

TEST REPORT

Application No.:	KSCR2409001732AT
FCC ID:	2BHG-0211C6U4
IC:	32743-0211C6U4
Name of Testing Laboratory preparing the Report:	Compliance Certification Services (Kunshan) Inc.
Address of Testing Laboratory preparing the Report:	No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.
Applicant:	KeyLife International Technology Limited
Address of Applicant:	27th Floor, Alexandra House, 18 Chater Road, Central, Hong Kong
Manufacturer:	KeyLife International Technology Limited
Address of Manufacturer:	27th Floor, Alexandra House, 18 Chater Road, Central, Hong Kong
Factory:	Zhejiang Uniview Systems Technology Co., Ltd.
Address of Factory:	No.1277 South Qingfeng South Road, Tongxiang City, Jiaxing City, Zhejiang Province, China
Equipment Under Test (EUT):	
EUT Name:	Dual-cam Doorbell (battery)
Model No.:	DB312, DB312 XXX XXX (where X may be 0-9 A-Z a-z or blank. The differences no impact safety related constructions and EMC) ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
For IC Model No.:	DB312
Standard(s) :	47 CFR Part 15, Subpart C 15.247 RSS-247 Issue 3, August 2023 RSS-Gen Issue 5 Amendment 2 (February 2021)
Date of Receipt:	2024-09-04
Date of Test:	2024-09-13 to 2024-10-22
Date of Issue:	2024-10-22

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-Document.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.



Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240900173203

Page: 2 of 86

Revision Record			
Version	Description	Date	Remark
00	Original	2024-10-22	/

Authorized for issue by:			
Tested By		<u>Maker_Qi</u>	
		<u>Maker_Qi/Project Engineer</u>	
Approved By		<u>Terry Hou</u>	
		<u>Terry Hou /Reviewer</u>	

2 Test Summary

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

N/A: Not applicable

Radio Spectrum Matter Part					
Item	FCC Requirement	IC Requirement	Method	Result	Test Lab*
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.207	RSS-Gen Clause 8.8	ANSI C63.10 (2013) Section 6.2	Pass	B
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	A
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	A
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	A
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	A
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	A
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	B
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	B
99% Bandwidth	-	RSS-Gen Section 6.7	ANSI C63.10 Section 6.9.3	Pass	A

Model No.: DB312,DB312 XXX XXX (where X may be 0-9 A-Z a-z or blank. The differences no impact safety related constructions and EMC)

Only the model DB312 was tested.

There are series models mentioned in this report, and they are identical in electrical and electronic characters. Only the model DB312 was tested since their differences were the model number and appearance.

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	8
4.7 Deviation from Standards	8
4.8 Abnormalities from Standard Conditions	8
5 Equipment List	9
6 Radio Spectrum Technical Requirement	11
6.1 Antenna Requirement	11
7 Radio Spectrum Matter Test Results	12
7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)	12
7.2 Radiated Emissions which fall in the restricted bands	16
7.3 Radiated Spurious Emissions Below 1GHz	34
7.4 Radiated Spurious Emissions Above 1GHz	38
7.5 Conducted Peak Output Power	52
7.6 Minimum 6dB Bandwidth	54
7.7 Power Spectrum Density	55
7.8 Conducted Band Edges Measurement	56
7.9 Conducted Spurious Emissions	57
8 Test Setup Photo	58
9 EUT Constructional Details (EUT Photos)	58
10 Appendix	59

4 General Information

4.1 Details of E.U.T.

Power supply:	~12-24V,50/60Hz,1.0A DC 5V/2A DC 3.6V by battery
Test voltage:	AC 120V/60Hz
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	Internal antenna
Antenna Gain:	3.9dBi

4.2 Power level setting using in test:

Channel	BLE	BLE	BLE	BLE
	S8	S2	1M	2M
0	default	default	default	default
19	default	default	default	default
39	default	default	default	default

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	8.4×10^{-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.

Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240900173203

Page: 7 of 86

4.5 Test Location

Lab A:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

Lab B:

Conducted Emissions at AC Power Line (150kHz-30MHz); Radiated Emissions; Radiated Emissions which fall in the restricted bands test at:

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

South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working 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).
3. Sample source: sent by customer.

Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240900173203

Page: 8 of 86

4.6 Test Facility

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

Lab A:

- **A2LA**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

- **FCC**

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

- **ISED**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

- **VCCI**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

Lab B:

- **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

- **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240900173203

Page: 9 of 86

5 Equipment List

Lab A:

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
RF Radiated Test						
1	Spectrum Analyzer	R&S	FSV40	KUS1806E003	08/06/2024	08/05/2025
2	Universal Radio Communication Tester	R&S	CMW500	KSEM009-1	03/19/2024	03/18/2025
4	Loop Antenna	COM-POWER	AL-130R	KUS1806E001	03/18/2023	03/17/2025
5	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E005	06/29/2023	06/28/2025
6	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E006	03/19/2024	03/18/2025
7	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	KS301079	03/23/2024	08/22/2026
8	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	KS301186	04/07/2023	04/06/2025
9	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	CZ301058	01/07/2024	01/06/2026
10	Amplifier(30MHz~18GHz)	PANSHAN TECHNOLOGY	LNA:1~18G	KSEM010-1	01/15/2024	01/14/2025
11	Amplifier(18~40GHz)	PANSHAN TECHNOLOGY	LNA180400G40	KSEM038	08/12/2024	08/11/2025
12	RE Test Cable	REBES MICROWAVE	/	CZ301097	08/12/2024	08/11/2025
13	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-4	03/21/2024	03/20/2025
14	Software	Faratronic	EZ_EMCA-3A1	/	NCR	NCR
15	Software	ESE	E3_V 6.111221a	/	NCR	NCR



Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240900173203

Page: 10 of 86

Lab B:

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
Conducted Emission at Mains Terminals						
1	Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2/1/2024	1/31/2025
2	Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2/8/2024	2/7/2025
3	Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-03	2/4/2024	2/3/2025
4	Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-04	2/4/2024	2/3/2025
5	Measurement Software	Tonscend	JS32-CE	SUWI-02-09-05	NCR	NCR
RF Radiated Test						
1	Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-02	6/3/2023	6/2/2026
2	Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-13	2/8/2024	2/7/2025
3	Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	5/8/2024	5/7/2025
4	Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-06	11/21/2023	11/20/2024
5	Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2/1/2024	1/31/2025
6	Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9168	SUWI-01-11-04	11/25/2023	11/24/2024
7	Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-05	11/25/2023	11/24/2024
8	Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	5/12/2023	5/11/2025
9	Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	5/13/2023	5/12/2025
10	Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2/1/2024	1/31/2025
11	Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2/1/2024	1/31/2025
12	Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	2/1/2024	1/31/2025
13	Measurement Software	Tonscend	JS32-RE	SUWI-02-09-04	NCR	NCR
14	Measurement Software	Tonscend	JS32-RSE	SUWI-02-09-06	NCR	NCR

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 Internal antenna on the main PCB and no consideration of replacement. The best case gain of the antenna is 3.9 dBi.

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: 23 °C

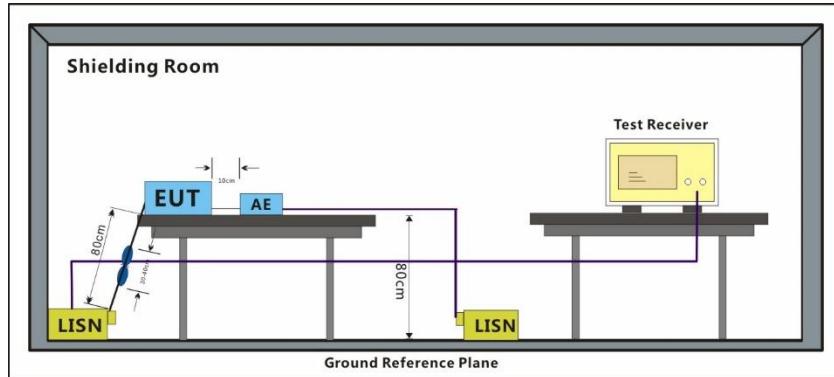
Humidity: 46 % RH

Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

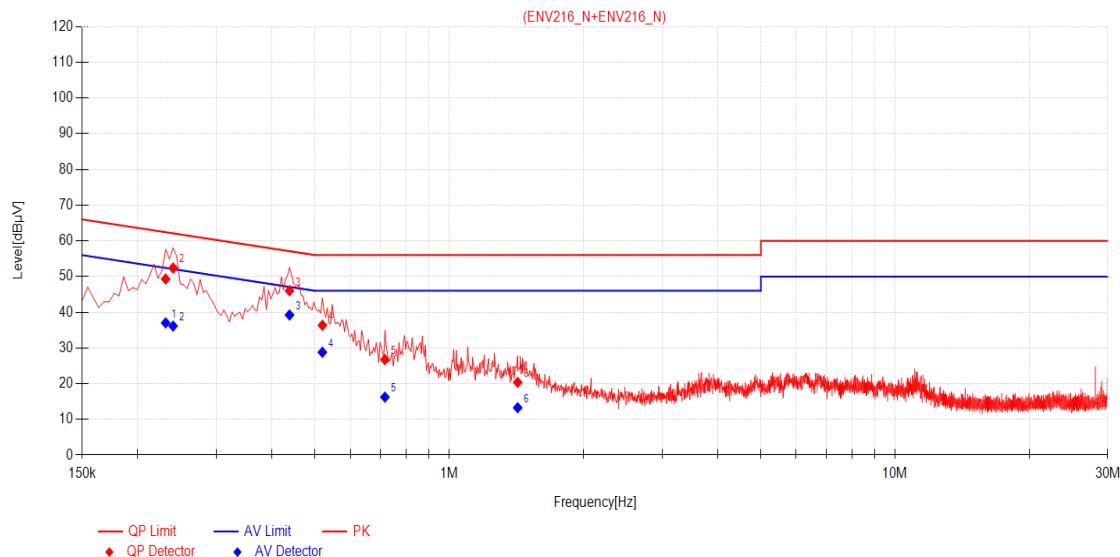
7.1.3 Test Setup Diagram



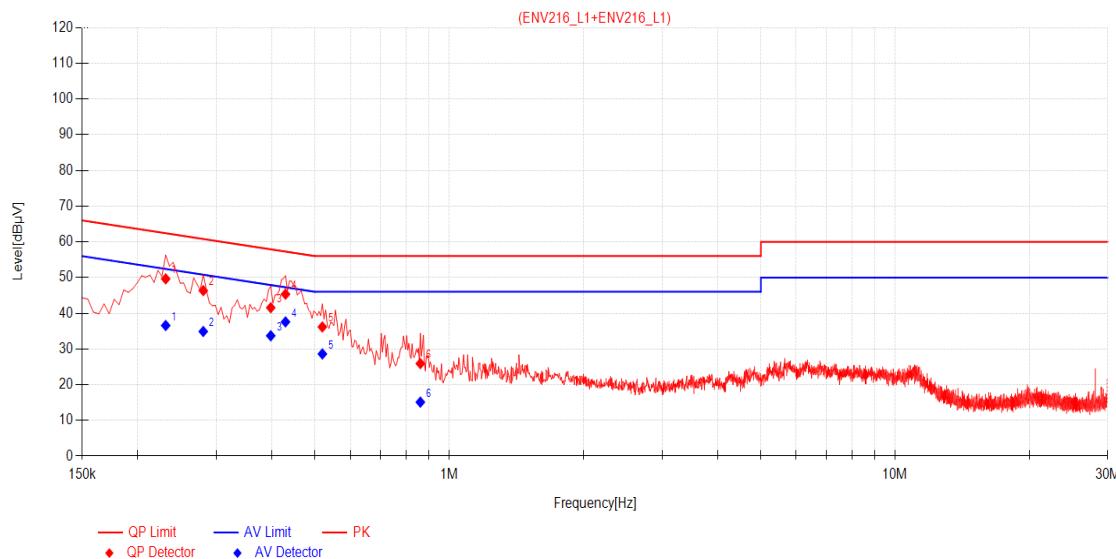
7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 μ H + 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



Final Data List											
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dB μ V]	QP Value [dB μ V]	QP Limit [dB μ V]	QP Margin [dB]	AV Reading [dB μ V]	AV Value [dB μ V]	AV Limit [dB μ V]	AV Margin [dB]	Verdict
1	0.2310	10.17	39.13	49.30	62.41	13.11	26.86	37.03	52.41	15.38	PASS
2	0.2400	10.16	42.25	52.41	62.10	9.69	25.97	36.13	52.10	15.97	PASS
3	0.4380	10.16	35.86	46.02	57.10	11.08	29.07	39.23	47.10	7.87	PASS
4	0.5190	10.17	26.18	36.35	56.00	19.65	18.62	28.79	46.00	17.21	PASS
5	0.7170	10.20	16.54	26.74	56.00	29.26	6.04	16.24	46.00	29.76	PASS
6	1.4235	10.11	10.27	20.38	56.00	35.62	3.15	13.26	46.00	32.74	PASS



Final Data List											
NO.	Frequency [MHz]	Factor [dB]	QP Reading [dB μ V]	QP Value [dB μ V]	QP Limit [dB μ V]	QP Margin [dB]	AV Reading [dB μ V]	AV Value [dB μ V]	AV Limit [dB μ V]	AV Margin [dB]	Verdict
1	0.2310	10.17	39.46	49.63	62.41	12.78	26.40	36.57	52.41	15.84	PASS
2	0.2805	10.15	36.19	46.34	60.80	14.46	24.74	34.89	50.80	15.91	PASS
3	0.3975	10.16	31.40	41.56	57.91	16.35	23.55	33.71	47.91	14.20	PASS
4	0.4290	10.17	35.17	45.34	57.27	11.93	27.41	37.58	47.27	9.69	PASS
5	0.5190	10.18	25.99	36.17	56.00	19.83	18.42	28.60	46.00	17.40	PASS
6	0.8610	10.13	15.79	25.92	56.00	30.08	4.99	15.12	46.00	30.88	PASS

7.2 Radiated Emissions which fall in the restricted bands

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

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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

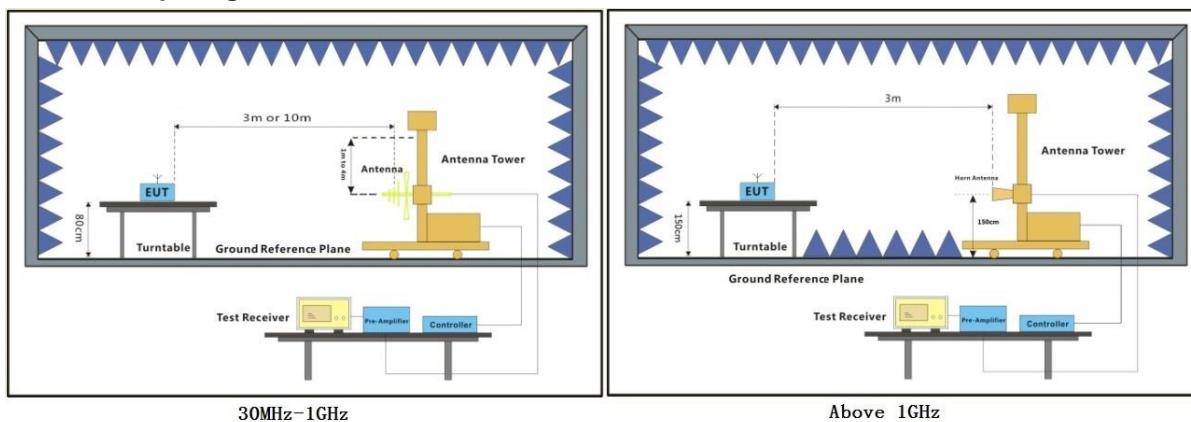
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 46 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	09	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

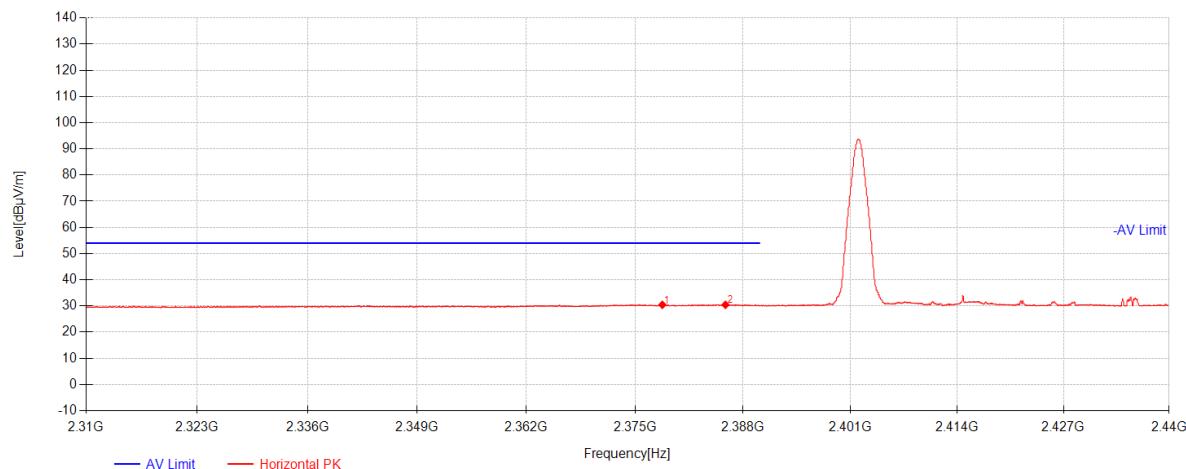
7.2.3 Test Setup Diagram**7.2.4 Measurement Procedure and Data**

- 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 :

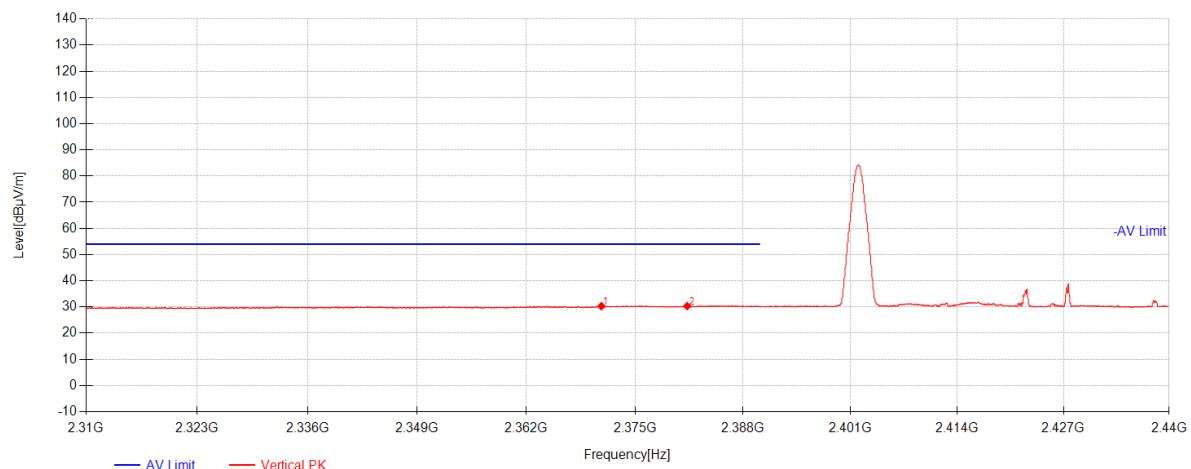
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.
3. For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

BLE 1M_Channel 00

**Data List**

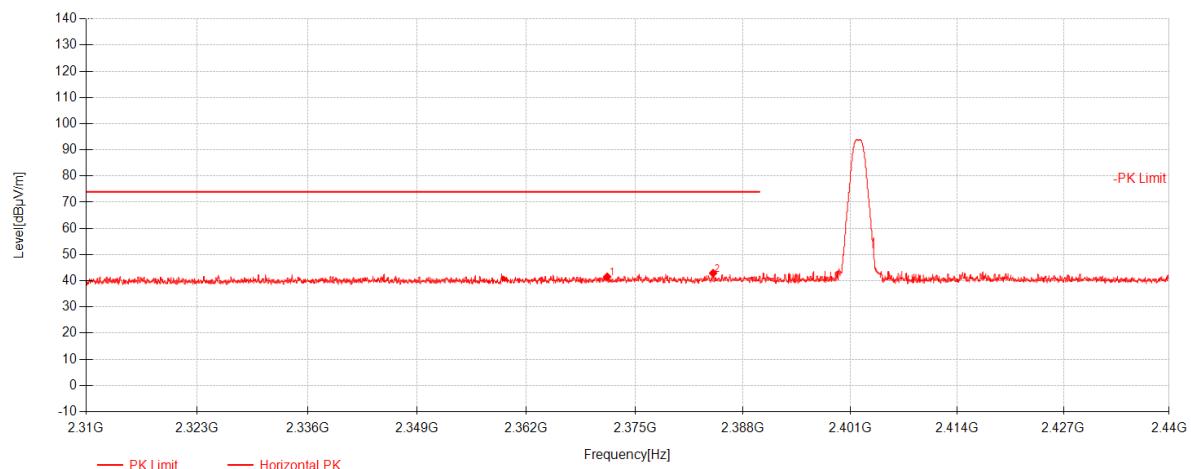
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2378.2825	27.05	26.96	-23.57	30.43	54.00	23.57	Horizontal
2	2385.8875	27.04	26.97	-23.57	30.44	54.00	23.56	Horizontal

BLE 1M_Channel 00



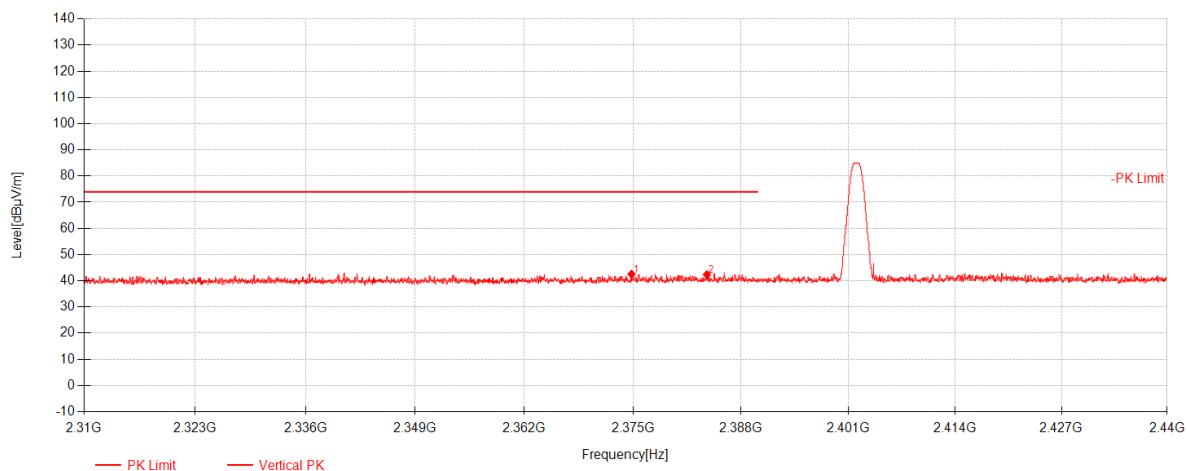
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2370.97	26.93	26.94	-23.57	30.30	54.00	23.70	Vertical
2	2381.2725	26.92	26.96	-23.57	30.31	54.00	23.69	Vertical

BLE 1M_Channel 00

**Data List**

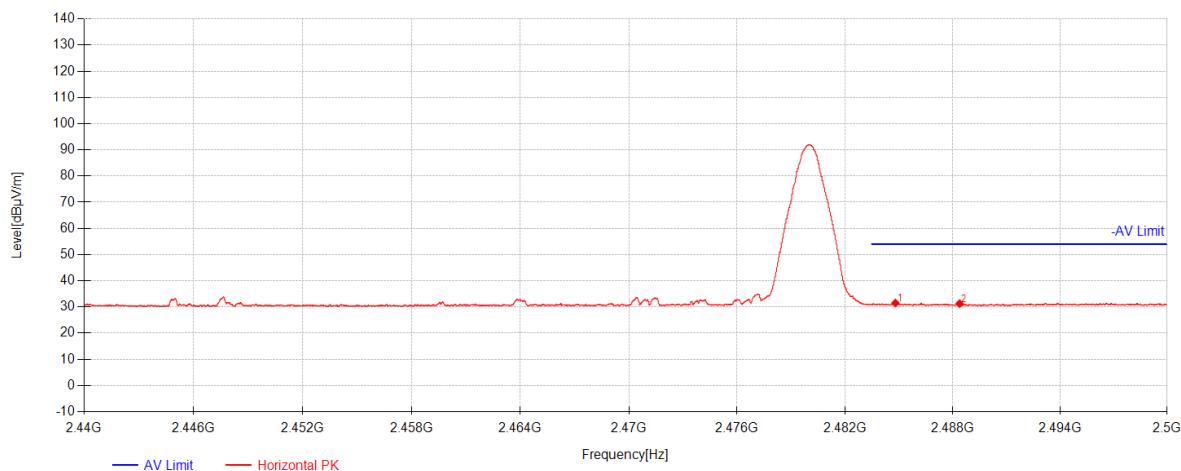
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2371.6688	38.15	26.94	-23.57	41.52	74.00	32.48	Horizontal
2	2384.3925	39.50	26.97	-23.57	42.90	74.00	31.10	Horizontal

BLE 1M_Channel 00

**Data List**

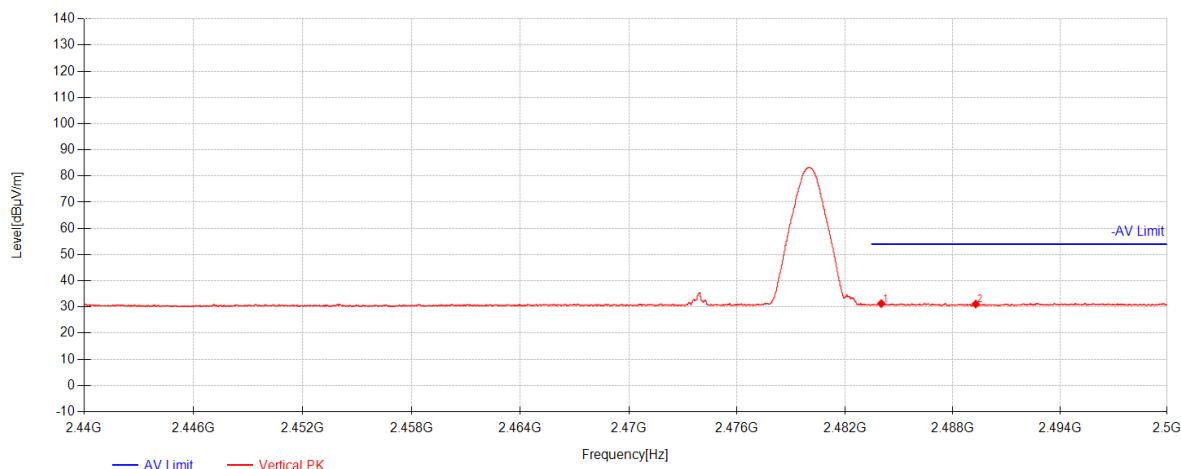
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2374.8212	39.18	26.95	-23.57	42.56	74.00	31.44	Vertical
2	2383.8888	38.99	26.97	-23.57	42.39	74.00	31.61	Vertical

BLE 1M_Channel 39

**Data List**

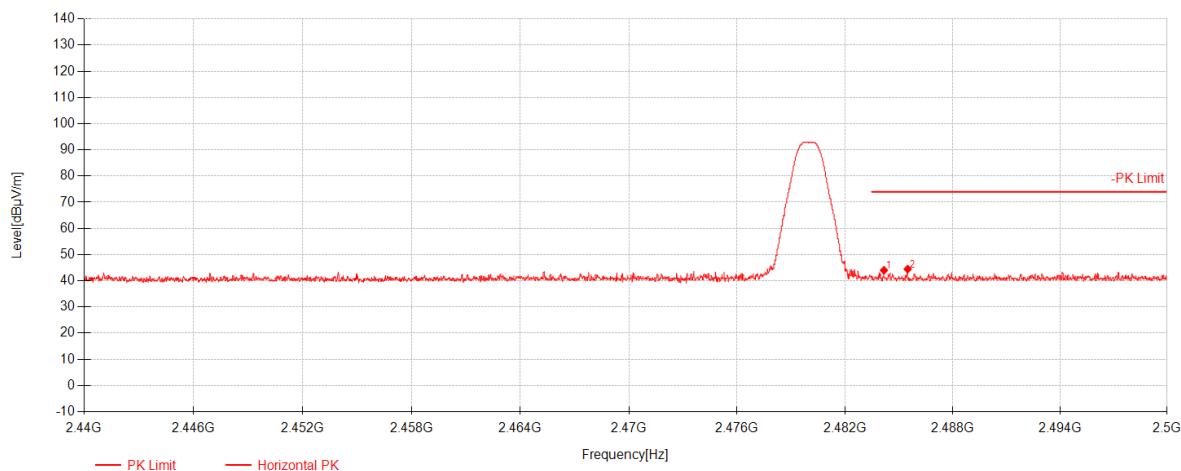
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2484.8125	27.89	27.17	-23.54	31.52	54.00	22.48	Horizontal
2	2488.39	27.64	27.18	-23.54	31.27	54.00	22.73	Horizontal

BLE 1M_Channel 39

**Data List**

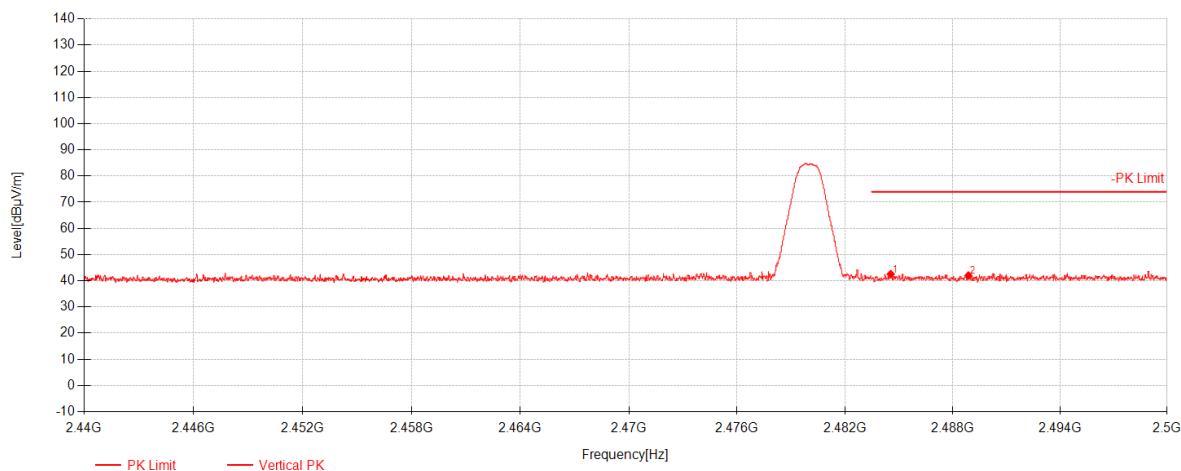
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.025	27.68	27.17	-23.54	31.30	54.00	22.70	Vertical
2	2489.29	27.46	27.18	-23.54	31.10	54.00	22.90	Vertical

BLE 1M_Channel 39

**Data List**

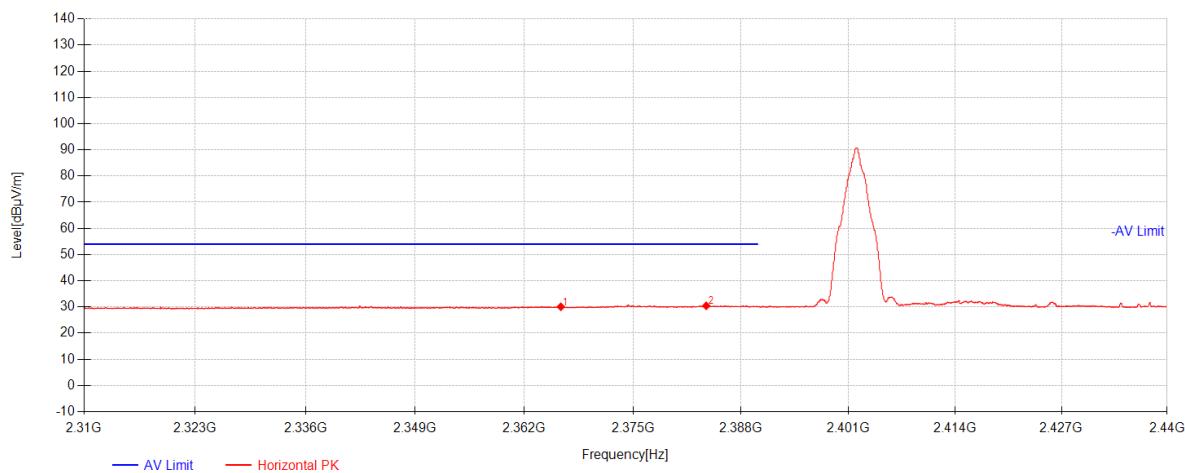
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2484.175	40.39	27.17	-23.54	44.01	74.00	29.99	Horizontal
2	2485.495	40.81	27.17	-23.54	44.44	74.00	29.56	Horizontal

BLE 1M_Channel 39



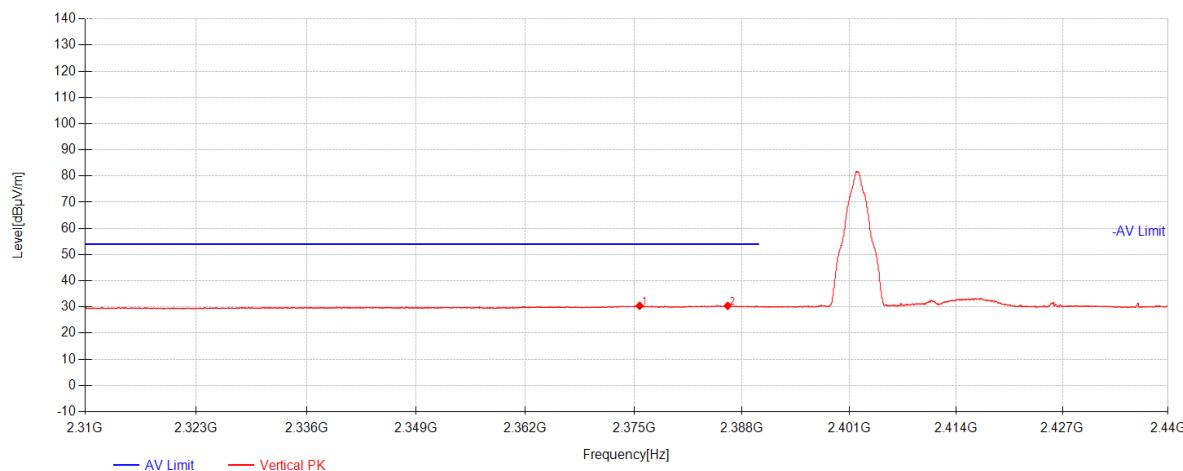
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2484.55	38.93	27.17	-23.54	42.55	74.00	31.45	Vertical
2	2488.885	38.37	27.18	-23.54	42.00	74.00	32.00	Vertical

BLE 2M_Channel 00

**Data List**

NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2366.355	26.70	26.93	-23.57	30.06	54.00	23.94	Horizontal
2	2383.8075	27.05	26.97	-23.57	30.45	54.00	23.55	Horizontal

BLE 2M_Channel 00

**Data List**

NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2375.6825	27.05	26.95	-23.57	30.43	54.00	23.57	Vertical
2	2386.2775	27.03	26.97	-23.57	30.43	54.00	23.57	Vertical

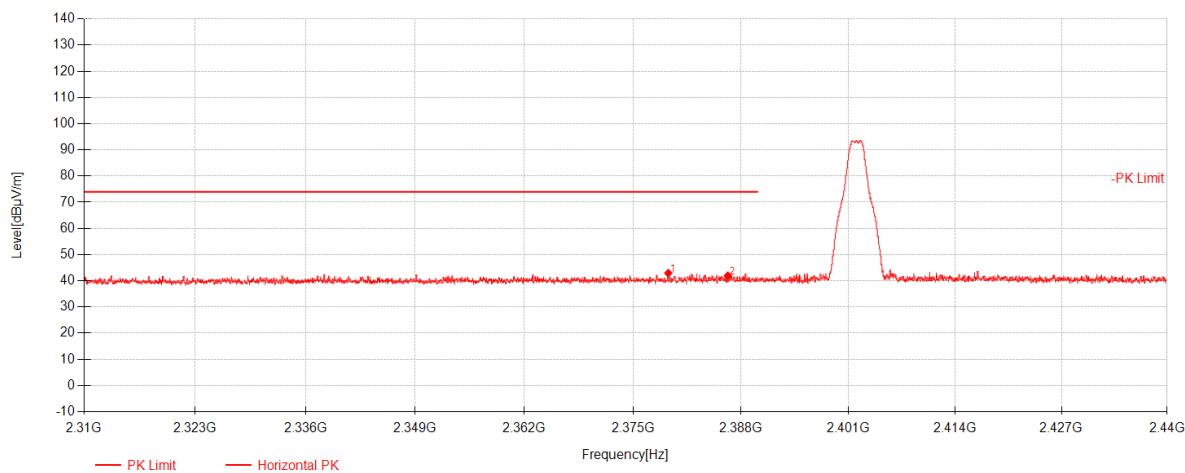
Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240900173203

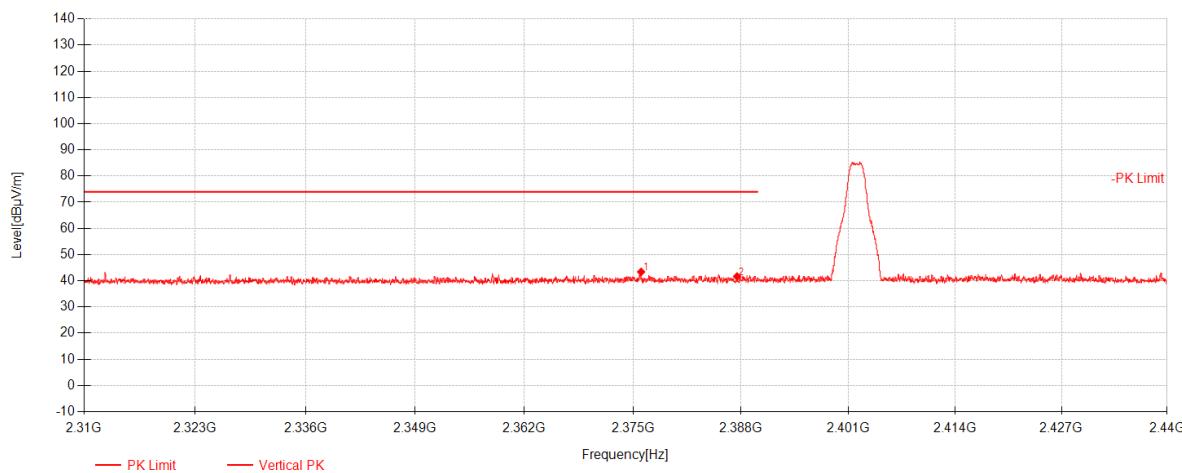
Page: 28 of 86

BLE 2M_Channel 00

**Data List**

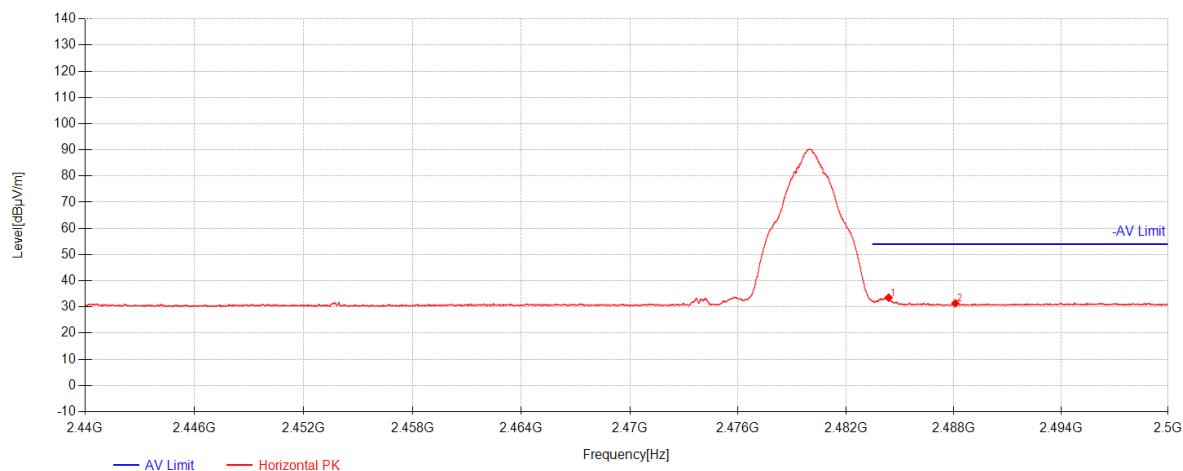
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2379.2412	39.52	26.96	-23.57	42.91	74.00	31.09	Horizontal
2	2386.4075	38.50	26.97	-23.57	41.90	74.00	32.10	Horizontal

BLE 2M_Channel 00



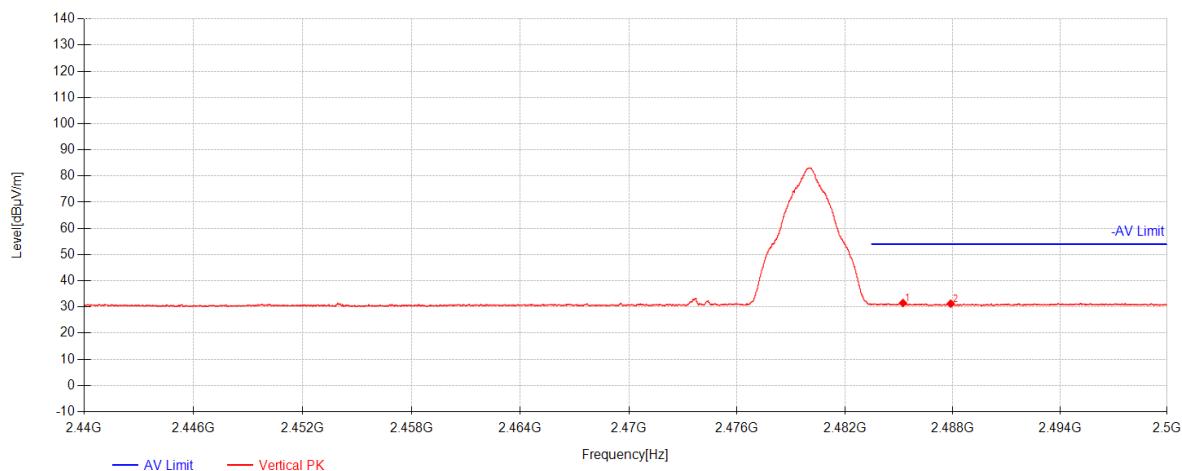
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2375.975	40.02	26.95	-23.57	43.40	74.00	30.60	Vertical
2	2387.5288	38.23	26.98	-23.57	41.63	74.00	32.37	Vertical

BLE 2M_Channel 39

**Data List**

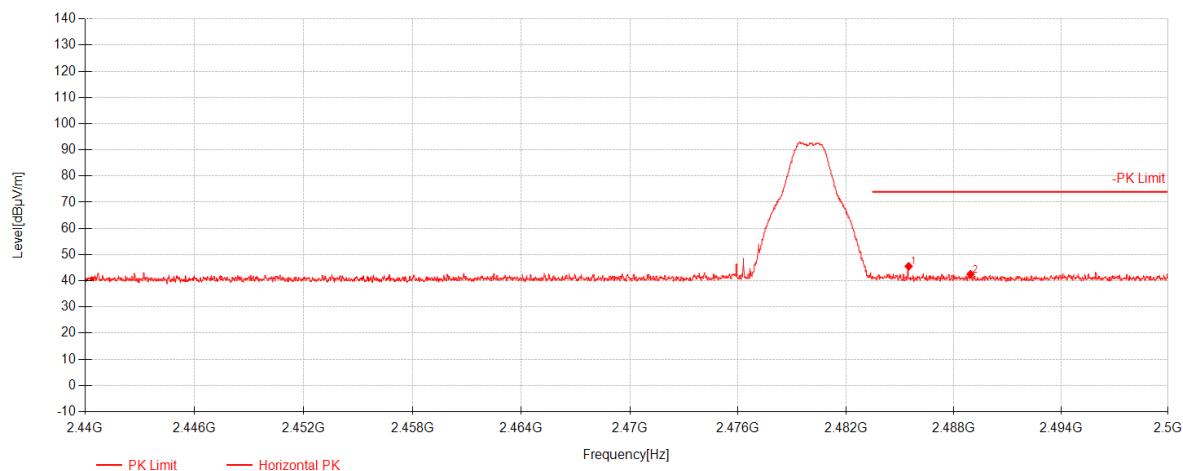
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2484.3775	29.95	27.17	-23.54	33.57	54.00	20.43	Horizontal
2	2488.0975	27.77	27.18	-23.54	31.40	54.00	22.60	Horizontal

BLE 2M_Channel 39



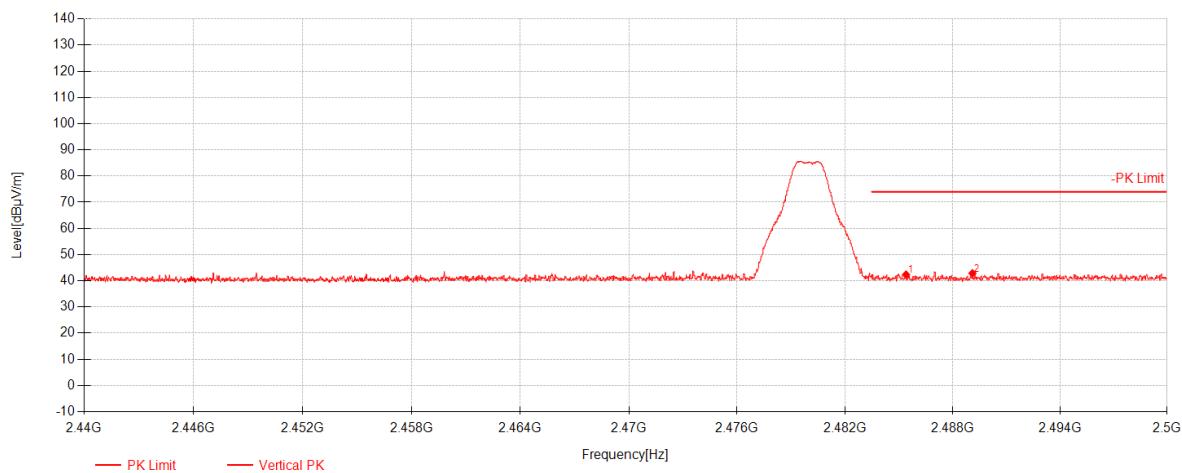
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2485.2325	27.88	27.17	-23.54	31.51	54.00	22.49	Vertical
2	2487.895	27.63	27.18	-23.54	31.26	54.00	22.74	Vertical

BLE 2M_Channel 39

**Data List**

NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2485.495	41.89	27.17	-23.54	45.52	74.00	28.48	Horizontal
2	2488.945	38.87	27.18	-23.54	42.50	74.00	31.50	Horizontal

BLE 2M_Channel 39

**Data List**

NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	2485.405	38.71	27.17	-23.54	42.34	74.00	31.66	Vertical
2	2489.11	39.23	27.18	-23.54	42.86	74.00	31.14	Vertical

7.3 Radiated Spurious Emissions Below 1GHz

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

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

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
960-1000	500	3

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C

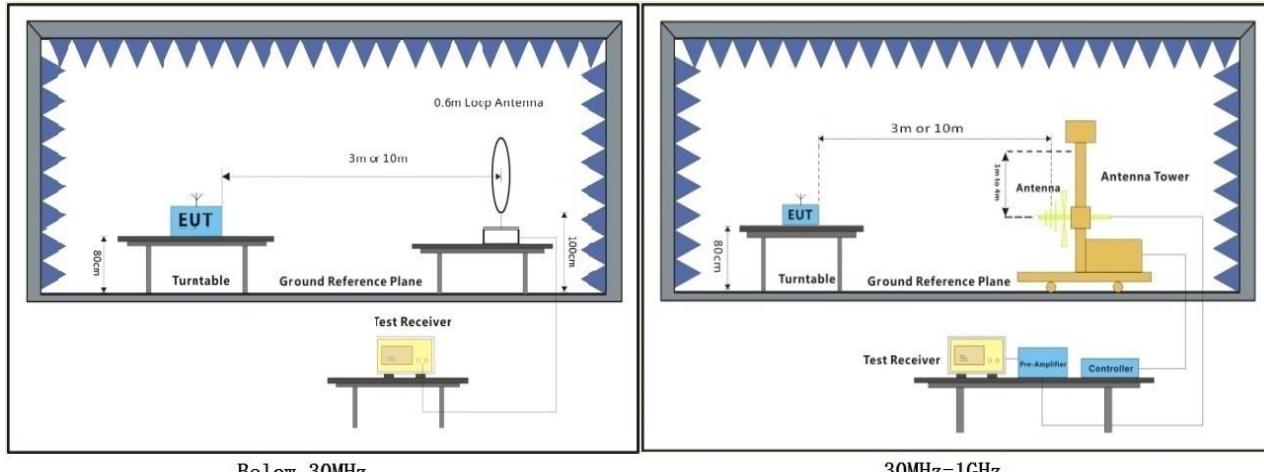
Humidity: 46 % RH

Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram



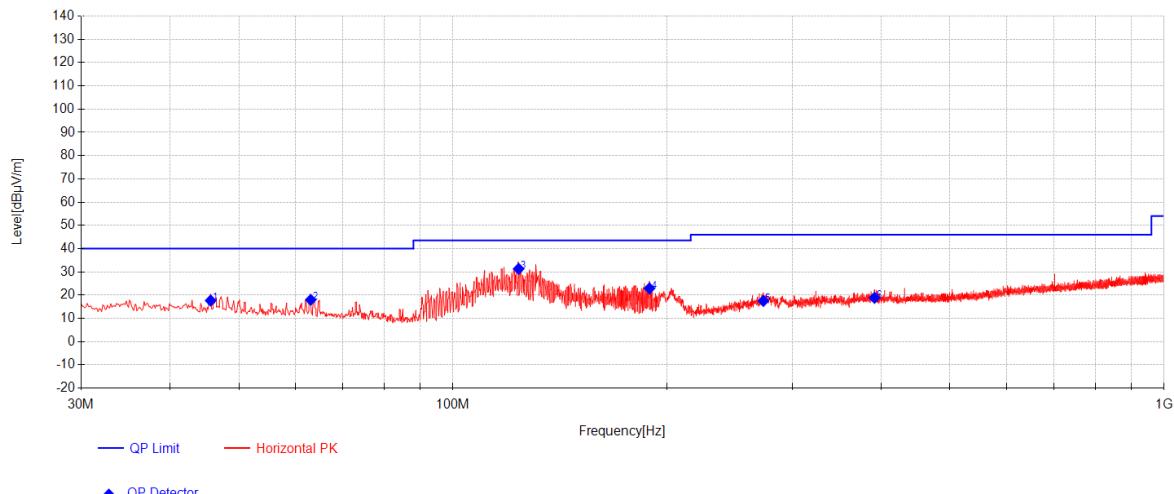
7.3.4 Measurement Procedure and Data

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

Remark:

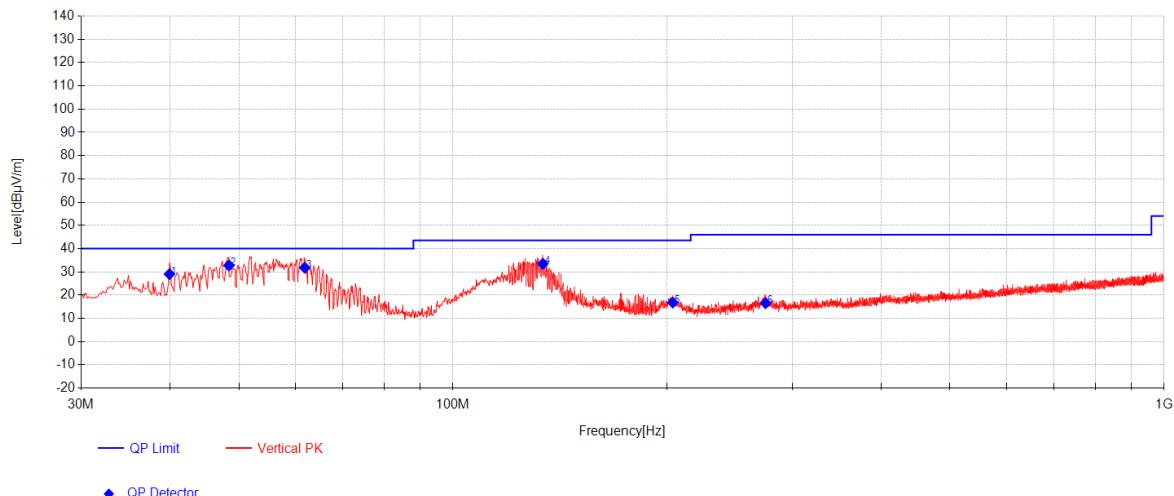
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from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

BLE 1M_Channel 39



Final Data List								
NO.	Frequency [MHz]]	Reading [dB μ V]	Factor [dB]	AF [dB/m]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Polarity
1	45.6412	32.63	-33.99	19.03	17.67	40.00	22.33	Horizontal
2	63.1012	34.22	-33.82	17.59	17.99	40.00	22.01	Horizontal
3	123.7262	47.22	-33.32	17.42	31.32	43.50	12.18	Horizontal
4	188.9588	40.21	-32.83	15.50	22.89	43.50	20.61	Horizontal
5	273.2275	32.24	-32.32	17.56	17.49	46.00	28.51	Horizontal
6	391.5675	30.24	-31.57	20.16	18.84	46.00	27.16	Horizontal

BLE 1M_Channel 39



Final Data List								
NO.	Frequency [MHz]]	Reading [dB μ V]	Factor [dB]	AF [dB/m]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Polarity
1	39.9425	44.26	-34.00	18.79	29.05	40.00	10.95	Vertical
2	48.43	47.96	-33.98	18.80	32.78	40.00	7.22	Vertical
3	61.8888	48.24	-33.84	17.41	31.81	40.00	8.19	Vertical
4	133.79	48.55	-33.27	18.20	33.48	43.50	10.02	Vertical
5	203.7512	34.21	-32.68	15.27	16.80	43.50	26.70	Vertical
6	275.1675	31.26	-32.31	17.60	16.55	46.00	29.45	Vertical

7.4 Radiated Spurious Emissions Above 1GHz

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

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

Measurement Distance: 3m

Limit:

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

7.4.1 E.U.T. Operation

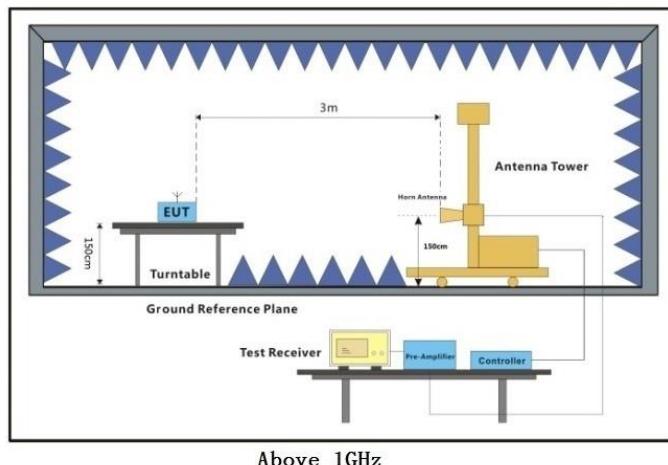
Operating Environment:

Temperature: 23 °C Humidity: 46 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	09	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

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

Remark:

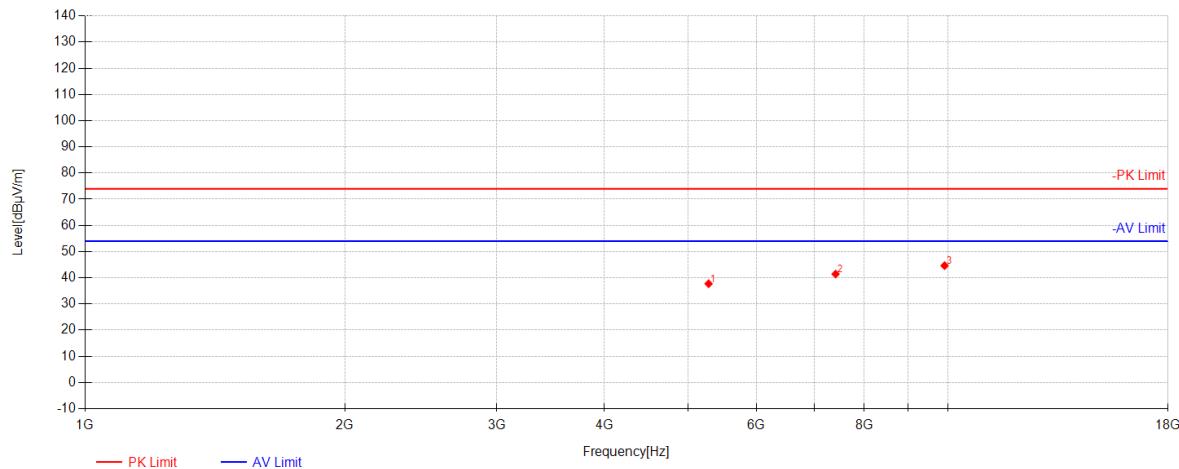
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.
5. For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

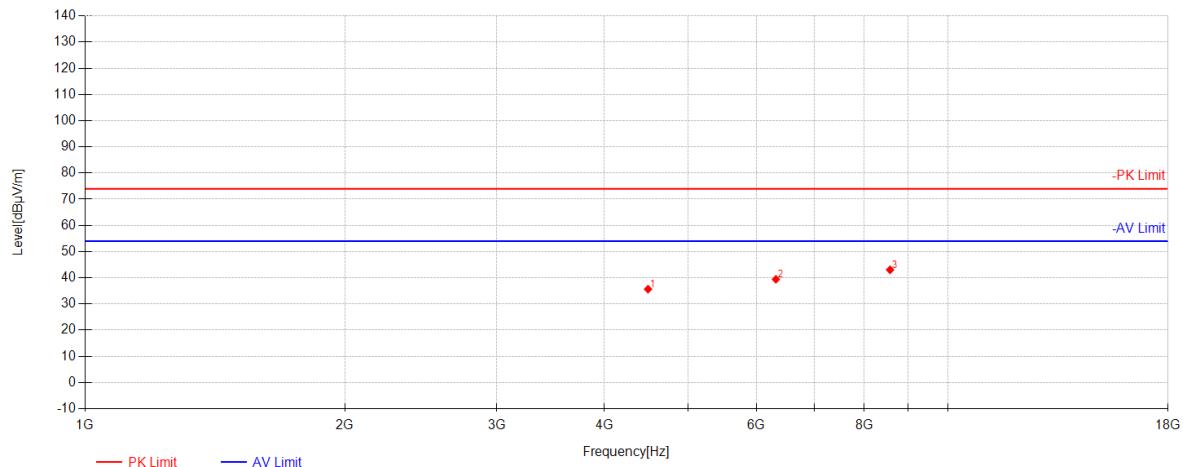
Report No.: KSCR240900173203

Page: 40 of 86

BLE 1M_Channel 00

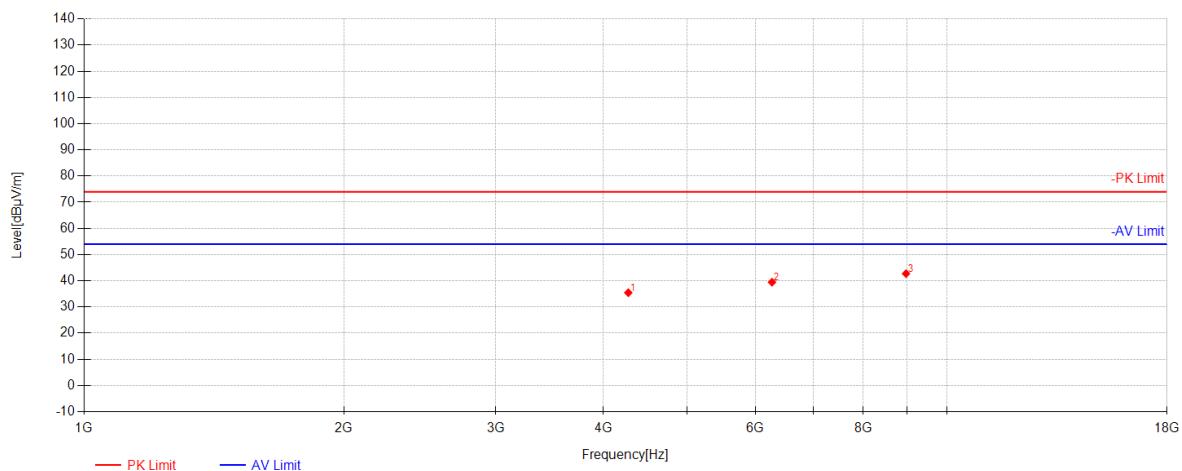
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	5280.75	50.95	31.91	-45.13	37.73	74.00	36.27	Horizontal
2	7410.75	48.66	36.15	-43.38	41.43	74.00	32.57	Horizontal
3	9913.5	45.62	38.33	-39.32	44.63	74.00	29.37	Horizontal

BLE 1M_Channel 00



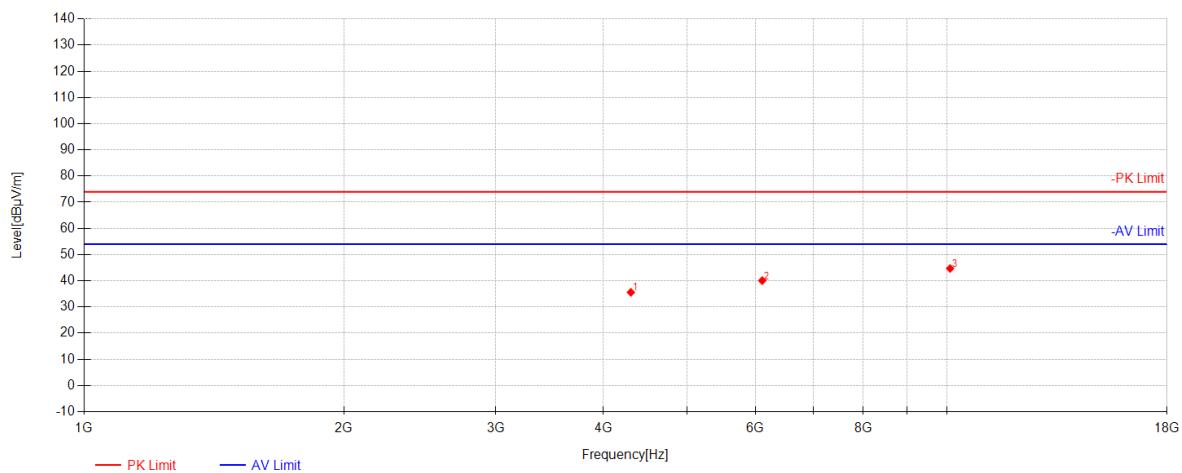
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4492.5	50.78	30.58	-45.72	35.64	74.00	38.36	Vertical
2	6319.5	50.45	33.49	-44.51	39.42	74.00	34.58	Vertical
3	8570.25	47.71	36.76	-41.42	43.05	74.00	30.95	Vertical

BLE 1M_Channel 19



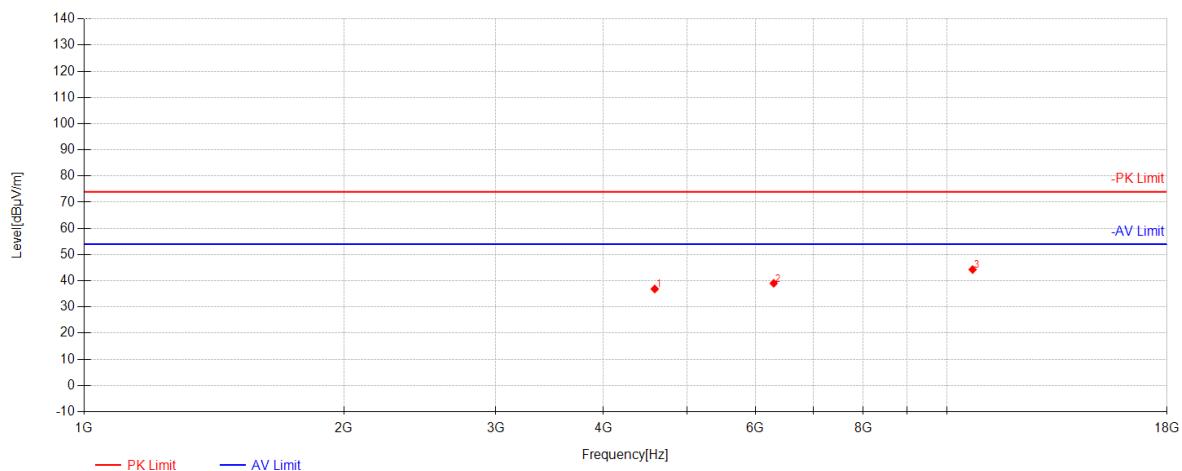
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4273.5	50.99	30.06	-45.60	35.45	74.00	38.55	Horizontal
2	6271.5	50.74	33.32	-44.60	39.46	74.00	34.54	Horizontal
3	8967.75	47.30	36.52	-41.08	42.74	74.00	31.26	Horizontal

BLE 1M_Channel 19

**Data List**

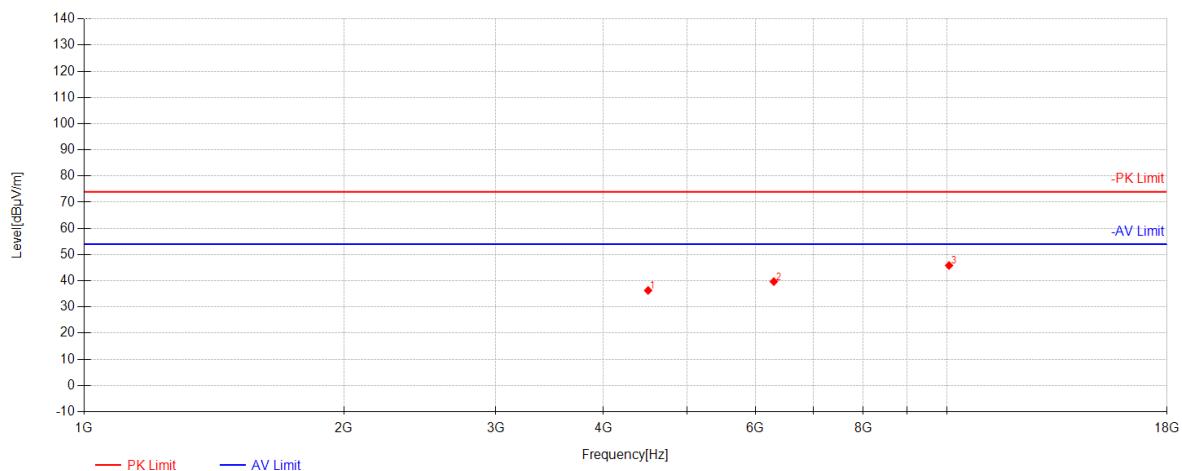
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4303.125	51.00	30.13	-45.55	35.58	74.00	38.42	Vertical
2	6109.5	51.76	32.77	-44.48	40.05	74.00	33.95	Vertical
3	10086.375	45.33	38.51	-39.14	44.70	74.00	29.30	Vertical

BLE 1M_Channel 39



Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4585.5	51.82	30.74	-45.68	36.88	74.00	37.12	Horizontal
2	6300	50.16	33.42	-44.54	39.04	74.00	34.96	Horizontal
3	10711.5	43.68	38.57	-37.96	44.29	74.00	29.71	Horizontal

BLE 1M_Channel 39

**Data List**

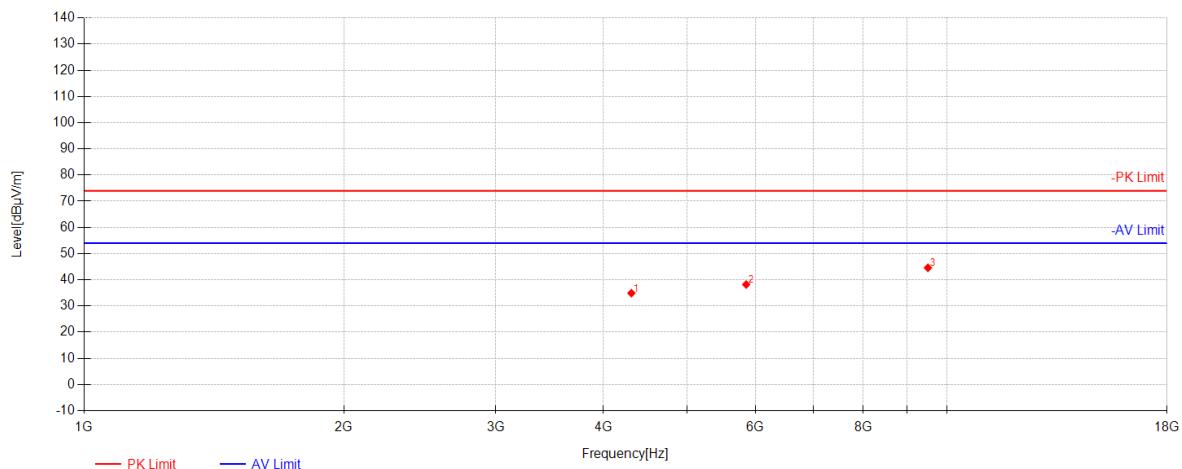
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4505.625	51.40	30.61	-45.71	36.30	74.00	37.70	Vertical
2	6301.875	50.81	33.43	-44.54	39.70	74.00	34.30	Vertical
3	10058.625	46.50	38.51	-39.17	45.84	74.00	28.16	Vertical

Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

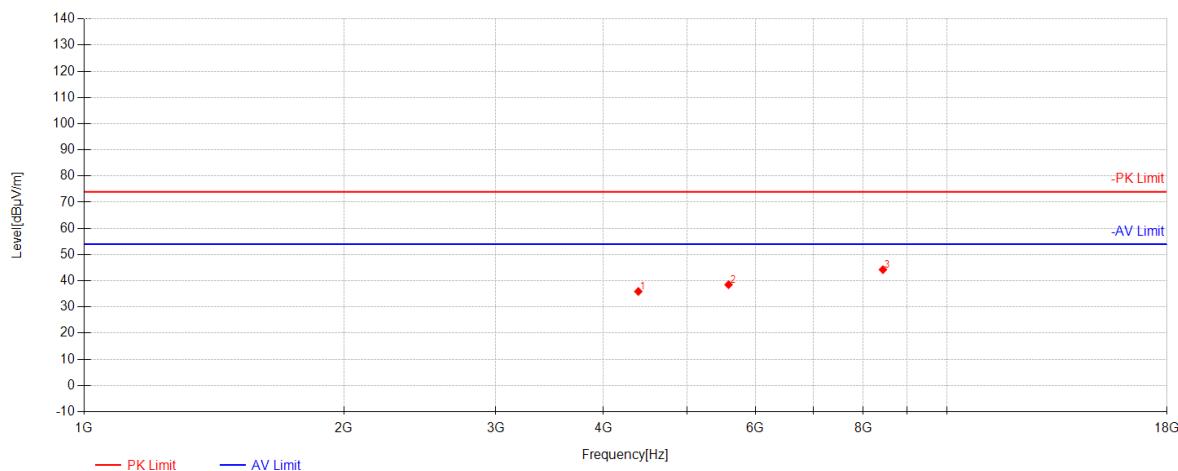
Report No.: KSCR240900173203

Page: 46 of 86

BLE 2M_Channel 00

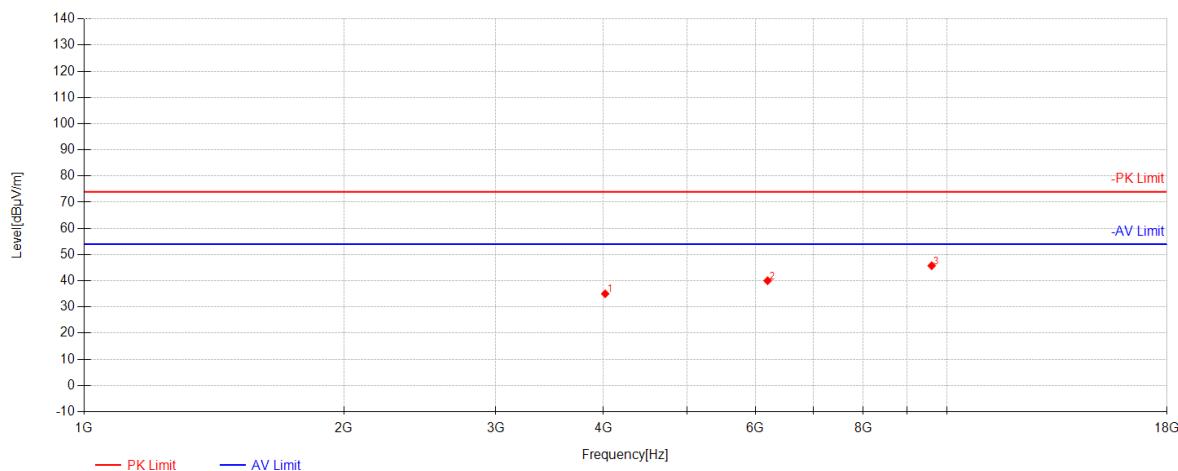
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4309.125	50.30	30.14	-45.57	34.88	74.00	39.12	Horizontal
2	5853.375	50.67	32.37	-44.87	38.17	74.00	35.83	Horizontal
3	9508.125	47.24	37.52	-40.18	44.57	74.00	29.43	Horizontal

BLE 2M_Channel 00

**Data List**

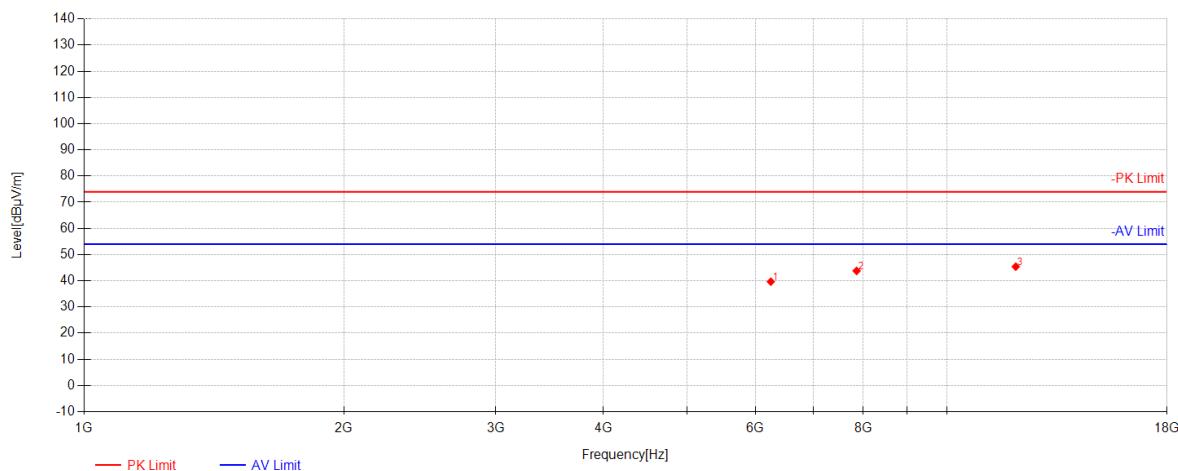
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4389.75	51.37	30.34	-45.79	35.91	74.00	38.09	Vertical
2	5584.875	51.29	32.32	-45.10	38.51	74.00	35.49	Vertical
3	8431.125	48.91	36.84	-41.50	44.25	74.00	29.75	Vertical

BLE 2M_Channel 19

**Data List**

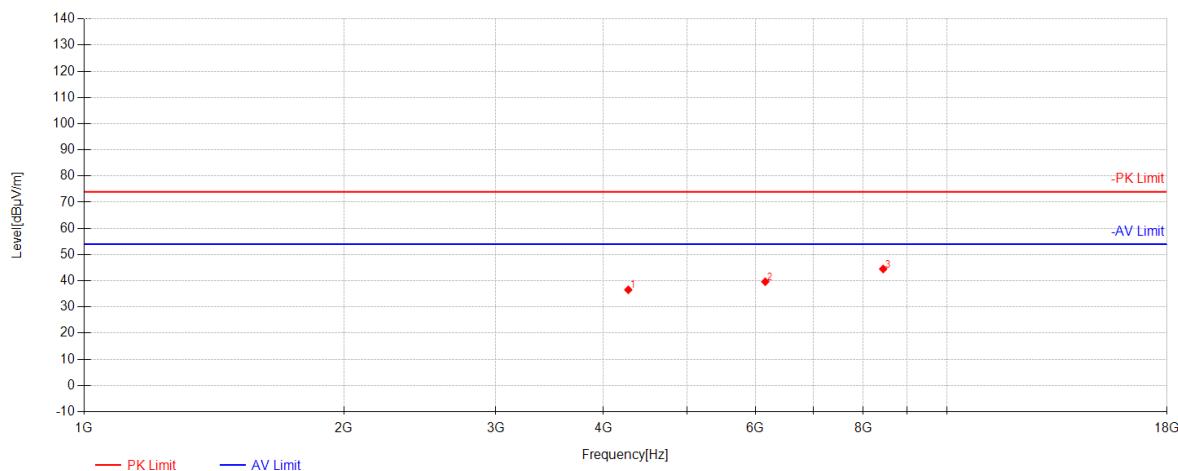
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4018.125	51.59	29.44	-45.99	35.04	74.00	38.96	Horizontal
2	6197.625	51.70	33.07	-44.75	40.02	74.00	33.98	Horizontal
3	9602.625	47.72	37.71	-39.66	45.76	74.00	28.24	Horizontal

BLE 2M_Channel 19



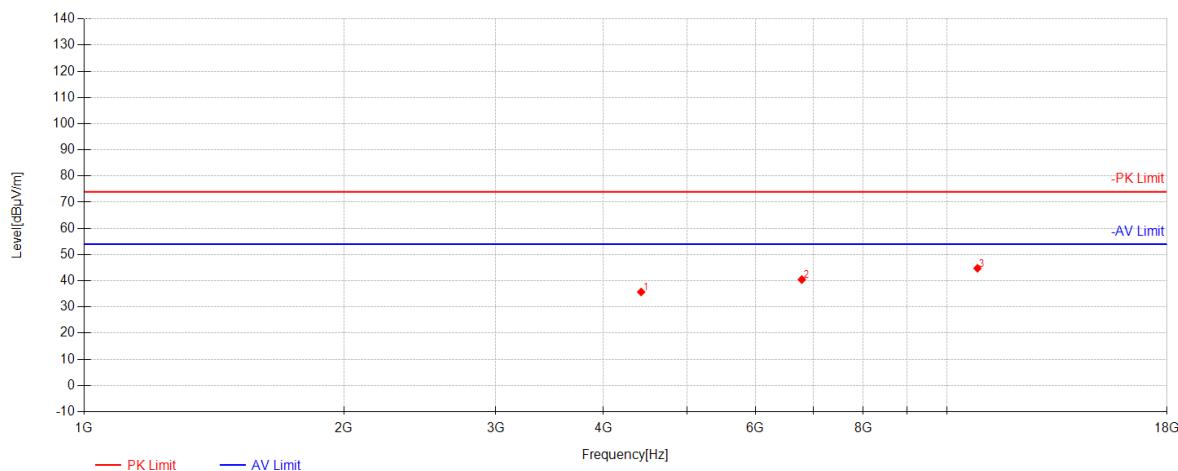
Data List								
NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	6251.25	51.05	33.25	-44.65	39.66	74.00	34.34	Vertical
2	7859.25	49.48	36.90	-42.61	43.77	74.00	30.23	Vertical
3	12018.375	43.86	39.11	-37.58	45.39	74.00	28.61	Vertical

BLE 2M_Channel 39

**Data List**

NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4273.5	52.09	30.06	-45.60	36.55	74.00	37.45	Horizontal
2	6159.375	51.33	32.94	-44.63	39.64	74.00	34.36	Horizontal
3	8437.5	49.19	36.84	-41.51	44.51	74.00	29.49	Horizontal

BLE 2M_Channel 39

**Data List**

NO.	Frequency [MHz]	Reading [dB μ V]	AF [dB/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity
1	4422.75	51.10	30.41	-45.79	35.72	74.00	38.28	Vertical
2	6790.125	49.97	34.62	-44.13	40.46	74.00	33.54	Vertical
3	10852.125	44.37	38.59	-38.19	44.76	74.00	29.24	Vertical

7.5 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)
Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

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

7.5.1 E.U.T. Operation

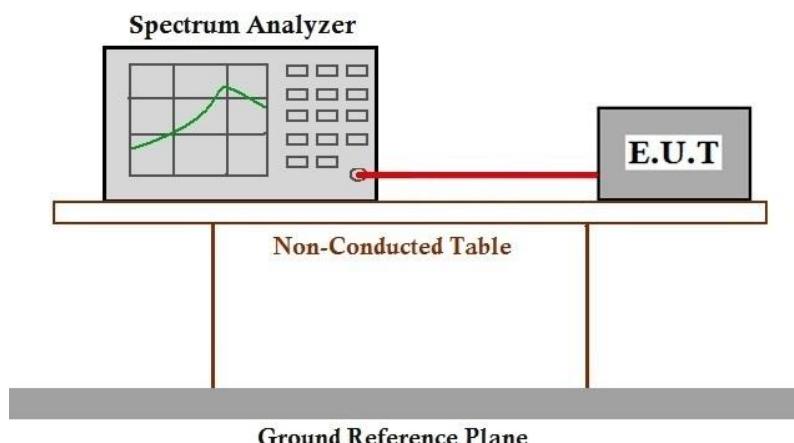
Operating Environment:

Temperature: 22.5 °C Humidity: 48.2 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	09	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

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

Please Refer to Appendix for Details

7.6 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)

Test Method: ANSI C63.10 (2013) Section 11.8.1

Limit:

≥500 kHz

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 48.2 % RH Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	09	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.6.3 Measurement Procedure and Data

Please Refer to Appendix for Details

7.7 Power Spectrum Density

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

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

Limit:

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

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 48.2 % RH Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	09	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.7.3 Measurement Procedure and Data

Please Refer to Appendix for Details

7.8 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Limit:

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

7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 48.2 % RH Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	09	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.8.3 Measurement Procedure and Data

Please Refer to Appendix for Details

7.9 Conducted Spurious Emissions

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

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

Limit:

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

7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 48.2 % RH Atmospheric Pressure: 1010 mbar

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	08	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	09	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.9.3 Measurement Procedure and Data

Please Refer to Appendix for Details

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2409001732AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2409001732AT

10 Appendix

1. Duty Cycle

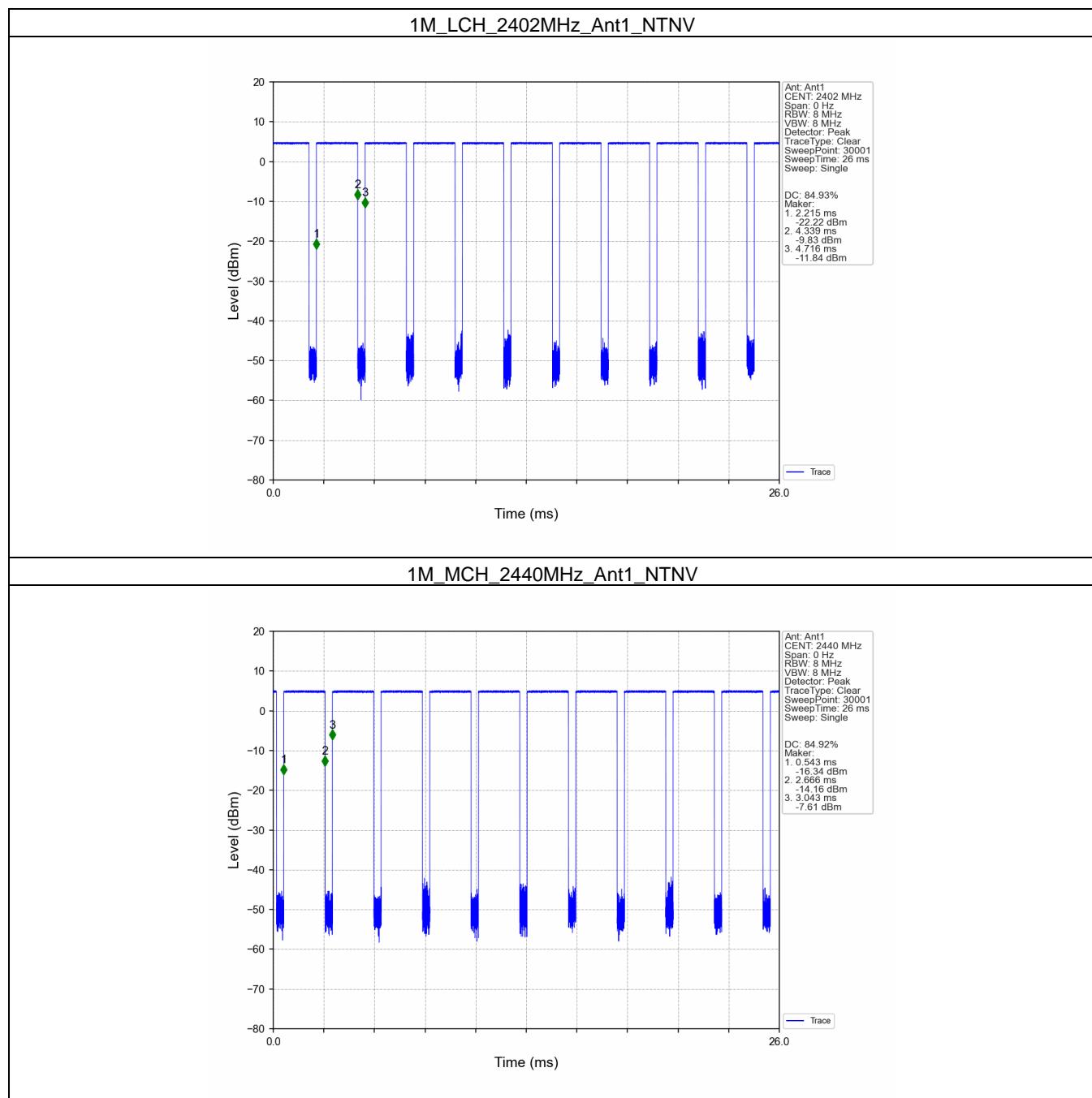
1.1 Test Result

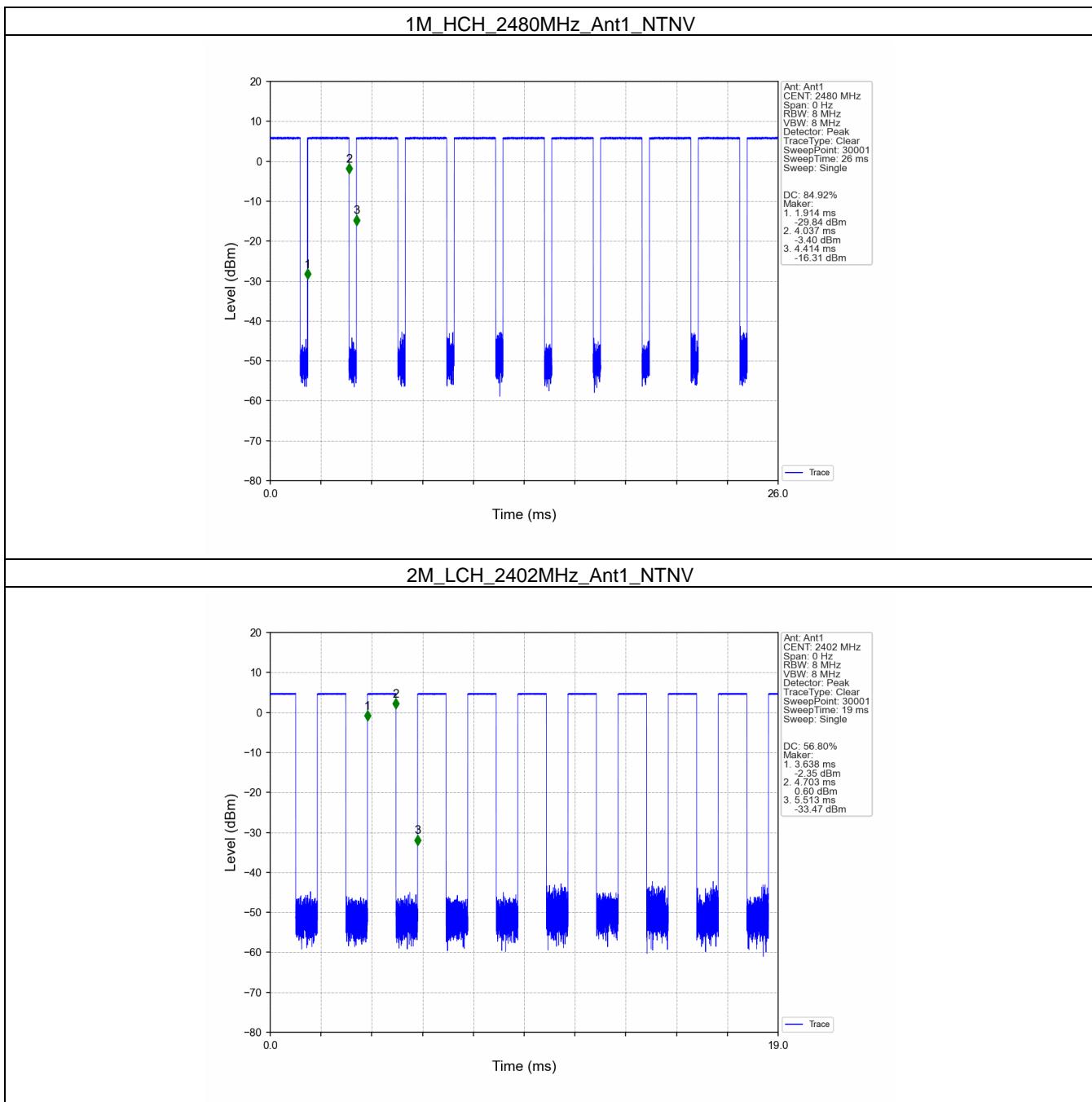
1.1.1 Ant1

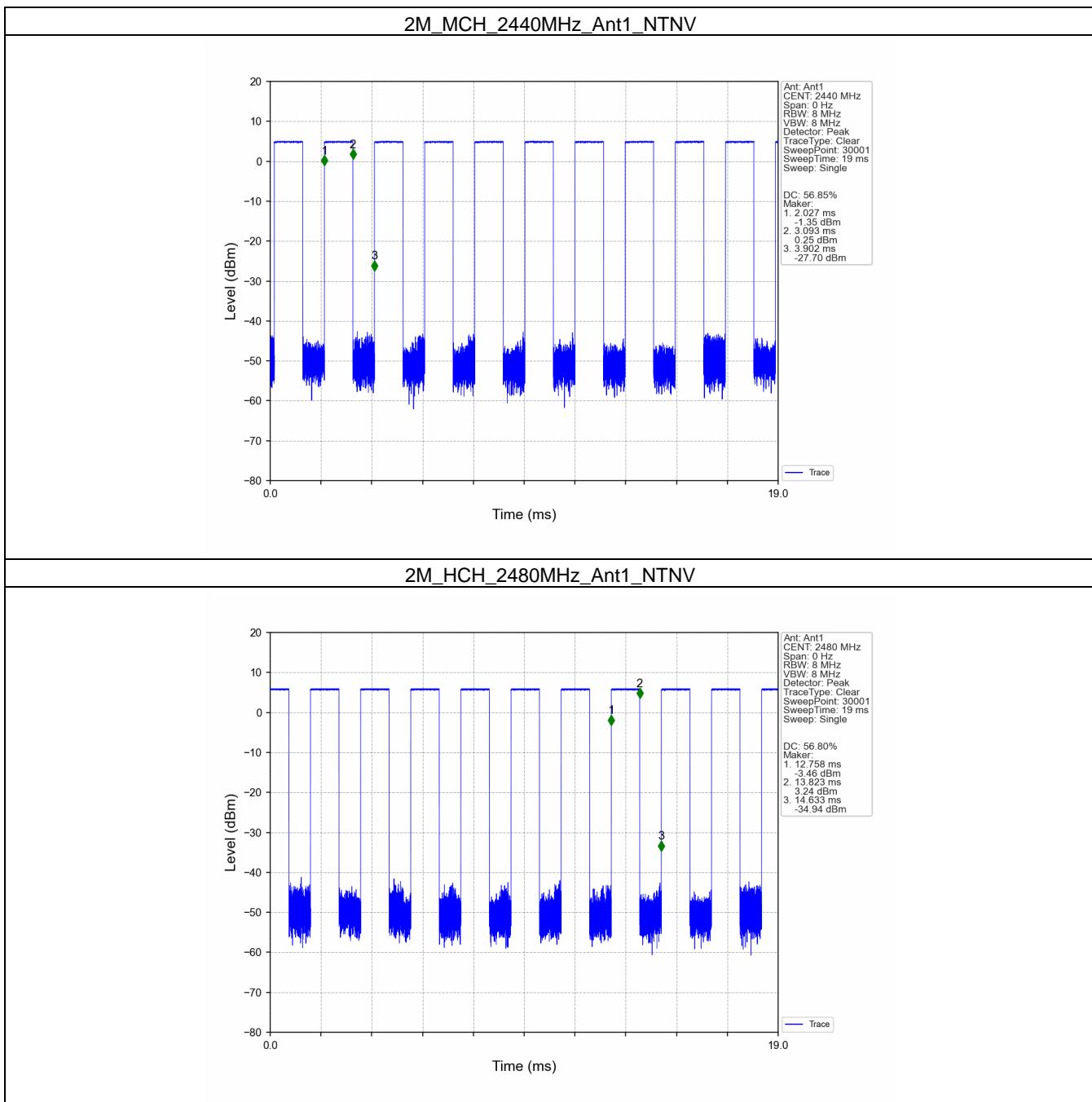
Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	2.124	2.501	84.93	0.71	0.03
		2440	2.123	2.500	84.92	0.71	0.03
		2480	2.123	2.500	84.92	0.71	0.03
2M	SISO	2402	1.065	1.875	56.80	2.46	0.01
		2440	1.066	1.875	56.85	2.45	0.01
		2480	1.065	1.875	56.80	2.46	0.03

1.2 Test Graph

1.2.1 Ant1







2. Bandwidth

2.1 Test Result

2.1.1 OBW

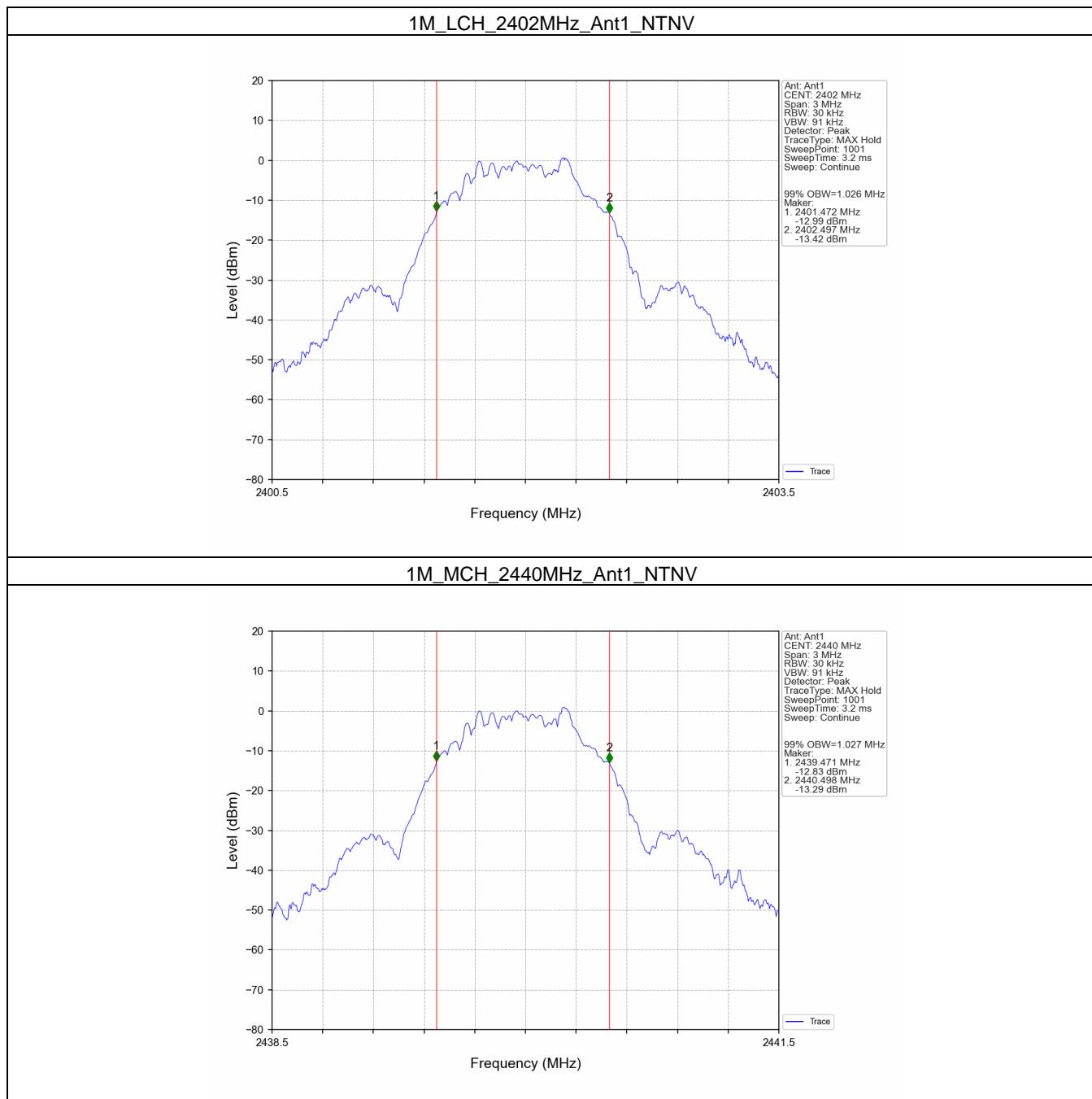
Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	1.026	/	Pass
		2440	1	1.027	/	Pass
		2480	1	1.027	/	Pass
2M	SISO	2402	1	2.063	/	Pass
		2440	1	2.063	/	Pass
		2480	1	2.064	/	Pass

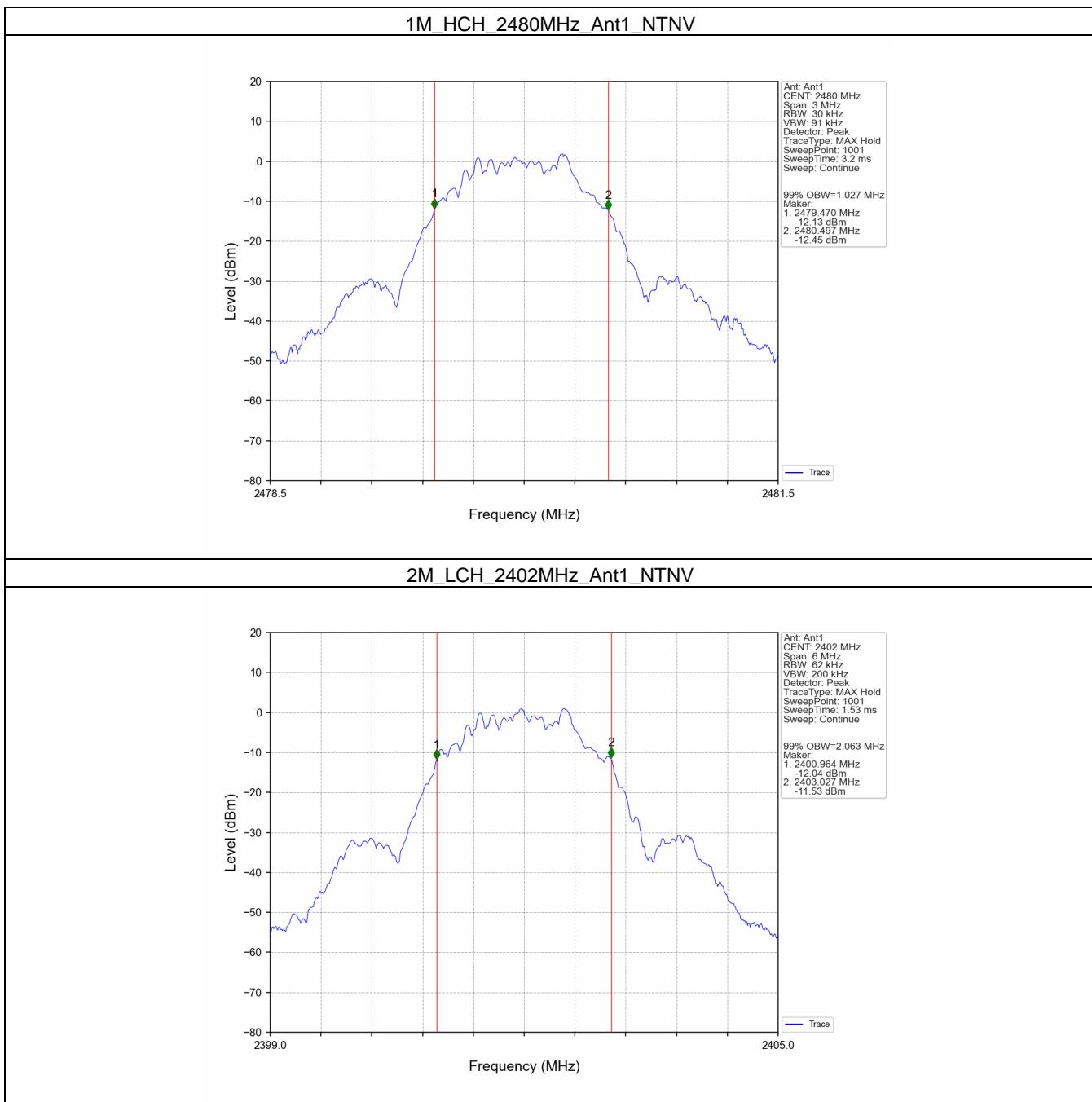
2.1.2 6dB BW

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.674	>=0.5	Pass
		2440	1	0.674	>=0.5	Pass
		2480	1	0.671	>=0.5	Pass
2M	SISO	2402	1	1.261	>=0.5	Pass
		2440	1	1.215	>=0.5	Pass
		2480	1	1.177	>=0.5	Pass

2.2 Test Graph

2.2.1 OBW



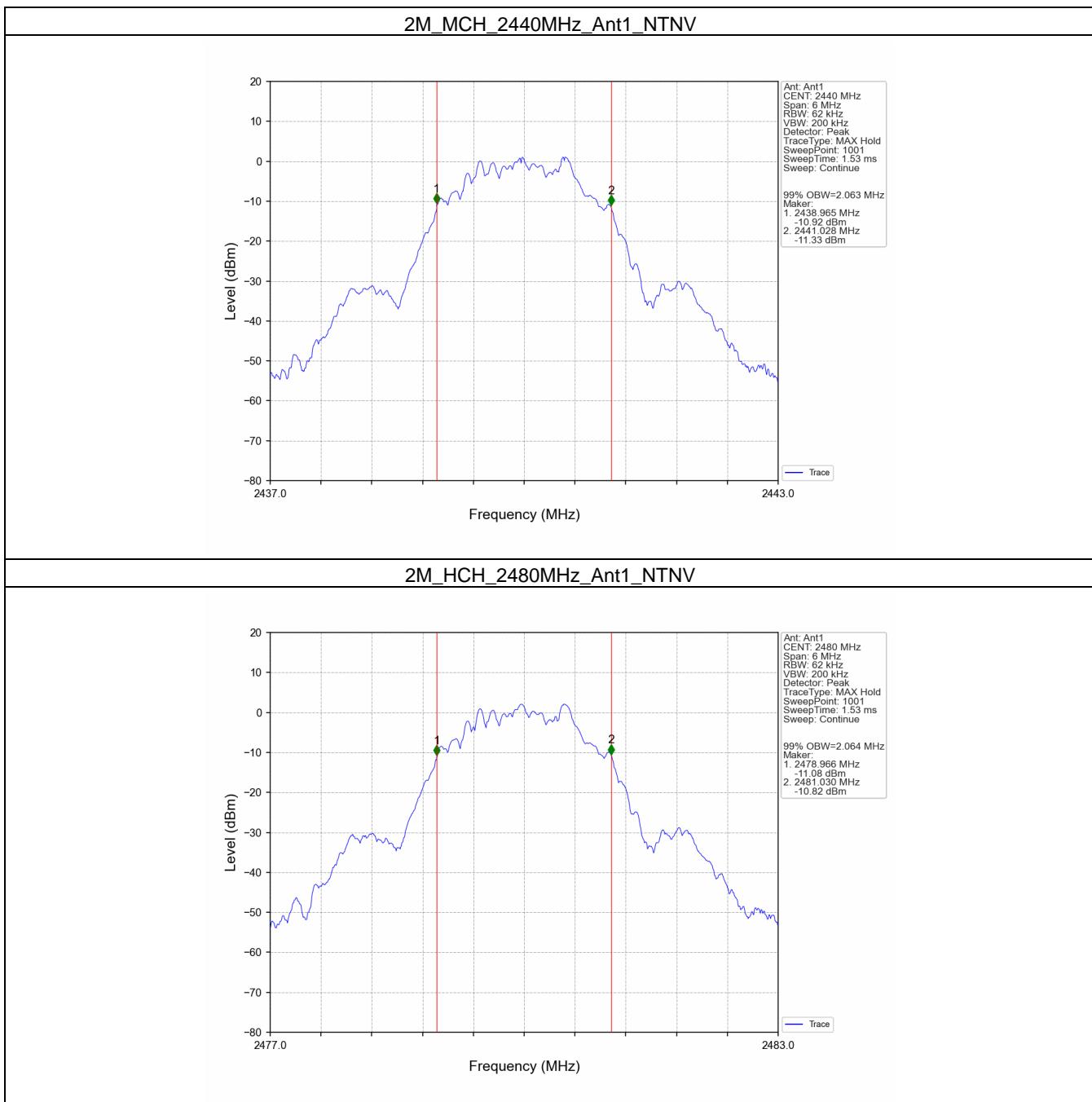


Compliance Certification Services (Kunshan) Inc.

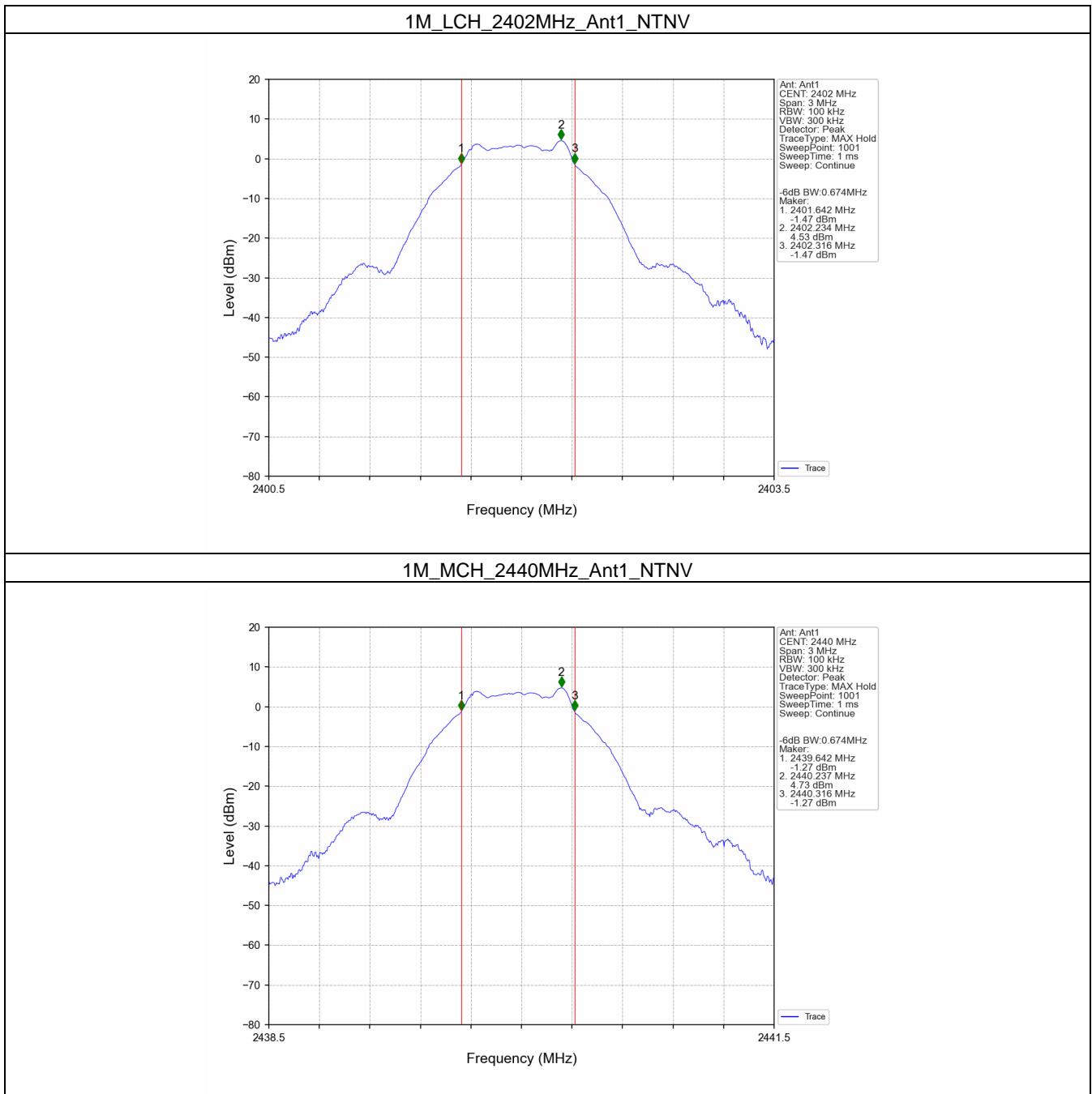
CCSEM-TRF-001 Rev. 02 Sep 01, 2023

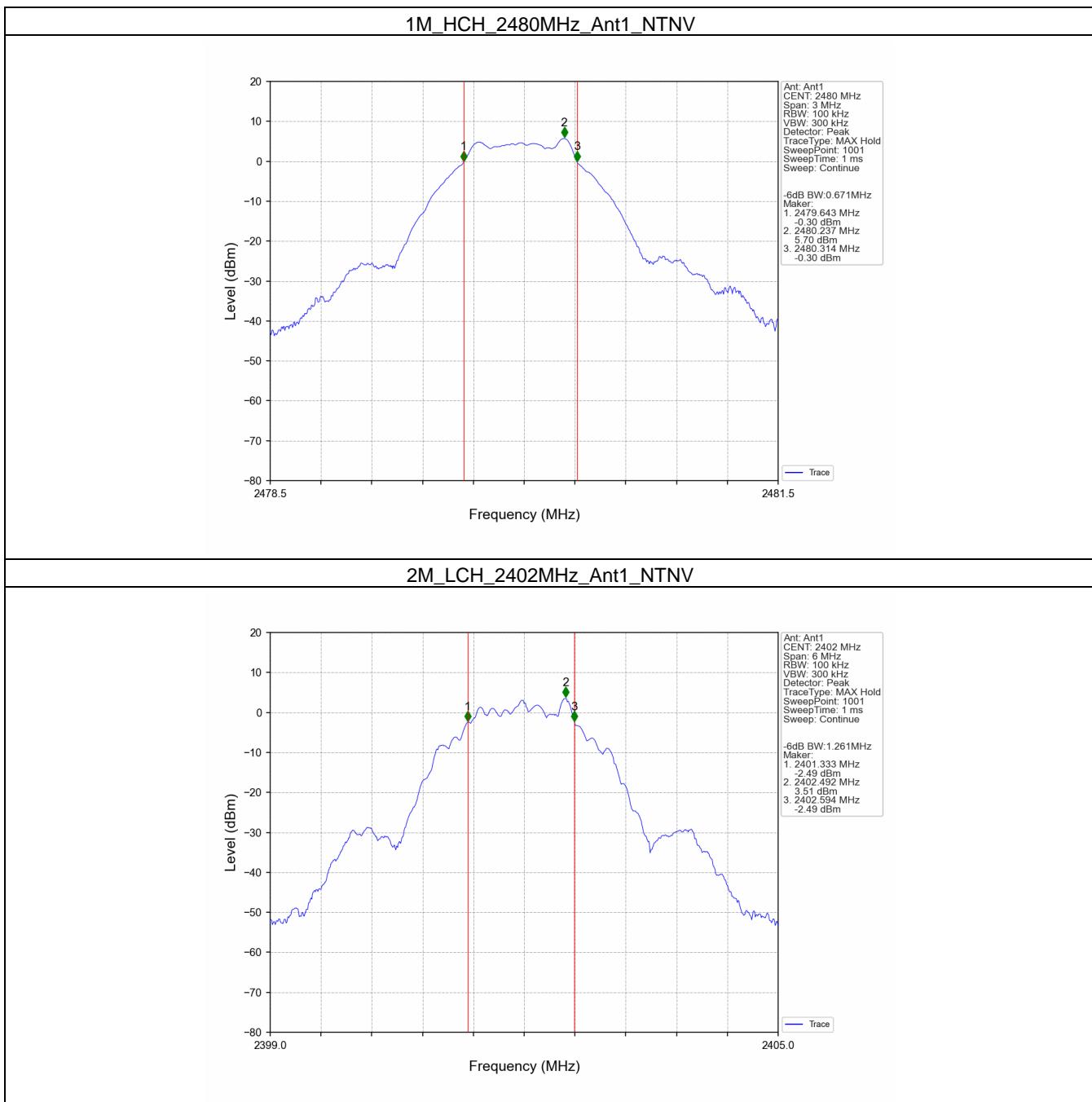
Report No.: KSCR240900173203

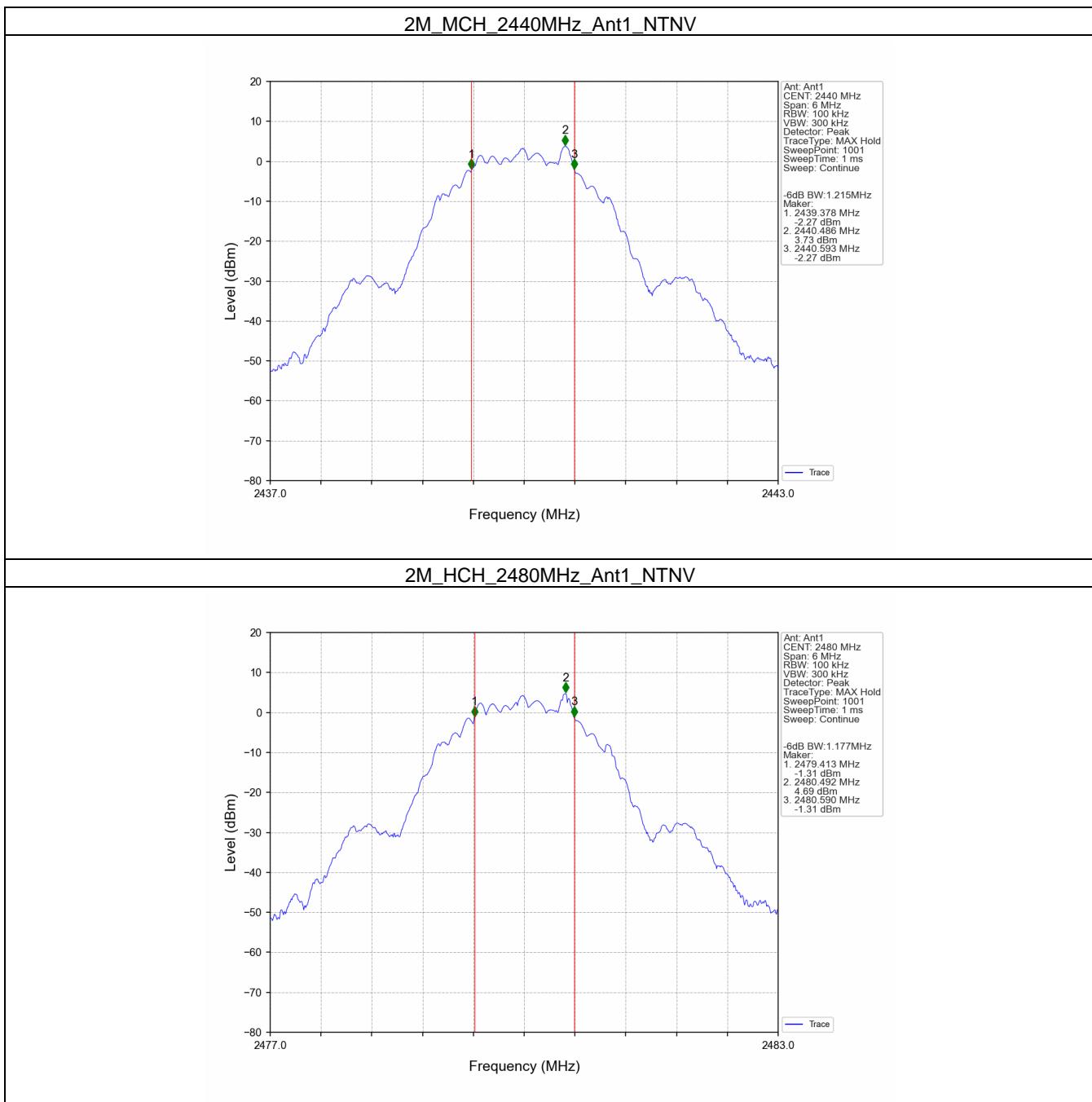
Page: 66 of 86



2.2.2 6dB BW







3. Maximum Conducted Output Power

3.1 Test Result

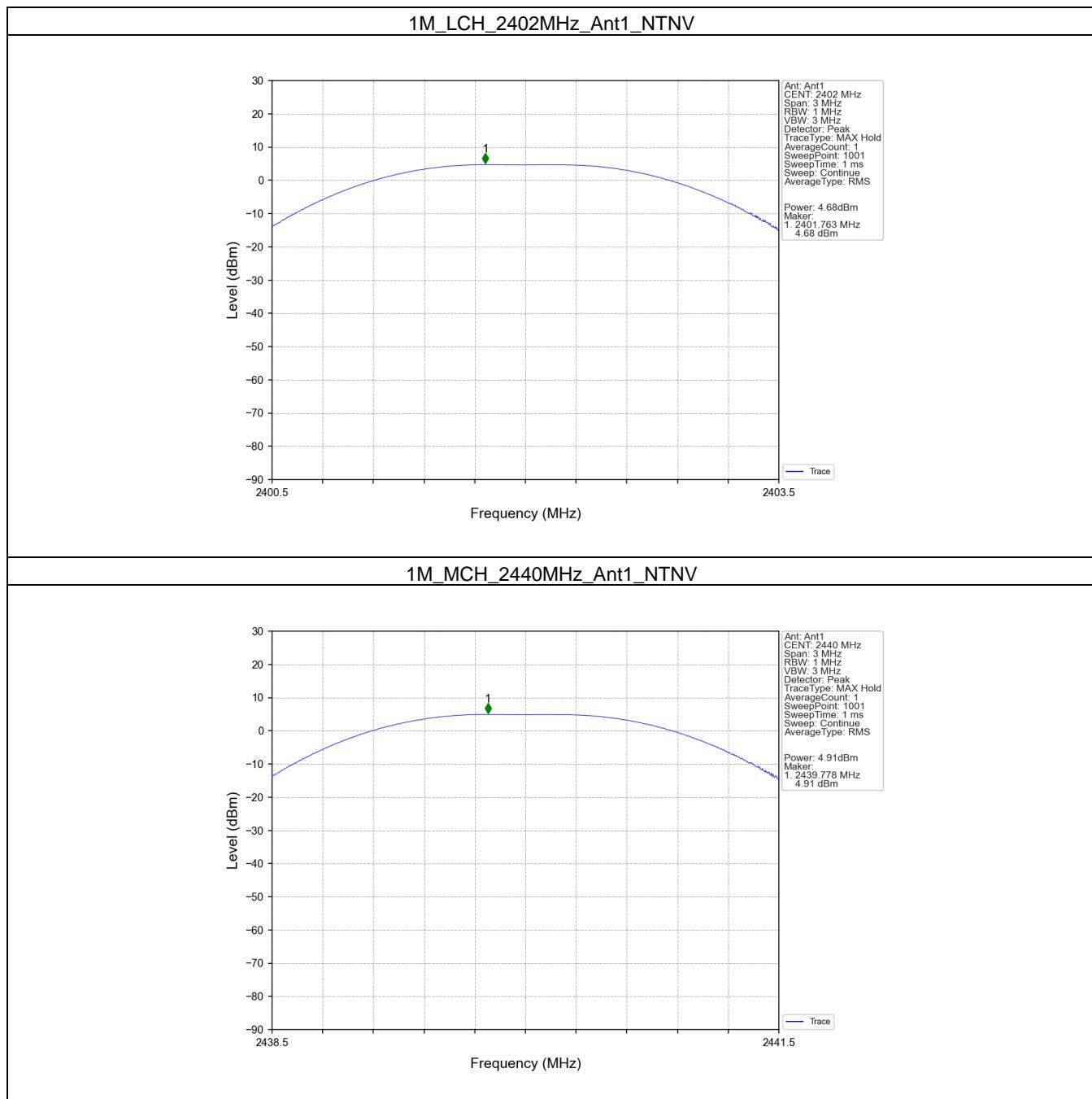
3.1.1 Power

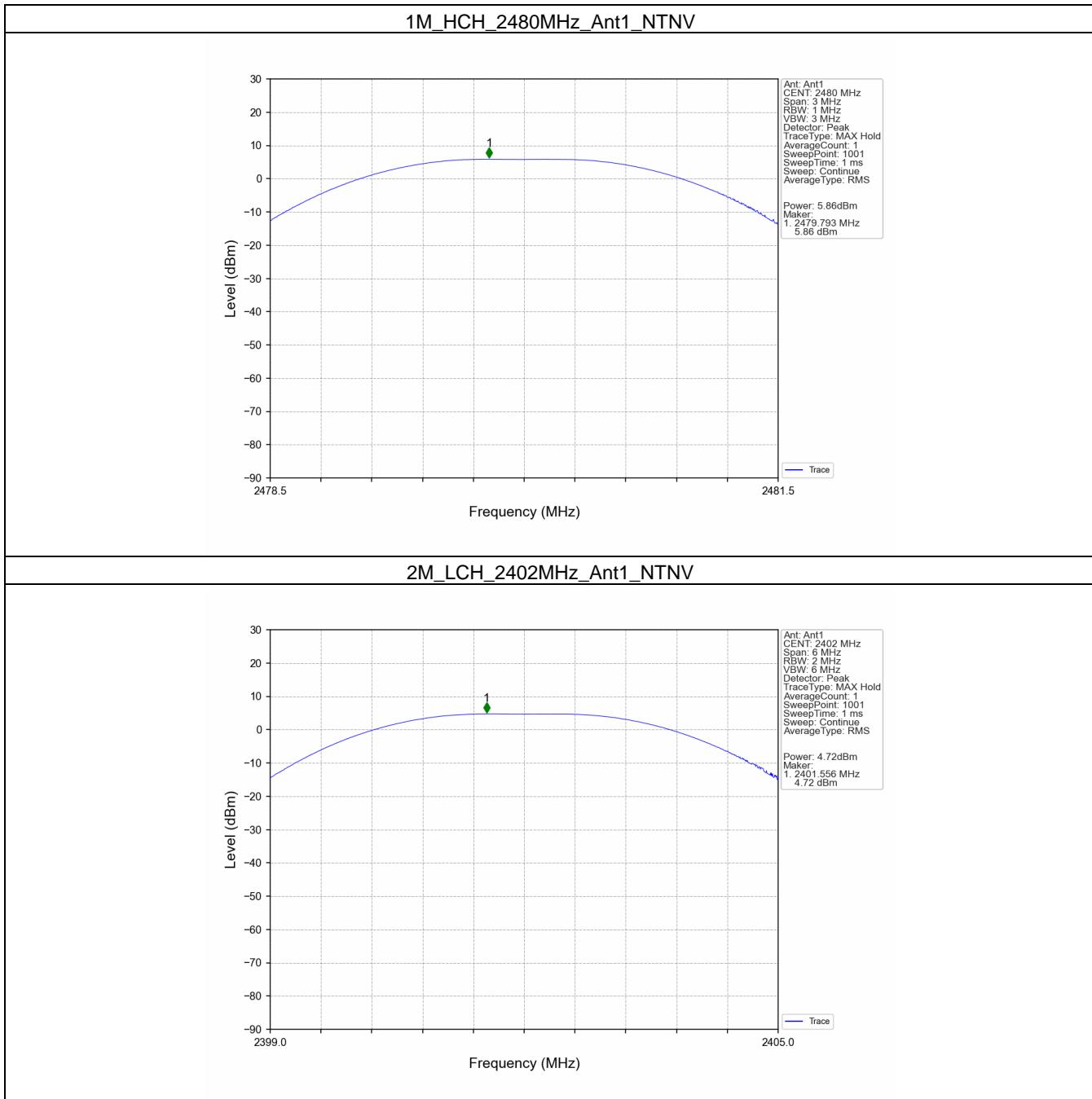
Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	4.68	<=30	Pass
		2440	4.91	<=30	Pass
		2480	5.86	<=30	Pass
2M	SISO	2402	4.72	<=30	Pass
		2440	4.94	<=30	Pass
		2480	5.86	<=30	Pass

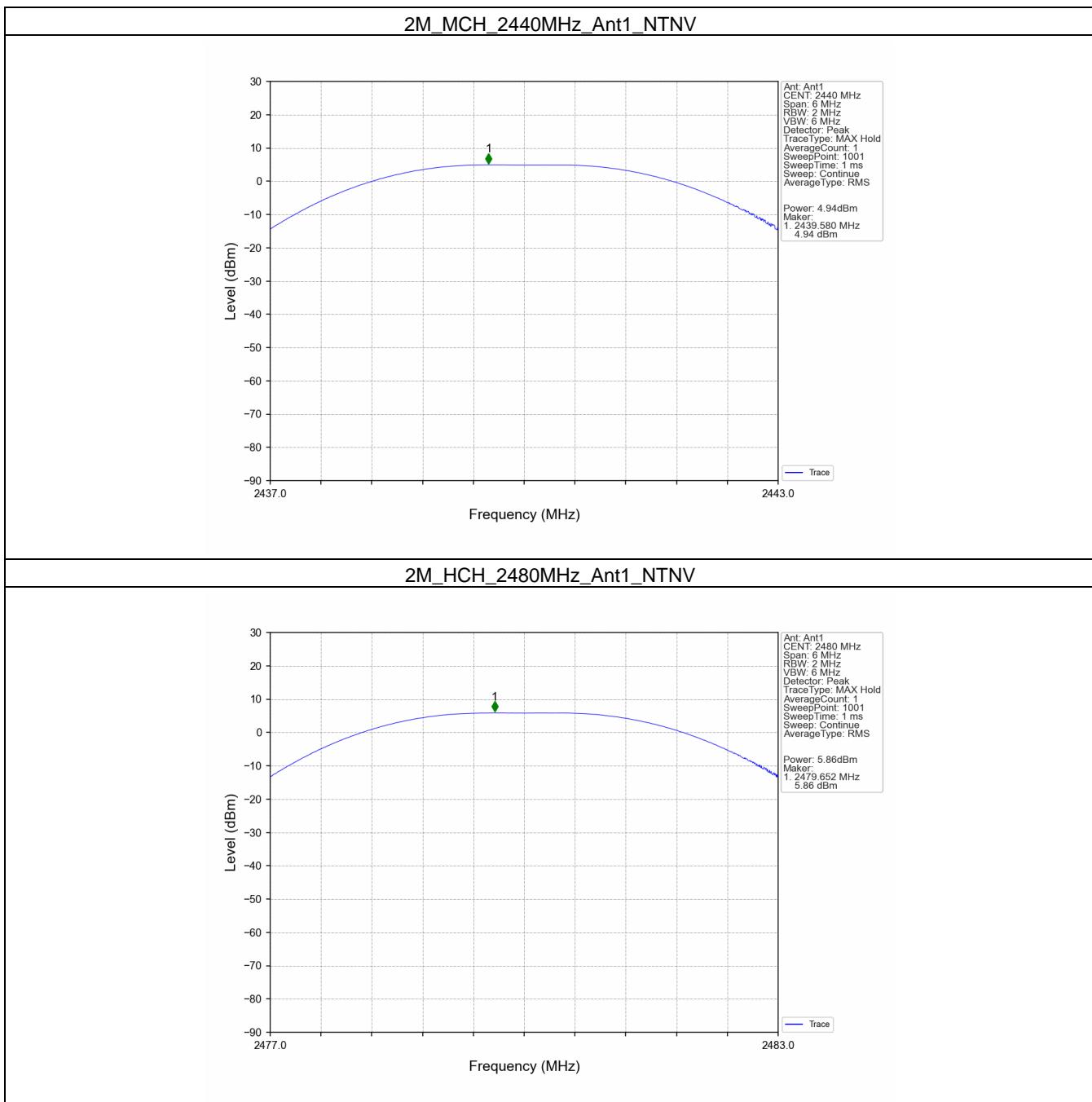
Note1: Antenna Gain: Ant1: 3.90dBi;

3.2 Test Graph

3.2.1 Power







4. Maximum Power Spectral Density

4.1 Test Result

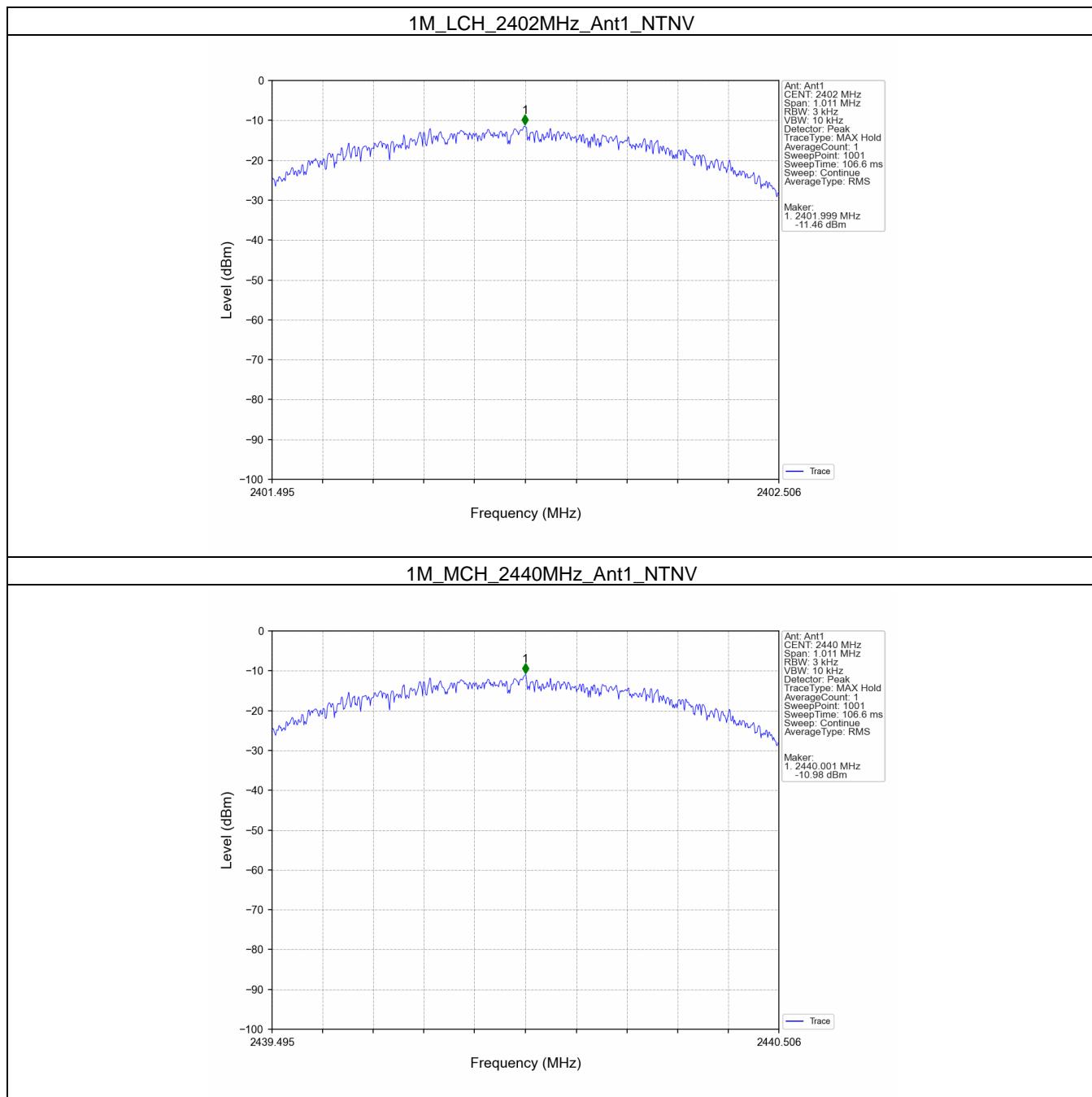
4.1.1 PSD

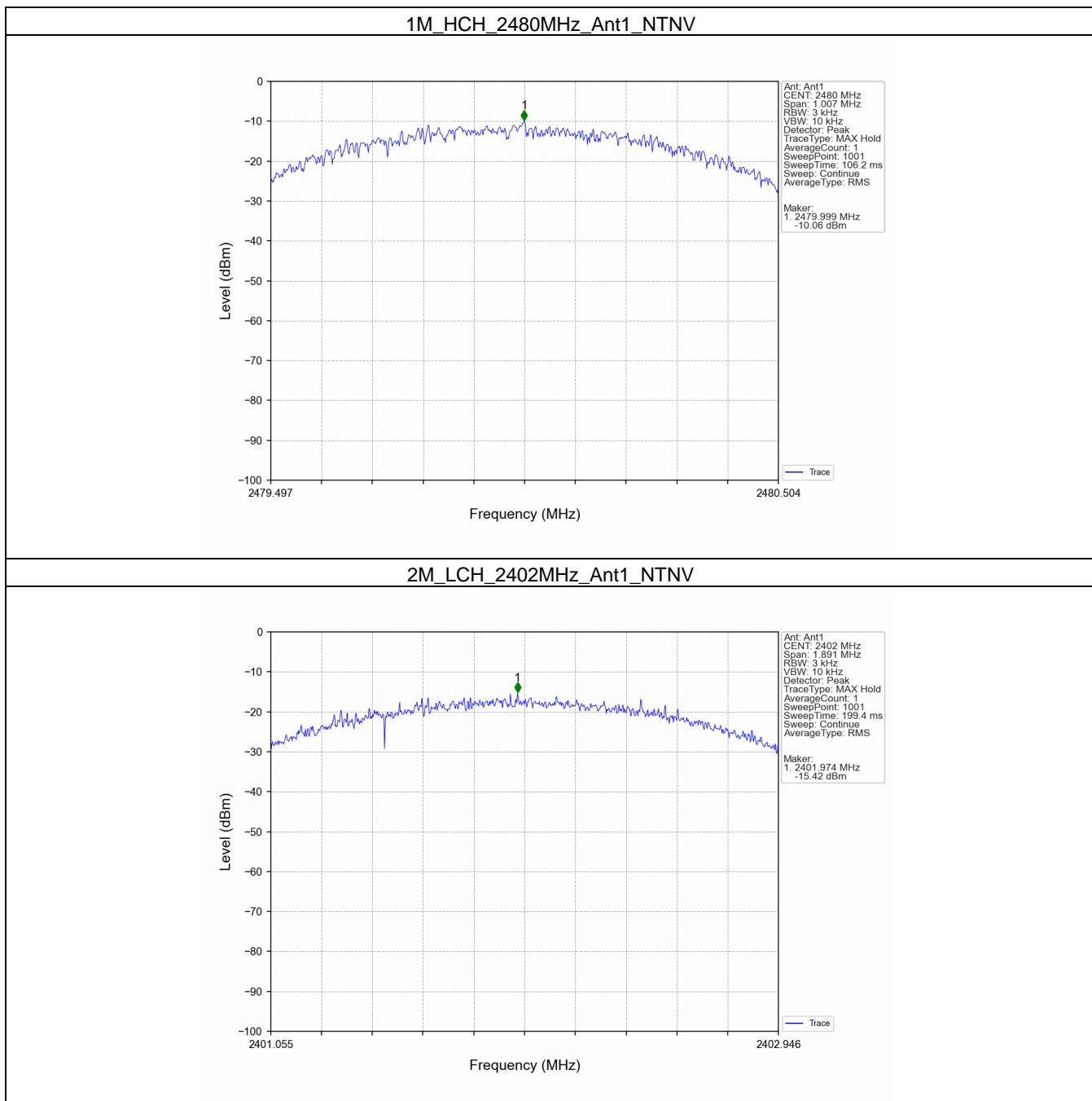
Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-11.46	<=8	Pass
		2440	-10.98	<=8	Pass
		2480	-10.06	<=8	Pass
2M	SISO	2402	-15.42	<=8	Pass
		2440	-14.60	<=8	Pass
		2480	-13.79	<=8	Pass

Note1: Antenna Gain: Ant1: 3.90dBi;

4.2 Test Graph

4.2.1 PSD



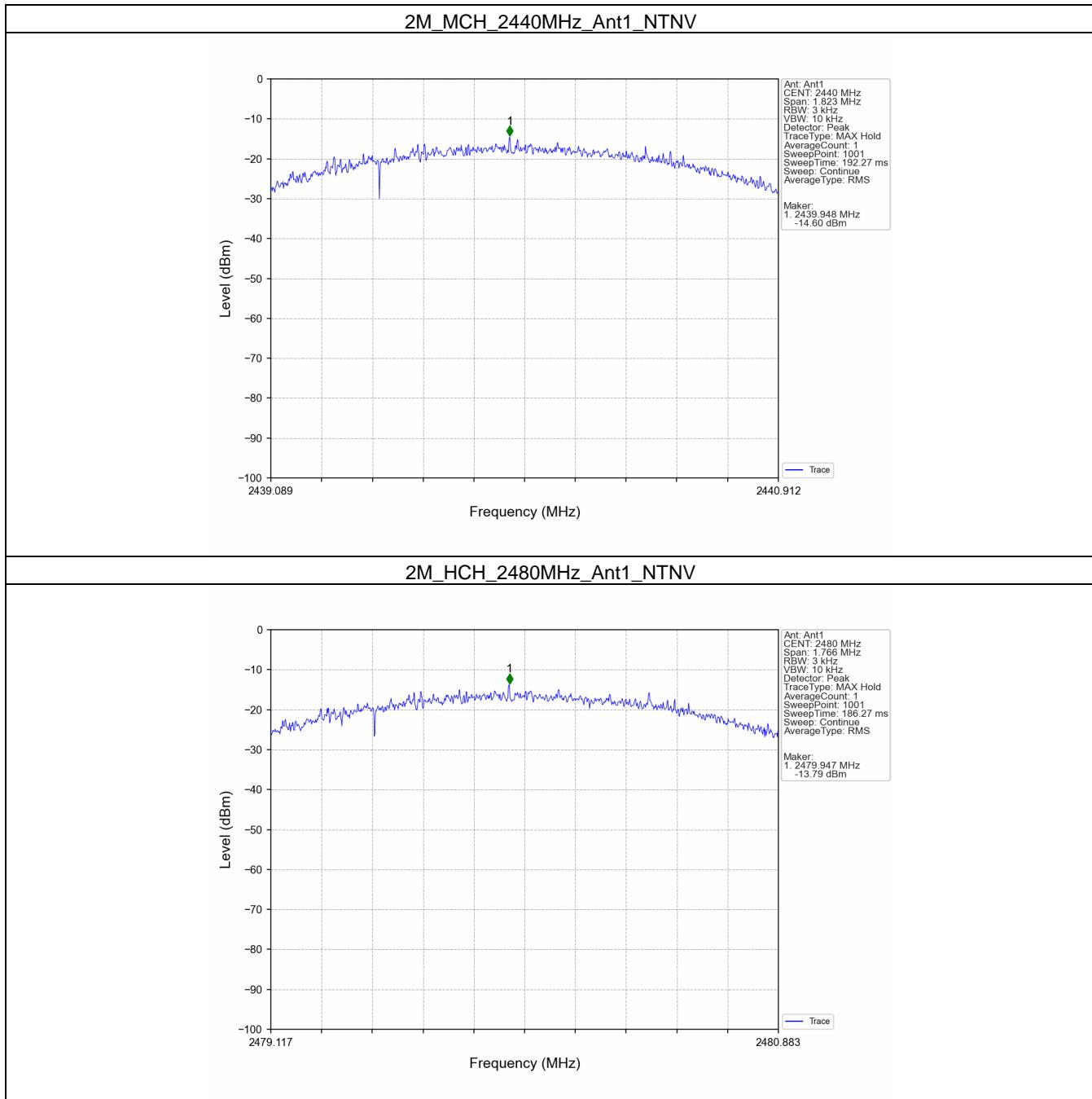


Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR240900173203

Page: 77 of 86



5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Test Result

5.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	4.51
		2440	1	4.70
		2480	1	5.67
2M	SISO	2402	1	3.42
		2440	1	3.60
		2480	1	4.57

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

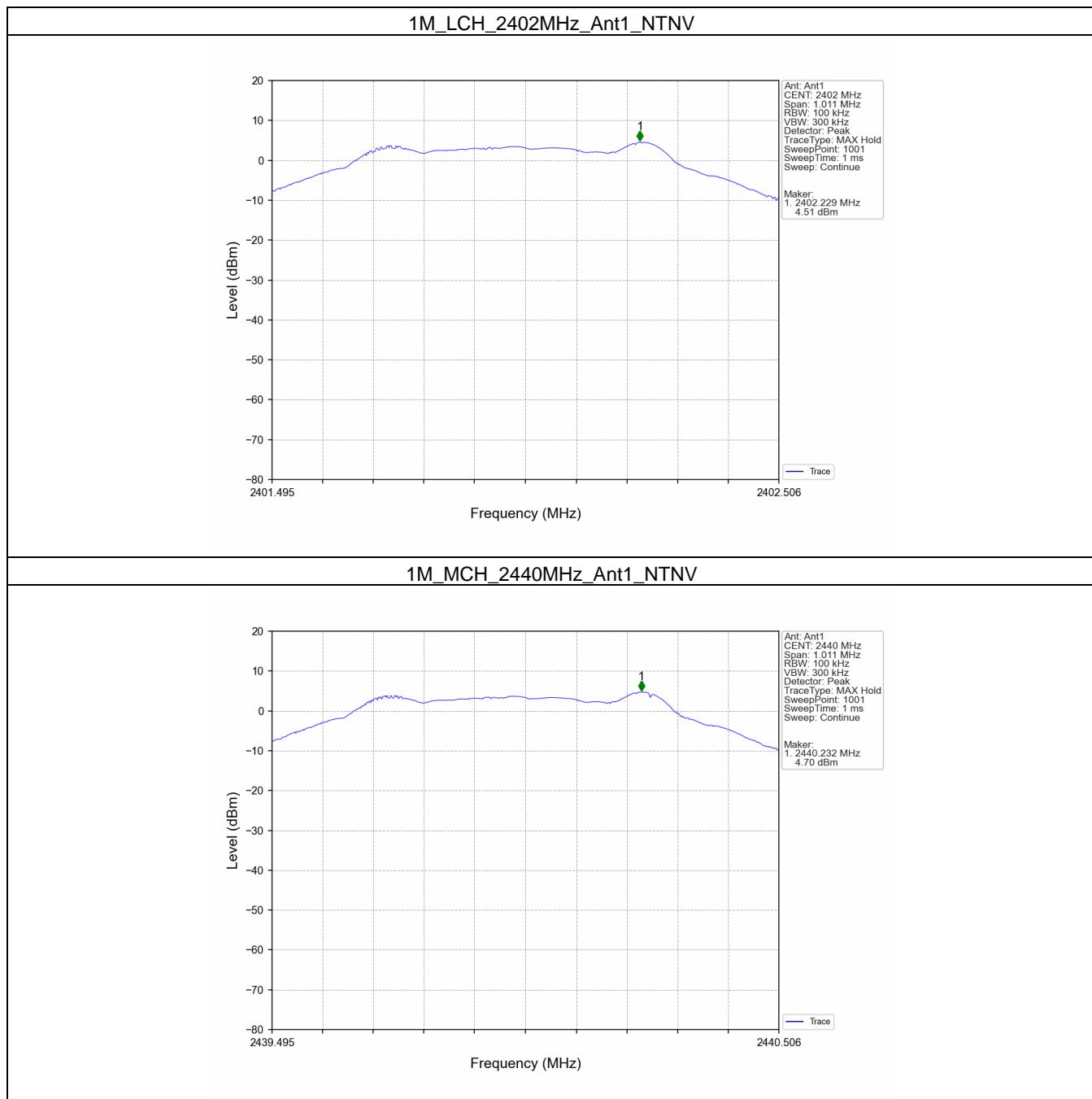
5.1.2 CSE

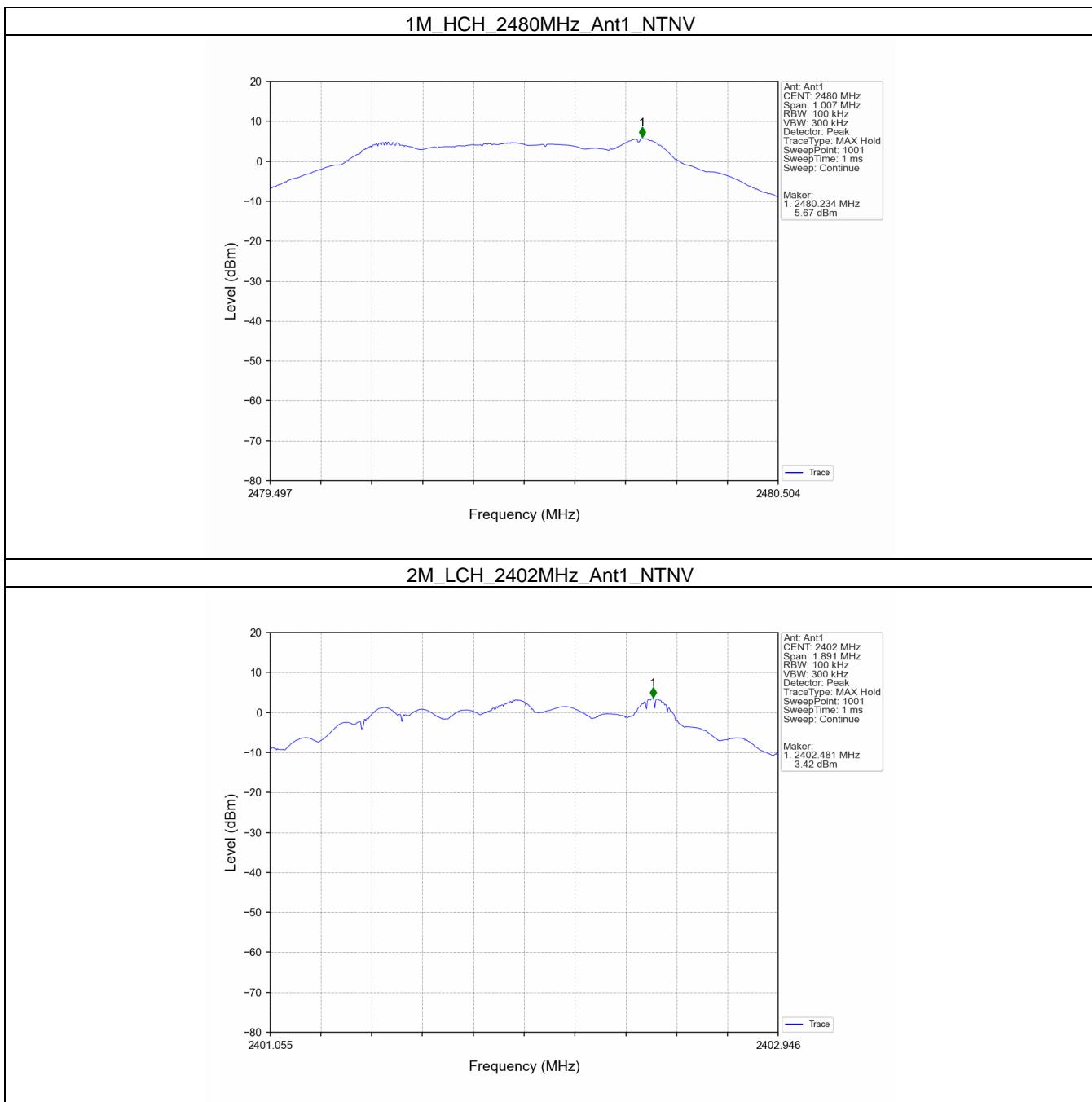
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	5.67	-14.33	Pass
		2440	1	5.67	-14.33	Pass
		2480	1	5.67	-14.33	Pass
2M	SISO	2402	1	4.57	-15.43	Pass
		2440	1	4.57	-15.43	Pass
		2480	1	4.57	-15.43	Pass

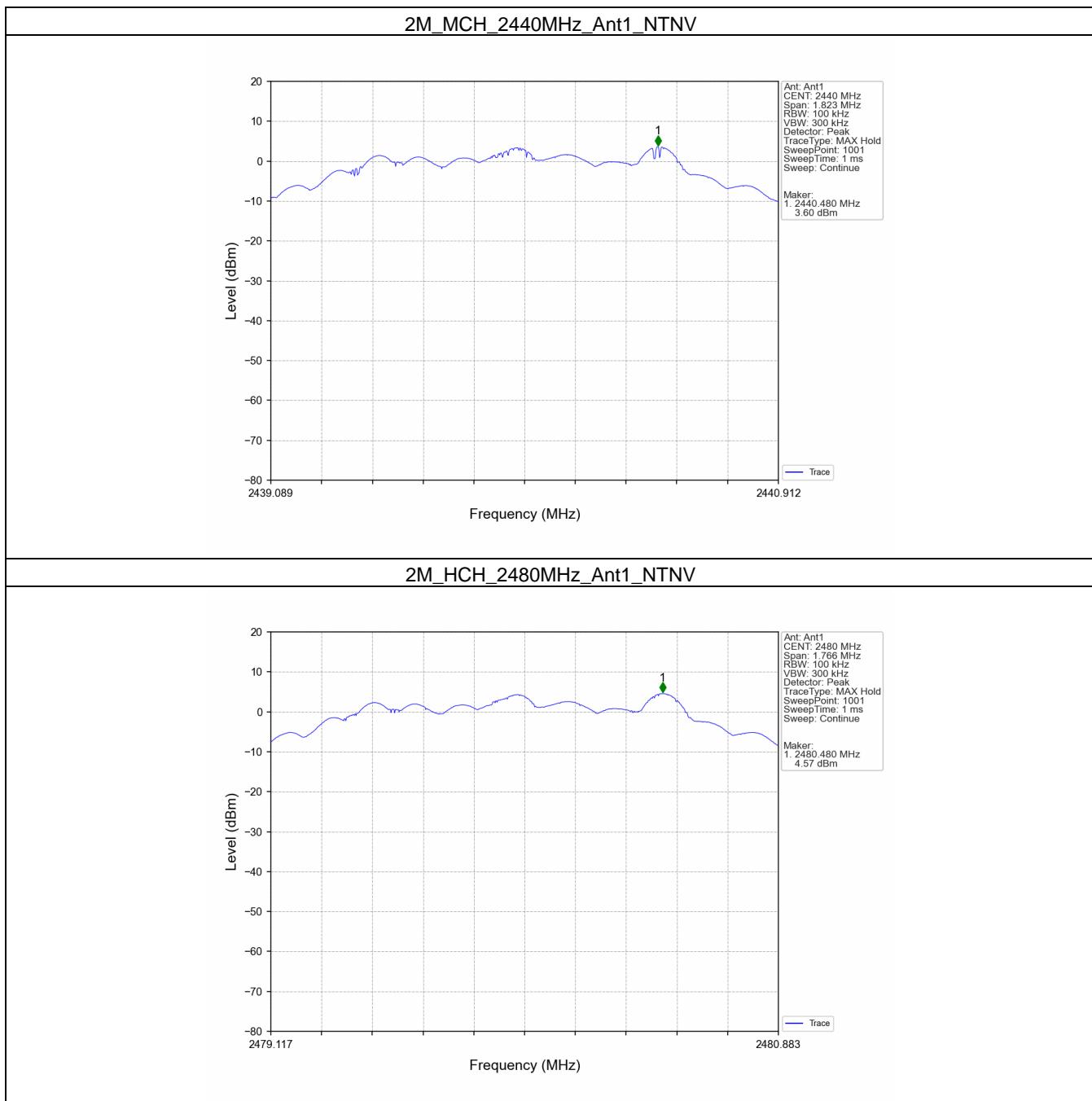
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

5.2 Test Graph

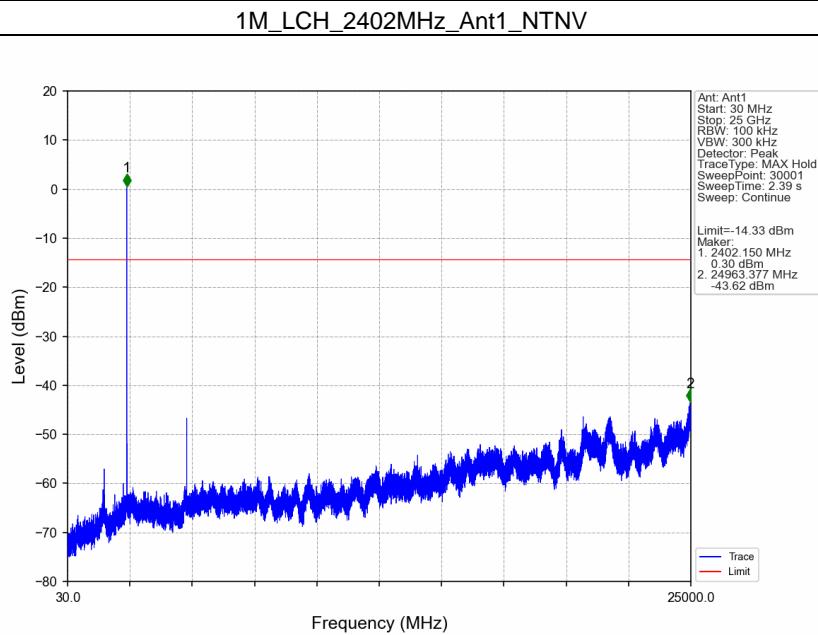
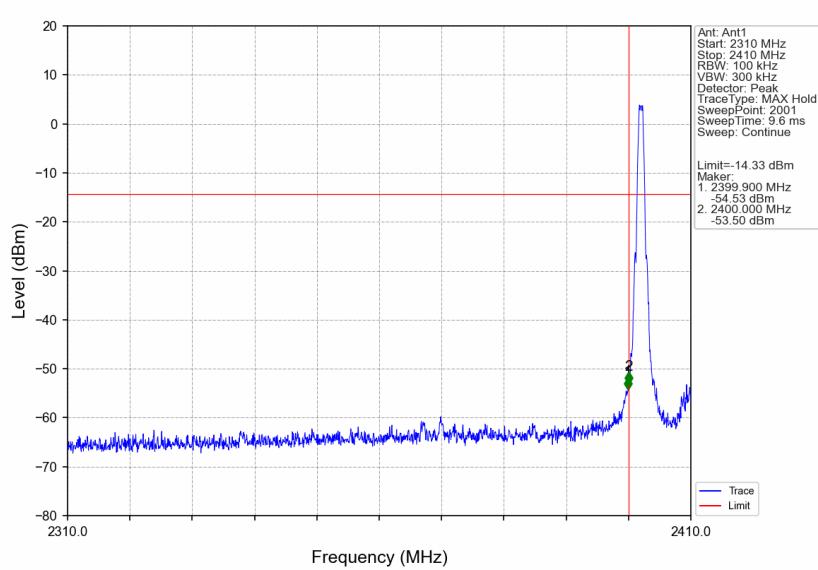
5.2.1 Ref

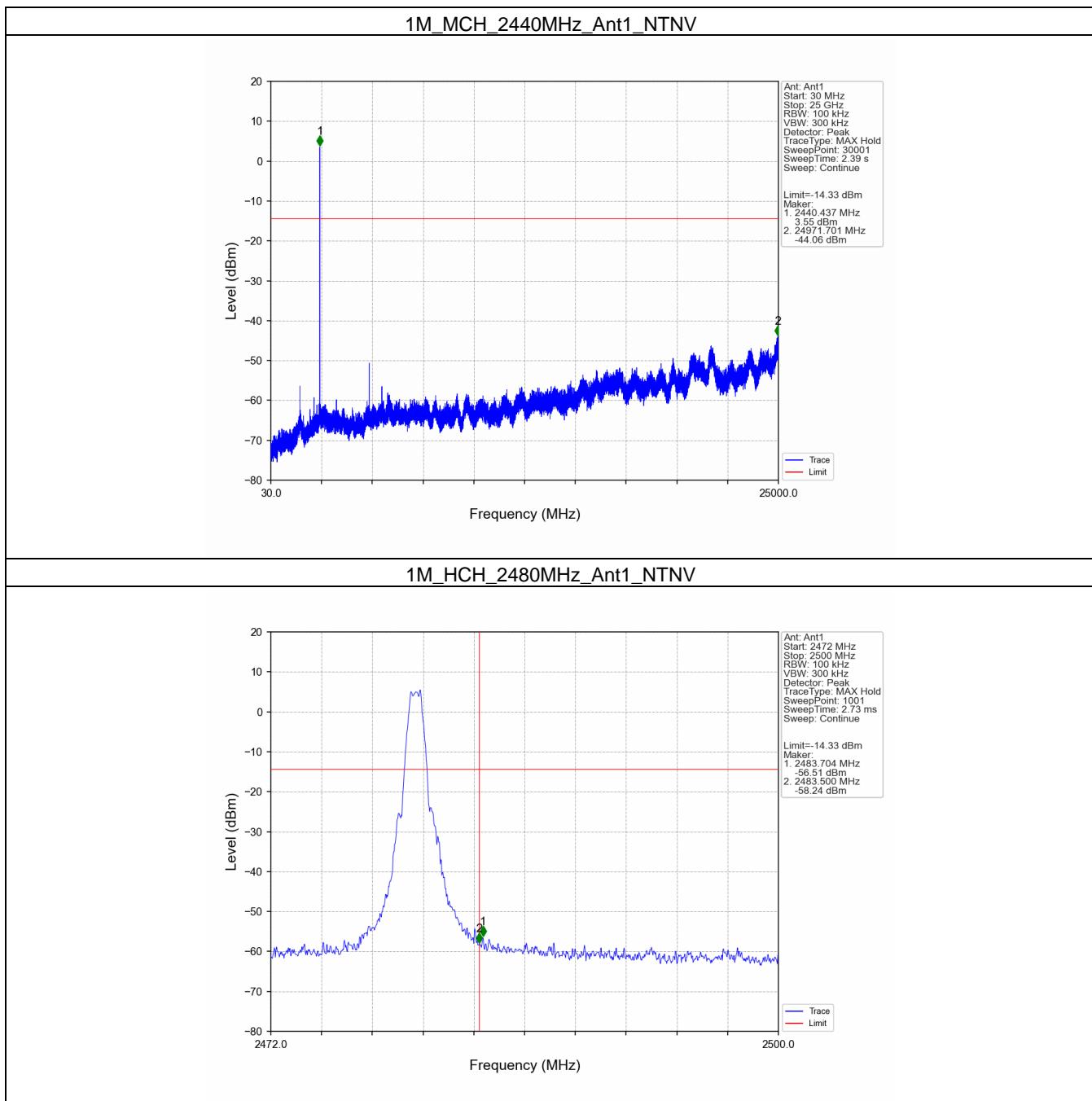


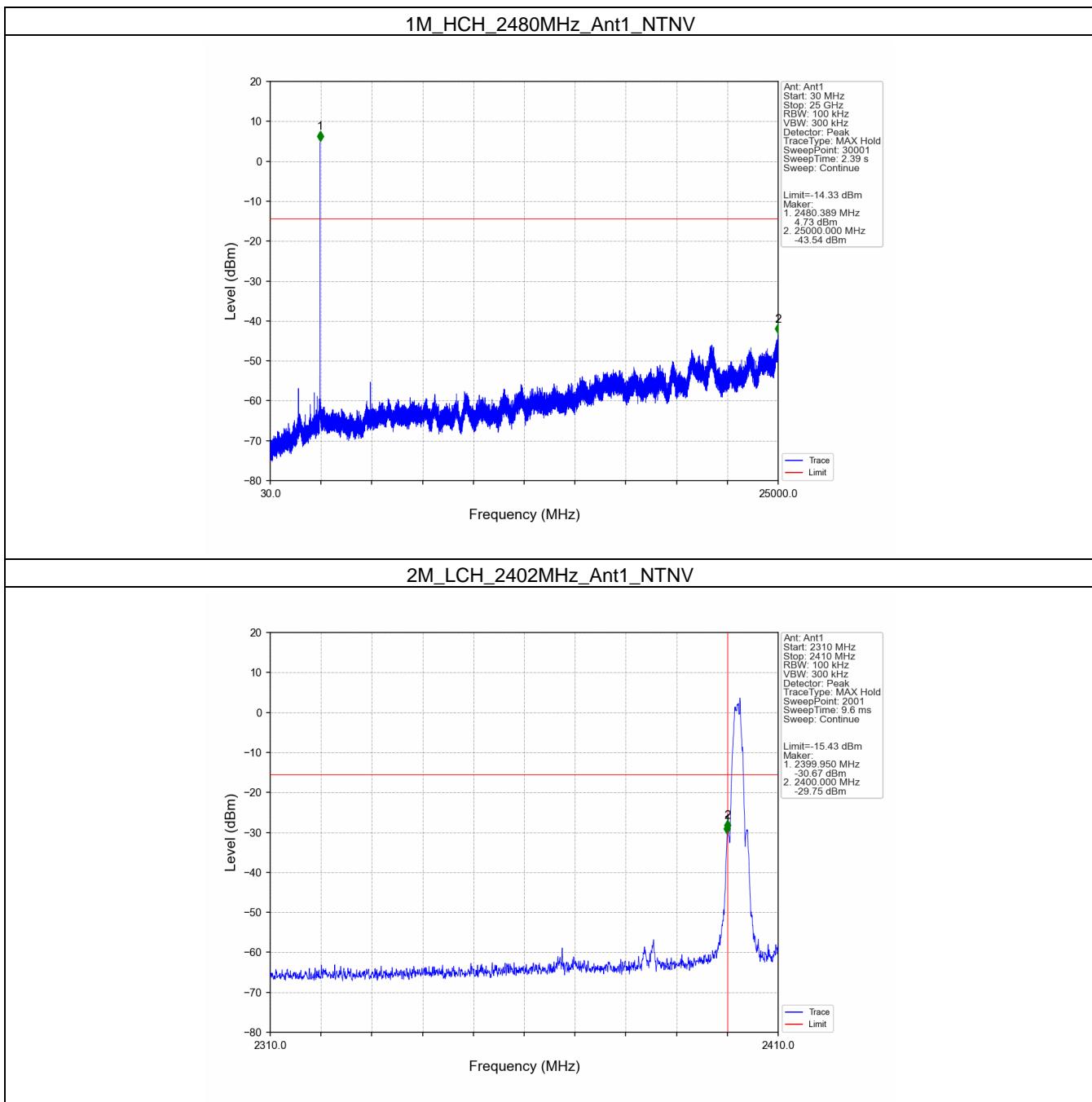


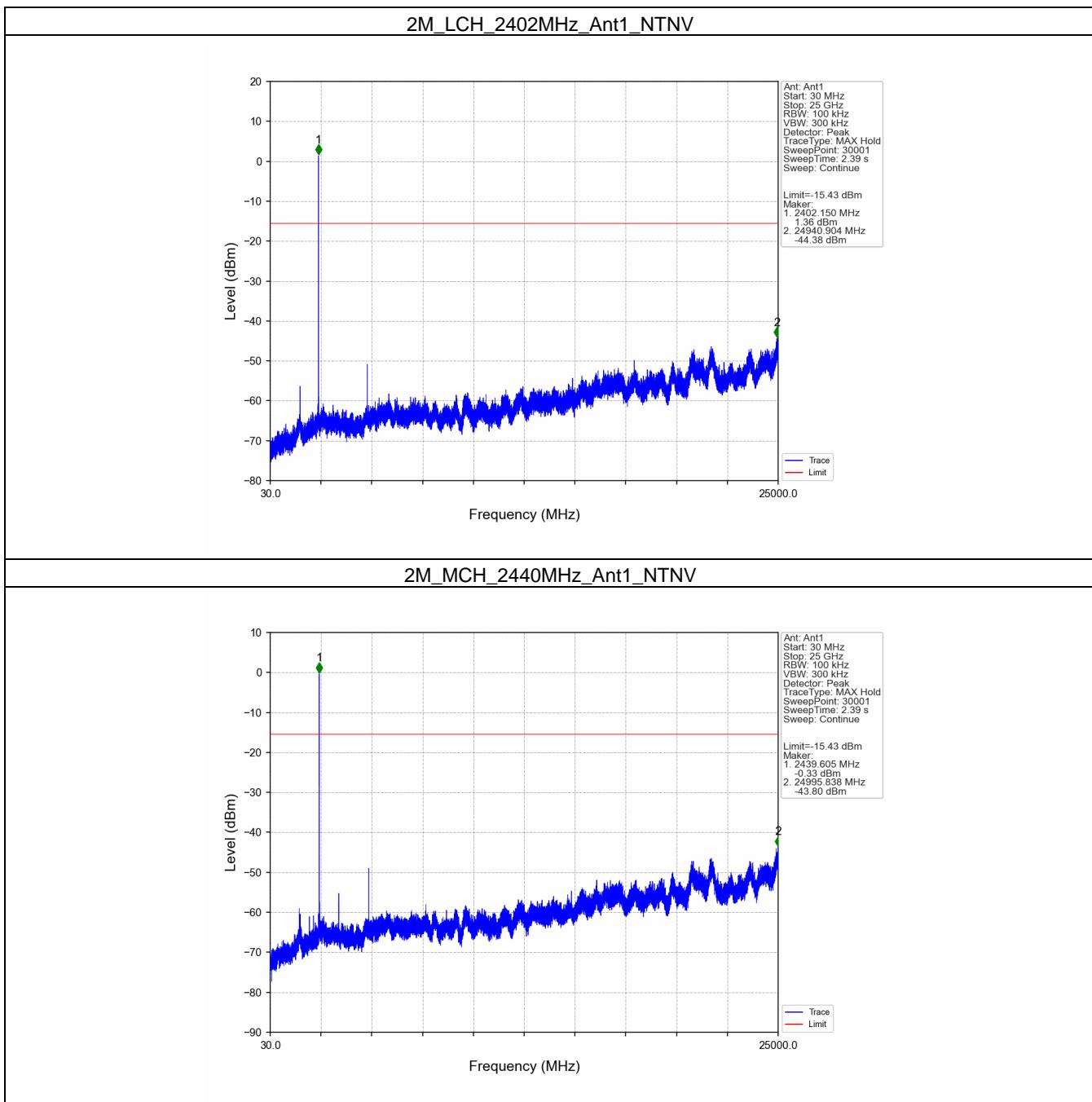


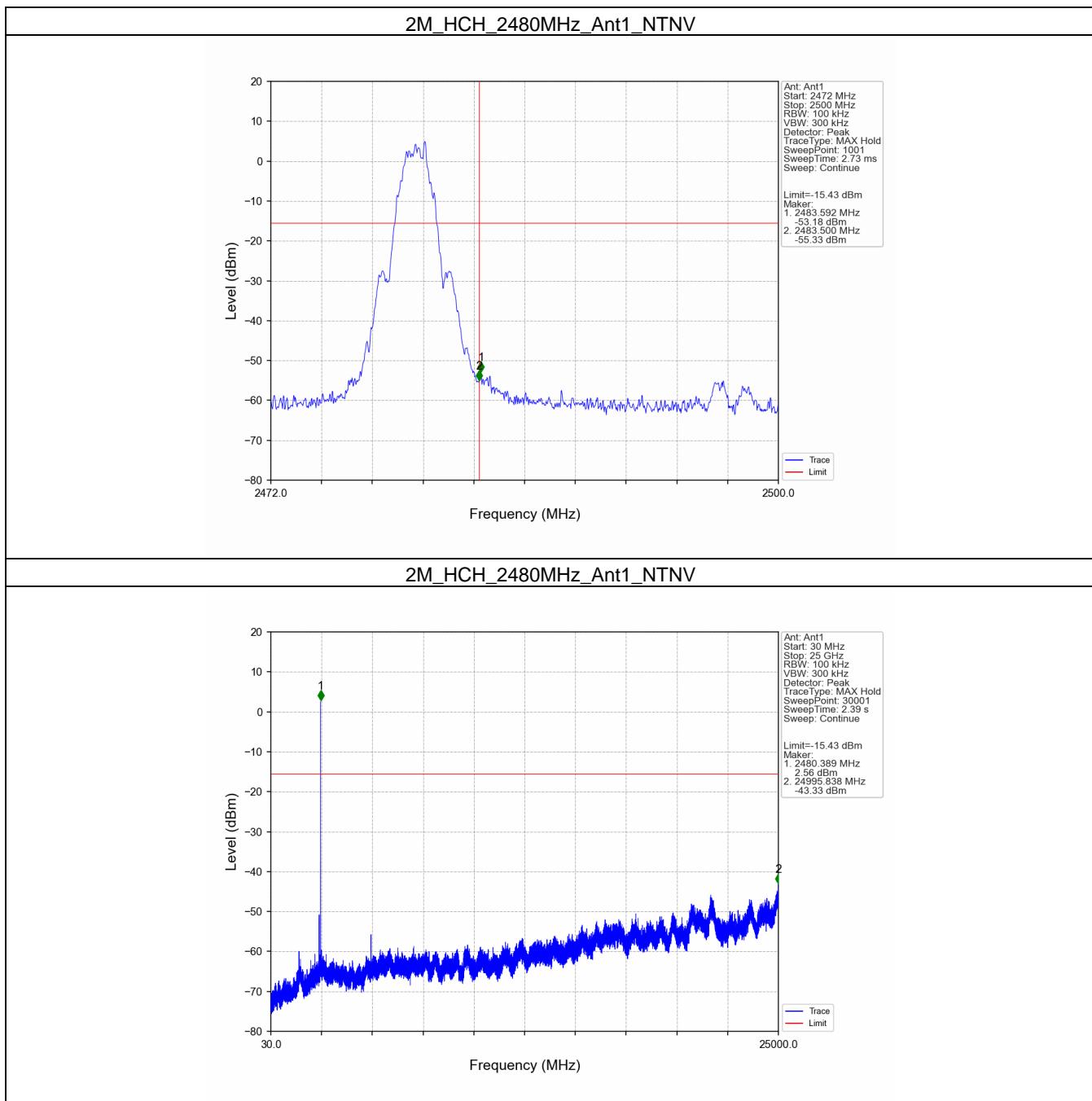
5.2.2 CSE











- End of the Report -