

TEST REPORT

Application No.: SUCR2512001238MO
Applicant: Quectel Wireless Solutions Co., Ltd.
Address of Applicant: No. 8 Waipojing Road, Sijing Town, Songjiang District, Shanghai 201601, China
Manufacturer: Quectel Wireless Solutions Co., Ltd.
Address of Manufacturer: No. 8 Waipojing Road, Sijing Town, Songjiang District, Shanghai 201601, China
Equipment Under Test (EUT):
EUT Name: Bluetooth Low Energy and 802.15.4 wireless radio module
Model No.: KCM233S
Trade Mark: QUECTEL
FCC ID: XMR2025KCM233S
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2025-12-29
Date of Test: 2026-01-19
Date of Issue: 2026-01-20

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> 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>. 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.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone:(86-755) 8307 1443, or email: CN.Doccheck@sgs.com



Revision Record			
Version	Description	Date	Remark
00	Original	2026-01-20	/

Authorized for issue by:				
Tested By		Nature Shen		
		Nature Shen/Project Engineer		
Approved By		Cedar cheng		
		Cedar Cheng /Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2020) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2020) Section 6.10.5 & 11.12	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2020) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2020) Section 6.6 & 11.12	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Maximum Conducted Output Power		ANSI C63.10 (2020) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth		ANSI C63.10 (2020) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Power Spectral Density		ANSI C63.10 (2020) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2020) Section 6.10.4	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2020) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	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 Environment Parameter	5
4.3 Description of Support Units	5
4.4 Measurement Uncertainty & Decision Rule	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 Radiated Emissions which fall in the restricted bands	15
7.3 Radiated Spurious Emissions Below 1GHz	33
7.4 Radiated Spurious Emissions Above 1GHz.....	39
7.5 Maximum Conducted Output Power	55
7.6 Minimum 6dB Bandwidth.....	57
7.7 Power Spectral Density	58
7.8 Conducted Band Edges Measurement	59
7.9 Conducted Spurious Emissions	61
8 Test Setup Photo	63
9 EUT Constructional Details (EUT Photos).....	63
10 Appendix.....	64



4 General Information

4.1 Details of E.U.T.

Power supply:	3.3V
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V6.0
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	External Antenna
Antenna Gain:	0.2 dBi (Provided by the manufacturer)
Antenna Number:	1

Note: Bluetooth LE 125k/500k/1Mbps uses the same modulation, and 1Mbps was found to be the worst case scenario which was performed full test and recorded in this test report.

4.2 Environment Parameter

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	25	3.3

Note:
NV: Normal Voltage LV: Low Extreme Test Voltage HV: High Extreme Test Voltage
NT: Normal Temperature LT: Low Extreme Test Temperature HT: High Extreme Test Temperature

4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Computer	Lenovo	T14	2YK6GR
Mouse	Lenovo	3D optical Mouse	N/A
Adaptor	Huawei	HW-050200C02	N/A

4.4 Measurement Uncertainty & Decision Rule

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	Conduction emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
5	RF conducted power	$\pm 0.75\text{dB}$
6	RF power density	$\pm 2.84\text{dB}$
7	Conducted Spurious emissions	$\pm 0.75\text{dB}$
8	RF Radiated power	$\pm 2.6\text{dB}$ (30MHz-1GHz)
		$\pm 2.7\text{dB}$ (1GHz-18GHz)
9	Temperature test	$\pm 1^{\circ}\text{C}$
10	Humidity test	$\pm 3\%$
11	Supply voltages	$\pm 1\%$
12	Time	$\pm 3\%$
Remark: The U_{lab} (lab Uncertainty) is less than $U_{\text{CISPR/ETSI}}$ (CISPR/ETSI Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.		

4.5 Test Location

All tests were performed 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

No tests were sub-contracted.

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.

4.6 Test Facility

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

• **A2LA (Certificate No. 6336.01)**

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

• **FCC (Designation Number: CN1312)**

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd. has been recognized as an accredited testing laboratory. Test Firm Registration Number:717327

• **ISED (CAB Identifier: CN0120)**

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 27594

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
Conducted Emission at Mains Terminals						
1	EMI Test Receive	R&S	ESR7	SUWI-01-10-01	1/14/2026	1/13/2027
2	LISN	R&S	ENV216	SUWI-01-19-03	5/8/2025	5/7/2026
3	LISN	Schwarzbeck	ENV216	SUWI-01-19-04	5/8/2025	5/7/2026
4	Test Software	Tonscend	JS32-CE_4.0.0.2	SUWI-02-09-05	N.C.R	N.C.R
RF Conducted Test						
1	Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	1/14/2026	1/13/2027
2	Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-15	11/21/2025	11/20/2026
3	MXG Vector signal genitor	KEYSIGHT	N5182B	SUWI-01-38-01	1/14/2026	1/13/2027
4	Signal Generator	ROHDE&SCHWARZ	SMW200A	SUWI-01-07-08	1/14/2026	1/13/2027
5	Signal Generator	ROHDE&SCHWARZ	SMW100A	SUWI-01-08-01	1/14/2026	1/13/2027
6	MXG Vector Signal Generator	ROHDE&SCHWARZ	SMR20	SUWI-01-33-01	11/21/2025	11/20/2026
7	Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	SUWI-01-16-13	5/8/2025	5/7/2026
8	Wideband Radio Communication Test Station	Anritsu	MT8000A	SUWI-01-34-02	11/21/2025	11/20/2026
9	Wideband Radio Communication Tester	Anritsu	MT8821C	SUWI-01-26-03	11/21/2025	11/20/2026
10	Power meter	Anritsu	ML2495A	SUWI-01-31-01	11/21/2025	11/20/2026
11	Pulse power sensor	Anritsu	MA2411B	SUWI-01-32-01	11/21/2025	11/20/2026
12	DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	1/14/2026	1/13/2027
13	Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2/13/2025	2/12/2026
14	Temperature Chamber	GIANT FORCE	ICT-017-40-SP-SD	SUWI-01-13-02	5/7/2025	5/6/2026
15	Measurement Software	TST	TST 272 V2.02	SUWI-03-55-03	NCR	NCR
16	RF Control unit	TST	TSCB3023R2	SUWI-02-20-01	NCR	NCR
17	RF Cables	Tonscend	NA	SUWI-01-03-01	NCR	NCR
RF Radiated Test						
1	Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	6/3/2023	6/2/2026
2	Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	1/14/2026	1/13/2027
3	Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-09	11/21/2025	11/20/2026
4	Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	1/14/2026	1/13/2027
5	Signal Generator	ROHDE&SCHWARZ	SMW100A	SUWI-01-18-01	1/14/2026	1/13/2027
6	Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9168	SUWI-01-11-04	9/10/2025	9/9/2027
7	Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	5/7/2025	5/6/2027
8	Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	5/7/2025	5/6/2027
9	Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	5/7/2025	5/6/2027



Report No.: SUCR251200123801

Page: 9 of 85

10	Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	1/14/2026	1/13/2027
11	Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	1/14/2026	1/13/2027
12	Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	1/14/2026	1/13/2027
13	Wideband Radio Communication Tester	Anritsu	MT8820C	SUWI-01-26-01	11/21/2025	11/20/2026
14	Wideband Radio Communication Tester	Anritsu	MT8821C	SUWI-01-26-03	8/25/2025	8/24/2026
15	Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	SUWI-01-16-09	8/26/2025	8/25/2026
16	Radio Communication Analyzer	StarPoint	SP9500E	SUWI-01-28-02	11/21/2025	11/20/2026
17	Signal Generator	ROHDE&SCHWARZ	SMB100A	SUWI-01-08-01	1/14/2026	1/13/2027
18	DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	1/14/2026	1/13/2027
19	Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2/13/2025	2/12/2026
20	Measurement Software	Tonscend	JS32-RE 4.0.0.0	SUWI-02-09-06	NCR	NCR
21	RF Control unit	Tonscend	JS0806-1	SUWI-02-20-01	NCR	NCR
22	RF Cables	Tonscend	NA	SUWI-01-03-02	NCR	NCR

Remark: NCR=No Calibration Requirement.

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 module uses a dedicated RF connector not intended for user replacement, meeting §15.203.

The best case gain of the antenna is 0.2 dBi.



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 (2020) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		
Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz		

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C

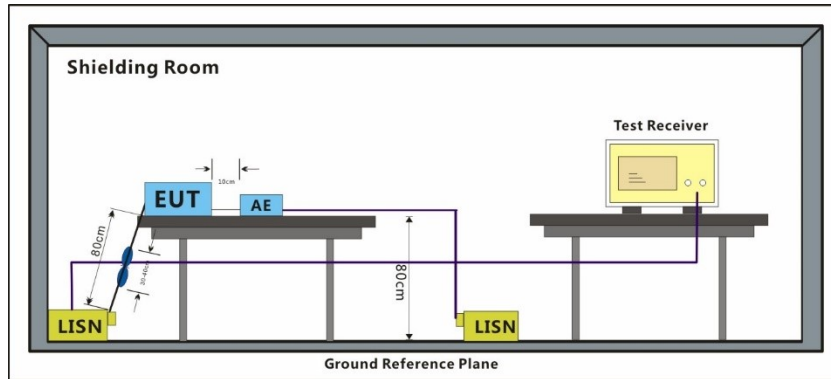
Humidity: 44 % RH

Atmospheric Pressure: 1001 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Pre-scan	01	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.1.3 Test Setup Diagram

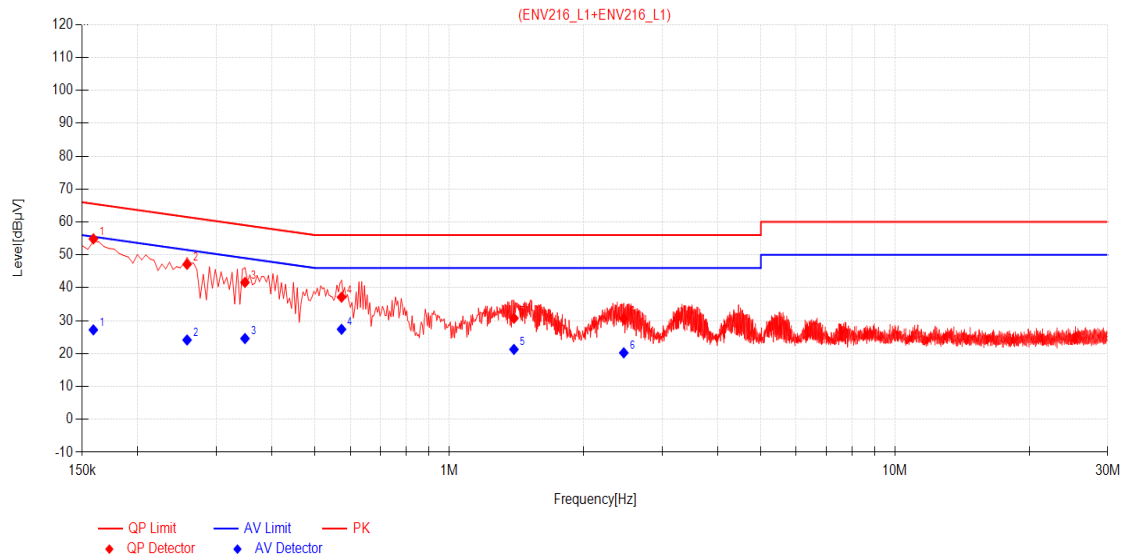


7.1.4 Measurement Procedure and Data

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

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

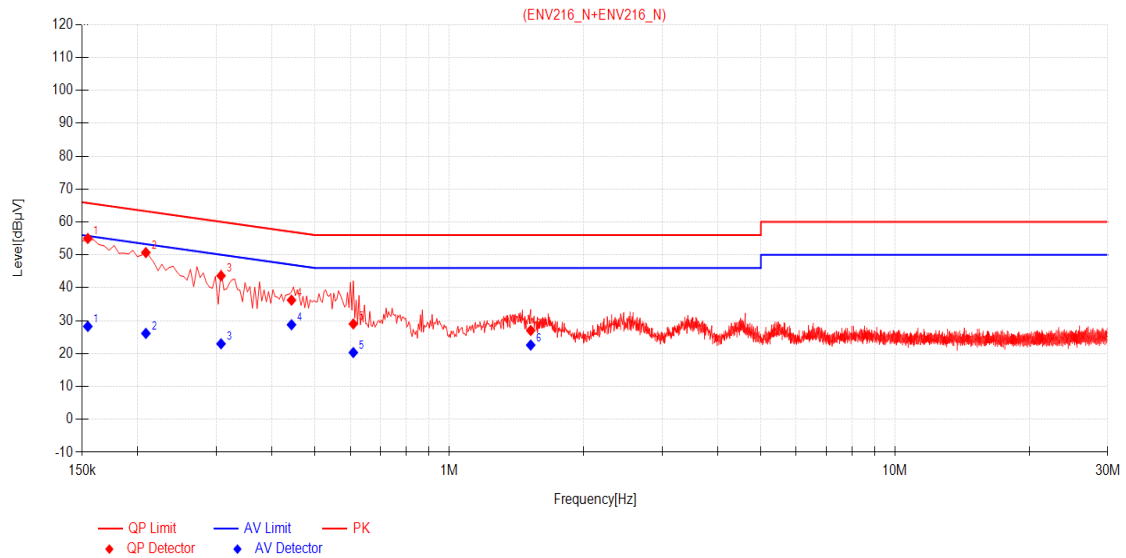
Test Mode: 00; Line: Live line



Final Data List

NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.1590	9.96	44.91	54.87	65.52	10.65	17.25	27.21	55.52	28.31	PASS
2	0.2580	9.97	37.15	47.12	61.50	14.38	14.16	24.13	51.50	27.37	PASS
3	0.3480	9.96	31.67	41.63	59.01	17.38	14.62	24.58	49.01	24.43	PASS
4	0.5730	9.94	27.20	37.14	56.00	18.86	17.44	27.38	46.00	18.62	PASS
5	1.3965	9.90	20.84	30.74	56.00	25.26	11.37	21.27	46.00	24.73	PASS
6	2.4630	9.89	20.76	30.65	56.00	25.35	10.34	20.23	46.00	25.77	PASS

Test Mode: 00; Line: Neutral Line



Final Data List

NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.1545	9.95	45.03	54.98	65.75	10.77	18.30	28.25	55.75	27.50	PASS
2	0.2085	9.94	40.76	50.70	63.26	12.56	16.19	26.13	53.26	27.13	PASS
3	0.3075	9.98	33.66	43.64	60.04	16.40	12.99	22.97	50.04	27.07	PASS
4	0.4425	9.94	26.30	36.24	57.01	20.77	18.82	28.76	47.01	18.25	PASS
5	0.6090	9.93	19.08	29.01	56.00	26.99	10.39	20.32	46.00	25.68	PASS
6	1.5225	9.94	17.08	27.02	56.00	28.98	12.64	22.58	46.00	23.42	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 (2020) Section 6.10.5 & 11.12

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

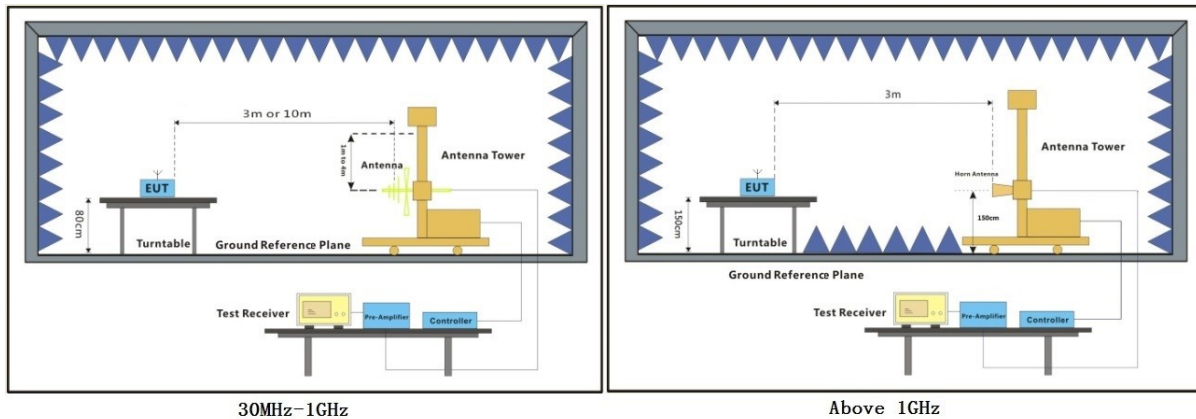
Operating Environment:

Temperature: 23 °C Humidity: 44 % RH Atmospheric Pressure: 1001 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	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

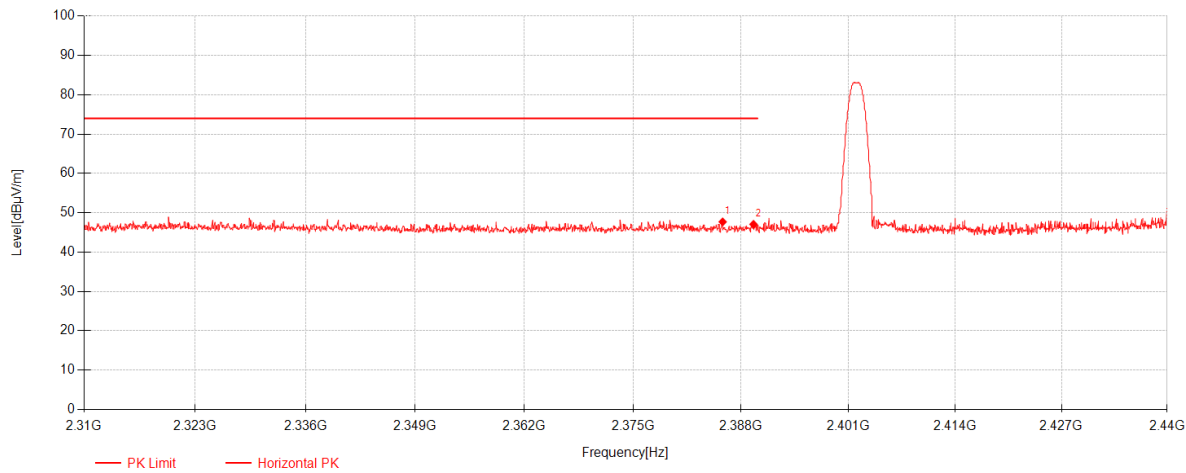
- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters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

Remark 1: 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.

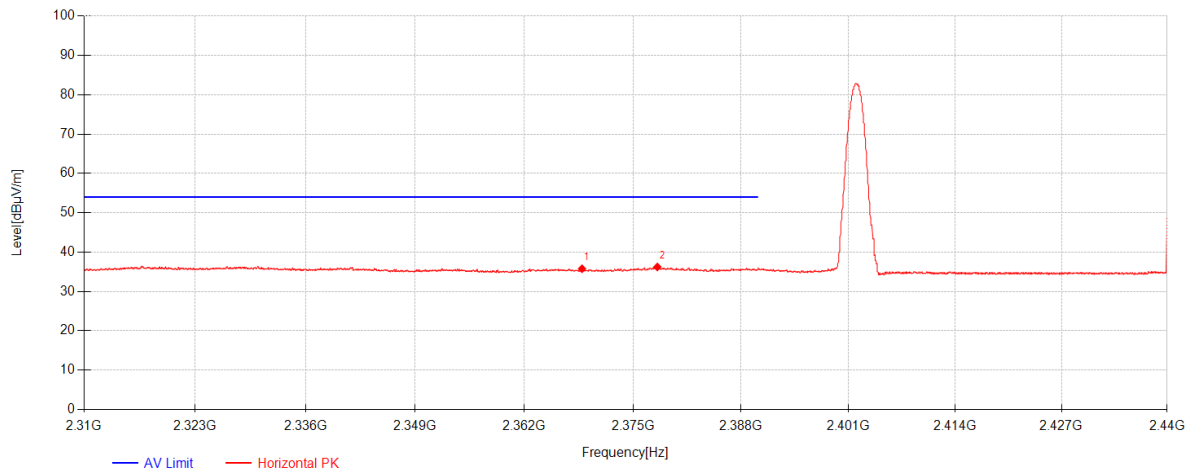


BLE_1M_TX_CH_00_Horizontal_Peak



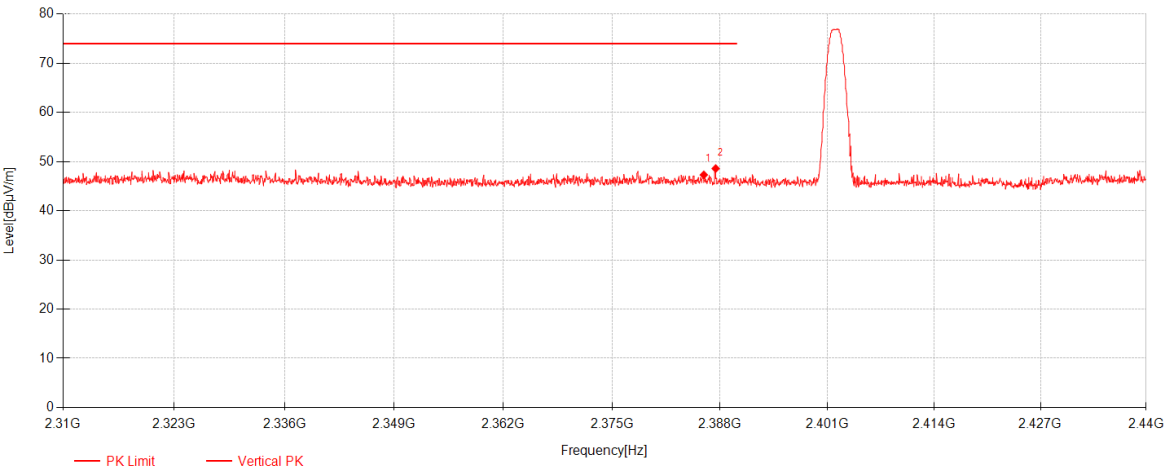
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2385.79	44.21	26.99	-23.51	47.69	74.00	26.31	Horizontal
2	2389.5167	43.59	27.00	-23.52	47.07	74.00	26.93	Horizontal

BLE_1M_TX_CH_00_Horizontal_Average



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2368.89	32.30	26.96	-23.49	35.77	54.00	18.23	Horizontal
2	2377.925	32.75	26.98	-23.50	36.23	54.00	17.77	Horizontal

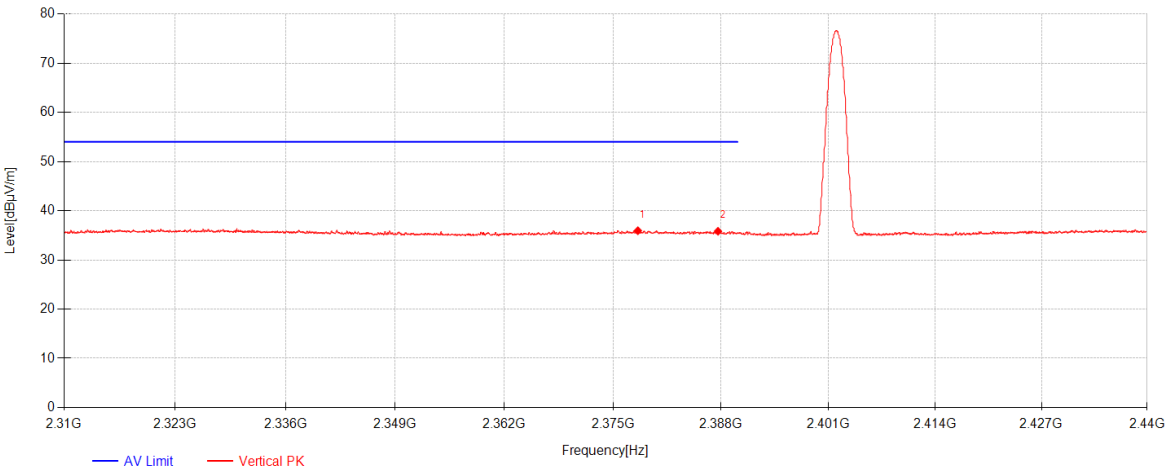
BLE_1M_TX_CH_00_Vertical_Peak



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2386.05	43.81	26.99	-23.51	47.29	74.00	26.71	Vertical
2	2387.48	45.11	27.00	-23.51	48.59	74.00	25.41	Vertical



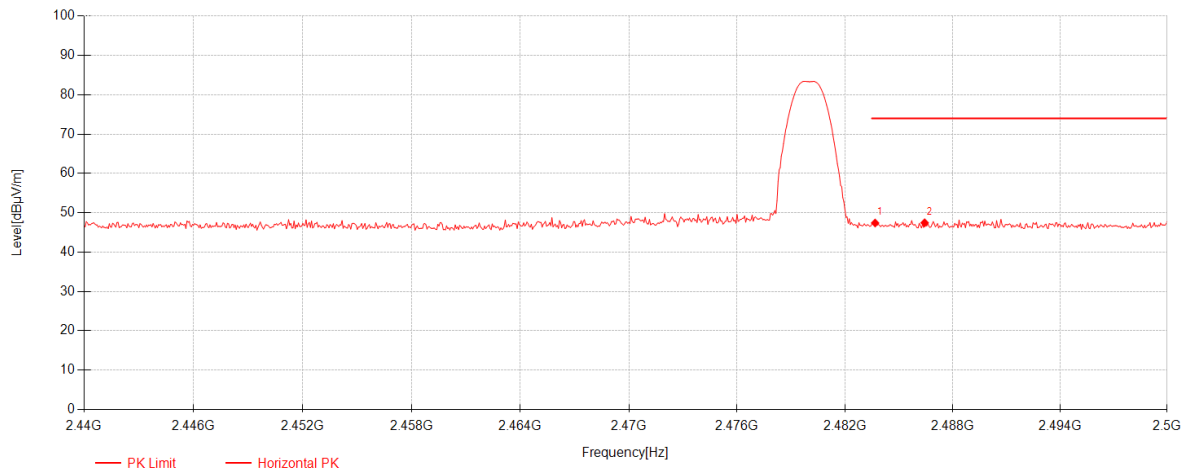
BLE_1M_TX_CH_00_Vertical_Average



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2377.99	32.47	26.98	-23.50	35.95	54.00	18.05	Vertical
2	2387.6425	32.35	27.00	-23.51	35.83	54.00	18.17	Vertical

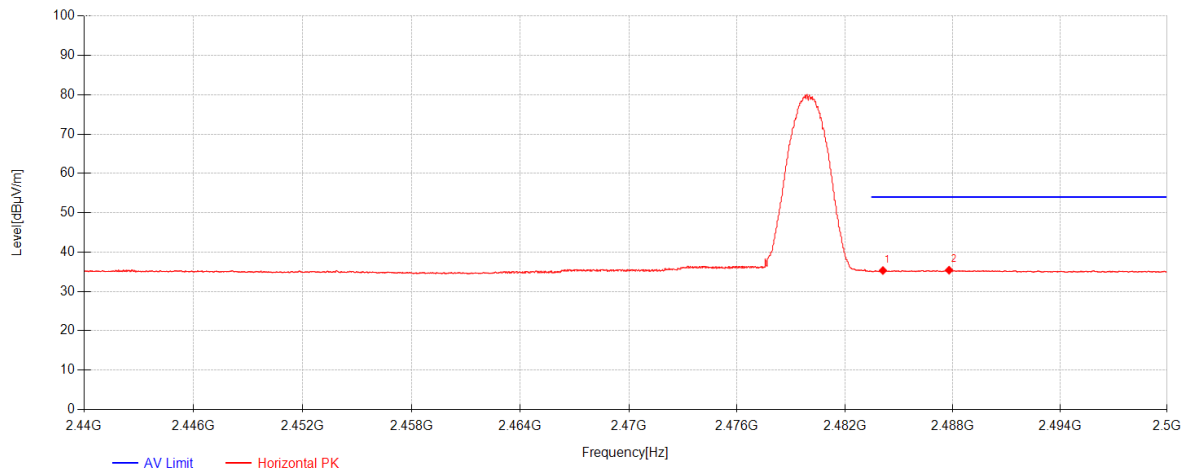


BLE_1M_TX_CH_39_Horizontal_Peak



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.68	43.41	27.17	-23.18	47.40	74.00	26.60	Horizontal
2	2486.44	43.45	27.18	-23.17	47.46	74.00	26.54	Horizontal

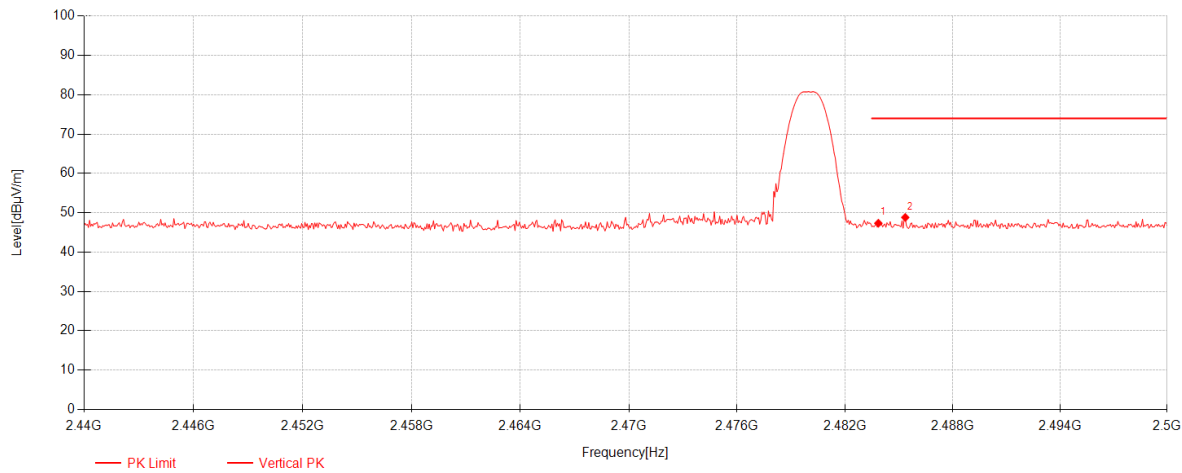
BLE_1M_TX_CH_39_Horizontal_Average



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.115	31.33	27.17	-23.18	35.32	54.00	18.68	Horizontal
2	2487.805	31.38	27.18	-23.16	35.40	54.00	18.60	Horizontal



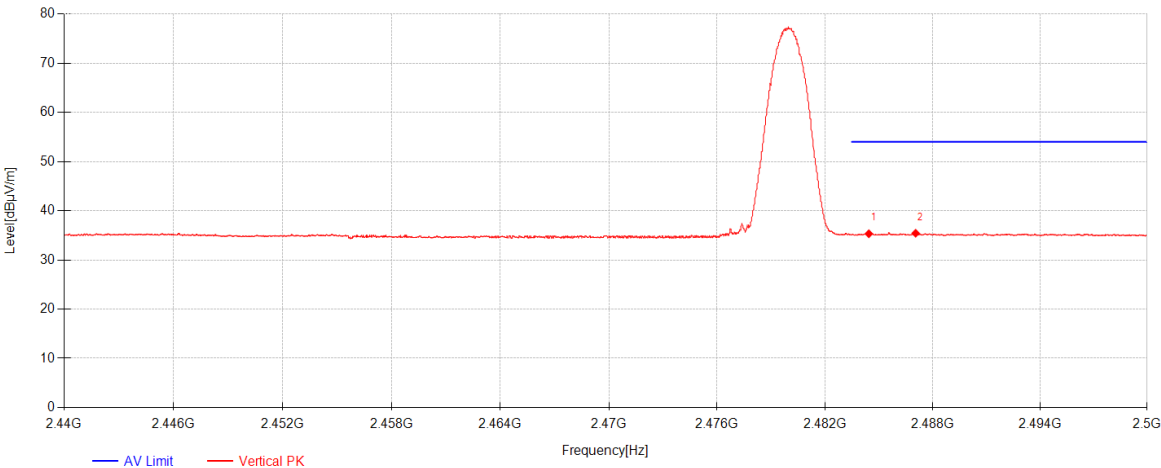
BLE_1M_TX_CH_39_Vertical_Peak



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2483.86	43.35	27.17	-23.18	47.34	74.00	26.66	Vertical
2	2485.36	44.81	27.17	-23.17	48.81	74.00	25.19	Vertical



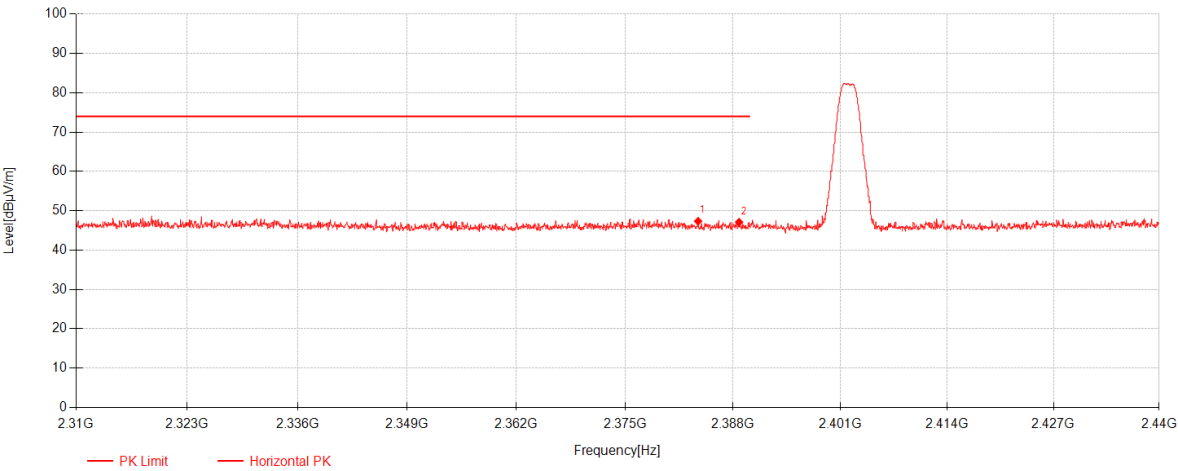
BLE_1M_TX_CH_39_Veritical_Average



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.445	31.33	27.17	-23.18	35.33	54.00	18.67	Vertical
2	2487.055	31.42	27.18	-23.16	35.43	54.00	18.57	Vertical

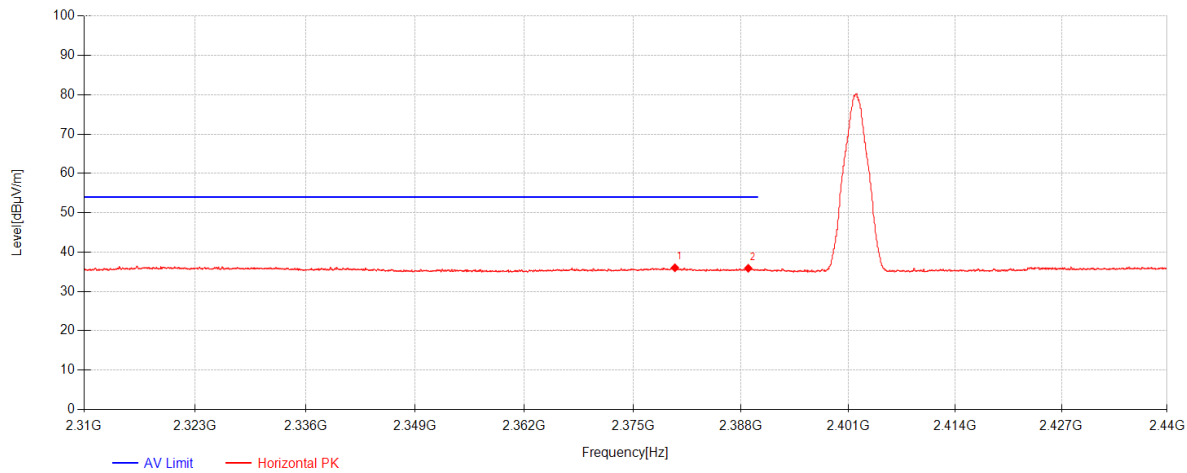


BLE_2M_TX_CH_00_Horizontal_Peak



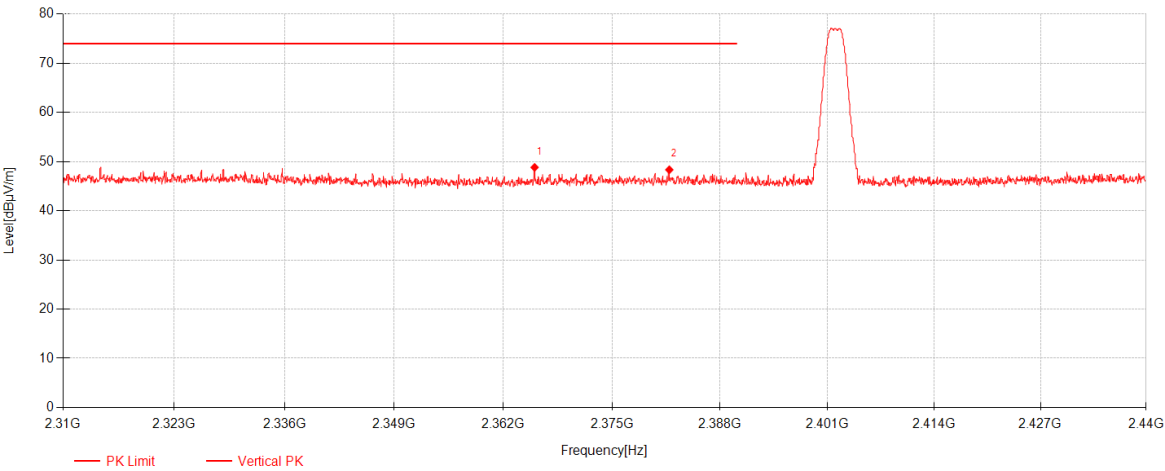
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2383.7967	43.86	26.99	-23.51	47.34	74.00	26.66	Horizontal
2	2388.7367	43.61	27.00	-23.52	47.09	74.00	26.91	Horizontal

BLE_2M_TX_CH_00_Horizontal_Average



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2380.0375	32.54	26.98	-23.50	36.02	54.00	17.98	Horizontal
2	2388.8775	32.41	27.00	-23.52	35.89	54.00	18.11	Horizontal

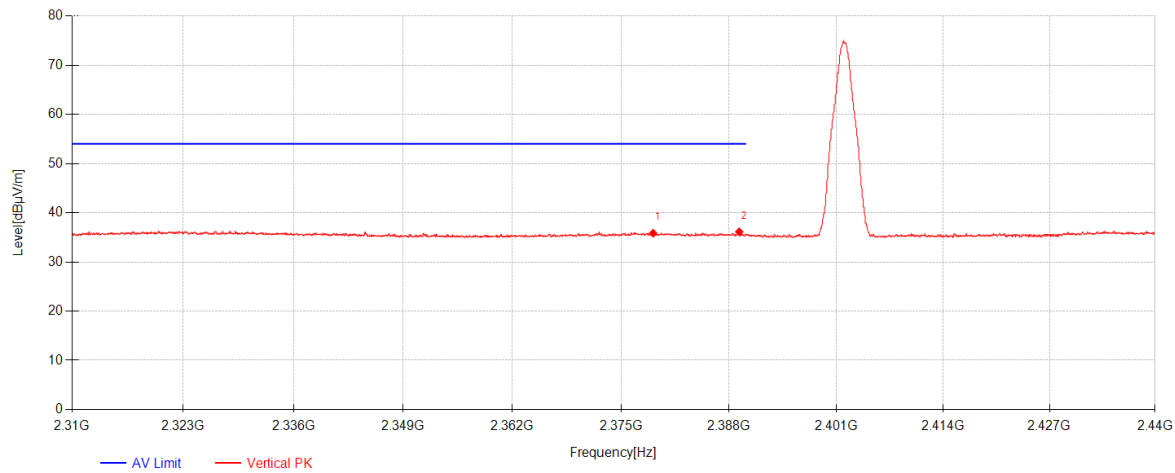
BLE_2M_TX_CH_00_Vertical_Peak



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2365.7267	45.35	26.96	-23.49	48.82	74.00	25.18	Vertical
2	2381.89	44.86	26.99	-23.51	48.34	74.00	25.66	Vertical

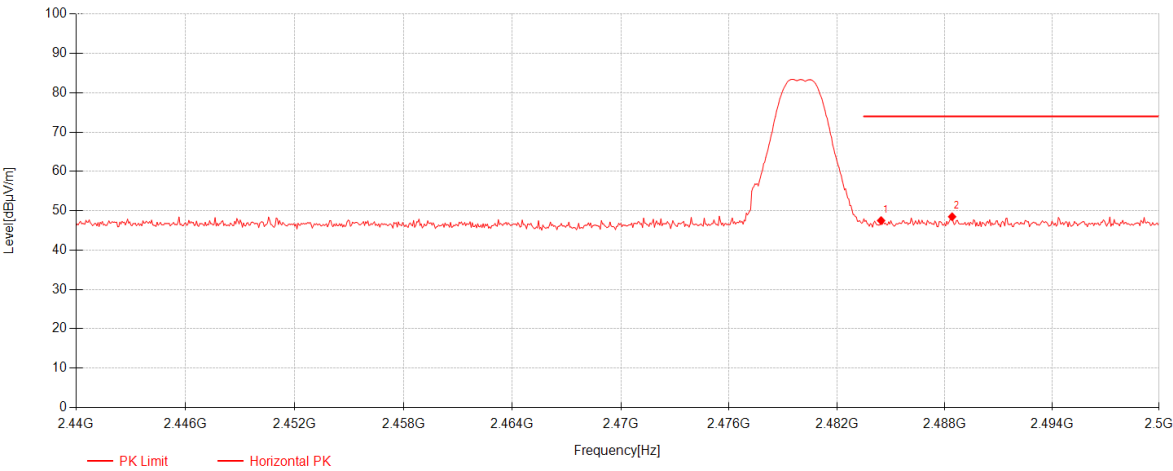


BLE_2M_TX_CH_00_Vertical_Average



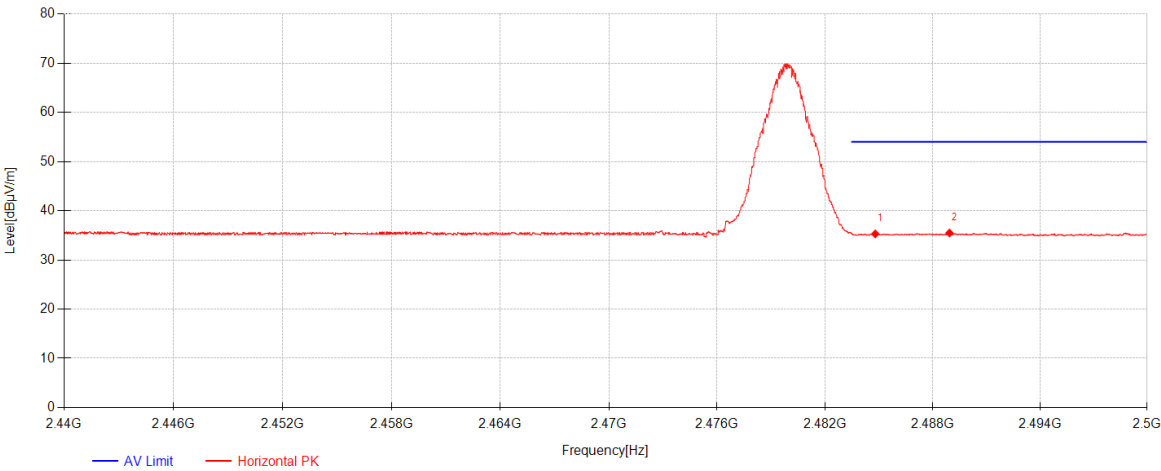
Data List								
NO.	Frequency [MHz]	Reading [dBµV]	AF [dB/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity
1	2378.8675	32.37	26.98	-23.50	35.85	54.00	18.15	Vertical
2	2389.235	32.65	27.00	-23.52	36.13	54.00	17.87	Vertical

BLE_2M_TX_CH_39_Horizontal_Peak



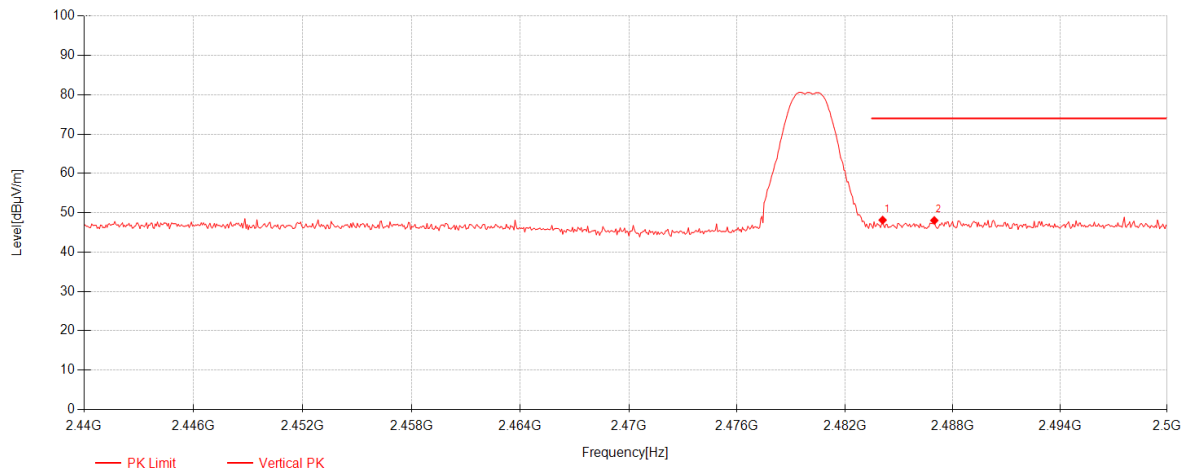
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.46	43.51	27.17	-23.18	47.51	74.00	26.49	Horizontal
2	2488.42	44.46	27.18	-23.16	48.48	74.00	25.52	Horizontal

BLE_2M_TX_CH_39_Horizontal_Average



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.805	31.30	27.17	-23.17	35.30	54.00	18.70	Horizontal
2	2488.945	31.46	27.18	-23.16	35.48	54.00	18.52	Horizontal

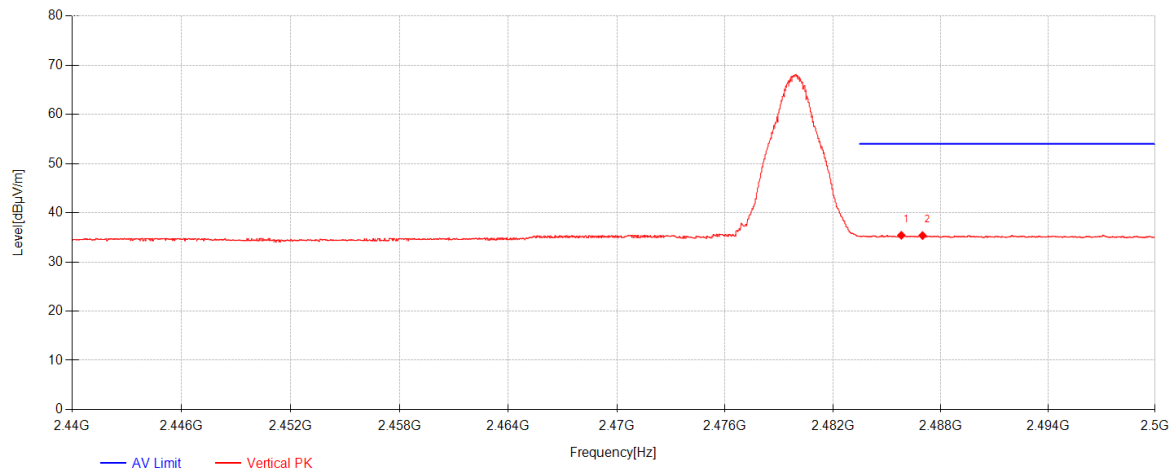
BLE_2M_TX_CH_39_Vertical_Peak



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2484.1	44.15	27.17	-23.18	48.14	74.00	25.86	Vertical
2	2486.98	44.03	27.18	-23.16	48.04	74.00	25.96	Vertical



BLE_2M_TX_CH_39_Vertical_Average



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2485.81	31.42	27.17	-23.17	35.42	54.00	18.58	Vertical
2	2486.995	31.36	27.18	-23.16	35.37	54.00	18.63	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 (2020) 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

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C

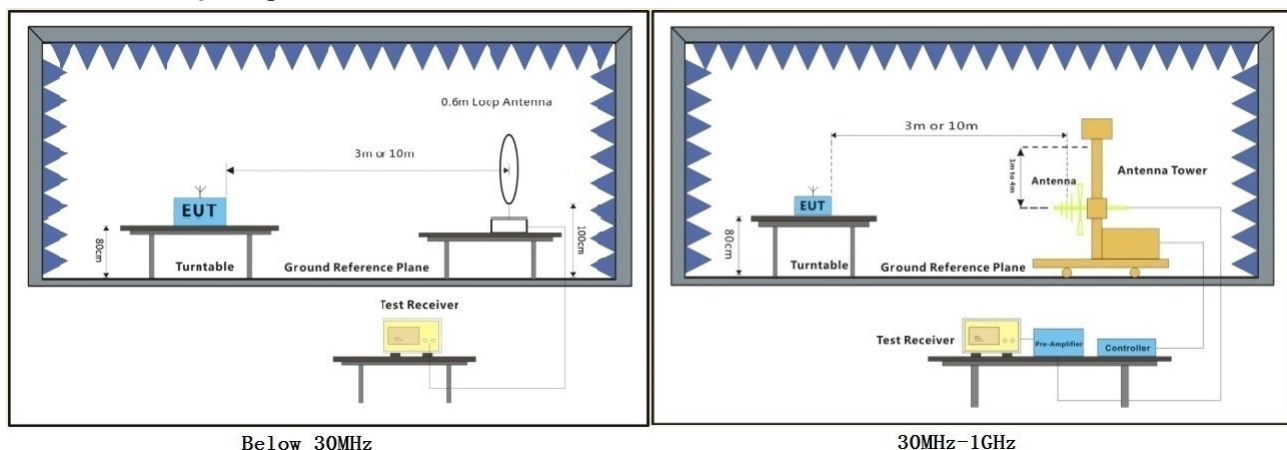
Humidity: 43 % RH

Atmospheric Pressure: 1001 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Pre-scan	01	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram



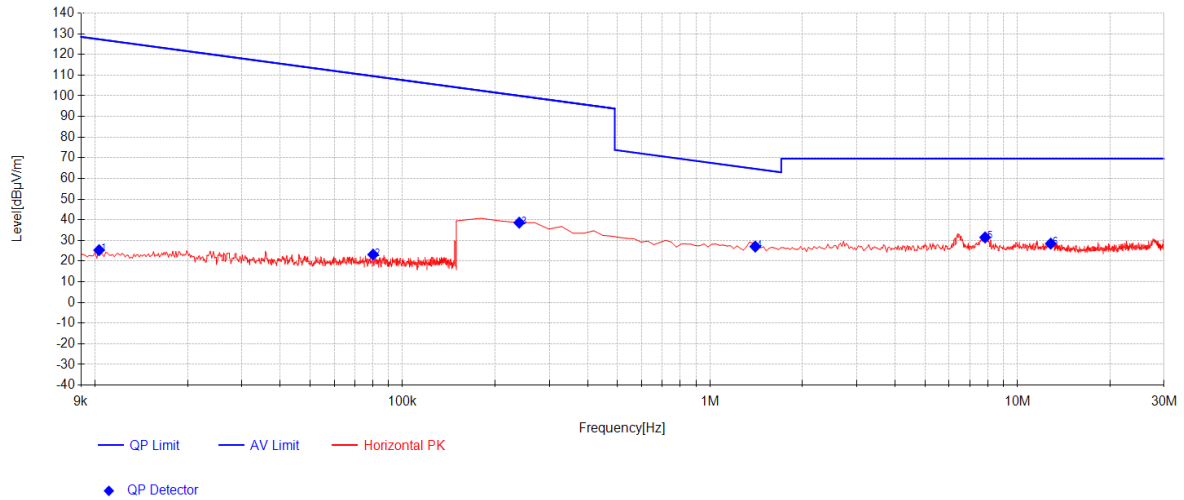
7.3.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-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 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:

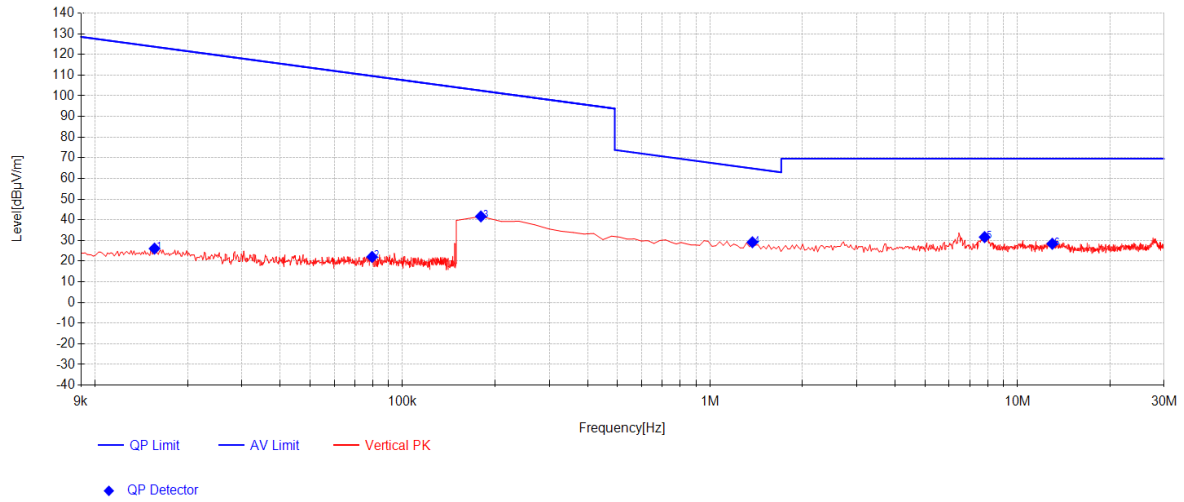
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Test Mode: 00; Polarity: Coaxial



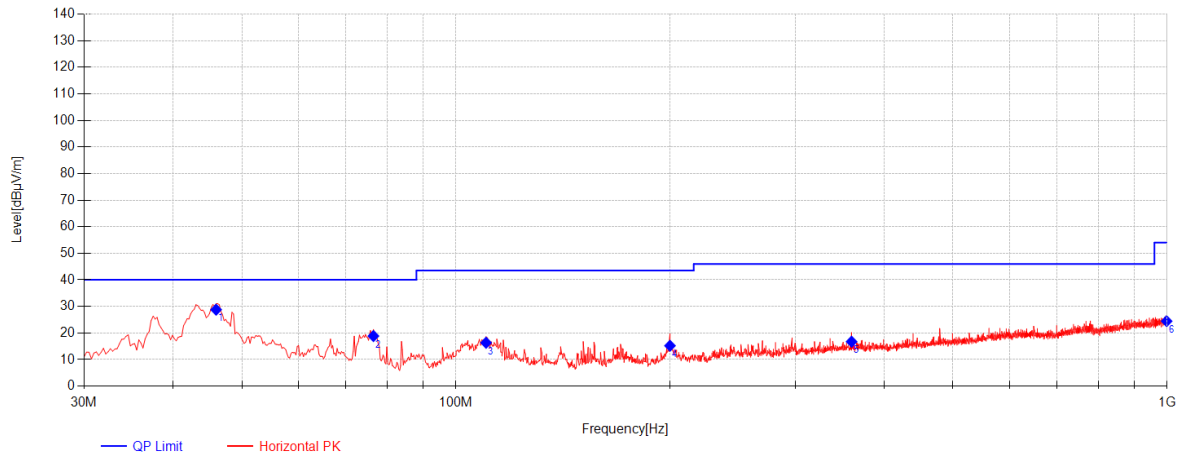
Final Data List										
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
4	1.4037	6.52	20.06	0.46	27.04	64.66	37.62	100	240	Coaxial
5	7.8513	10.67	20.21	0.58	31.46	69.54	38.08	100	30	Coaxial
6	12.8362	7.69	20.11	0.67	28.47	69.54	41.07	100	60	Coaxial
NO.	Frequency [MHz]	AV Reading [dBμV]	AF [dB/m]	Factor [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0103	5.19	19.70	0.43	25.32	127.34	102.02	100	360	Coaxial
2	0.0802	2.83	19.90	0.43	23.16	109.52	86.36	100	330	Coaxial
3	0.2396	18.25	19.93	0.43	38.61	100.01	61.40	100	90	Coaxial

Test Mode: 00; Polarity: Coplanar



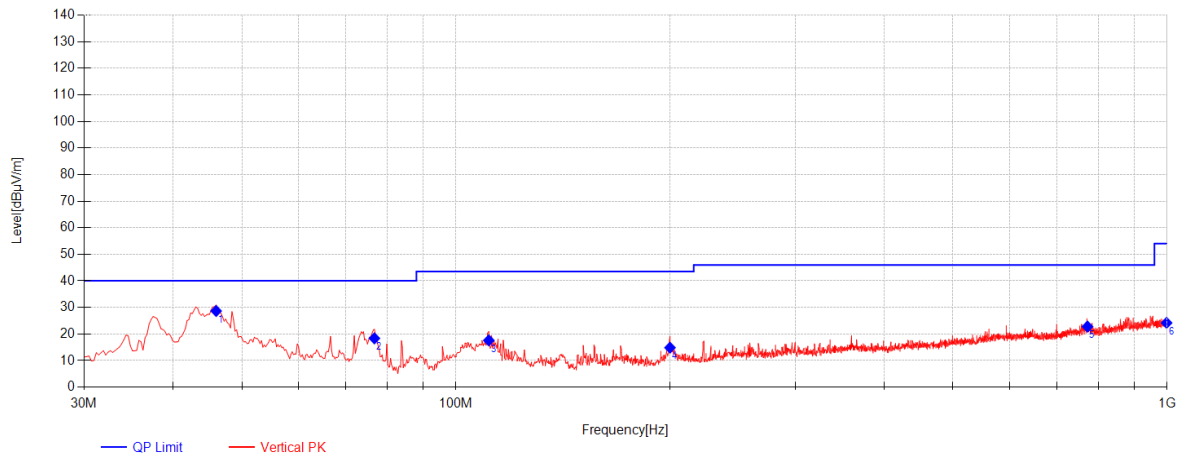
Final Data List										
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
4	1.3738	8.61	20.06	0.46	29.13	64.85	35.72	100	10	Coplanar
5	7.8214	10.82	20.22	0.58	31.62	69.54	37.92	100	100	Coplanar
6	12.9855	7.63	20.10	0.68	28.41	69.54	41.13	100	290	Coplanar
NO.	Frequency [MHz]	AV Reading [dBμV]	AF [dB/m]	Factor [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0156	5.94	19.70	0.43	26.07	123.73	97.66	100	10	Coplanar
2	0.0796	1.70	19.90	0.43	22.03	109.58	87.55	100	210	Coplanar
3	0.1798	21.28	19.91	0.43	41.62	102.51	60.89	100	120	Coplanar

Test Mode: 00; Polarity: Horizontal



Final Data List									
NO.	Frequency [MHz]	AF [dB/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	46.005	14.30	-41.06	28.77	40.00	11.23	192	206	Horizontal
2	76.56	8.54	-40.66	18.86	40.00	21.14	107	177	Horizontal
3	110.2675	12.25	-40.14	16.33	43.50	27.17	114	0	Horizontal
4	199.9925	16.47	-39.27	15.21	43.50	28.29	183	99	Horizontal
5	360.0425	14.80	-37.90	16.73	46.00	29.27	156	236	Horizontal
6	998.545	22.00	-33.70	24.45	54.00	29.55	199	129	Horizontal

Test Mode: 00; Polarity: Vertical



Final Data List									
NO.	Frequency [MHz]	AF [dB/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	46.005	14.30	-41.06	28.67	40.00	11.33	198	343	Vertical
2	76.8025	8.52	-40.65	18.37	40.00	21.63	173	199	Vertical
3	111.2375	12.03	-40.13	17.59	43.50	25.91	166	0	Vertical
4	199.9925	16.47	-39.27	14.84	43.50	28.66	102	31	Vertical
5	772.7775	19.70	-35.17	22.78	46.00	23.22	185	275	Vertical
6	998.545	22.00	-33.70	24.18	54.00	29.82	116	92	Vertical

Remark: All channels have been tested, but only the worst case data displayed in this report.

7.4 Radiated Spurious Emissions Above 1GHz

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

Test Method: ANSI C63.10 (2020) Section 6.6 & 11.12

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

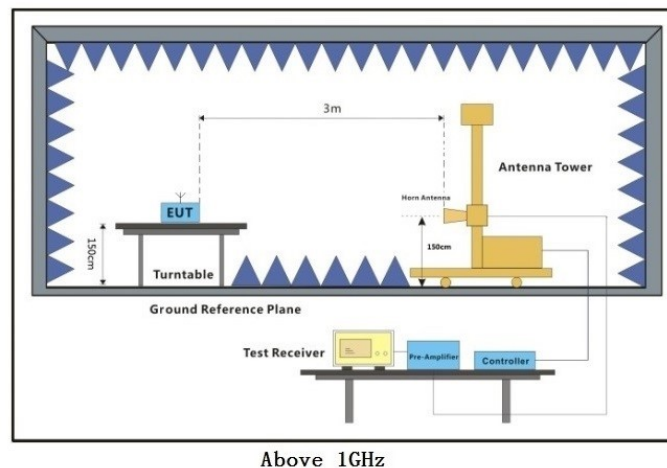
Humidity: 44 % RH

Atmospheric Pressure: 1001 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.3 Test Setup Diagram



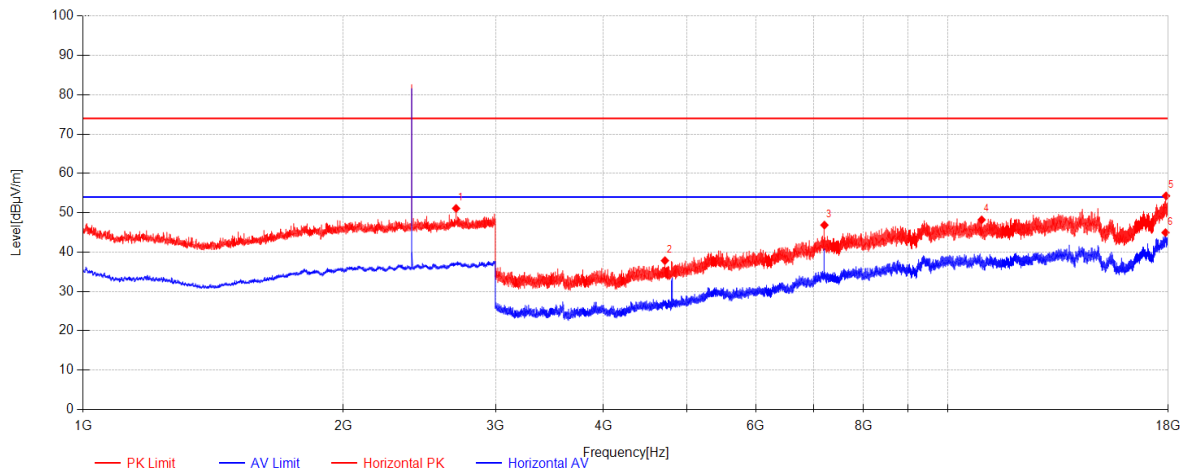
7.4.4 Measurement Procedure and Data

- 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 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:

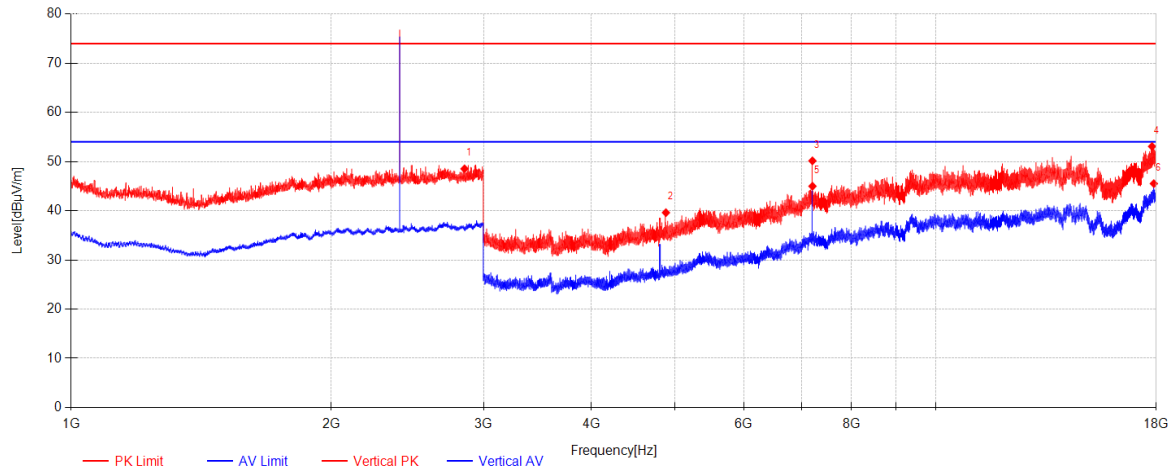
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

BLE_1M_TX_CH_00_Horizontal



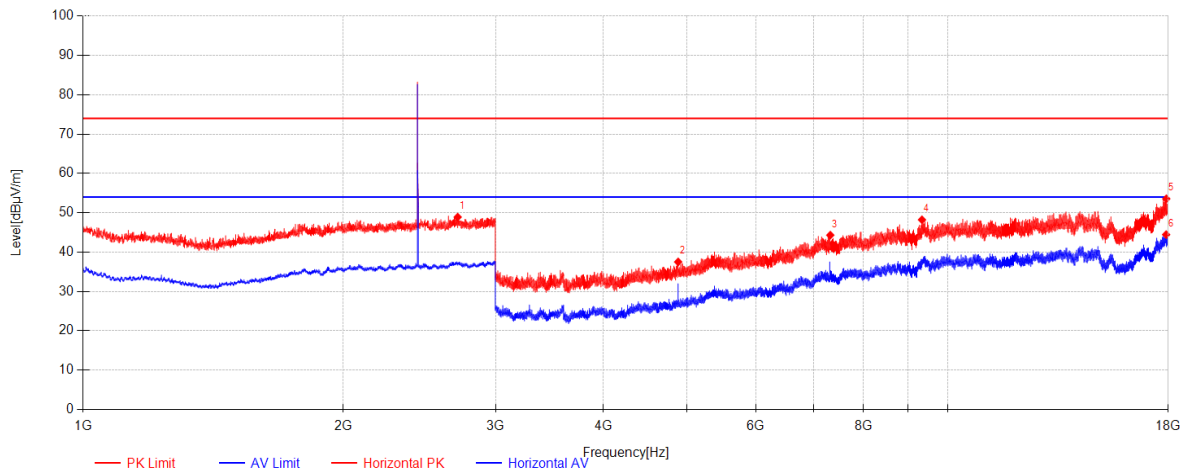
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2700.6667	46.51	27.56	-22.96	51.11	74.00	22.89	Horizontal
2	4711.5	55.23	30.57	-47.97	37.83	74.00	36.17	Horizontal
3	7206.75	57.20	35.87	-46.20	46.87	74.00	27.13	Horizontal
4	10956	49.13	39.47	-40.40	48.20	74.00	25.80	Horizontal
5	17909.25	48.25	44.26	-38.22	54.29	74.00	19.71	Horizontal
6	17881.875	39.03	44.09	-38.16	44.96	54.00	9.04	Horizontal

BLE_1M_TX_CH_00_Vertical



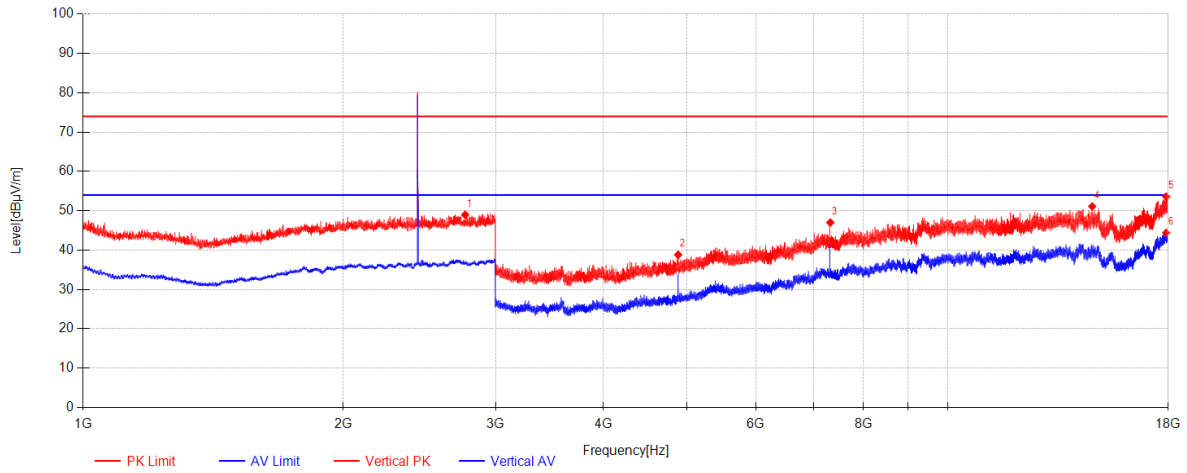
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2851.6667	43.83	27.83	-23.13	48.53	74.00	25.47	Vertical
2	4877.25	56.72	30.93	-48.03	39.62	74.00	34.38	Vertical
3	7206	60.48	35.87	-46.20	50.15	74.00	23.85	Vertical
4	17811.375	47.60	43.67	-38.19	53.08	74.00	20.92	Vertical
5	7206.375	55.32	35.87	-46.20	44.99	54.00	9.01	Vertical
6	17896.875	39.49	44.18	-38.15	45.52	54.00	8.48	Vertical

BLE_1M_TX_CH_19_Horizontal



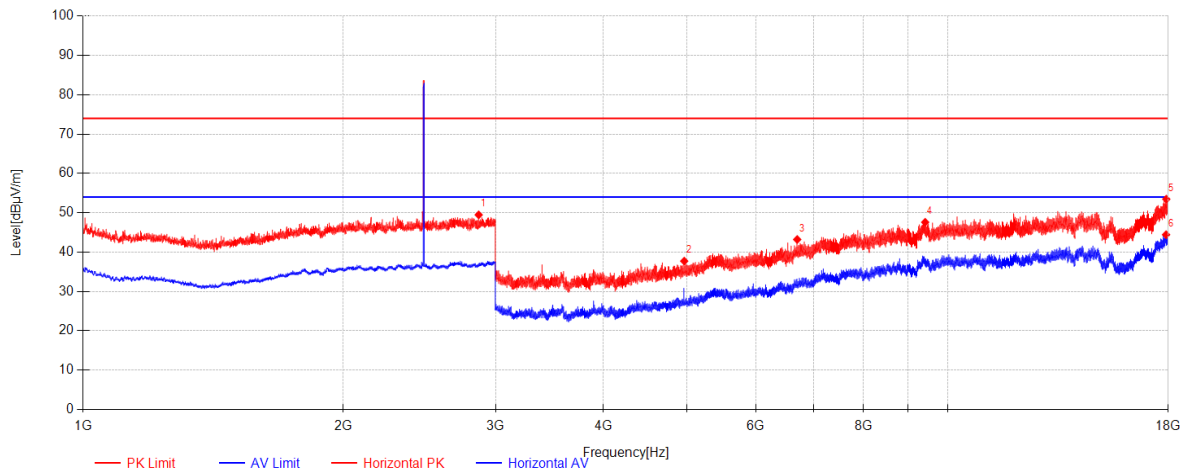
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2712	44.31	27.58	-23.00	48.89	74.00	25.11	Horizontal
2	4880.25	54.60	30.94	-48.03	37.51	74.00	36.49	Horizontal
3	7319.625	54.40	36.08	-46.16	44.31	74.00	29.69	Horizontal
4	9345.375	53.28	37.88	-42.96	48.21	74.00	25.79	Horizontal
5	17919.375	47.54	44.32	-38.30	53.56	74.00	20.44	Horizontal
6	17912.25	38.41	44.27	-38.24	44.44	54.00	9.56	Horizontal

BLE_1M_TX_CH_19_Vertical



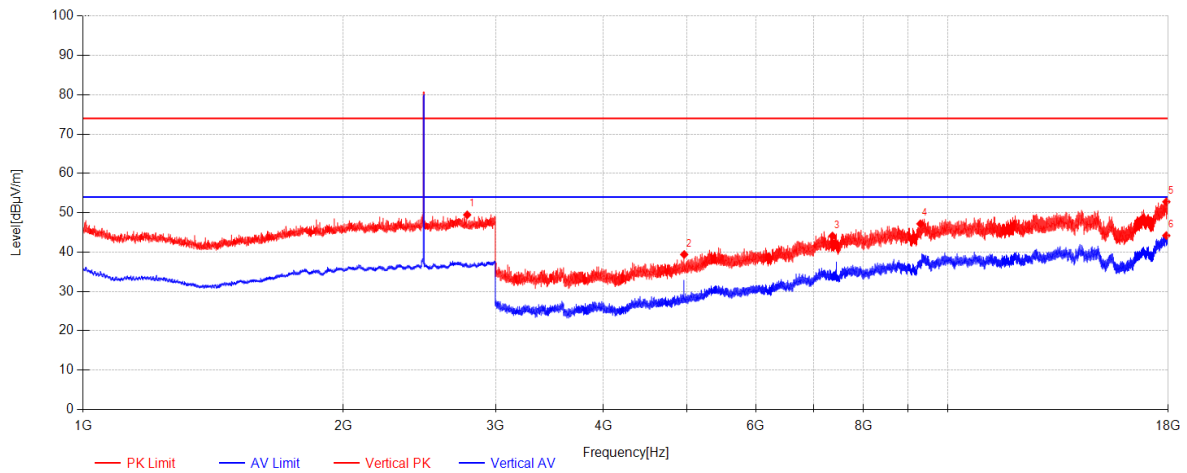
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2767	44.46	27.68	-23.17	48.97	74.00	25.03	Vertical
2	4880.25	55.90	30.94	-48.03	38.81	74.00	35.19	Vertical
3	7320	57.09	36.08	-46.16	47.00	74.00	27.00	Vertical
4	14710.5	47.58	40.23	-36.70	51.11	74.00	22.89	Vertical
5	17917.125	47.56	44.30	-38.28	53.58	74.00	20.42	Vertical
6	17912.625	38.36	44.28	-38.24	44.39	54.00	9.61	Vertical

BLE_1M_TX_CH_39_Horizontal



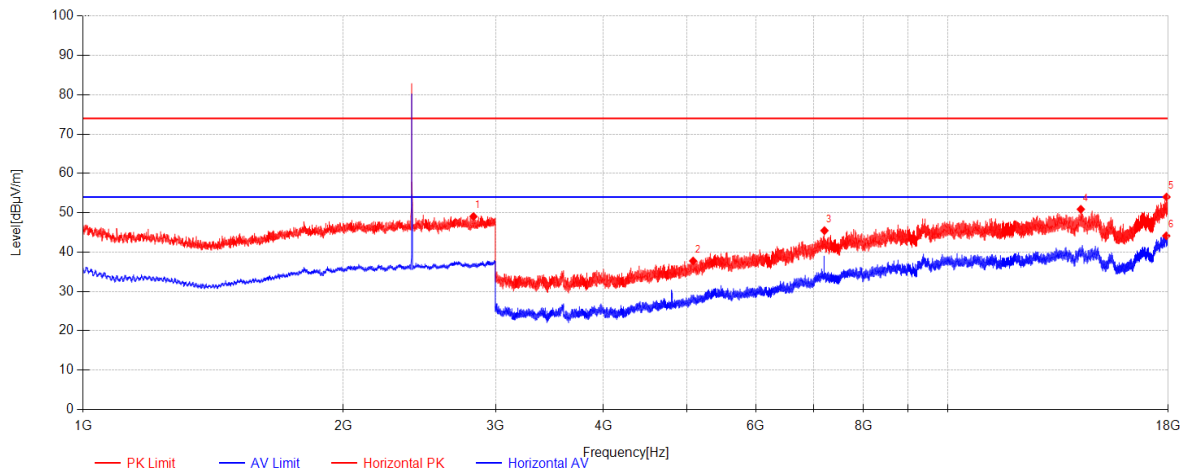
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2868.3333	44.69	27.86	-23.08	49.47	74.00	24.53	Horizontal
2	4959.75	54.62	31.11	-48.02	37.71	74.00	36.29	Horizontal
3	6702	54.74	35.02	-46.56	43.21	74.00	30.79	Horizontal
4	9424.875	52.48	37.99	-42.88	47.59	74.00	26.41	Horizontal
5	17918.625	47.44	44.31	-38.29	53.46	74.00	20.54	Horizontal
6	17908.125	38.38	44.25	-38.21	44.42	54.00	9.58	Horizontal

BLE_1M_TX_CH_39_Verical



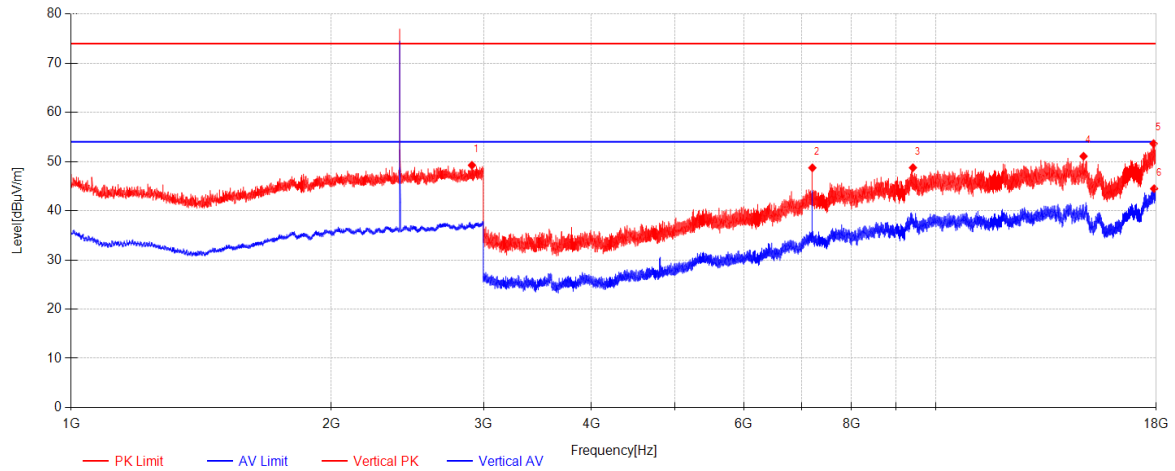
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2781.6667	44.99	27.71	-23.22	49.48	74.00	24.52	Vertical
2	4959.375	56.30	31.11	-48.02	39.39	74.00	34.61	Vertical
3	7362.75	54.10	36.15	-46.17	44.09	74.00	29.91	Vertical
4	9306.75	52.25	37.83	-42.89	47.19	74.00	26.81	Vertical
5	17924.25	46.78	44.35	-38.33	52.79	74.00	21.21	Vertical
6	17919.375	38.18	44.32	-38.30	44.20	54.00	9.80	Vertical

BLE_2M_TX_CH_00_Horizontal



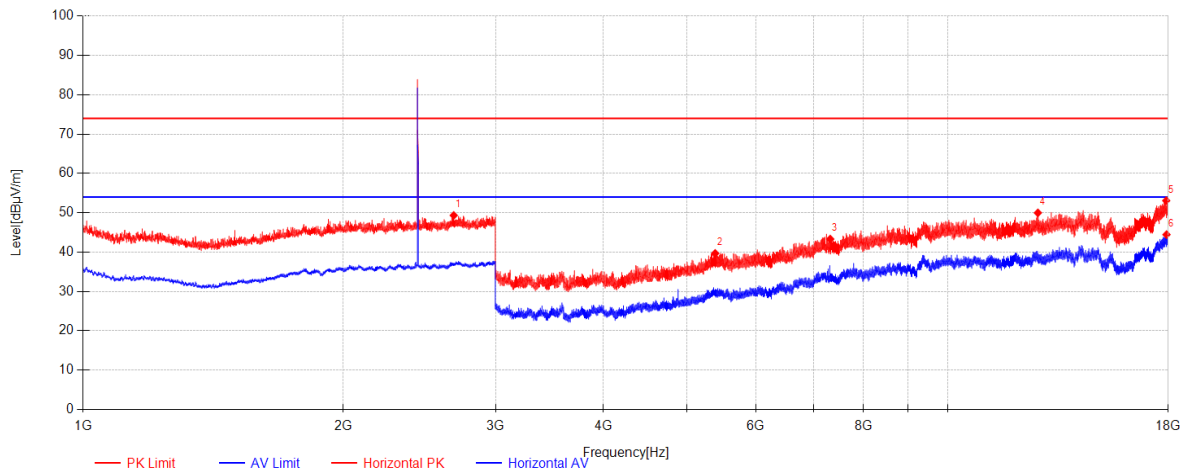
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2828.6667	44.46	27.79	-23.20	49.05	74.00	24.95	Horizontal
2	5078.625	54.20	31.42	-47.86	37.76	74.00	36.24	Horizontal
3	7207.125	55.79	35.87	-46.20	45.47	74.00	28.53	Horizontal
4	14269.5	49.11	40.27	-38.49	50.89	74.00	23.11	Horizontal
5	17930.25	48.00	44.38	-38.38	54.00	74.00	20.00	Horizontal
6	17917.125	38.11	44.30	-38.28	44.13	54.00	9.87	Horizontal

BLE_2M_TX_CH_00_Vetical



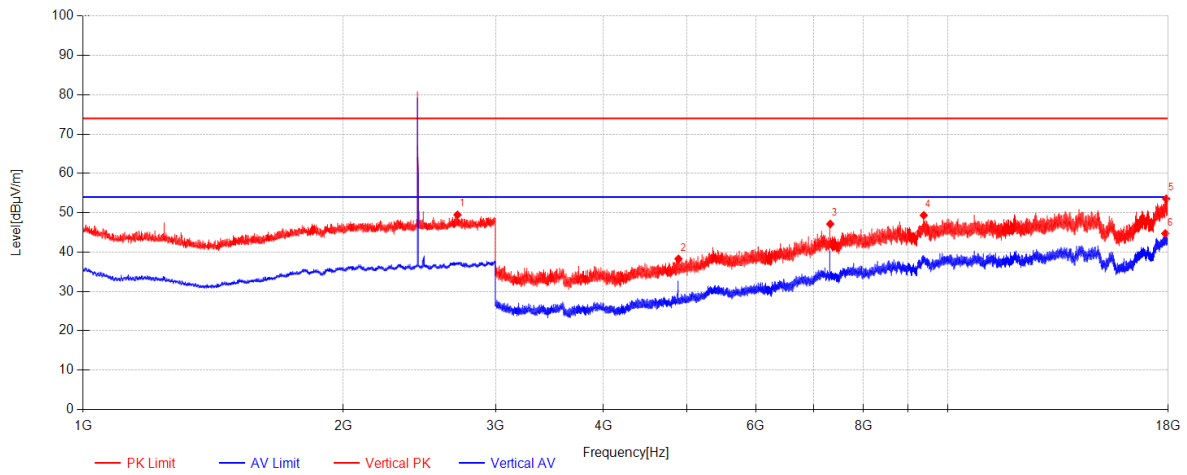
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2908.6667	44.28	27.94	-22.95	49.26	74.00	24.74	Vertical
2	7205.625	59.06	35.87	-46.20	48.73	74.00	25.27	Vertical
3	9419.25	53.69	37.99	-42.92	48.76	74.00	25.24	Vertical
4	14841	47.93	40.22	-37.06	51.08	74.00	22.92	Vertical
5	17884.5	47.71	44.11	-38.16	53.66	74.00	20.34	Vertical
6	17909.25	38.45	44.26	-38.22	44.49	54.00	9.51	Vertical

BLE_2M_TX_CH_19_Horizontal



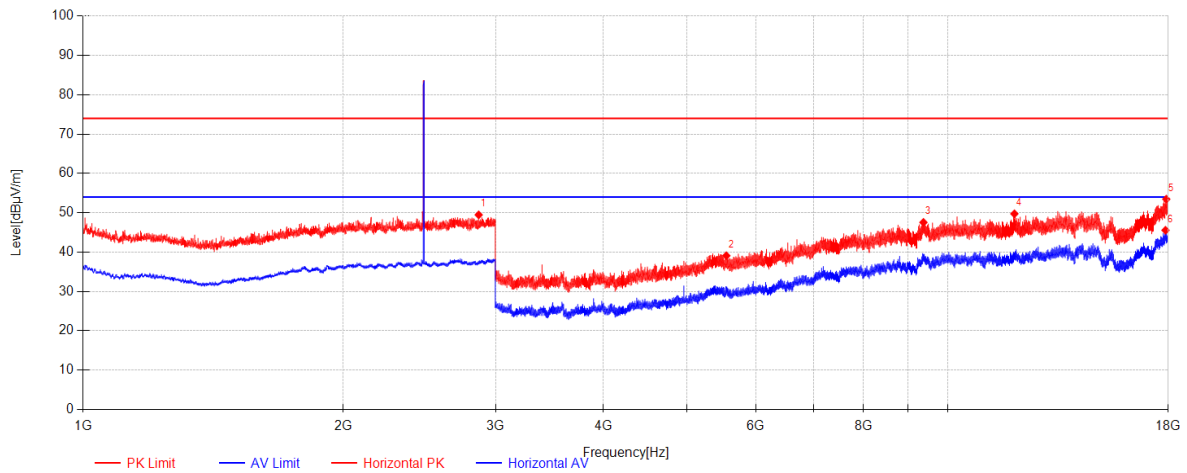
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2683.6667	44.88	27.53	-23.08	49.33	74.00	24.67	Horizontal
2	5385.75	55.12	32.28	-47.73	39.67	74.00	34.33	Horizontal
3	7318.125	53.41	36.07	-46.16	43.32	74.00	30.68	Horizontal
4	12726.375	50.29	38.96	-39.28	49.98	74.00	24.02	Horizontal
5	17915.625	47.05	44.29	-38.27	53.08	74.00	20.92	Horizontal
6	17928.375	38.43	44.37	-38.36	44.44	54.00	9.56	Horizontal

BLE_2M_TX_CH_19_Vertica



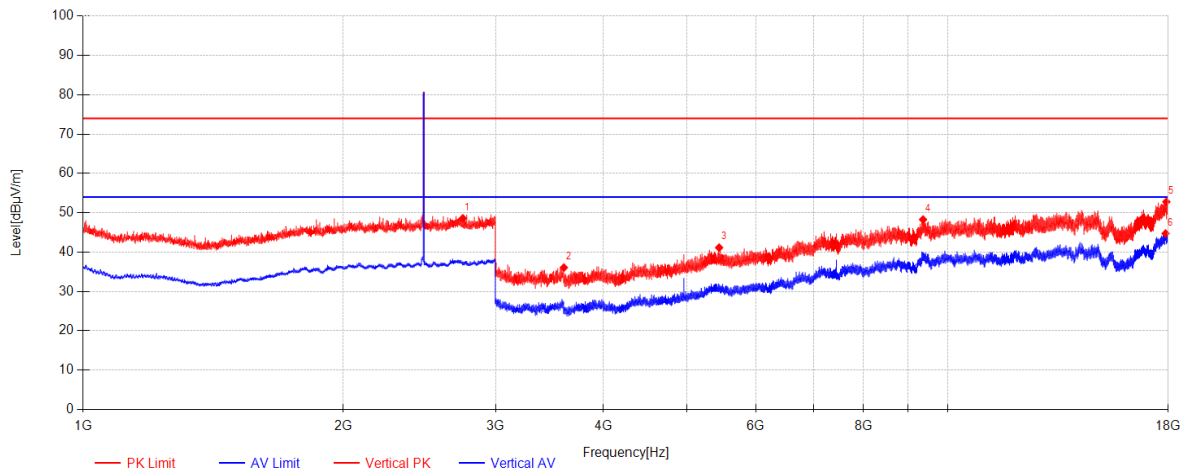
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2710.6667	44.89	27.58	-22.99	49.48	74.00	24.52	Vertical
2	4884.375	55.37	30.95	-48.03	38.29	74.00	35.71	Vertical
3	7318.5	57.24	36.07	-46.16	47.15	74.00	26.85	Vertical
4	9389.25	54.44	37.94	-43.03	49.35	74.00	24.65	Vertical
5	17917.125	47.53	44.30	-38.28	53.55	74.00	20.45	Vertical
6	17871.75	38.86	44.03	-38.16	44.73	54.00	9.27	Vertical

BLE_2M_TX_CH_39_Horizontal



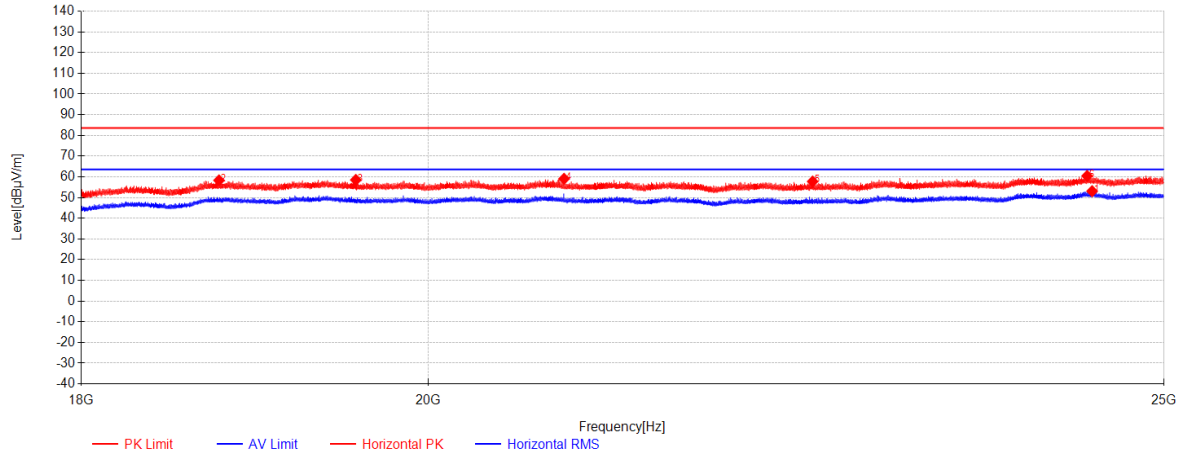
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2868.3333	44.69	27.86	-23.08	49.47	74.00	24.53	Horizontal
2	5548.875	54.12	32.62	-47.65	39.09	74.00	34.91	Horizontal
3	9382.125	52.63	37.93	-43.02	47.55	74.00	26.45	Horizontal
4	11955	50.01	39.40	-39.68	49.74	74.00	24.26	Horizontal
5	17918.625	47.44	44.31	-38.29	53.46	74.00	20.54	Horizontal
6	17879.625	39.63	44.08	-38.16	45.55	54.00	8.45	Horizontal

BLE_2M_TX_CH_39_Vertical



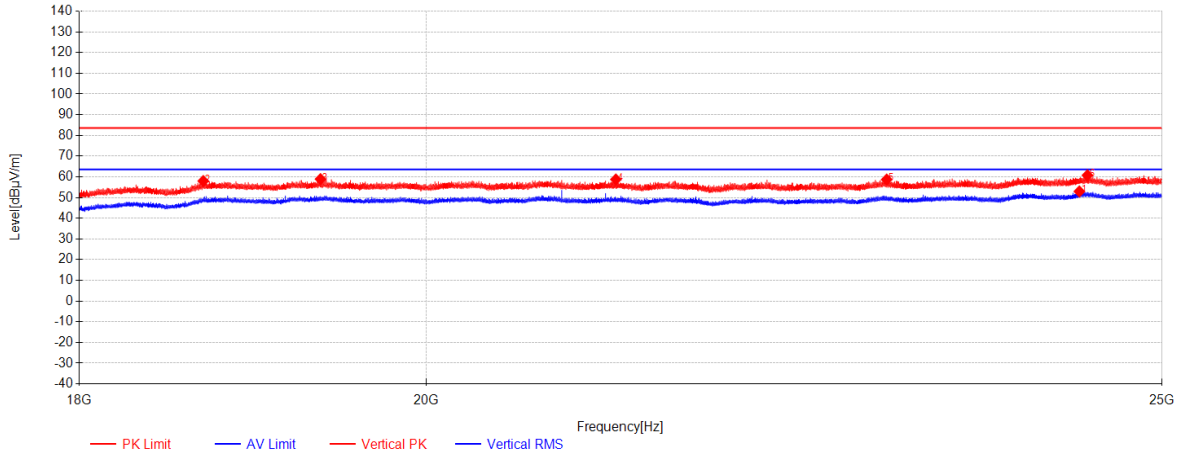
Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2749.6667	44.06	27.65	-23.12	48.59	74.00	25.41	Vertical
2	3599.25	55.69	28.66	-48.28	36.07	74.00	37.93	Vertical
3	5442.75	56.37	32.44	-47.67	41.14	74.00	32.86	Vertical
4	9371.25	53.35	37.92	-43.00	48.27	74.00	25.73	Vertical
5	17924.25	46.78	44.35	-38.33	52.79	74.00	21.21	Vertical
6	17884.125	38.78	44.10	-38.16	44.73	54.00	9.27	Vertical

BLE_2M_TX_CH_19_Horizontal



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	24460.125	37.84	39.39	-24.16	53.07	63.54	6.47	Horizontal
2	18769.125	48.50	38.12	-28.33	58.28	83.54	21.26	Horizontal
3	19564.325	48.26	38.66	-28.42	58.50	83.54	21.04	Horizontal
4	20839.9	47.38	38.28	-26.61	59.05	83.54	20.49	Horizontal
5	22471.95	45.93	37.78	-25.97	57.74	83.54	21.80	Horizontal
6	24423.2	45.05	39.38	-23.99	60.44	83.54	19.10	Horizontal

BLE_2M_TX_CH_19_Vertical



Data List								
NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	24380.5	37.58	39.38	-24.00	52.95	63.54	6.59	Vertical
2	18691.25	48.45	37.95	-28.42	57.98	83.54	21.56	Vertical
3	19367.625	48.40	38.64	-28.14	58.90	83.54	20.64	Vertical
4	21182.9	46.93	38.07	-26.26	58.74	83.54	20.80	Vertical
5	22996.6	45.54	38.10	-24.95	58.69	83.54	20.85	Vertical
6	24440.175	45.43	39.39	-24.07	60.75	83.54	18.79	Vertical

Remark: For radiated spurious emissions above 18 GHz, all channels have been tested and only the worst-case data is presented in this report.

7.5 Maximum Conducted Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2020) 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: 25.3 °C

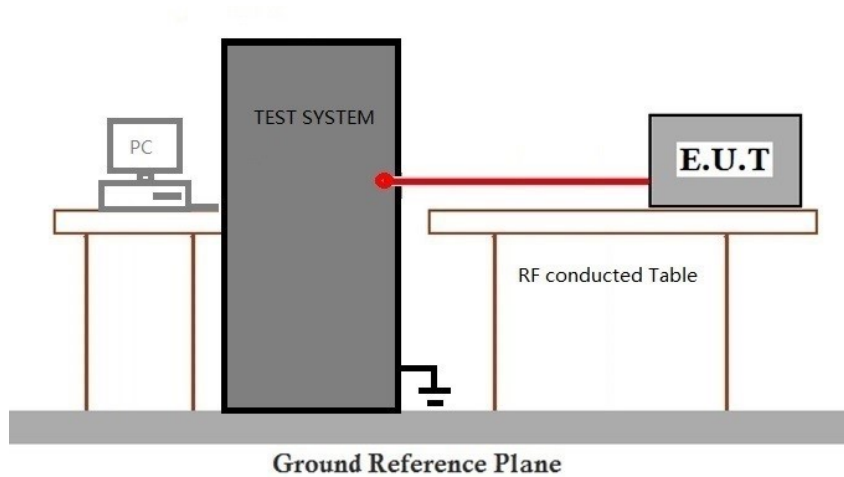
Humidity: 57.3 % RH

Atmospheric Pressure: 1001 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	02	TX mode(125K)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(500K)_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 (2020) Section 11.8.1

Limit: ≥ 500 kHz

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 25.3 °C

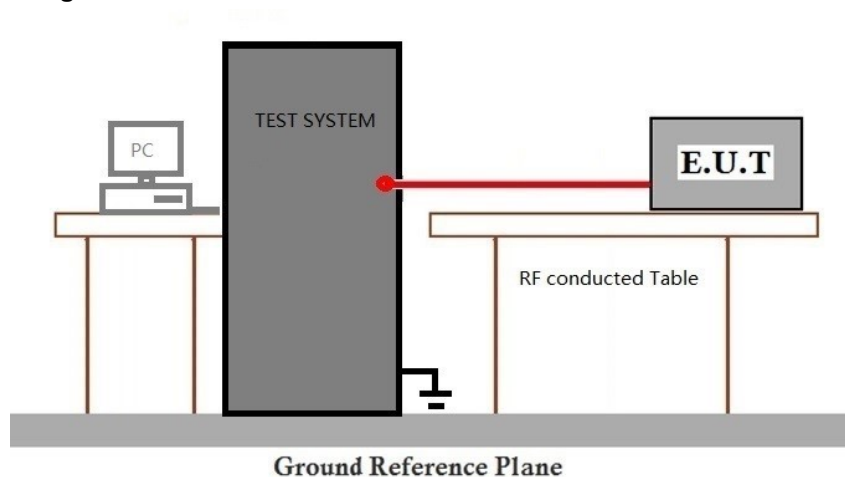
Humidity: 57.3 % RH

Atmospheric Pressure: 1001 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	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 Power Spectral Density

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

Test Method: ANSI C63.10 (2020) 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: 25.3 °C

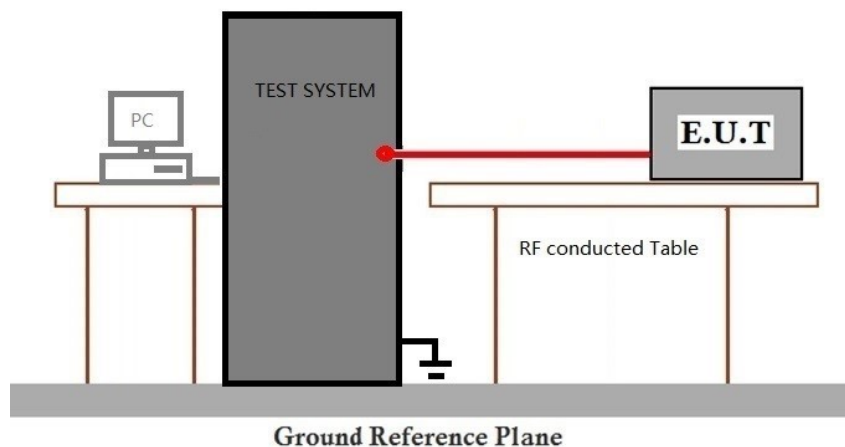
Humidity: 57.3 % RH

Atmospheric Pressure: 1001 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	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

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 (2020) Section 6.10.4

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: 25.3 °C

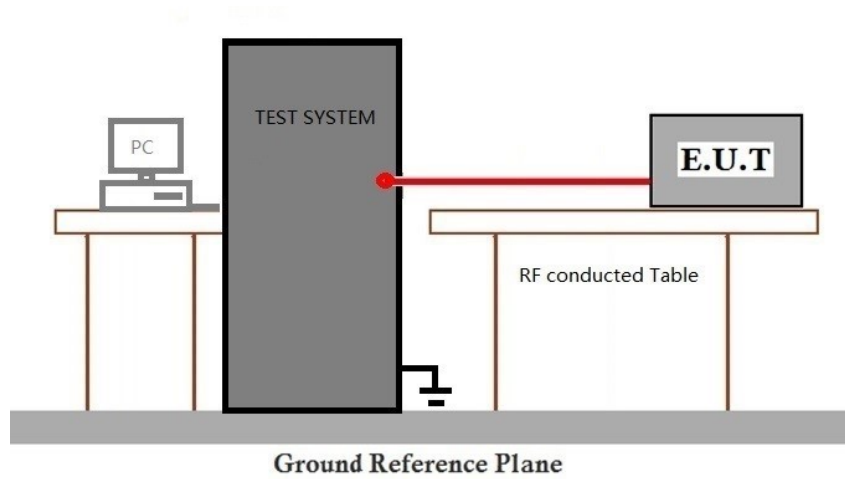
Humidity: 57.3 % RH

Atmospheric Pressure: 1001 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	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

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 (2020) 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: 25.3 °C

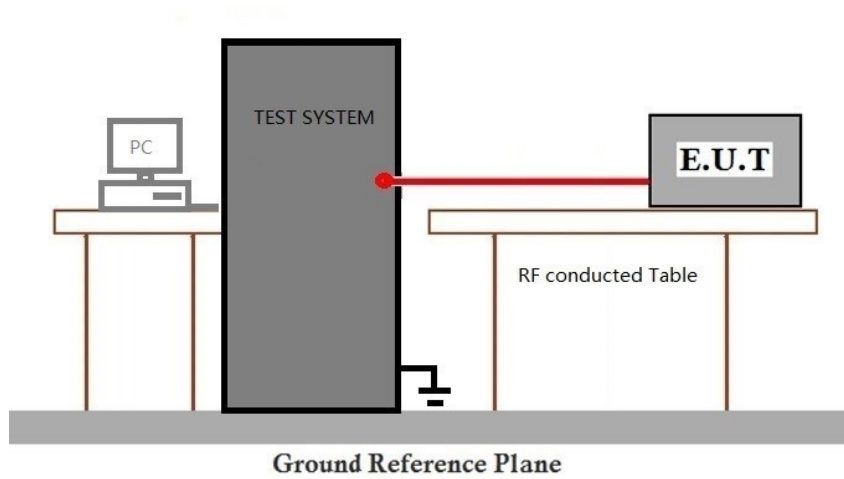
Humidity: 57.3 % RH

Atmospheric Pressure: 1001 mbar

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	01	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.9.3 Test Setup Diagram



7.9.4 Measurement Procedure and Data

Please Refer to Appendix for Details



Report No.: SUCR251200123801

Page: 63 of 85

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SUCR2512001238MO

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - External Photos for SUCR2512001238MO and Appendix - Internal Photos for SUCR2512001238MO



10 Appendix

1. Duty Cycle

1.1 Test Result

1.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.394	0.626	62.94	2.01	0.04
2M	SISO	2402	0.209	0.625	33.44	4.76	0.31



2. Bandwidth

2.1 Test Result

2.1.1 OBW

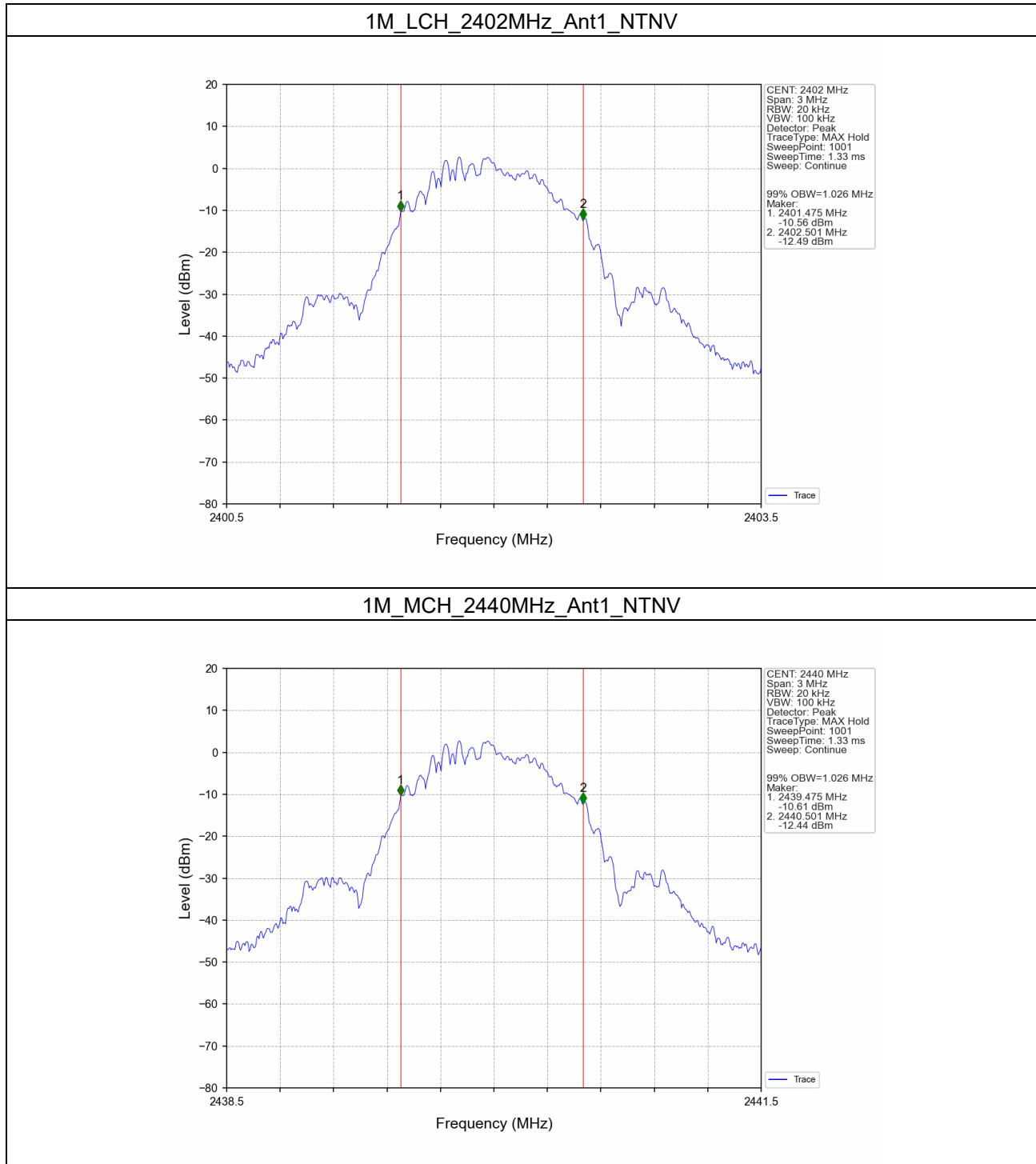
Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	1.026	/	Pass
		2440	1	1.026	/	Pass
		2480	1	1.025	/	Pass
2M	SISO	2402	1	2.074	/	Pass
		2440	1	2.079	/	Pass
		2480	1	2.083	/	Pass

2.1.2 6dB BW

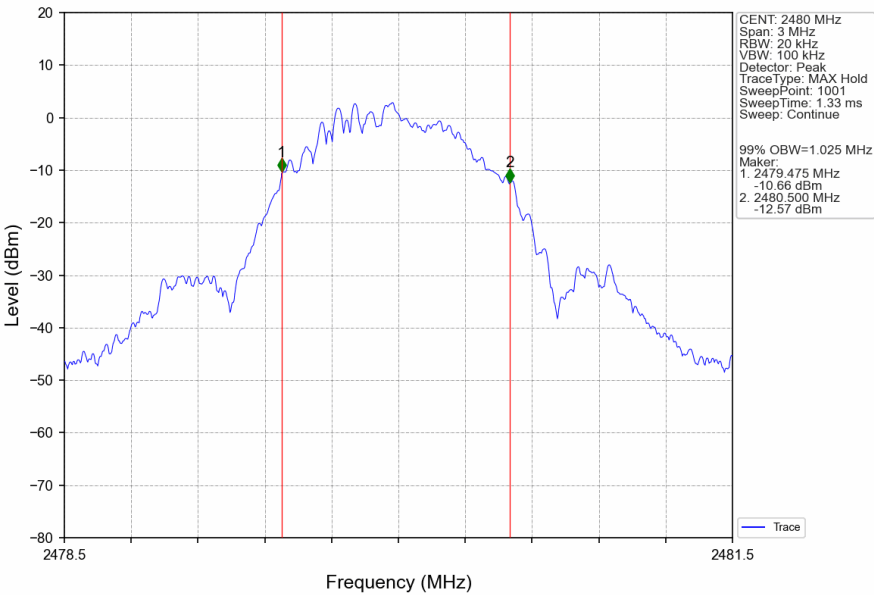
Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.676	≥ 0.5	Pass
		2440	1	0.675	≥ 0.5	Pass
		2480	1	0.670	≥ 0.5	Pass
2M	SISO	2402	1	1.130	≥ 0.5	Pass
		2440	1	1.125	≥ 0.5	Pass
		2480	1	1.126	≥ 0.5	Pass

2.2 Test Graph

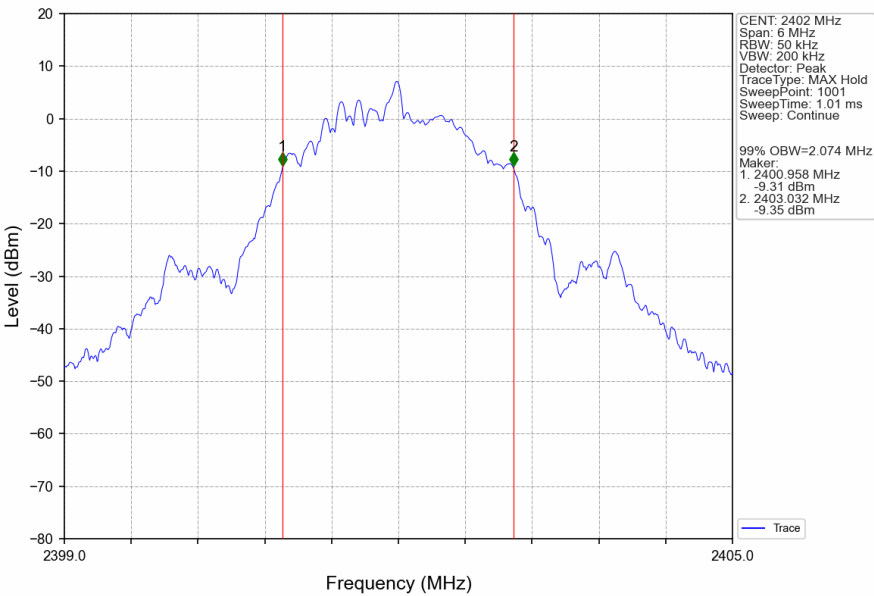
2.2.1 OBW



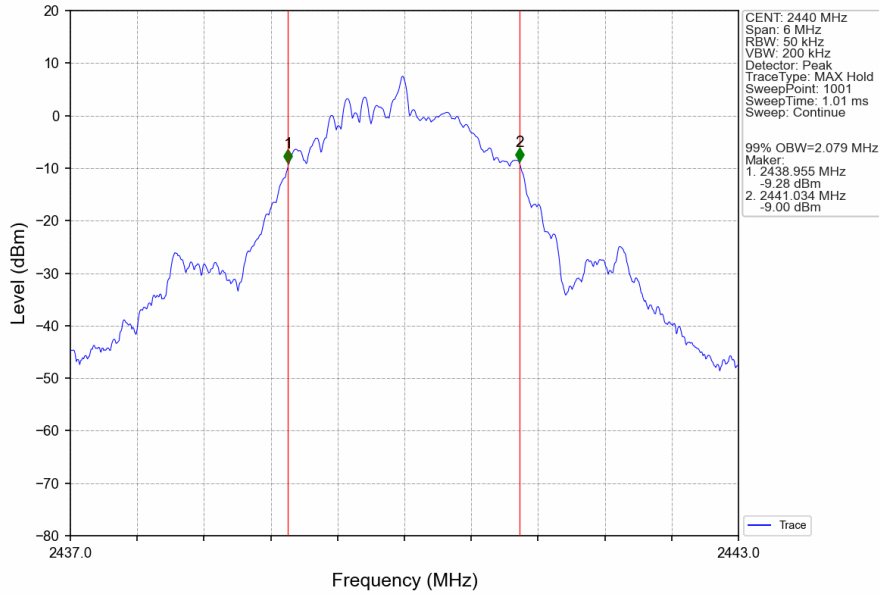
1M_HCH_2480MHz_Ant1_NTNV



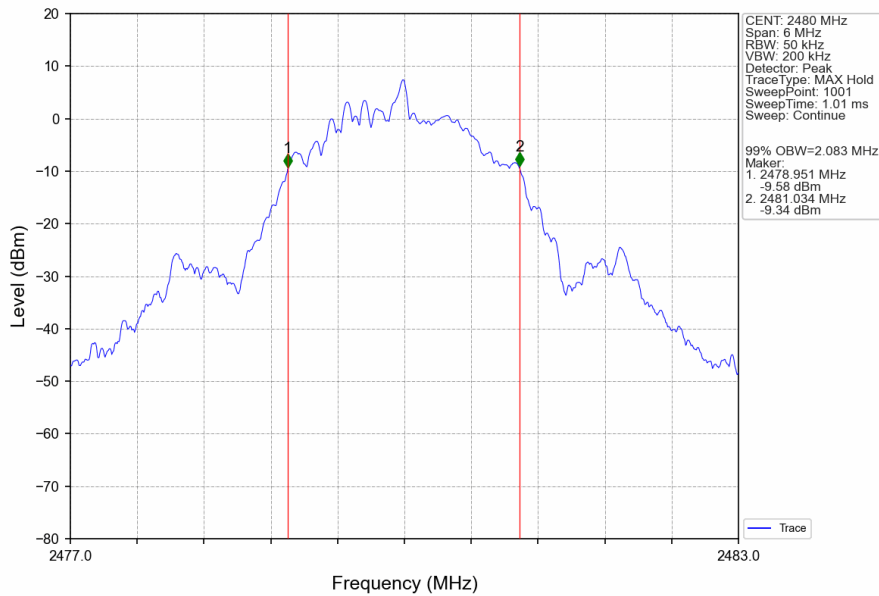
2M_LCH_2402MHz_Ant1_NTNV



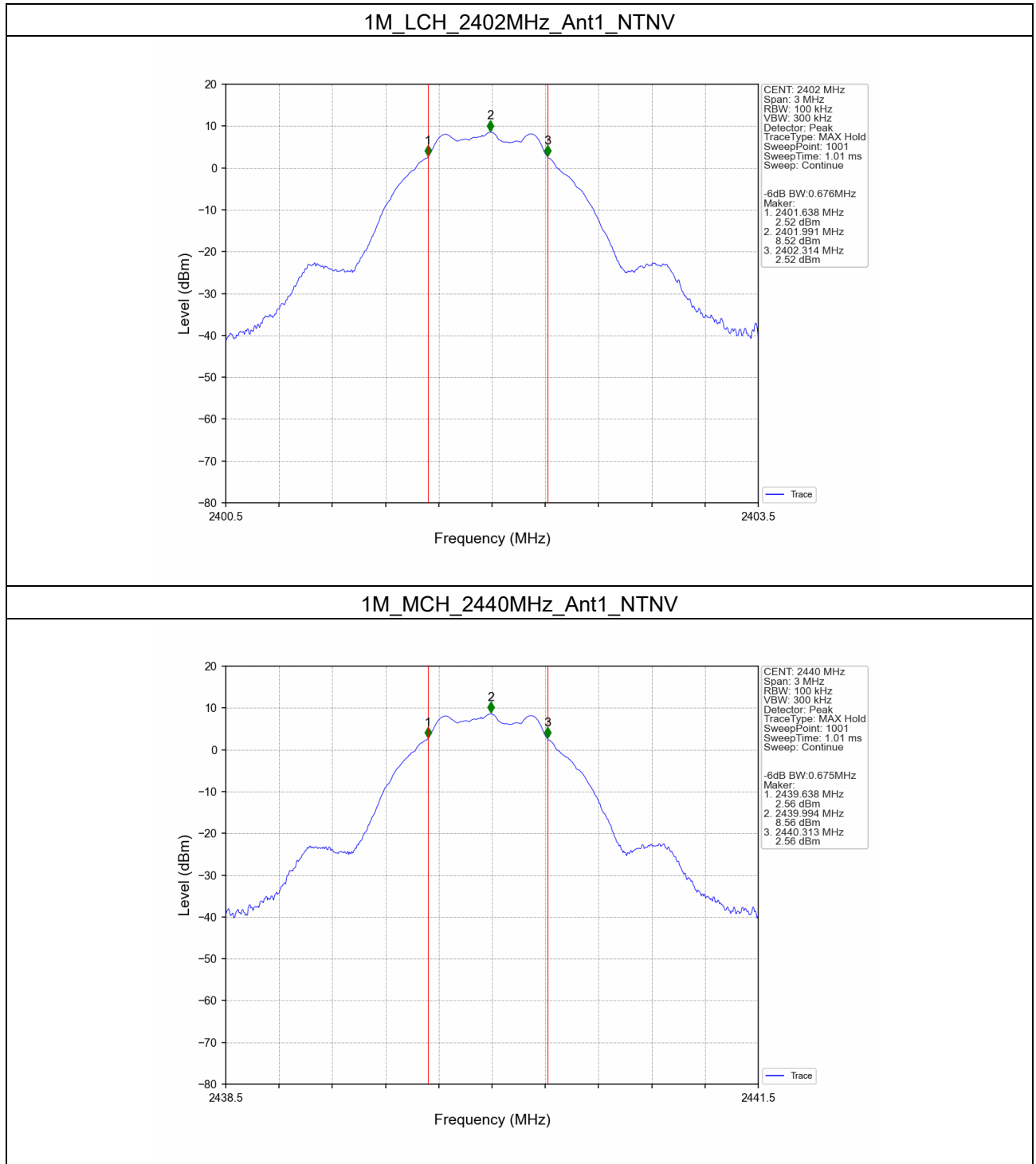
2M_MCH_2440MHz_Ant1_NTNV



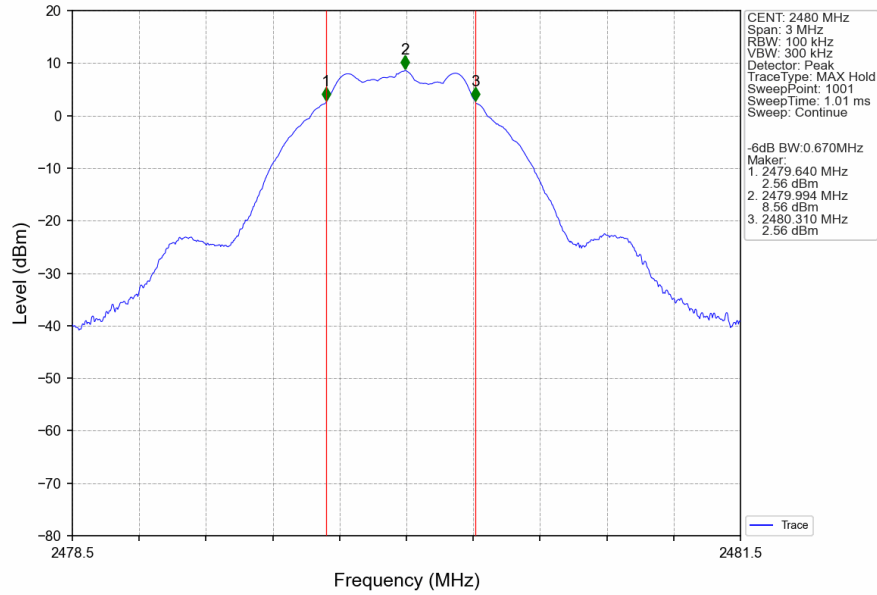
2M_HCH_2480MHz_Ant1_NTNV



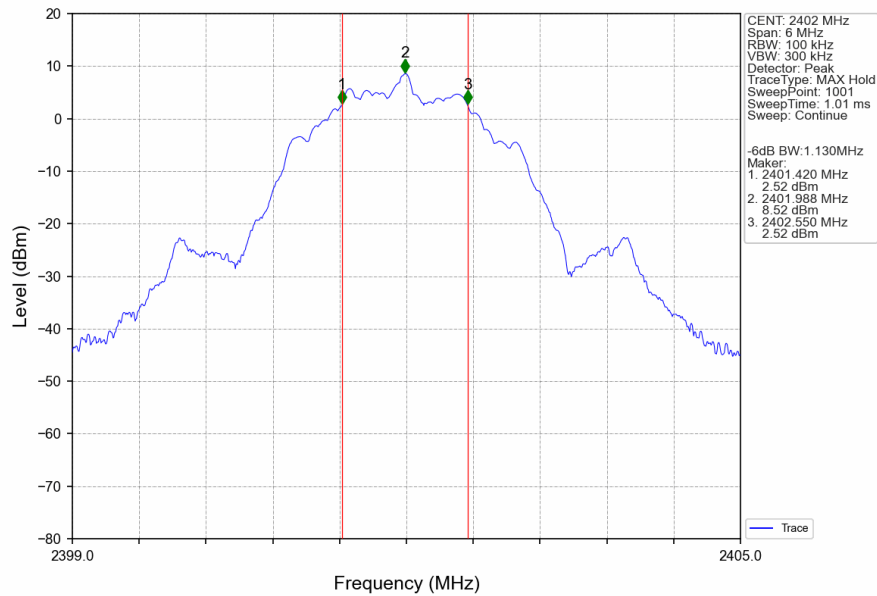
2.2.2 6dB BW



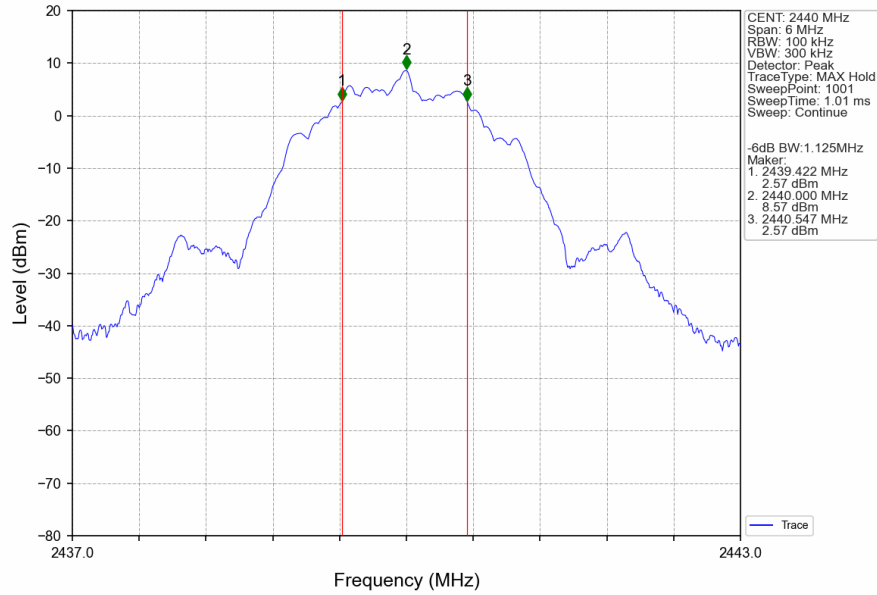
1M_HCH_2480MHz_Ant1_NTNV



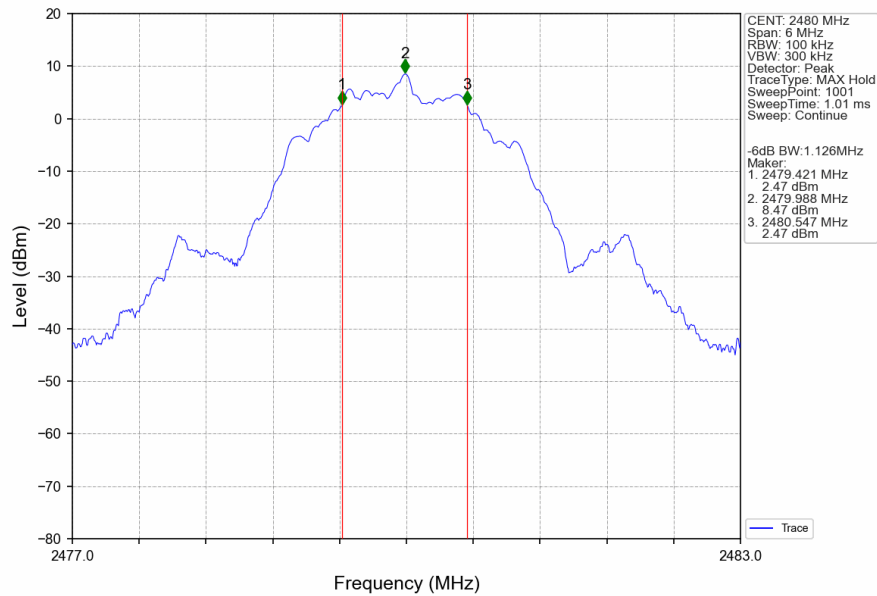
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV





3. Maximum Conducted Output Power

3.1 Test Result

3.1.1 Power

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
S8	SISO	2402	7.95	<=30	Pass
		2440	8.03	<=30	Pass
		2480	7.97	<=30	Pass
S2	SISO	2402	7.97	<=30	Pass
		2440	8.04	<=30	Pass
		2480	7.97	<=30	Pass
1M	SISO	2402	8.92	<=30	Pass
		2440	8.95	<=30	Pass
		2480	8.86	<=30	Pass
2M	SISO	2402	8.98	<=30	Pass
		2440	8.98	<=30	Pass
		2480	8.91	<=30	Pass
Note1: Antenna Gain: Ant1: 0.20dBi;					



4. Maximum Power Spectral Density

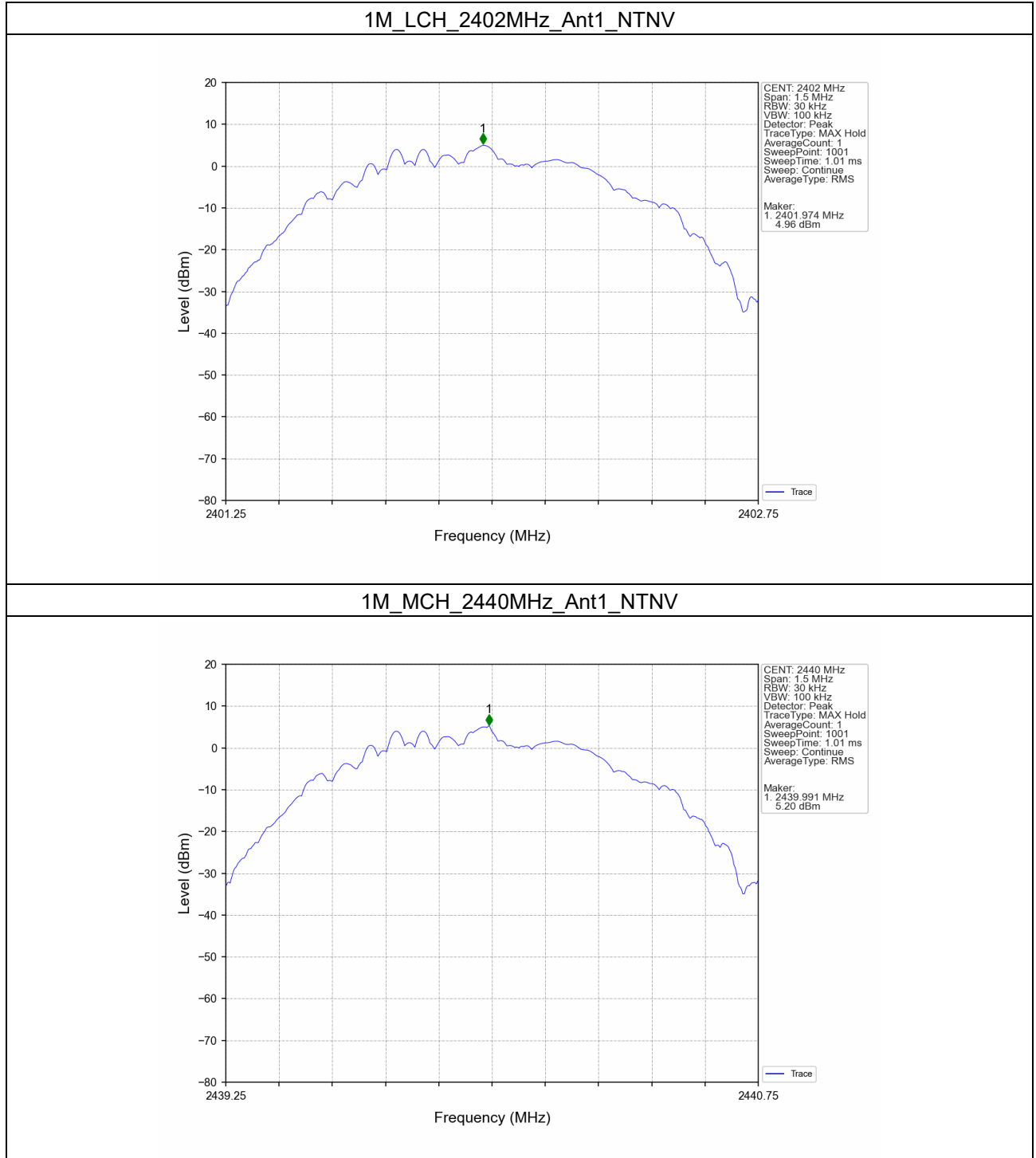
4.1 Test Result

4.1.1 PSD

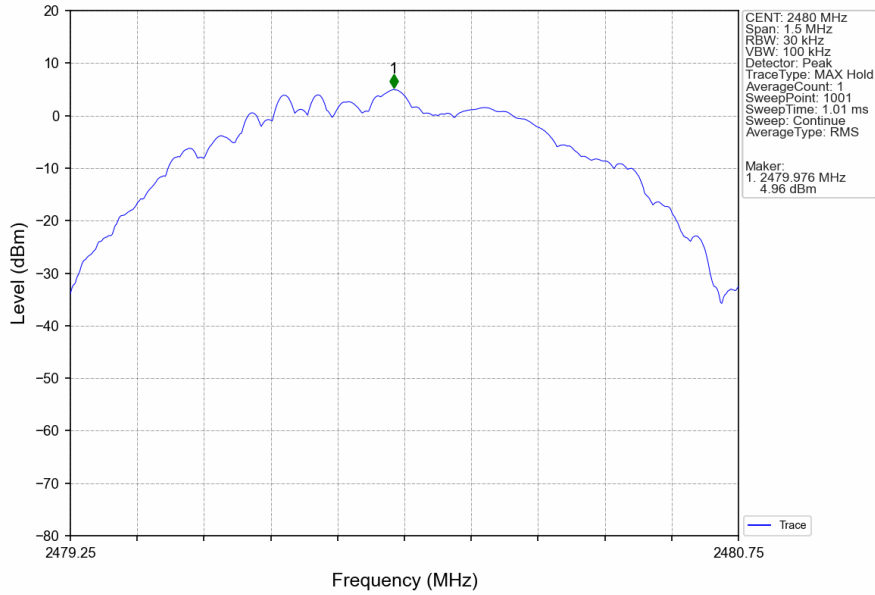
Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	4.96	<=8	Pass
		2440	5.20	<=8	Pass
		2480	4.96	<=8	Pass
2M	SISO	2402	4.20	<=8	Pass
		2440	4.21	<=8	Pass
		2480	4.14	<=8	Pass
Note1: Antenna Gain: Ant1: 0.20dBi;					

4.2 Test Graph

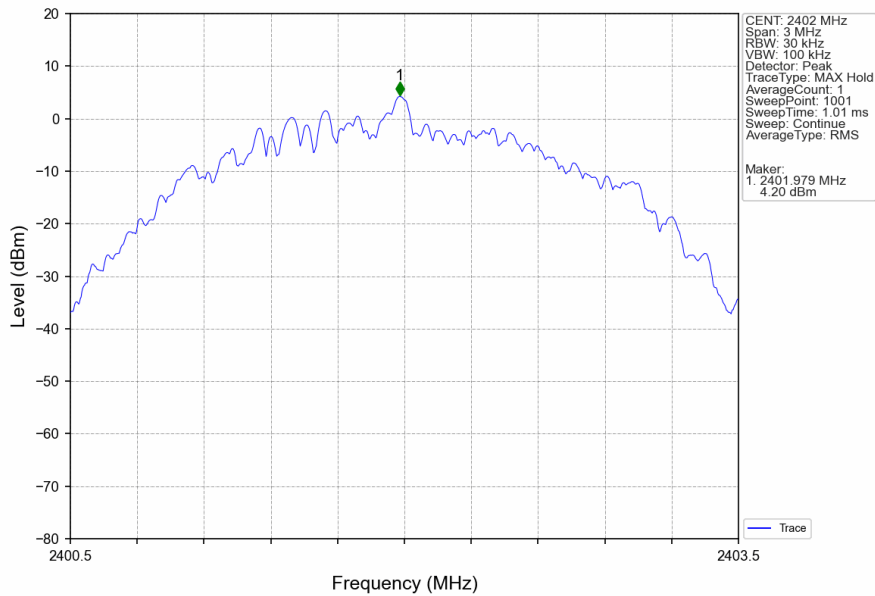
4.2.1 PSD



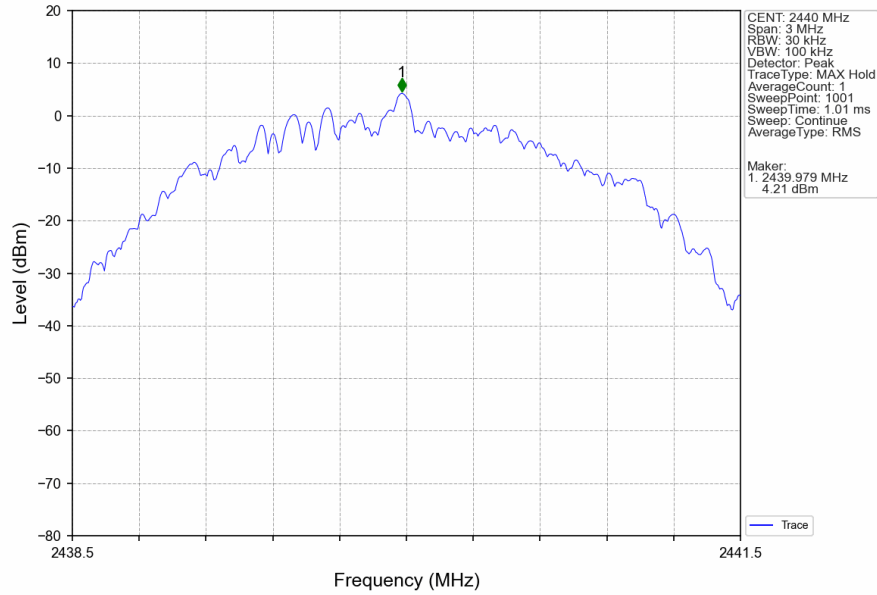
1M_HCH_2480MHz_Ant1_NTNV



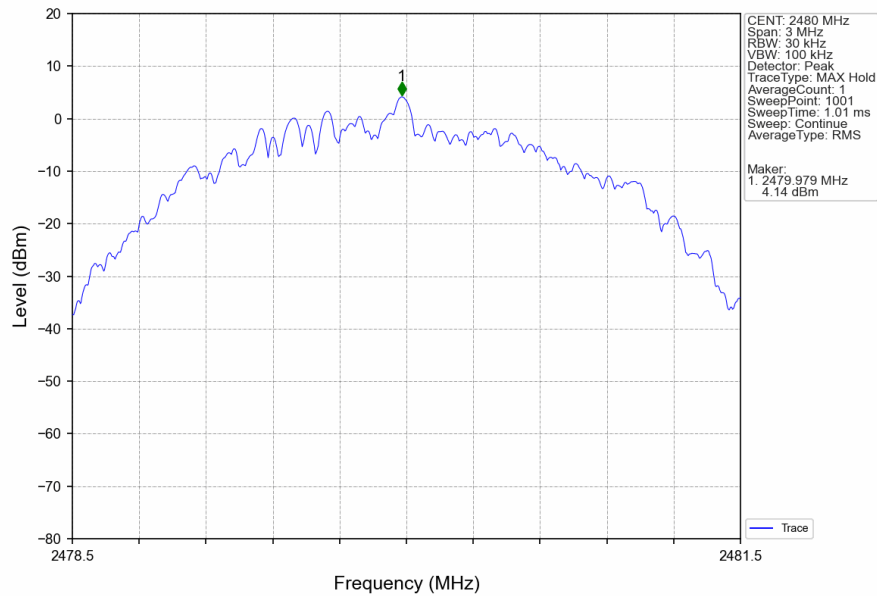
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV





5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Test Result

5.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	8.60
		2440	1	8.65
		2480	1	8.49
2M	SISO	2402	1	8.64
		2440	1	8.61
		2480	1	8.40

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.

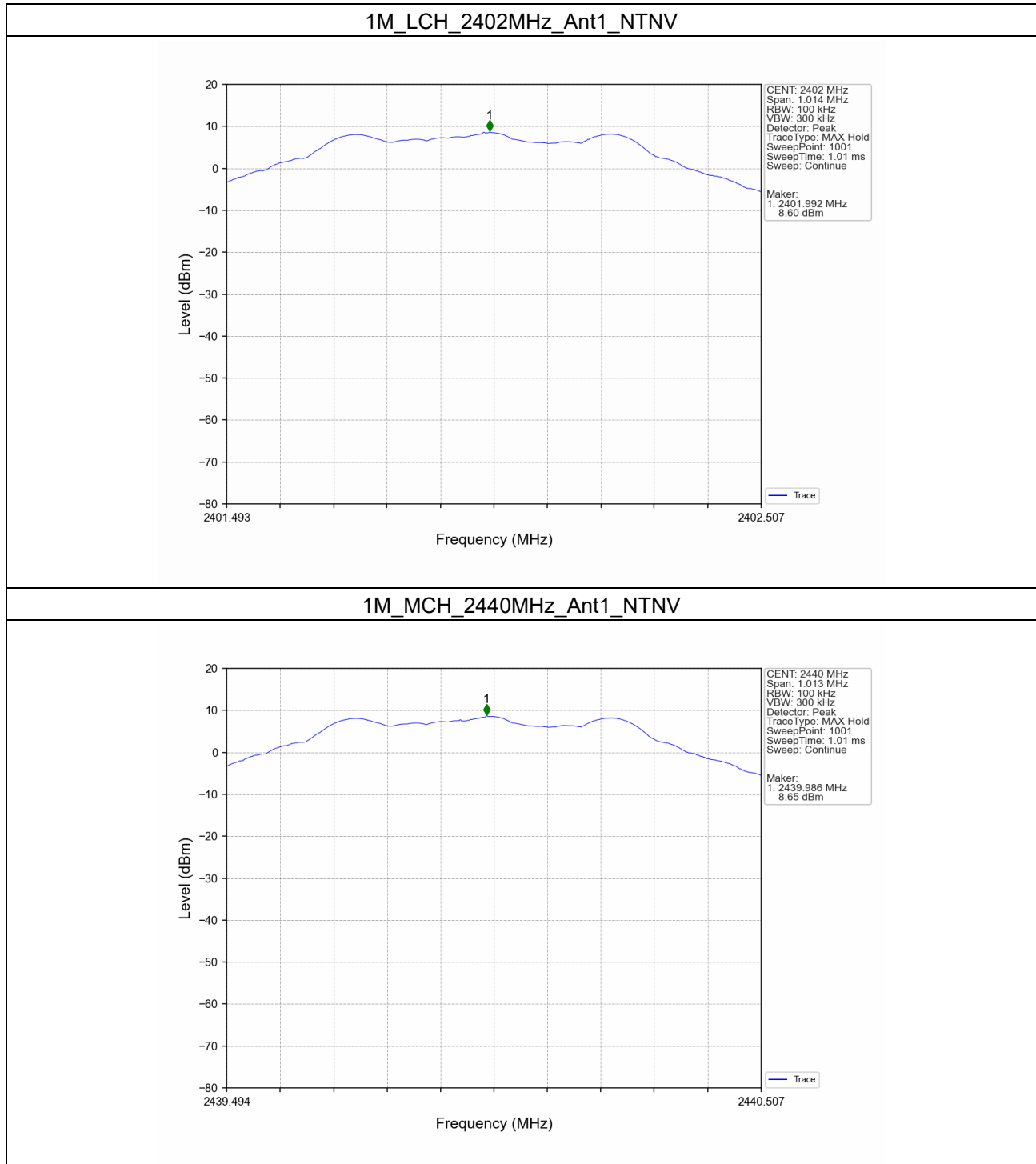
5.1.2 CSE

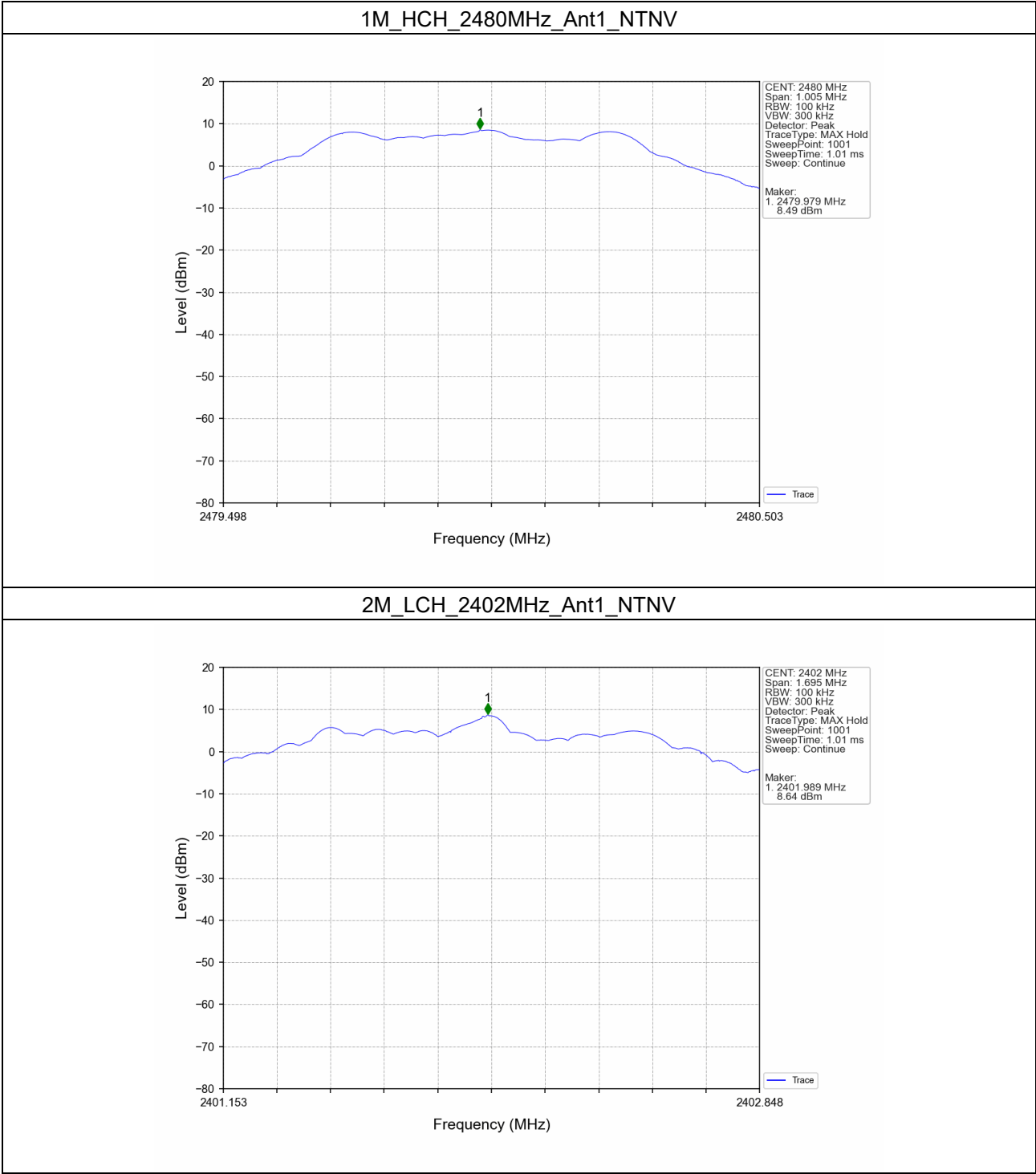
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	8.65	-11.35	Pass
		2440	1	8.65	-11.35	Pass
		2480	1	8.65	-11.35	Pass
2M	SISO	2402	1	8.64	-11.36	Pass
		2440	1	8.64	-11.36	Pass
		2480	1	8.64	-11.36	Pass

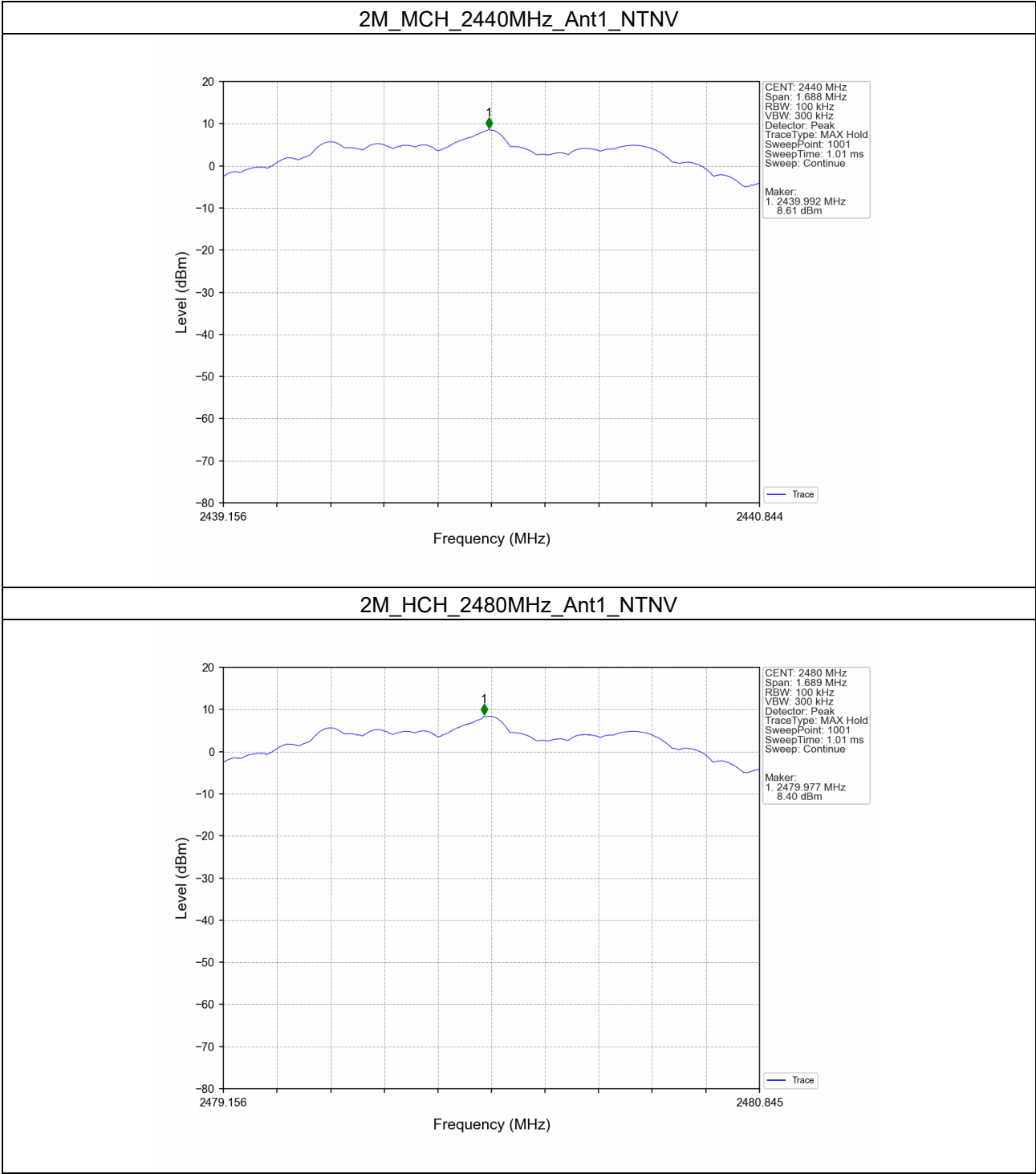
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.

5.2 Test Graph

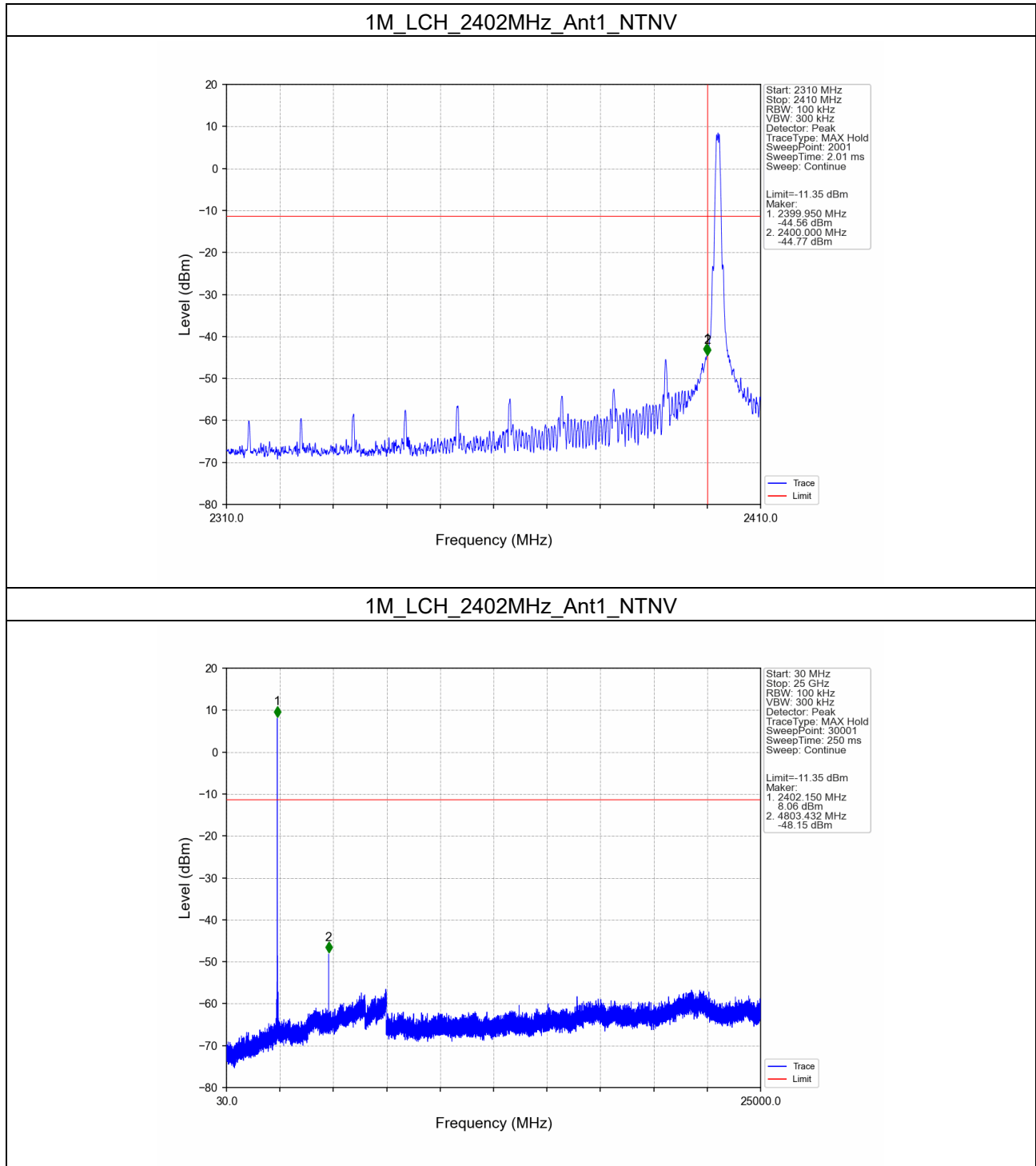
5.2.1 Ref

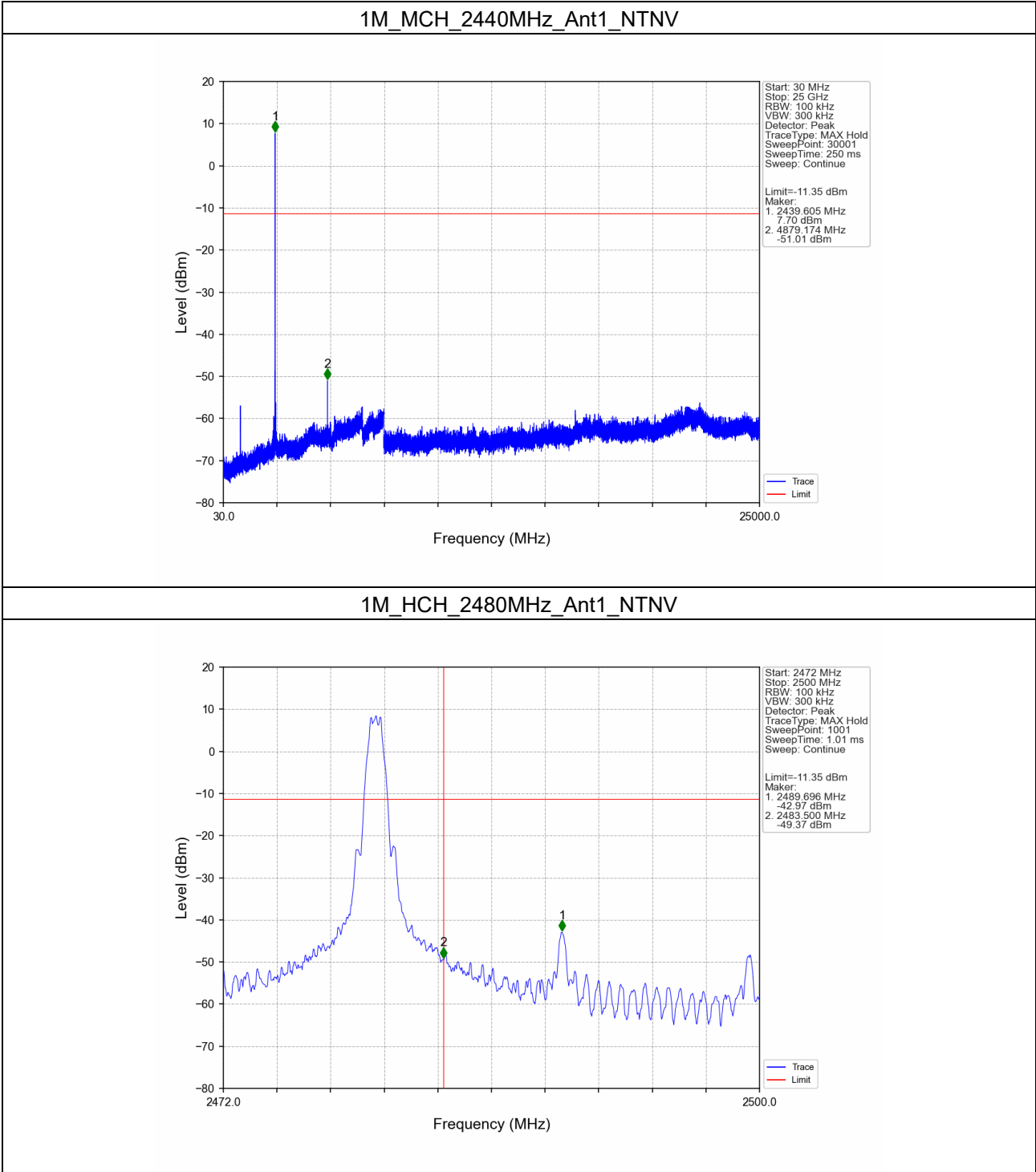




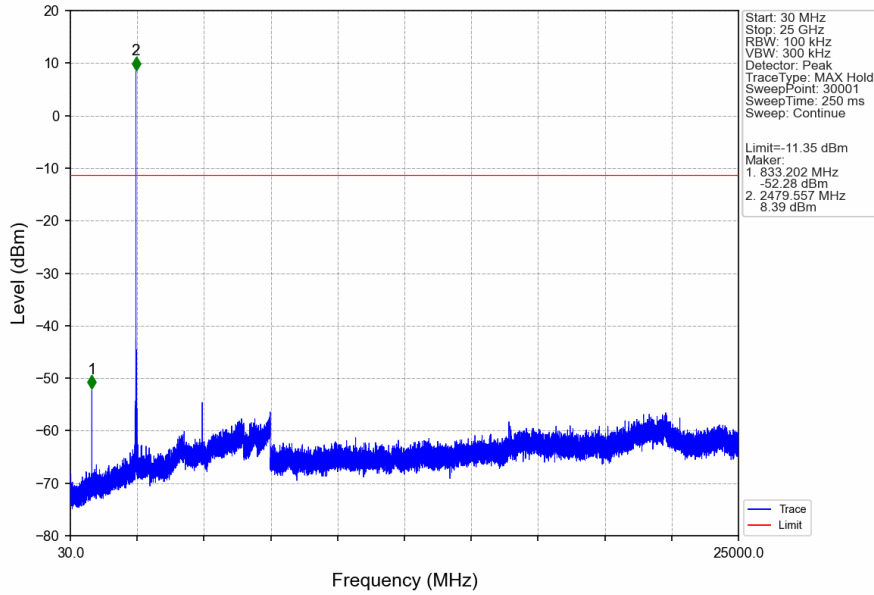


5.2.2 CSE

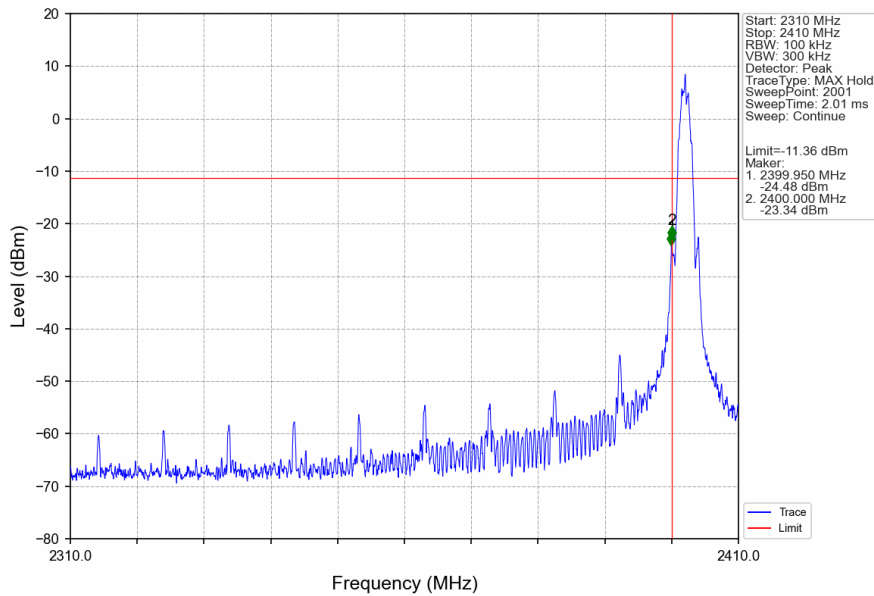




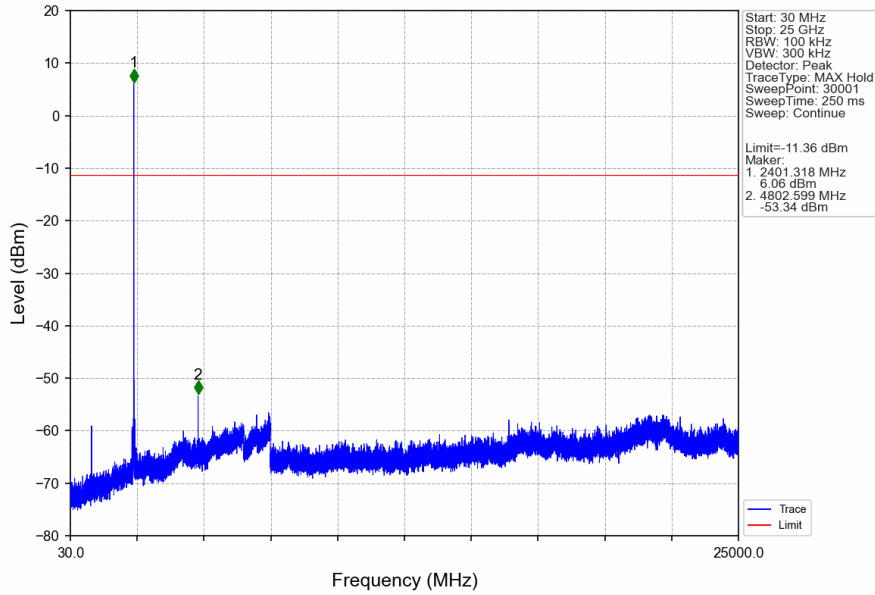
1M_HCH_2480MHz_Ant1_NTNV



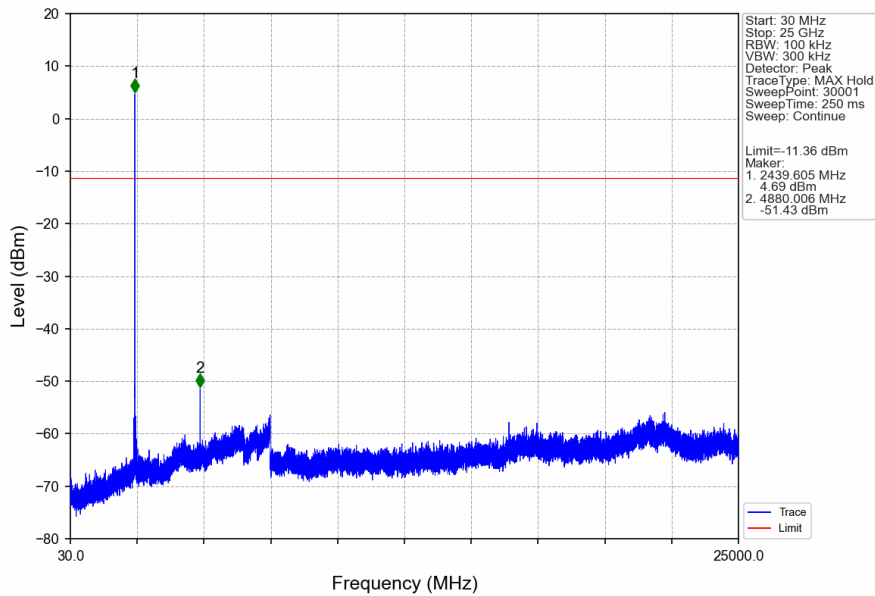
2M_LCH_2402MHz_Ant1_NTNV



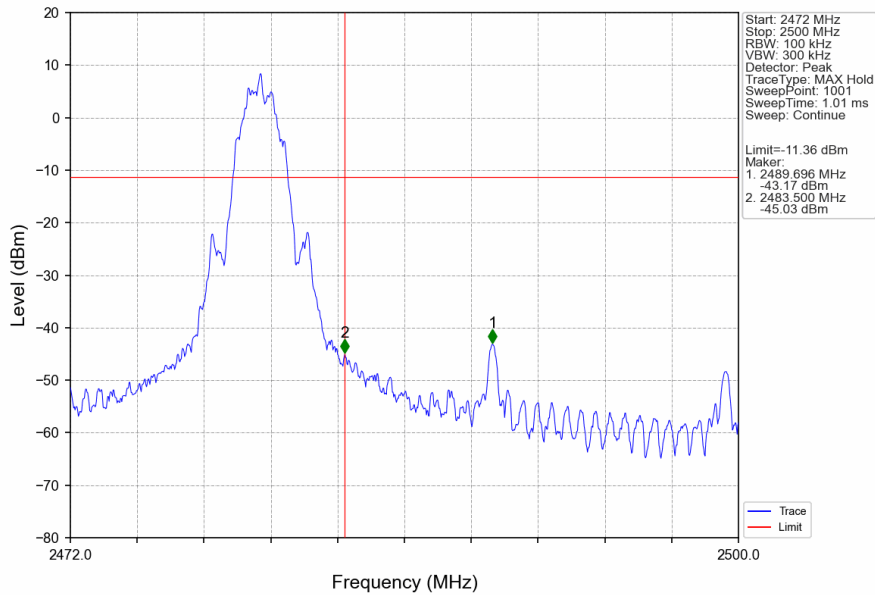
2M_LCH_2402MHz_Ant1_NTNV



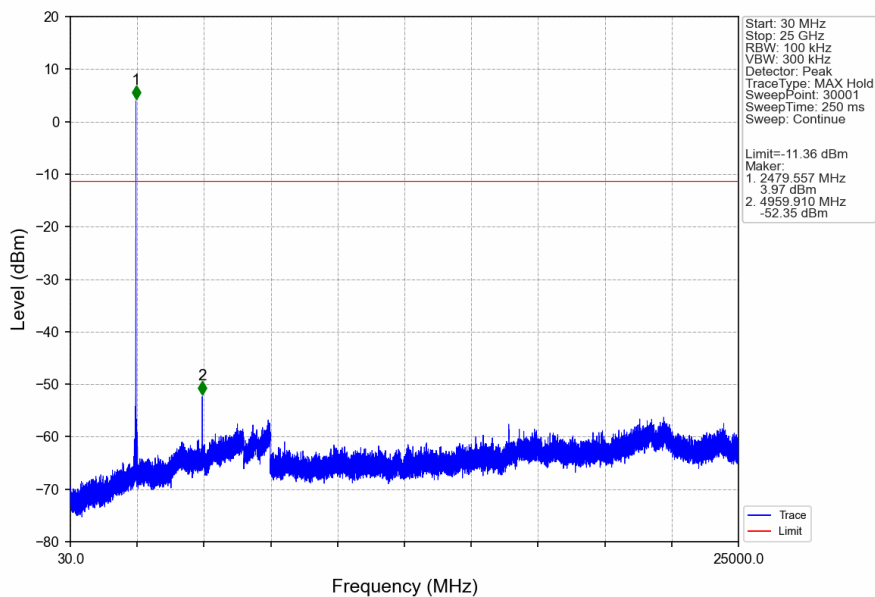
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



- End of the Report -