TEST REPORT

Report No.:	BCTC2410830549-2E
Applicant:	Radxa Computer (Shenzhen) Co.,Ltd.
Product Name:	Radxa ZERO 3W
Test Model:	Radxa ZERO 3W D1E0H1W15
Tested Date:	2024-10-10 to 2024-11-15
Issued Date:	2024-11-15

Shenzhen BCTC Testing Co., Ltd.

Product Name:	Radxa ZERO 3W
Trademark:	radxa®
Model/Type reference:	Radxa ZERO 3W D1E0H1W15 Radxa ZERO 3W D1E0H0W15, Radxa ZERO 3W D2E0H0W15, Radxa ZERO 3W D4E0H0W15, Radxa ZERO 3W D8E0H0W15, Radxa ZERO 3W D2E0H1W15, Radxa ZERO 3W D4E0H1W15, Radxa ZERO 3W D8E0H1W15, Radxa ZERO 3W D1E8H0W15, Radxa ZERO 3W D2E16H0W15, Radxa ZERO 3W D4E32H0W15, Radxa ZERO 3W D8E64H0W15, Radxa ZERO 3W D1E8H1W15, Radxa ZERO 3W D2E16H1W15, Radxa ZERO 3W D4E32H1W15, Radxa ZERO 3W D8E64H1W15
Prepared For:	Radxa Computer (Shenzhen) Co.,Ltd.
Address:	1602, Smart Valley, tiezai Road, Gongle community, Xixiang, Baoan, Shenzhen, China
Manufacturer:	Radxa Computer (Shenzhen) Co.,Ltd.
Address:	1602, Smart Valley, tiezai Road, Gongle community, Xixiang, Baoan, Shenzhen, China
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2024-10-10
Sample tested Date:	2024-10-10 to 2024-11-15
Issue Date:	2024-11-15
Report No.:	BCTC2410830549-2E
Test Standards:	Article 2 paragraph 1 of item 19 MIC Notice No.88 Appendix No.43
Test Results:	PASS
Remark:	This is JAPAN RADIO test report.

Tested by:

Lei Chen

Lei Chen/Project Handler

Approved by:

Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

Table Of Content

(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2410830549-2E	2024-11-15	Original	Valid

2. Test Summary

Test procedures according to the technical standards:

Article 2 paragraph 1 of item 19	
Description of Test	**Result**
Frequency Error	Complies
Occupied Bandwidth (99%) and Spread-spectrum Bandwidth (90%)	Complies
Unwanted Emission Intensity	Complies
Antenna Power Error	Complies
Limitation of Collateral Emission of Receiver	Complies
Transmission Antenna Gain (EIRP Antenna Power)	N/A
Transmission Radiation Angle Width (3dB Beamwidth)	N/A
Radio Interference Prevention Capability	Complies
Construction Protection Confirmation	Complies

NOTE:
(1)" N/A" denotes test is not applicable in this Test Report

3. Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

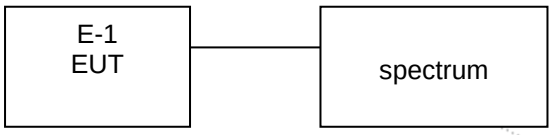
No.	Item	Uncertainty
1	Conducted Emission Test	±3.2dB
2	Radiated Emission Test	±4.7dB
3	RF power, conducted	±0.16dB
4	Spurious emissions, conducted	±0.21dB
5	All emissions, radiated(<1G)	±4.68dB
6	All emissions, radiated(>1G)	±5.0dB
7	frequency error ppm	±0.5ppm

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference:	Radxa ZERO 3W D1E0H1W15 Radxa ZERO 3W D1E0H0W15, Radxa ZERO 3W D2E0H0W15, Radxa ZERO 3W D4E0H0W15, Radxa ZERO 3W D8E0H0W15, Radxa ZERO 3W D2E0H1W15, Radxa ZERO 3W D4E0H1W15, Radxa ZERO 3W D8E0H1W15, Radxa ZERO 3W D1E8H0W15, Radxa ZERO 3W D2E16H0W15, Radxa ZERO 3W D4E32H0W15, Radxa ZERO 3W D8E64H0W15, Radxa ZERO 3W D1E8H1W15, Radxa ZERO 3W D2E16H1W15, Radxa ZERO 3W D4E32H1W15, Radxa ZERO 3W D8E64H1W15
Model differences:	All the model are the same circuit and RF module, except model names and appearance of the color.
Hardware Version:	V1.11
Software Version:	b6
Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK (1Mbps, 2Mbps)
Number Of Channel:	40 CH
Antenna installation:	Chip antenna
Antenna Gain:	1.5 dBi Remark: ☒ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☐ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.
Ratings:	DC 5V

4.2 Block Digram Parameters Of Text Software Setting



4.3 Description Of Support Units (Conducted Mode)

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Radxa ZERO 3W	radxa®	Radxa ZERO 3W D1E0H1W15	N/A	EUT

Notes:
1. The support equipment was authorized by Declaration of Confirmation.
2. For detachable type I/O cable should be specified the length in cm in『Length』column
3. “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

4.4 Channel List

Channel List					
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
01	2402	11	2422	21	2442
02	2404	12	2424	22	2444
03	2406	13	2426	23	2446
~	~	~	~	~	~
09	2418	19	2438	39	2478
10	2420	20	2440	40	2480

4.5 Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

For All Mode	Description	Modulation Type
Mode 1	CH01	GFSK 1Mbps
Mode 2	CH20	
Mode 3	CH40	
Mode 4	CH01	GFSK 2Mbps
Mode 5	CH20	
Mode 6	CH40	
Mode 7	RX	GFSK

4.6 Test Conditions

The EUT was tested while in a continuous transmitter/receiver mode.
The EUT was tuned to a low, middle, and high channel for all tests. For all test case pre/scans were completed in all Modes to determine worst case levels.

Power Supply Voltage Fluctuation Test

Voltage Fluctuation Test	Normal Voltage	High Voltage +10% of Normal Voltage	Low Voltage -10% of Normal Voltage
Input DC Power	5V	5.5V	4.5V
Voltage Variation (%)	0%	+10%	-10%

Note:
Voltage Variation (%)= (Output high or Low Voltage - Output Normal Voltage)/ Output Normal Voltage* 100

During the input supply voltage to the EUT from the external power source is varied by ±10%, ±10% of the external power change, will not affect the voltage of the RF, so only operated in normal voltage to test all regulations.

4.7 Table Of Parameters Of Test Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Test software Version	**CMD**		
Frequency	2402 MHz	2440 MHz	2480 MHz
Parameters	DEF	DEF	DEF

5. Test Facility And Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address:1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.
FCC Test Firm Registration Number: 712850
A2LA certificate registration number is: CN1212
ISED Registered No.: 23583
ISED CAB identifier: CN0017

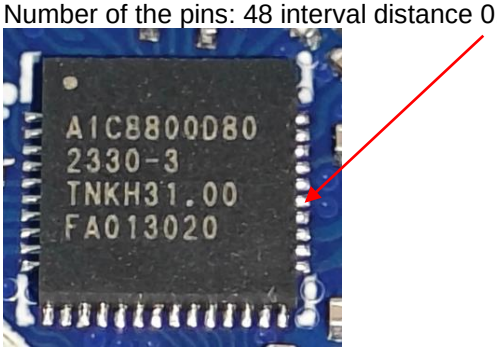
5.2 Test Instrument Used

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1.	Power Metter	Keysight	E4419	\	May 16, 2024	May 15, 2025
2.	Signal Analyzer 20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 16, 2024	May 15, 2025
3.	Signal Generator	Keysight	N5182B	MY56200519	May 16, 2024	May 15, 2025
4	Pulse limiter	Schwarzbeck	VTSD 9561-F	01323	May 16, 2024	May 15, 2025
5	Hygrothermograph	Thermo	HTC-1	\	Nov. 13, 2023	Nov. 12, 2024

Calibration laboratory: CCIC(Shenzhen) Co., Ltd

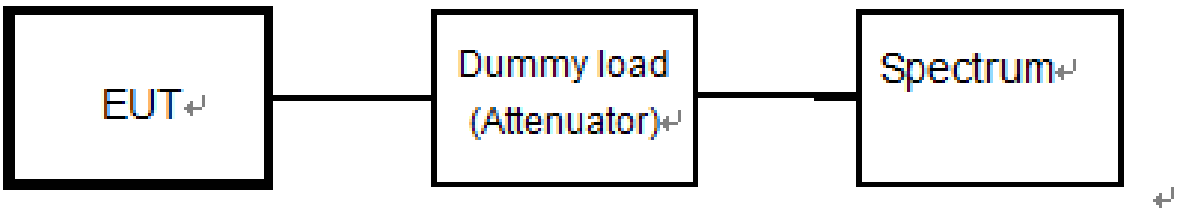
6. RF Shielding Method

Chipset:
The product structure is uses SMD patch process.
As shown in the picture, If the will be open so the product be damage.
Number of the pins: 48 interval distance 0.5mm



7. Frequency Error

7.1 Block Diagram Of Test Setup



7.2 Limit

Item	Limits
Frequency Error	±50ppm

7.3 Measuring Instruments And Setting

The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
RB / VB	10KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.4 Test Procedure

(1) In the case of unmodulated signal (continuous or continuous burst), measure the frequency directly by a frequency meter.
(2) In the case of burst waves, the measurement shall be done for enough time in order to obtain the enough measuring accuracy, and the average of the measured values becomes the final value.
(3) In the case of a test mode with a specific frequency spectrum, measure the frequency of the specific spectrum by a spectrum analyzer.
(4) In the cases above, if the frequency equivalent to the test frequency is not directly measured in principle, it shall be obtained by necessary calculation.
In the case of modulated signal, if there is no specific spectrum measurable by a spectrum analyzer but a specific dip is observed, it is allowed to measure the frequency with the signal generator (synthesized). That is, observe a signal of the signal generator concurrently (or alternately) with the tested signal using the spectrum analyzer while setting the frequency of the signal generator to the position of the dip on the screen of the spectrum analyzer, and determine the frequency of the signal generator at the time as a measured value.

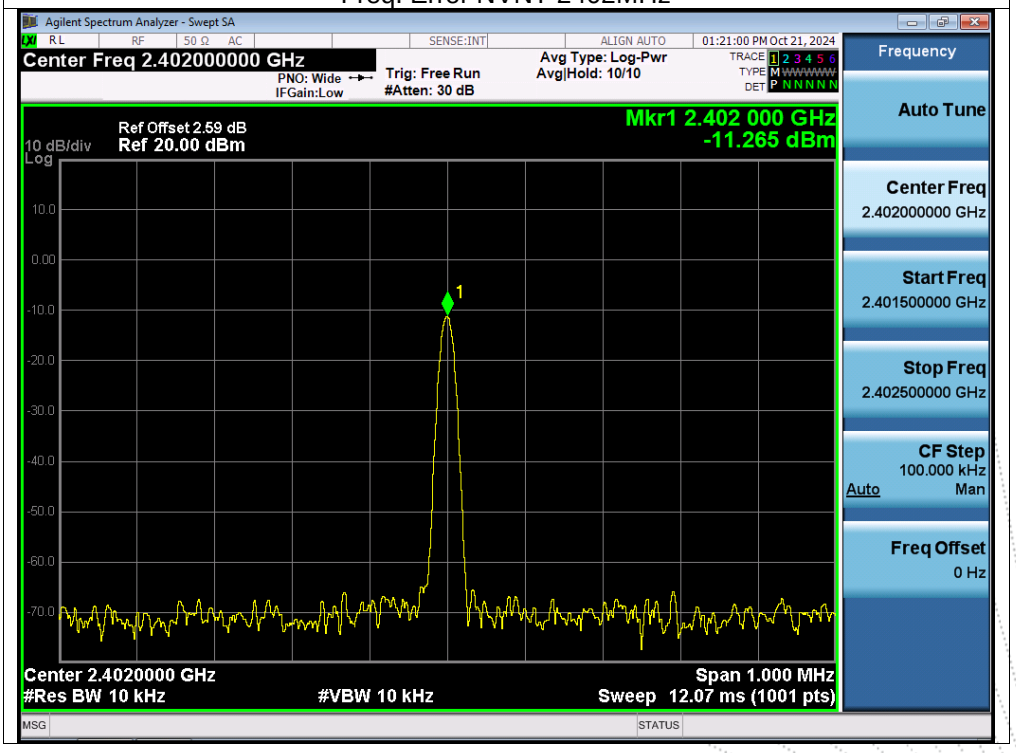
7.5 Test Result

Temperature:	25°C		
Humidity:	55 % RH	Test Voltage	DC 5V

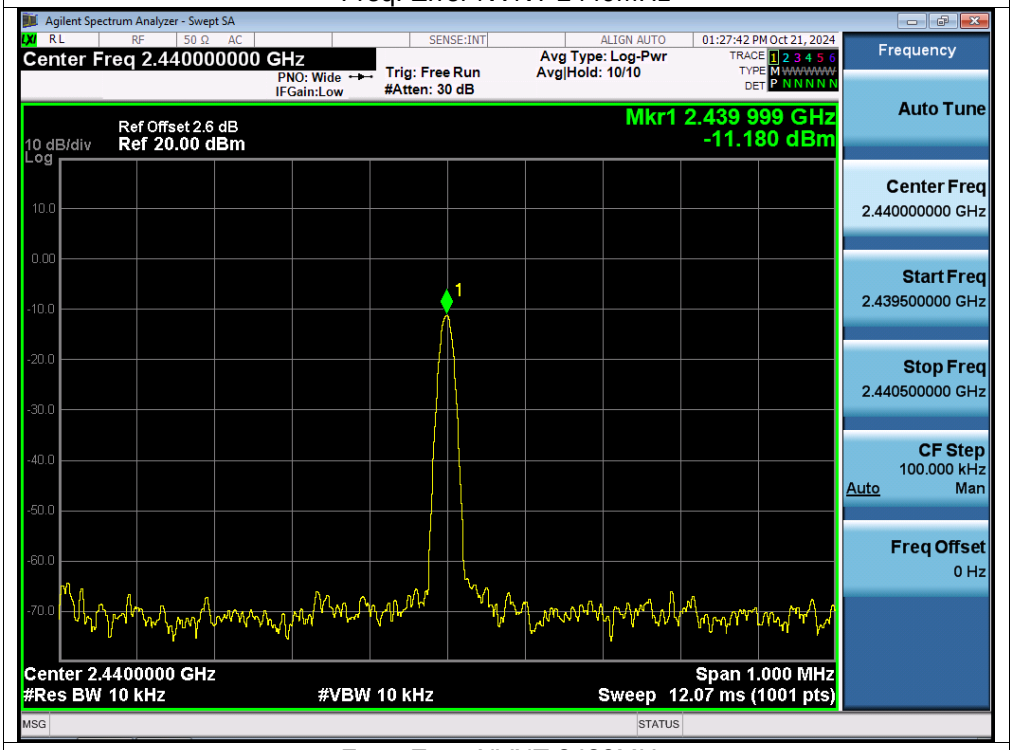
Condition	Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NVNT	2402	2402	0	0	50	Pass
NVNT	2440	2439.999	-1000	-0.41	50	Pass
NVNT	2480	2480	0	0	50	Pass

Test Graphs

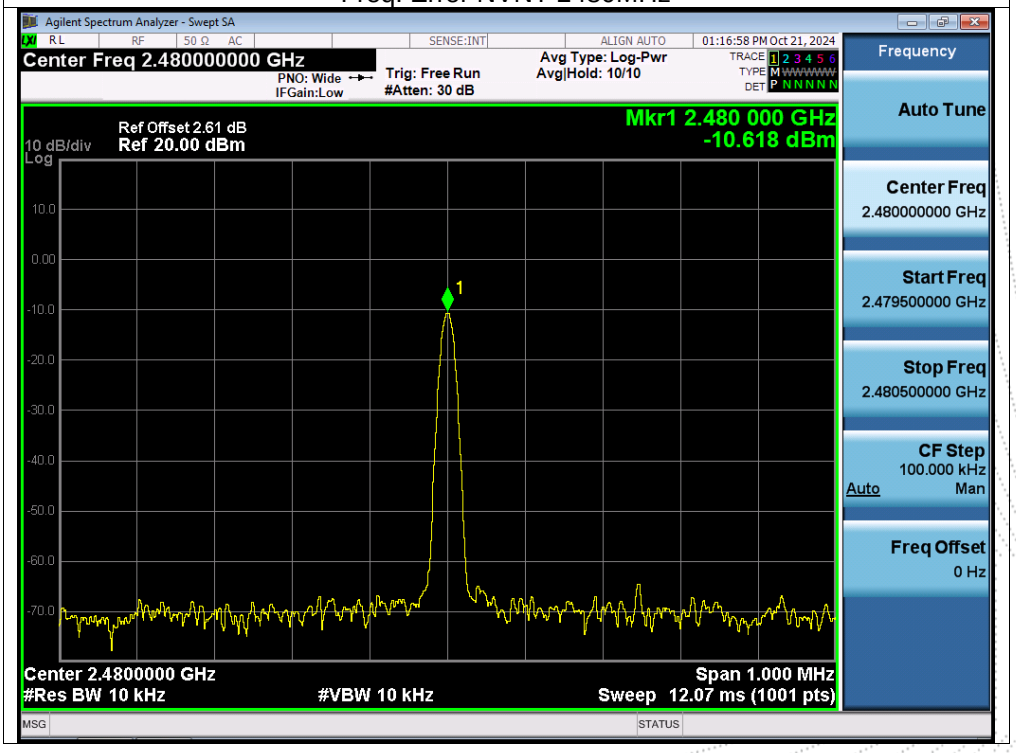
Freq. Error NVNT 2402MHz



Freq. Error NVNT 2440MHz

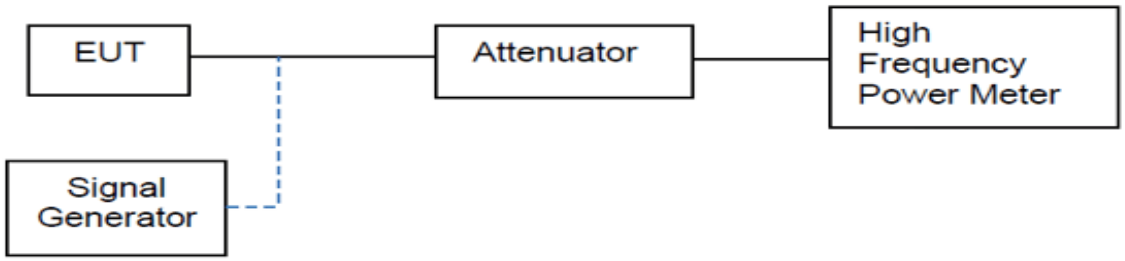


Freq. Error NVNT 2480MHz



8. Antenna Power

8.1 Block Diagram Of Test Setup



8.2 Limit

Item	Limits
Antenna Power Density	(1)≦3mW/MHz (FH,FH+DS,FH+OFDM form 2400 - 2483.5 MHz) (2)≦10mW/MHz (OFDM OBW＜26MHz, DS, FH other than (1)) (3)≦5mW/MHz (OFDM OBW 26-38MHz) (4) ≦10mW (Other than (1) & (2)& (3)
Antenna Power Error	+20%, -80% (Base on manufacturer declare antenna power density)

8.3 Test Procedure

1: Measure the total power by Power Meter in a state of hopping mode or non-hopping mode (with Average Sensor)
2: If it's the burst wave, please measure the burst ratio. Then calculate the real total power by burst ratio.
3: Calculate the mean power.
Output Power Density (mW) = Total Output Power (mW) / Duty cycle

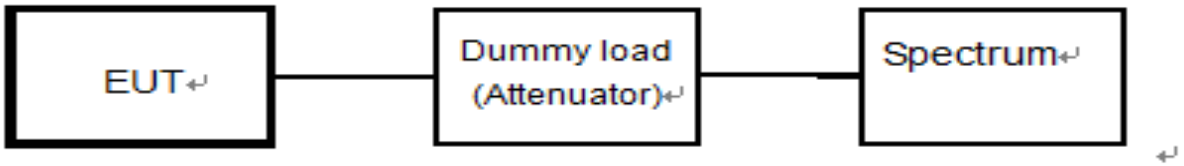
8.4 Test Result

Temperature:	25°C		
Humidity:	55 % RH	Test Voltage	DC 5V

Condi-tion	Mode	Fre-quency (MHz)	Power (dBm)	Antenna Power (mW)	Limit (Mw)	Declared Power (mW)	Tolerance (%)	Limit (%)	Verdict
NVNT	BLE 1M	2402	1.06	1.28	10	2	-36	-80~20	Pass
NVNT	BLE 1M	2440	1.13	1.30	10	2	-35	-80~20	Pass
NVNT	BLE 1M	2480	1.57	1.44	10	2	-28	-80~20	Pass
NVNT	BLE 2M	2402	1.02	1.26	10	2	-37	-80~20	Pass
NVNT	BLE 2M	2440	1.09	1.29	10	2	-36	-80~20	Pass
NVNT	BLE 2M	2480	1.52	1.42	10	2	-29	-80~20	Pass

9. Occupied Bandwith

9.1 Block Diagram Of Test Setup



9.2 Limit

Item	Limits
Occupied Band Width:	FH 83.5MHz; OFDM,DS ≦26MHz;Others≦26MHz
Spreading Bandwidth:	≧500 kHz (FH, DS)

9.3 Test Procedure

1. Setting of SA is following as: RB: 300kHz / VB:300kHz / SPAN: 3MHz / AT: 20dB Ref: 10dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
2. EUT have transmitted the maximum modulation signal and fixed channelize (For DSSS or OFDM Device) or continuous maximum power of hopping mode (For FHSS Device).
SA set to 99% of occupied bandwidth to measure occupied bandwidth. The limit is less than 26MHz (For DSSS or OFDM Device) or 83.5MHz (For FHSS Device).
3. SA set to 90% of occupied bandwidth to measure Spread Spectrum Bandwidth and must greater than 500kHz.
4. Spread Spectrum Factor = Spread Spectrum Bandwidth / modulation rate of EUT.
5. Spread Spectrum Factor limit is greater than 5

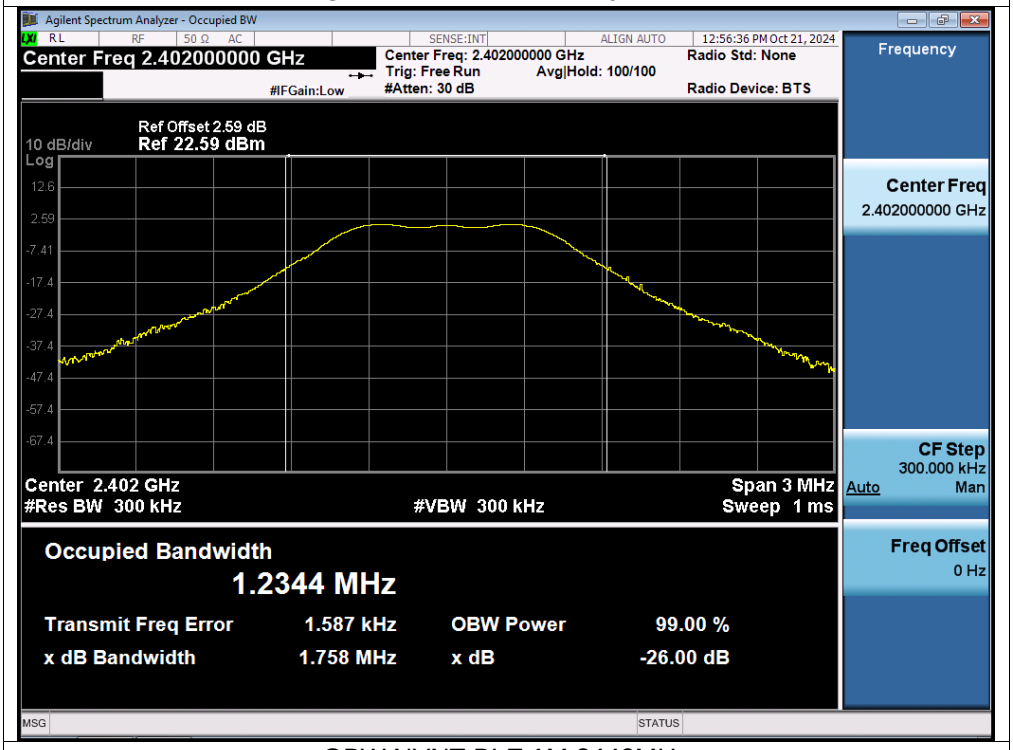
9.4 Test Result

Temperature:	25°C		
Humidity:	55 % RH	Test Voltage	DC 5V

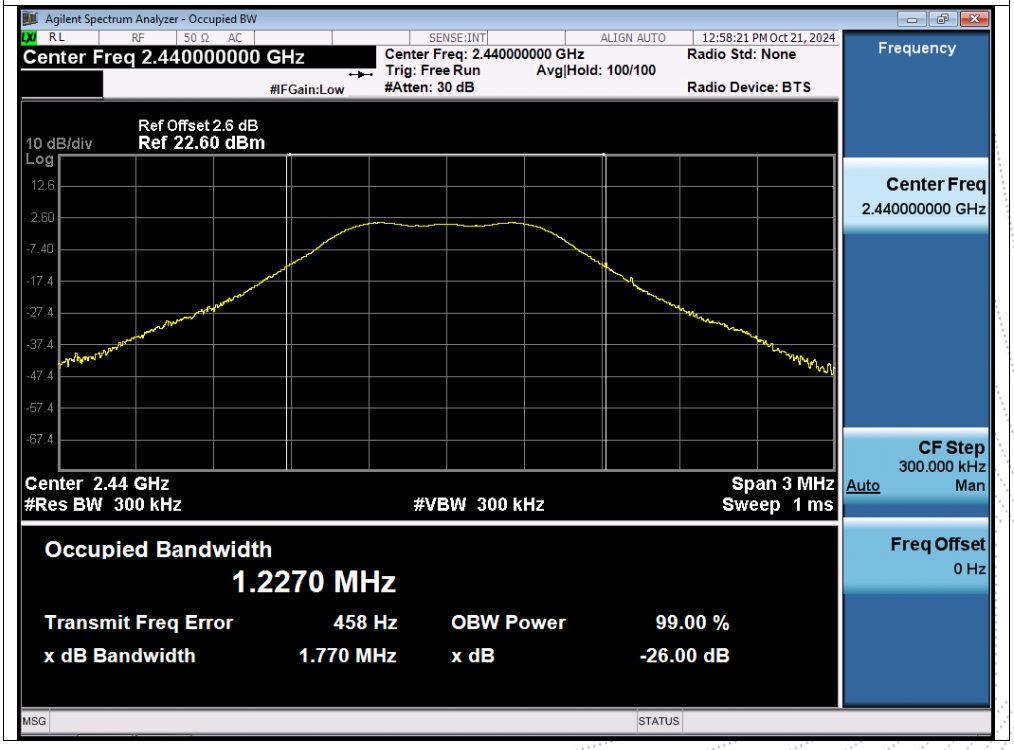
Condition	Mode	Frequency (MHz)	99% OBW (MHz)	90% OBW (MHz)	Limit (MHz)	Verdict
NVNT	BLE 1M	2402	1.234	0.828	0.5	Pass
NVNT	BLE 1M	2440	1.227	0.826	0.5	Pass
NVNT	BLE 1M	2480	1.218	0.825	0.5	Pass
NVNT	BLE 2M	2402	2.131	1.381	0.5	Pass
NVNT	BLE 2M	2440	2.131	1.38	0.5	Pass
NVNT	BLE 2M	2480	2.13	1.382	0.5	Pass

Test Graphs

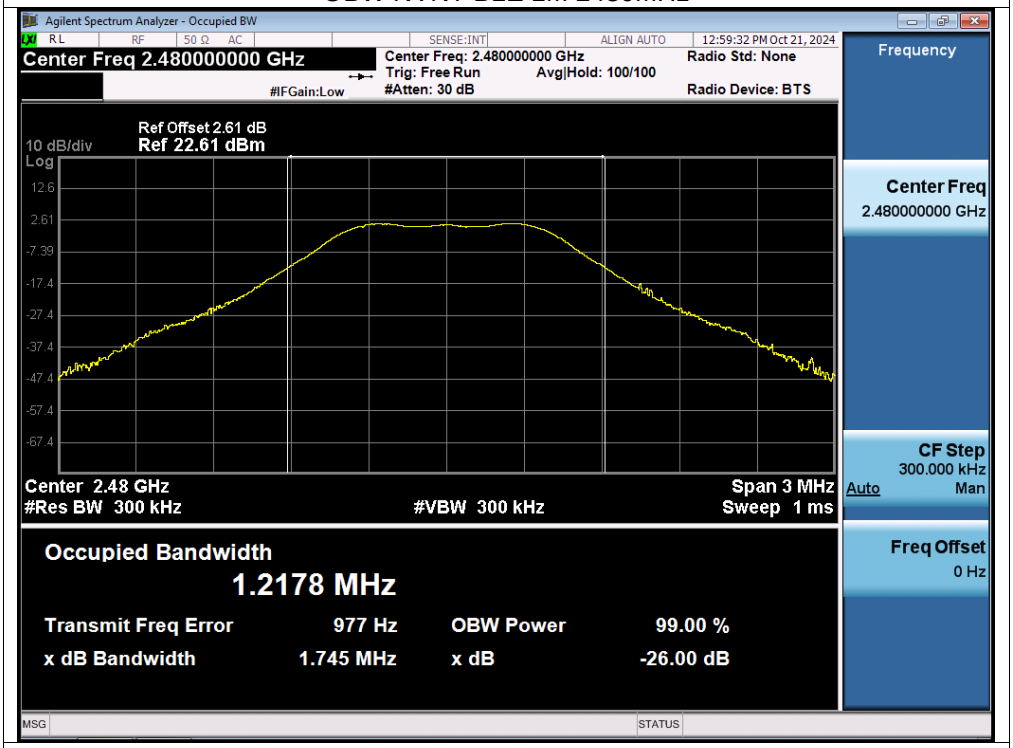
OBW NVNT BLE 1M 2402MHz



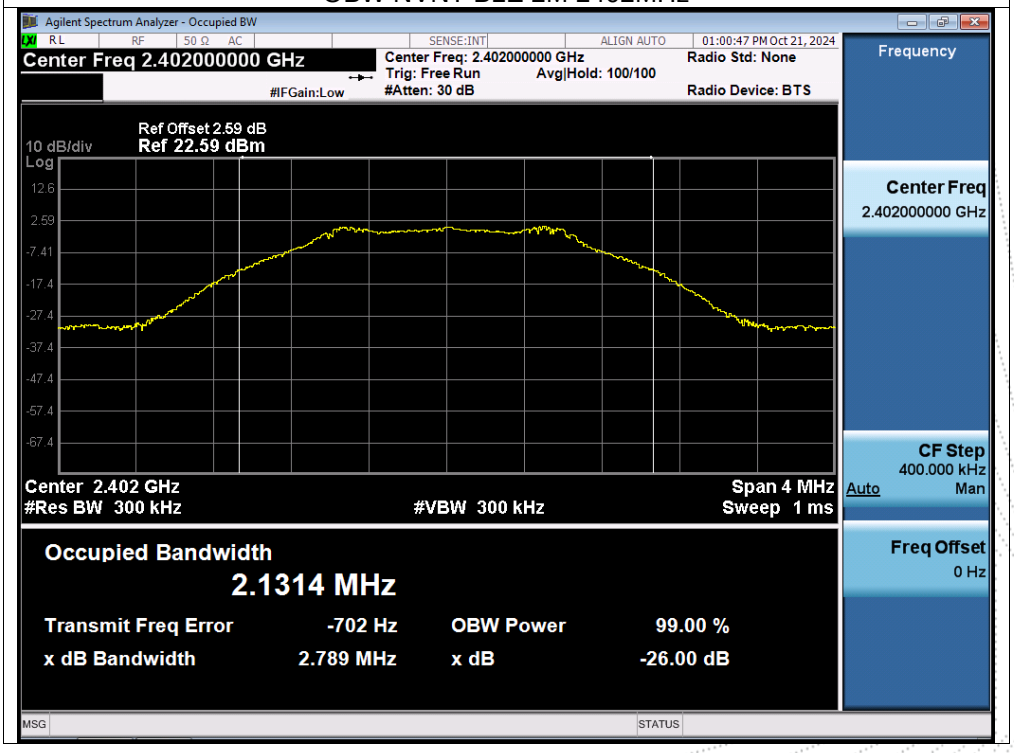
OBW NVNT BLE 1M 2440MHz



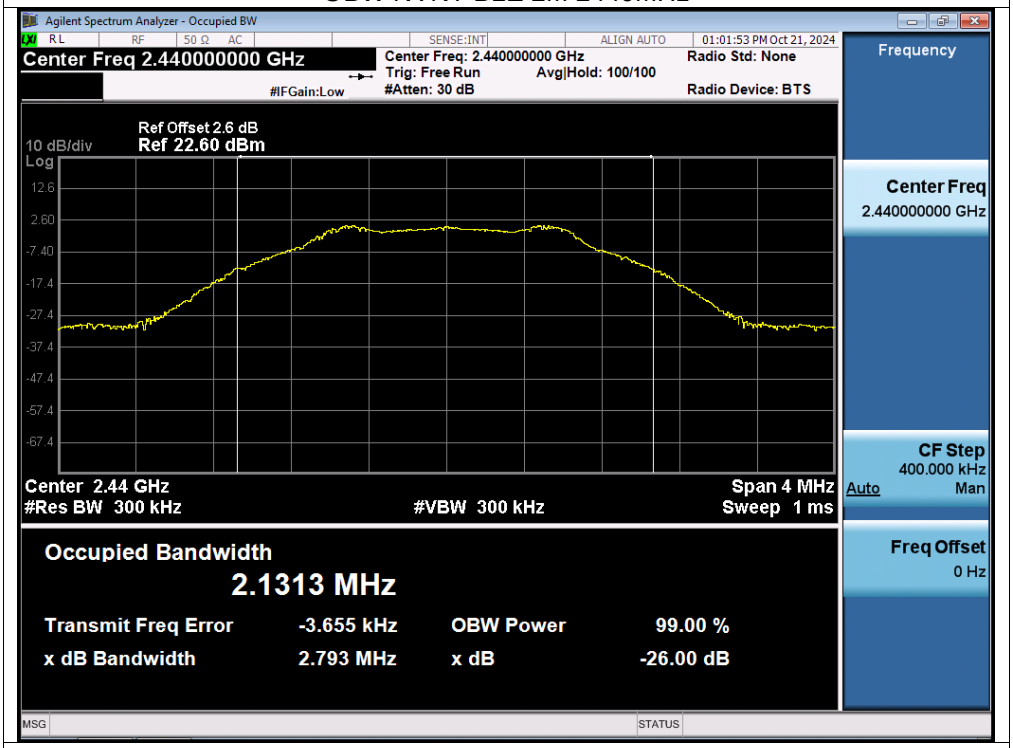
OBW NVNT BLE 1M 2480MHz



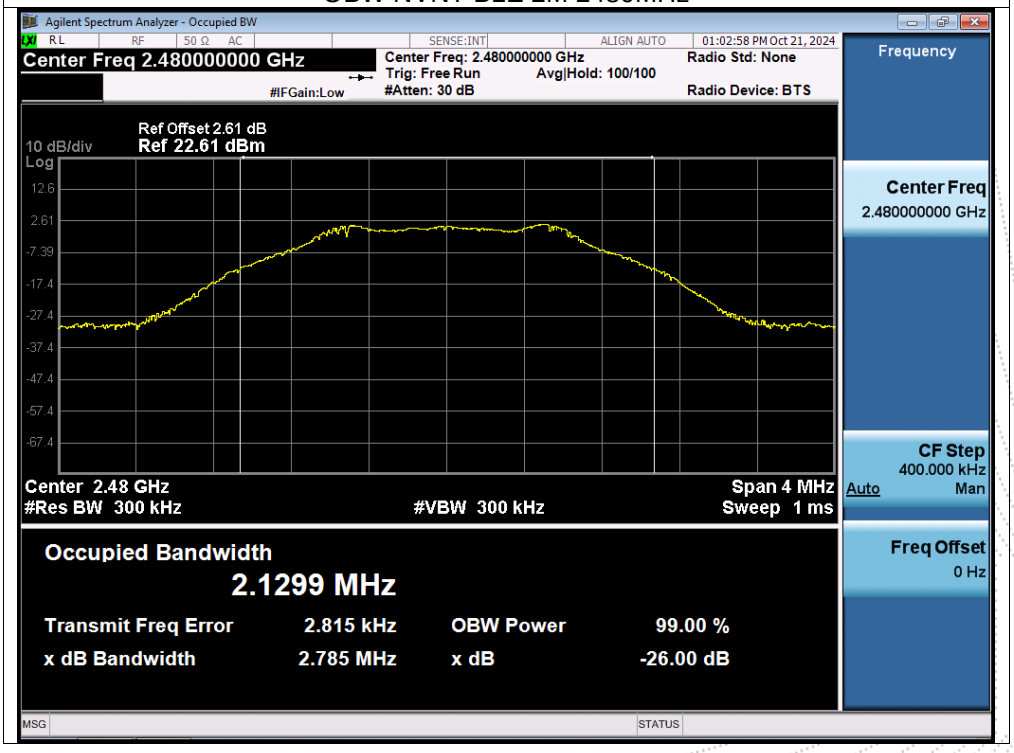
OBW NVNT BLE 2M 2402MHz



OBW NVNT BLE 2M 2440MHz

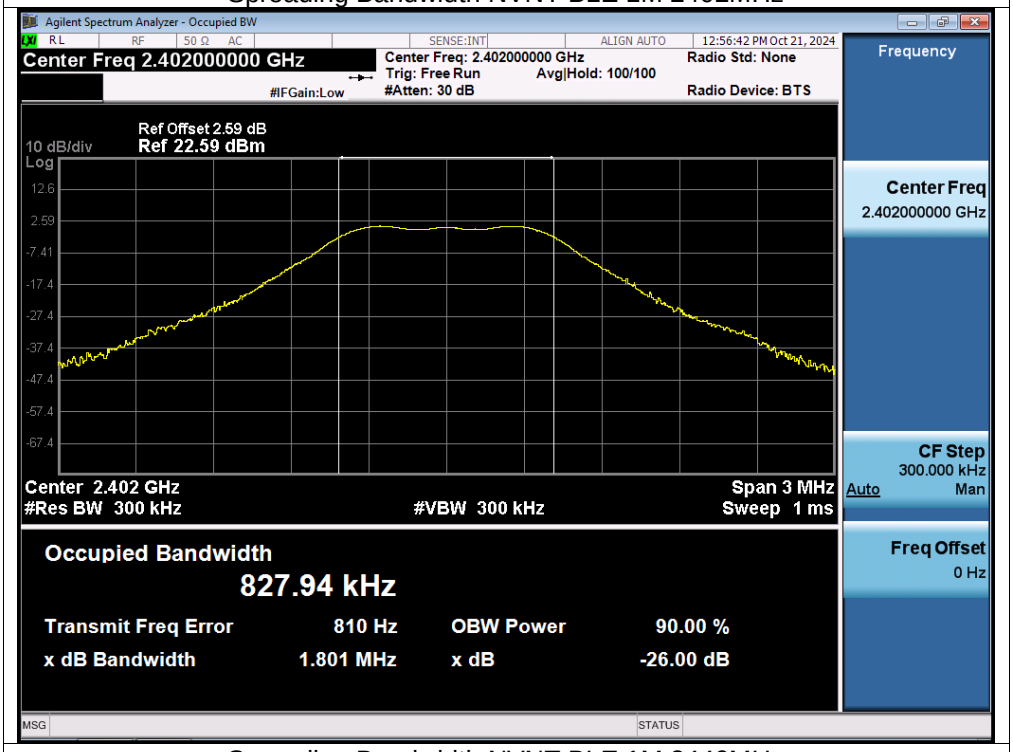


OBW NVNT BLE 2M 2480MHz

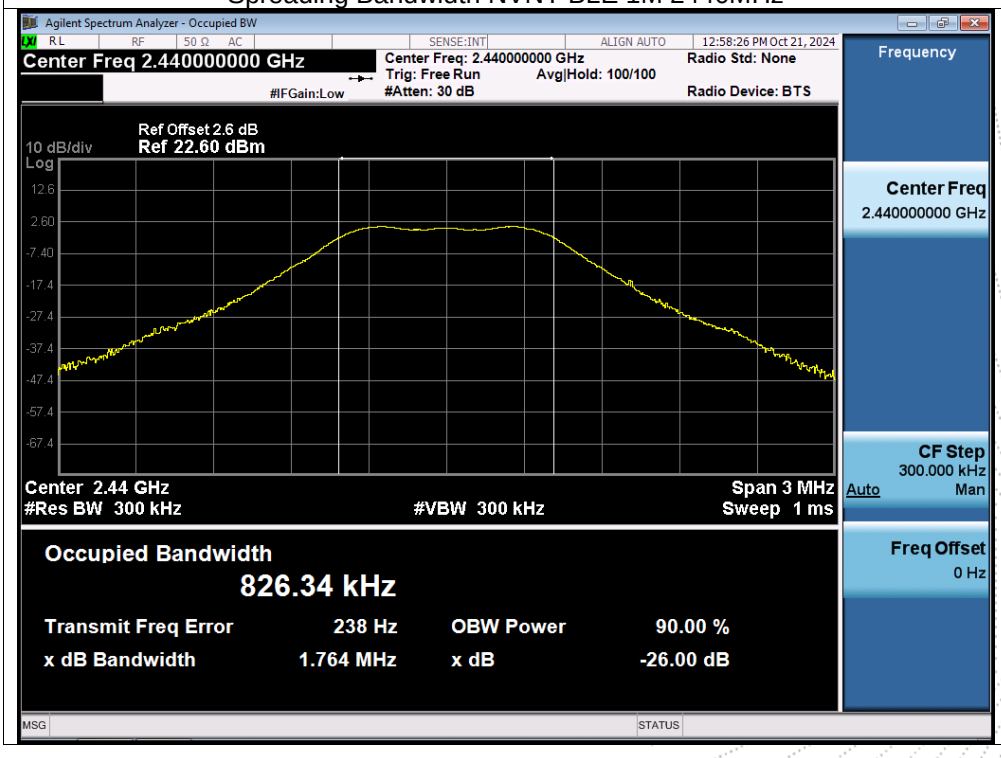


Test Graphs

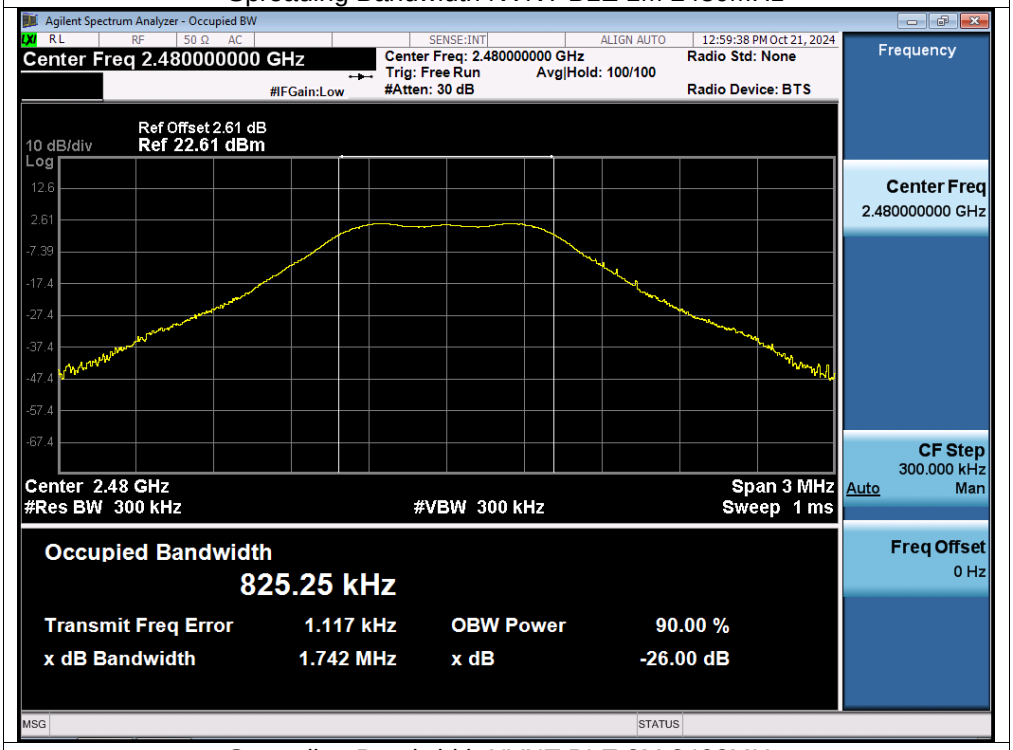
Spreading Bandwidth NVNT BLE 1M 2402MHz



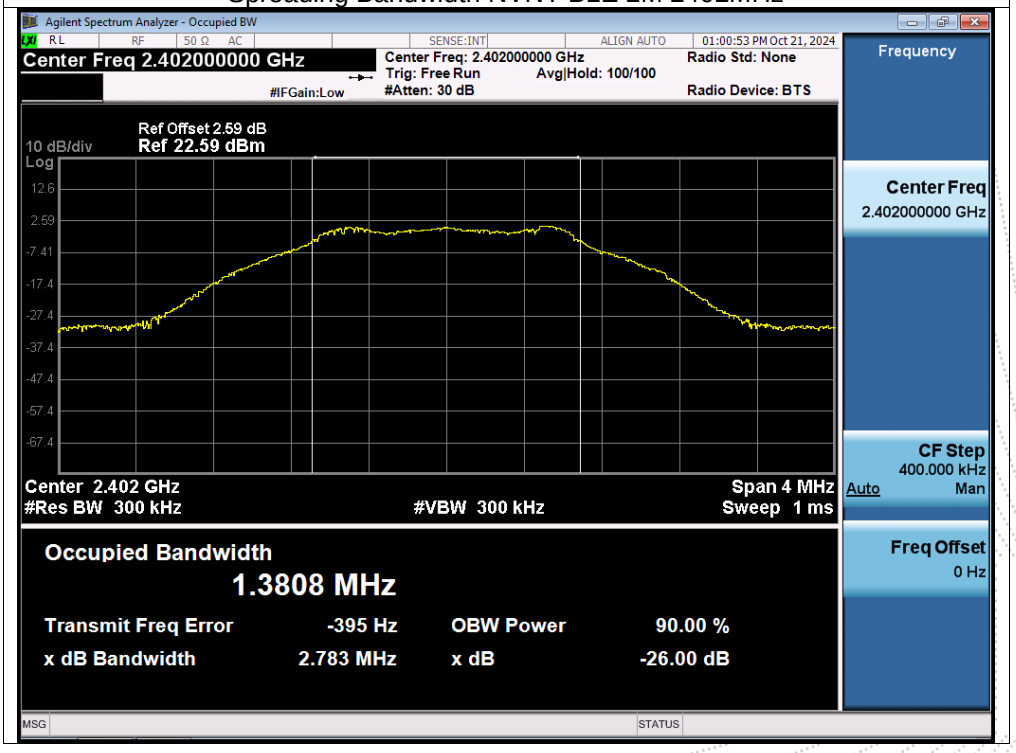
Spreading Bandwidth NVNT BLE 1M 2440MHz



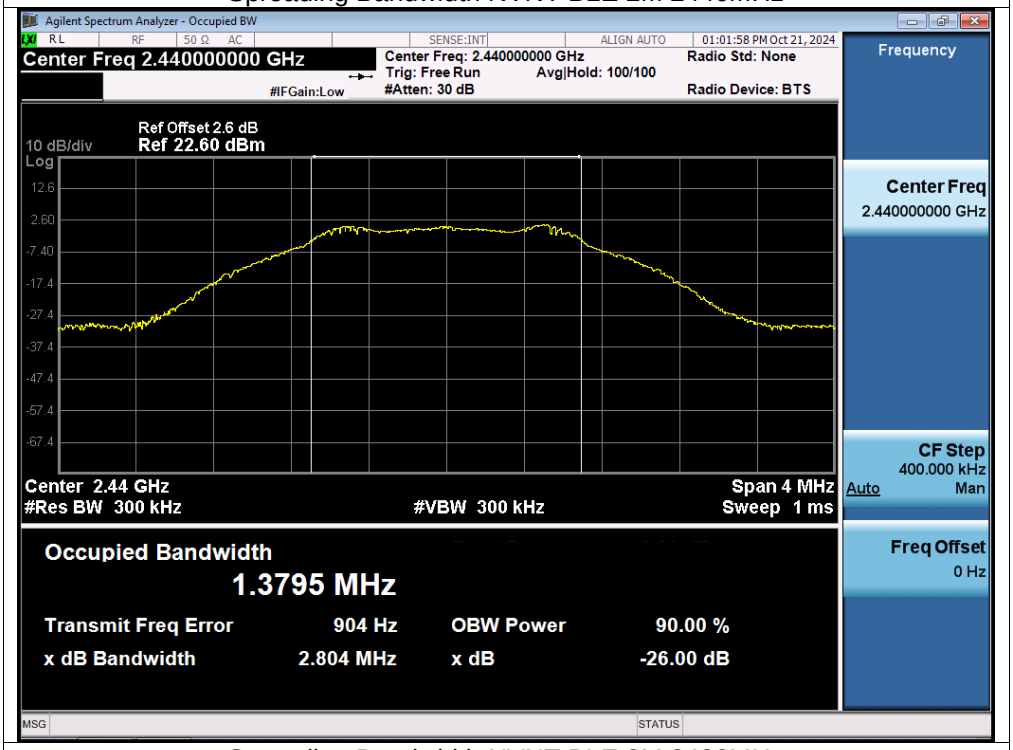
Spreading Bandwidth NVNT BLE 1M 2480MHz



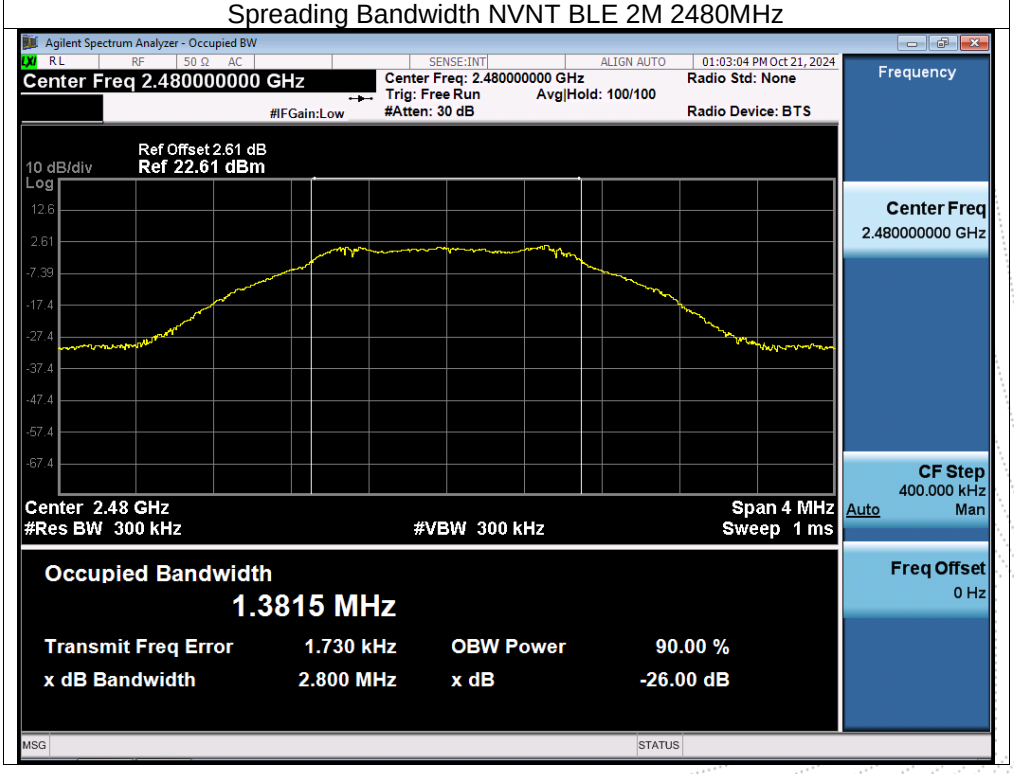
Spreading Bandwidth NVNT BLE 2M 2402MHz



Spreading Bandwidth NVNT BLE 2M 2440MHz

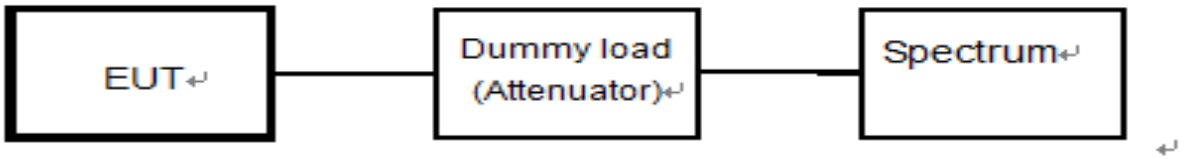


Spreading Bandwidth NVNT BLE 2M 2480MHz



10. Unwanted Emission Intensity Measurement

10.1 Block Diagram Of Test Setup



10.2 Limit

Item	RB / VB	Limits
TX Spurious Emission	100KHz	≦ 0.25 μW（-36dBm） (30MHz≦f≦1000MHz)
	1 MHz	≦2.5 μW （-26dBm (1000MHz<f≦2387MHz)
	1 MHz	≦25 μW （-16dBm (2387MHz<f≦2400MHz)
	1 MHz	≦25 μW（-16dBm (2483.5MHz≦f<2496.5MHz)
	1 MHz	≦2.5 μW（-26dBm (2496.5MHz≦f<12500MHz)

10.3 Measuring Instruments And Setting

Please refer to section 5 in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
RB / VB	1 MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

10.4 Test Procedure

1. EUT have transmitted the maximum modulation signal and fixed channelize.
2. Setting of SA is following as: Below 1GHz RB:100KHz / VB:100KHz
Above 1GHz RB:1MHz / VB:1MHz / AT: 20dB Ref: 10dBm / Sweep time: Auto
Sweep Mode: Continuous sweep / Detect mode: Positive peak
Trace mode: Max hold
3. Setting of SA is following as 30MHz and stop frequency 1000MHz Then to mark peak reading value + cable loss shall be less than 0.25μW.
4. Setting of SA is following as 1000MHz and stop frequency 2387MHz Then to mark peak reading value + cable loss shall be less than 2.5μW.
5. SA adjusted to start frequency 2387MHz and stop frequency 2400MHz. Then to mark peak reading value + cable loss shall be less than 25μW.
6. SA adjusted to start frequency 2483.5MHz and stop frequency 2496.5MHz Then to mark peak reading value + cable loss shall be less than 25μW
7. SA adjusted to start frequency 2496.5MHz and stop frequency 12500MHz Then to mark peak reading value + cable loss shall be less than 2.5μW

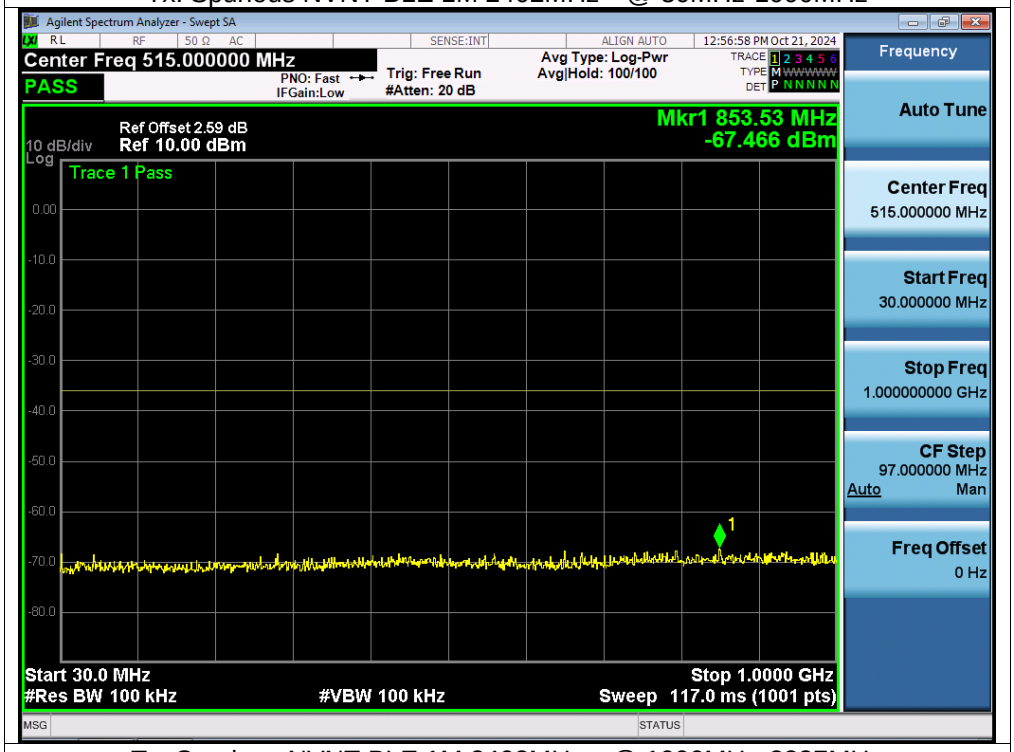
10.5 Test Result

Temperature:	25°C		
Humidity:	55 % RH	Test Voltage	DC 5V

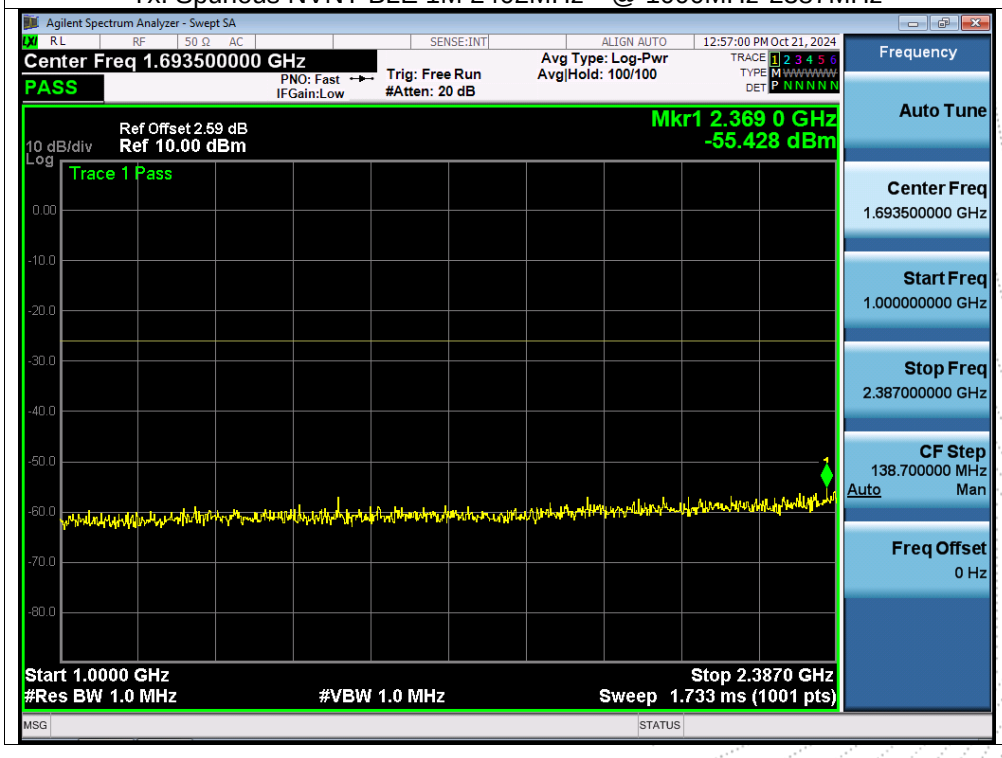
Condi-tion	Mode	Fre-quency (MHz)	Range (MHz)	Emission Frequency (MHz)	Max Value (dBm)	Limit Start (dBm)	Limit Stop (dBm)	Verdict
NVNT	BLE 1M	2402	30-1000	853.53	-67.47	-36	-36	Pass
NVNT	BLE 1M	2402	1000-2387	2368.97	-55.43	-26	-26	Pass
NVNT	BLE 1M	2402	2387-2400	2400	-35.16	-16	-16	Pass
NVNT	BLE 1M	2402	2483.5-2496.5	2488.67	-56.79	-16	-16	Pass
NVNT	BLE 1M	2402	2496.5-13000	5174.89	-49.82	-26	-26	Pass
NVNT	BLE 1M	2440	30-1000	909.79	-66.77	-36	-36	Pass
NVNT	BLE 1M	2440	1000-2387	2301.01	-55.79	-26	-26	Pass
NVNT	BLE 1M	2440	2387-2400	2399.4	-55.81	-16	-16	Pass
NVNT	BLE 1M	2440	2483.5-2496.5	2486.98	-55.08	-16	-16	Pass
NVNT	BLE 1M	2440	2496.5-13000	5258.92	-42.67	-26	-26	Pass
NVNT	BLE 1M	2480	30-1000	31.94	-65.91	-36	-36	Pass
NVNT	BLE 1M	2480	1000-2387	2341.23	-56.12	-26	-26	Pass
NVNT	BLE 1M	2480	2387-2400	2393.44	-57.03	-16	-16	Pass
NVNT	BLE 1M	2480	2483.5-2496.5	2483.66	-51.28	-16	-16	Pass
NVNT	BLE 1M	2480	2496.5-13000	5174.89	-49.18	-26	-26	Pass
NVNT	BLE 2M	2402	30-1000	31.94	-64.93	-36	-36	Pass
NVNT	BLE 2M	2402	1000-2387	2385.61	-53.3	-26	-26	Pass
NVNT	BLE 2M	2402	2387-2400	2399.99	-21.79	-16	-16	Pass
NVNT	BLE 2M	2402	2483.5-2496.5	2494.65	-56.21	-16	-16	Pass
NVNT	BLE 2M	2402	2496.5-13000	5258.92	-39.24	-26	-26	Pass
NVNT	BLE 2M	2440	30-1000	31.94	-64.41	-36	-36	Pass
NVNT	BLE 2M	2440	1000-2387	2299.62	-55.92	-26	-26	Pass
NVNT	BLE 2M	2440	2387-2400	2396.26	-56.03	-16	-16	Pass
NVNT	BLE 2M	2440	2483.5-2496.5	2488.38	-55.35	-16	-16	Pass
NVNT	BLE 2M	2440	2496.5-13000	5195.9	-48.52	-26	-26	Pass
NVNT	BLE 2M	2480	30-1000	31.94	-62.93	-36	-36	Pass
NVNT	BLE 2M	2480	1000-2387	2292.68	-56.45	-26	-26	Pass
NVNT	BLE 2M	2480	2387-2400	2388.18	-56.91	-16	-16	Pass
NVNT	BLE 2M	2480	2483.5-2496.5	2483.59	-49.71	-16	-16	Pass
NVNT	BLE 2M	2480	2496.5-13000	5258.92	-44.43	-26	-26	Pass

Test Graphs

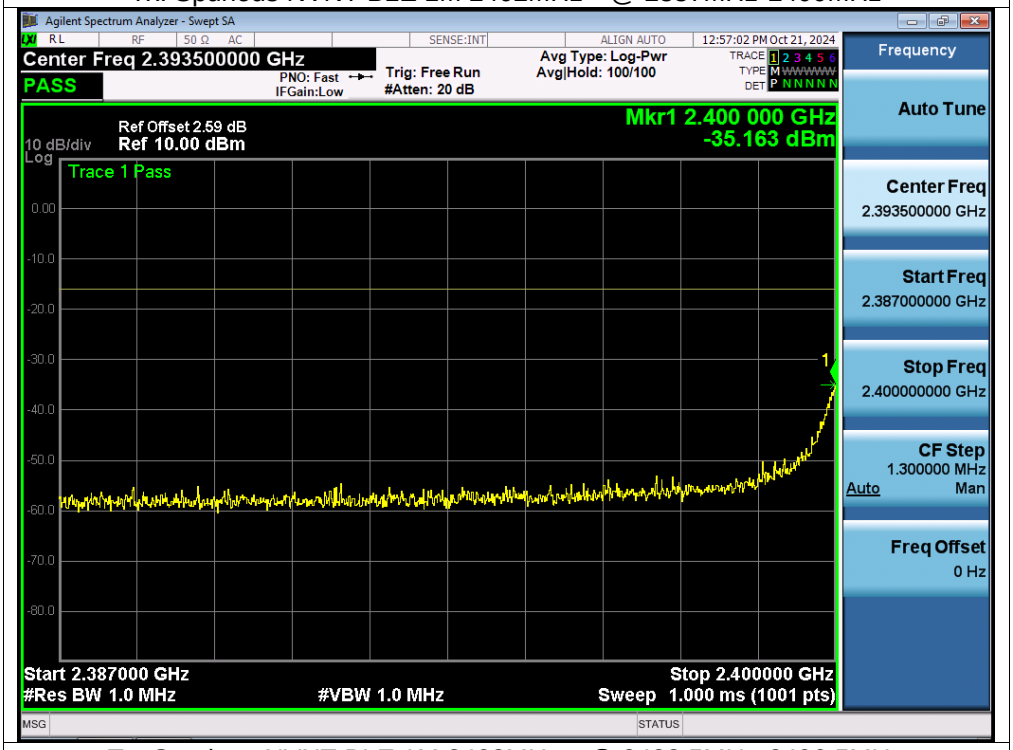
Tx. Spurious NVNT BLE 1M 2402MHz @ 30MHz-1000MHz



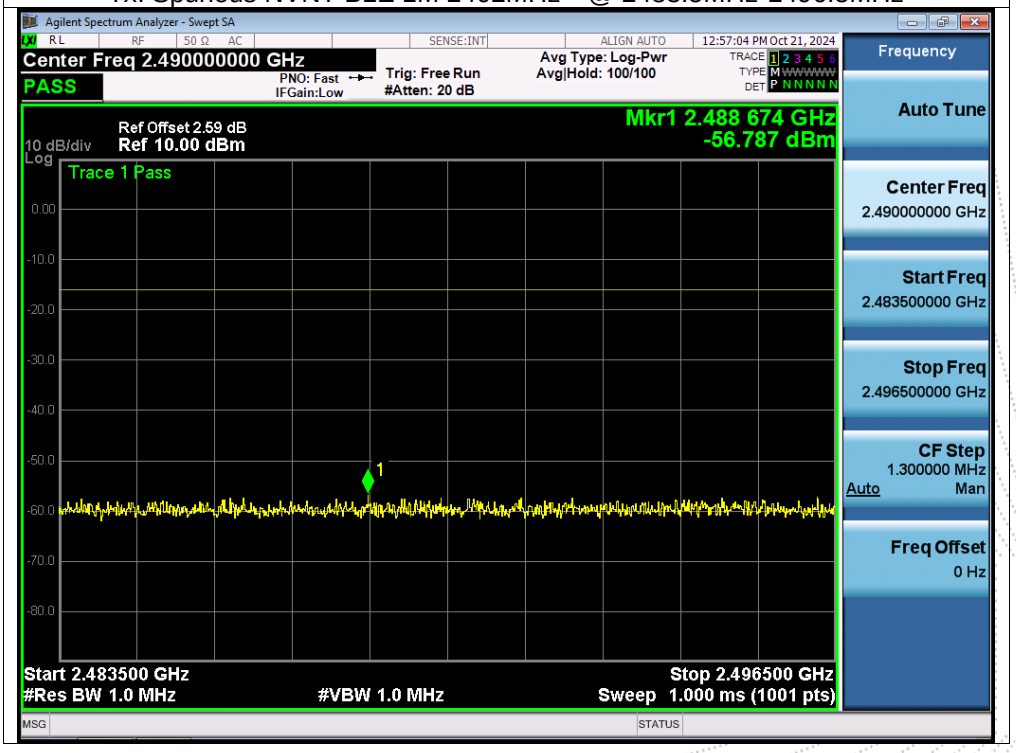
Tx. Spurious NVNT BLE 1M 2402MHz @ 1000MHz-2387MHz



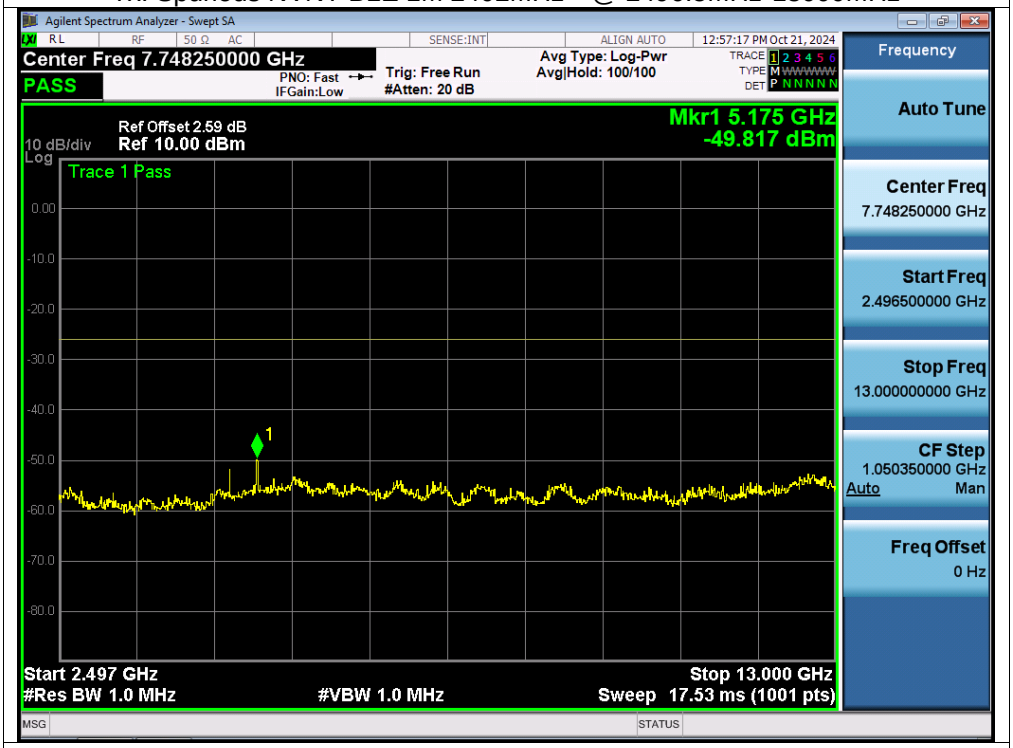
Tx. Spurious NVNT BLE 1M 2402MHz @ 2387MHz-2400MHz



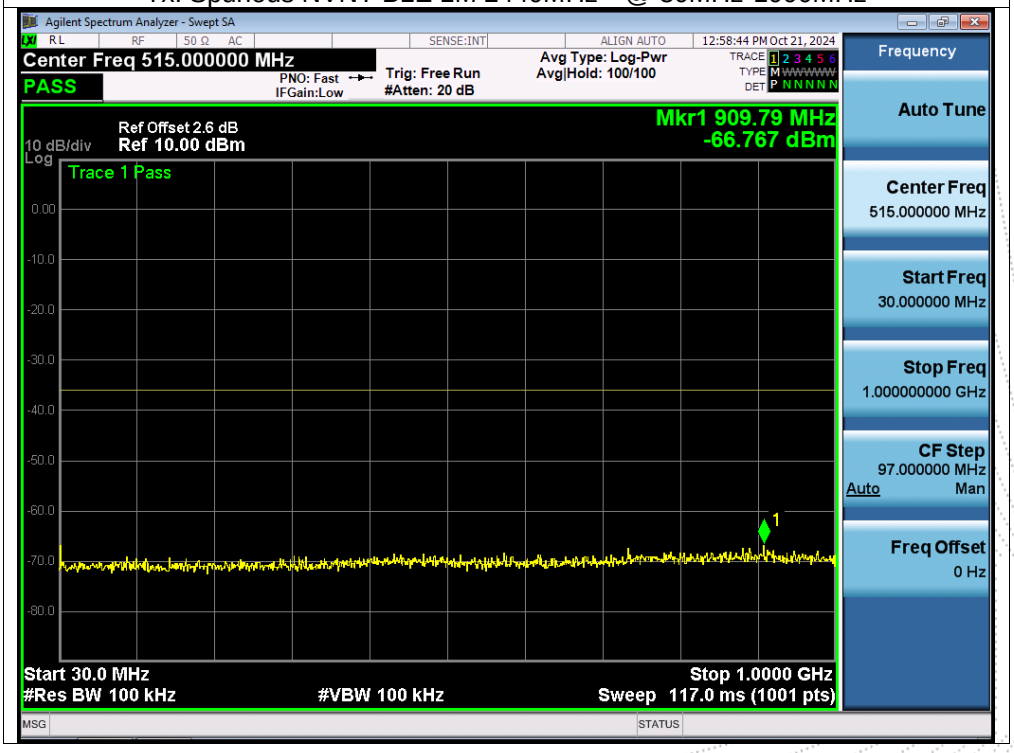
Tx. Spurious NVNT BLE 1M 2402MHz @ 2483.5MHz-2496.5MHz



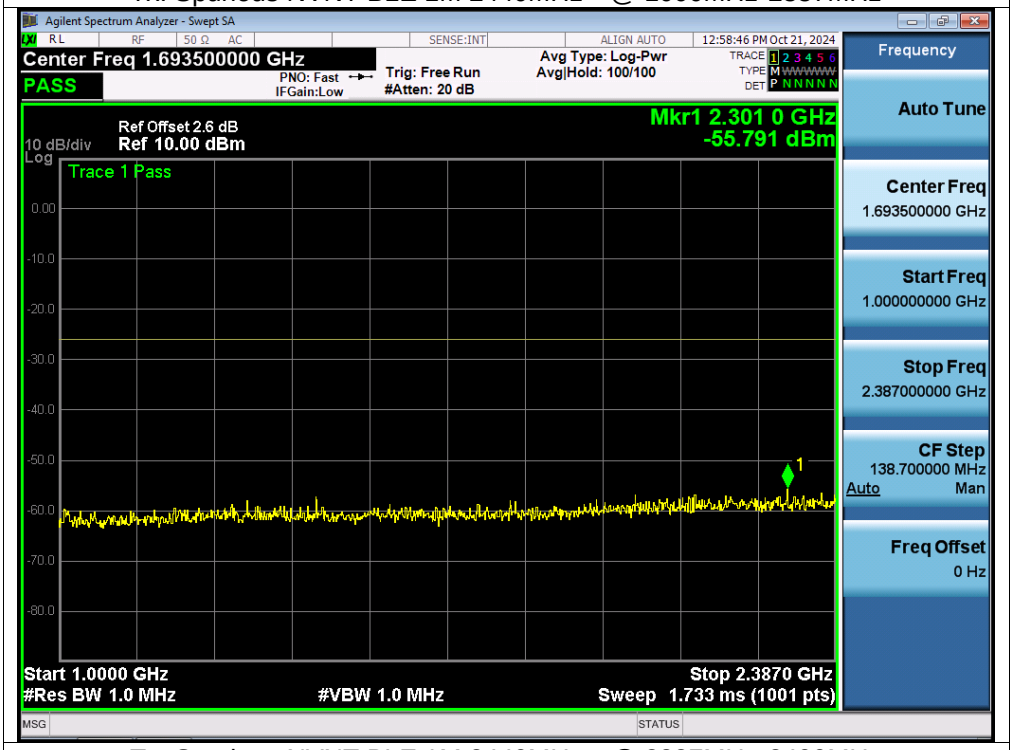
Tx. Spurious NVNT BLE 1M 2402MHz @ 2496.5MHz-13000MHz



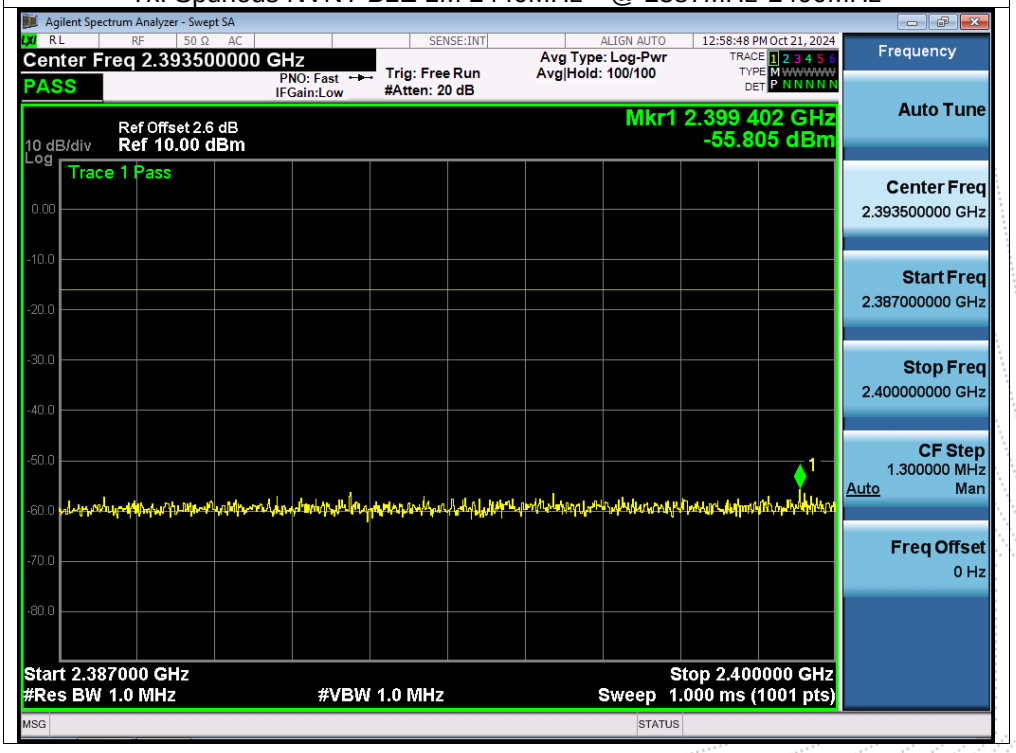
Tx. Spurious NVNT BLE 1M 2440MHz @ 30MHz-1000MHz



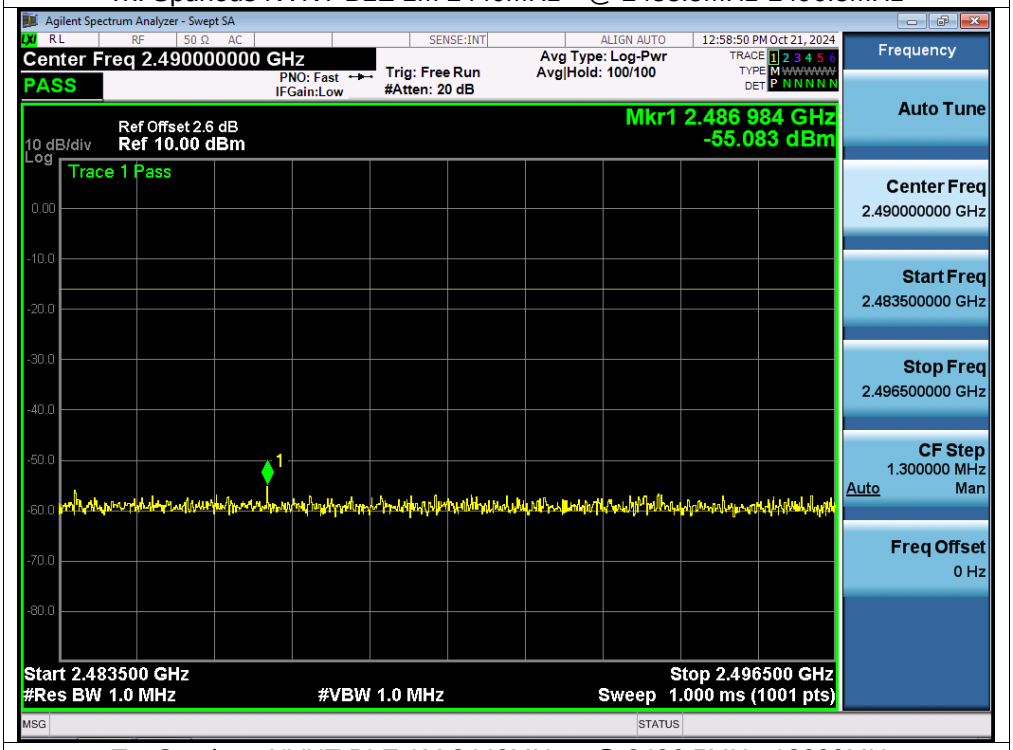
Tx. Spurious NVNT BLE 1M 2440MHz @ 1000MHz-2387MHz



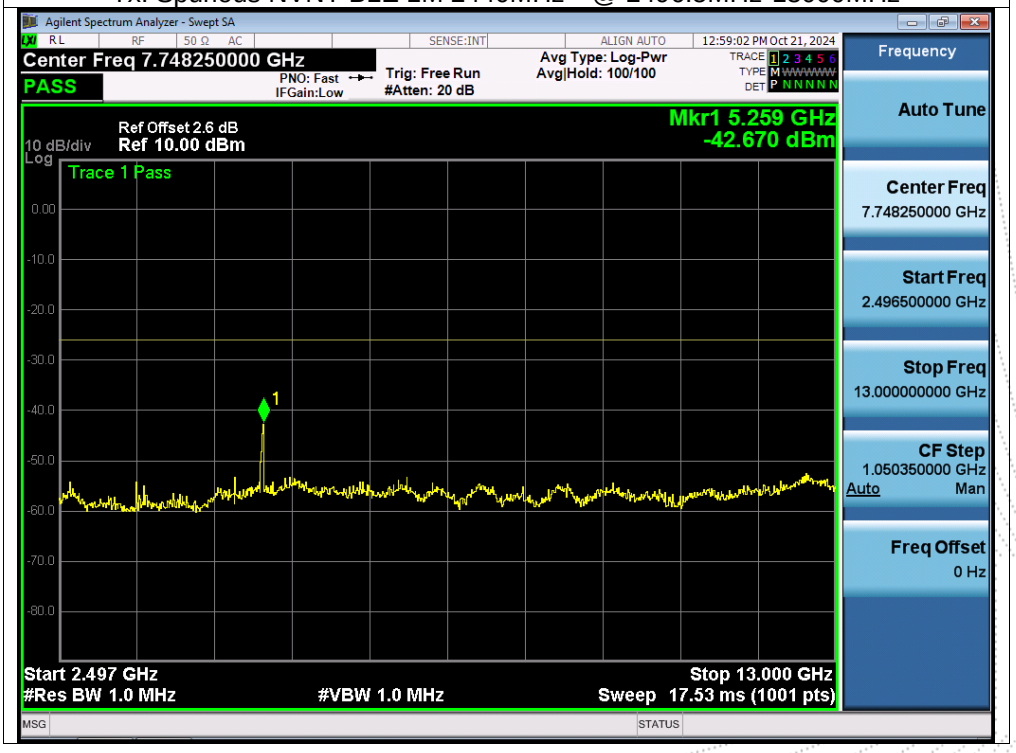
Tx. Spurious NVNT BLE 1M 2440MHz @ 2387MHz-2400MHz



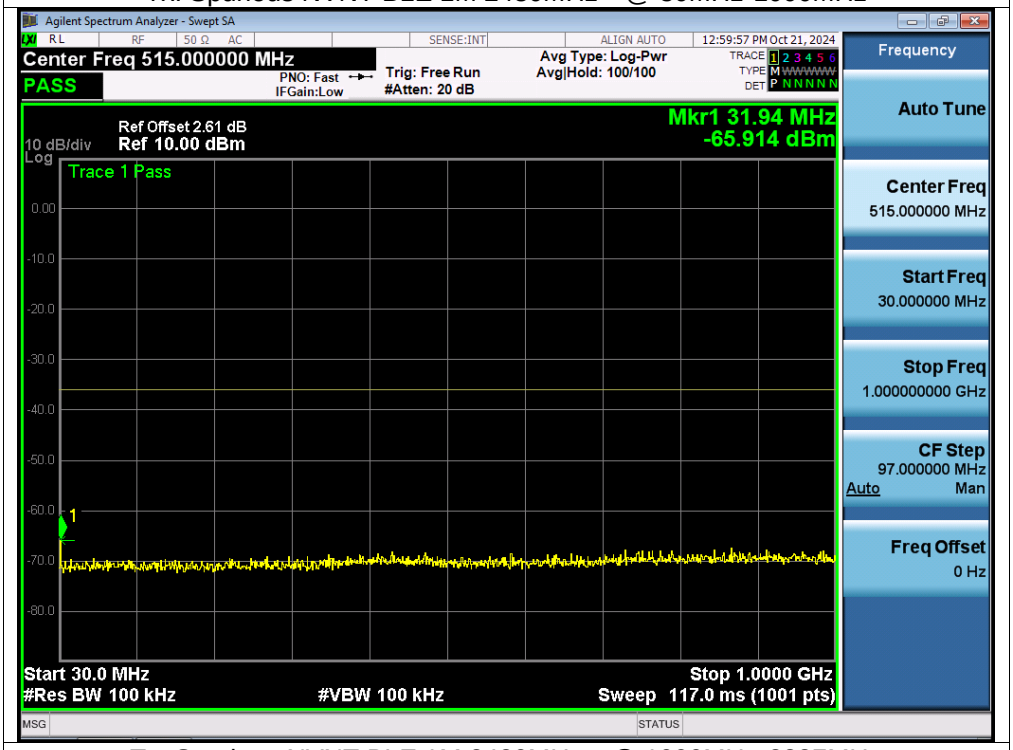
Tx. Spurious NVNT BLE 1M 2440MHz @ 2483.5MHz-2496.5MHz



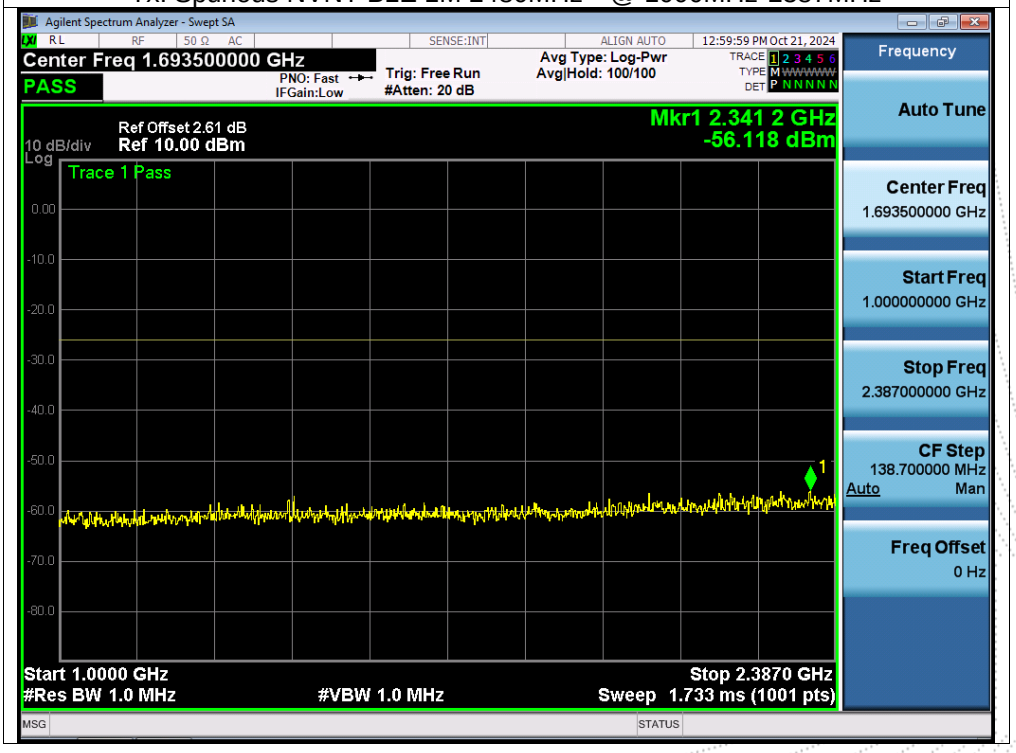
Tx. Spurious NVNT BLE 1M 2440MHz @ 2496.5MHz-13000MHz



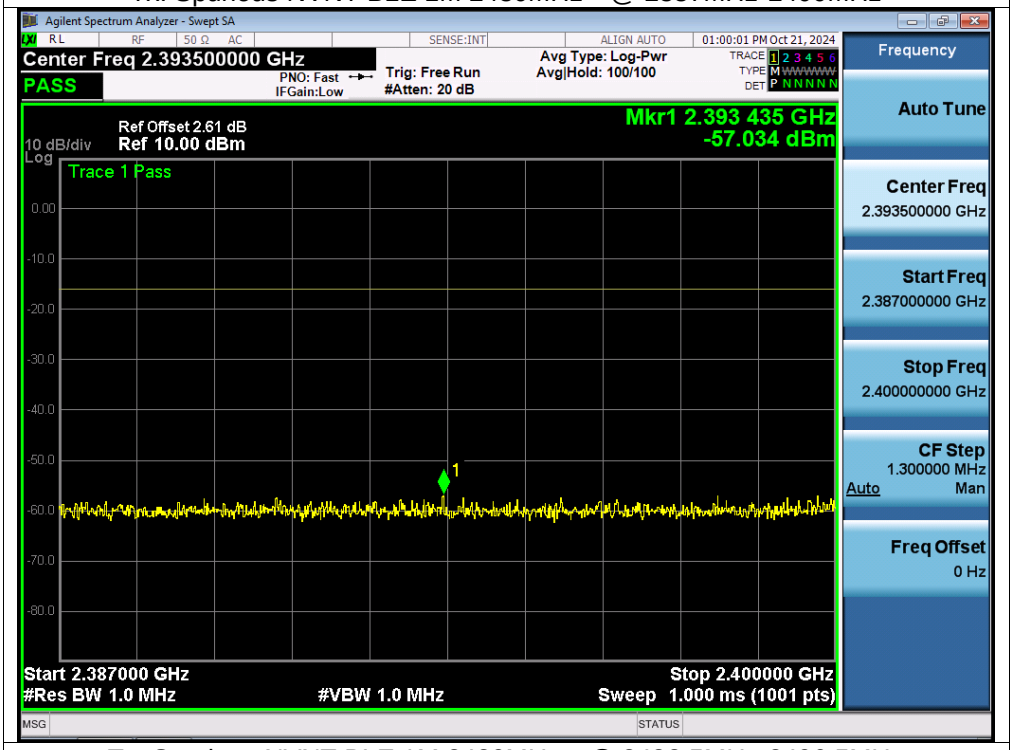
Tx. Spurious NVNT BLE 1M 2480MHz @ 30MHz-1000MHz



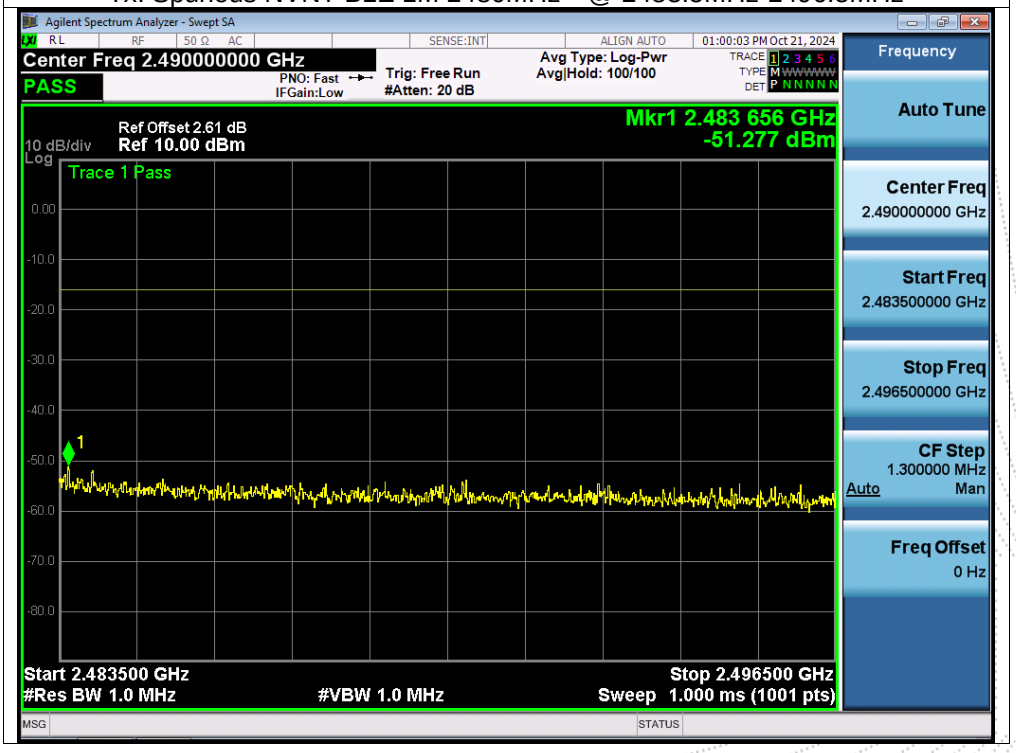
Tx. Spurious NVNT BLE 1M 2480MHz @ 1000MHz-2387MHz



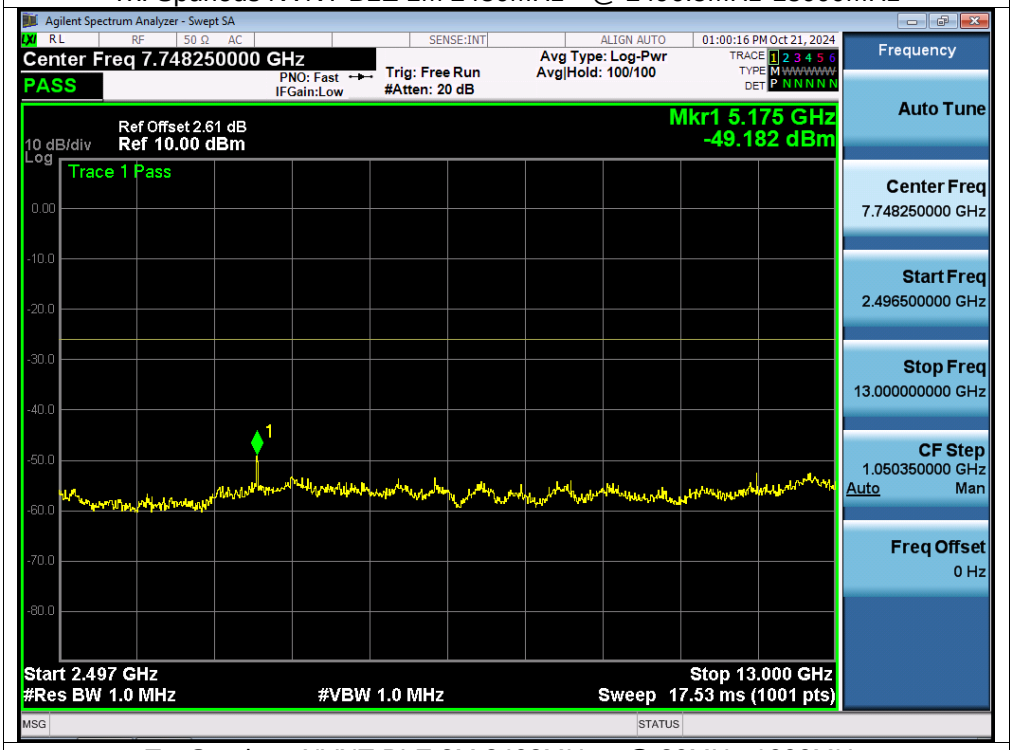
Tx. Spurious NVNT BLE 1M 2480MHz @ 2387MHz-2400MHz



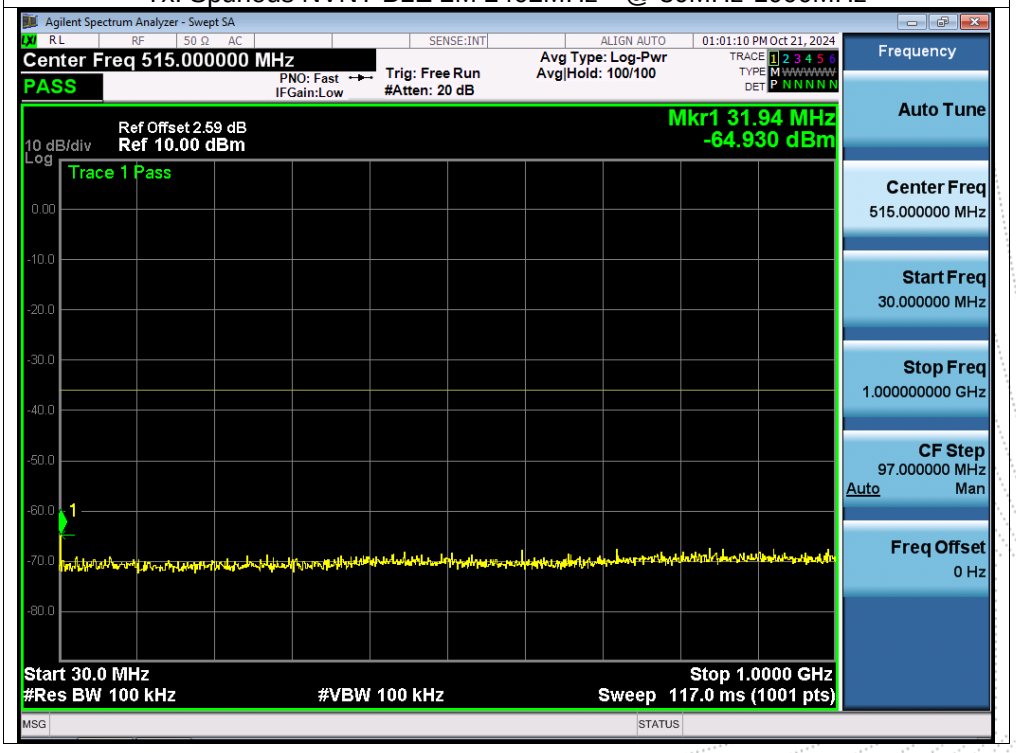
Tx. Spurious NVNT BLE 1M 2480MHz @ 2483.5MHz-2496.5MHz



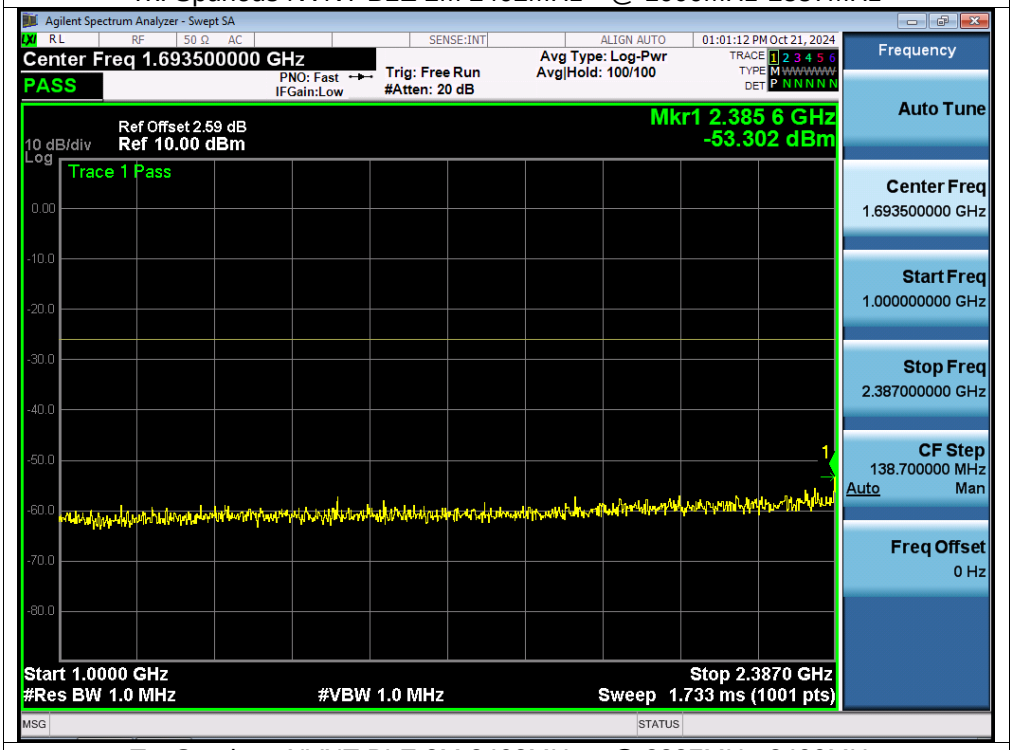
Tx. Spurious NVNT BLE 1M 2480MHz @ 2496.5MHz-13000MHz



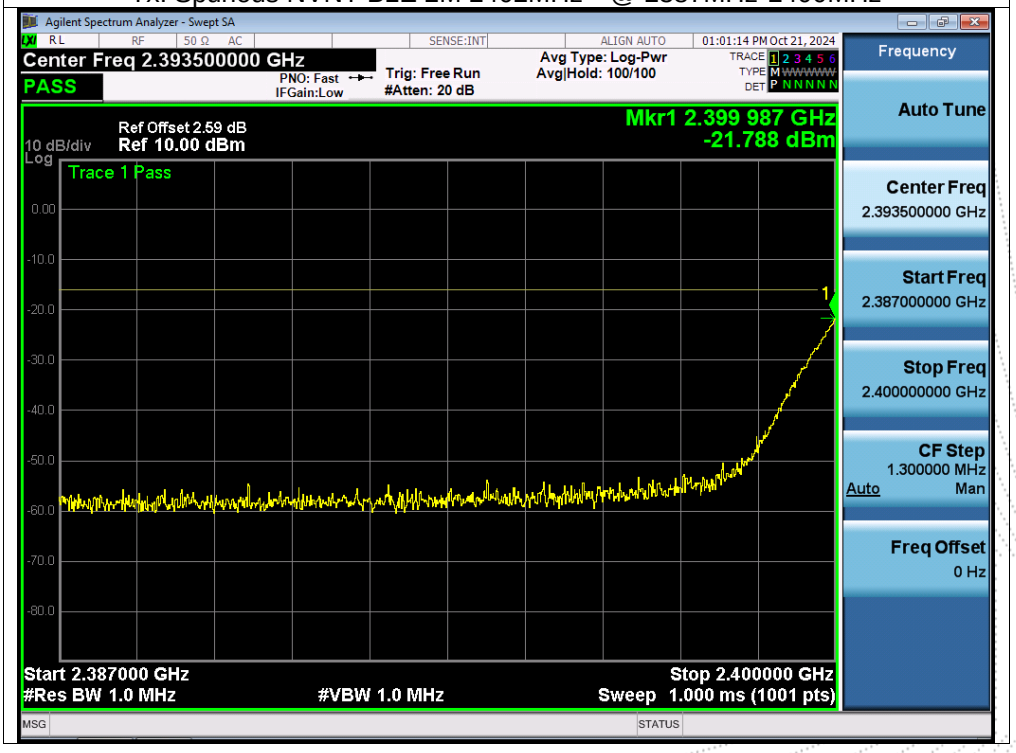
Tx. Spurious NVNT BLE 2M 2402MHz @ 30MHz-1000MHz



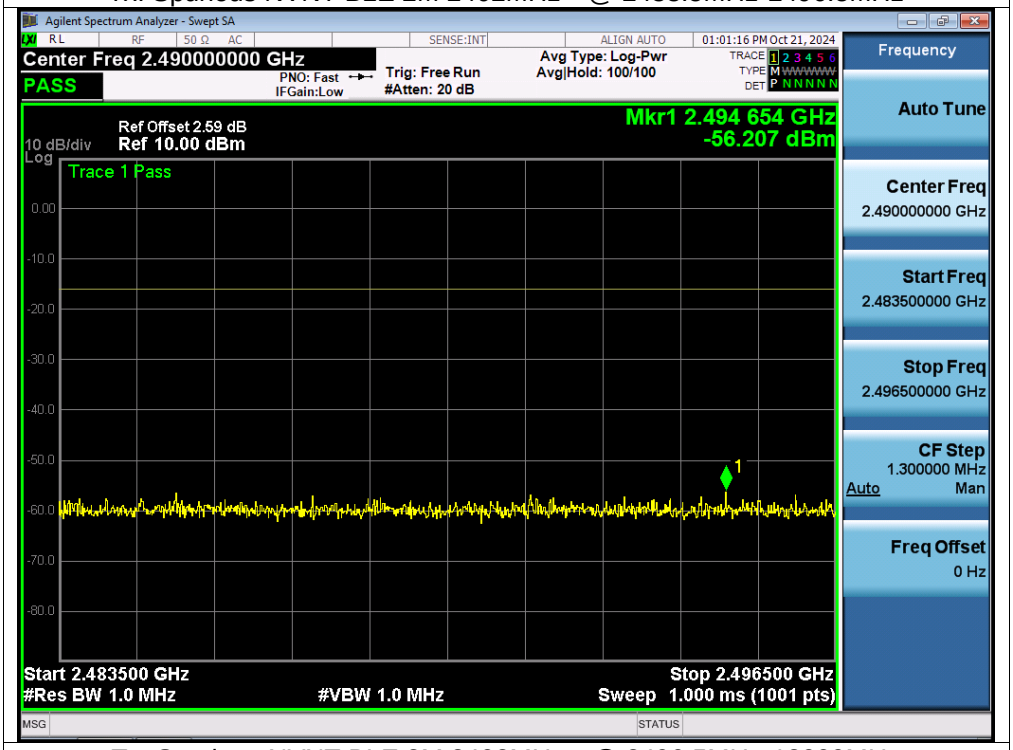
Tx. Spurious NVNT BLE 2M 2402MHz @ 1000MHz-2387MHz



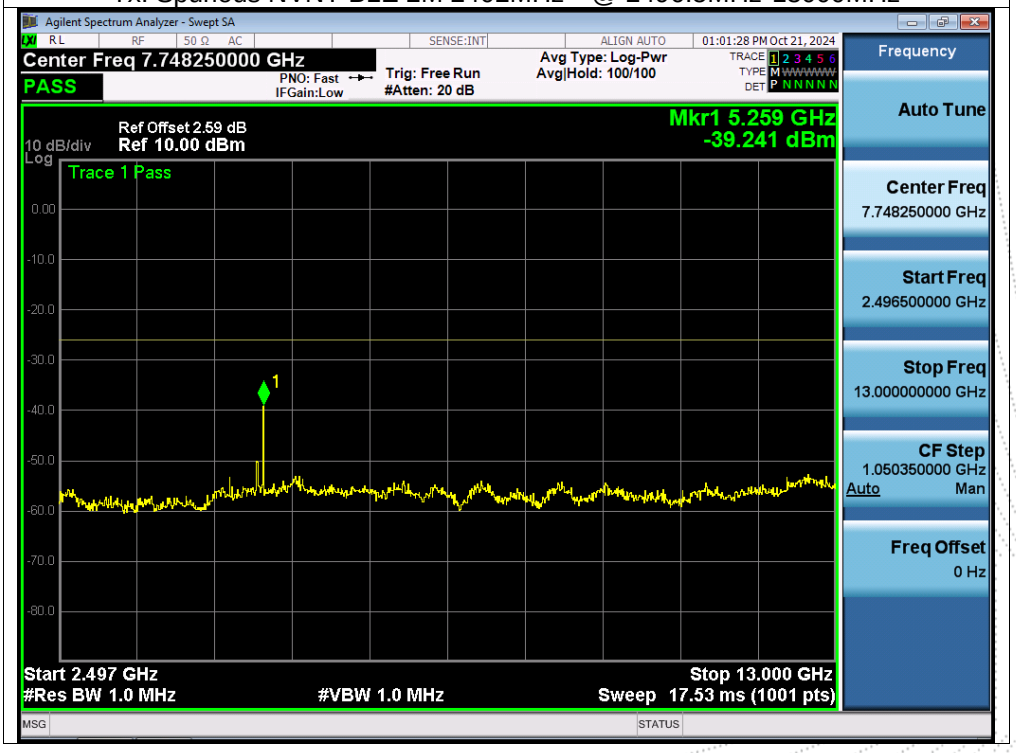
Tx. Spurious NVNT BLE 2M 2402MHz @ 2387MHz-2400MHz



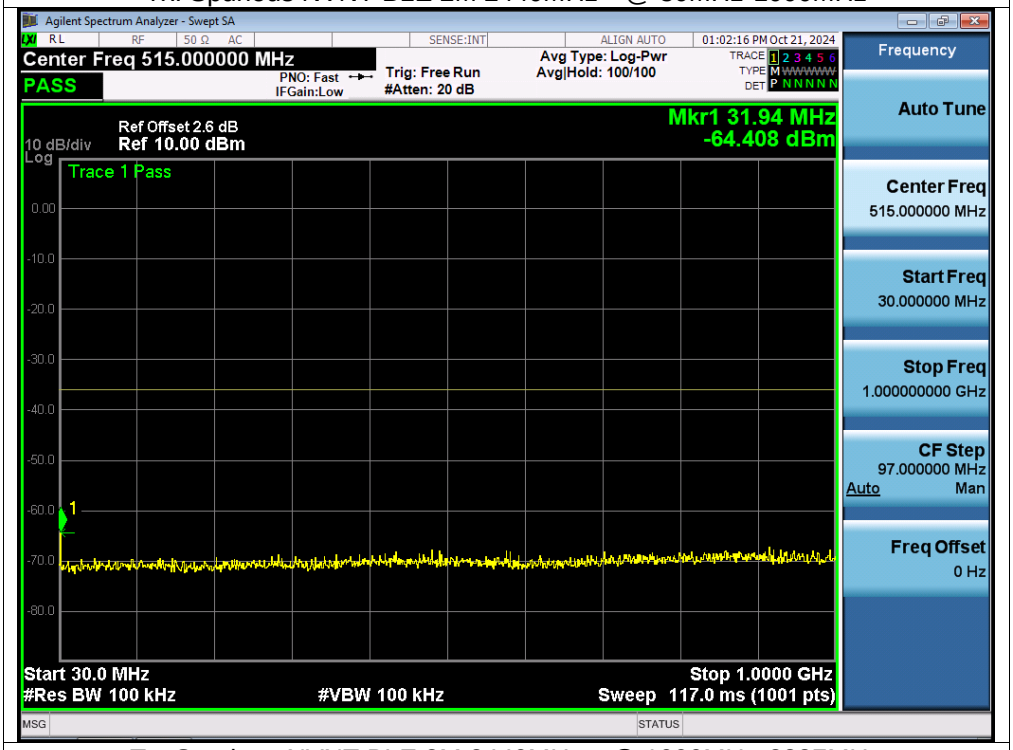
Tx. Spurious NVNT BLE 2M 2402MHz @ 2483.5MHz-2496.5MHz



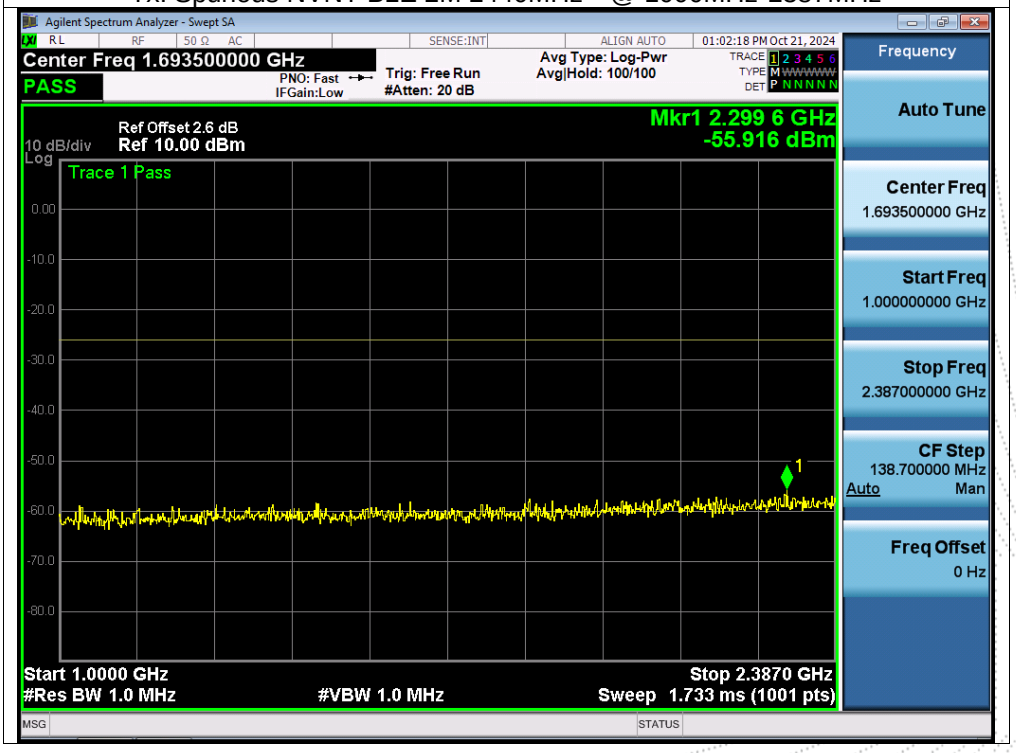
Tx. Spurious NVNT BLE 2M 2402MHz @ 2496.5MHz-13000MHz



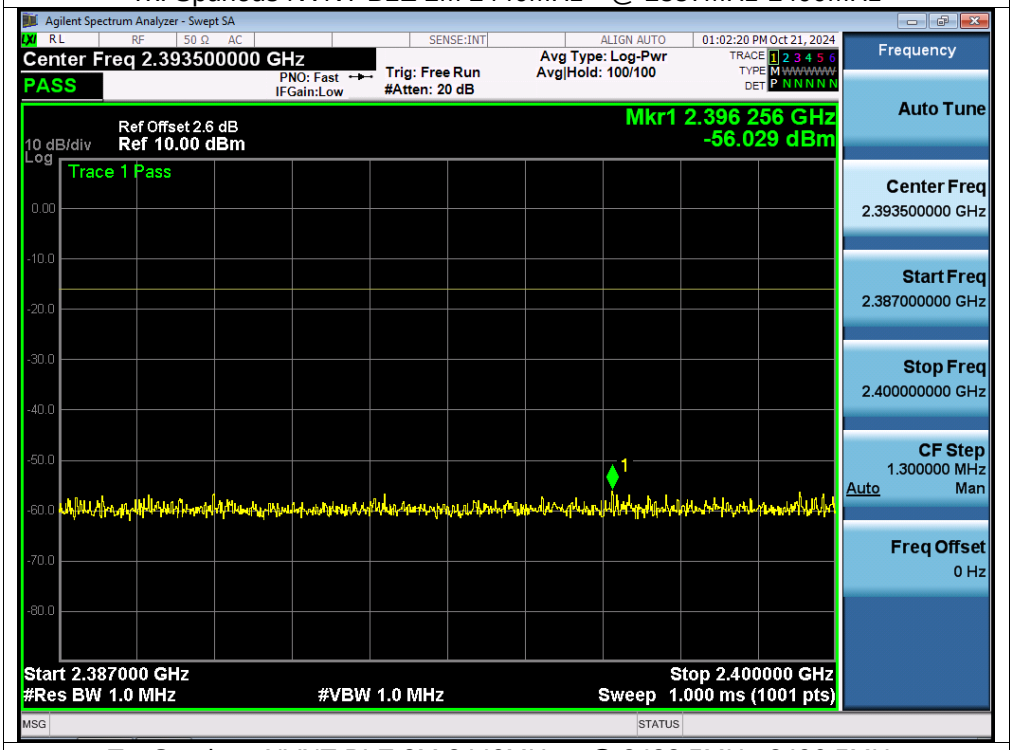
Tx. Spurious NVNT BLE 2M 2440MHz @ 30MHz-1000MHz



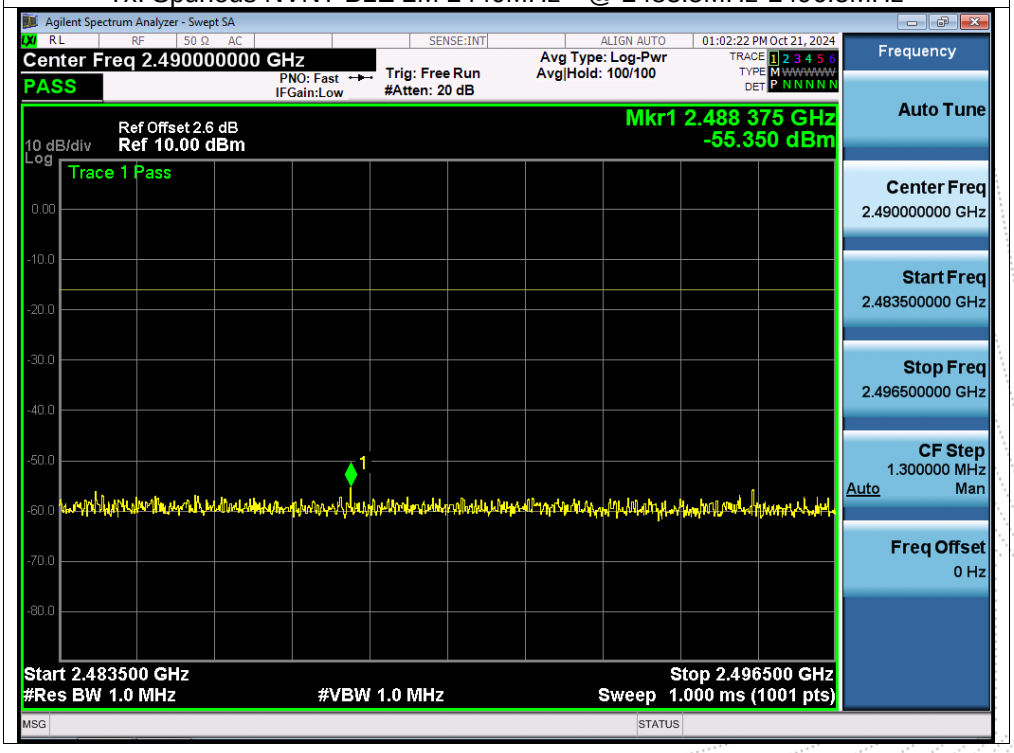
Tx. Spurious NVNT BLE 2M 2440MHz @ 1000MHz-2387MHz



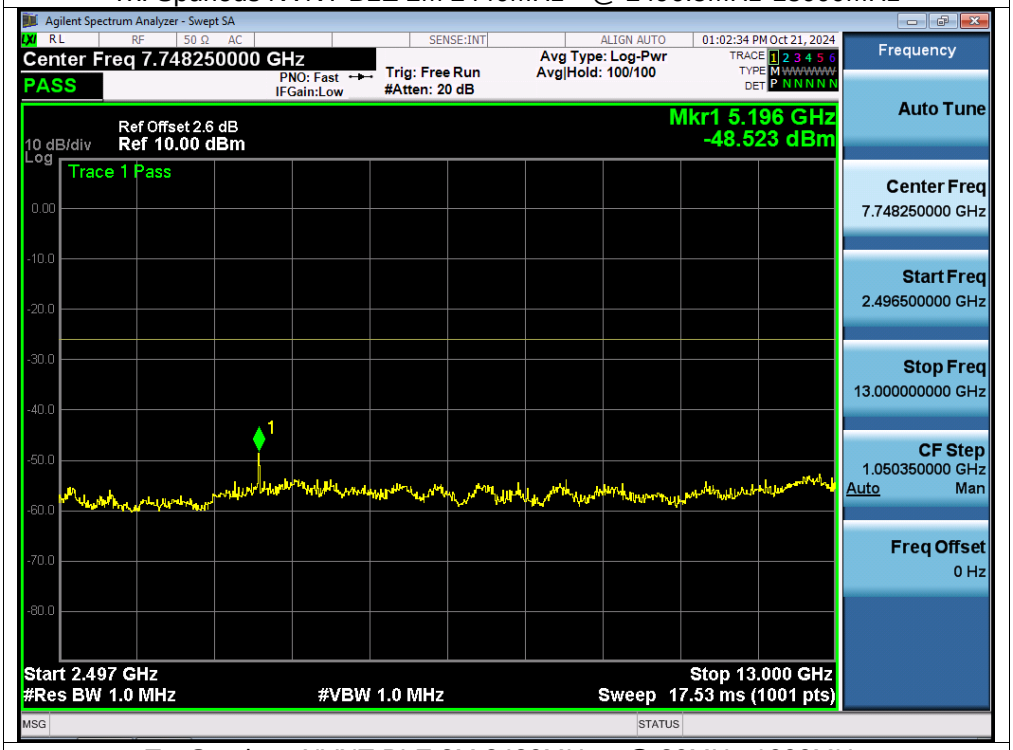
Tx. Spurious NVNT BLE 2M 2440MHz @ 2387MHz-2400MHz



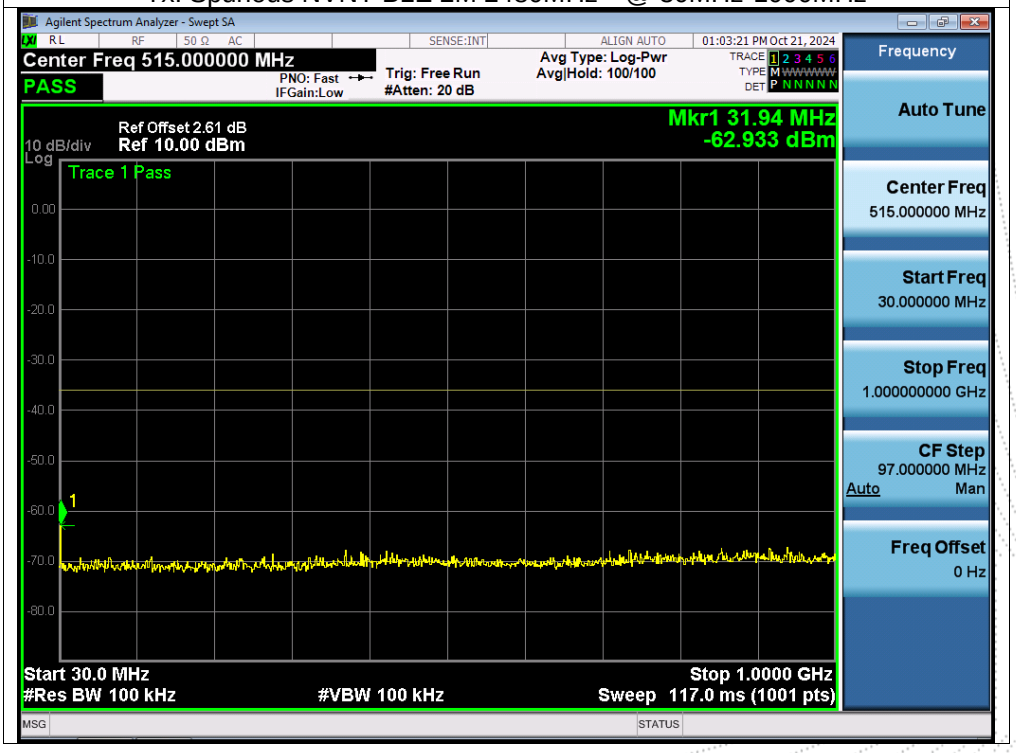
Tx. Spurious NVNT BLE 2M 2440MHz @ 2483.5MHz-2496.5MHz



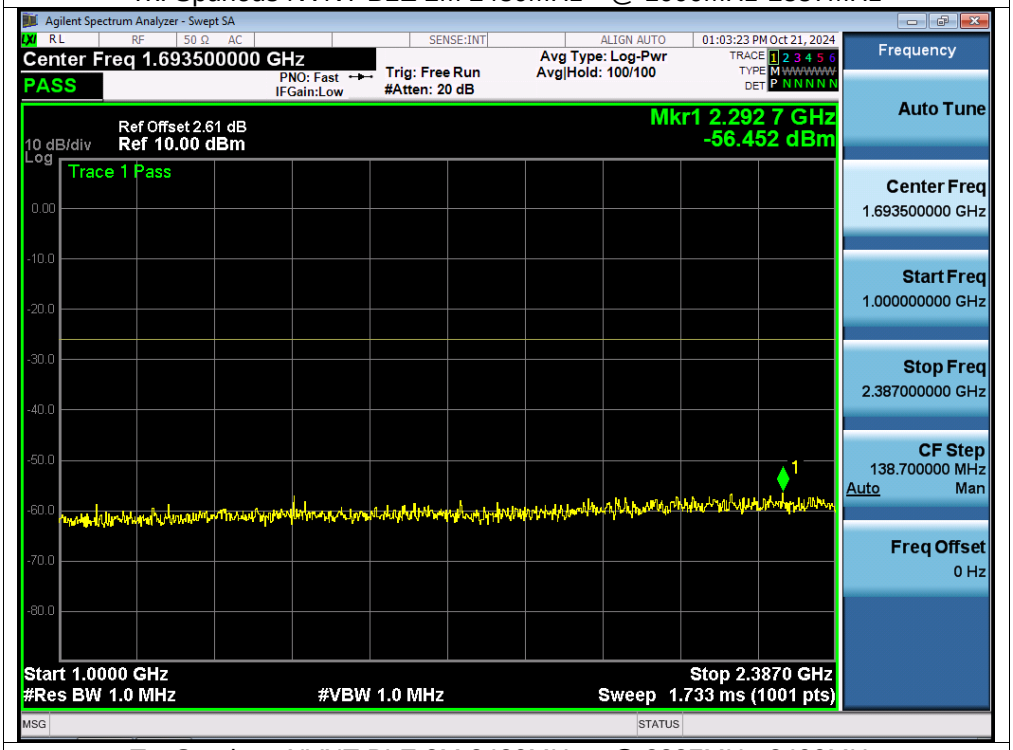
Tx. Spurious NVNT BLE 2M 2440MHz @ 2496.5MHz-13000MHz



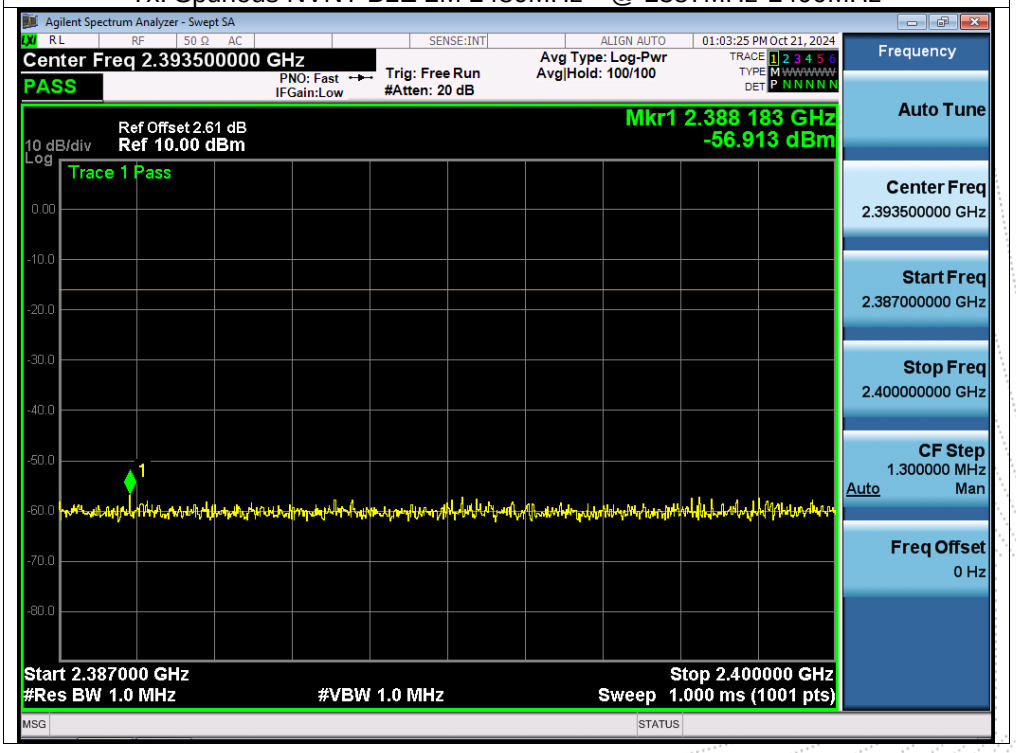
Tx. Spurious NVNT BLE 2M 2480MHz @ 30MHz-1000MHz



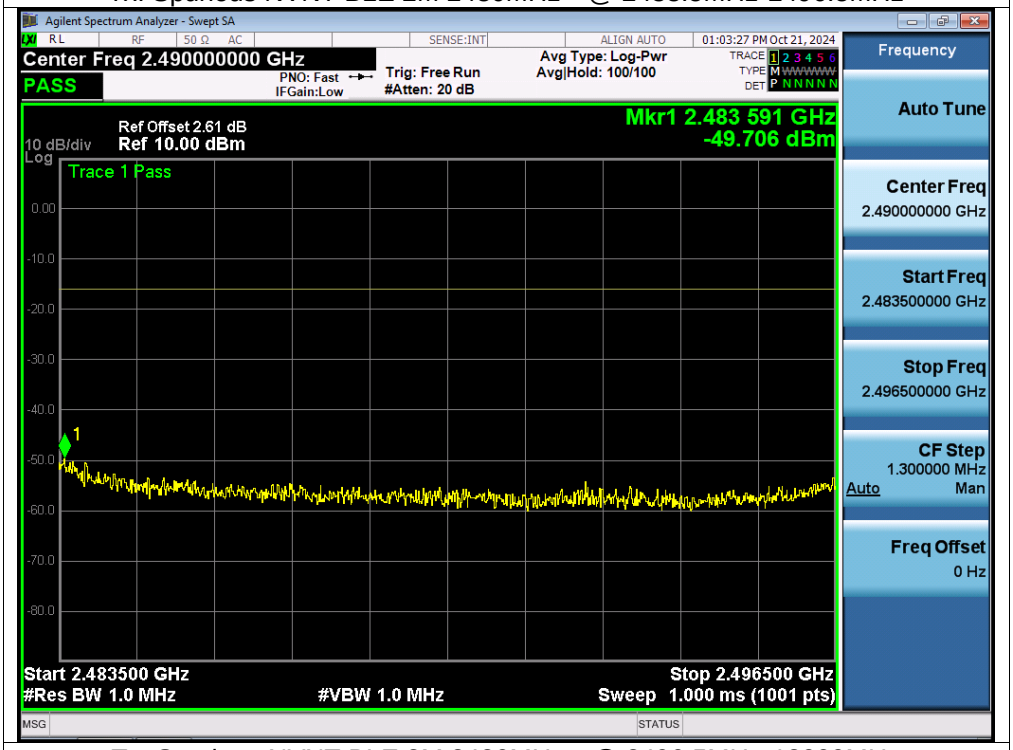
Tx. Spurious NVNT BLE 2M 2480MHz @ 1000MHz-2387MHz



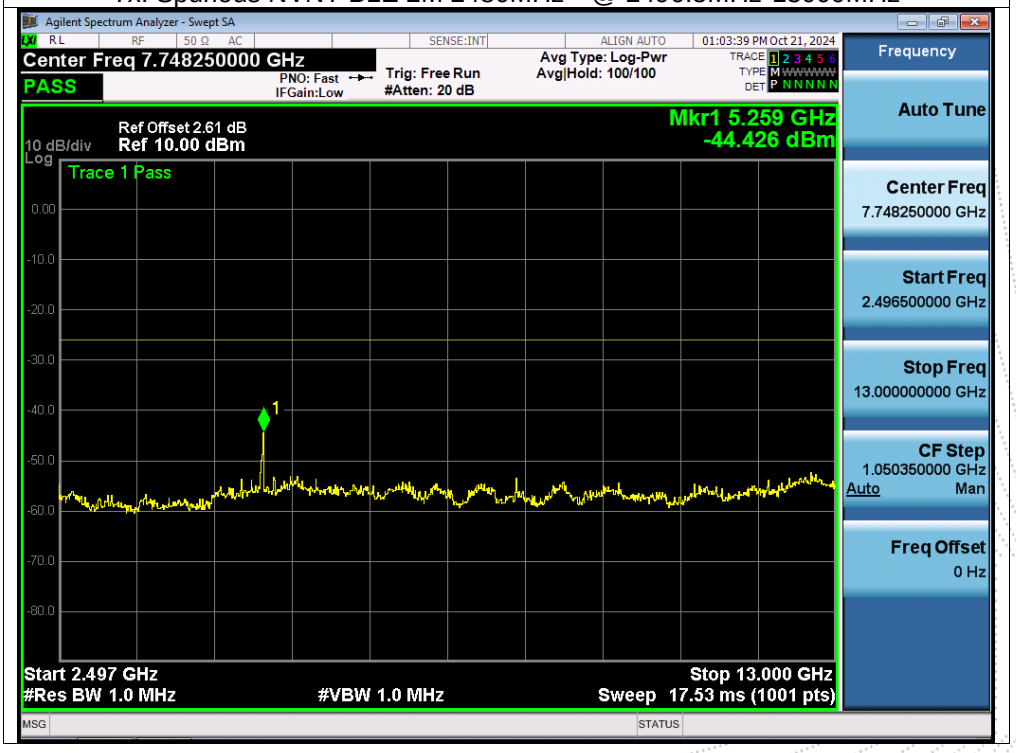
Tx. Spurious NVNT BLE 2M 2480MHz @ 2387MHz-2400MHz



Tx. Spurious NVNT BLE 2M 2480MHz @ 2483.5MHz-2496.5MHz

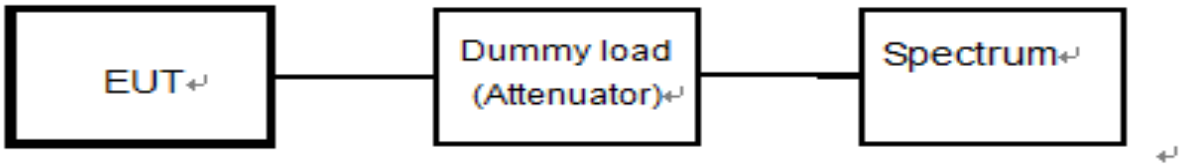


Tx. Spurious NVNT BLE 2M 2480MHz @ 2496.5MHz-13000MHz



11. Imitation Of Collateral Emission Of Receiver Measurement

11.1 Block Diagram Of Test Setup



11.2 Limit

Item	Limits
RX Spurious Emission:	≦4nW（-54dBm） (f<1GHz)
	≦20nW（-47dBm） (1GHz≦f)

11.3 Measuring Instruments And Setting

Please refer to section 5 in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
RB	100 kHz (below 1GHz emissions) 1 MHz (above 1GHz emissions)
VB	100 kHz (below 1GHz emissions) 1 MHz (above 1GHz emissions)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

11.4 Test Procedure

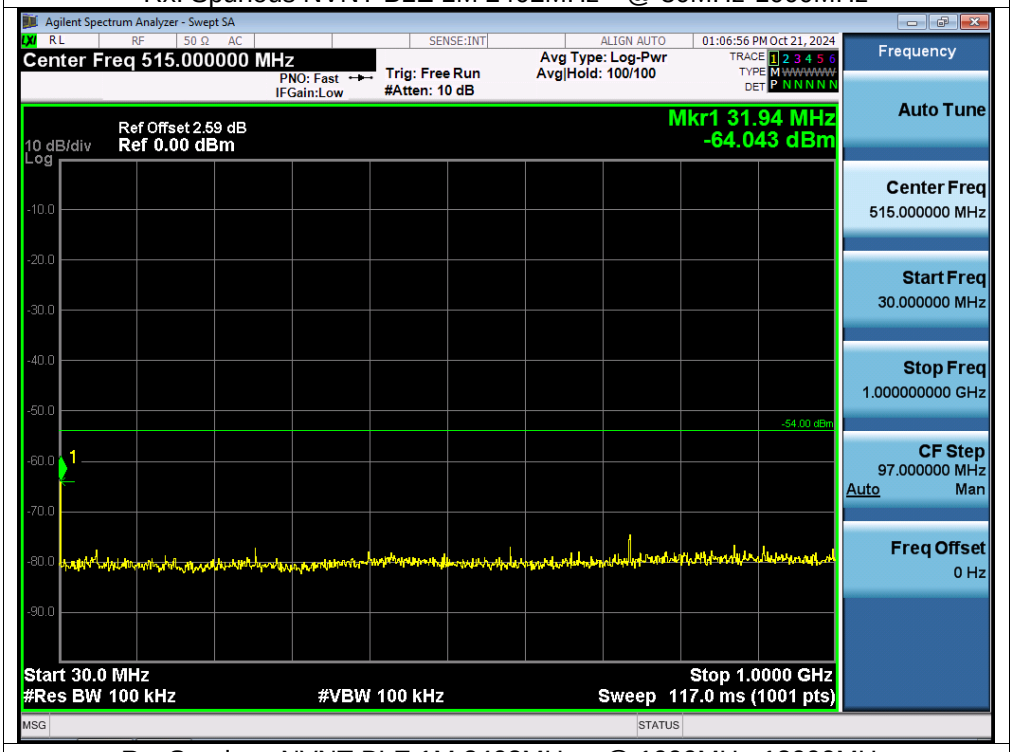
1. EUT have the continuous reception mode and fixed only one channelize.
2. Setting of SA is following as RB / VB: 100 kHz (below 1GHz emissions) / 1 MHz (above 1GHz emissions) /AT: 6dB / Ref: -20dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
3. SA set RB: 100kHz and VB: 100kHz. Then adjust to start frequency 30MHz and stop frequency 1000MHz. Search to mark peak reading value + cable loss shall be less than 4nW
4. SA set RB: 1MHz and VB: 1MHz. Then adjust to start frequency 1000MHz and stop frequency 12500MHz. Search to mark peak reading value + cable loss shall be less than 20nW
5. If power level of lower emissions are more than 1/10 of limit (.0.4nW for f < 1GHz, 2nW for f >= 1GHz), all those are to be indicated in the 2nd and 3rd lines. If others are 1/10 or less more of the limit, no necessary to be indicated.

11.5 Test Result

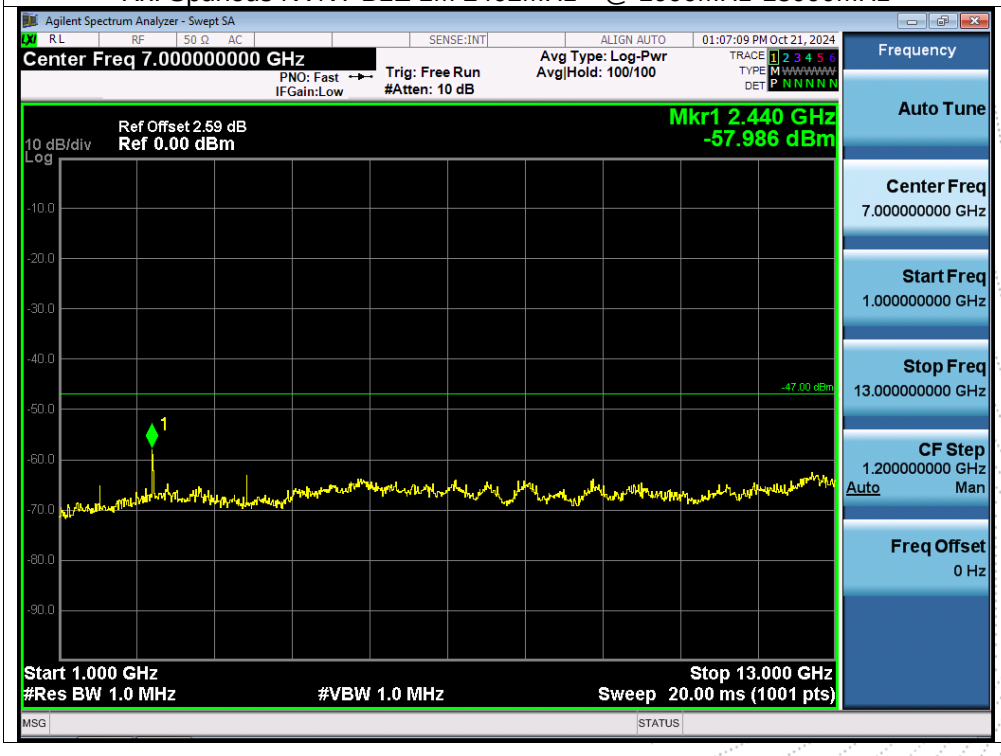
Temperature:	25°C		
Humidity:	55 % RH	Test Voltage	DC 5V

Condition	Mode	Frequency (MHz)	Range (MHz)	Emission Frequency (MHz)	Max Value (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	30-1000	31.94	-64.04	-54	Pass
NVNT	BLE 1M	2402	1000-13000	2440	-57.99	-47	Pass
NVNT	BLE 1M	2440	30-1000	31.94	-64.49	-54	Pass
NVNT	BLE 1M	2440	1000-13000	5872	-62.84	-47	Pass
NVNT	BLE 1M	2480	30-1000	31.94	-64.72	-54	Pass
NVNT	BLE 1M	2480	1000-13000	5668	-63.05	-47	Pass
NVNT	BLE 2M	2402	30-1000	31.94	-64.81	-54	Pass
NVNT	BLE 2M	2402	1000-13000	12724	-62.79	-47	Pass
NVNT	BLE 2M	2440	30-1000	31.94	-64.9	-54	Pass
NVNT	BLE 2M	2440	1000-13000	12736	-62.95	-47	Pass
NVNT	BLE 2M	2480	30-1000	31.94	-64.89	-54	Pass
NVNT	BLE 2M	2480	1000-13000	12652	-63.04	-47	Pass

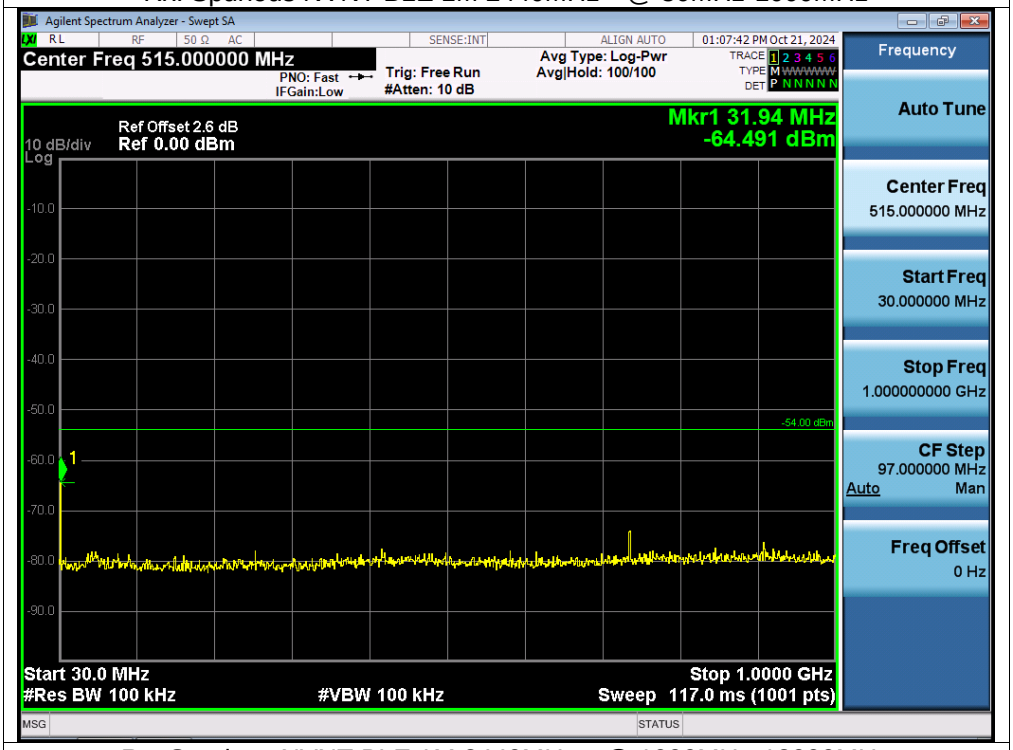
Test Graphs
Rx. Spurious NVNT BLE 1M 2402MHz @ 30MHz-1000MHz



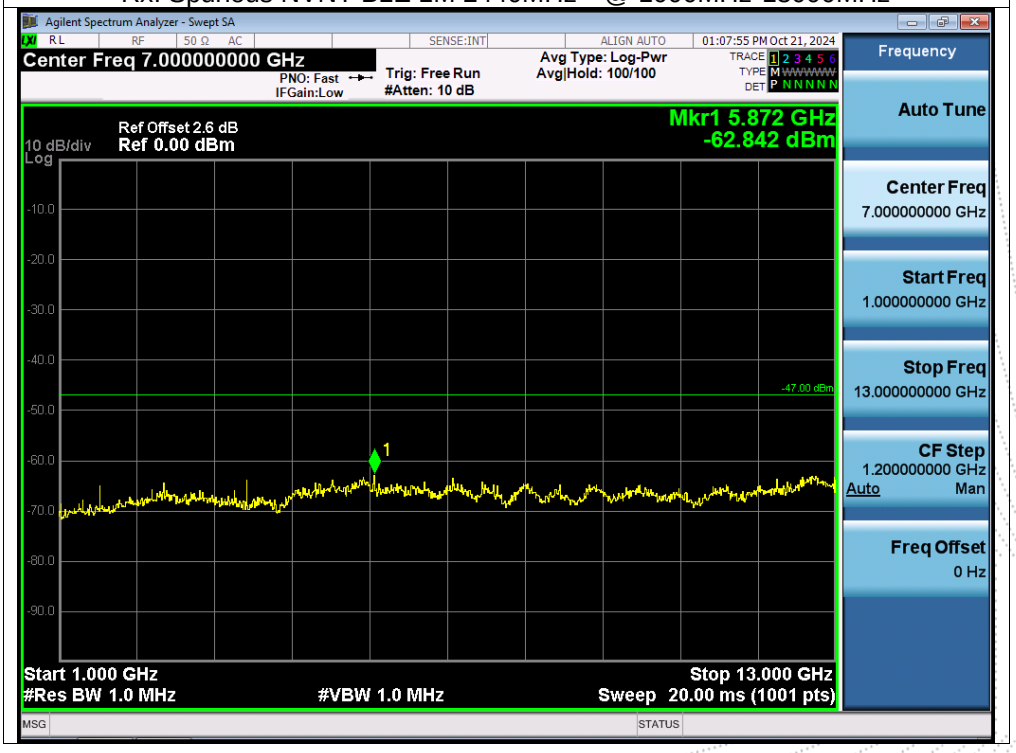
Rx. Spurious NVNT BLE 1M 2402MHz @ 1000MHz-13000MHz



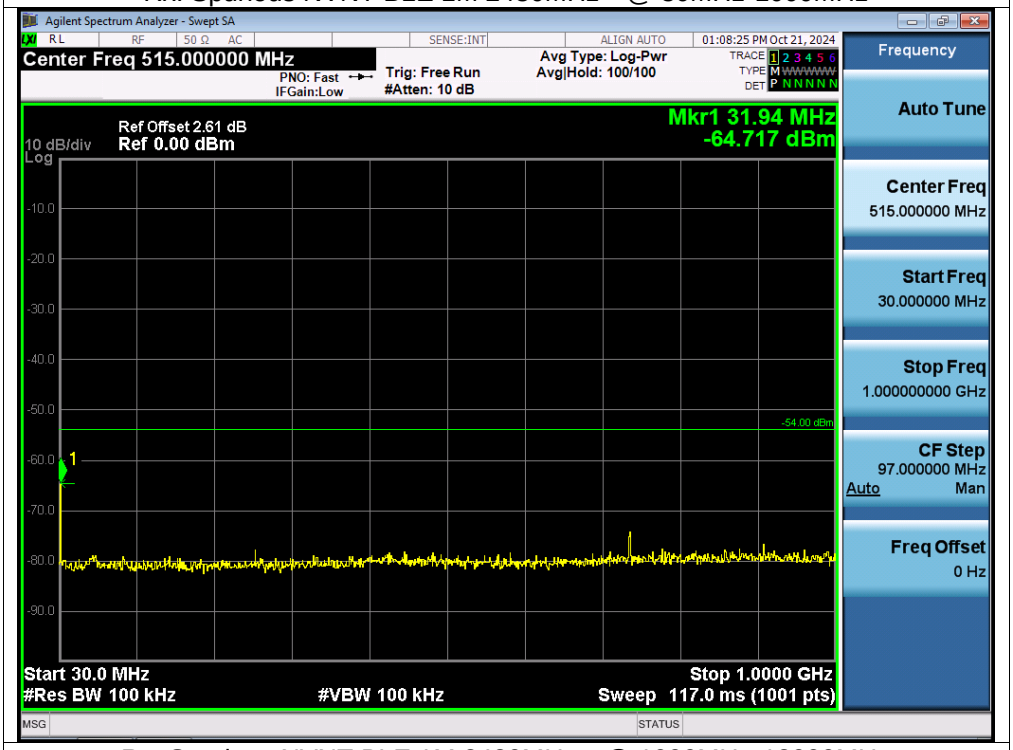
Rx. Spurious NVNT BLE 1M 2440MHz @ 30MHz-1000MHz



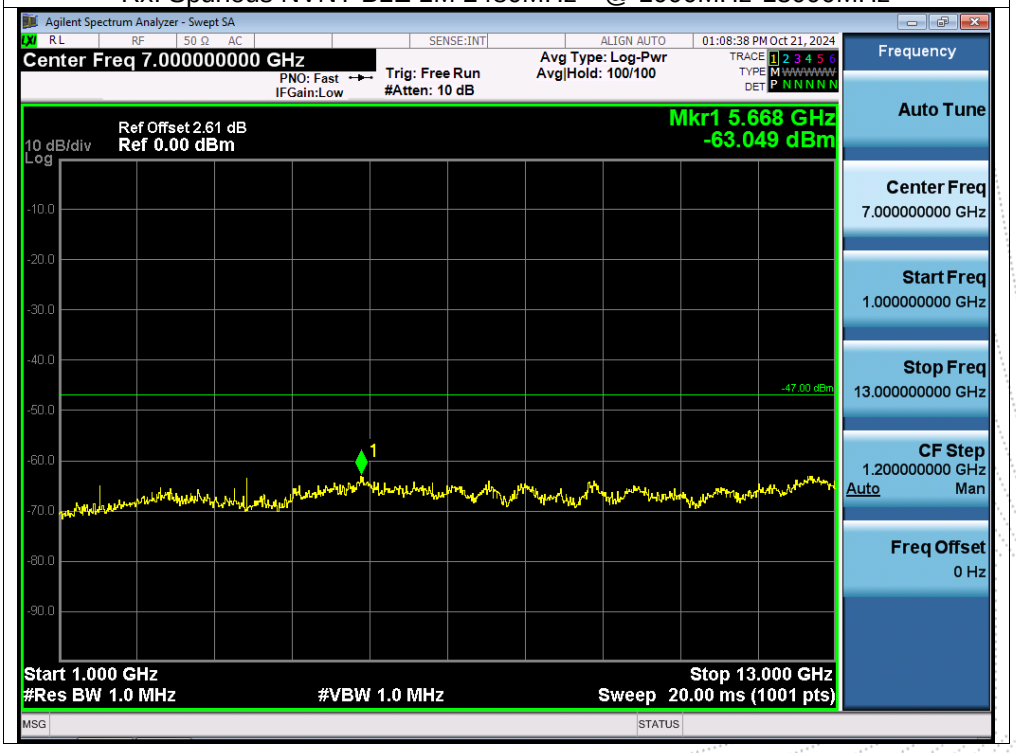
Rx. Spurious NVNT BLE 1M 2440MHz @ 1000MHz-13000MHz



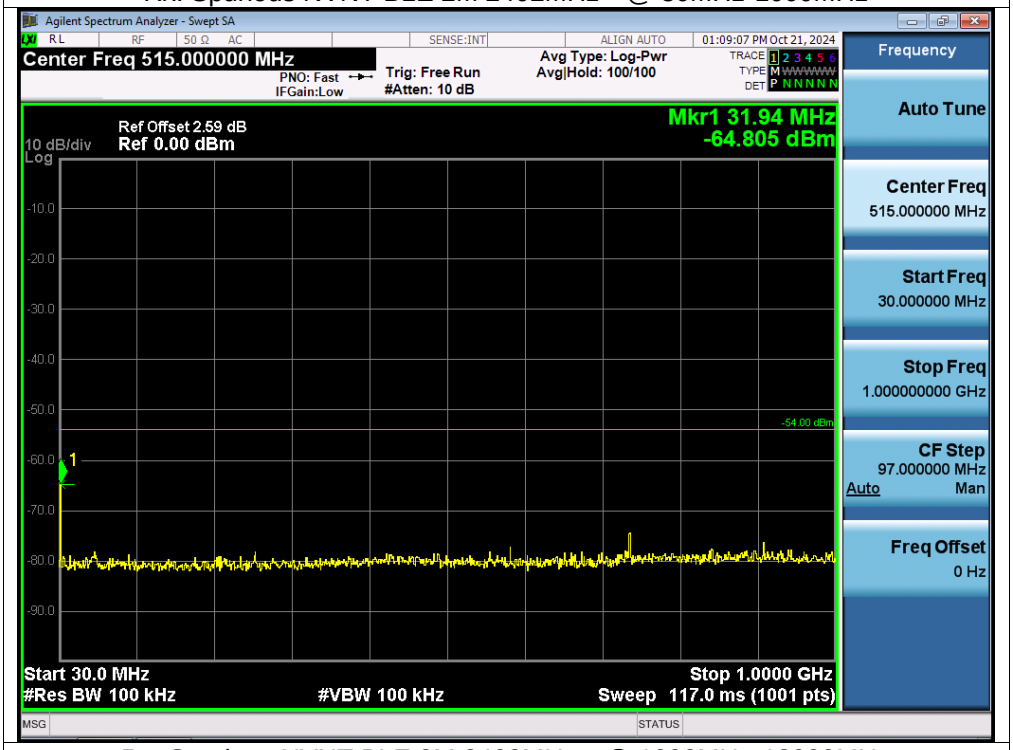
Rx. Spurious NVNT BLE 1M 2480MHz @ 30MHz-1000MHz



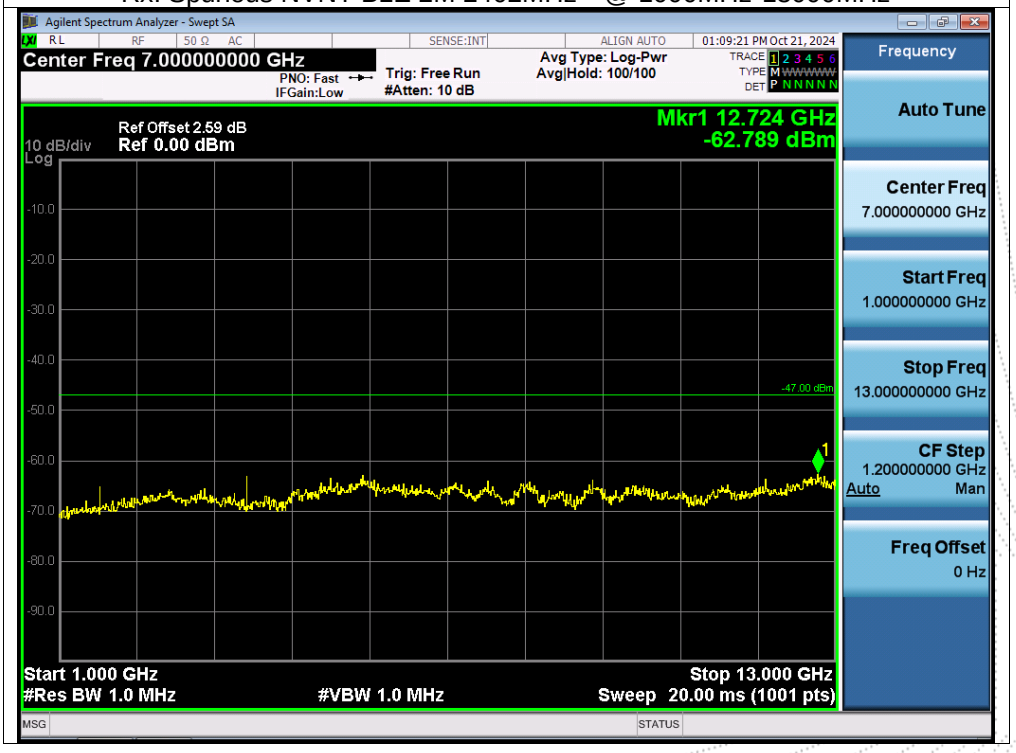
Rx. Spurious NVNT BLE 1M 2480MHz @ 1000MHz-13000MHz



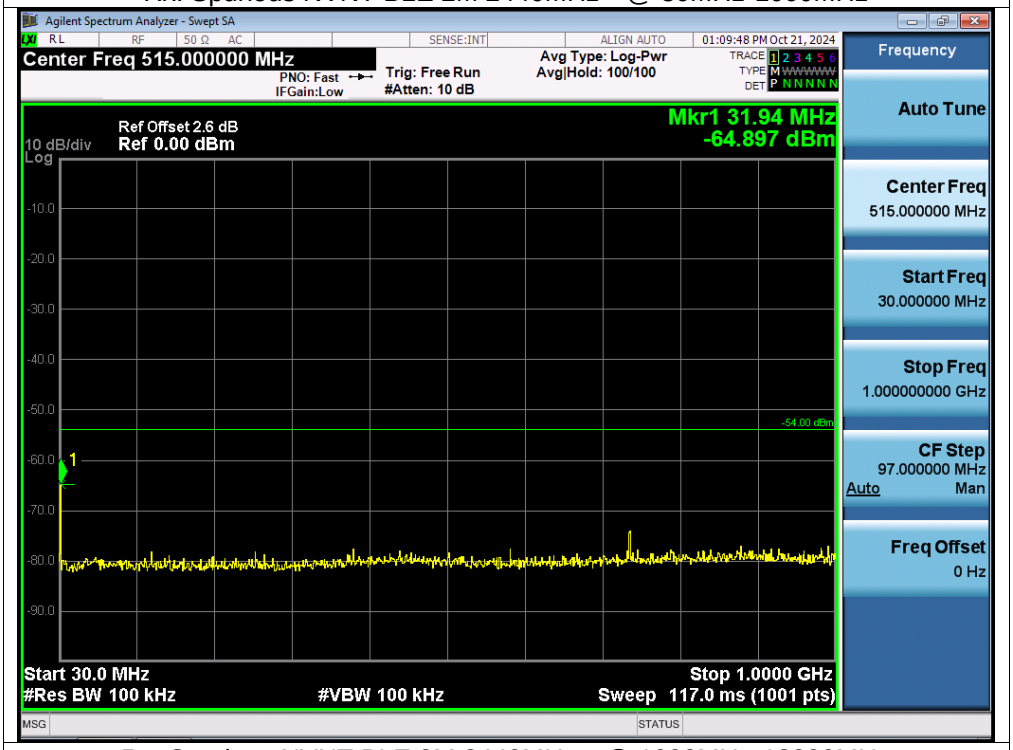
Rx. Spurious NVNT BLE 2M 2402MHz @ 30MHz-1000MHz



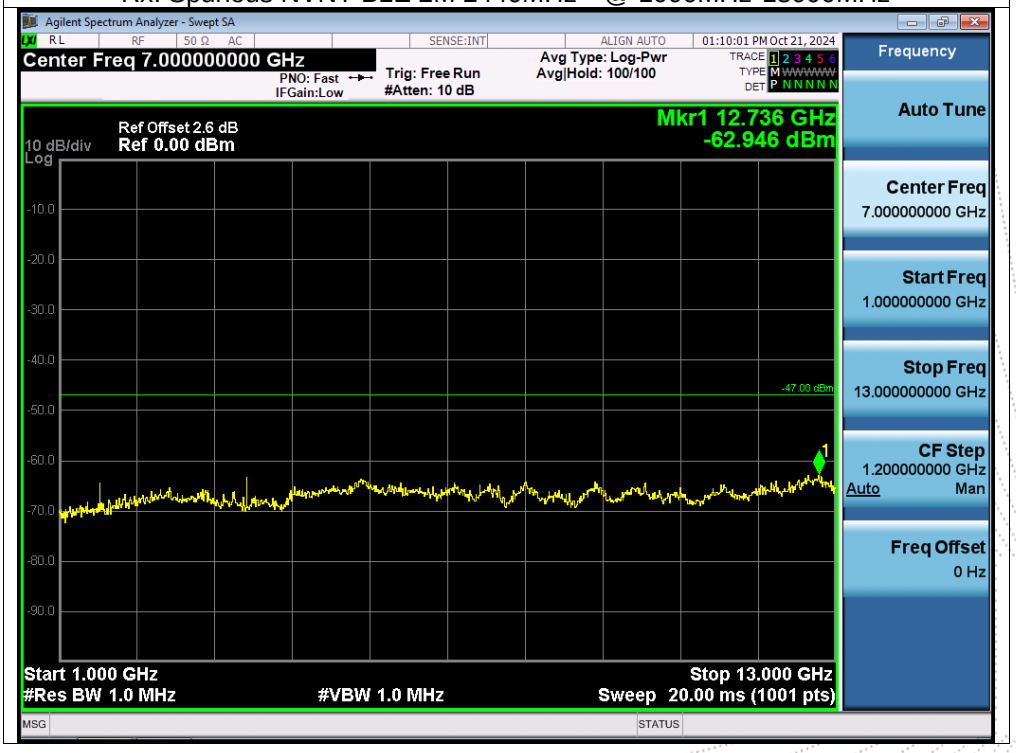
Rx. Spurious NVNT BLE 2M 2402MHz @ 1000MHz-13000MHz



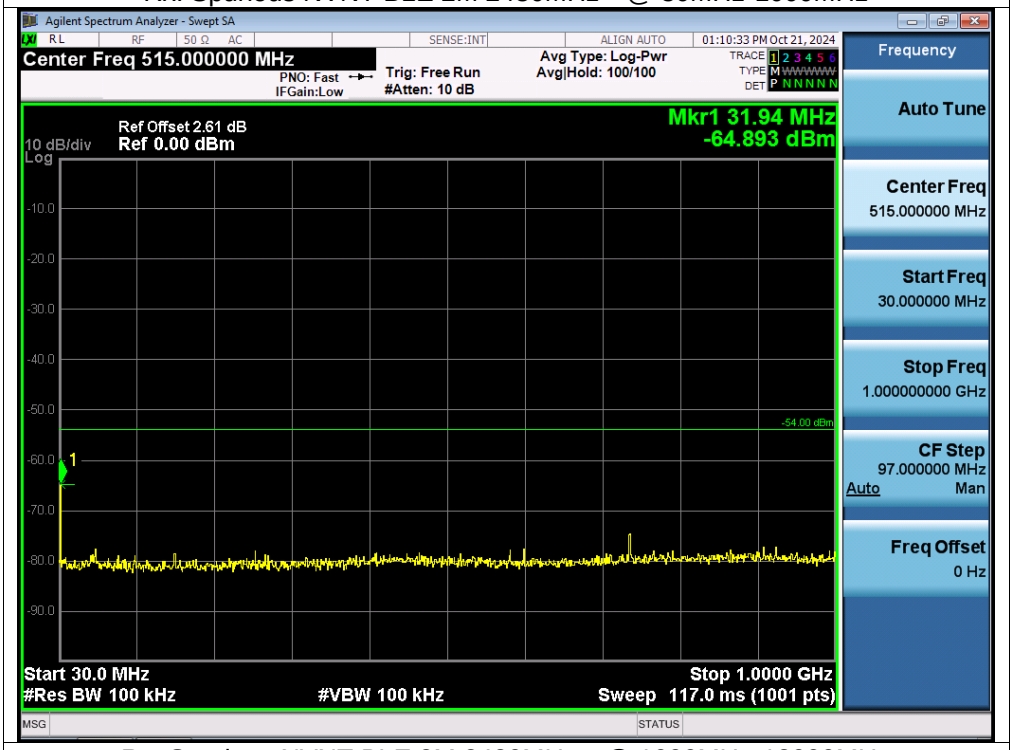
Rx. Spurious NVNT BLE 2M 2440MHz @ 30MHz-1000MHz



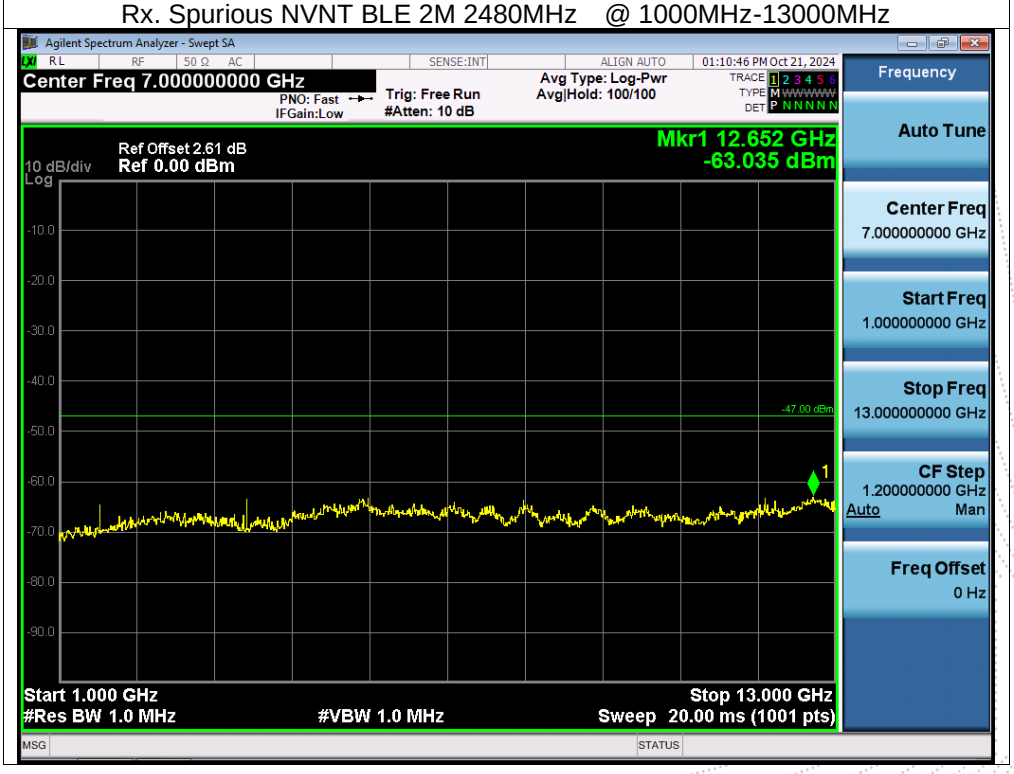
Rx. Spurious NVNT BLE 2M 2440MHz @ 1000MHz-13000MHz



Rx. Spurious NVNT BLE 2M 2480MHz @ 30MHz-1000MHz



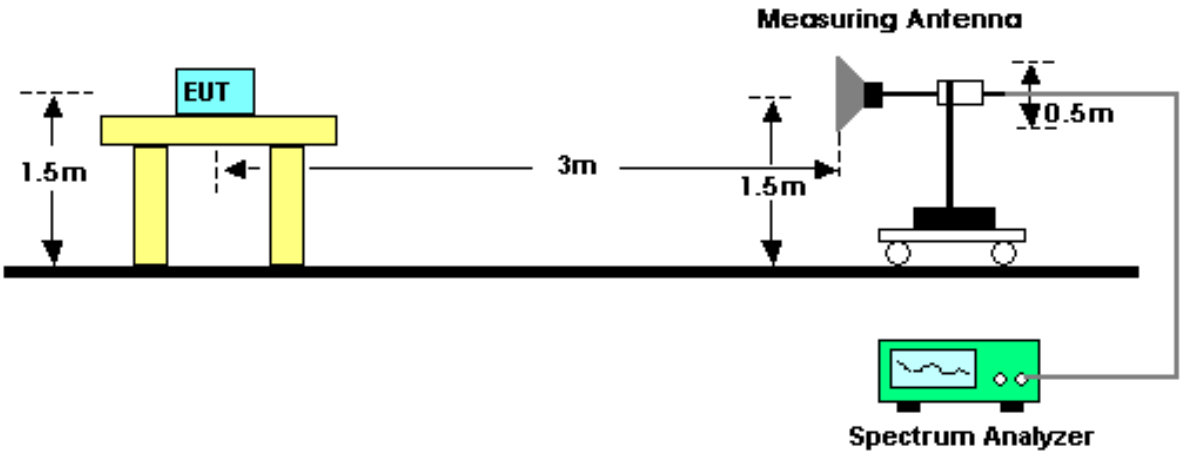
Rx. Spurious NVNT BLE 2M 2480MHz @ 1000MHz-13000MHz



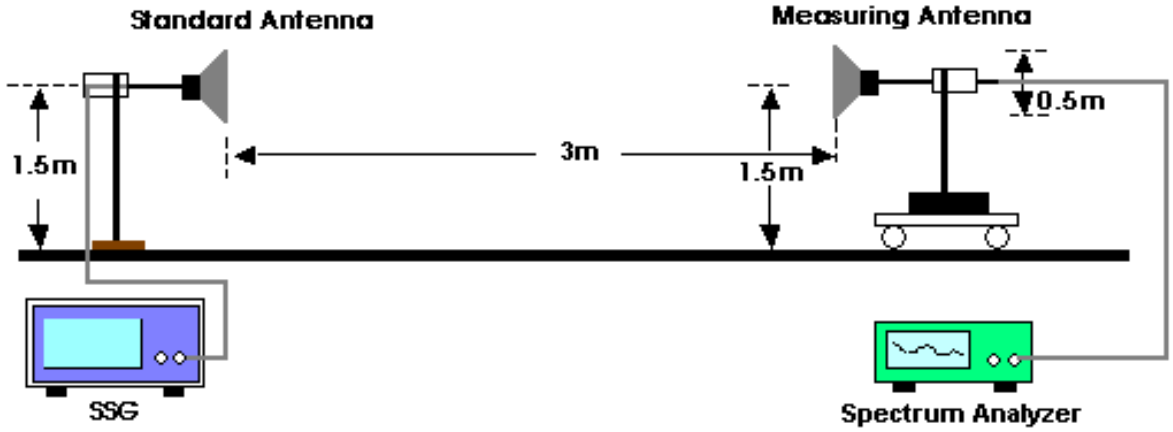
12. Transmission Antenna Gain (EIRP Antenna Power) Measurement

12.1 Block Diagram Of Test Setup

For EUT radiation measurement



For standard antenna measurement



12.2 Limit

Item	Limits
EIRP Power Density	≦16.91dBm/MHz (FH form 2427 - 2470.75 MHz) ≦22.14dBm/MHz (OFDM,DS from 2400~2483.5MHz) ≦22.14dBm (Other from 2400~2483.5MHz)
Note: This test item is not applied for radio equipment with equivalent isotropic radiation power lower than 12.14dBm/MHz, but Antenna Power(Conducted) limit is 10 mW/MHz (10 dBm/MHz), So the test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less	

12.3 Measuring Instruments And Setting

Please refer to section 5 in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameter	**Setting**
Attenuation	Auto
RB/VB	1 MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

12.4 Test Procedure

1. Set EUT ad measuring antenna at the same height and roughly facing each other.
2. Move the measuring antenna height up and down within ± 50cm of EUT height and swing it to find the maximum output of the measuring antenna. The output level at the spectrum analyzer is read sa “E“.
3. Remove the EUT from the turn table and put the replacing antenna facing to measuring antenna at same height. Set the standard signal generator (SSG) at same frequency and transmit on then receive the signal
4. Swing the replacing antenna give a maximum receiving level.
5. Move the measuring antenna height up and down within ± 50cm of replacing antenna height and swing it to find the maximum receiving level.
6. Set SSG output power at Pt to give the equivalent output level of “E” or caluate Pt with SSG output which gives the nearest of “E” and difference (± 1dB). Record the Pt.
7. Calculate EIRP by the formula below EIRP = Gt – L + Pt.

Gt: gain of replacing antenna (dBi)
L: feeder loss between SSG and replacing antenna
Pt: Output power of the SSG

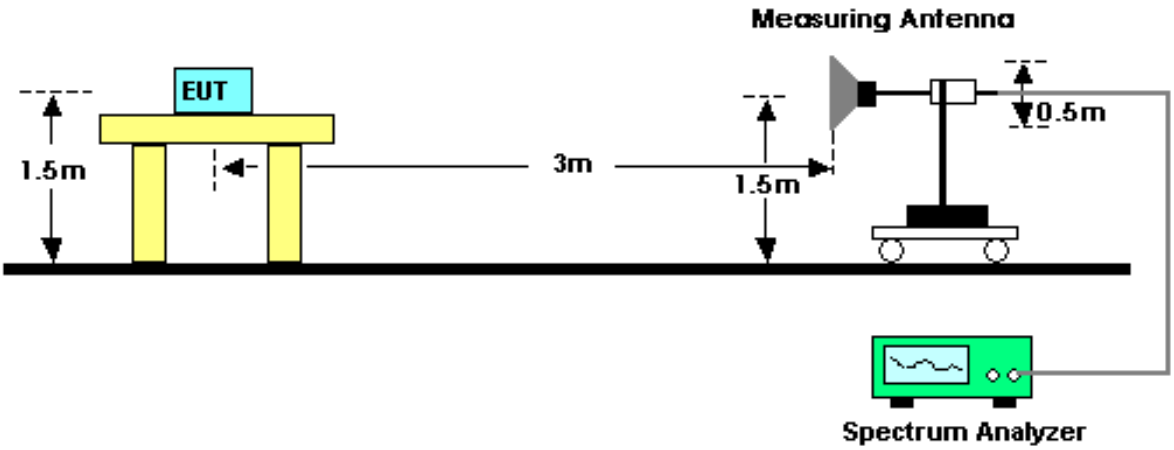
8. If the antenna for the EUT has circular polarization, sum of V-field and H-field will be result if measuring antenna is linear polarization.

12.5 Test Result

Note: This test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

13. Transmission Radiation Angle Width (3db Beamwidth) Measurement

13.1 Block Diagram Of Test Setup



13.2 Limit

Item	Limits
3dB antenna beam width	360/A (If A<1; then A=1)
Note: A = E.I.R.P. / (2.14dBi + "Antenna Power (limit)" of each modulation method (*3mW/MHz, 10mW/MHz, etc.))	

13.3 Measuring Instruments And Setting

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	0 MHz
RB	1 MHz
VB	1 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

13.4 Test Procedure

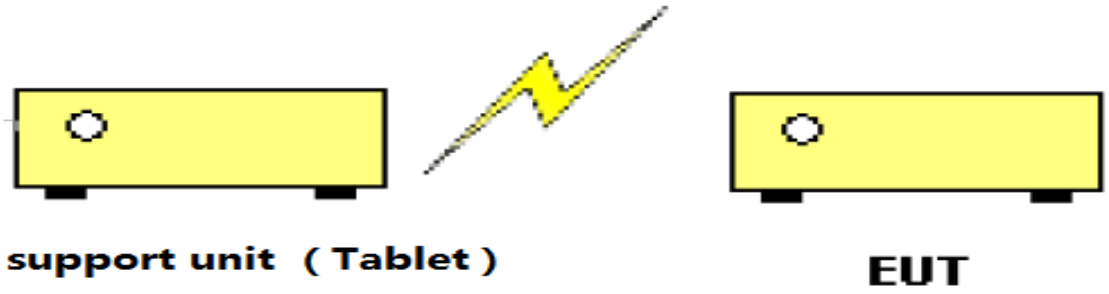
1. Set EUT and measuring antenna at the same height and roughly facing each other.
2. Set spectrum analyzer with condition in section 4.7.2 and tune reference level to observe receving signal position.
3. Rotate directions of the EUT horizontally and ertically to find the maximum receiving power.
4. Move the measuring antenna height up and down within ± 50cm of EUT height and swing it to find the maximum output of measuing antenna. The output level at the spectrum analyzer is read as “E”
5. Calculate permitted radiation angle in horizontal and vertical using EIRP measured in another test method.
6. Calculate 3dB antenna beam width by the formula below 360/A (If A<1; then A=1).

13.5 Test Result

N/A

14. Radio Interference Prevention Capability Measurement

14.1 Block Diagram Of Test Setup



14.2 Limit

Item	Limits
Identification code	≧48 bits

14.3 Measuring Instruments And Setting

Item	Limits
MAC IP List	MAC Scan

14.4 Test Procedure

1. In the case that the EUT has the function of automatically transmitting the identification code:
a. Transmit the predetermined identification codes form EUT.
b. Check the transmitted identification codes with the demodulator.
2. In the case of receiving the identification ocde:
a. Transmit the predetermined identification codes form the counterpart.
b . Check if communication is normal.
c. Transmit the signals other than predetermined ID codes form the counterpart.
d. check if the EUT stops the transmission, or if it displays that idnetification codes are different from the predetermined ones.

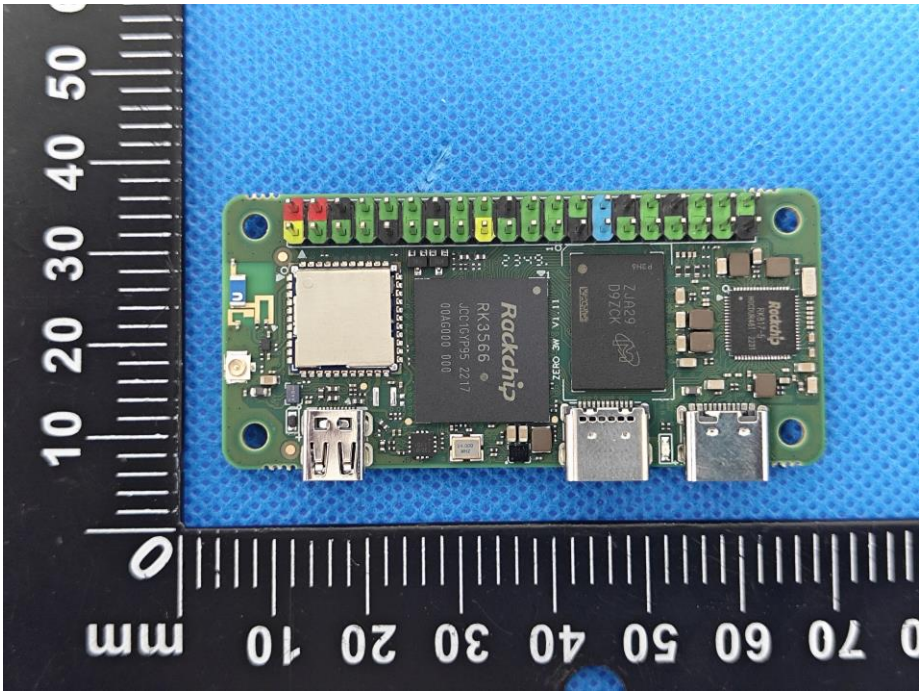
14.5 Test Result

Temperature:	25°C		
Humidity:	55 % RH	Test Voltage	DC 5V
Operation Mode:	GFSK		

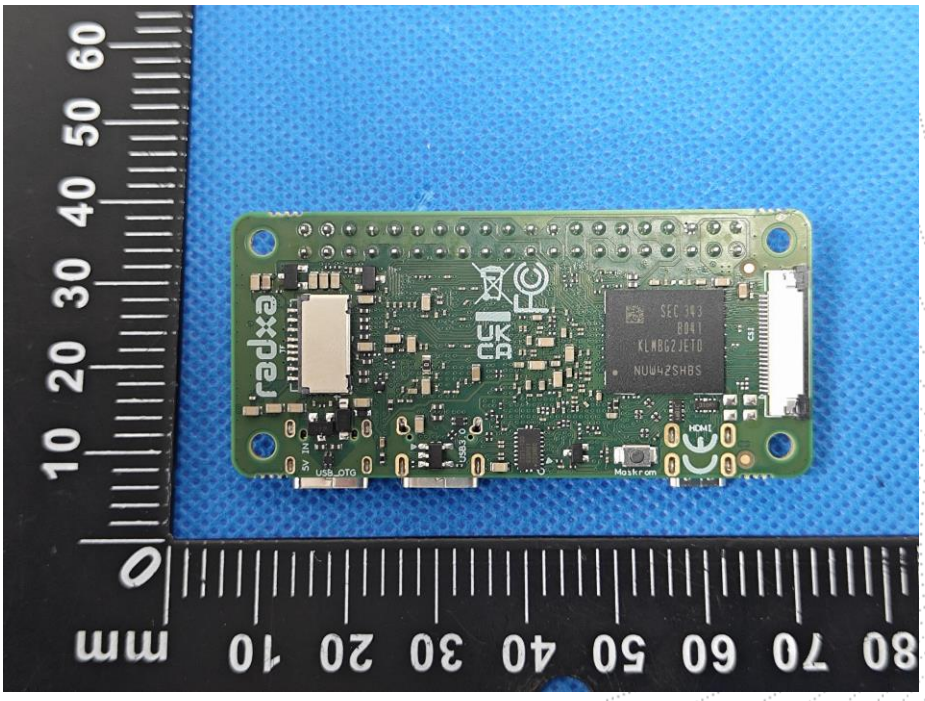
1.Bluetooth Device Address: 56-2b-6c-b8-8f-43
2.Test result: PASS

15. EUT Photographs

EUT Photo 1



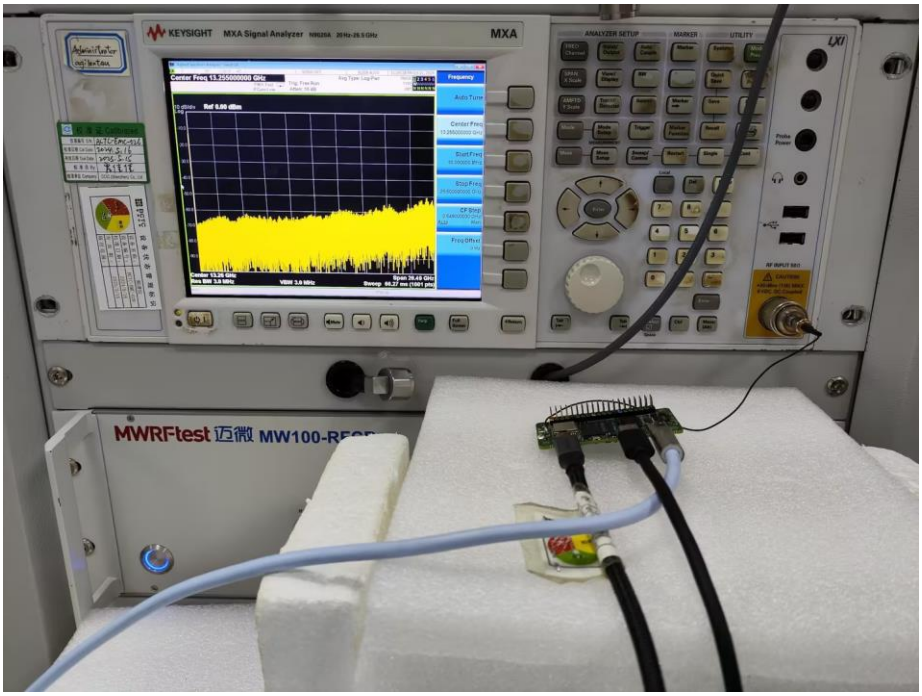
EUT Photo 2



NOTE: Appendix-Photographs Of EUT Constructional Details.

16. EUT Test Setup Photographs

Measurement Photos



STATEMENT

1. The equipment lists are traceable to the national reference standards.

2. The test report can not be partially copied unless prior written approval is issued from our lab.

3. The test report is invalid without the "special seal for inspection and testing".

4. The test report is invalid without the signature of the approver.

5. The test process and test result is only related to the Unit Under Test.

6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.

7. The quality system of our laboratory is in accordance with ISO/IEC17025.

8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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