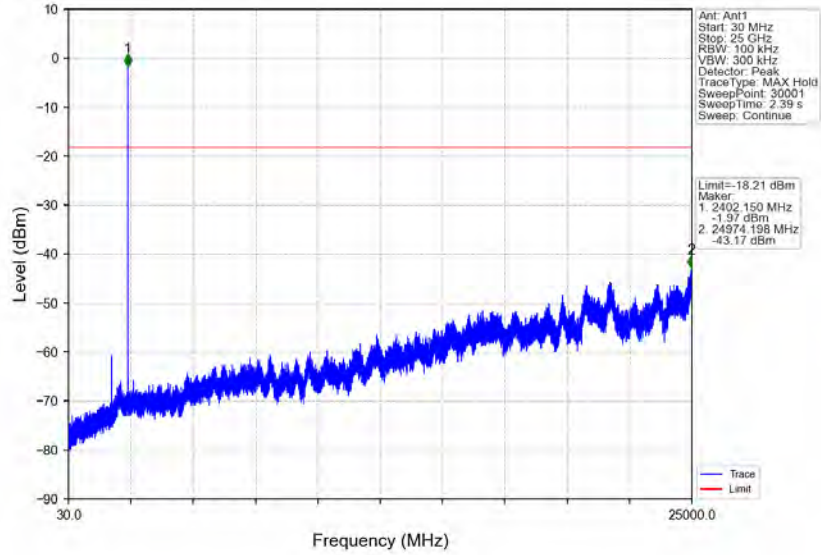
1M_HCH_2480MHz_Ant1_NTNV



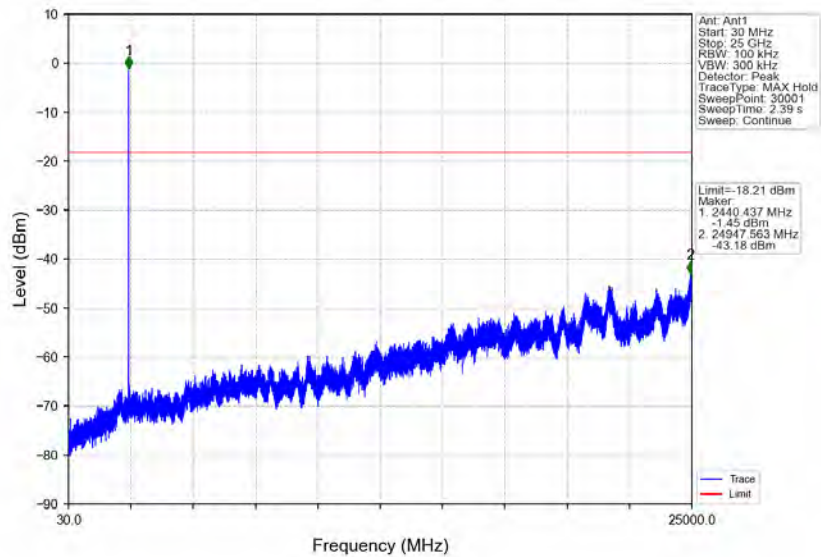
2M_LCH_2402MHz_Ant1_NTNV



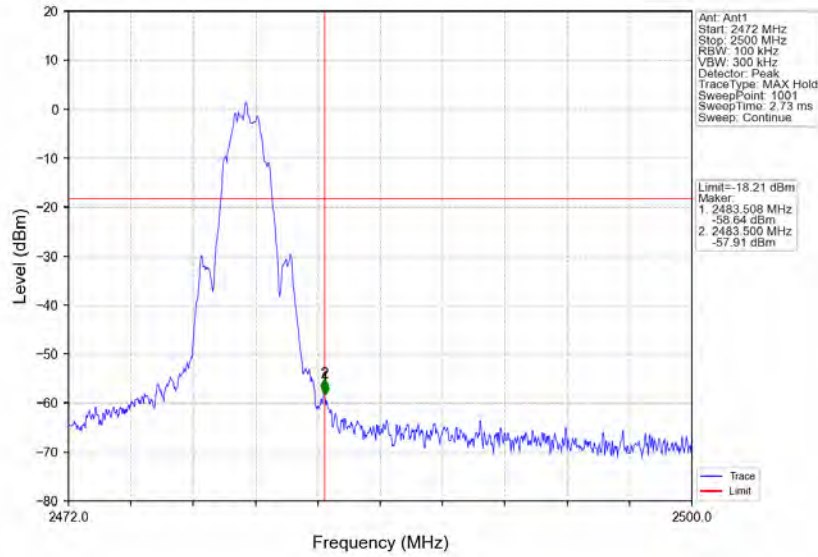
2M_LCH_2402MHz_Ant1_NTNV



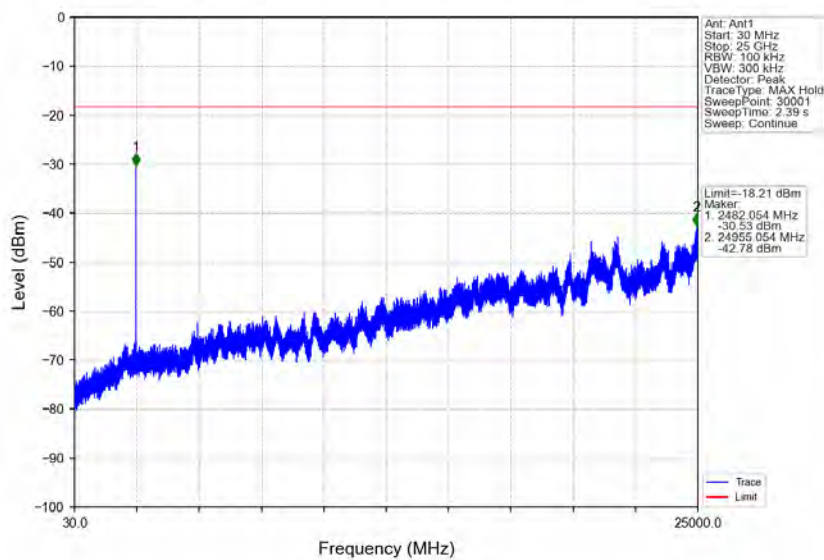
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 100 of 129

Right

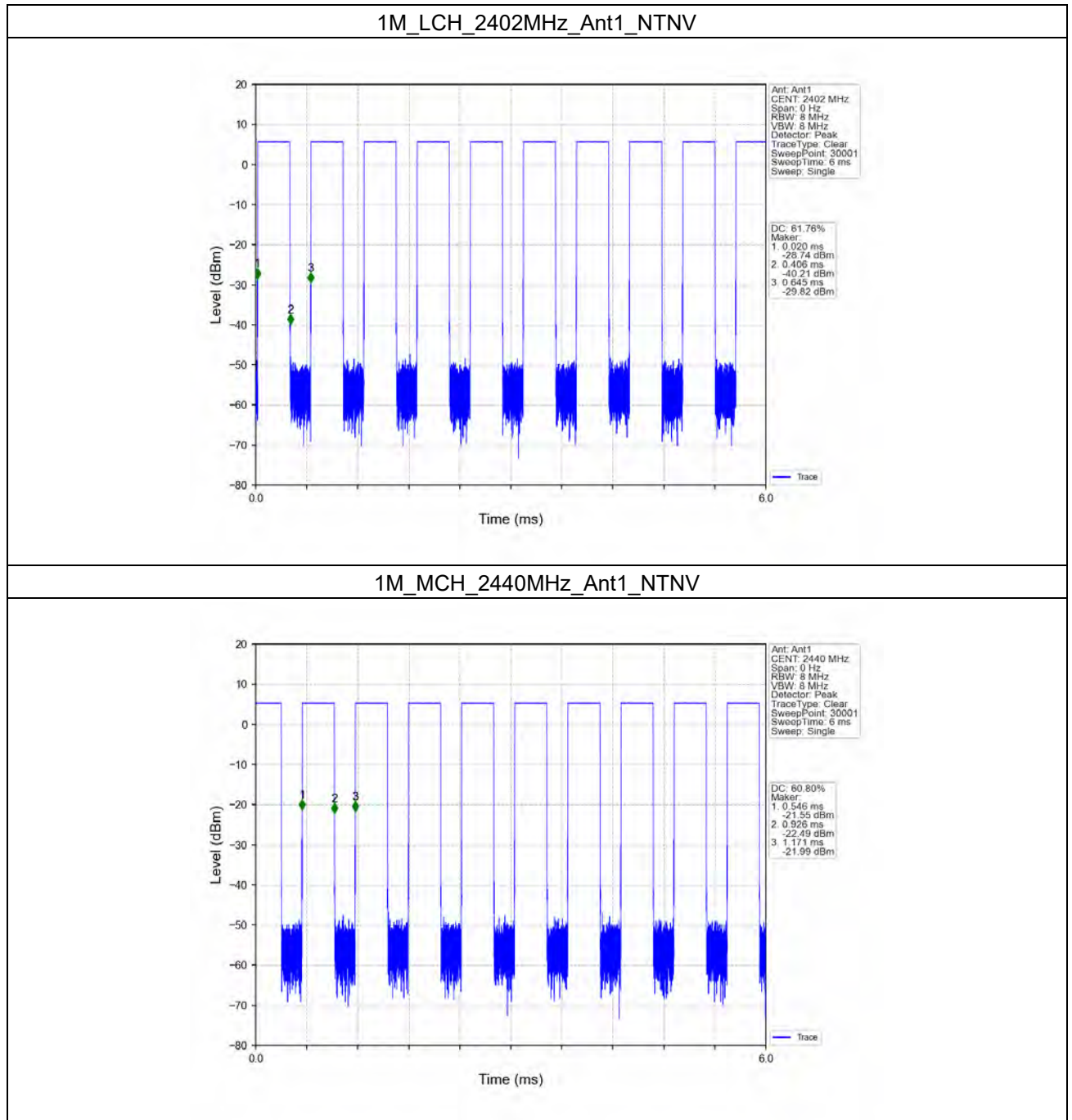
1. Duty Cycle

1.1 Ant1

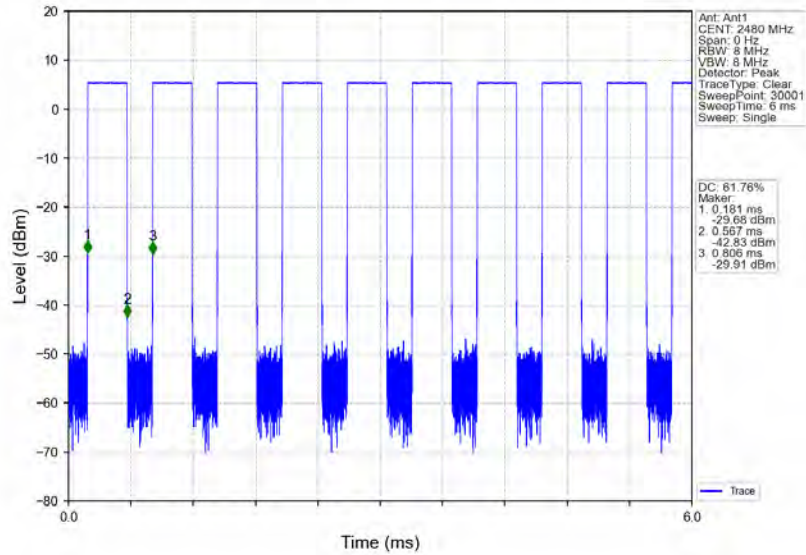
1.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.386	0.625	61.76	2.09	0.00
		2440	0.380	0.625	60.80	2.16	0.00
		2480	0.386	0.625	61.76	2.09	0.00
2M	SISO	2402	0.202	0.625	32.32	4.91	0.00
		2440	0.201	0.624	32.21	4.92	0.02
		2480	0.201	0.625	32.16	4.93	0.05

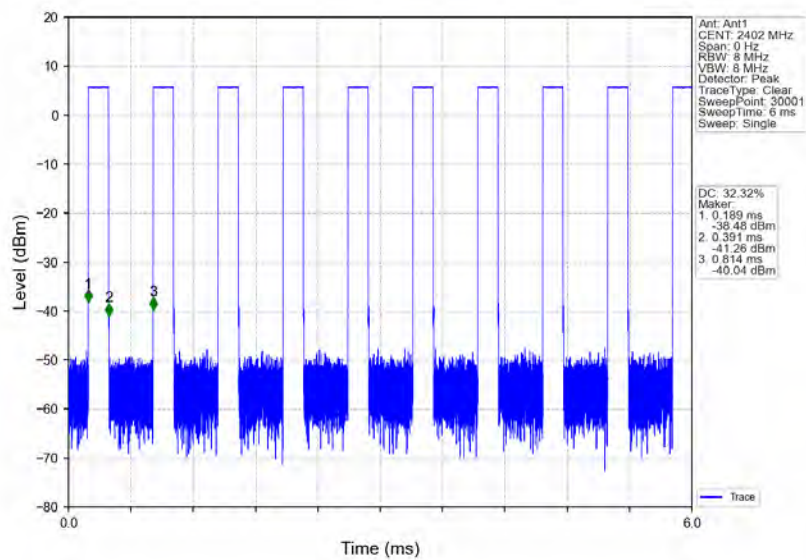
1.1.2 Test Graph



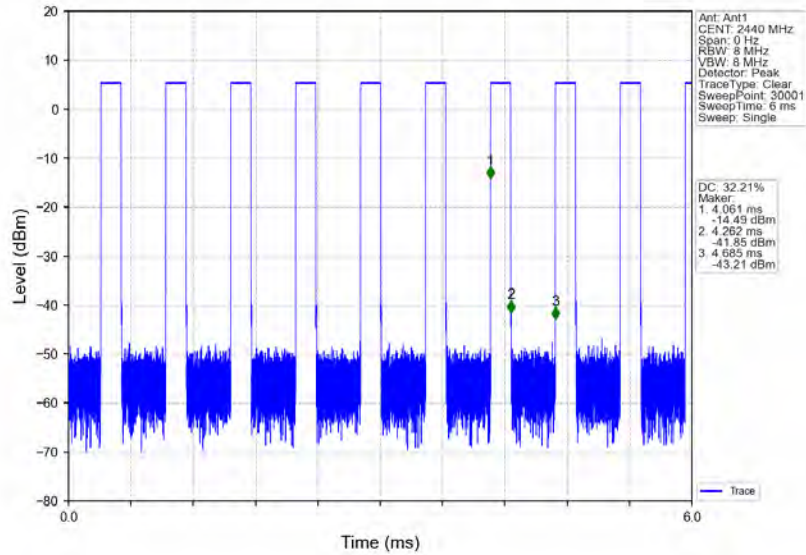
1M_HCH_2480MHz_Ant1_NTNV



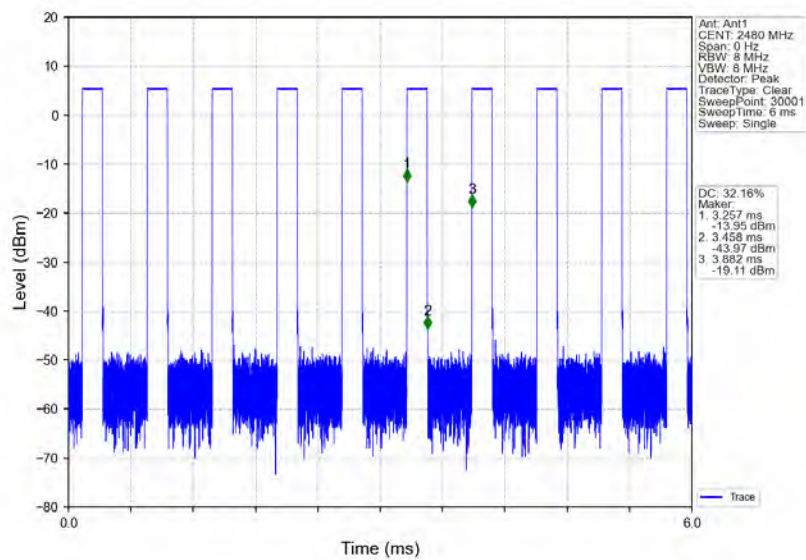
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



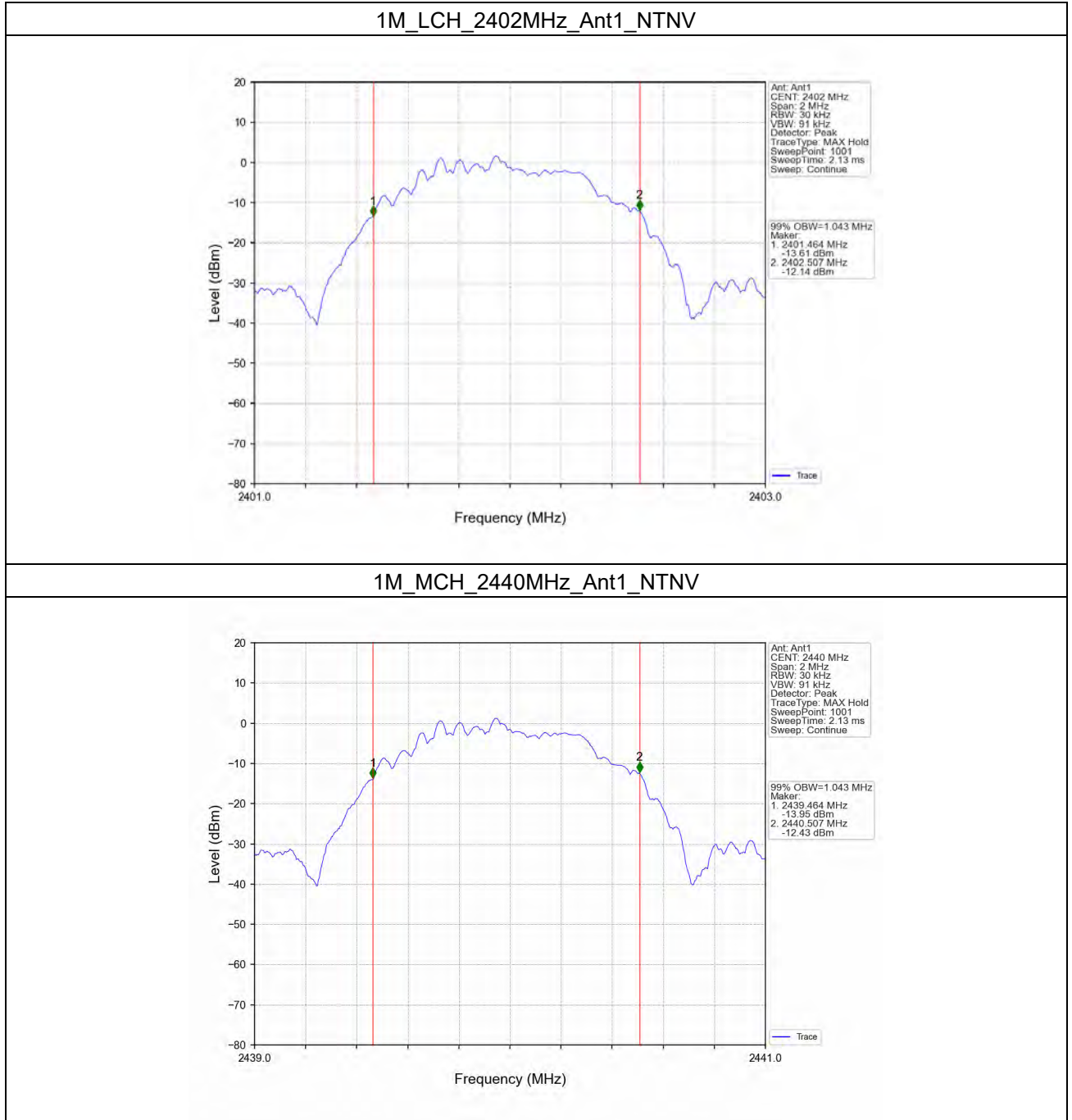
2. Bandwidth

2.1 OBW

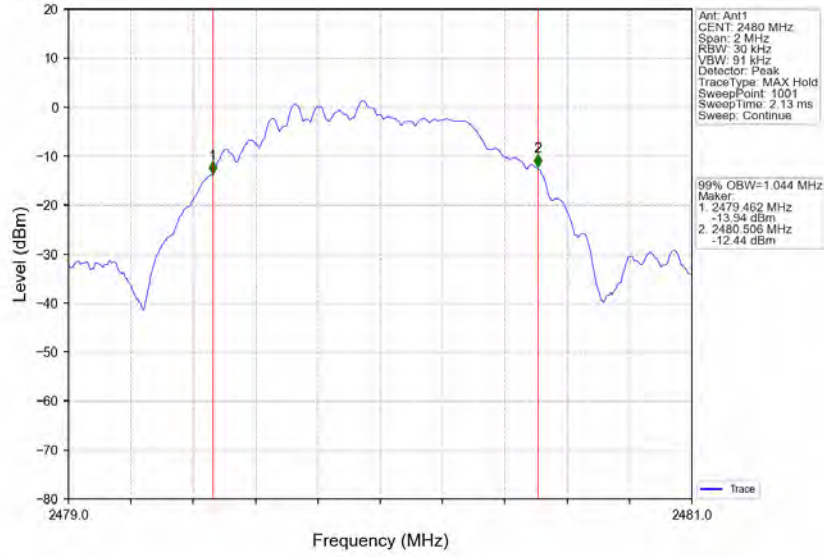
2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)	Verdict
				Result	
1M	SISO	2402	1	1.043	Pass
		2440	1	1.043	Pass
		2480	1	1.044	Pass
2M	SISO	2402	1	2.081	Pass
		2440	1	2.081	Pass
		2480	1	2.081	Pass

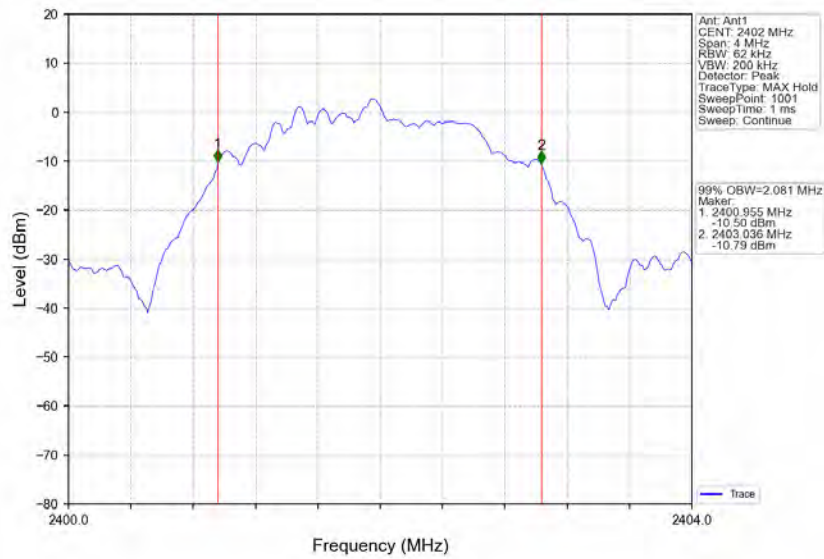
2.1.2 Test Graph



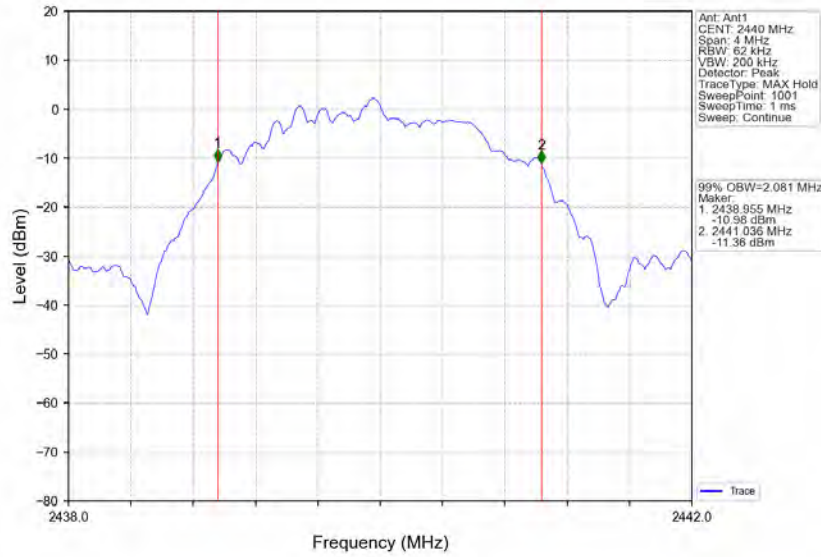
1M_HCH_2480MHz_Ant1_NTNV



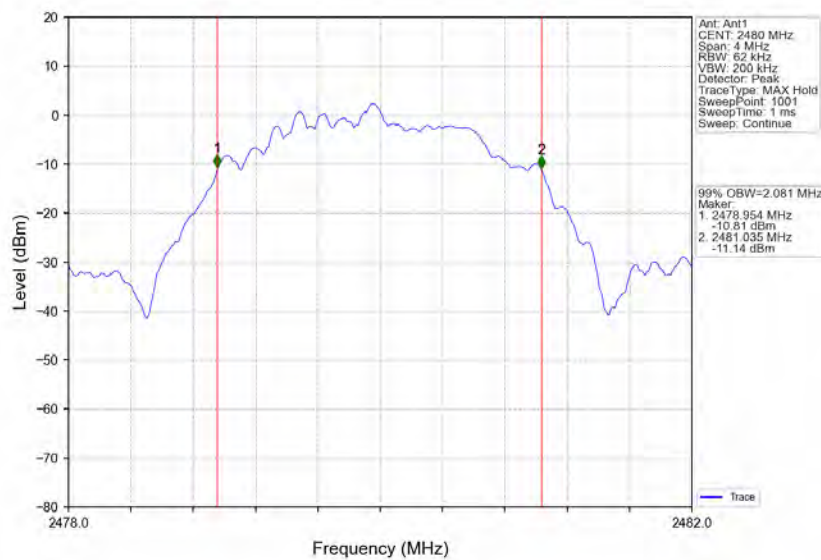
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV

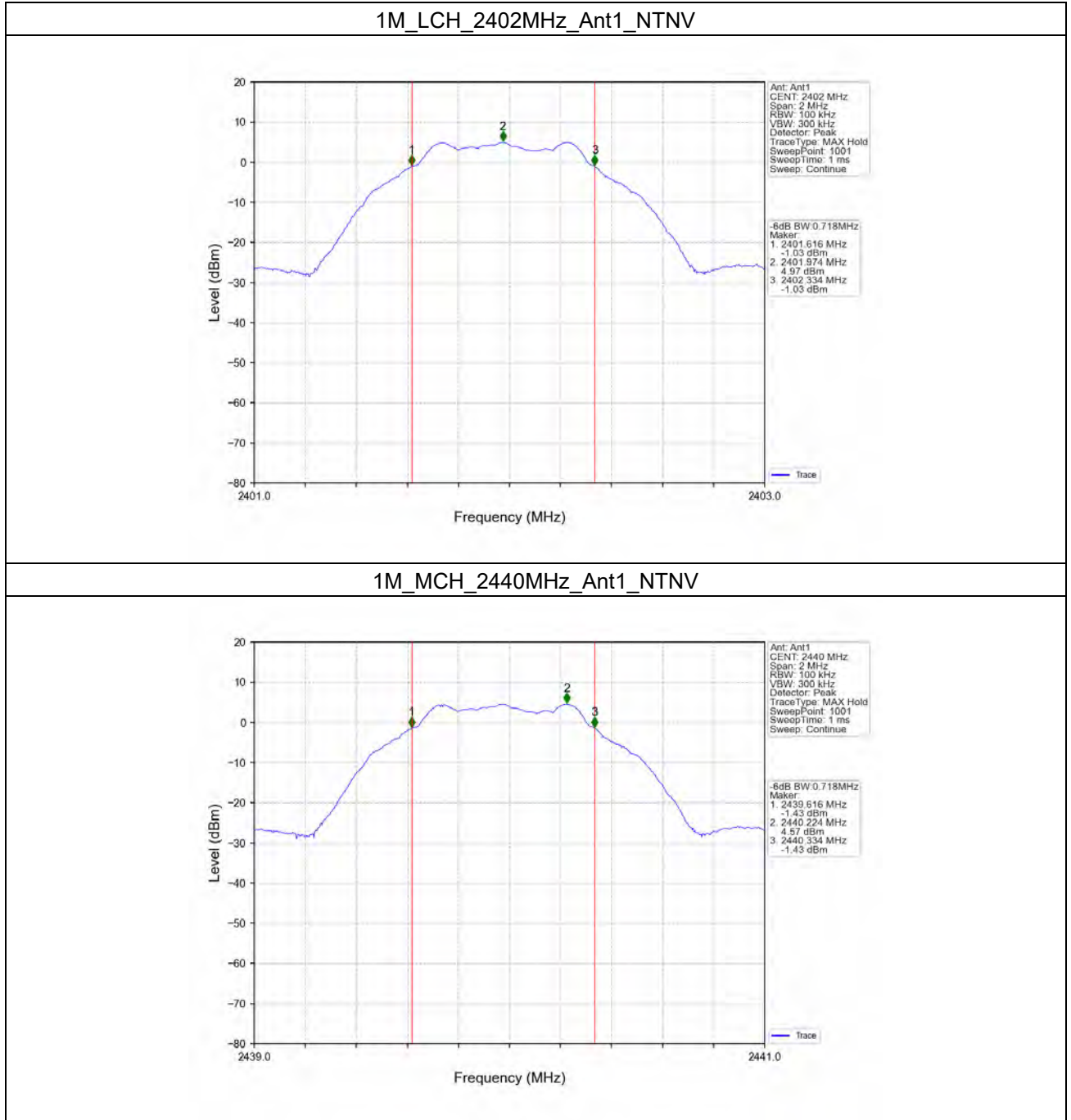


2.2 6dB BW

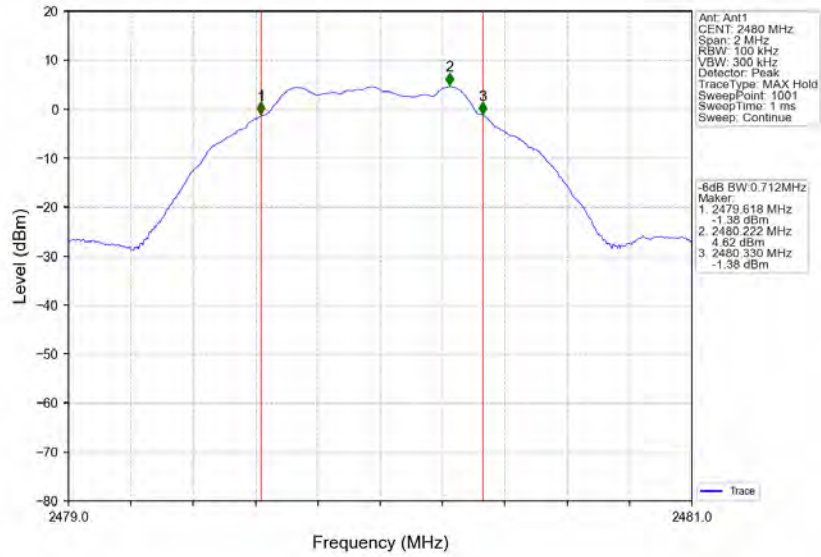
2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.718	≥ 0.5	Pass
		2440	1	0.718	≥ 0.5	Pass
		2480	1	0.712	≥ 0.5	Pass
2M	SISO	2402	1	1.241	≥ 0.5	Pass
		2440	1	1.254	≥ 0.5	Pass
		2480	1	1.254	≥ 0.5	Pass

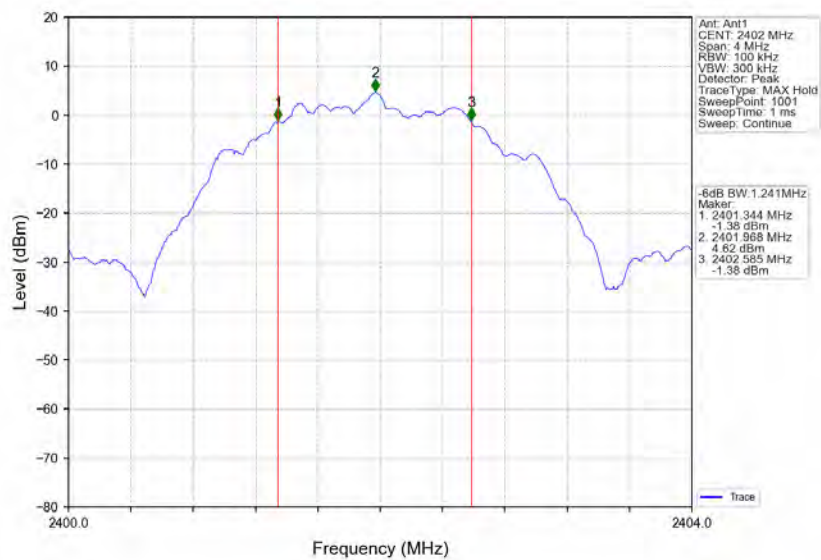
2.2.2 Test Graph



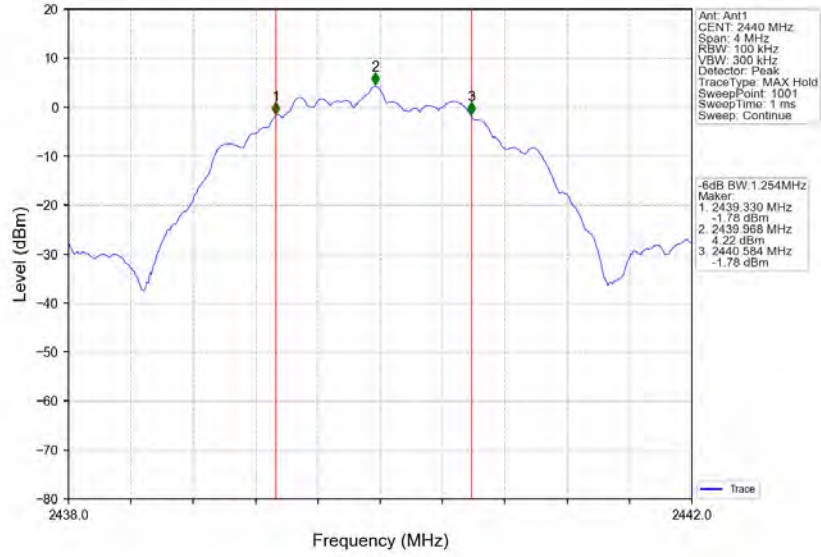
1M_HCH_2480MHz_Ant1_NTNV



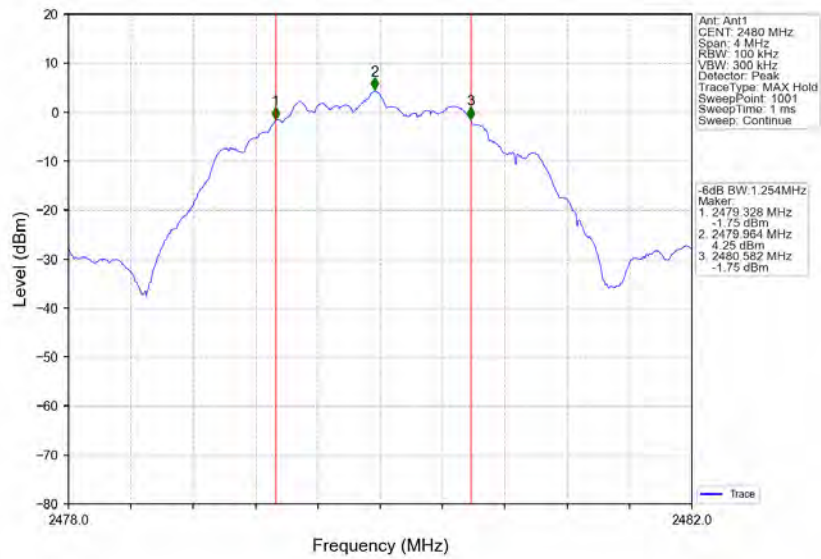
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



3. Maximum Conducted Output Power

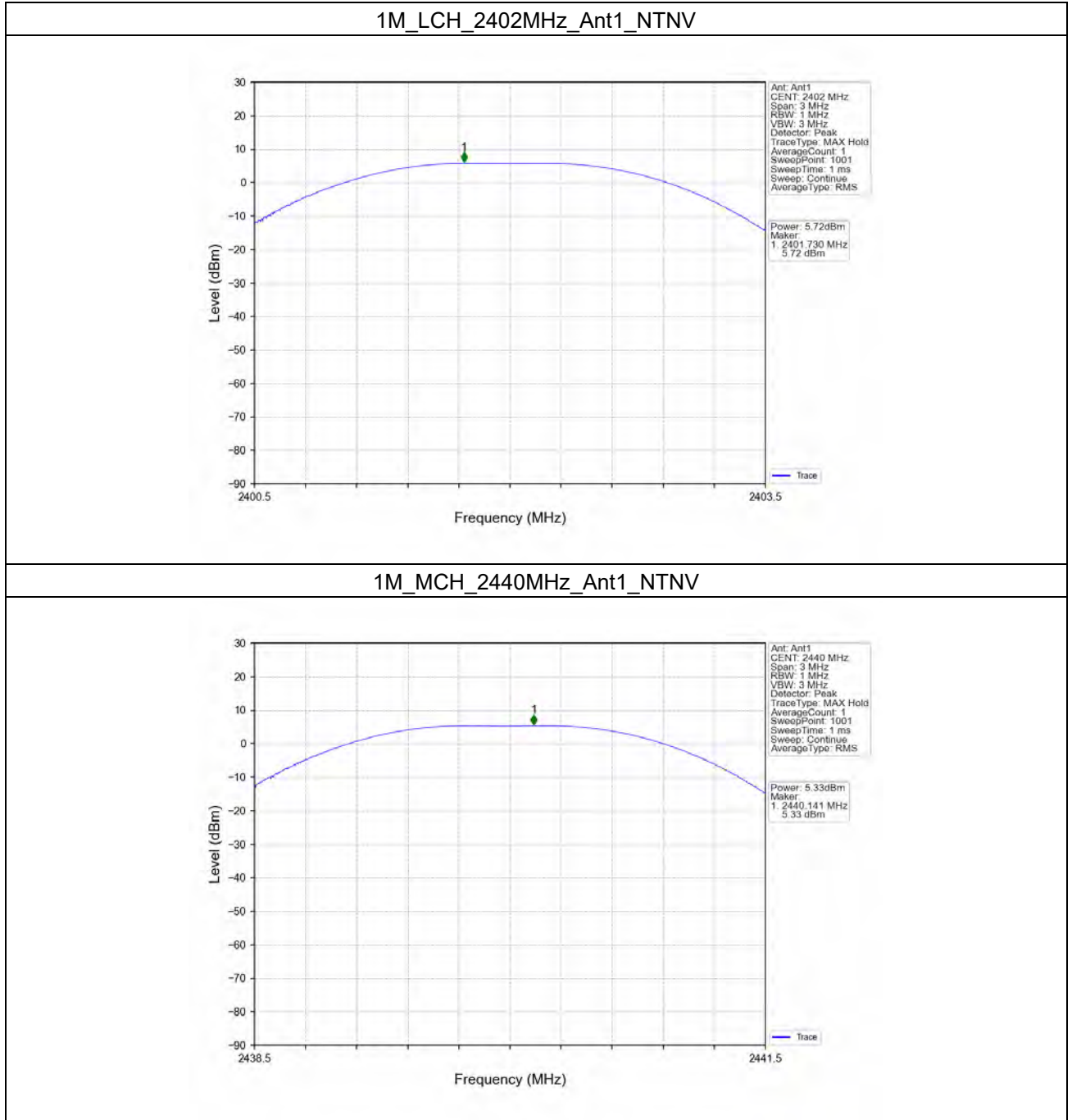
3.1 Power

3.1.1 Test Result

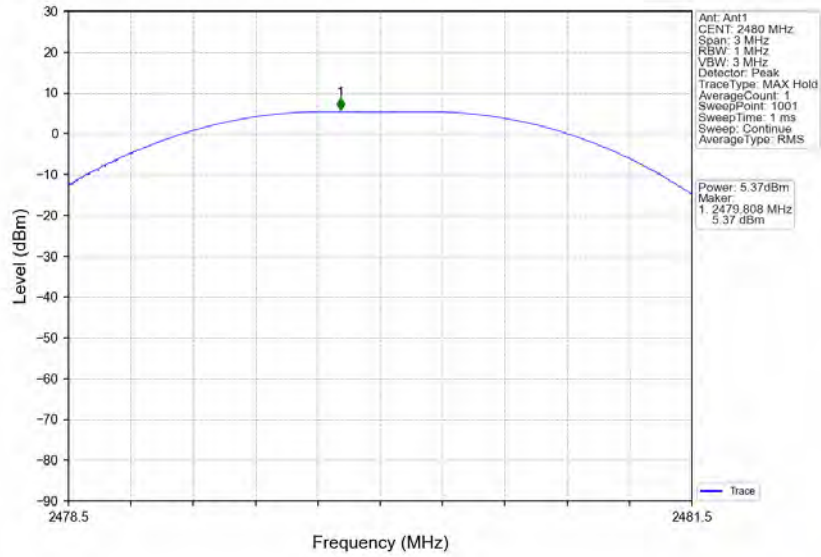
Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	5.72	<=30	Pass
		2440	5.33	<=30	Pass
		2480	5.37	<=30	Pass
2M	SISO	2402	5.74	<=30	Pass
		2440	5.35	<=30	Pass
		2480	5.40	<=30	Pass

Note1: Antenna Gain: Ant1: -0.06dBi;

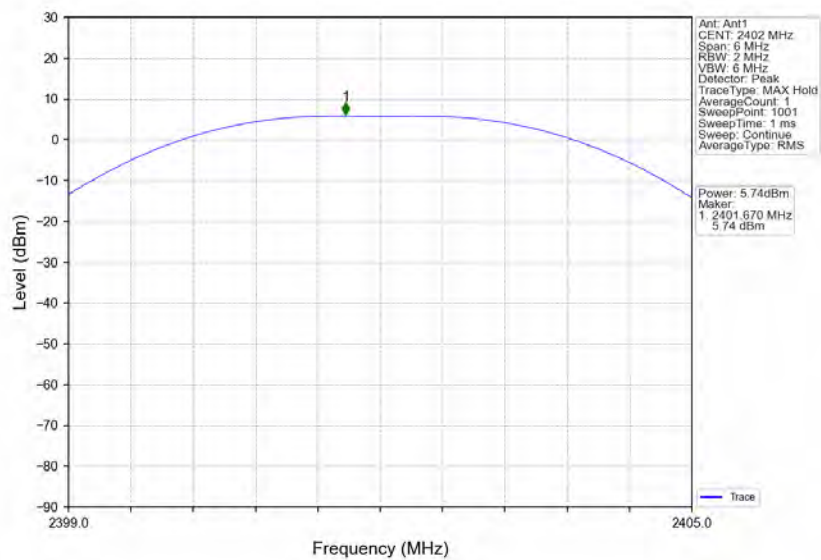
3.1.2 Test Graph



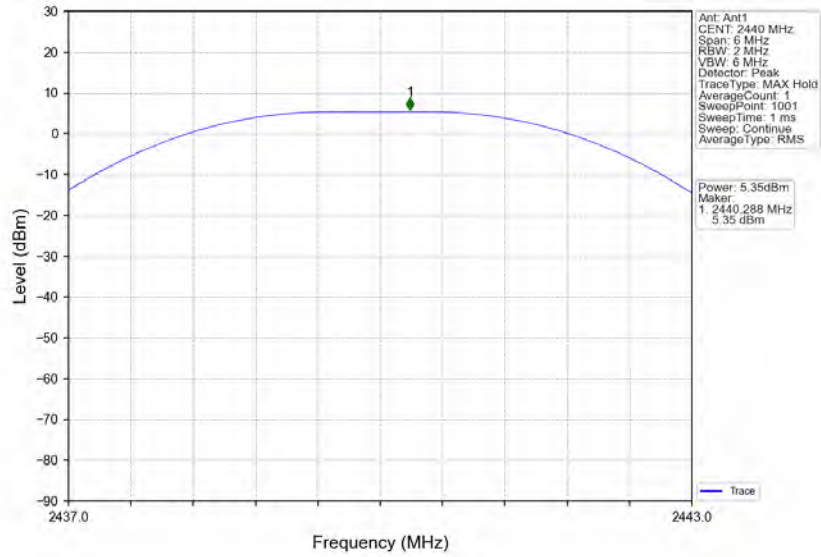
1M_HCH_2480MHz_Ant1_NTNV



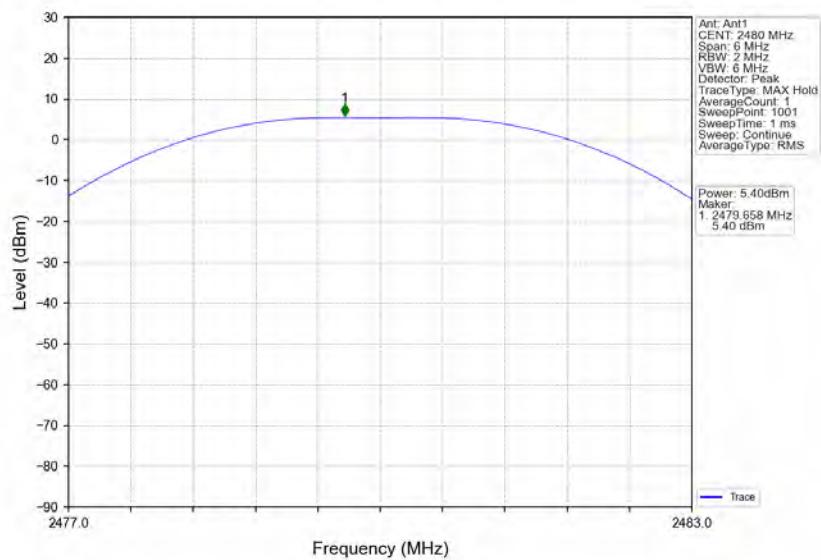
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



4. Maximum Power Spectral Density

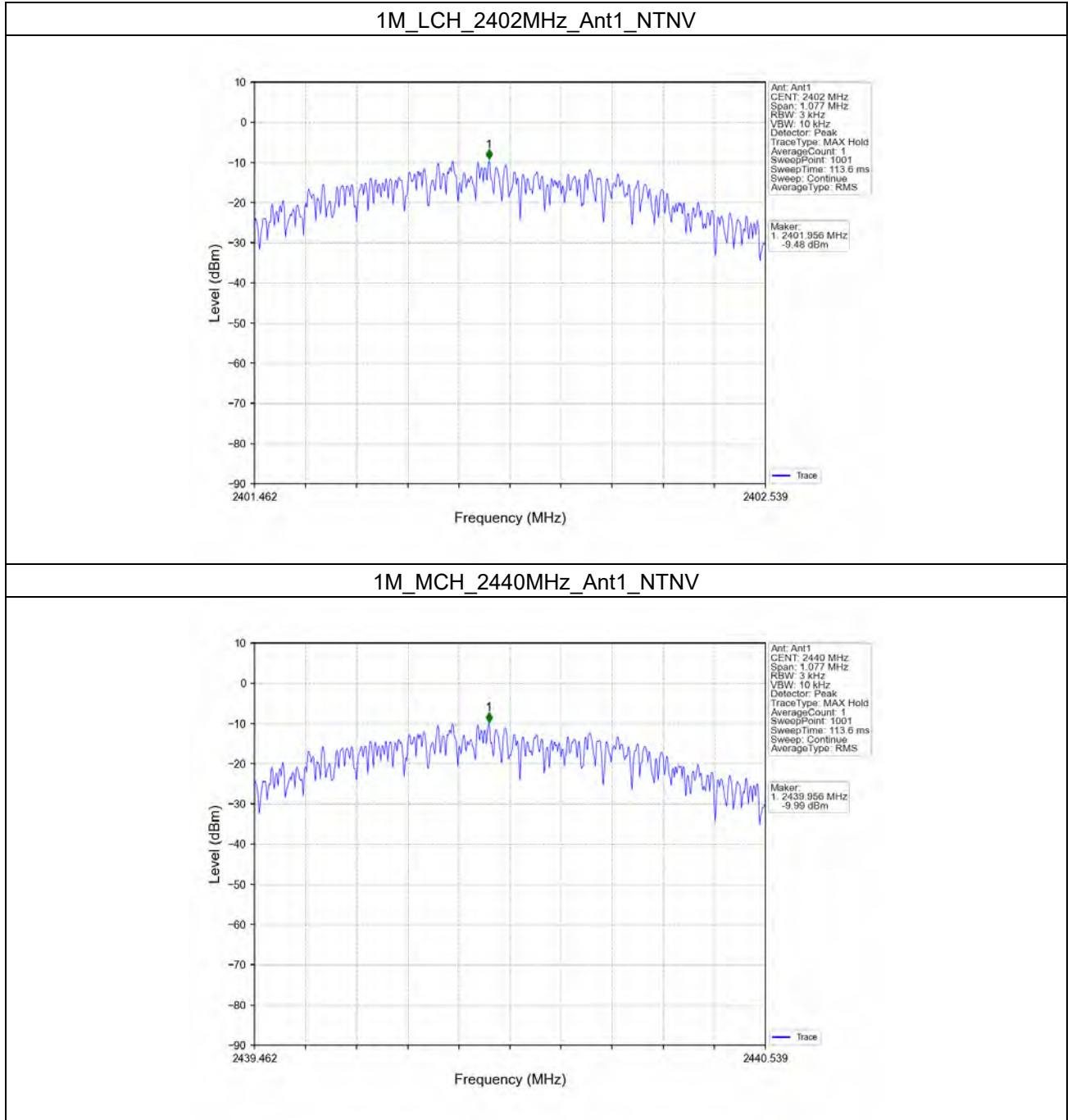
4.1 PSD

4.1.1 Test Result

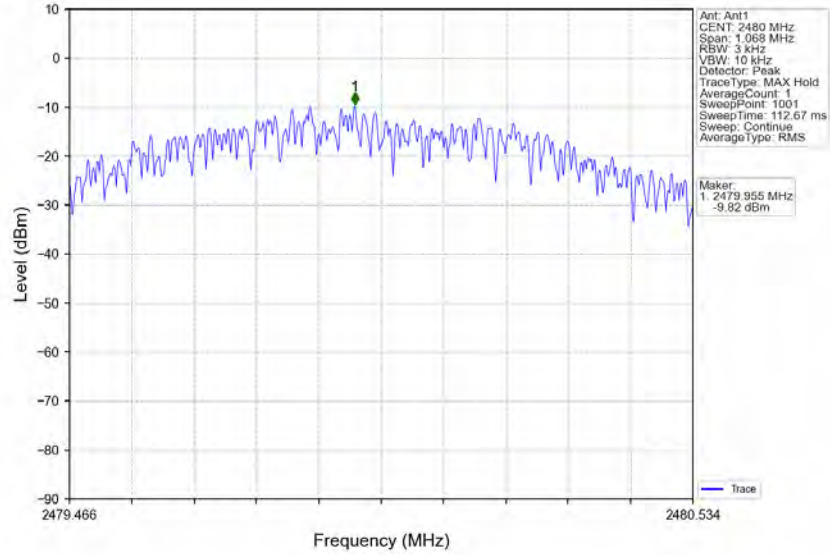
Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-9.48	<=8	Pass
		2440	-9.99	<=8	Pass
		2480	-9.82	<=8	Pass
2M	SISO	2402	-11.75	<=8	Pass
		2440	-12.16	<=8	Pass
		2480	-12.12	<=8	Pass

Note1: Antenna Gain: Ant1: -0.06dBi;

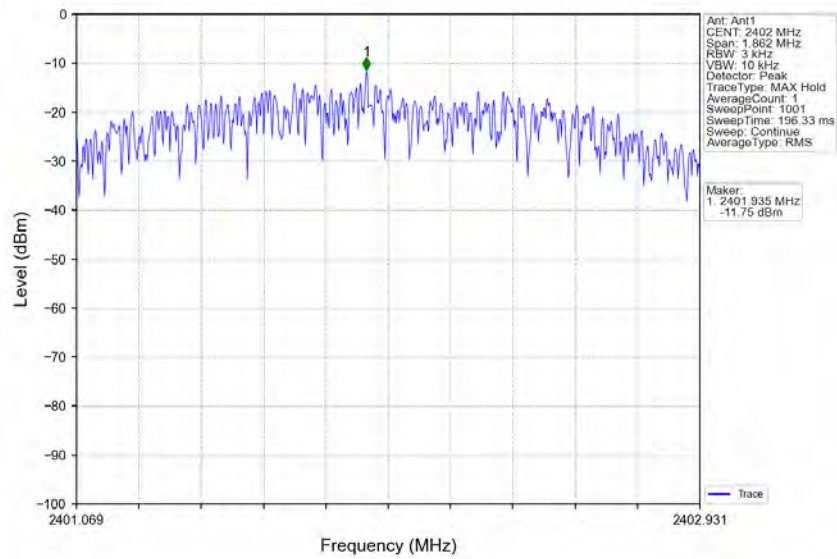
4.1.2 Test Graph



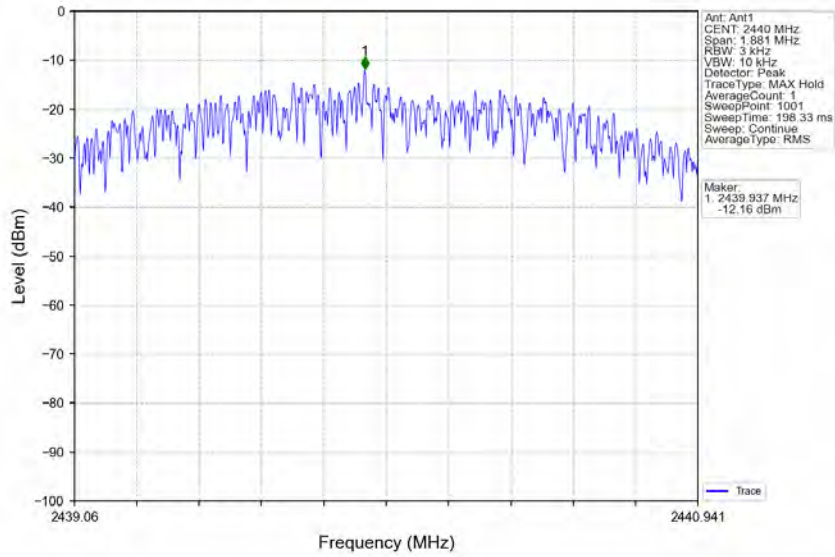
1M_HCH_2480MHz_Ant1_NTNV



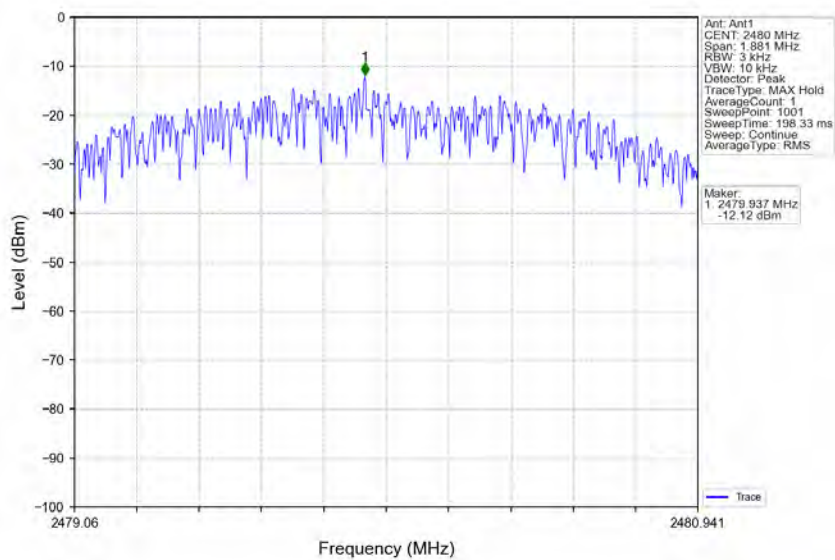
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



5. Unwanted Emissions In Non-restricted Frequency Bands

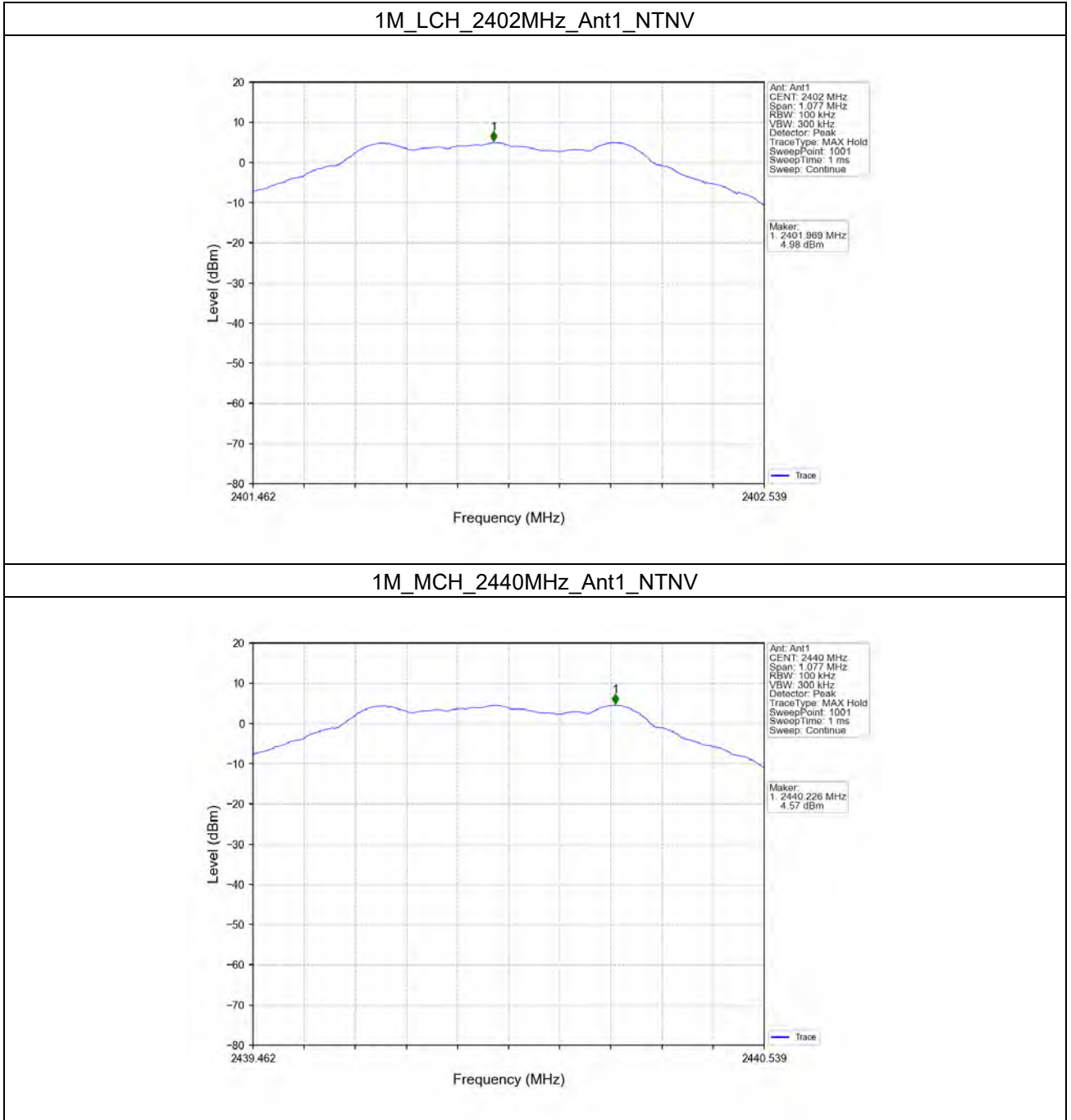
5.1 Ref

5.1.1 Test Result

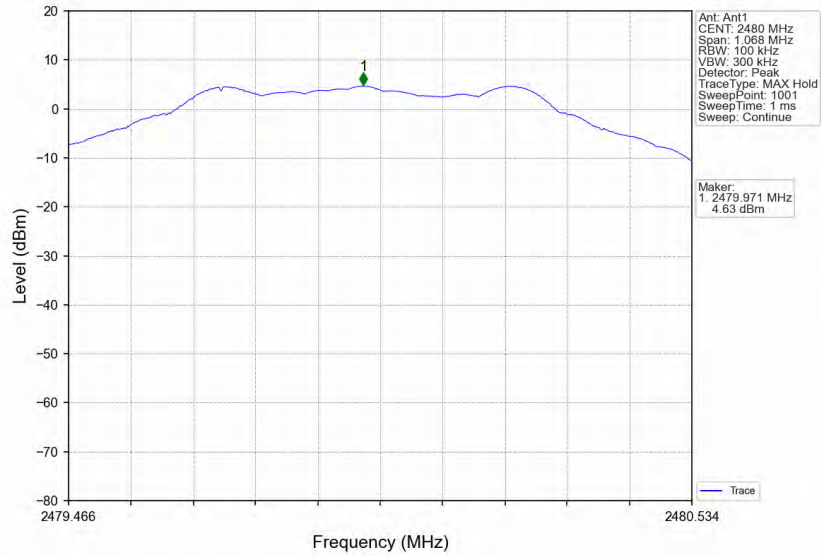
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	4.98
		2440	1	4.57
		2480	1	4.63
2M	SISO	2402	1	4.64
		2440	1	4.23
		2480	1	4.30

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.

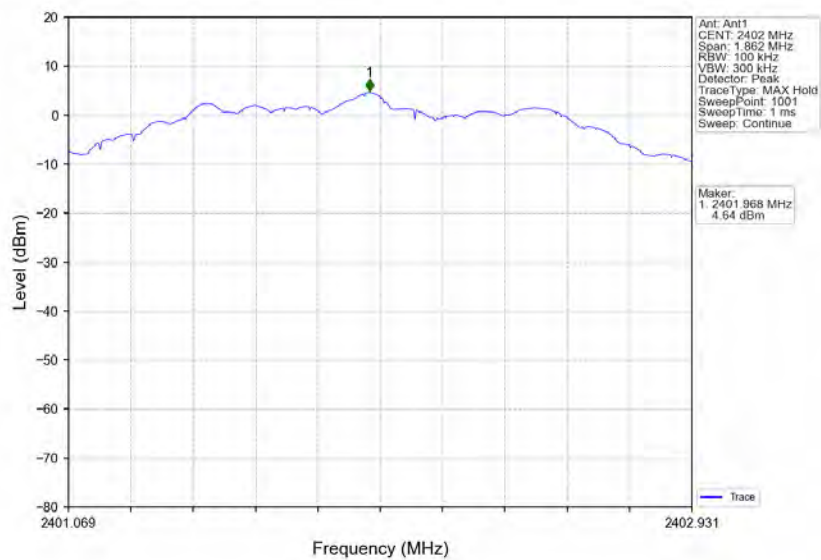
5.1.2 Test Graph



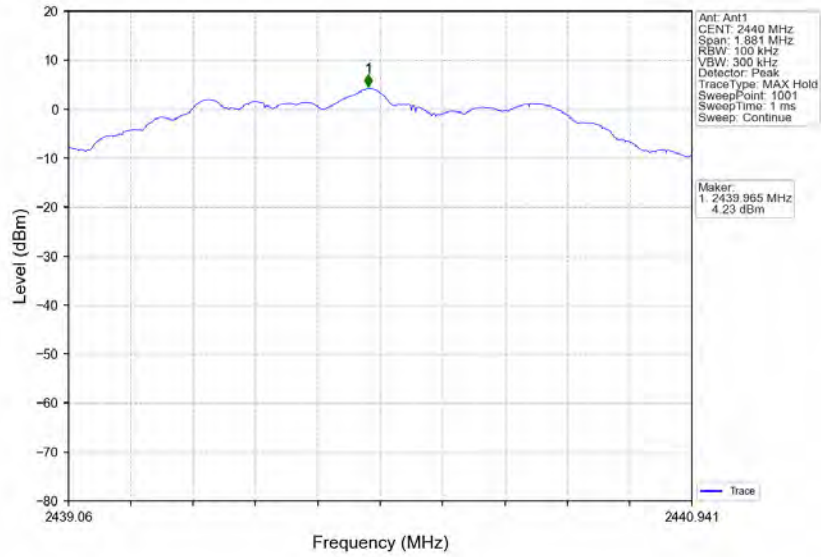
1M_HCH_2480MHz_Ant1_NTNV



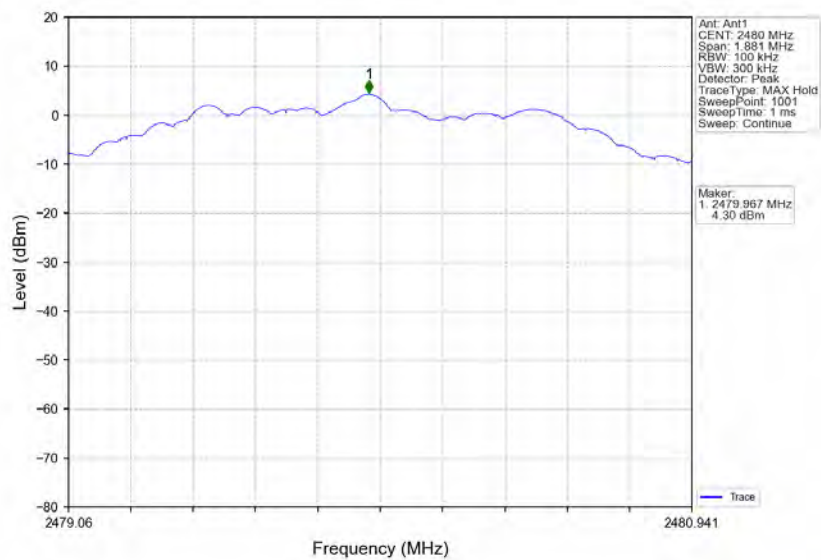
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV





SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

SHEM-TRF-001 Rev. 02 Sep01, 2023

Report No.: SHCR230700149802

Page: 124 of 129

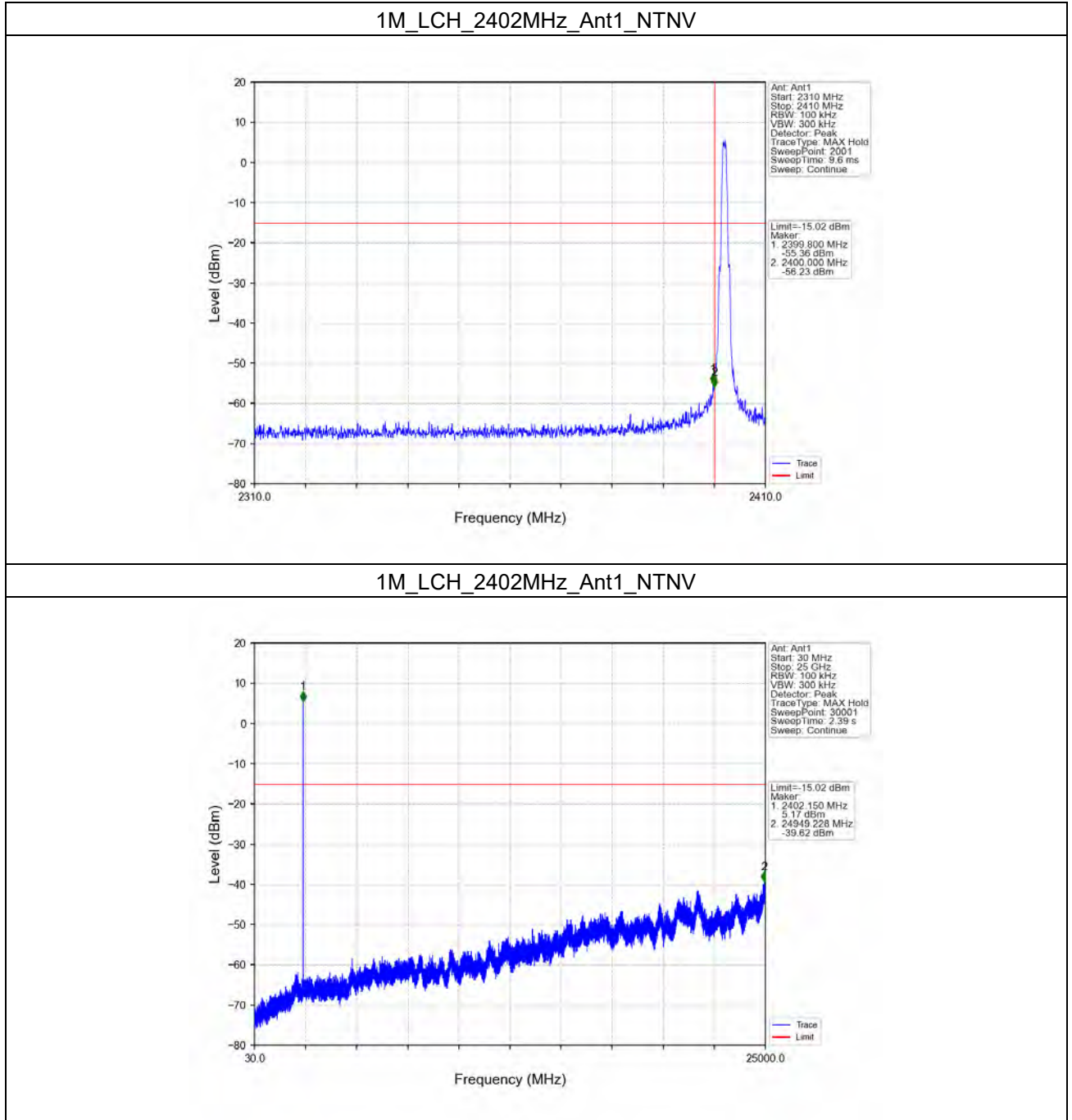
5.2 CSE

5.2.1 Test Result

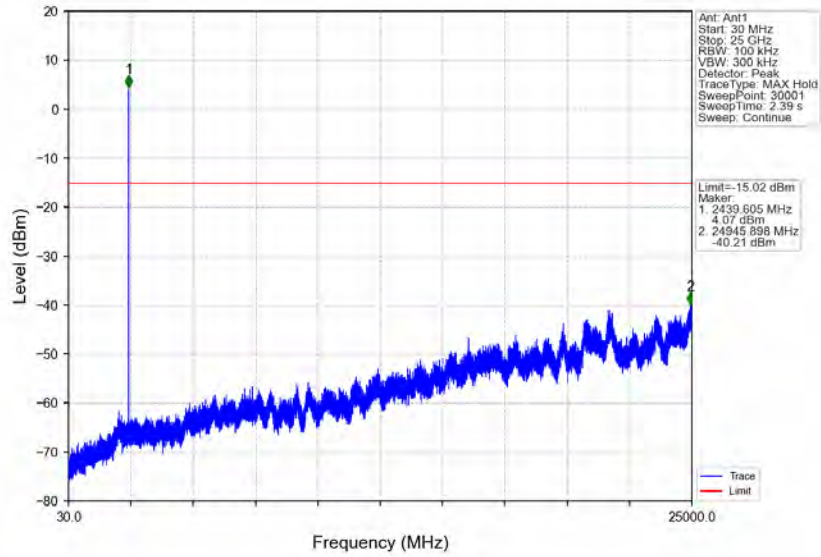
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	4.98	-15.02	Pass
		2440	1	4.98	-15.02	Pass
		2480	1	4.98	-15.02	Pass
2M	SISO	2402	1	4.64	-15.36	Pass
		2440	1	4.64	-15.36	Pass
		2480	1	4.64	-15.36	Pass

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.

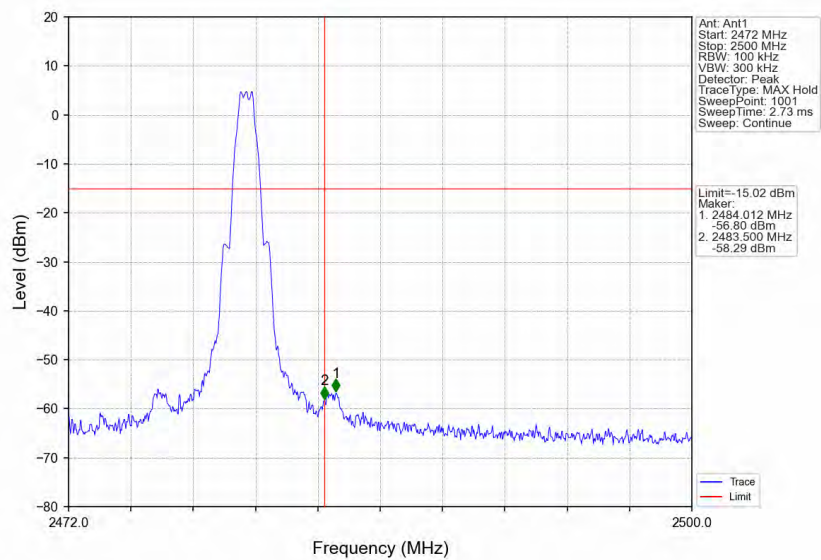
5.2.2 Test Graph



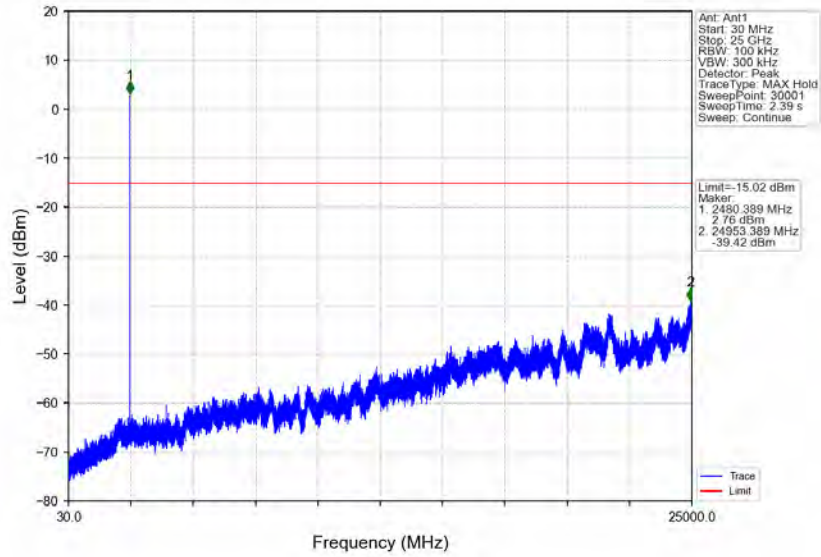
1M_MCH_2440MHz_Ant1_NTNV



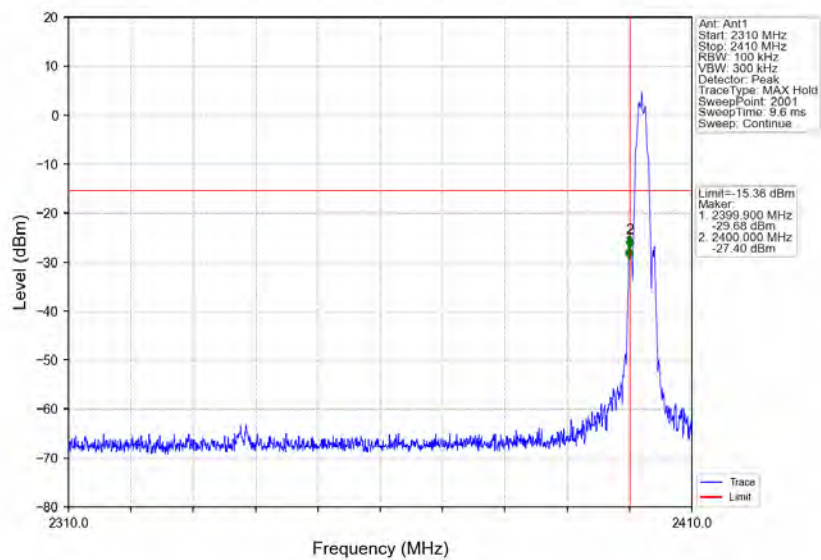
1M_HCH_2480MHz_Ant1_NTNV



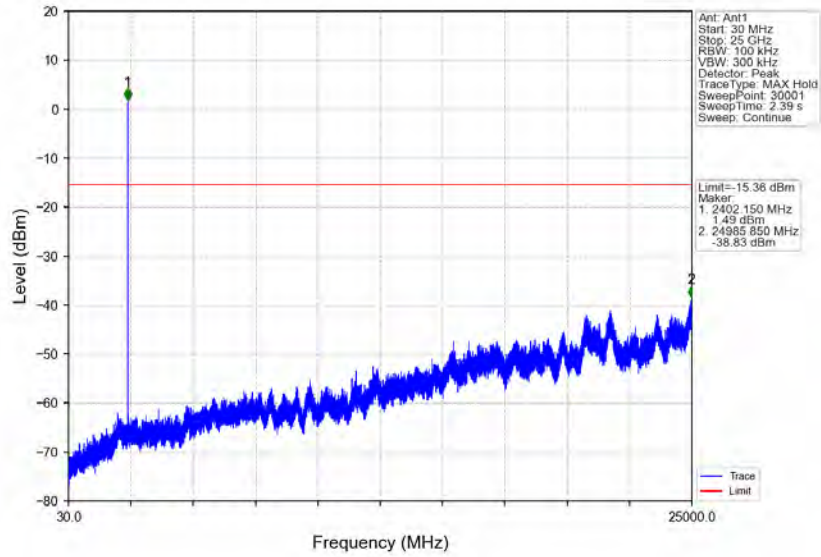
1M_HCH_2480MHz_Ant1_NTNV



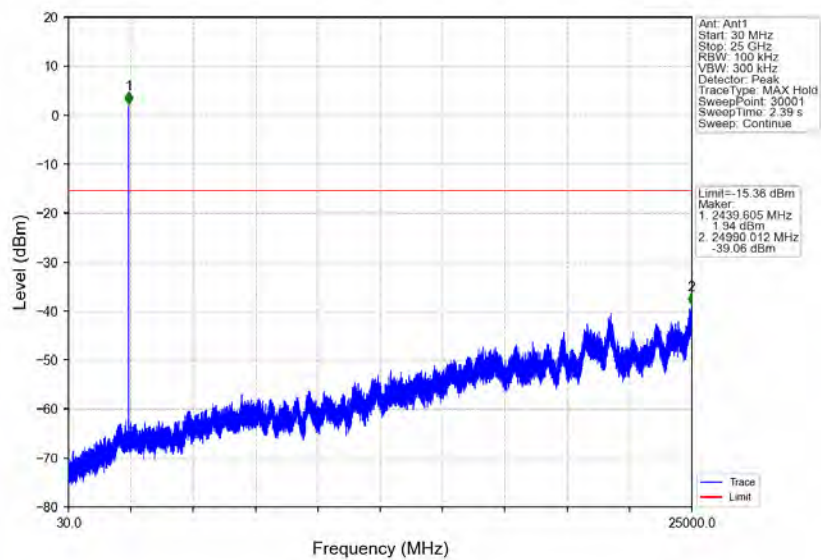
2M_LCH_2402MHz_Ant1_NTNV



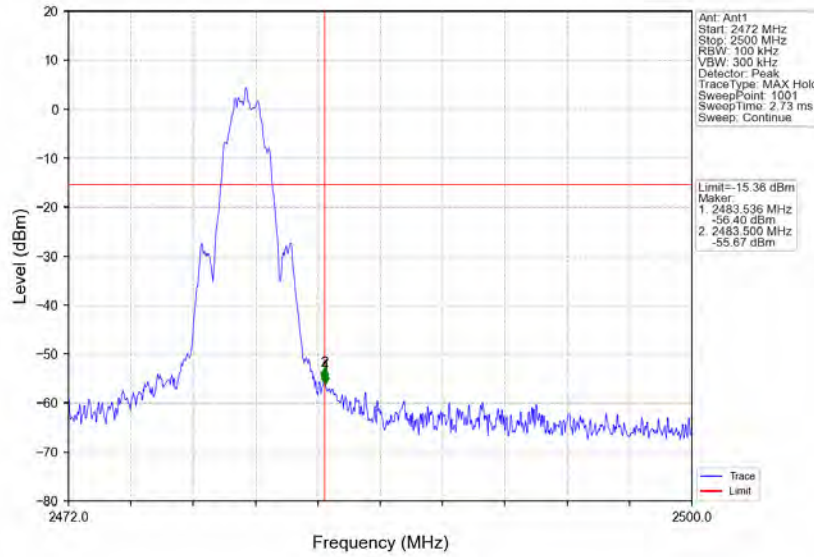
2M_LCH_2402MHz_Ant1_NTNV



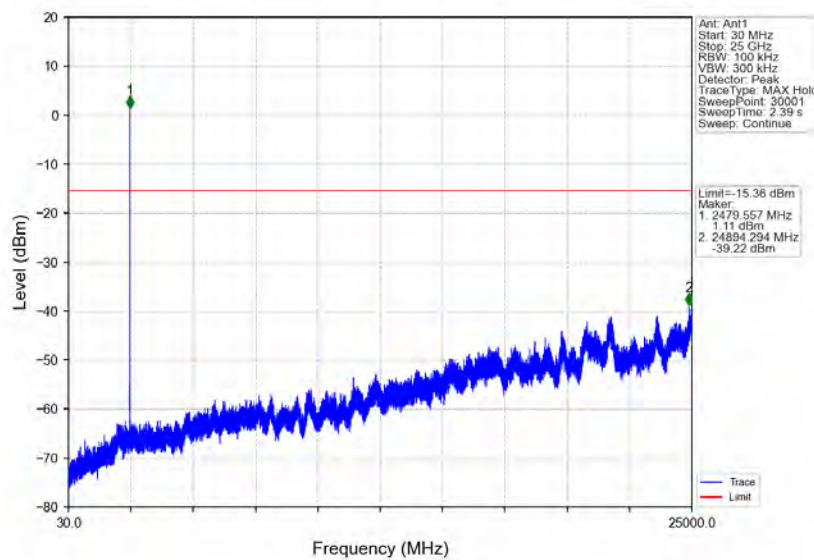
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



- End of the Report -