DEKRA Testing and Certification (Suzhou) Co., Ltd.
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Test report No:
2480839R-RF-US-P06V01

FCC & ISED TEST REPORT

Product Name	Level lock
Trademark	level
Model and /or type reference	B1,B2,B3,B4
FCC ID	2ATIO2
IC	27158-2
Applicant´s name / address	Level Home Inc. 935 Main St Redwood City, CA 94063, United States of America
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10: 2013 RSS-Gen Issue 5 Amendment 2/ RSS-247 Issue 3
Verdict Summary	IN COMPLIANCE
Documented by (name / position & signature)	Tim Cao/Project Manager
Approved by (name / position & signature)	Jack Zhang/ Manager
Date of issue	2024-09-19
Report Version	V1.1
Report template No	Template_FCC Part 15C-RF-V1.0

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page

COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Aug. 28, 2024
Date (start test)	Aug. 29, 2024
Date (finish test)	Sept. 05, 2024

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT : Equipment Under Test
QP : Quasi-Peak
CAV : CISPR Average
AV : Average
CDN : Coupling Decoupling Network
SAC : Semi-Anechoic Chamber
OATS : Open Area Test Site
BW : Bandwidth
AM : Amplitude Modulation
PM : Pulse Modulation
HCP : Horizontal Coupling Plane
VCP : Vertical Coupling Plane
U_N : Nominal voltage
*T*x : Transmitter
*R*x : Receiver
N/A : Not Applicable
N/M : Not Measured

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2480839R-RF-US-P06V02	V1.0	Initial issue of report.	2024-09-14
2480839R-RF-US-P06V02	V1.1	Page 10: Add FVIN information. (The test report No.: 2480839R-RF-US-P06V02 V1.1 is to replace the test report No.: 2480839R-RF-US-P06V02 V1.0, and test report 2480839R-RF-US-P06V02 V1.0 is obsoleted.)	2024-09-19

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with FCC 47CFR §15.247, ANSI C63.10: 2013, RSS-Gen Issue 5 Amendment 2 and RSS-247 Issue 3.
3. The only change this time is to add Thread function through software update. After verification, there is no degradation of Bluetooth and NFC functions, so only Thread test report is provided this time.
4. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
5. The test results presented in this report relate only to the object tested.
6. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
7. This report will not be used for social proof function in China market.
8. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
    - Chapter 1.1 General Description of the Item(s);
    - Chapter 1.2 Antenna Informaion;
    - Chapter 1.3 Channel List.

USED EQUIPMENT

Emissions in non-restricted frequency bands/ Occupied Bandwidth/ Fundamental emission output power Power Spectral Density / TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal.Date	Next Cal. Date	Firmware Version	Software version
Wireless Connectivity Tester	R&S	CMW 270	102593	2024.05.15	2025.05.14	V 4.0.60	N/A
Coaxial Cable	N/A	N/A	2477	2024.06.11	2025.06.10	N/A	N/A
Coaxial Cable	N/A	N/A	2478	2024.06.11	2025.06.10	N/A	N/A
High and low temperature and fast temperature change test box	ASTUOD	ASTD-FBT-225K	N/A	2024.04.21	2025.04.20	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2024.07.11	2025.07.10	N/A	N/A
Test system							
Instrument	Manufacturer	Model No.	Serial No.	Cal.Date	Next Cal. Date	Firmware Version	Software version
MAX Signal Analyzer	Keysight	N9010A	MY48030494	2023.11.08	2024.11.07	A.14.03	N/A
RF Control Unit	Tonscend	JS0806-2	22G8060594	2024.02.06	2025.02.05	N/A	N/A
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY61252529	2024.05.12	2025.05.11	B.01.96	N/A
Frequency extender for EXG or MXG	Keysight	N5182BX07	MY59362500	2024.05.12	2025.05.11	N/A	N/A
EXG-B MW Analog Signal Generator	Keysight	N5173B	MY61252566	2024.07.06	2025.07.05	B.01.95	N/A
Test Software	Tonscend	TS1120	JS1120-3	N/A	N/A	N/A	V3.0.22

Radiated Emission(30MHz-1GHz) / AC3

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
EMI Test Receiver	R&S	ESCI	100573	2024.02.06	2025.02.05	4.42 SP3	N/A
Loop Antenna	R&S	HFH2-Z2E	101149	2024.03.27	2025.03.26	N/A	N/A
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2024.03.20	2025.03.19	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	AC3-TH	2024.07.04	2025.07.03	N/A	N/A
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC3-C	2024.04.27	2025.04.26	N/A	N/A
Dekra test software	Dekra	N/A	N/A	N/A	N/A	N/A	3

Radiated Emission / AC5(1GHz-40GHz)(Chamber details)

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
EXA Spectrum Analyzer	Keysight	N9020B	MY60112218	2023.11.08	2024.11.07	A.31.05	N/A
Pre-Amplifier	SKET	LNPA_0118G-45	SK2021090101	2024.04.27	2025.04.26	N/A	N/A
Preamplifier	CHENGYI	EMC184045SE	980263	2024.07.06	2025.07.05	N/A	N/A
DRG Horn	ETS-Lindgren	3117	123988	2023.11.07	2024.11.06	N/A	N/A
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2024.05.30	2025.05.29	N/A	N/A
Filter Switch Box	MVE	MSW-F196	C070001S	2024.04.20	2025.04.19	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-1909	THM-024	2024.05.17	2025.05.16	N/A	N/A
Coaxial Cable	ROSENBERGER	LA1-C011-2000/3000	AC5-40G	2024.01.25	2025.01.24	N/A	N/A
Coaxial Cable	ROSENBERGER	LA1-C011-2000/3000	AC5-40G-2	2024.05.26	2025.05.25	N/A	N/A
Cable	Rosenberger	LA1-C390-2000	0001	2024.05.26	2025.05.25	N/A	N/A
Cable	Rosenberger	LA1-C390-2000	0002	2024.05.26	2025.05.25	N/A	N/A
Dekra test software	Dekra	N/A	N/A	N/A	N/A	N/A	3

UNCERTAINTY

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95% .

Test item	Uncertainty
AC Power Line Conducted Emission	9kHz~150kHz: 2.80dB 150kHz~30MHz: 2.40dB
Peak Power Output	± 1.27 dB
Radiated Emission(30MHz~1GHz)	Horizontal: 30MHz~200MHz: 3.50 dB 300MHz~1GHz: 3.60 dB Vertical: 30MHz~200MHz: 3.60 dB 300MHz~1GHz: 3.50 dB
Radiated Emission(1GHz~26.5GHz)	Horizontal: 1GHz~18GHz: 5.00 dB Vertical: 1GHz~18GHz: 4.80 dB
RF antenna conducted test	± 1.27dB
Radiated Emission Band Edge	± 3.9 dB
DTS Bandwidth	±150Hz
Occupied Bandwidth	±1kHz
Power Density	±1.27dB

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Product Name.....:	Level lock
Model No. .....:	B1,B2,B3,B4
Trademark .....:	level
FCC ID.....:	2ATIO2
IC .....:	27158-2
Hardware version .....:	309000135725R3 / 810-00011-00 Rev6
Software version.....:	1.6.0.2
FVIN .....:	Echo_GeminiMatter_CustomerApp_B05_3.1.0
Manufacturer .....:	Level Home Inc.
Manufacturer address.....:	935 Main St Redwood City, CA 94063, United States of America
Model Difference(s) .....:	These models have the same RF module and antenna, different models are only for different markets.

Wireless specifiction .....:	Thread
Operating frequency range(s)	2405~2480MHz
Type of Modulation .....:	QPSK
Data Rate .....:	250kbps
Number of channel .....:	16

Rated power supply .....:	Voltage and Frequency	
	☐	AC: 220 – 240 Vac, 50/60 Hz
	☐	AC: 110 – 130 Vac, 50/60 Hz
	☐	DC: ……
	☒	Battery: 3Vdc
	☐	PoE: ……
Mounting position.....:	☒	Table top equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☐	Hand-held equipment
	☐	Other: …….

1.2 Antenna Information

Antenna model / type number .....:	N/A			
Antenna serial number .....:	N/A			
Antenna Delivery .....:	☒	1TX + 1RX		
	☐	2TX + 2RX		
	☐	Others:……		
Antenna technology.....:	☒	SISO		
	☐	MIMO	☐	CDD
			☐	Beam-forming
Antenna Type .....:	☐	External	☐	Dipole
			☐	Sectorized
	☒	Internal	☐	Ceramic Chip
			☐	PIFA
			☒	PCB
			☐	Others……..
Antenna Gain.....:	-6.1 dBi			

1.3 Channel List

Working Frequency of Each Channel: For Thread							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405 MHz	12	2410 MHz	13	2415 MHz	14	2420 MHz
15	2425 MHz	16	2430 MHz	17	2435 MHz	18	2440 MHz
19	2445 MHz	20	2450 MHz	21	2455 MHz	22	2460 MHz
23	2465 MHz	24	2470 MHz	25	2475 MHz	26	2480 MHz

Note: The General Description of the Item , antenna information and Channel List for the EUT in clause 1 are provided and confirmed by the client.

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

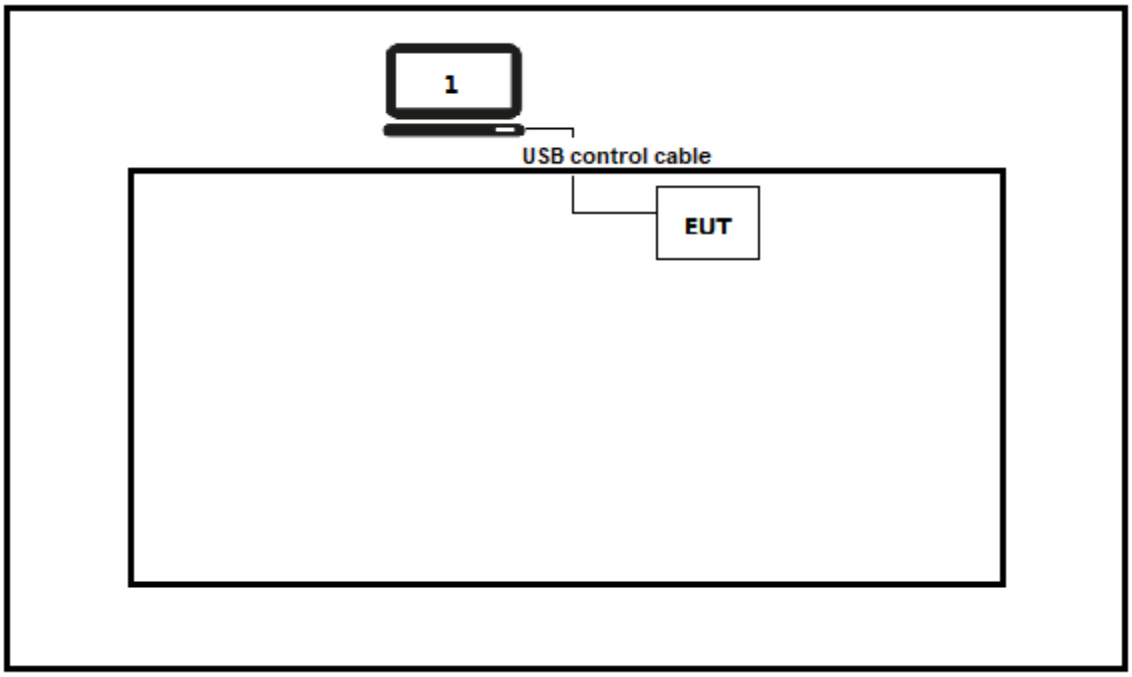
Test Mode For Thread	Mode1: Transmit by Thread

2.2 Auxiliary equipment / Test software for the EUT

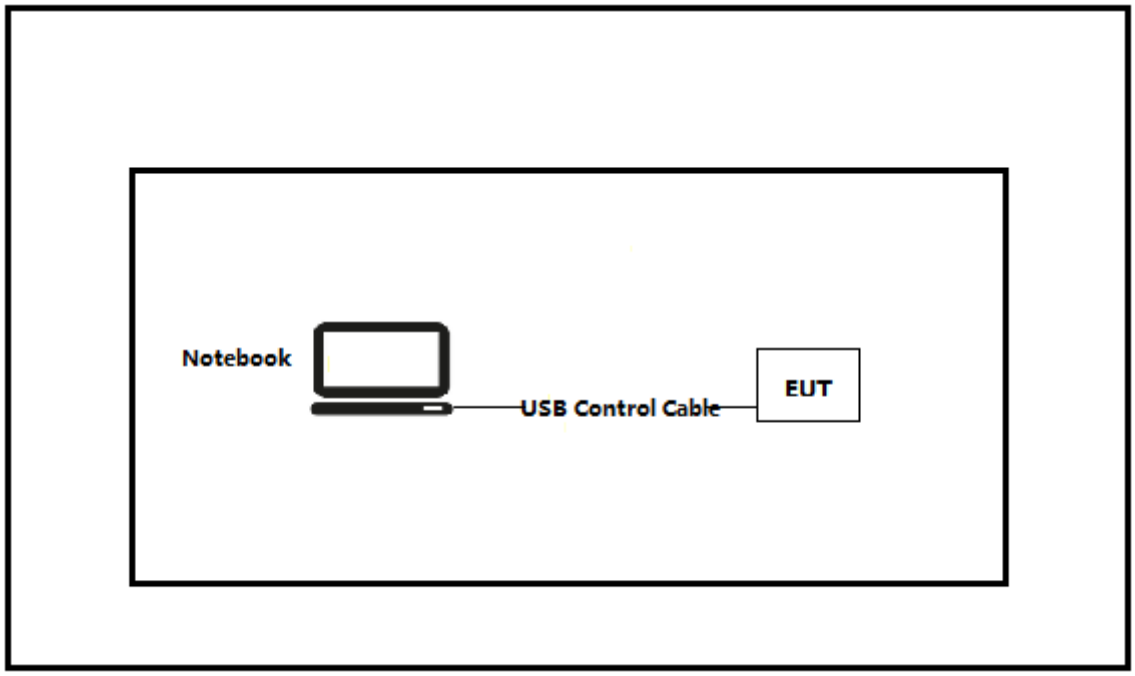
Auxiliary equipment	Type / Version	Manufacturer	Supplied by
Notebook	Thinkpad T14	Lenovo	Adapter
USB to serial board	N/A	N/A	N/A
software	Type / Version	Manufacturer	Supplied by
Putty	V0.71	N/A	N/A

2.3 Test Configuration / Block diagram used for tests

Test setup Diagram- AC Line Conducted Emission Test



Test setup Diagram- Conducted test



2.4 Testing process

1	Setup the EUT as shown in Section 2.3.
2	Execute the [Putty] on the notebook.
3	Configure the test mode, the test channel, and the data rate.
4	Verify that the EUT works properly.

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart C Section 15.247	2024	Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
KDB 558074 D01 v05r02	2019	Guidance for performing compliance measurements on Digital Transmission System (DTS) operating under section 15.247
RSS-Gen Issue 5 Amendment 2	2021	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 3	2023	Digital Transmission Systems (DTSs),Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards: N/A.

(Please define the deviations from the standard(s) if applicable)

3.3 Overview of results

For FCC

Requirement – Test case	Basic standard(s)	Verdict	Remark
AC Power Line Conducted Emission	FCC 15.207	N/A[1)]	--
Emissions in restricted frequency bands	FCC 15.247(b)(3)	PASS	Refer to **Appendix A** for test data
Duty cycle	ANSI C63.10:2013	PASS	Refer to **Appendix B** for test data
Emissions in non-restricted frequency bands	FCC 15.247(d), FCC 15.209	PASS	Refer to **Appendix C** for test data
Radiated Emission Band Edge	FCC 15.247(d)	PASS	Refer to **Appendix D** for test data
Fundamental emission output power	FCC 15.247(d), FCC 15.209	PASS	Refer to **Appendix E** for test data
DTS Bandwidth	FCC 15.247(a)(2)	PASS	Refer to **Appendix F** for test data
Power Spectral Density	FCC 15.247(e)	PASS	Refer to **Appendix G**for test data
Antenna Requirement	FCC 15.203	PASS	---
Note: The product is power supplied by battery, so the AC Power Line Conducted Emission test is not applicable.			

For ISED

Requirement – Test case	Basic standard(s)	Verdict	Remark
AC Power Line Conducted Emission	RSS-Gen Issue 5 Section 8.8	N/A[1)]	--
Emissions in restricted frequency bands	RSS-Gen Issue 5 Section 8.9	PASS	Refer to **Appendix A** for test data
Duty cycle	ANSI C63.10:2013	PASS	Refer to **Appendix B** for test data
Emissions in non-restricted frequency bands	RSS-247 Issue 3 Section 5.5	PASS	Refer to **Appendix C** for test data
Radiated Emission Band Edge	RSS-Gen Issue 5 Section 8.10	PASS	Refer to **Appendix D** for test data
Fundamental emission output power	RSS-247 Issue 3 Section 5.4(d)	PASS	Refer to **Appendix E** for test data
DTS Bandwidth	RSS-Gen Issue 5 Section 6.7	PASS	Refer to **Appendix F** for test data
Power Spectral Density	RSS-247 Issue 3 Section 5.2(b)	PASS	Refer to **Appendix G** for test data
Antenna Requirement	RSS-Gen Issue 5 Section 6.8	PASS	---
Note: The product is power supplied by battery, so the AC Power Line Conducted Emission test is not applicable.			

3.4 Power setting in test

Mode	Channel	Frequency (MHz)	Power setting
Thread	11	2405	8
	18	2440	8
	26	2480	8

3.5 Test Matrix

Test item	Model: B4		
	1(SN:B454336S10)	2)	3()
AC Power Line Conducted Emission	☐	☐	☐
Emissions in restricted frequency bands	☒	☐	☐
Duty cycle	☒	☐	☐
Emissions in non-restricted frequency bands	☒	☐	☐
Radiated Emission Band Edge	☒	☐	☐
Fundamental emission output power	☒	☐	☐
DTS Bandwidth	☒	☐	☐
Power Spectral Density	☒	☐	☐
Antenna Requirement	☒	☐	☐

Note: We have evaluated both lamp chimney, only the worst data was shown in report.

3.6 Test Facility

USA	:	**FCC Designation Number: CN1199**
CA	:	**ISED CAB identifier: CN0040**

4 TEST RESULTS

4.1 AC Power Line Conducted Emission	VERDICT: N/A

4.1.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.207	
Frequency range [MHz]	Limit: QP [dB(μV)[1)]]	Limit: AV [dB(μV) [1)]]
0,15 - 0,50	66 – 56 [2)]	56 - 46 [2)]
0,50 - 5,0	56	46
5,0 - 30	60	50

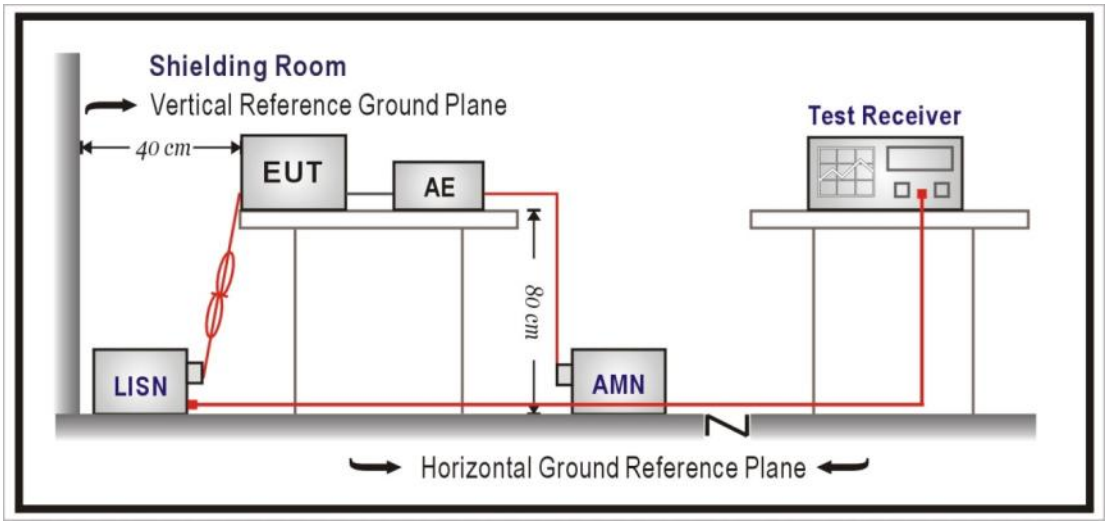
[1)] At the transition frequency, the lower limit applies.

[2)] The limit decreases linearly with the logarithm of the frequency.

NOTE 1: The exclusion band for transmitters shall be considered for transmitters operating at frequencies below 30 MHz.

NOTE 2: Where the AC output port is directly connected (or via a circuit breaker) to the AC power input port of the EUT the AC power output port need not to be tested.

4.1.2 Test Setup



4.1.3 Test Procedure

	References Rule	Chapter	Item
☒	ANSI C63.10-2013	6.2	Standard test method for ac power-line conducted emissions from unlicensed wireless devices

4.2 Emissions in restricted frequency bands — VERDICT: PASS

4.2.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.207

Restricted Bands of operation

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 –16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.81425 – 8.81475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975–12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675–12.57725	322 – 335.4	3600 – 4400	
13.36 – 13.41			

Restricted Bands of operation for IC

0.090 - 0.110	13.36 - 13.41	960 - 1427	9.0 - 9.2
0.495 - 0.505	16.42 - 16.423	1435 - 1626.5	9.3 - 9.5
2.1735 - 2.1905	16.69475 - 16.69525	1645.5 - 1646.5	10.6 - 12.7
3.020 - 3.026	16.80425 - 16.80475	1660 - 1710	13.25 - 13.4
4.125 - 4.128	25.5 - 25.67	1718.8 - 1722.2	14.47 - 14.5
4.17725 - 4.17775	37.5 - 38.25	2200 - 2300	15.35 - 16.2
4.20725 - 4.20775	73 - 74.6	2310 - 2390	17.7 - 21.4
5.677 - 5.683	74.8 - 75.2	2483.5 - 2500	22.01 - 23.12
6.215 - 6.218	108 - 138	2655 - 2900	23.6 - 24.0
6.26775 - 6.26825	149.9 - 150.05	3260 - 3267	31.2 - 31.8
6.31175 - 6.31225	156.52475 - 156.52525	3332 - 3339	36.43 - 36.5
8.291 - 8.294	156.7 - 156.9	3345.8 - 3358	Above 38.6
8.362 - 8.366	162.0125 - 167.17	3500 - 4400	
8.37625 - 8.38675	167.72 - 173.2	4500 - 5150	
8.41425 - 8.41475	240 - 285	5350 - 5460	
12.29 - 12.293	322 - 335.4	7250 - 7750	
12.51975 - 12.52025	399.9 - 410	8025 - 8500	
12.57675 - 12.57725	608 - 614	--	

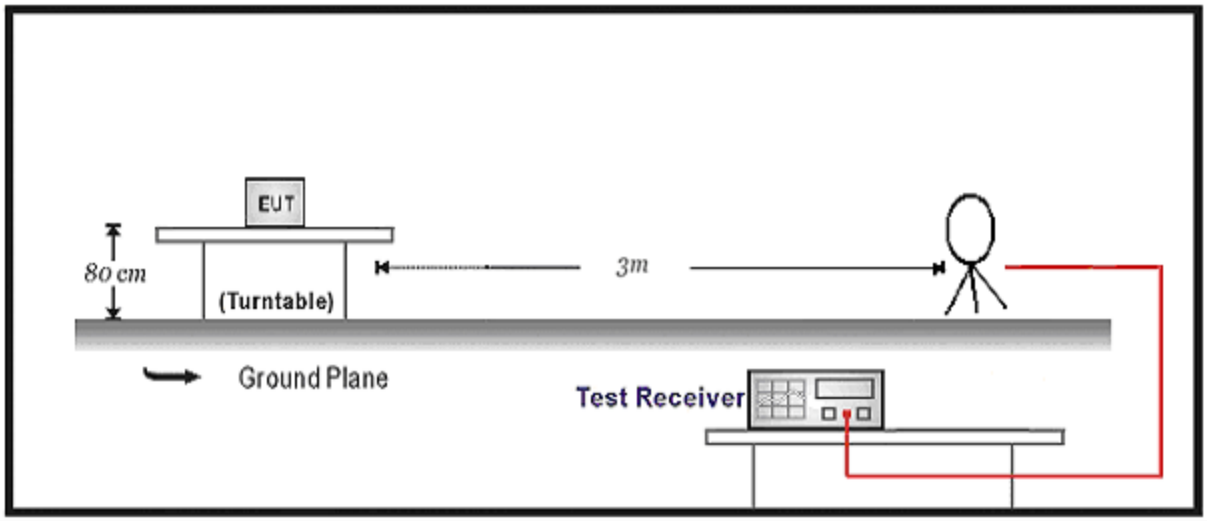
Restricted Band Emissions Limit			
Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30(Note 1)
1.705 - 30	30	29.5	30(Note 1)
30 - 88	100	40	3(Note 2)
88 - 216	150	43.5	3(Note 2)
216 - 960	200	46	3(Note 2)
Above 960	500	54	3(Note 2)

Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

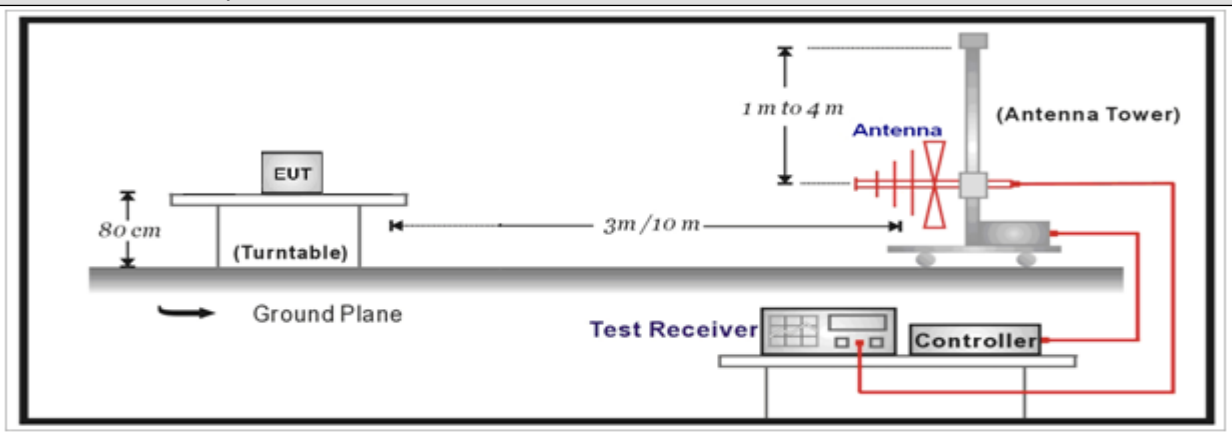
Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.2.2 Test Setup

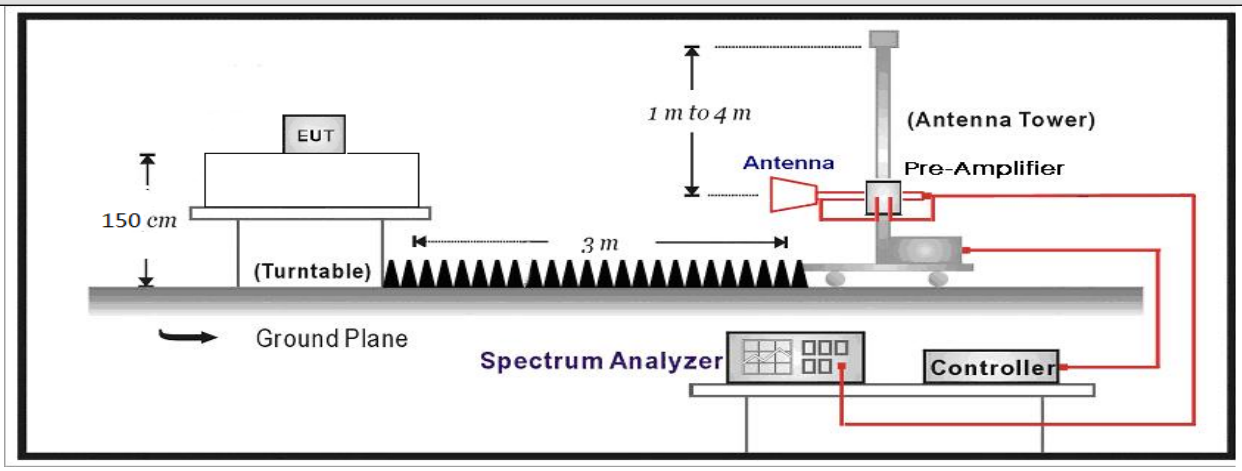
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



4.2.3 Test Procedure

	References Rule	Chapter	Description
☒	ANSI C63.10	11.12	Emissions in restricted frequency bands
	☒ ANSI C63.10	11.12.1	Radiated emission measurements
	☒ ANSI C63.10	11.12.2.7	Radiated spurious emission test
	☒ ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
	☒ ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
	☒ ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

4.3 Emissions in non-restricted frequency band — VERDICT: PASS

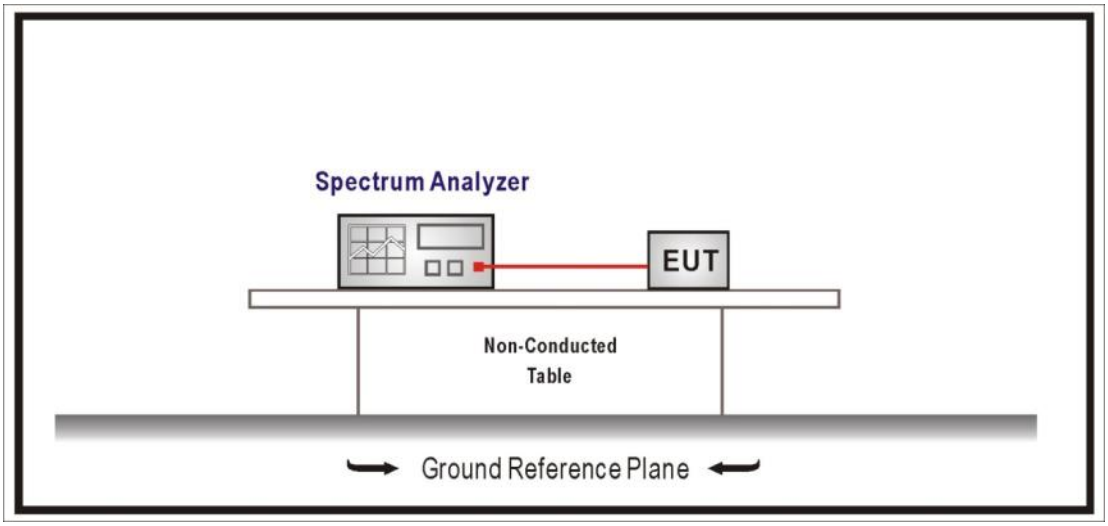
4.3.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(d)
RF Output power (Detection methods)	Limit(dB)
RF Output power(Average detector)	30dBc(Note1)
RF Output power(PK detector)	20dBc(Note2)

Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

4.3.2 Test Setup



4.3.3 Test Procedure

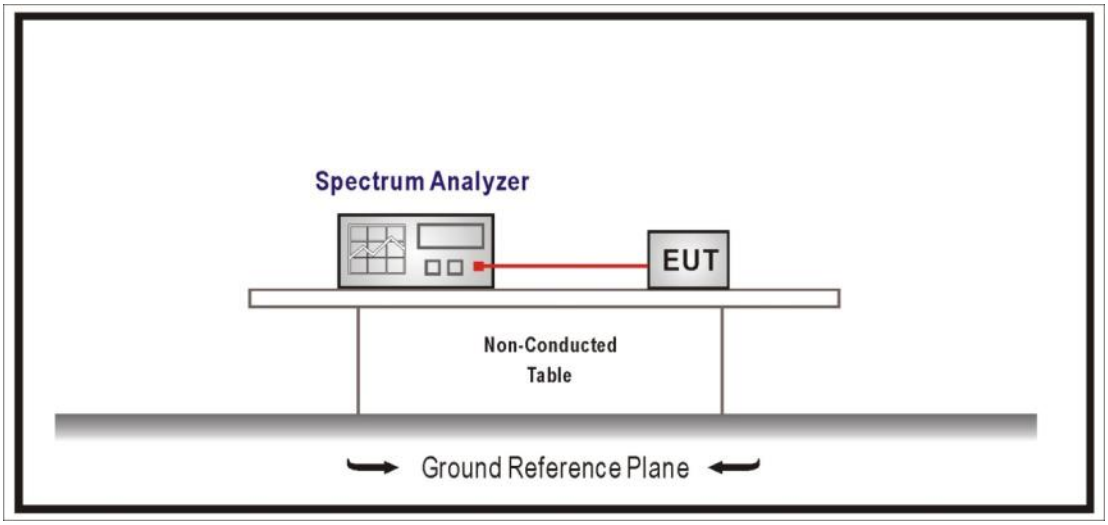
References Rule			Chapter	Description
☒	ANSI C63.10		11.11	Emissions in non-restricted frequency bands
	☒	ANSI C63.10	11.11.1	General
	☒	ANSI C63.10	11.11.2	Reference level measurement
	☒	ANSI C63.10	11.11.3	Emission level measurement

4.4 Duty cycle	VERDICT: PASS

4.4.1 Limit

N/A

4.4.2 Test Setup



4.4.3 Test Procedure

References Rule		Chapter	Description
☒	ANSI C63.10	11.6	Duty cycle (D), transmission duration (T), and maximum power control level

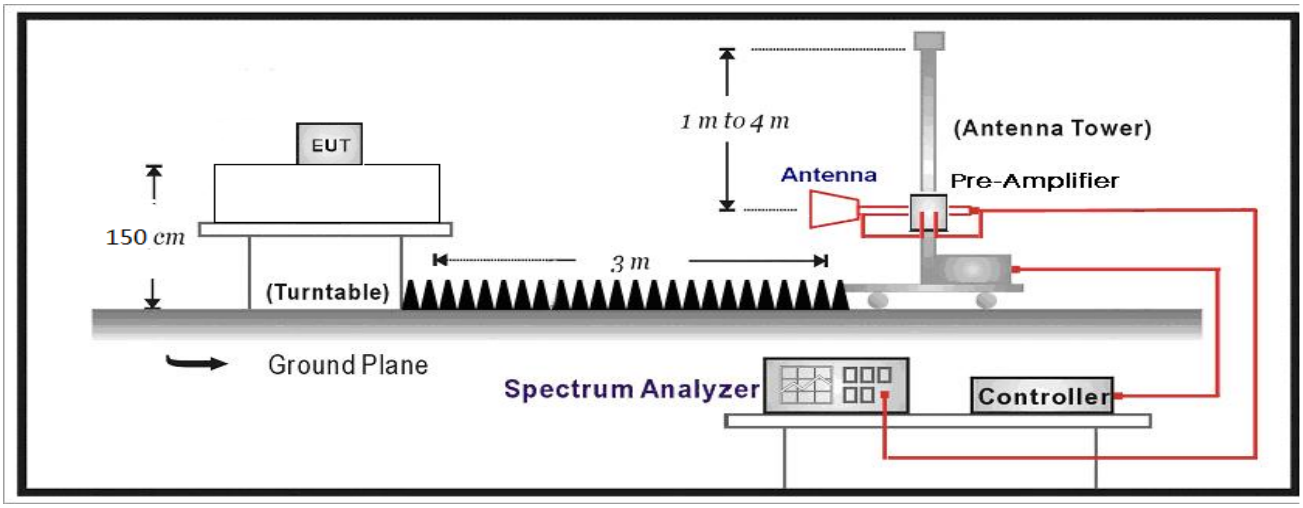
4.5 Radiated Emission Band Edge — VERDICT: PASS

4.5.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247(d) , 15.209			
Frequency bands (MHz)	Detector	Limit (dBμV/m)	RBW (MHz)	Distance (m)
2310-2390 2483.5-2500	PK	74	1	3
	AV	54	1	3
Note: The field strength of emissions appearing within these frequency bands shall not exceed the limits.				

4.5.2 Test Setup

Above 1GHz Test Setup:



4.5.3 Test Procedure

	References Rule	Chapter	Description
☒	ANSI C63.10	6.10	Band-edge testing
	☒ ANSI C63.10	6.10.5	Restricted-band band-edge measurements
	☐ ANSI C63.10	6.10.6	Marker-delta method
☒	ANSI C63.10	11.12	Emissions in restricted frequency bands
	☒ ANSI C63.10	11.12.1	Radiated emission measurements
	☒ ANSI C63.10	11.12.2.7	Radiated spurious emission test
☐	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
☐	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
☒	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

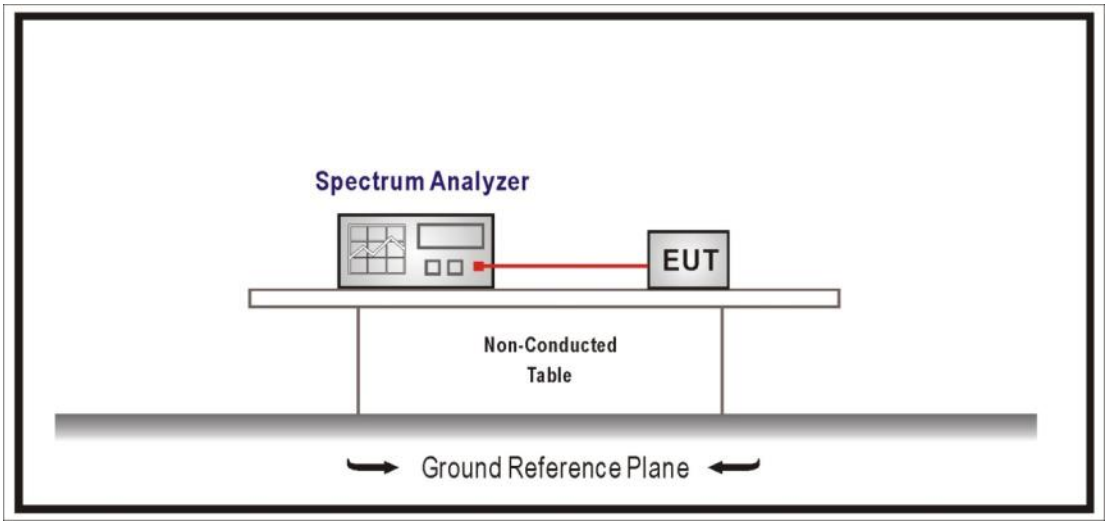
4.6 DTS Bandwidth — VERDICT: PASS

4.6.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.247 (a)(2)

Systems using digital modulation techniques operate in the2400-2483.5 MHz .The minimum 6 dB bandwidth shall be at least 500 kHz

4.6.2 Test Setup



4.6.3 Test Procedure

	Reference Rule		Chapter	Description
☒	ANSI C63.10		11.8	DTS bandwidth
	☐	ANSI C63.10	11.8.1	Option 1
	☒	ANSI C63.10	11.8.2	Option 2

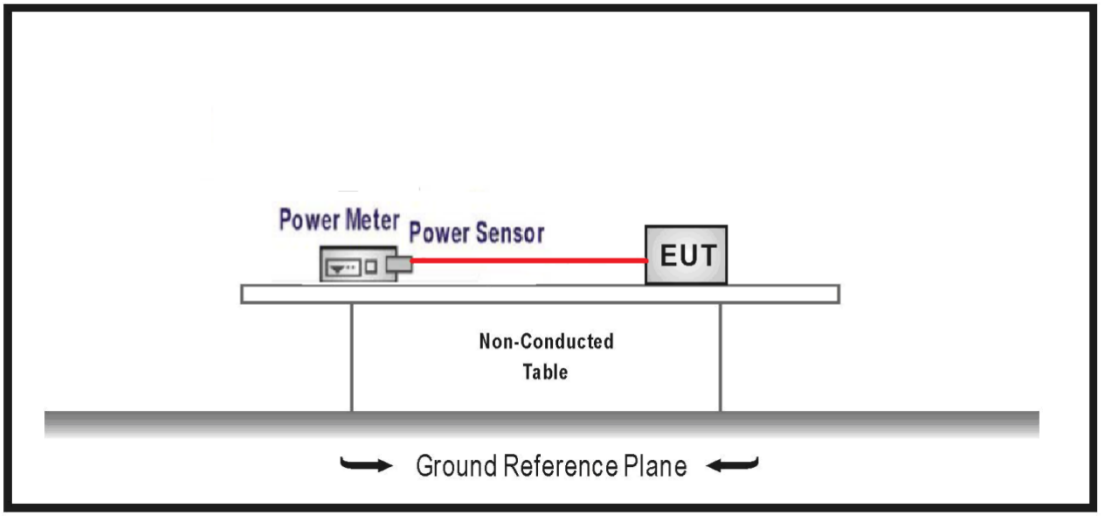
4.7 Fundamental emission output power — VERDICT: PASS

4.7.1 Limit

Standard			FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
☒	GTX ＜6dBi		Pout≤30dBm
☐	GTX ＞6dBi		
	☐	Non-Fix point-point	Pout≤30-(GTX -6)
	☐	Fix point-point	Pout≤30-[(GTX-6)]/3
	☐	Point-to-multipoint	Pout≤30-(GTX-6)
	☐	Overlap Beams	Pout≤30-[(GTX-6)]/3
	☐	Aggregate power transmitted simultaneously on all beams	Pout≤30-[(GTX-6)]/3
	☐	single directional beam	Pout≤30-[(GTX-6)]/3+8dB

Note 1 : GTX directional gain of transmitting antennas.
Note 2 : Pout is maximum peak conducted output power .

4.7.2 Test Setup



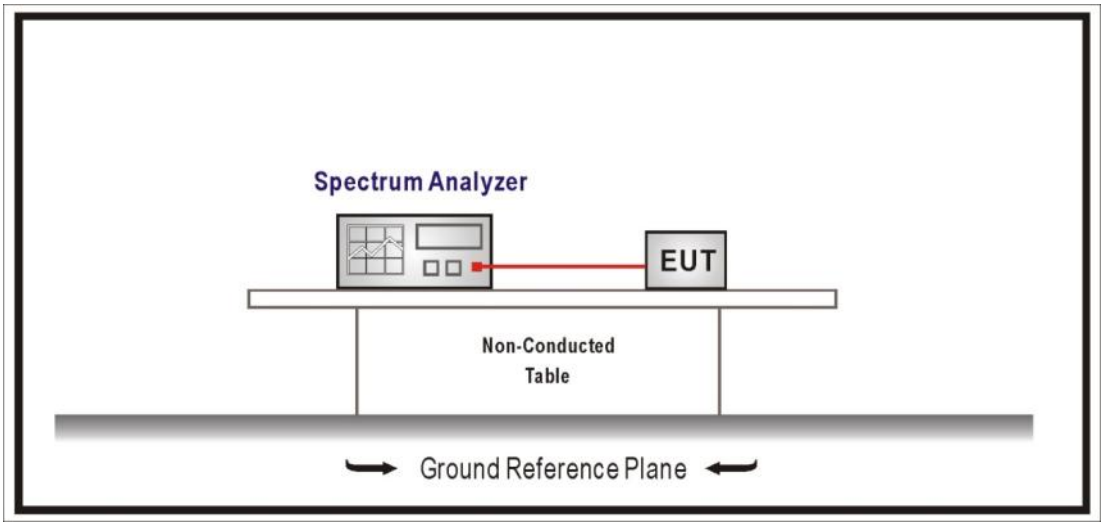
4.7.3 Test Procedure

	References Rule	Chapter	Description
☒	ANSI C63.10	11.9	Fundamental emission output power
	☒ ANSI C63.10	11.9.1	Maximum peak conducted output power
	☐ ANSI C63.10	11.9.1.1	RBW ≥ DTS bandwidth
	☐ ANSI C63.10	11.9.1.2	Integrated band power method
	☐ ANSI C63.10	11.9.1.3	PKPM1 Peak power meter method
	☐ ANSI C63.10	11.9.2	Maximum conducted (average) output power
	☐ ANSI C63.10	11.9.2.2	Measurement using a spectrum analyzer (SA)
	☐ ANSI C63.10	11.9.2.2.2	Method AVGSA-1(Duty cycle≥98%)
	☐ ANSI C63.10	11.9.2.2.3	Method AVGSA-1A(Duty cycle≥98%)
	☐ ANSI C63.10	11.9.2.2.4	Method AVGSA-2(Duty cycle≤98%)
	☐ ANSI C63.10	11.9.2.2.5	Method AVGSA-2A(Duty cycle≤98%)
	☐ ANSI C63.10	11.9.2.2.4	Method AVGSA-3
	☐ ANSI C63.10	11.9.2.2.5	Method AVGSA-3A
	☒ ANSI C63.10	11.9.2.3	Measurement using a power meter (PM)
	☒ ANSI C63.10	11.9.2.3.1	Method AVGPM
	☐ ANSI C63.10	11.9.2.3.2	Method AVGPM-G

4.8 Power Density	VERDICT: PASS

4.8.1 Limit:	
Standard	FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
Power Spectral Density≤8dBm/3kHz	

4.8.2 Test Setup



4.8.3 Test Procedure

	References Rule		Chapter	Description
☒	ANSI C63.10		11.10	Maximum power spectral density level in the fundamental emission
	☒	ANSI C63.10	11.10.2	Method PKPSD (peak PSD)
	☐	ANSI C63.10	11.10.3	Method AVGPSD-1(Duty cycle≥98%)
	☐	ANSI C63.10	11.10.4	Method AVGPSD-1A(Duty cycle≥98%)
	☐	ANSI C63.10	11.10.5	Method AVGPSD-2(Duty cycle＜98%)
	☐	ANSI C63.10	11.10.6	Method AVGPSD-2A(Duty cycle＜98%)
	☐	ANSI C63.10	11.10.7	Method AVGPSD-3
	☐	ANSI C63.10	11.10.8	Method AVGPSD-3A

4.9 Antenna Requirement	VERDICT: PASS

4.9.1 Limit:	
Standard	FCC Part 15 Subpart C Paragraph 15.203

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

4.9.2 Antenna Connector Construction:	
☒	The use of a permanently attached antenna
☐	The antenna use of a unique coupling to the intentional radiator
☐	The use of a nonstandard antenna jack or electrical connector

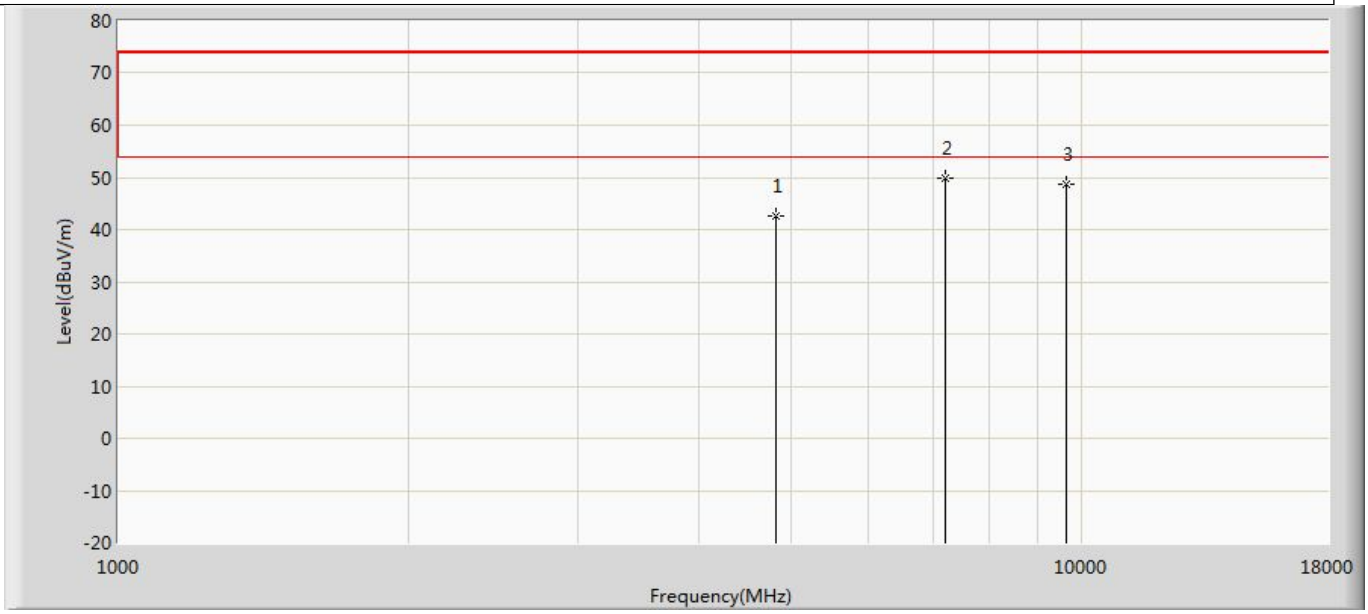
Please refer to the attached document “Internal Photograph” to show the antenna connector.

5 TEST SETUP PHOTO AND EUT PHOTO

Remark: The test setup photo and EUT Photo please see appendix.

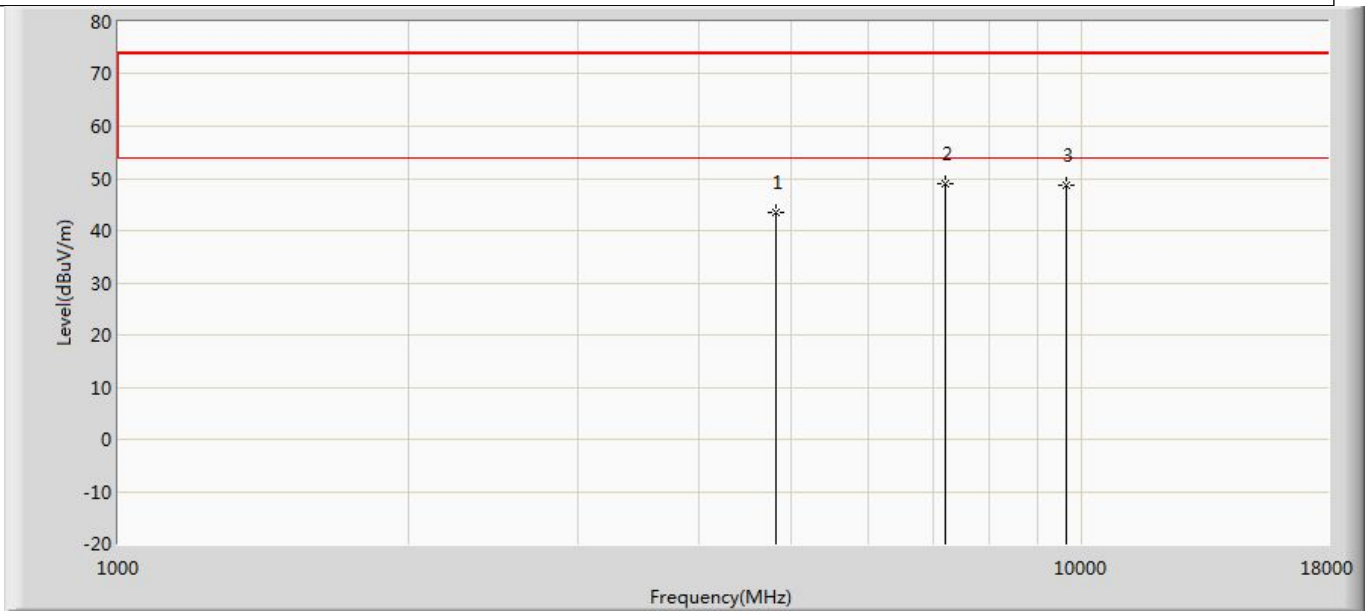
Appendix B: Emissions in restricted frequency bands

Profile: 2480839R	Page No.: 7
Engineer: Yu Liu	
Site: AC5	Time: 2024/09/05 - 11:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2405MHz by Thread	



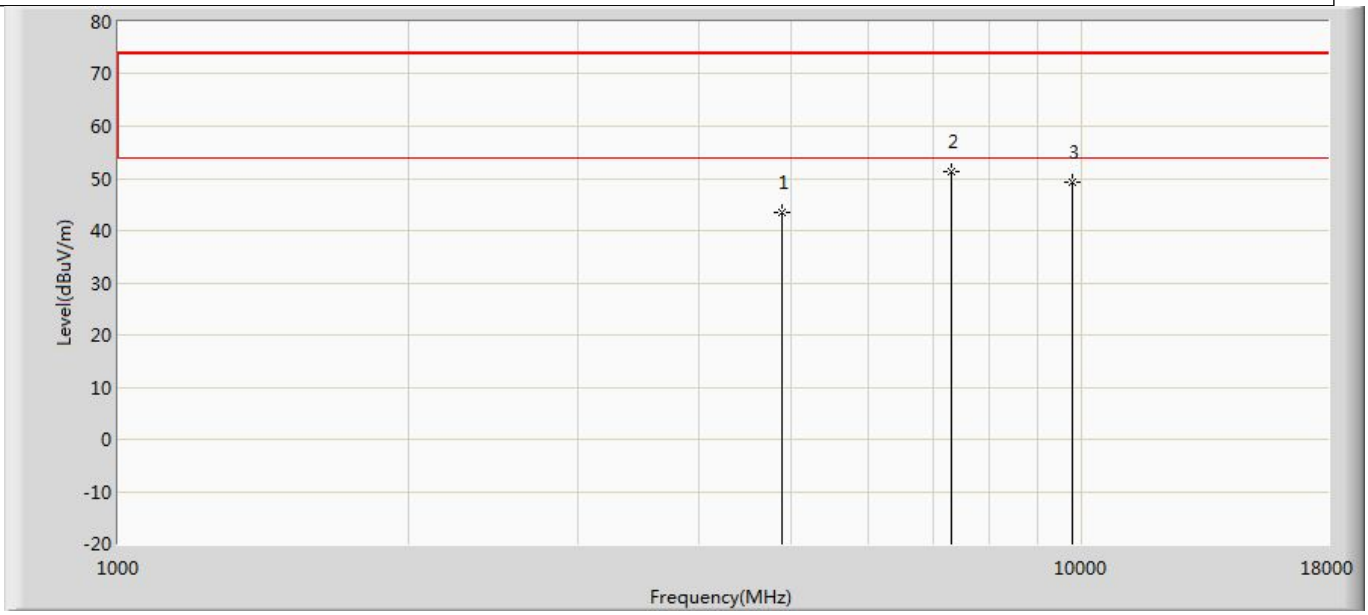
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4810.000	42.709	54.581	-31.291	74.000	-11.873	PK
2	*	7205.000	49.868	56.018	-24.132	74.000	-6.150	PK
3		9620.000	48.699	52.454	-25.301	74.000	-3.755	PK

Profile: 2480839R	Page No.: 8
Engineer: Yu Liu	
Site: AC5	Time: 2024/09/05 - 11:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2405MHz by Thread	



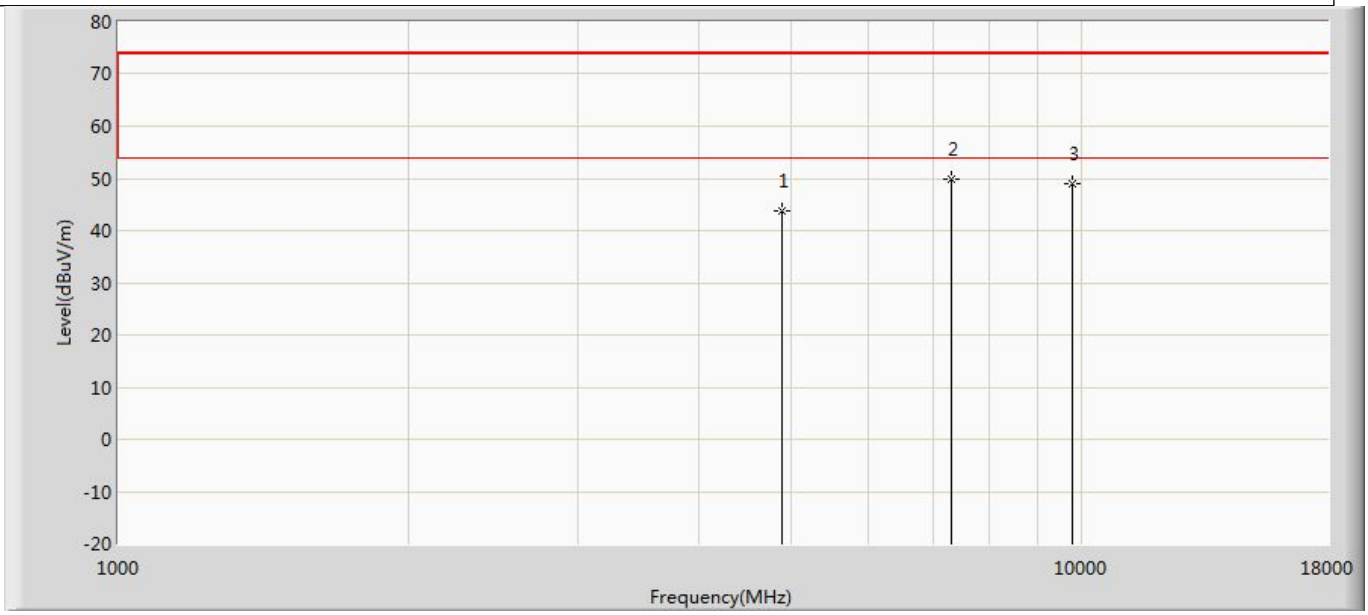
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4810.000	43.363	55.235	-30.637	74.000	-11.873	PK
2	*	7205.000	49.044	55.194	-24.956	74.000	-6.150	PK
3		9620.000	48.625	52.380	-25.375	74.000	-3.755	PK

Profile: 2480839R	Page No.: 9
Engineer: Yu Liu	
Site: AC5	Time: 2024/09/05 - 11:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2440MHz by Thread	



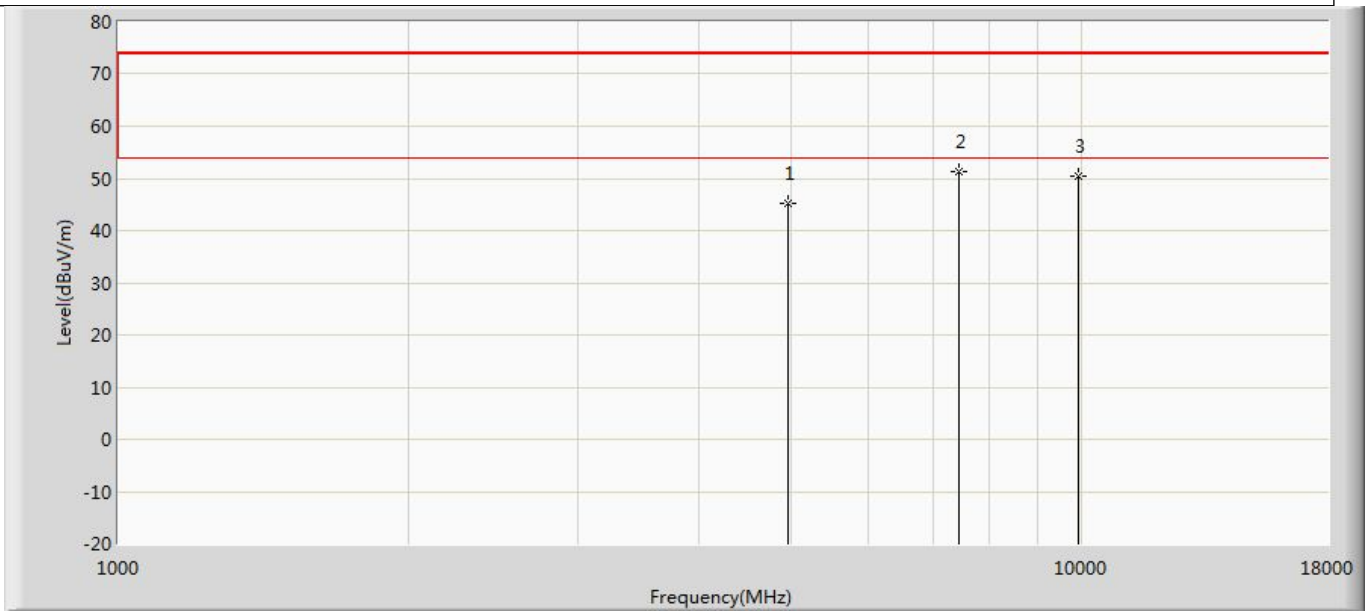
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	43.459	54.063	-30.541	74.000	-10.603	PK
2	*	7324.000	51.322	58.157	-22.678	74.000	-6.835	PK
3		9760.000	49.265	52.138	-24.735	74.000	-2.874	PK

Profile: 2480839R	Page No.: 10
Engineer: Yu Liu	
Site: AC5	Time: 2024/09/05 - 11:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2440MHz by Thread	



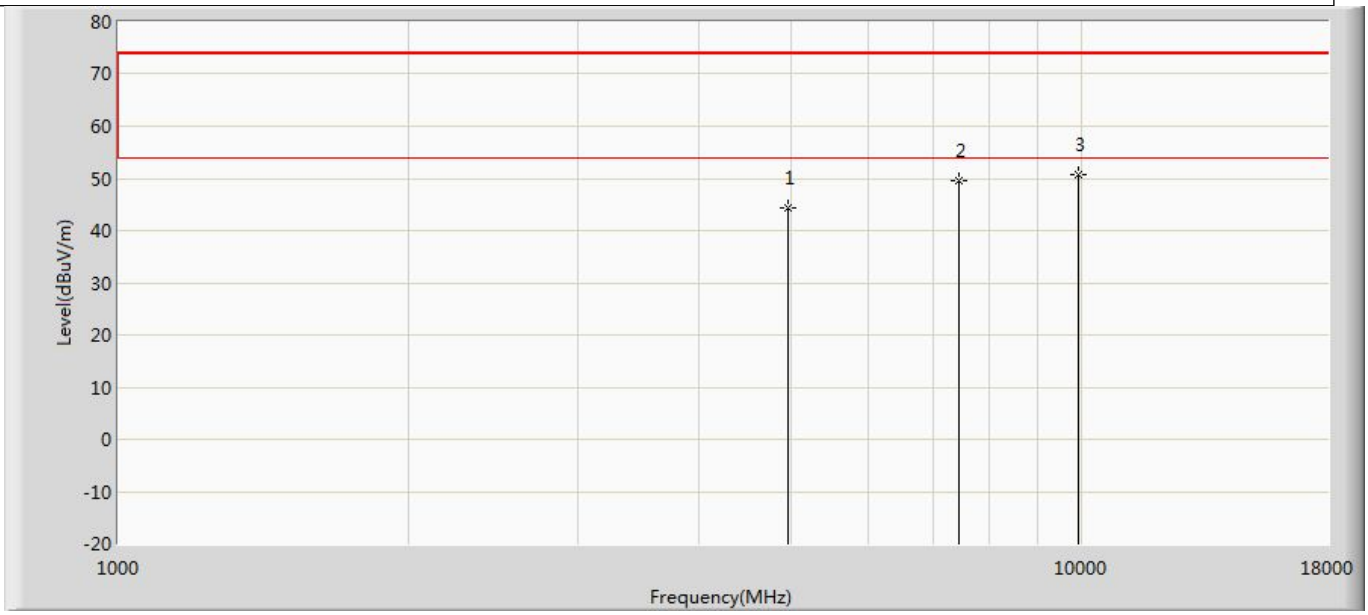
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4880.000	43.778	54.382	-30.222	74.000	-10.603	PK
2	*	7324.000	49.778	56.613	-24.222	74.000	-6.835	PK
3		9760.000	48.923	51.796	-25.077	74.000	-2.874	PK

Profile: 2480839R	Page No.: 11
Engineer: Yu Liu	
Site: AC5	Time: 2024/09/05 - 11:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2480MHz by Thread	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	45.280	55.986	-28.720	74.000	-10.707	PK
2	*	7443.000	51.316	58.073	-22.684	74.000	-6.757	PK
3		9920.000	50.498	52.320	-23.502	74.000	-1.821	PK

Profile: 2480839R	Page No.: 12
Engineer: Yu Liu	
Site: AC5	Time: 2024/09/05 - 11:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2480MHz by Thread	



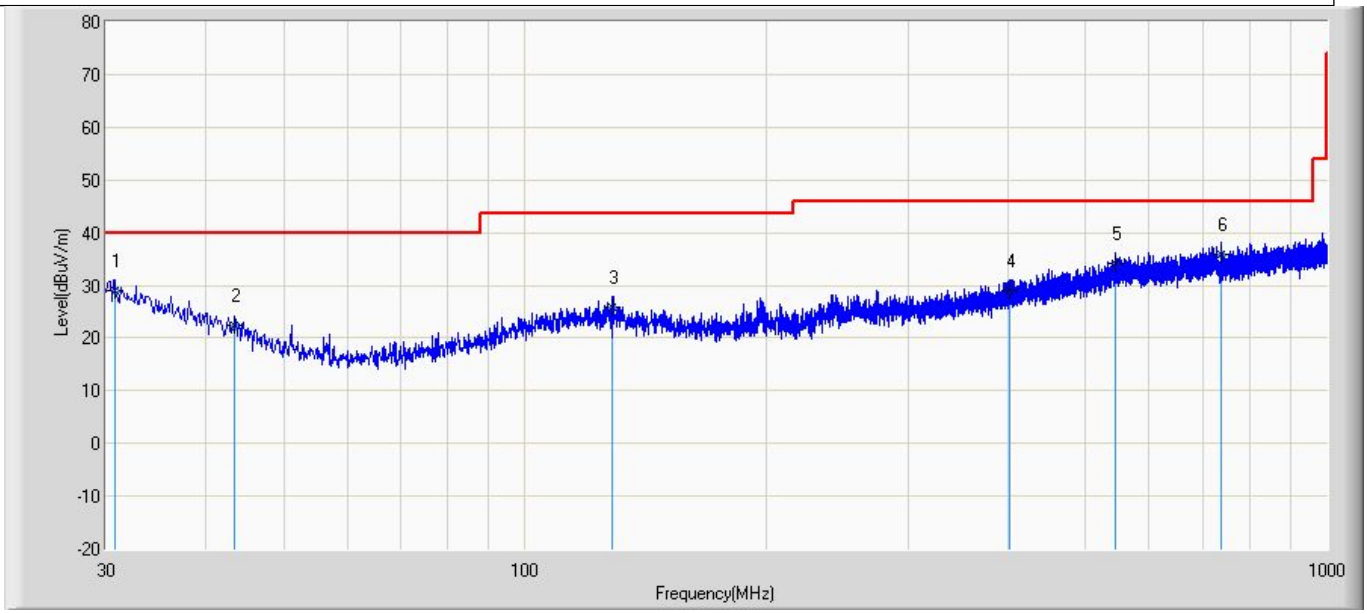
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		4960.000	44.385	55.091	-29.615	74.000	-10.707	PK
2		7443.000	49.624	56.381	-24.376	74.000	-6.757	PK
3	*	9920.000	50.658	52.480	-23.342	74.000	-1.821	PK

Note:

1. The test frequency range, 9kHz~30MHz and Above 18GHz worst case are at least 6dB below the limits, therefore no data appear in the report.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

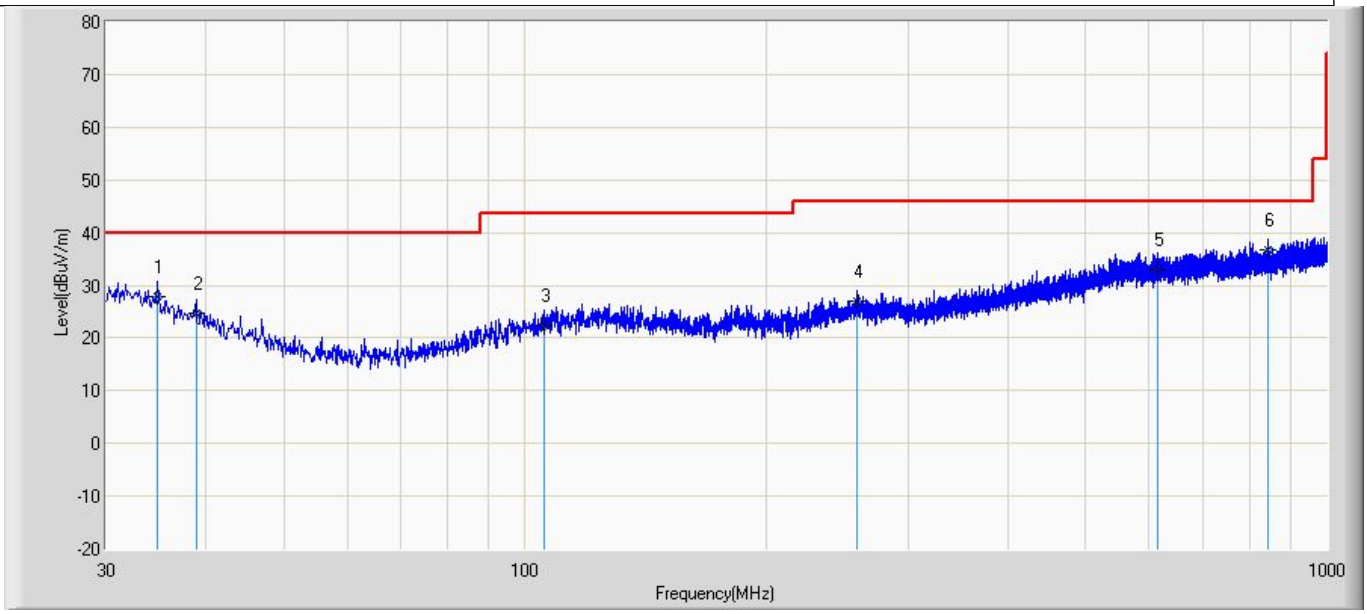
The worst case of Radiated Emission below 1GHz:

Profile: 2480839R	Page No.: 1
Engineer: YULIU	
Site: AC3	Time: 2024/09/05 - 19:50
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: CBL6112B_2931(30-1000MHz)	Polarity: Vertical
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2405MHz by Thread	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		30.728	28.885	4.125	-11.115	40.000	24.760	QP
2		43.459	22.337	4.351	-17.663	40.000	17.985	QP
3		128.576	25.953	6.984	-17.547	43.500	18.968	QP
4		402.844	28.892	5.174	-17.108	46.000	23.718	QP
5		545.070	34.206	7.029	-11.794	46.000	27.177	QP
6	*	737.736	35.754	7.258	-10.246	46.000	28.495	QP

Profile: 2480839R	Page No.: 2
Engineer: YULIU	
Site: AC3	Time: 2024/09/05 - 19:55
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: CBL6112B_2931(30-1000MHz)	Polarity: Horizontal
EUT: B4	Power: Battery 3Vdc
Note: Mode 1 : Transmit at 2405MHz by Thread	



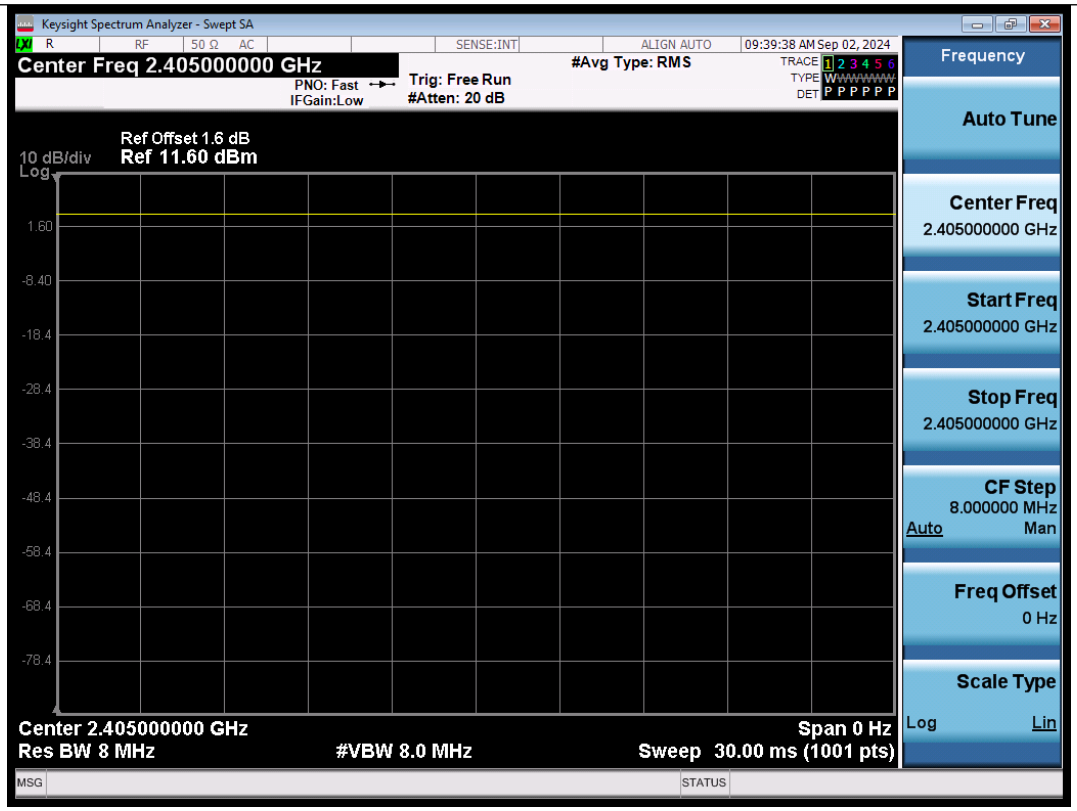
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		34.729	27.989	5.115	-12.011	40.000	22.874	QP
2		38.851	24.729	4.122	-15.271	40.000	20.607	QP
3		105.418	22.353	3.984	-21.147	43.500	18.369	QP
4		258.920	26.920	6.032	-19.080	46.000	20.888	QP
5		616.365	33.134	5.874	-12.866	46.000	27.260	QP
6	*	842.860	36.602	7.439	-9.398	46.000	29.163	QP

Note:
1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

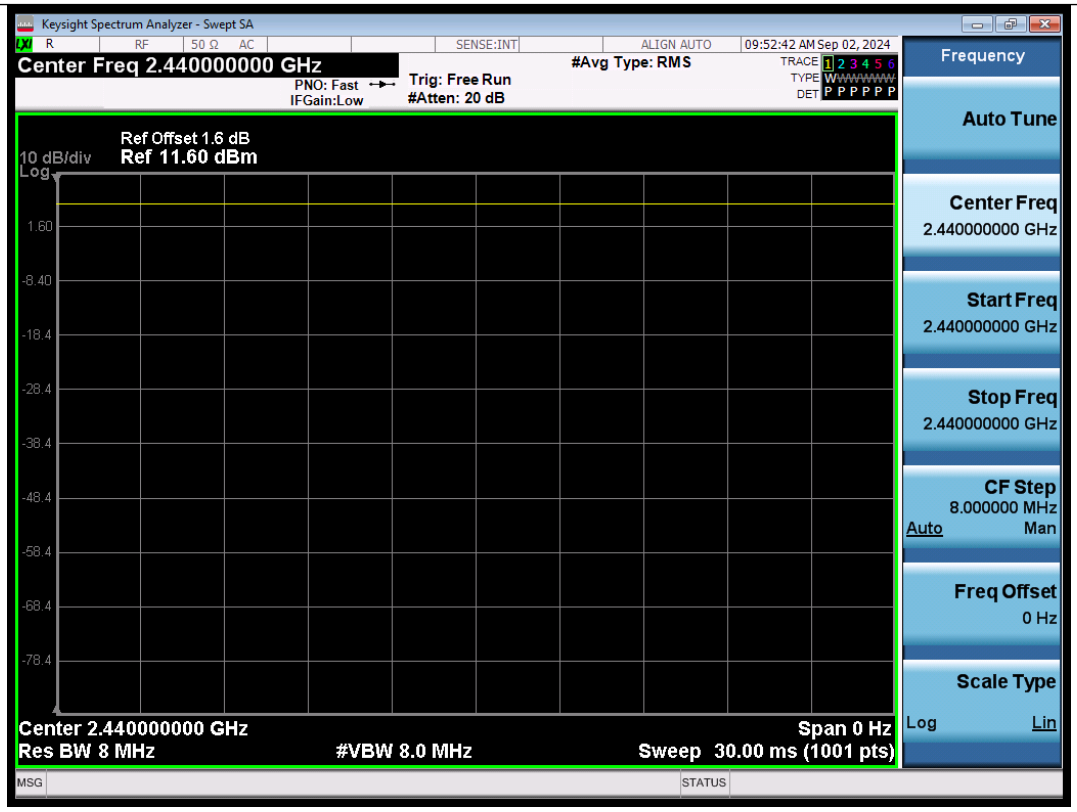
Appendix B: Duty cycle

TestMode	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]
Mode 1	2405	N/A	N/A	100
	2440	N/A	N/A	100
	2480	N/A	N/A	100

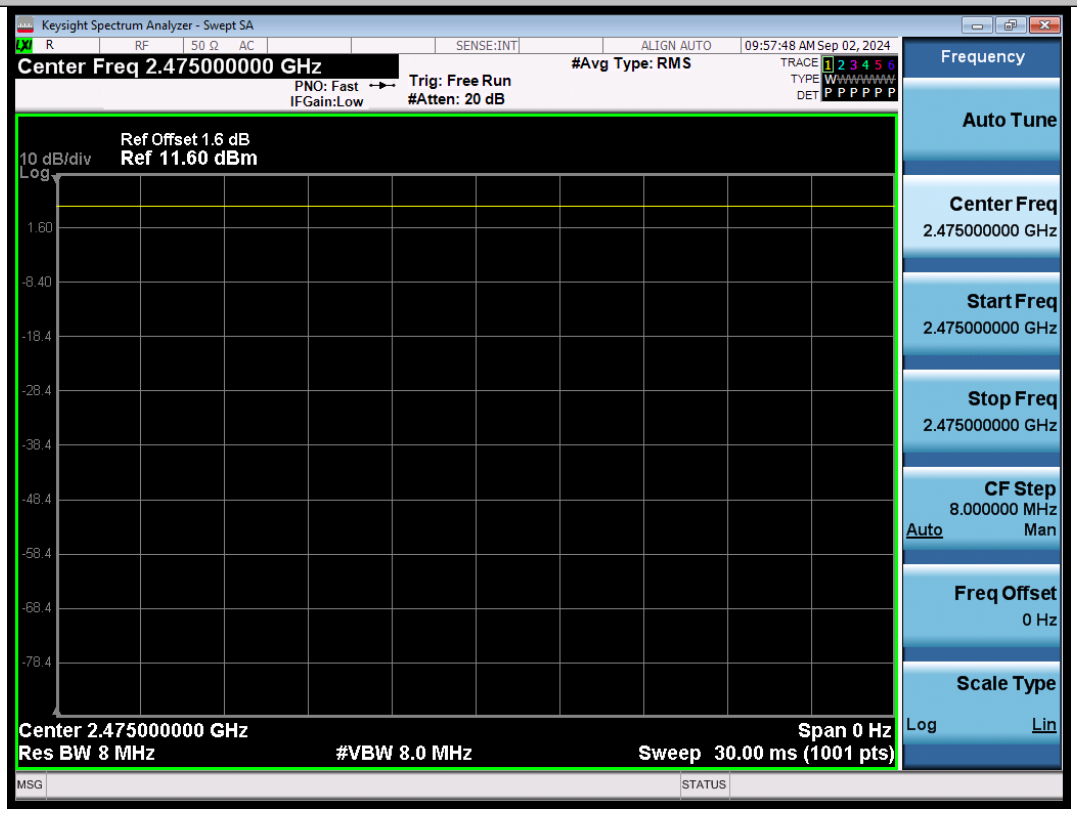
TEST GRAPHS:



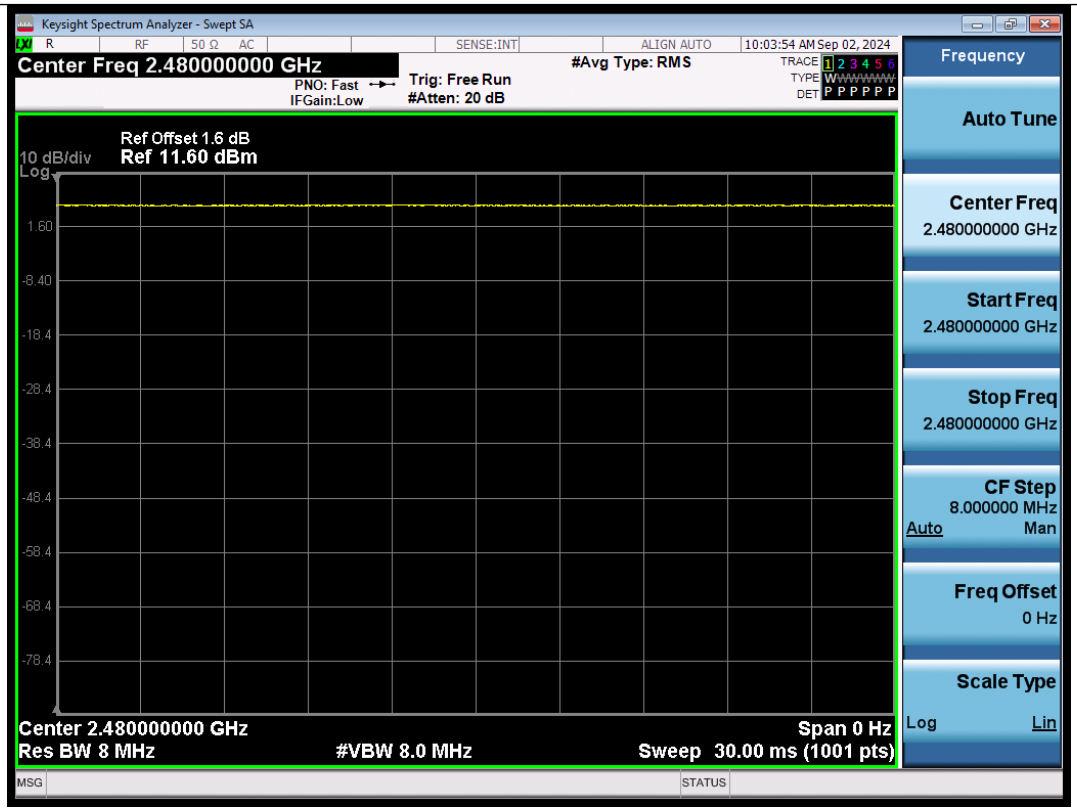
NTNV-Thread-Ant1-2405



NTNV-Thread-Ant1-2440



NTNV-Thread-Ant1-2475

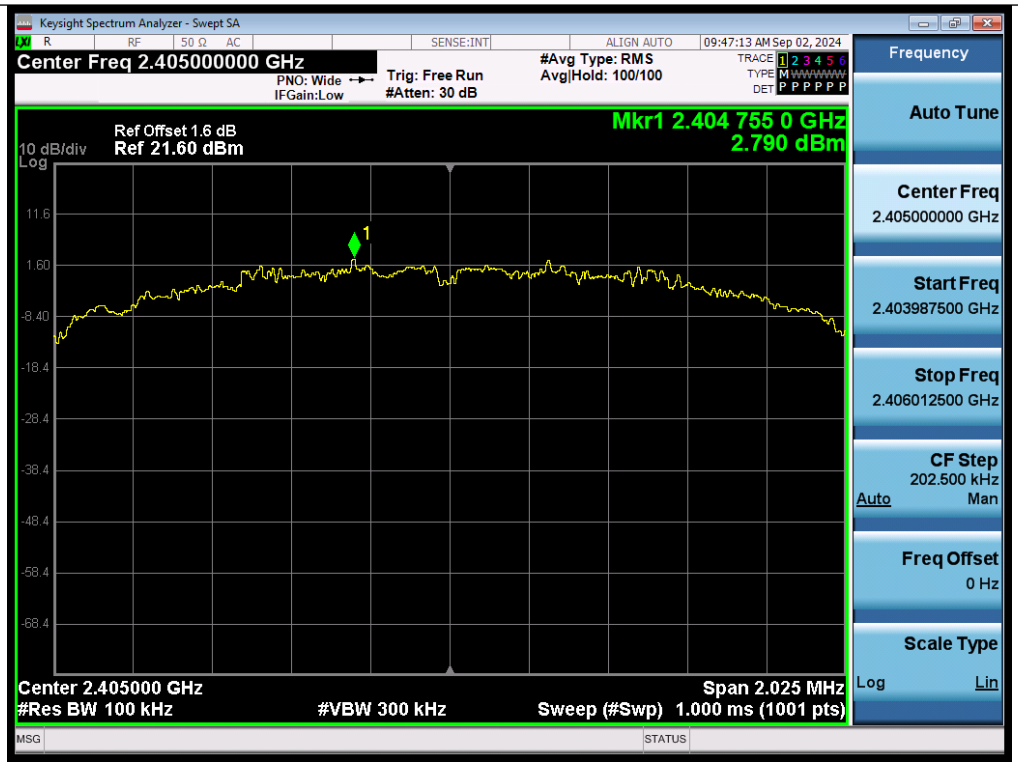


NTNV-Thread-Ant1-2480

Appendix C: Emissions in non-restricted frequency bands

Reference level measurement:

TestMode	Freq(MHz)	Max.Point[MHz]	Result[dBm]
Thread	2405	2404.75	2.79
Thread	2440	2440.29	1.97
Thread	2480	2479.73	1.63



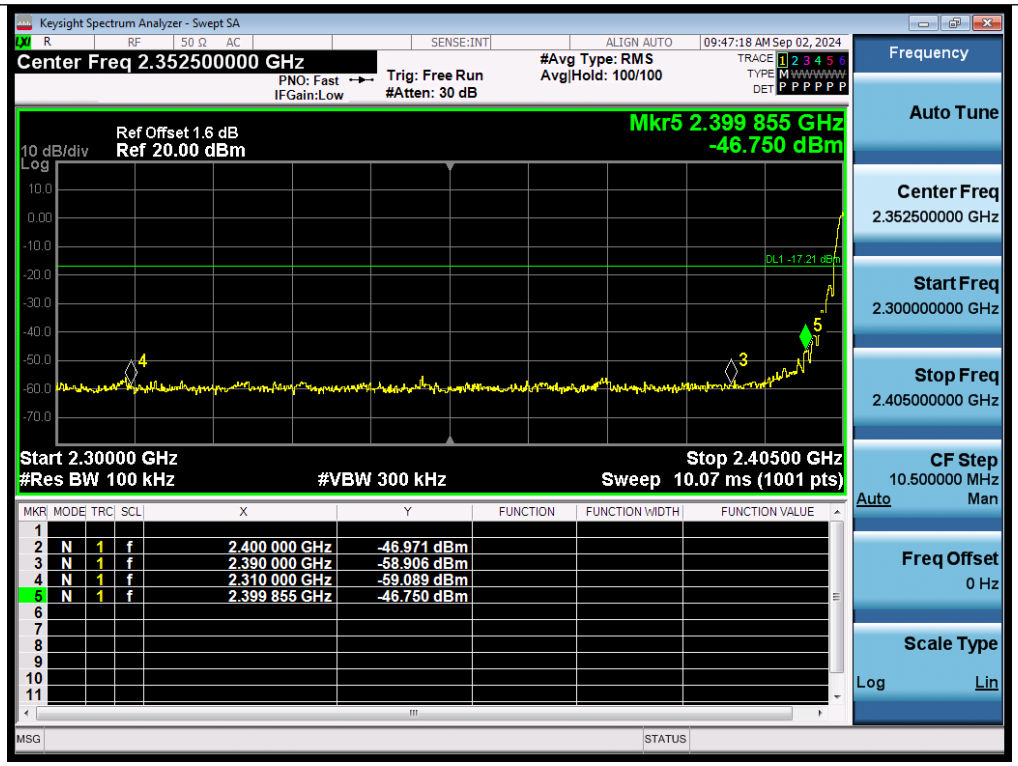
Thread-Ant1-2405-PASS

Thread-Ant1-2440-PASS

Thread-Ant1-2480-PASS

Test Result for Band edge:

TestMode	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
Thread	Low	2405	2.79	-46.75	≤-17.21	PASS
Thread	High	2480	1.63	-39.87	≤-18.37	PASS



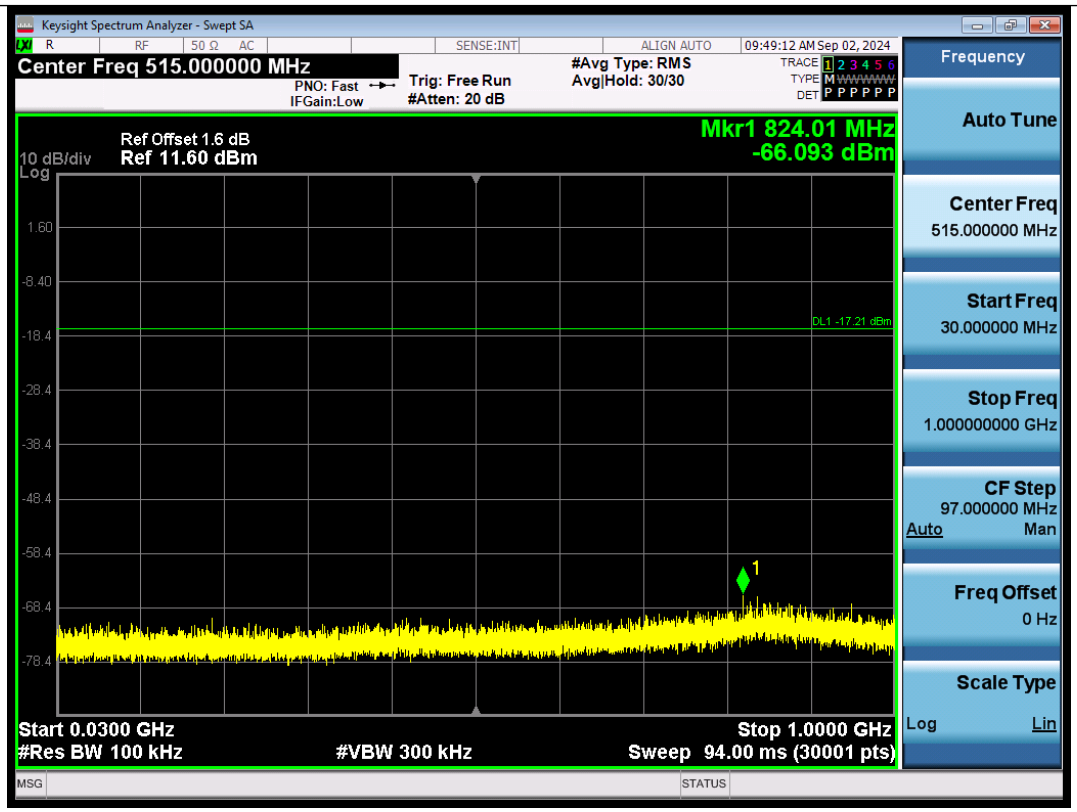
Thread-Ant1-2405-PASS

Thread-Ant1-2480-PASS

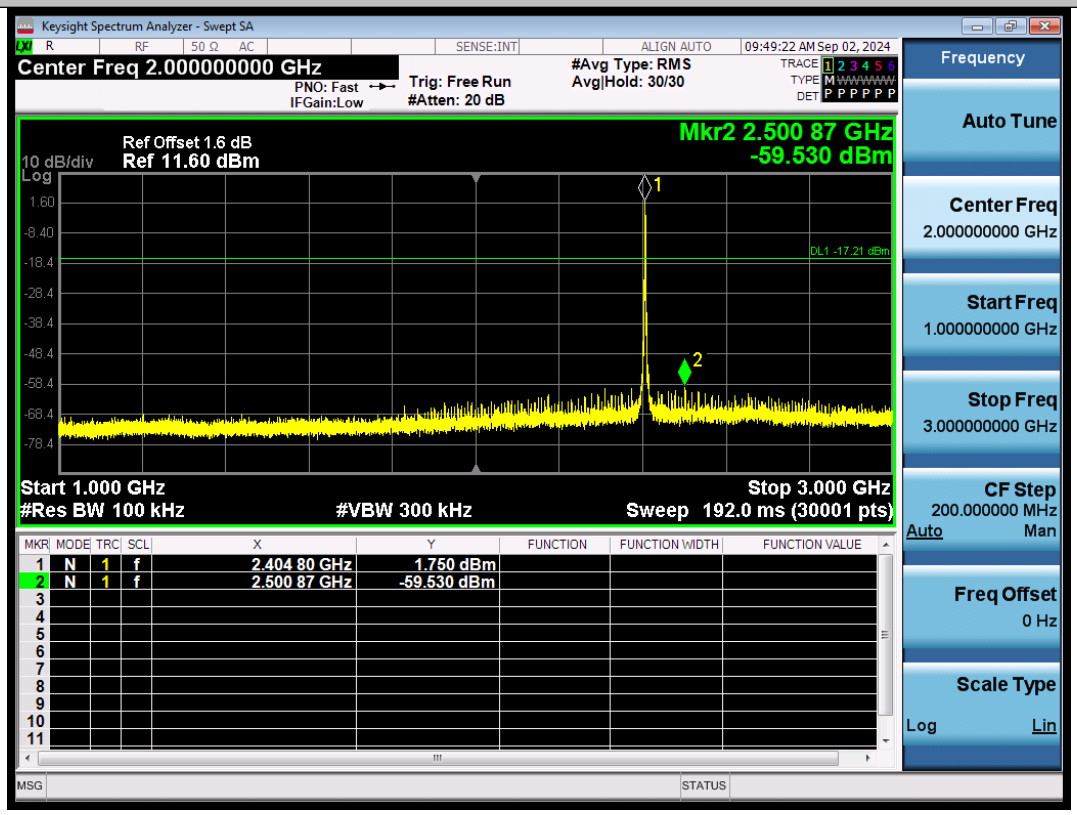
Test Result for Spurious Emission:

TestMode	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
Thread	2405	30~1000	2.79	-66.09	≤-17.21	PASS
Thread	2405	1000~3000	2.79	-59.53	≤-17.21	PASS
Thread	2405	3000~5000	2.79	-48.48	≤-17.21	PASS
Thread	2405	5000~7000	2.79	-67.97	≤-17.21	PASS
Thread	2405	7000~9000	2.79	-55.82	≤-17.21	PASS
Thread	2405	9000~11000	2.79	-66.99	≤-17.21	PASS
Thread	2405	11000~13000	2.79	-64.58	≤-17.21	PASS
Thread	2405	13000~15000	2.79	-65.65	≤-17.21	PASS
Thread	2405	15000~17000	2.79	-64.52	≤-17.21	PASS
Thread	2405	17000~19000	2.79	-62.5	≤-17.21	PASS
Thread	2405	19000~21000	2.79	-62.6	≤-17.21	PASS
Thread	2405	21000~23000	2.79	-61.85	≤-17.21	PASS
Thread	2405	23000~25000	2.79	-58.27	≤-17.21	PASS
Thread	2440	30~1000	1.97	-66.52	≤-18.03	PASS
Thread	2440	1000~3000	1.97	-59.13	≤-18.03	PASS
Thread	2440	3000~5000	1.97	-53.02	≤-18.03	PASS
Thread	2440	5000~7000	1.97	-67.44	≤-18.03	PASS
Thread	2440	7000~9000	1.97	-53.87	≤-18.03	PASS
Thread	2440	9000~11000	1.97	-67.72	≤-18.03	PASS
Thread	2440	11000~13000	1.97	-63.13	≤-18.03	PASS
Thread	2440	13000~15000	1.97	-65.42	≤-18.03	PASS
Thread	2440	15000~17000	1.97	-64.58	≤-18.03	PASS
Thread	2440	17000~19000	1.97	-63.03	≤-18.03	PASS
Thread	2440	19000~21000	1.97	-61.82	≤-18.03	PASS
Thread	2440	21000~23000	1.97	-62.11	≤-18.03	PASS
Thread	2440	23000~25000	1.97	-59.14	≤-18.03	PASS
Thread	2480	30~1000	1.63	-66.63	≤-18.37	PASS
Thread	2480	1000~3000	1.63	-58.52	≤-18.37	PASS
Thread	2480	3000~5000	1.63	-57.62	≤-18.37	PASS
Thread	2480	5000~7000	1.63	-67.47	≤-18.37	PASS
Thread	2480	7000~9000	1.63	-50.85	≤-18.37	PASS
Thread	2480	9000~11000	1.63	-67.76	≤-18.37	PASS
Thread	2480	11000~13000	1.63	-63.77	≤-18.37	PASS
Thread	2480	13000~15000	1.63	-65.71	≤-18.37	PASS
Thread	2480	15000~17000	1.63	-64.59	≤-18.37	PASS
Thread	2480	17000~19000	1.63	-62.85	≤-18.37	PASS
Thread	2480	19000~21000	1.63	-62.69	≤-18.37	PASS
Thread	2480	21000~23000	1.63	-61.92	≤-18.37	PASS
Thread	2480	23000~25000	1.63	-59.03	≤-18.37	PASS

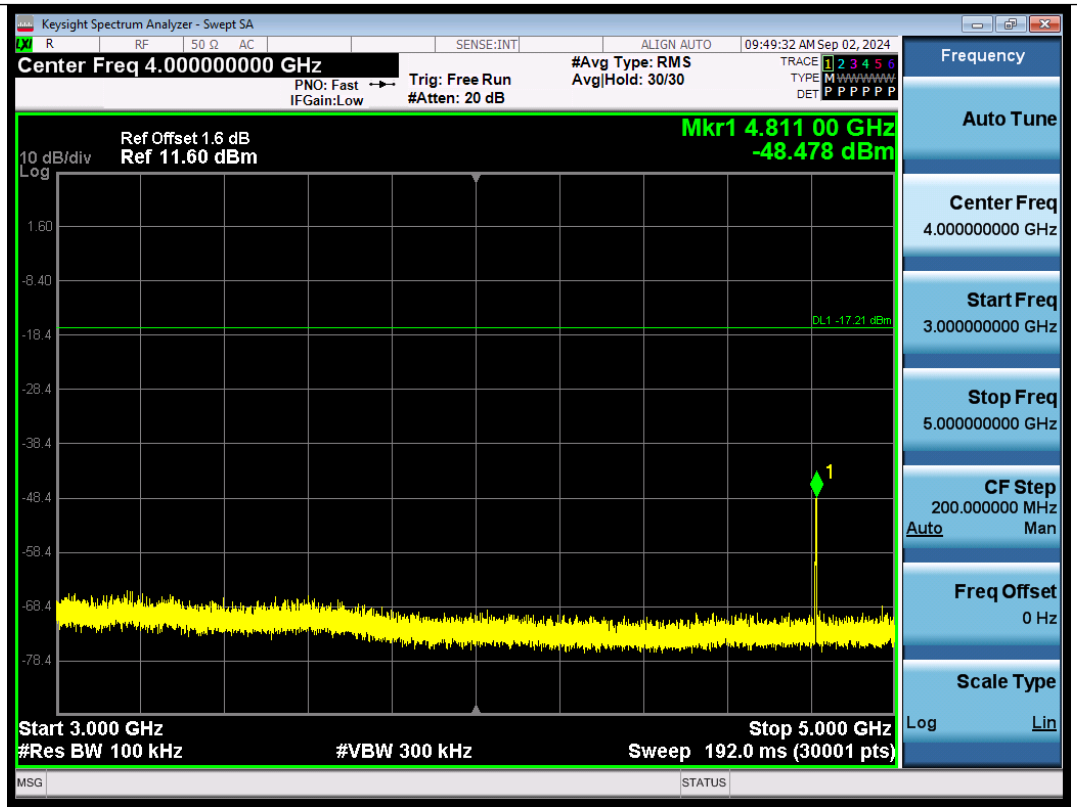
Test Graphs for Reference level



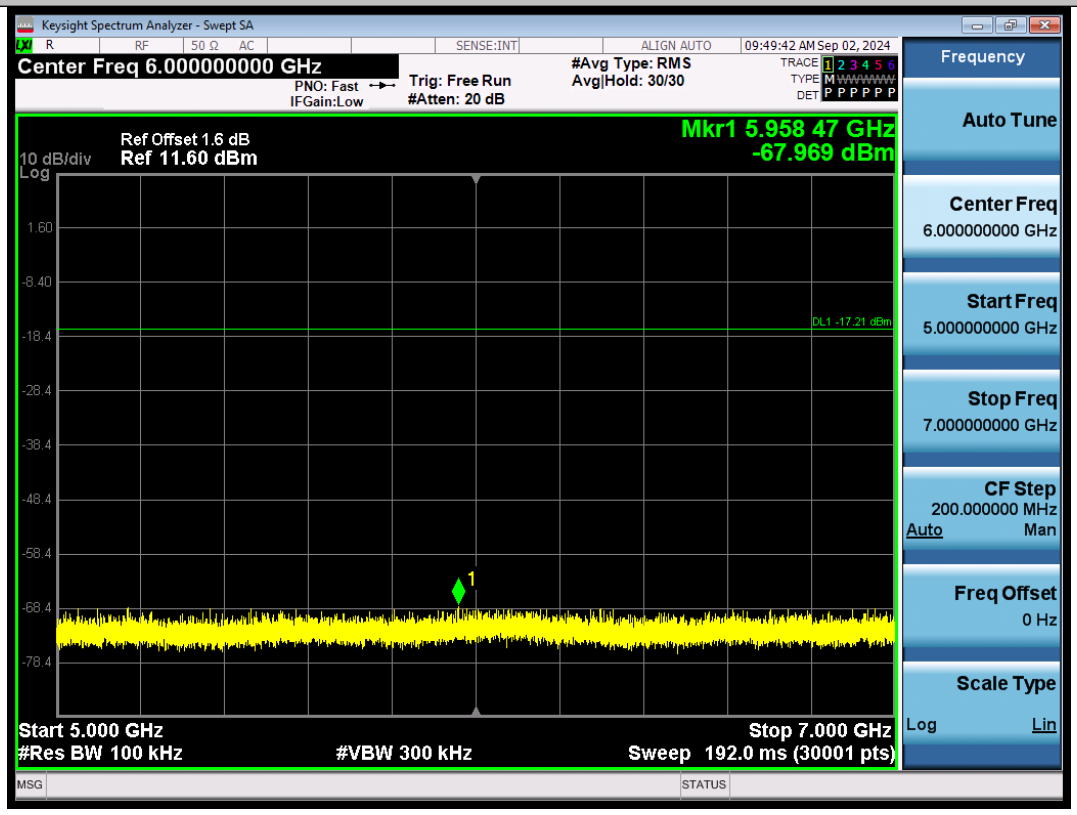
Thread-Ant1-2405-30~1000-PASS



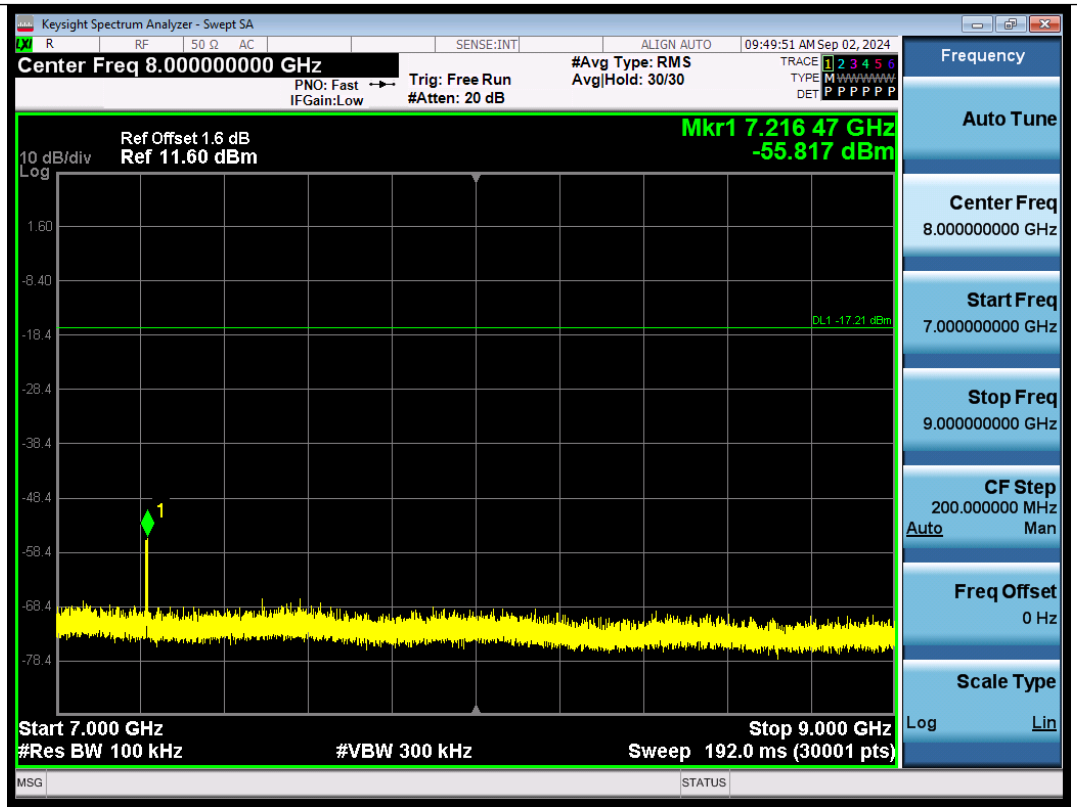
Thread-Ant1-2405-1000~3000-PASS



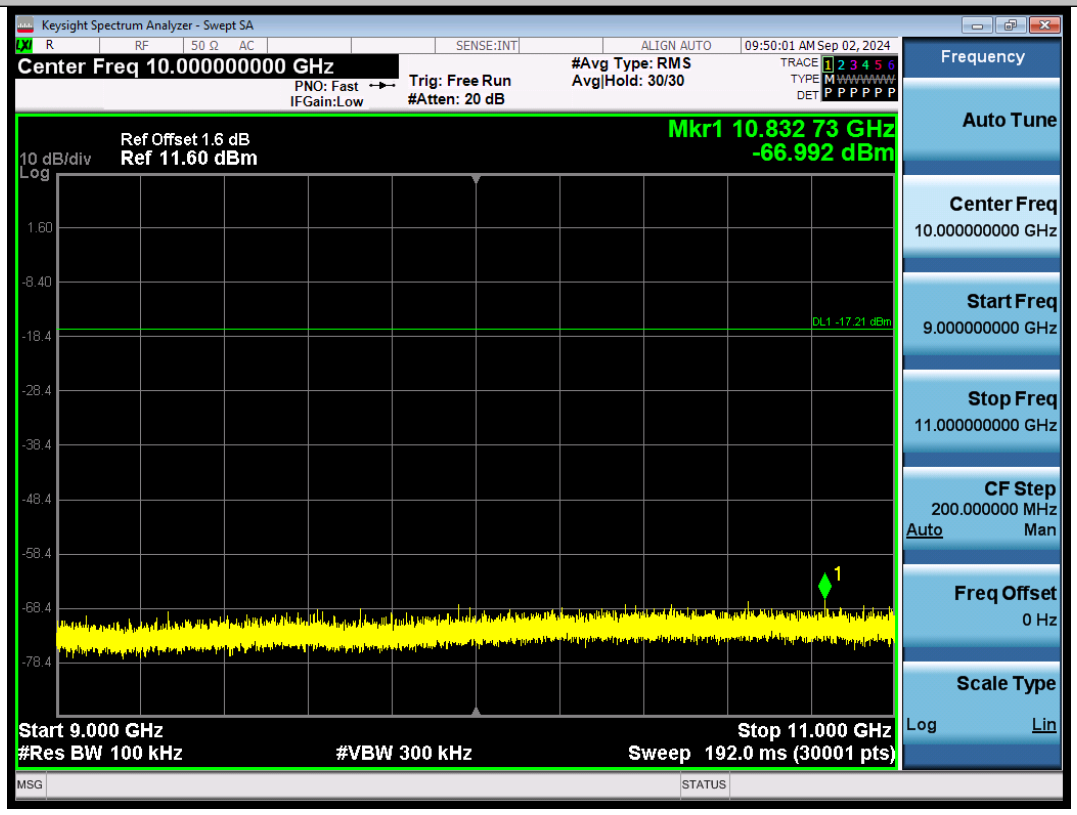
Thread-Ant1-2405-3000~5000-PASS



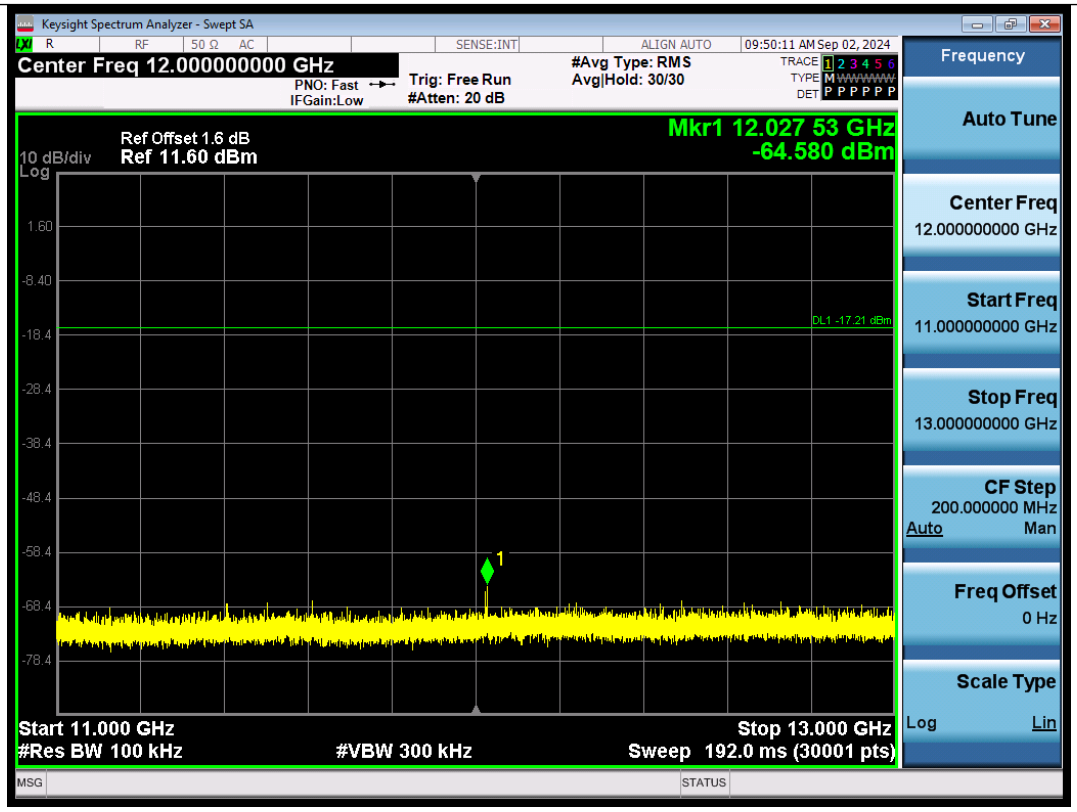
Thread-Ant1-2405-5000~7000-PASS



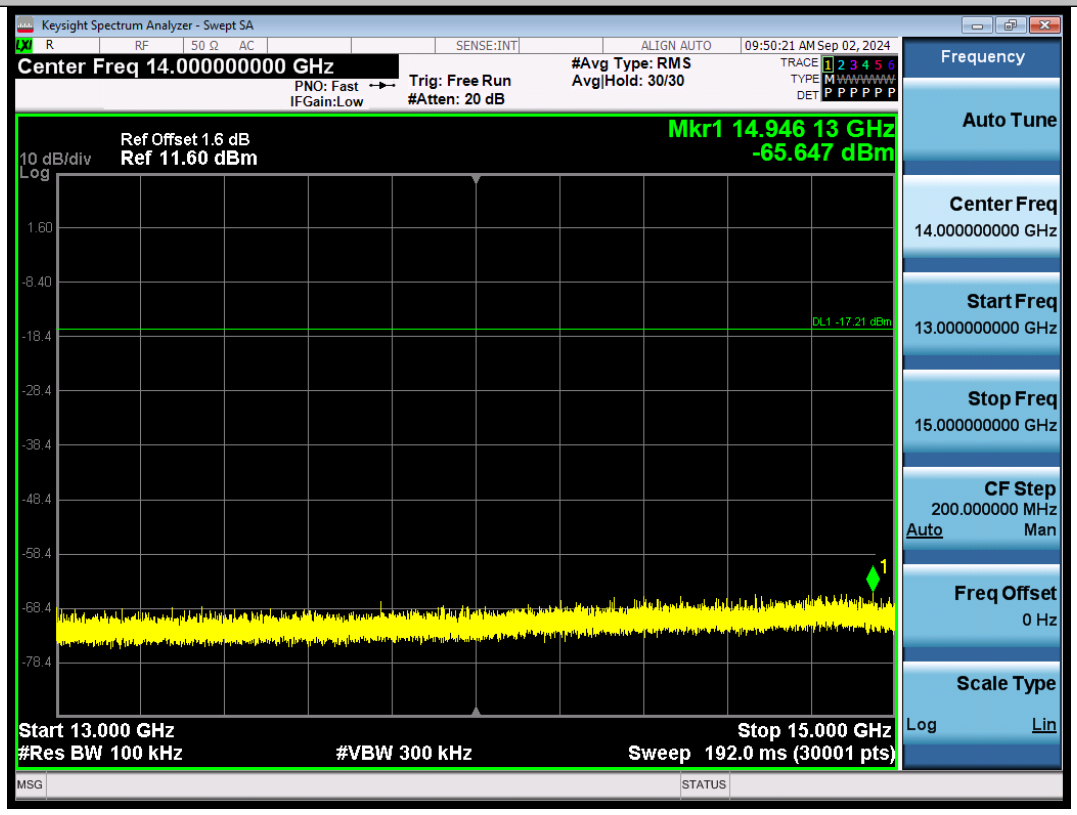
Thread-Ant1-2405-7000~9000-PASS



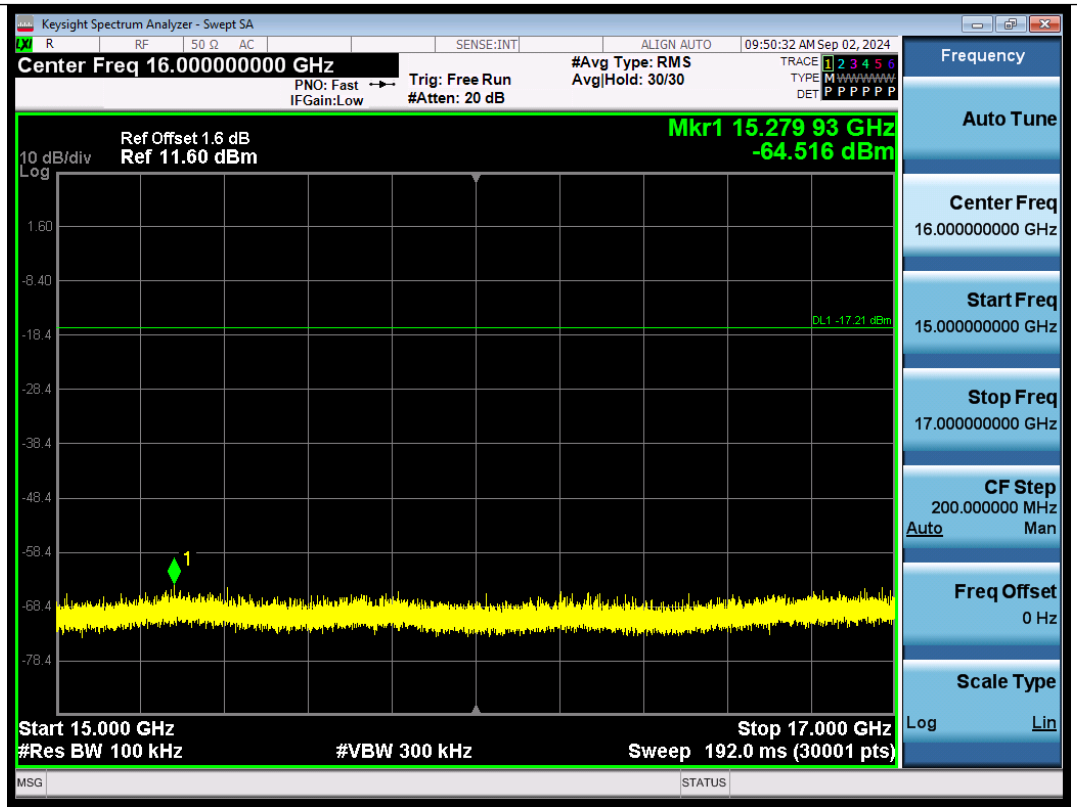
Thread-Ant1-2405-9000~11000-PASS



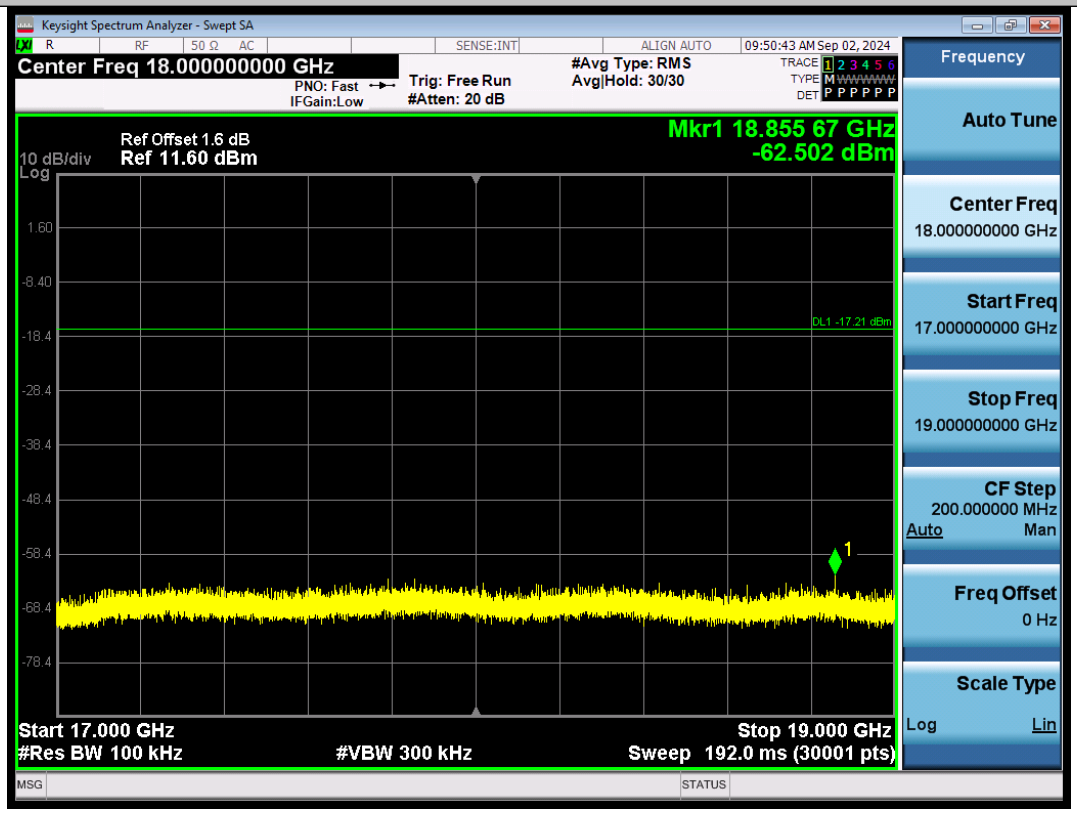
Thread-Ant1-2405-11000~13000-PASS



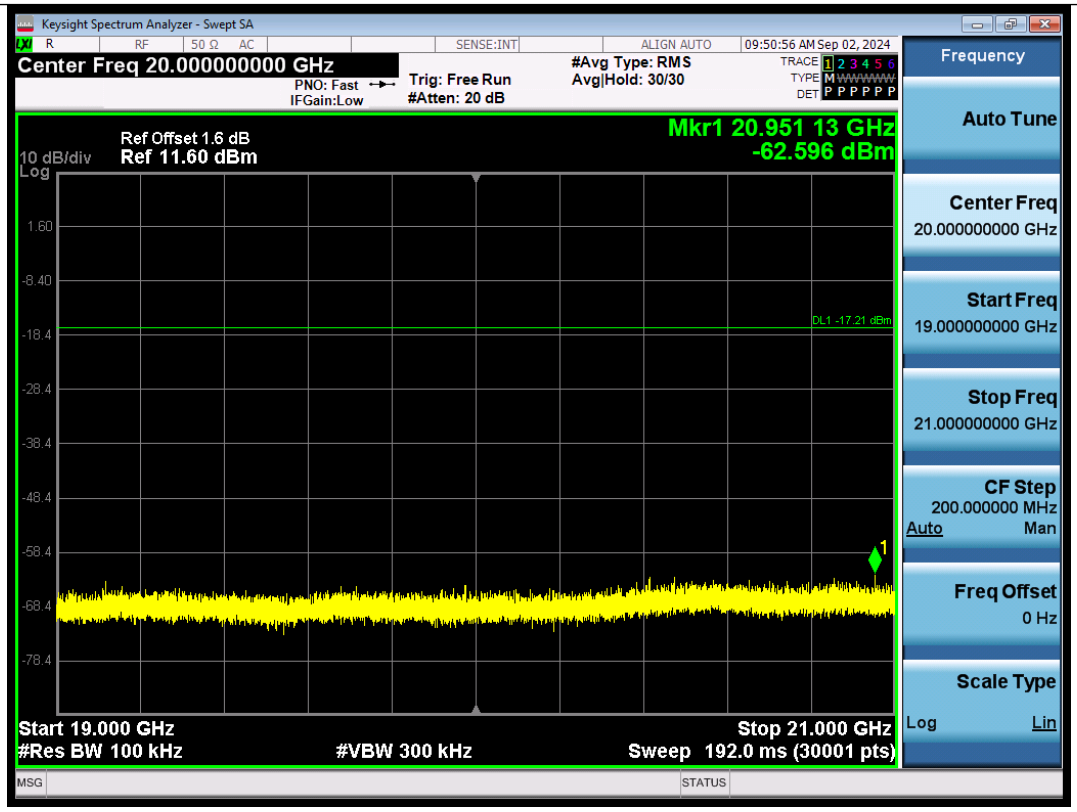
Thread-Ant1-2405-13000~15000-PASS



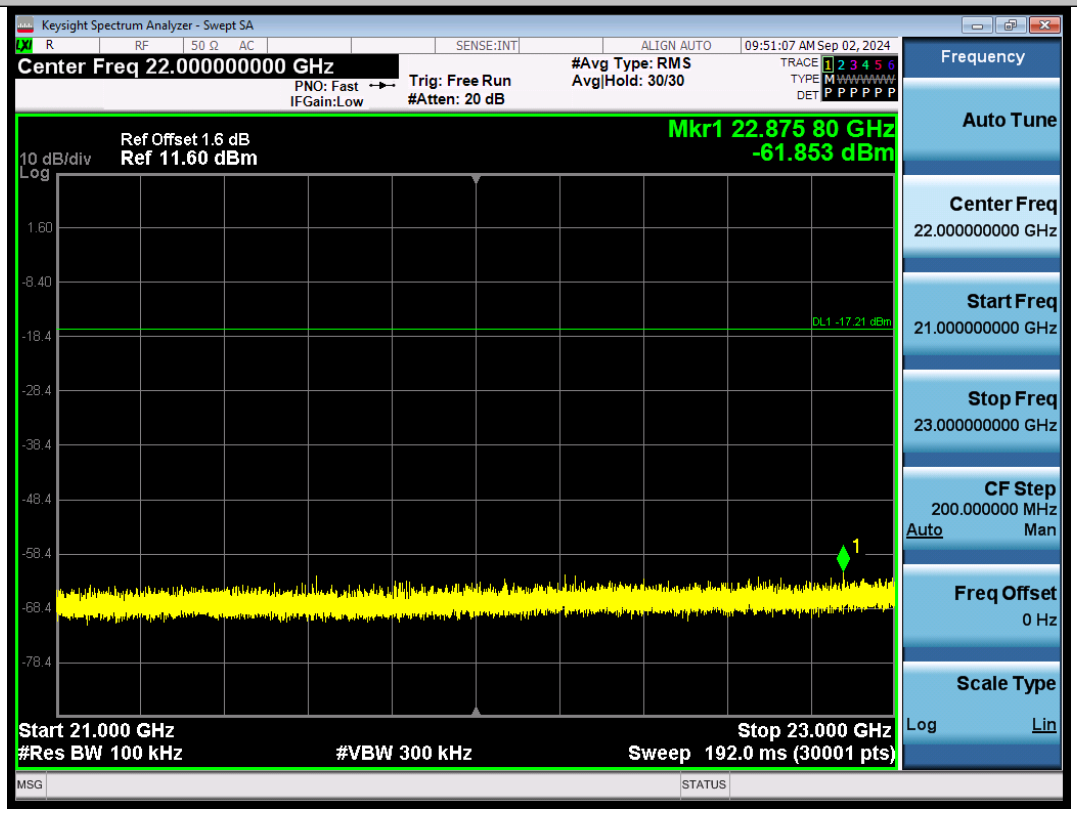
Thread-Ant1-2405-15000~17000-PASS



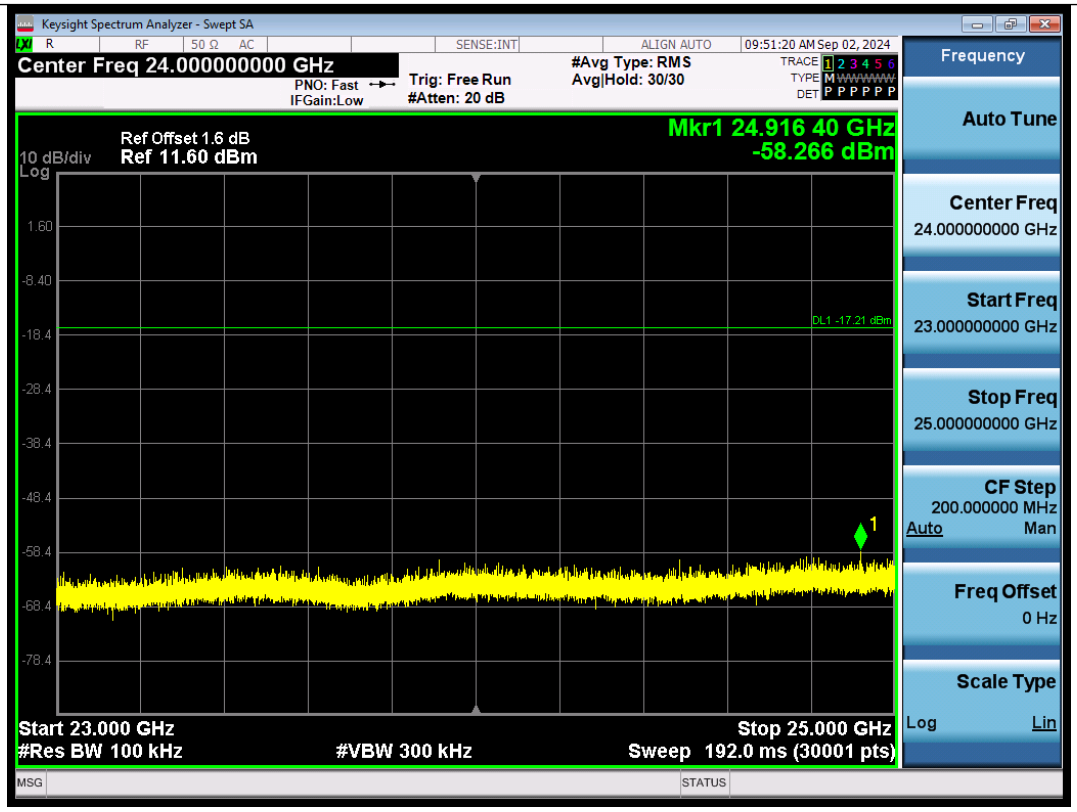
Thread-Ant1-2405-17000~19000-PASS



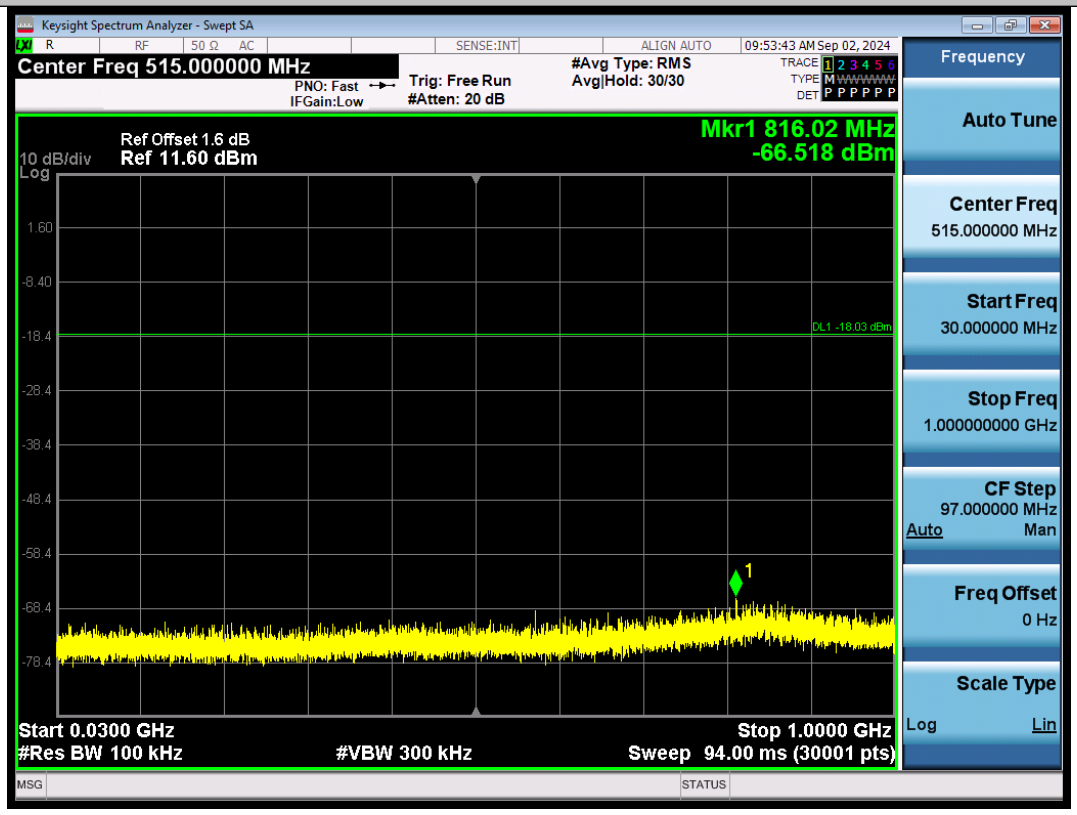
Thread-Ant1-2405-19000~21000-PASS



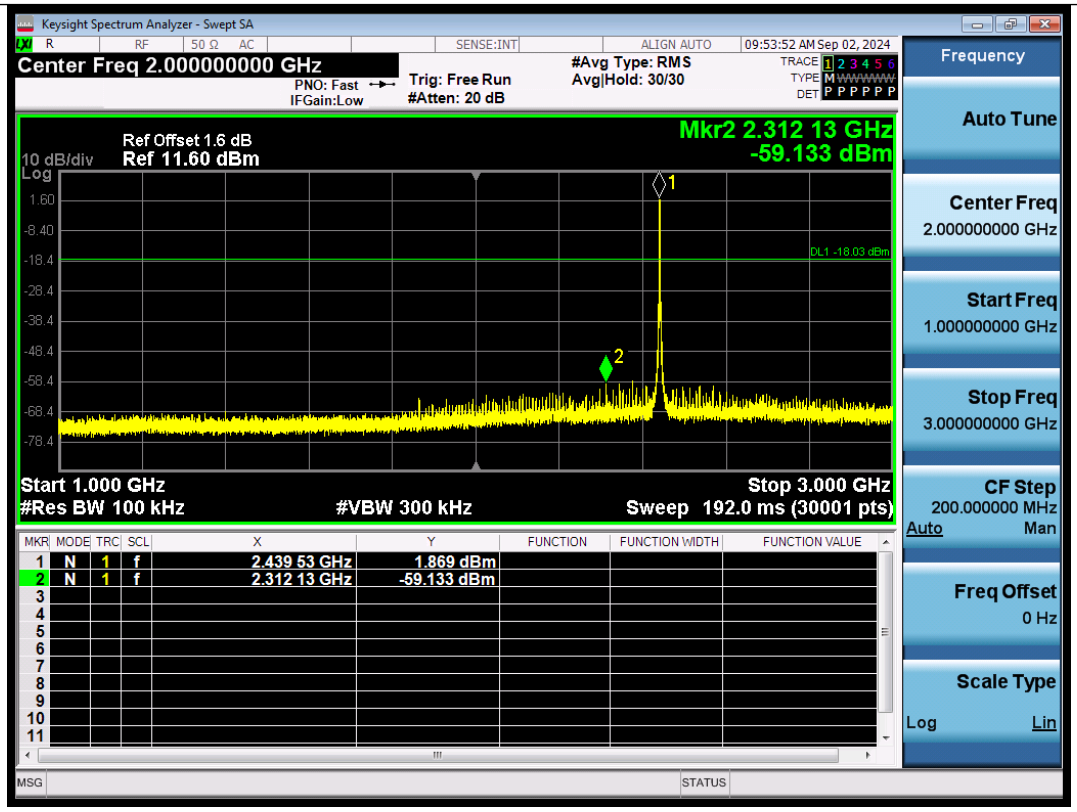
Thread-Ant1-2405-21000~23000-PASS



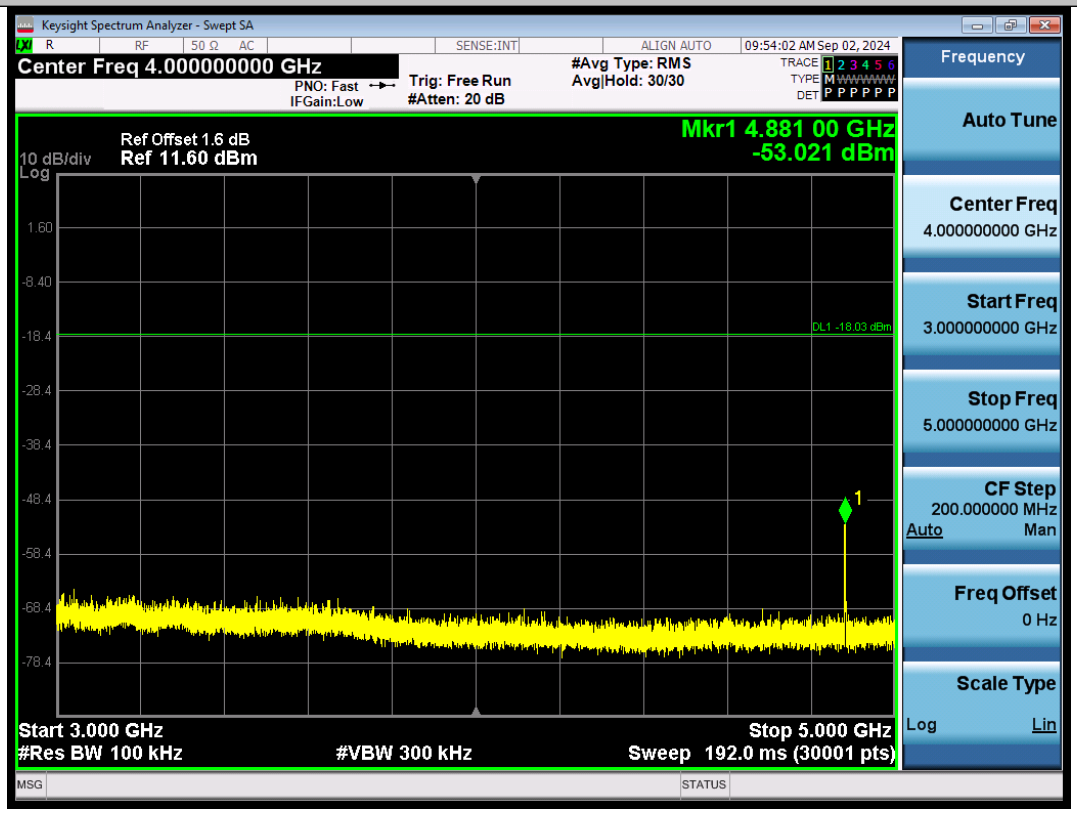
Thread-Ant1-2405-23000~25000-PASS



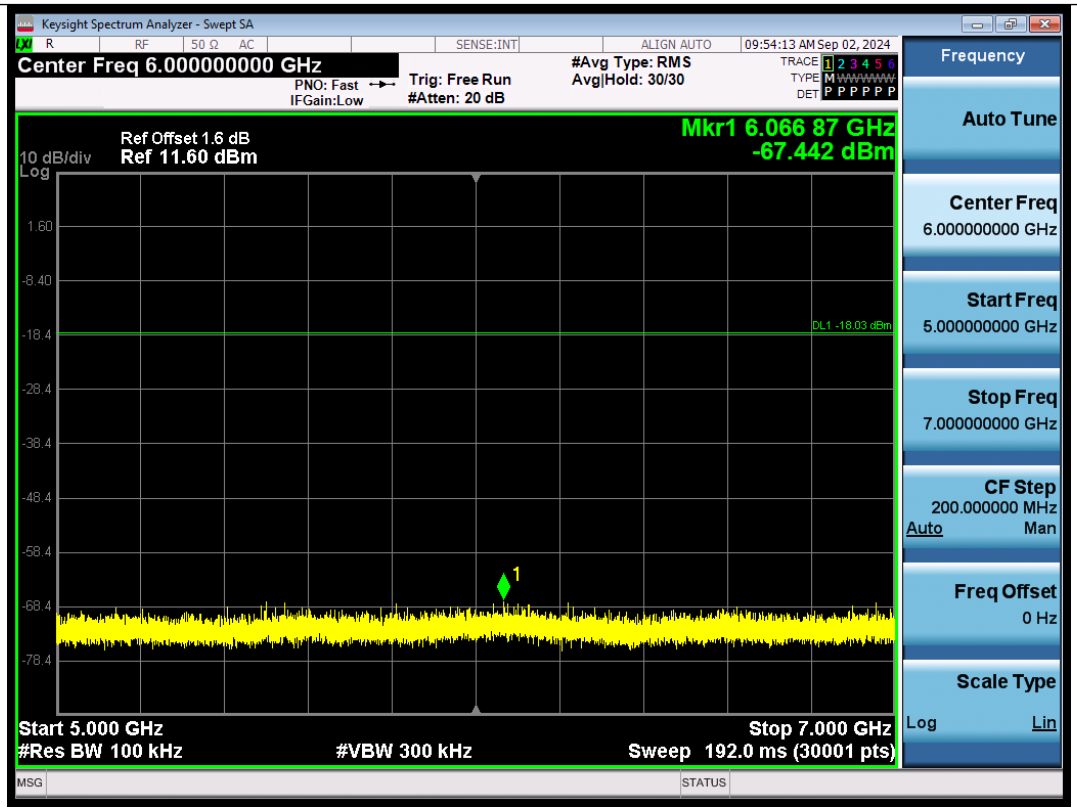
Thread-Ant1-2440-30~1000-PASS



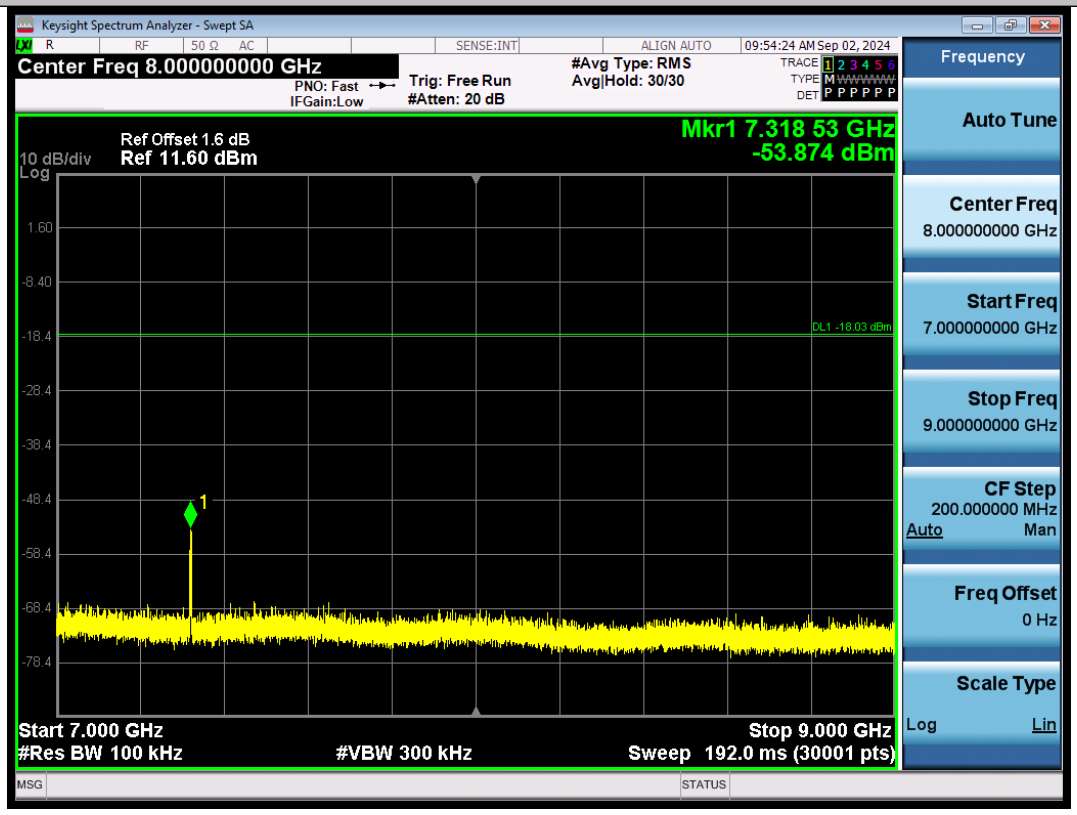
Thread-Ant1-2440-1000~3000-PASS



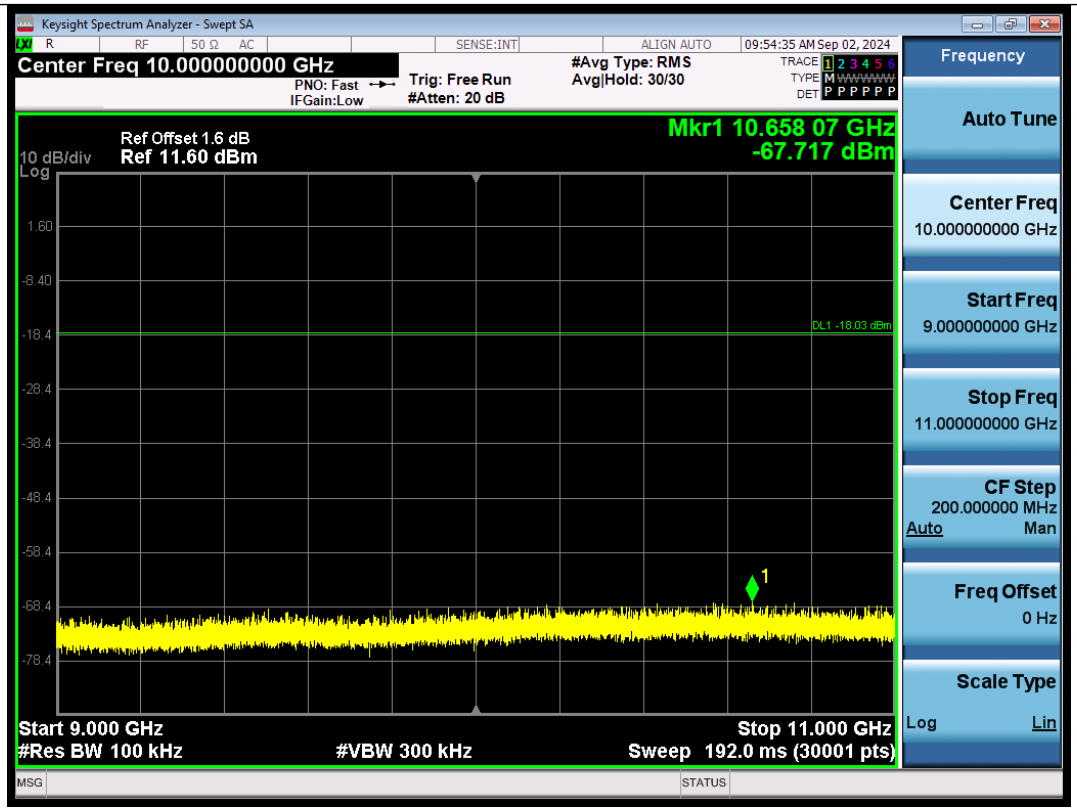
Thread-Ant1-2440-3000~5000-PASS



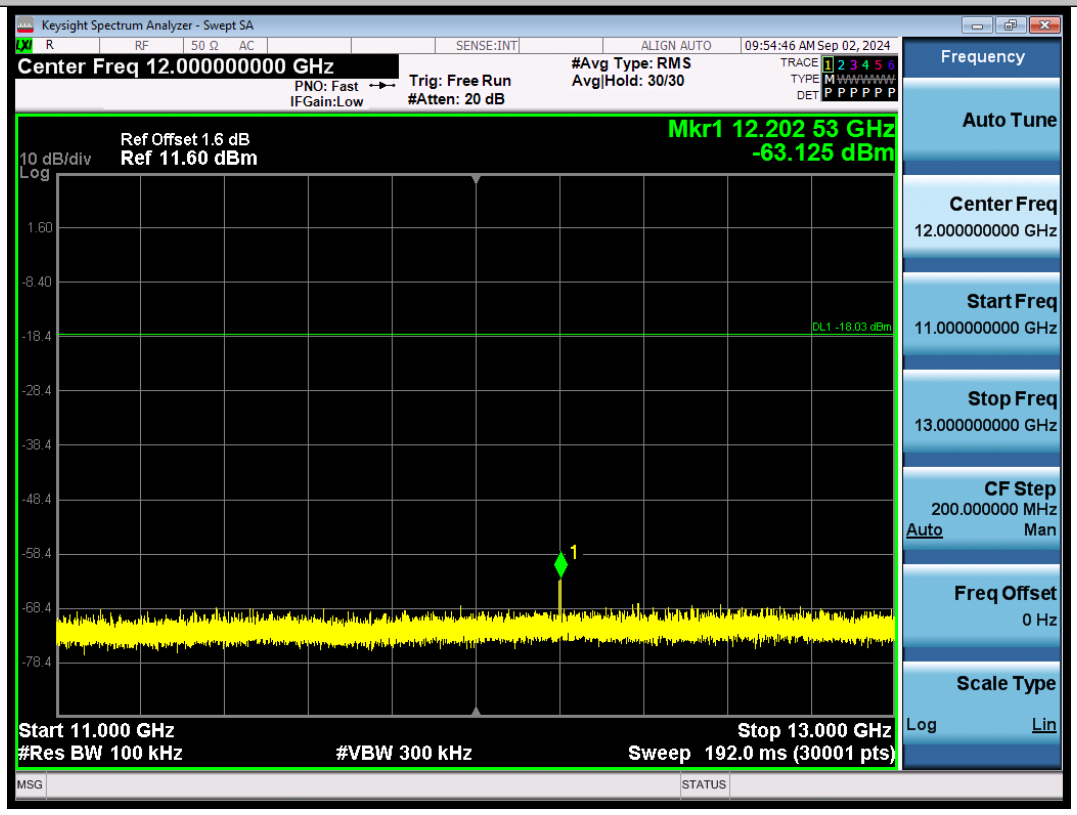
Thread-Ant1-2440-5000~7000-PASS



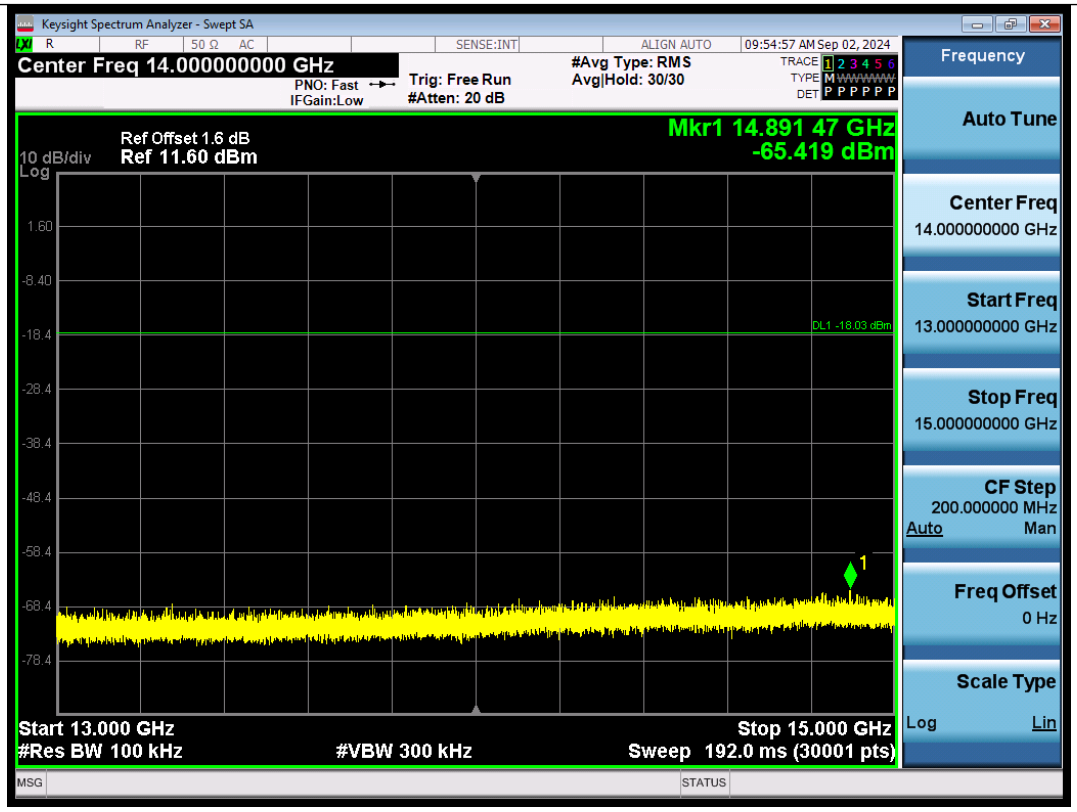
Thread-Ant1-2440-7000~9000-PASS



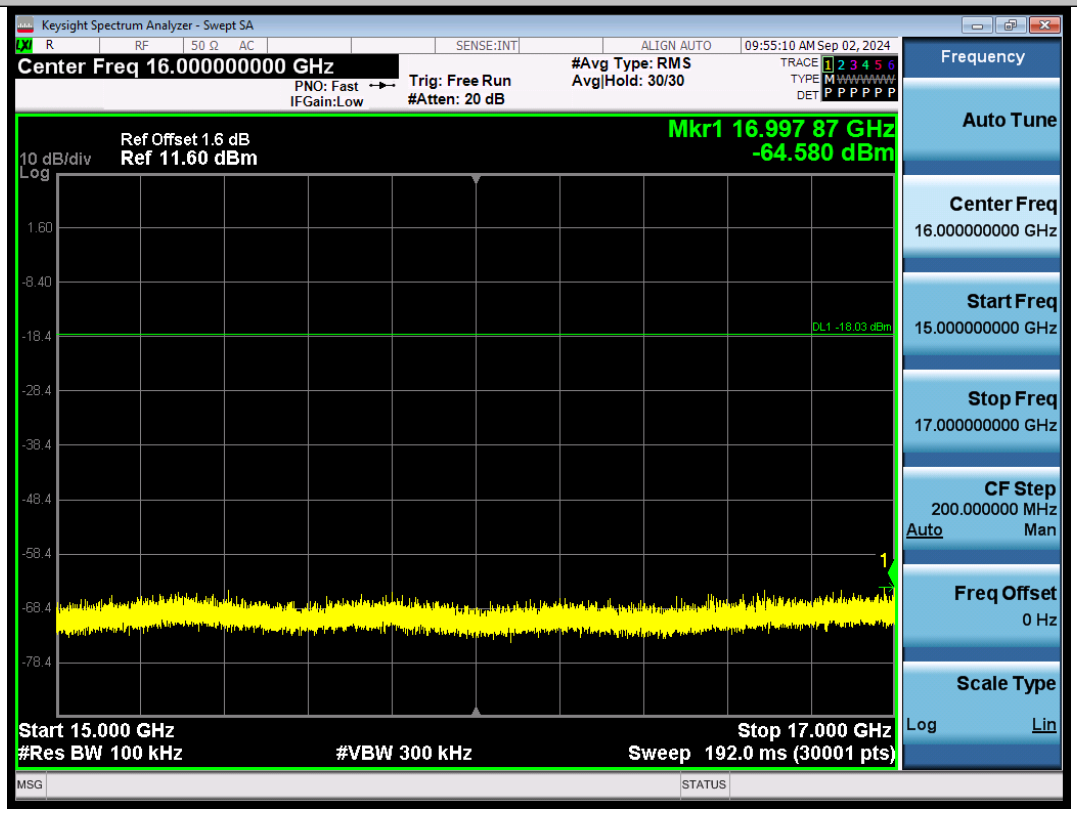
Thread-Ant1-2440-9000~11000-PASS



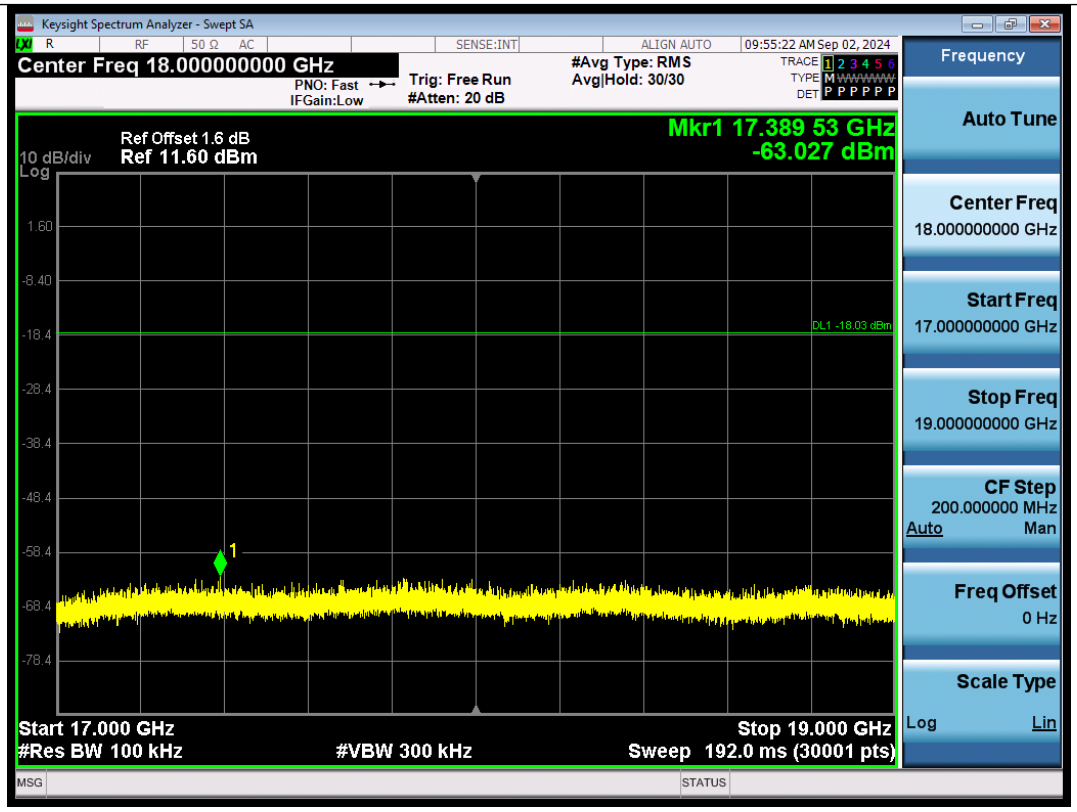
Thread-Ant1-2440-11000~13000-PASS



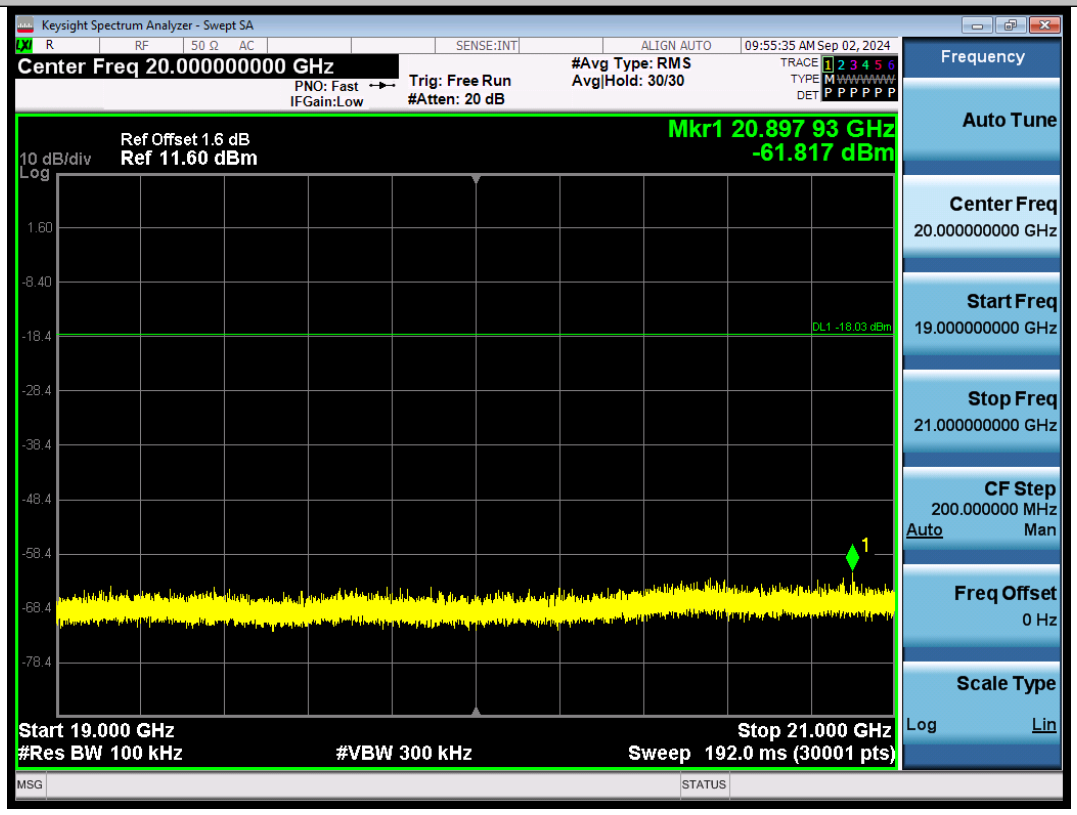
Thread-Ant1-2440-13000~15000-PASS



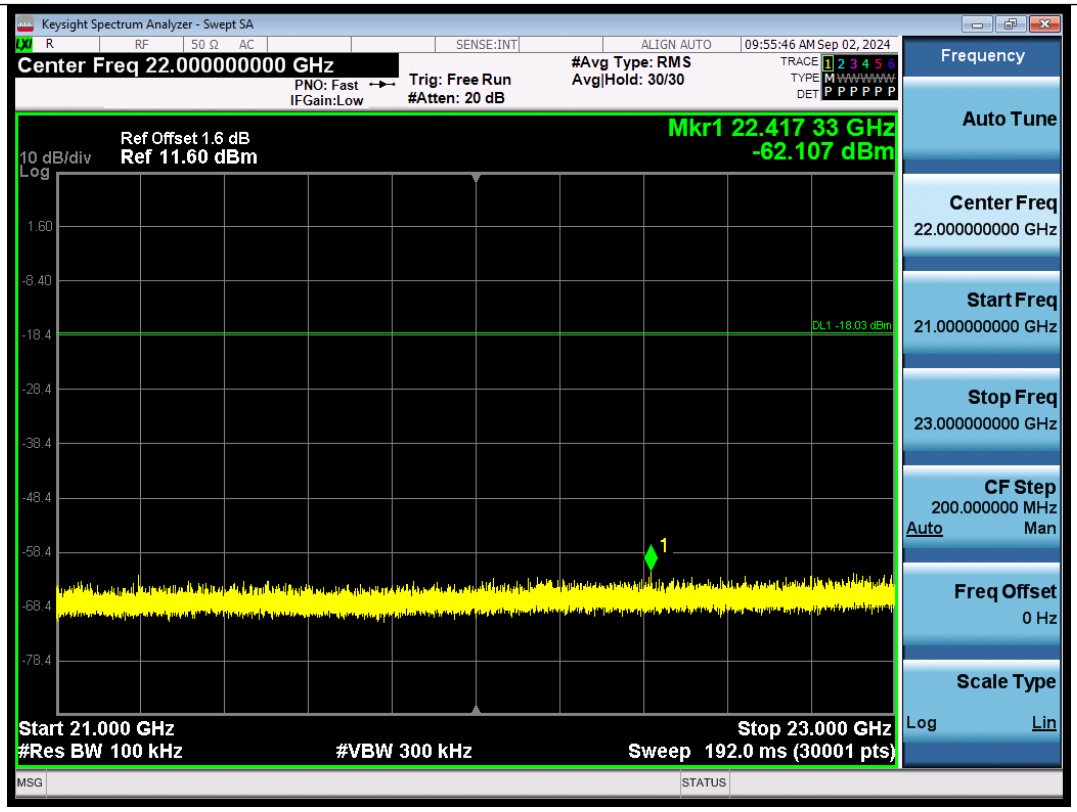
Thread-Ant1-2440-15000~17000-PASS



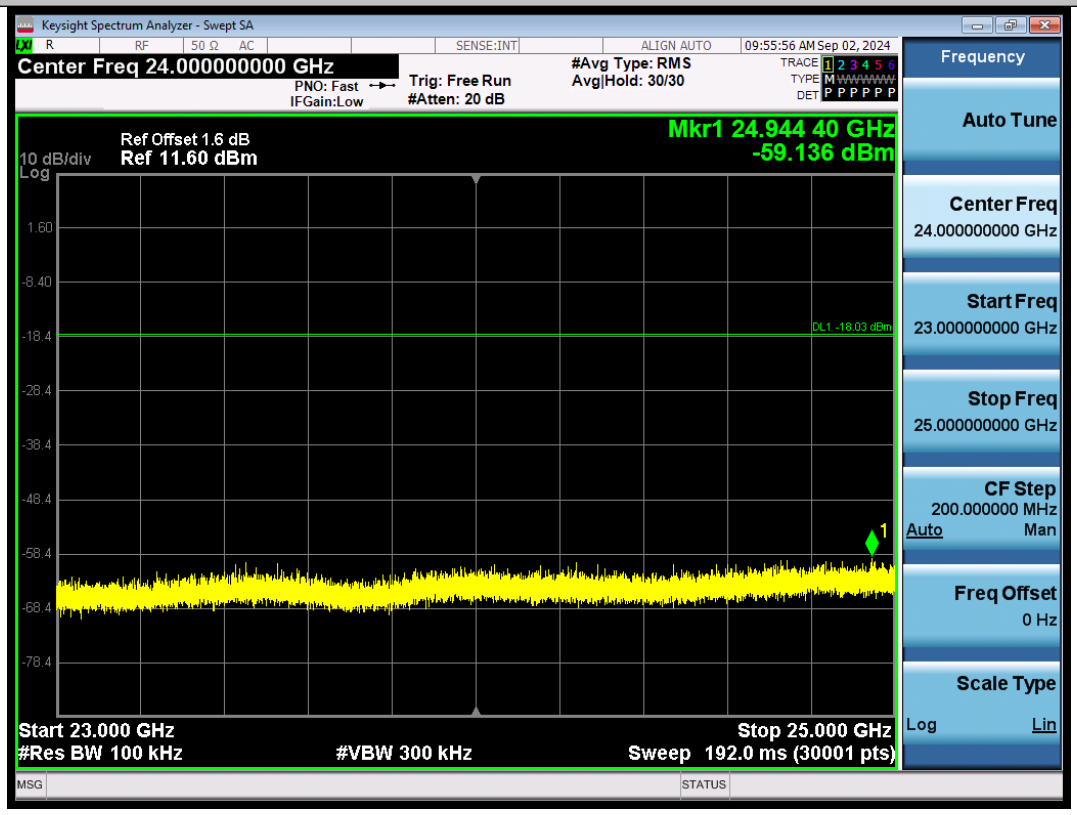
Thread-Ant1-2440-17000~19000-PASS



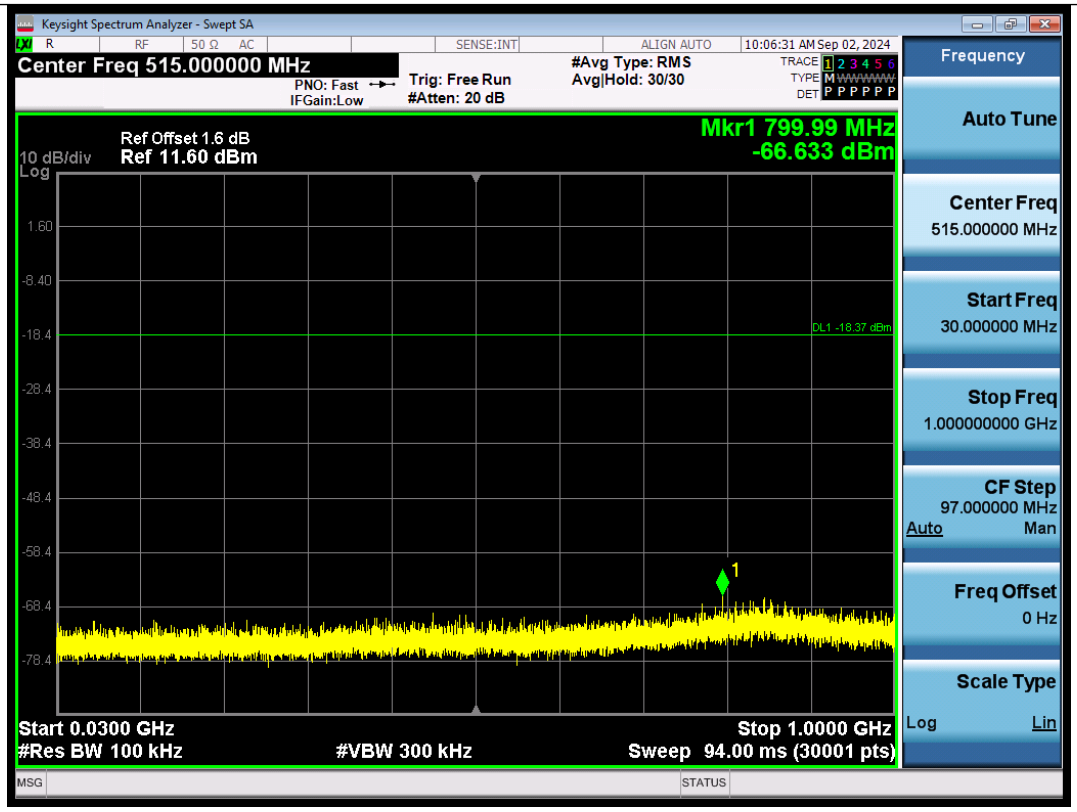
Thread-Ant1-2440-19000~21000-PASS



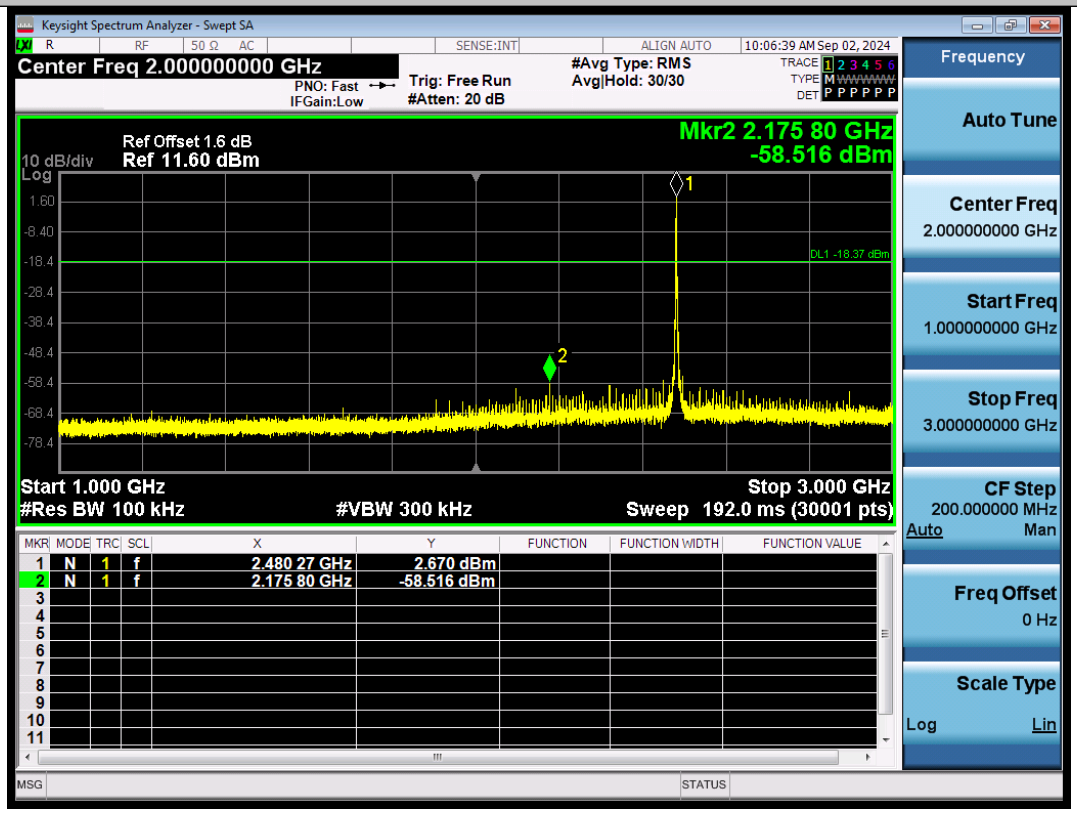
Thread-Ant1-2440-21000~23000-PASS



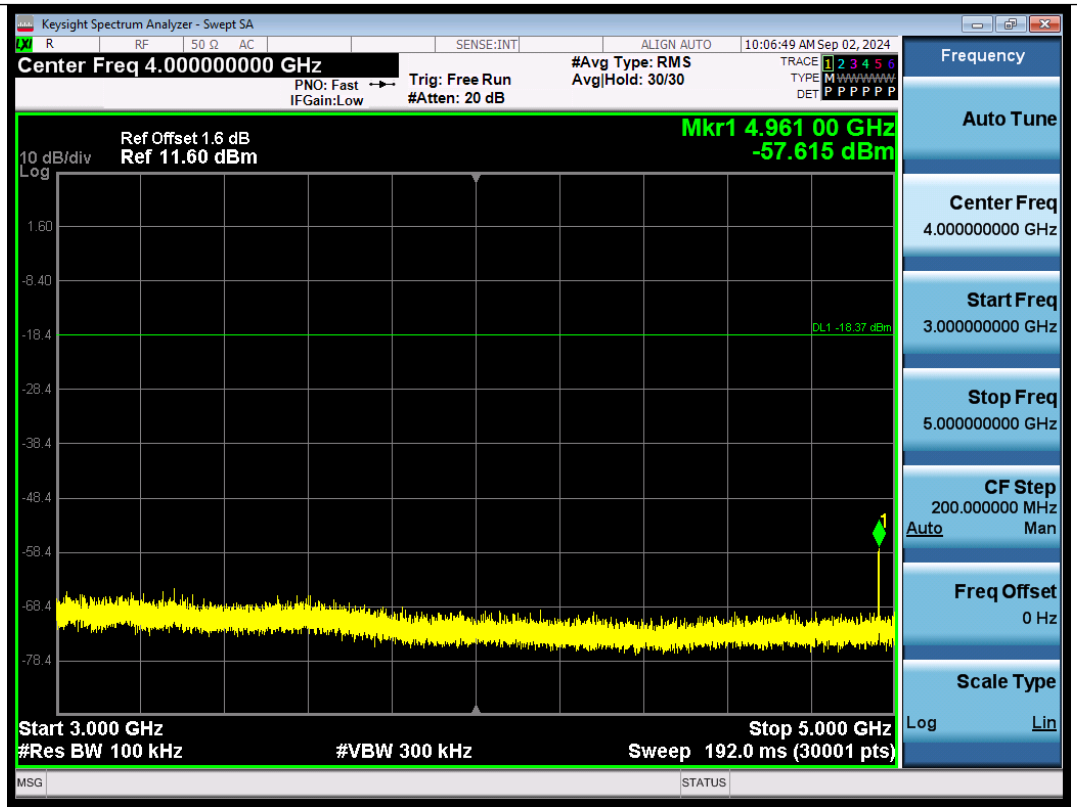
Thread-Ant1-2440-23000~25000-PASS



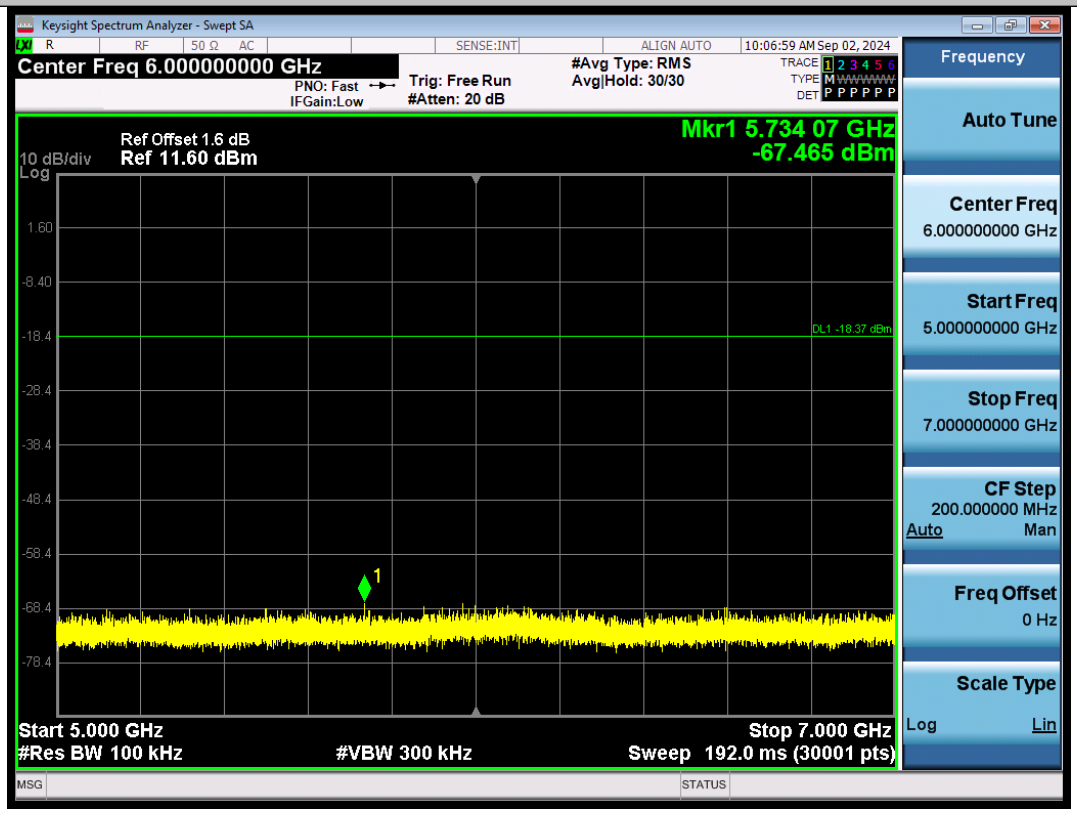
Thread-Ant1-2480-30~1000-PASS



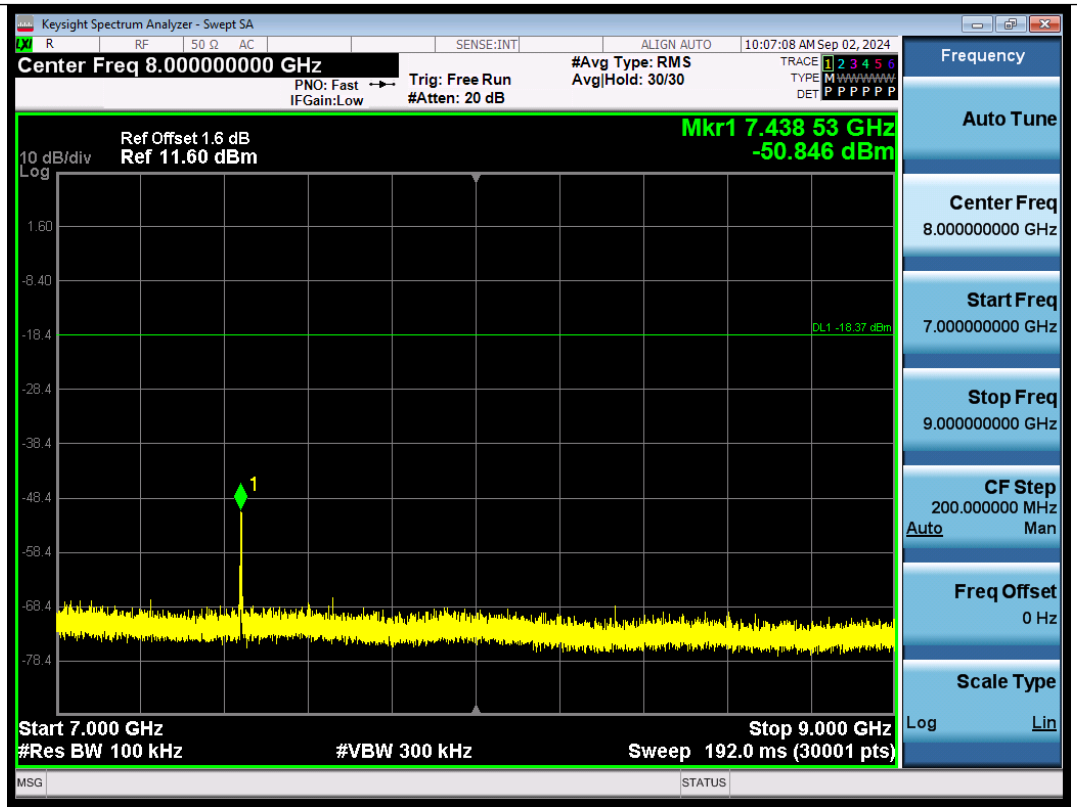
Thread-Ant1-2480-1000~3000-PASS



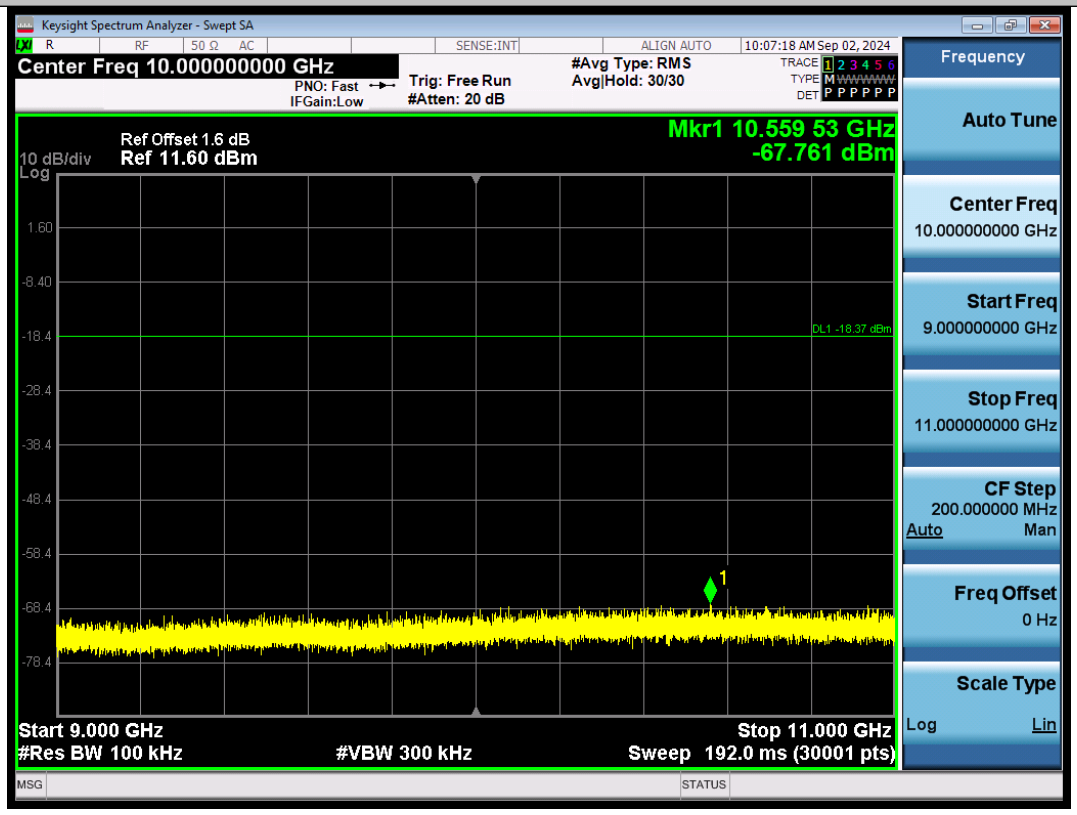
Thread-Ant1-2480-3000~5000-PASS



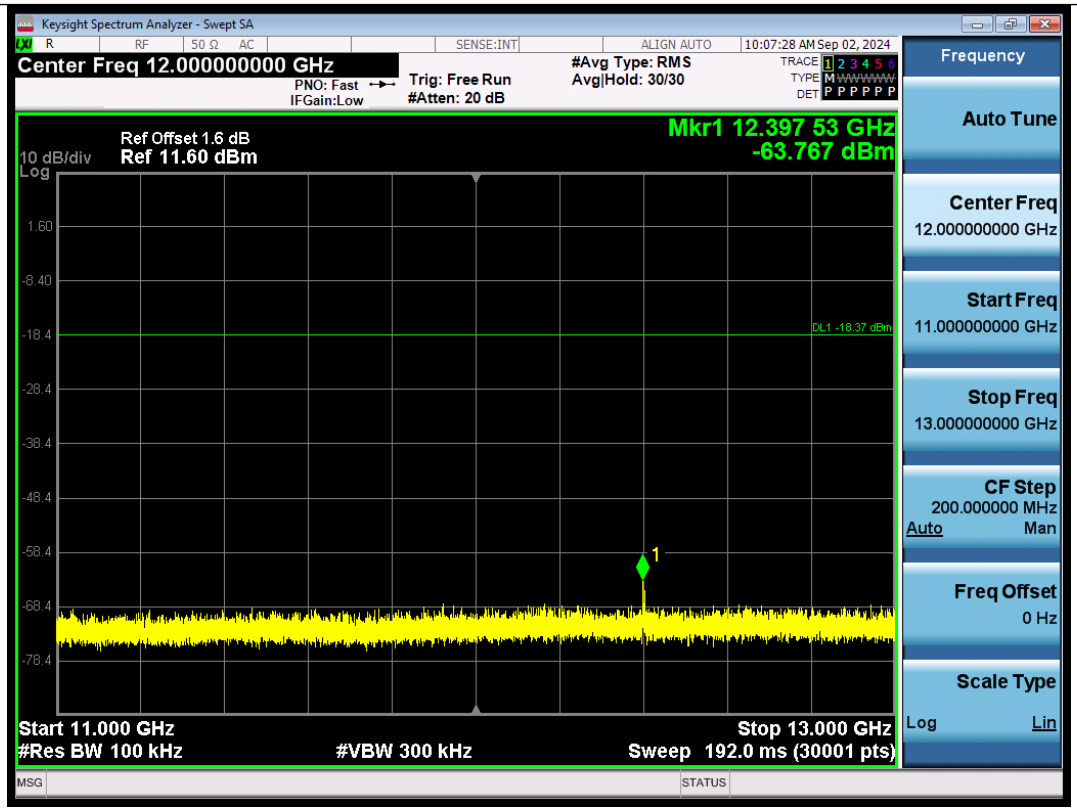
Thread-Ant1-2480-5000~7000-PASS



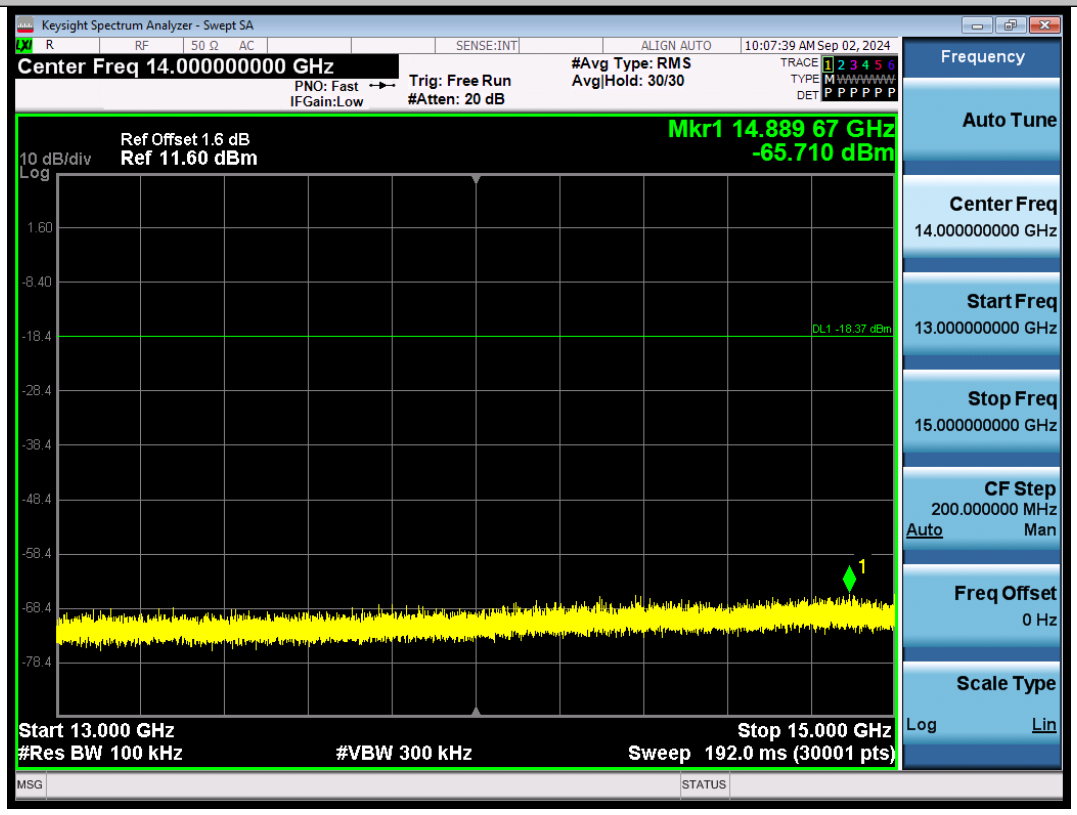
Thread-Ant1-2480-7000~9000-PASS



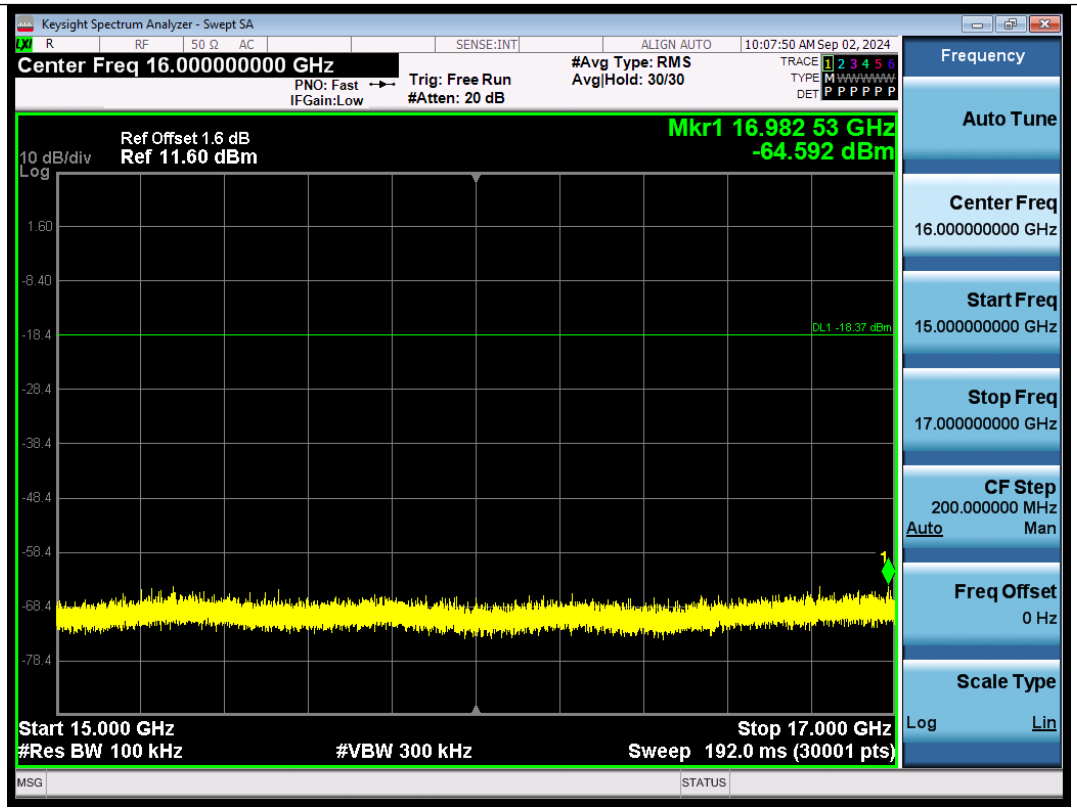
Thread-Ant1-2480-9000~11000-PASS



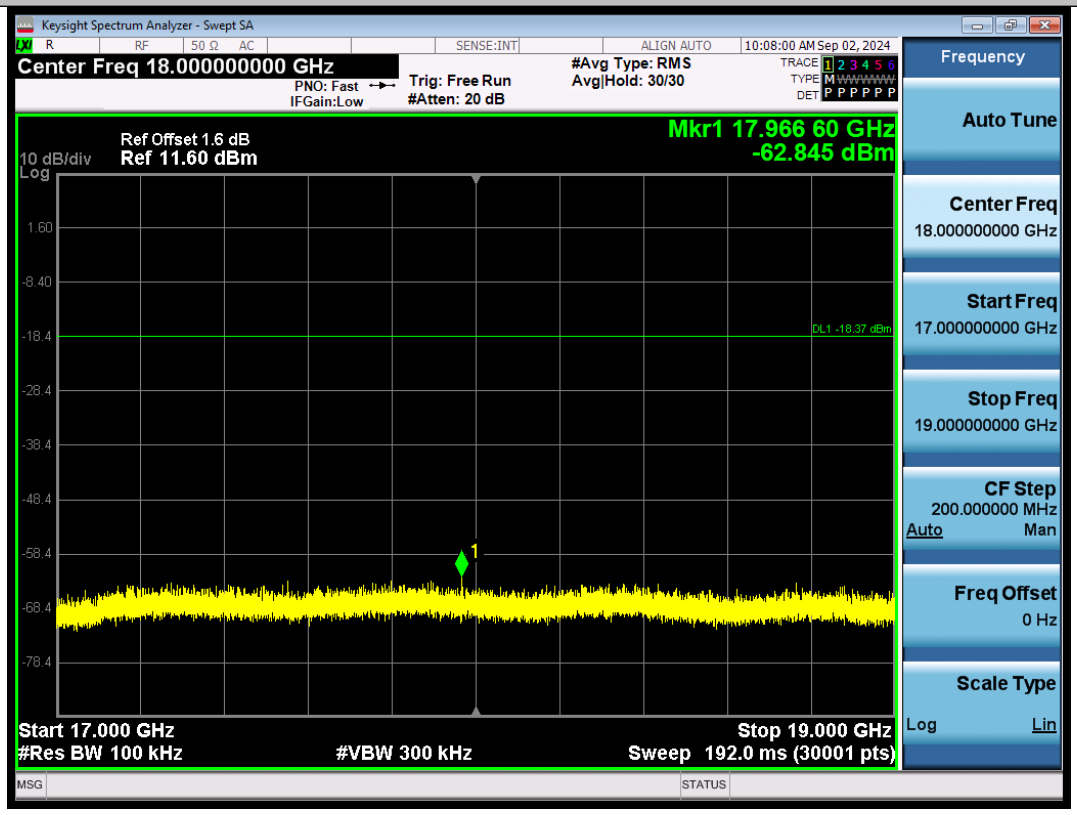
Thread-Ant1-2480-11000~13000-PASS



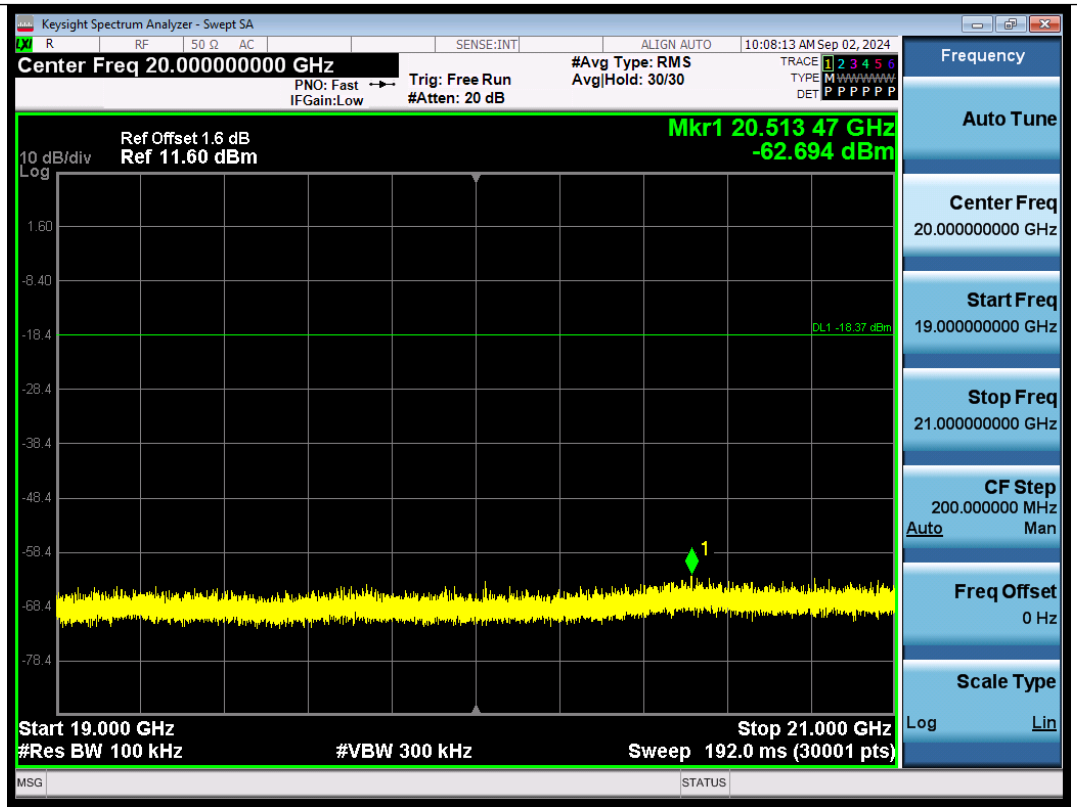
Thread-Ant1-2480-13000~15000-PASS



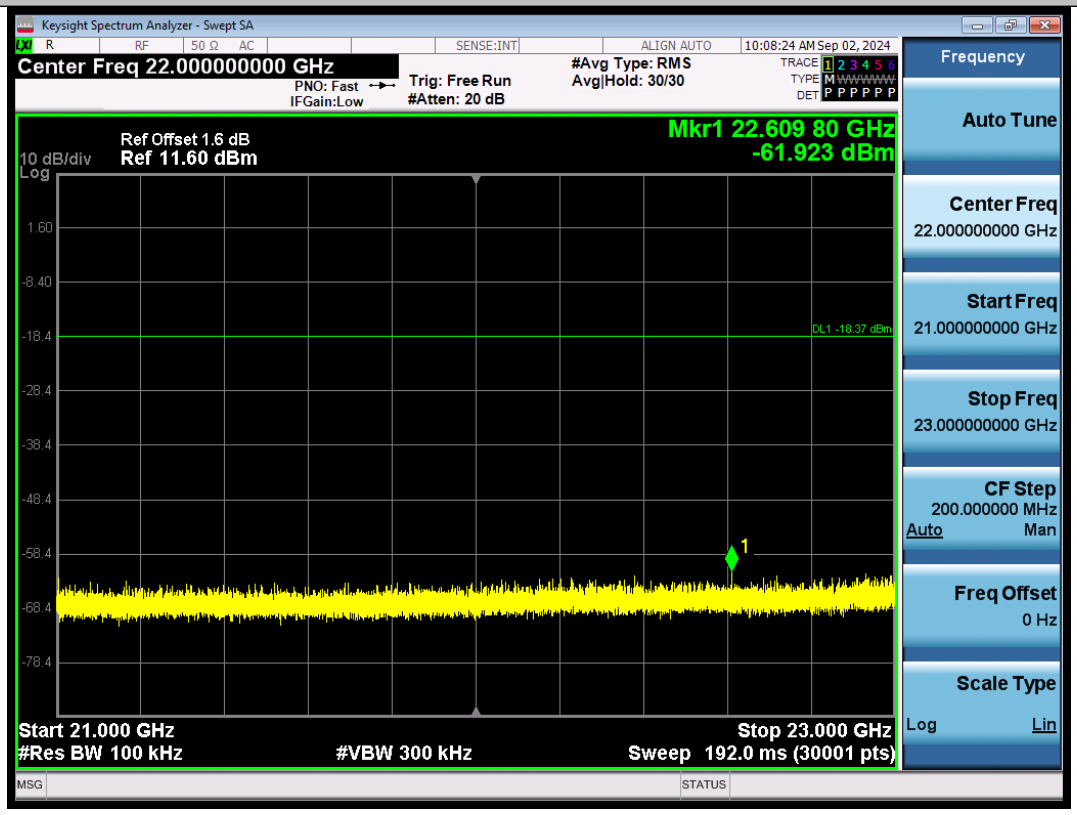
Thread-Ant1-2480-15000~17000-PASS



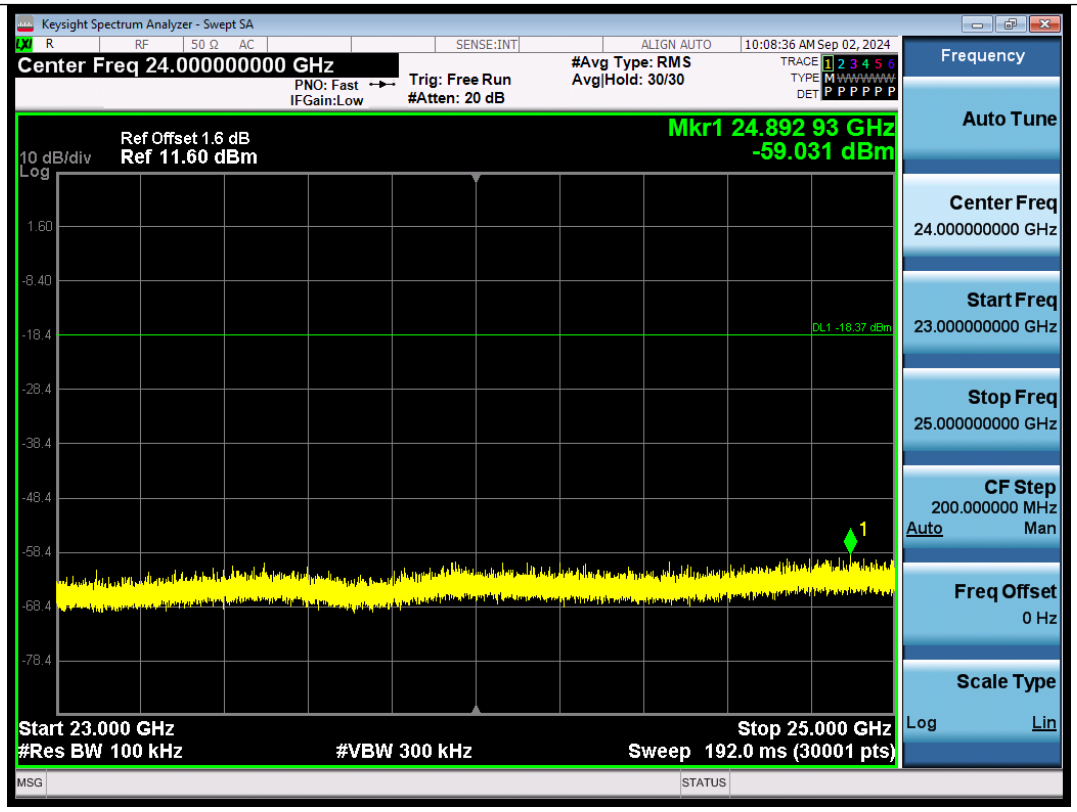
Thread-Ant1-2480-17000~19000-PASS



Thread-Ant1-2480-19000~21000-PASS



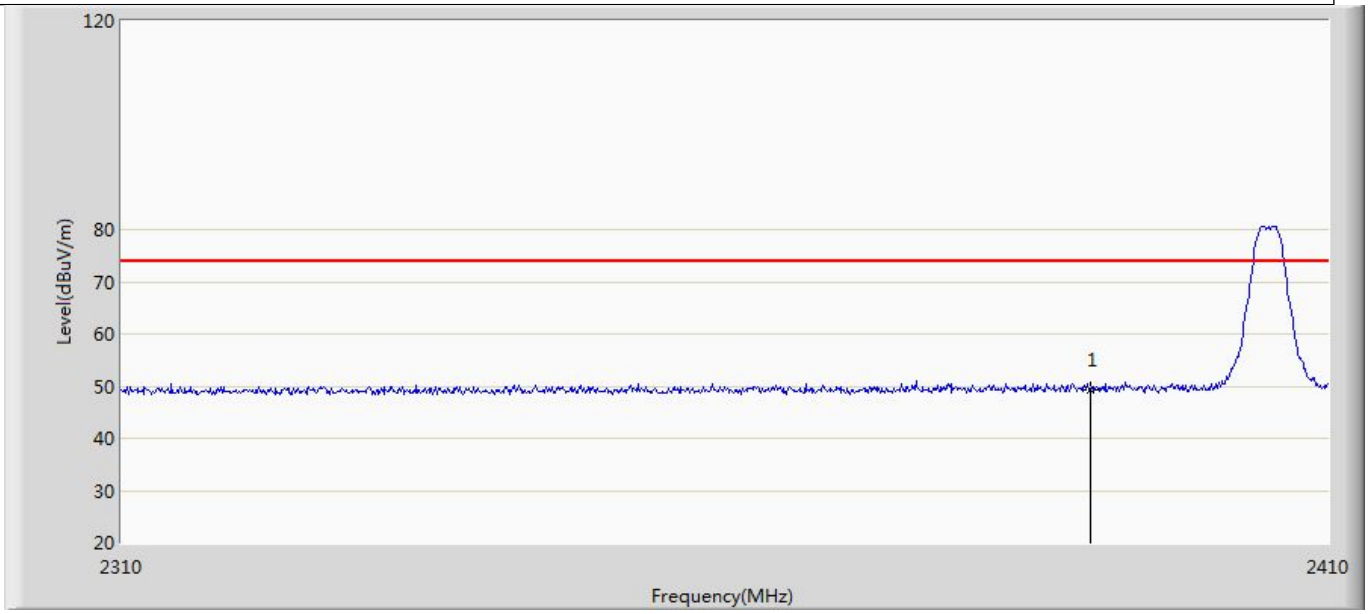
Thread-Ant1-2480-21000~23000-PASS



Thread-Ant1-2480-23000~25000-PASS

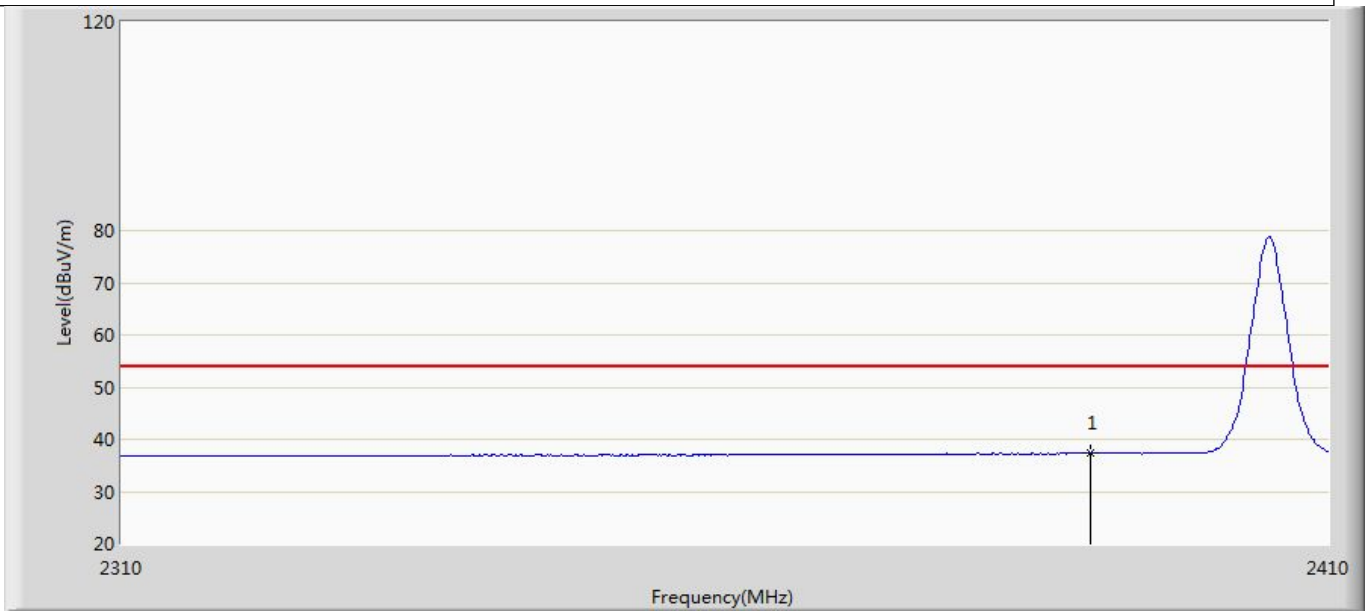
Appendix D: Radiated Emission Band Edge

Profile: 2480839R	Page No.: 1
Engineer: Yuliu	
Site: AC5	Time: 2024/09/05 - 09:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2405MHz by Thread	



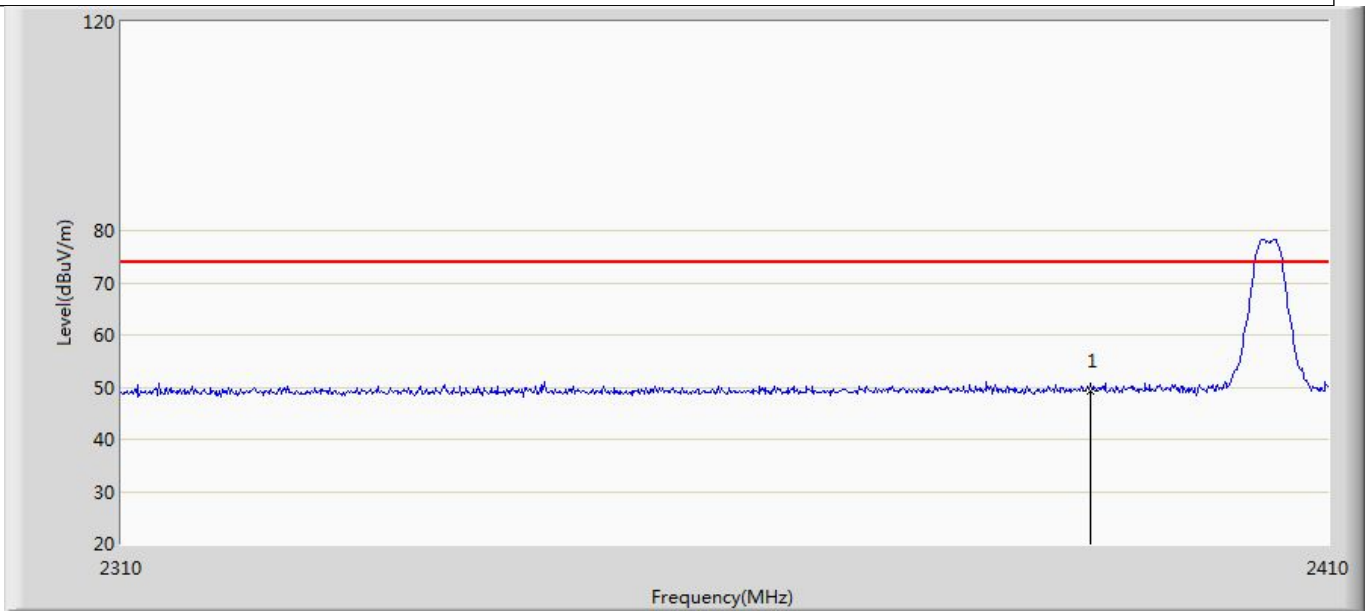
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	49.405	15.254	-24.595	74.000	34.151	PK

Profile: 2480839R	Page No.: 2
Engineer: Yuliu	
Site: AC5	Time: 2024/09/05 - 10:10
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2405MHz by Thread	



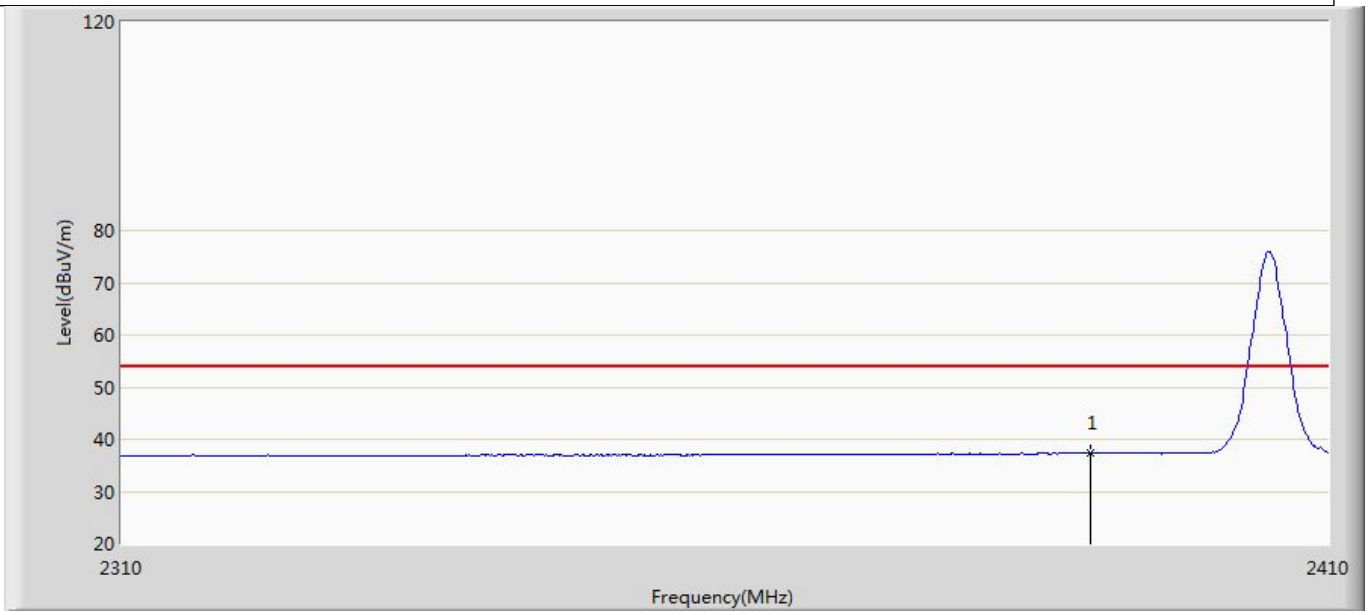
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	37.346	3.195	-16.654	54.000	34.151	AV

Profile: 2480839R	Page No.: 3
Engineer: Yuliu	
Site: AC5	Time: 2024/09/05 - 10:15
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2405MHz by Thread	



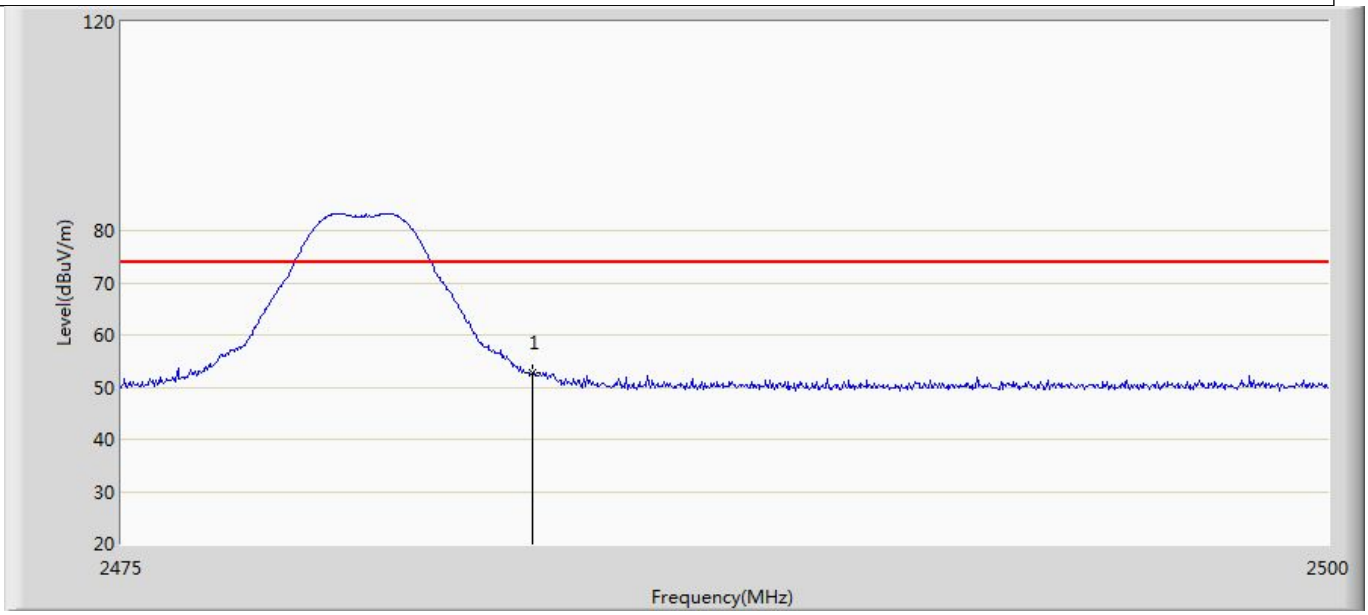
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	49.184	15.033	-24.816	74.000	34.151	PK

Profile: 2480839R	Page No.: 4
Engineer: Yuliu	
Site: AC5	Time: 2024/09/05 - 10:17
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2405MHz by Thread	



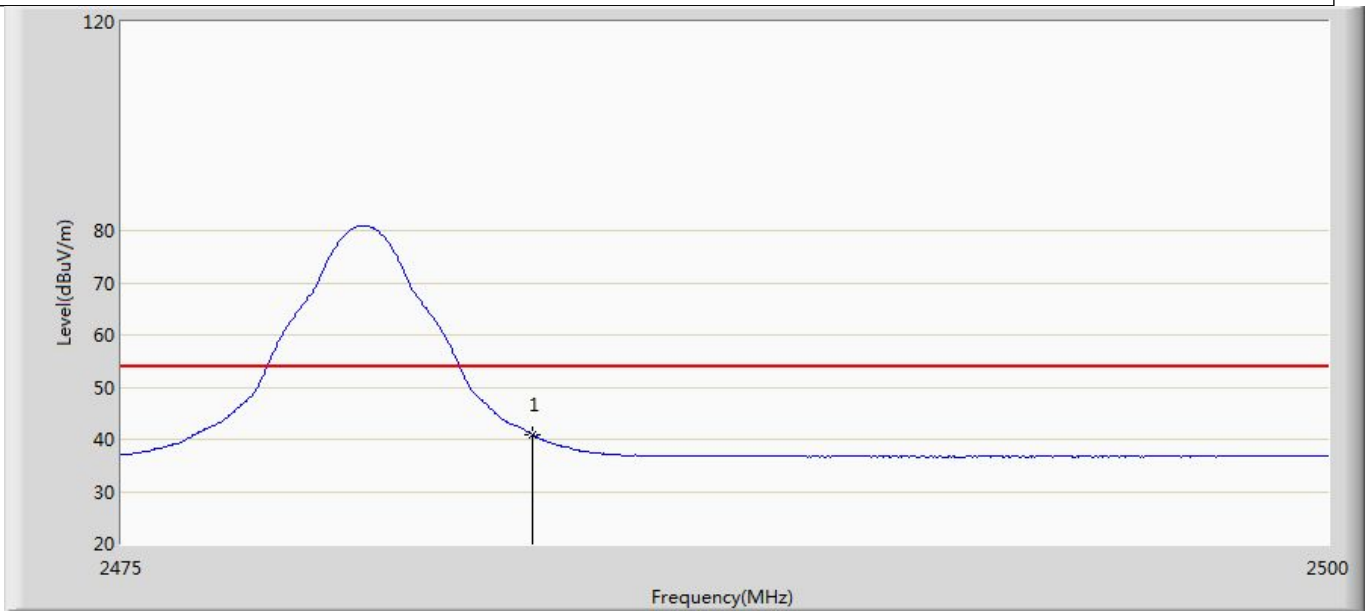
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2390.000	37.348	3.197	-16.652	54.000	34.151	AV

Profile: 2480839R	Page No.: 5
Engineer: Yuliu	
Site: AC5	Time: 2024/09/05 - 11:10
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2480MHz by Thread	



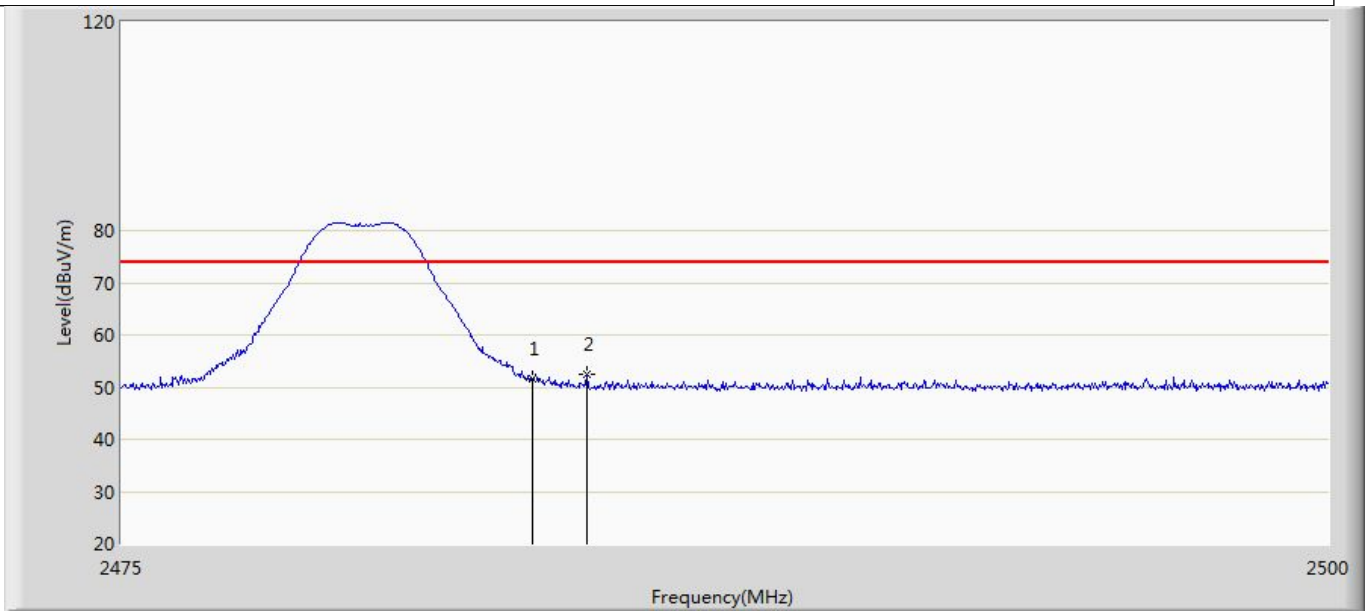
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	52.778	18.322	-21.222	74.000	34.456	PK

Profile: 2480839R	Page No.: 6
Engineer: Yuliu	
Site: AC5	Time: 2024/09/05 - 11:13
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2480MHz by Thread	



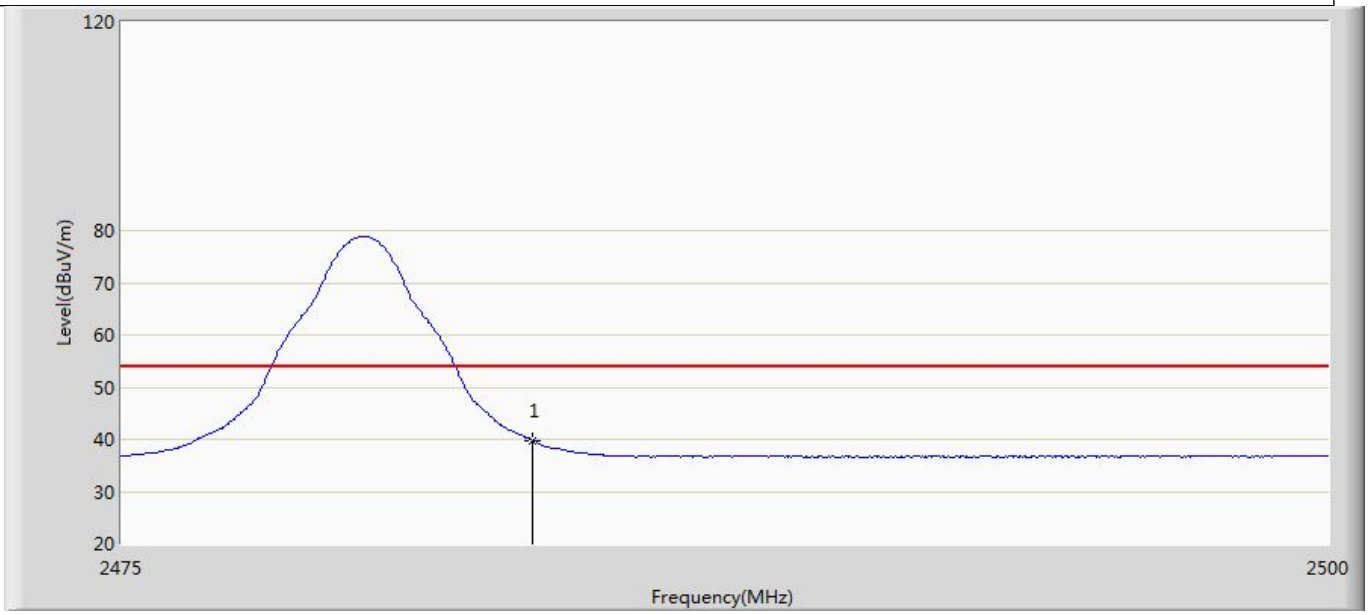
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	40.863	6.407	-13.137	54.000	34.456	AV

Profile: 2480839R	Page No.: 7
Engineer: Yuliu	
Site: AC5	Time: 2024/09/05 - 11:15
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2480MHz by Thread	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2483.500	51.470	17.014	-22.530	74.000	34.456	PK
2	*	2484.625	52.321	17.853	-21.679	74.000	34.468	PK

Profile: 2480839R	Page No.: 8
Engineer: Yuliu	
Site: AC5	Time: 2024/09/05 - 11:17
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: B4	Power: Battery 3Vdc
Note: Mode 1：Transmit at 2480MHz by Thread	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2483.500	39.761	5.305	-14.239	54.000	34.456	AV

Note:
1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Appendix F: Fundamental emission output power

TestMode	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
Mode 1	2405	6.56	≤30	0.46	≤36	PASS
	2440	5.96	≤30	-0.14	≤36	PASS
	2480	5.65	≤30	-0.45	≤36	PASS

Appendix G: DTS Bandwidth

6dB bandwidth:

TestMode	Frequency[MHz]	DTS BW [MHz] (6dB bandwidth)	Limit[MHz]	Verdict
Mode 1	2405	1.350	0.5	PASS
	2440	1.450	0.5	PASS
	2480	1.530	0.5	PASS

Test Graphs:

Thread-Ant1-2405-PASS

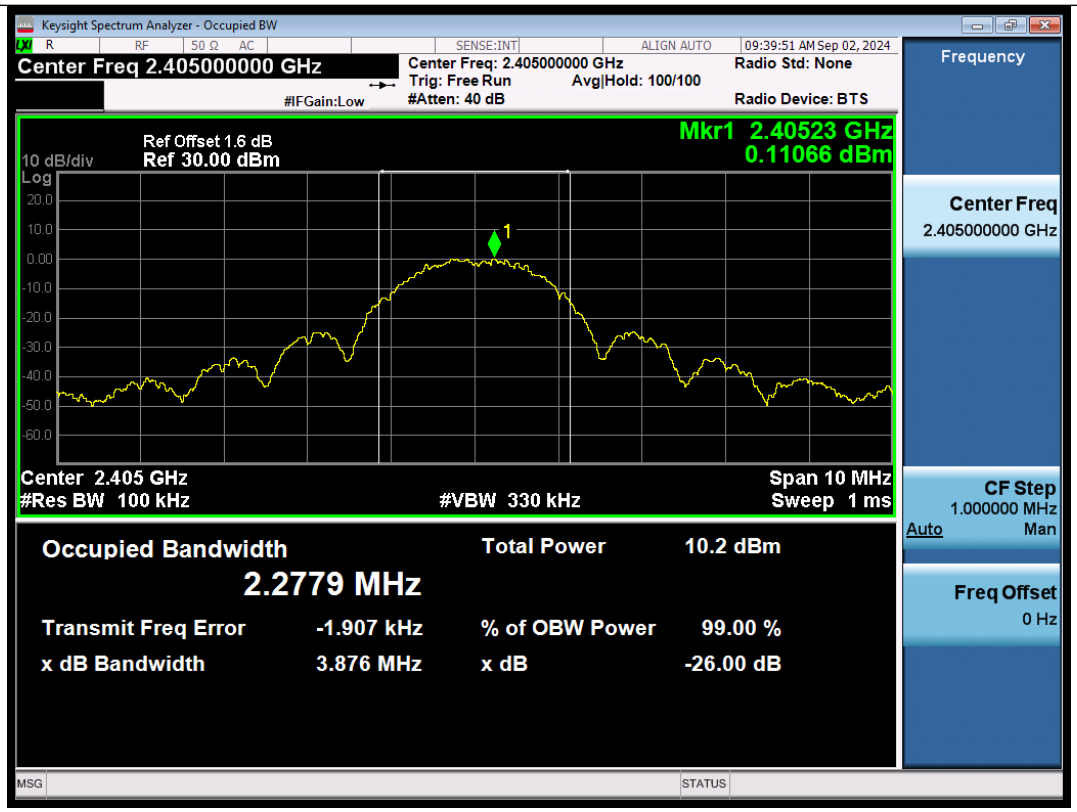
Thread-Ant1-2440-PASS

Thread-Ant1-2480-PASS

99% Occupied bandwidth:

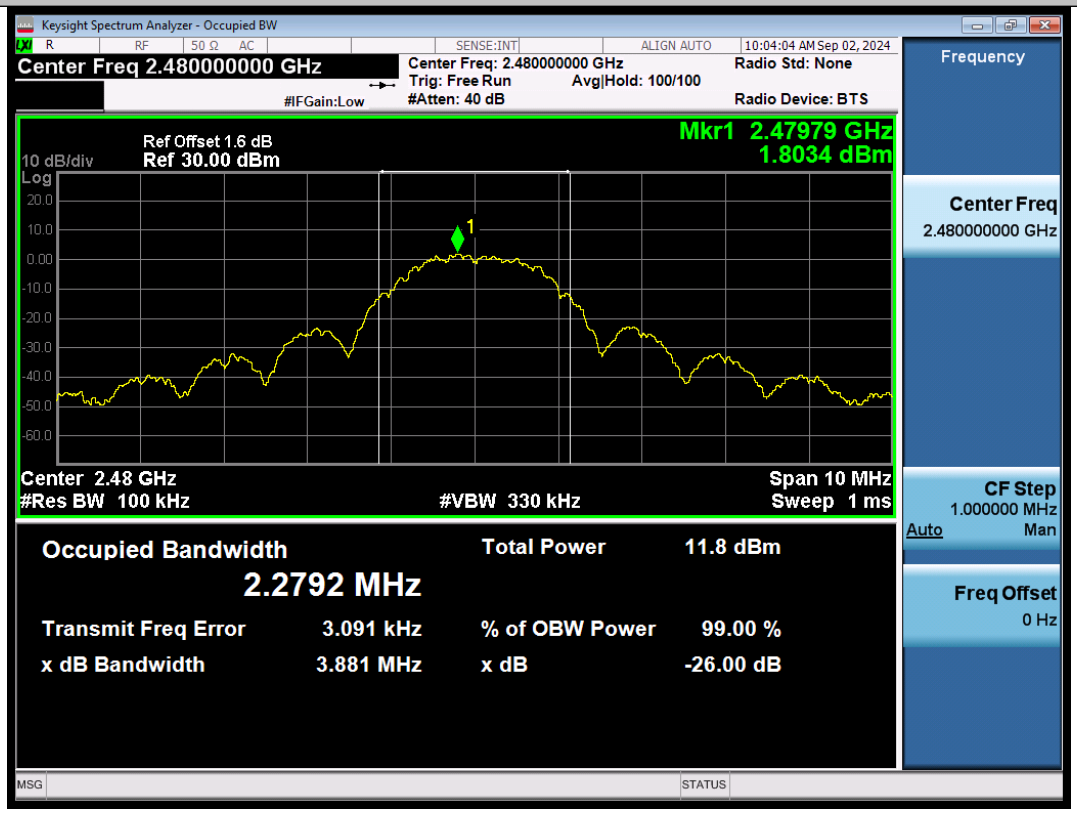
TestMode	Frequency[MHz]	99% OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
Mode 1	2405	2.2779	2403.8591	2406.1370	Within band	Pass
	2440	2.2789	2438.8612	2441.1401	Within band	Pass
	2480	2.2792	2478.8635	2481.1427	Within band	Pass

Test Graphs



Thread-Ant1-2405

Thread-Ant1-2440

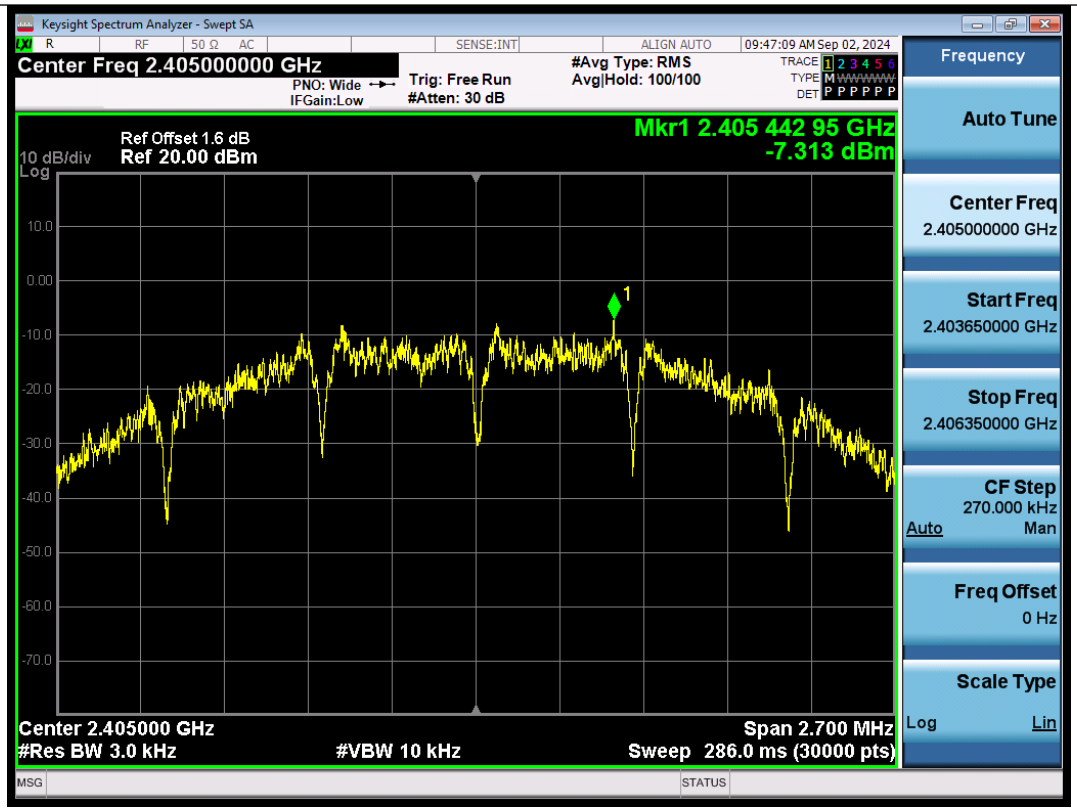


Thread-Ant1-2480

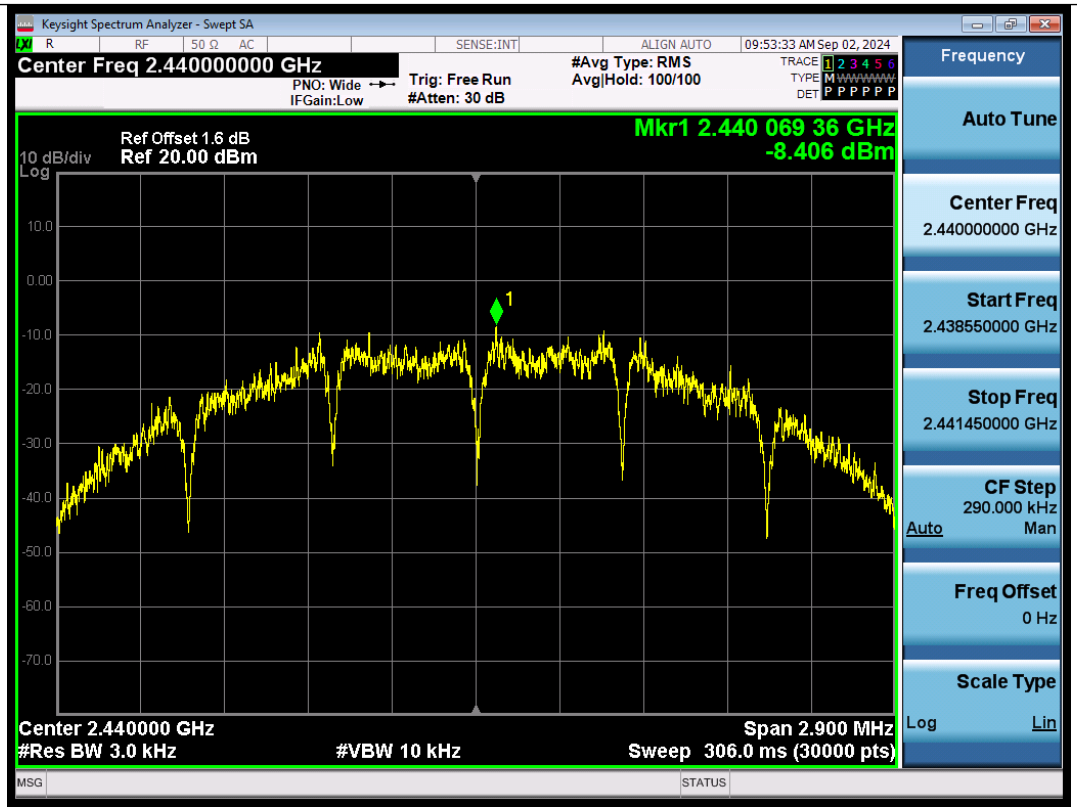
Appendix H: Power Spectral Density

TestMode	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
Mode 1	2405	-7.31	≤8.00	PASS
	2440	-8.41	≤8.00	PASS
	2480	-8.94	≤8.00	PASS

Test Graphs

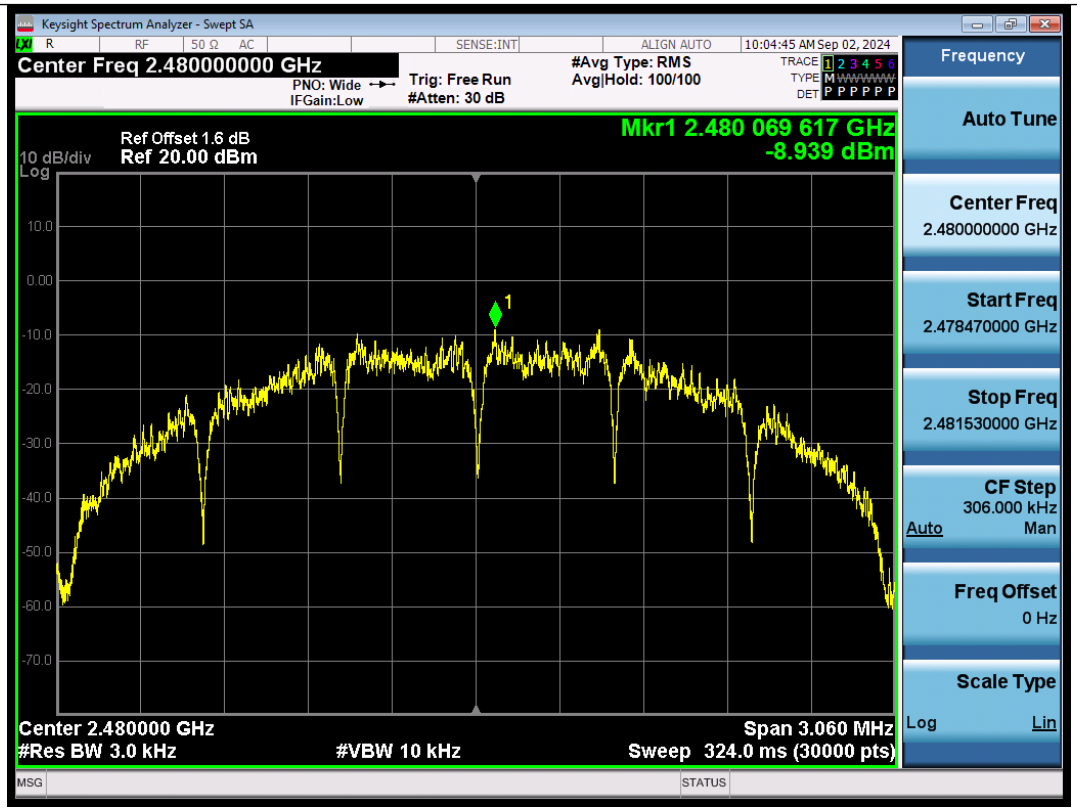


Thread-Ant1-2405-PASS



Thread-Ant1-2440-PASS

Thread-Ant1-2475-PASS



Thread-Ant1-2480-PASS

The End