TEST REPORT

Report No.:	BCTC2604603175-2E
Applicant:	SANSHIN ELECTRONICS CO., LTD.
Product Name:	Bluetooth Stellar Gateway
Test Model:	MG6
Tested Date:	2026-04-24 to 2026-05-21
Issued Date:	2026-06-08

Shenzhen BCTC Technology Co., Ltd.

Product Name:	Bluetooth Stellar Gateway
Trademark:	N/A
Model/Type reference:	MG6
Prepared For:	SANSHIN ELECTRONICS CO., LTD.
Address:	4-4-12, Shiba, Minato-ku, Tokyo 108-0014 Japan
Manufacturer:	Shenzhen Minew Technologies Co., Ltd.
Address:	2nd to 4th Floors, Building 3, Instrument World Industrial Park, No.306 Guiyue Road, Guanlan Pitouxia Community, Longhua District, Shenzhen
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Sample Received Date:	2026-04-24
Sample tested Date:	2026-04-24 to 2026-05-21
Report No.:	BCTC2604603175-2E
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:

Louis.zeng

Louis Zeng / Project Handler

Approved by:

Sewen Guo

Sewen Guo/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 Technology 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

Test Report Declaration Page
1. Version 5
2. Test Summary 6
3. Measurement Uncertainty 7
4. Product Information And Test Setup 8
4.1 Product Information 8
4.2 Block Digram Parameters Of Text Software Setting 9
4.3 Description Of Support Units (Conducted Mode) 9
4.4 Channel List 9
4.5 Test Mode 9
4.6 Test Conditions 10
4.7 Table Of Parameters Of Test Software Setting 10
5. Test Facility And Test Instrument Used 11
5.1 Test Facility 11
5.2 Test Instrument Used 11
6. RF Shielding Method 12
7. Frequency Error 13
7.1 Block Diagram Of Test Setup 13
7.2 Limit 13
7.3 Measuring Instruments And Setting 13
7.4 Test procedure 13
7.5 Test Result 14
8. Antenna Power 16
8.1 Block Diagram Of Test Setup 16
8.2 Limit 16
8.3 Test procedure 16
8.4 Test Result 17
9. Occupied Bandwidth 18
9.1 Block Diagram Of Test Setup 18
9.2 Limit 18
9.3 Test procedure 18
9.4 Test Result 19
10. Unwanted Emission Intensity Measurement 23
10.1 Block Diagram Of Test Setup 23
10.2 Limit 23
10.3 Measuring Instruments And Setting 23
10.4 Test procedure 23
10.5 Test Result 24
11. Imitation Of Collateral Emission Of Receiver Measurement 42
11.1 Block Diagram Of Test Setup 42
11.2 Limit 42
11.3 Measuring Instruments And Setting 42
11.4 Test procedure 42
11.5 Test Result 43
12. Transmission Antenna Gain (Eirp Antenna Power) Measurement 50
12.1 Block Diagram Of Test Setup 50
12.2 Limit 50

12.3 Measuring Instruments And Setting 51
12.4 Test procedure 51
12.5 Test Result 52
13. Transmission Radiation Angle Width (3db Beamwidth) Measurement 53
13.1 Block Diagram Of Test Setup 53
13.2 Limit 53
13.3 Measuring Instruments And Setting 53
13.4 Test procedure 54
13.5 Test Result 54
14. Radio Interference Prevention Capability Measurement 55
14.1 Block Diagram Of Test Setup 55
14.2 Limit 55
14.3 Measuring Instruments And Setting 55
14.4 Test procedure 55
14.5 Test Result 55
15. EUT Test Setup Photographs 55

1. Version

Report No.	Issue Date	Description	Approved
BCTC2604603175-2E	2026-06-08	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)	Complies
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 %.

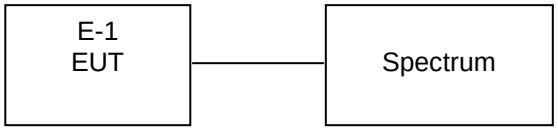
No.	Item	Uncertainty
1	Conducted Emission Test	±3.2dB
2	Radiated Emission Test	±4.7dB
3	RF power,conducted	±0.16dB
4	Spurious emissions,conducted	±0.21dB
5	All emissions,radiated(<1G)	±4.68dB
6	All emissions,radiated(>1G)	±5.0dB
7	frequency error ppm	±0.5ppm

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference:	MG6
Model differences:	N/A
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK1Mbps/2Mbps
Number Of Channel:	40 Channels for Bluetooth DTS;
Transmit Power Max:	3mW
Antenna installation:	FPC antenna
Antenna Gain:	4.28dBi
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.
power supply:	DC 12V/1A, POE(DC48V/1.25A)

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	Bluetooth Stellar Gateway	N/A	MG6	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/2Mbps
Mode 2	CH20	
Mode 3	CH40	
Mode 4	RX	GFSK,1Mbps/2Mbps

4.6 Test Conditions

The BLE module 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	DC 12V	DC 13.2V	DC 10.8V
output voltage(RF chip voltage)	DC 3.3V	DC 3.3V	DC 3.3V

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	nRF-DTM-master 32bits		
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 Technology Co., Ltd. Address: Room 101M, Unit 1, Building1, Pengyuan, No.18, Lilang Road, Shanglilang, Nanwan Subdistrict, Longgang 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.

5.2 Test Instrument Used

RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Spectrum Analyzer	Keysight	N9020A	MY51287403	2025.08.30	2026.08.29
Signal Generator	Keysight	N5182A	MY50144088	2025.08.30	2026.08.29
Power Sensor	Keysight	U2001	MY51250006	2025.10.28	2026.10.27
Temperature & Humidity	Wetest	HTC-1	/	2025.09.01	2026.08.31
Communication test set	R&S	CMW500	157483	2025.08.30	2026.08.29
Radio frequency control box	MWRFtest	MW100-RFCB	\	\	\
Software	MWRFtest	MTS 8310	V 3.0.0.0	\	\
D.C. Power Supply	Elektro-Automatik GmbH & Co.KG	D-41747 Viersen	6230316	2025.09.30	2026.08.29
Temperature and humidity test chamber	Auchno	OJN-9606-408L	19120183	2025.07.09	2026.07.08

Remark:
(a) Calibration conducted by the National institute of information and communications Technology (NICT) in Japan (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph in JRL.
(b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Act (Act No. 51 of 1992).
(c) Calibration conducted in countries except Japan, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
(d) Calibration, etc. conducted by using measuring instruments and other equipment listed in the right column of appended table No. 3, which shall have been given any type of calibration, etc. listed above from (a) to (c).
The calibration corresponds to c described above.From JRL Article 24-2, paragraph 4, Item 2
Notice: calibration duration for above equipments is 1 year

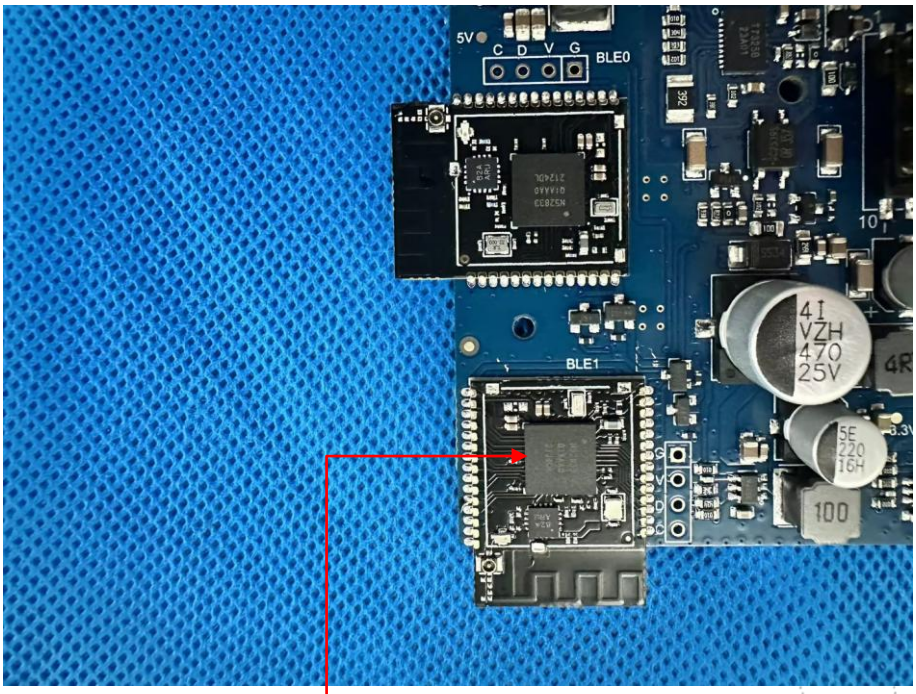
Calibration laboratory: CCIC(Shenzhen) Co., Ltd

6. RF Shielding Method

Chipset:

This product features a protective plastic casing, with internal components assembled using SMD surface-mount technology. As illustrated in the accompanying figure, attempting to disassemble the unit will result in permanent damage to the product.

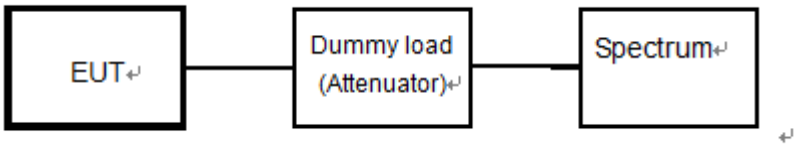
terminal number is 41. Pitch is 0.5mm.



Protective containment soldering

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.

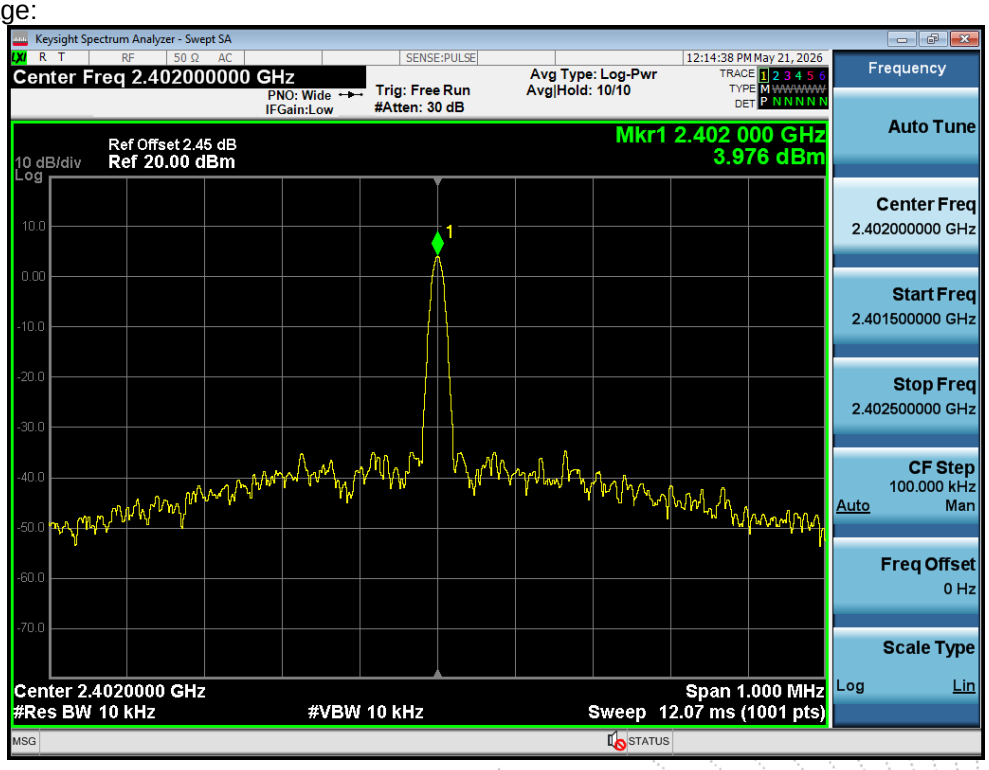
7.5 Test Result

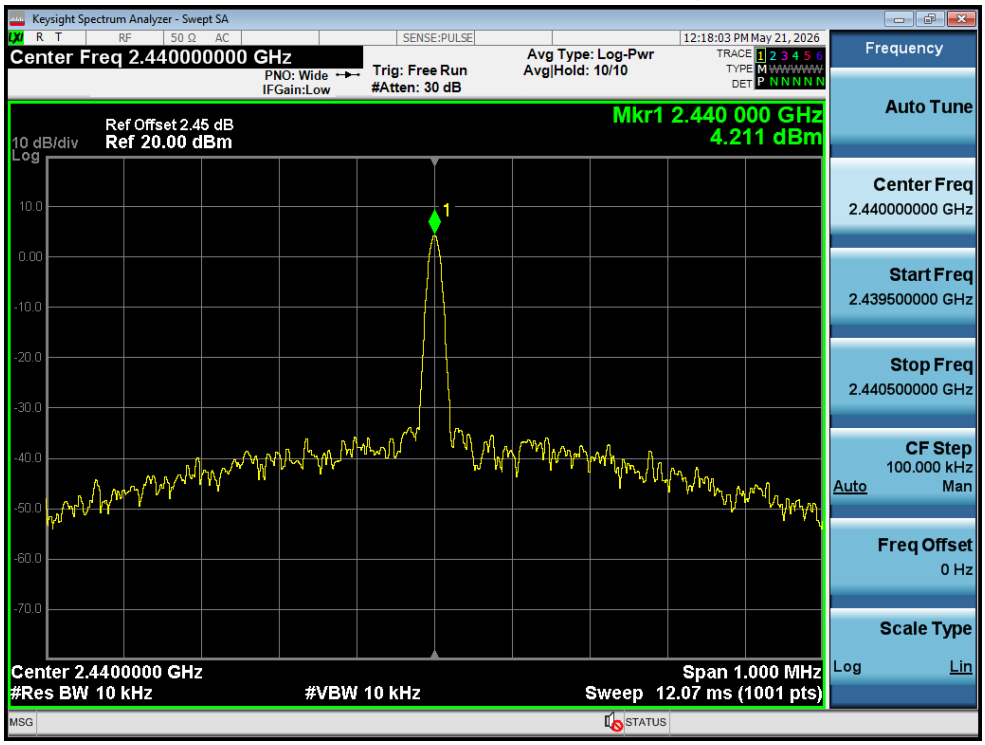
Temperature:	26^{0}C		
Humidity:	54 % RH	Test Voltage	DC 12V

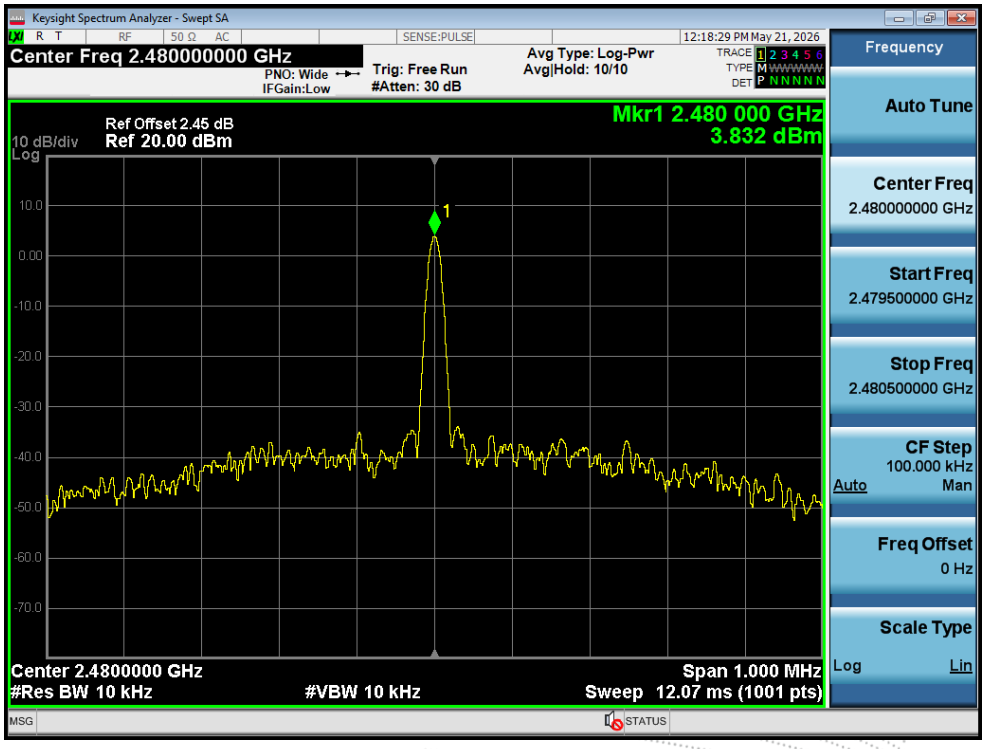
Operation Mode:	**Transmitting- unmodulation mode**

Voltage	Frequency	Reading	Tolerance	Limit
Normal Voltage	MHz	MHz	ppm	(ppm)
	2402	2402	0	±50
	2440	2440	0	±50
	2480	2480	0	±50

Normal Voltage:

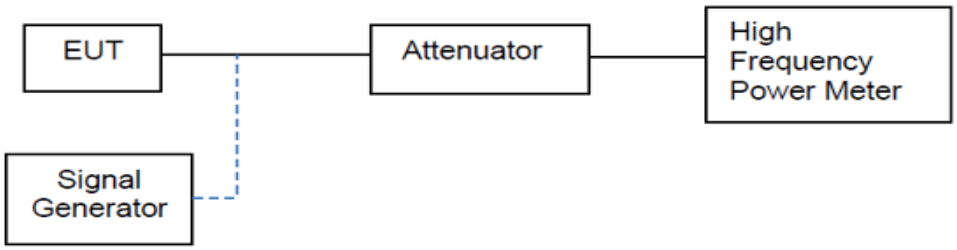



Keysight Spectrum Analyzer - Swept SA
Center Freq 2.440000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
12:18:03 PM May 21, 2026
Ref Offset 2.45 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.440 000 GHz
4.211 dBm
Center 2.4400000 GHz
#Res BW 10 kHz
#VBW 10 kHz
Span 1.000 MHz
Sweep 12.07 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.440000000 GHz
Start Freq
2.439500000 GHz
Stop Freq
2.440500000 GHz
CF Step
100.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
12:18:29 PM May 21, 2026
Ref Offset 2.45 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.480 000 GHz
3.832 dBm
Center 2.4800000 GHz
#Res BW 10 kHz
#VBW 10 kHz
Span 1.000 MHz
Sweep 12.07 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479500000 GHz
Stop Freq
2.480500000 GHz
CF Step
100.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

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 (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

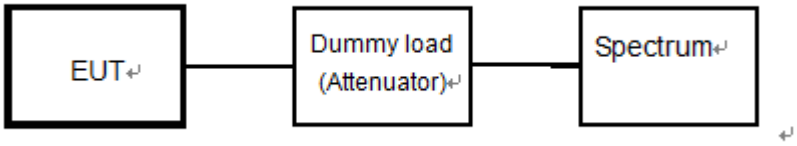
8.4 Test Result

Temperature:	26^{0}C		
Humidity:	54 % RH	Test Voltage	DC 12V

Modulate	Voltage		Test Frequency	Antenna Power (dBm)	Antenna Power (mW)	Rated output power (mW)	Antenna Power Error (%)	Limit
GFSK 1M	Normal Voltage	DC 12V	CH 01	3.99	2.51	3	-16.33	10mW
			CH 20	4.21	2.64		-12.00	
			CH 40	3.85	2.43		-19.00	
GFSK 2M			CH 01	3.99	2.51		-16.33	
			CH 20	4.18	2.62		-12.67	
			CH 40	3.79	2.39		-20.33	
Limit : +20% (Base on manufacturer declare antenna power density)								

9. Occupied Bandwidth

9.1 Block Diagram Of Test Setup



9.2 Limit

Item	Limits
Occupied Band Width:	FH 83.5MHz; OFDM,DS ≦26MHz;Others≦26MHz

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:	26^{0}C		
Humidity:	54 % RH	Test Voltage	DC 12V

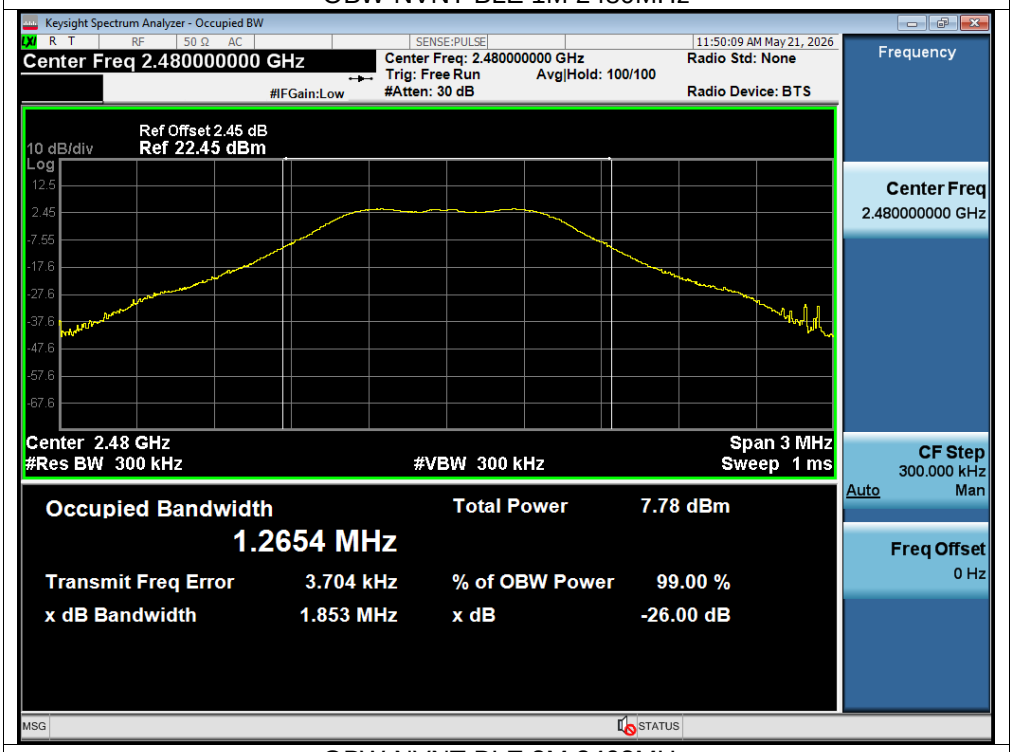
Voltage	Mode	Normal Voltage	99%Occupied bandwidth MHz	Occupied Bandwidth Limit MHz
Normal Voltage	GFSK (1Mbps)	CH01	1.259	≦26MHz
		CH20	1.264	≦26MHz
		CH40	1.265	≦26MHz
	GFSK (2Mbps)	CH01	2.145	≦26MHz
		CH20	2.127	≦26MHz
		CH40	2.133	≦26MHz

Test Graphs

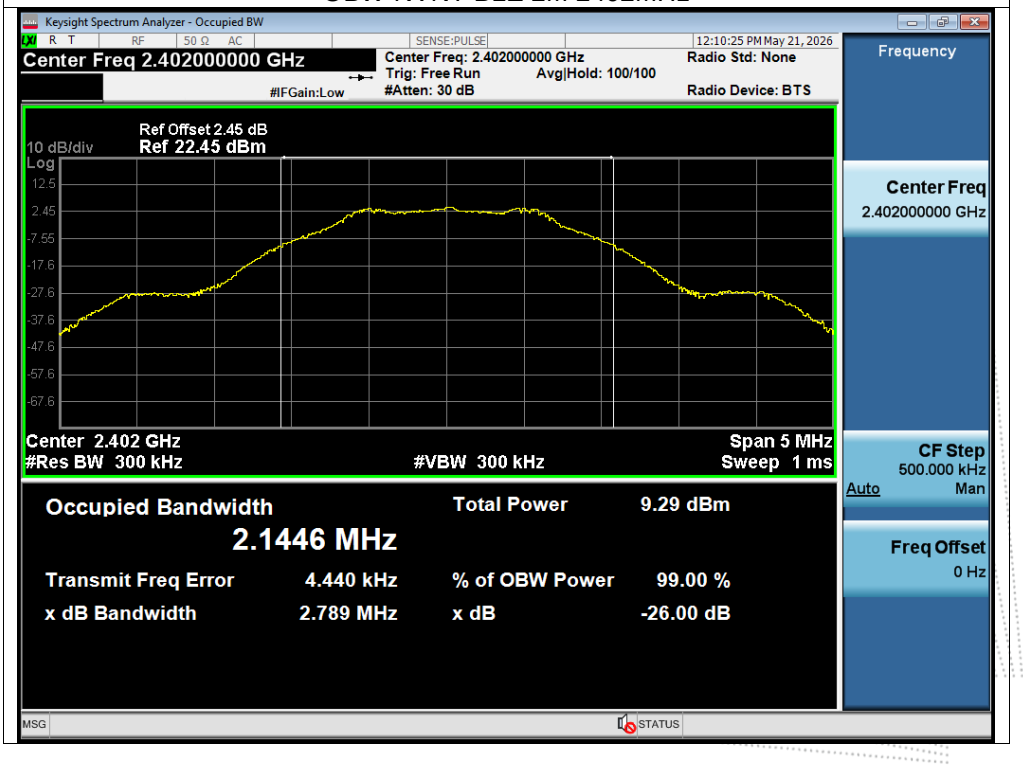
OBW NVNT BLE 1M 2402MHz

OBW NVNT BLE 1M 2440MHz

OBW NVNT BLE 1M 2480MHz

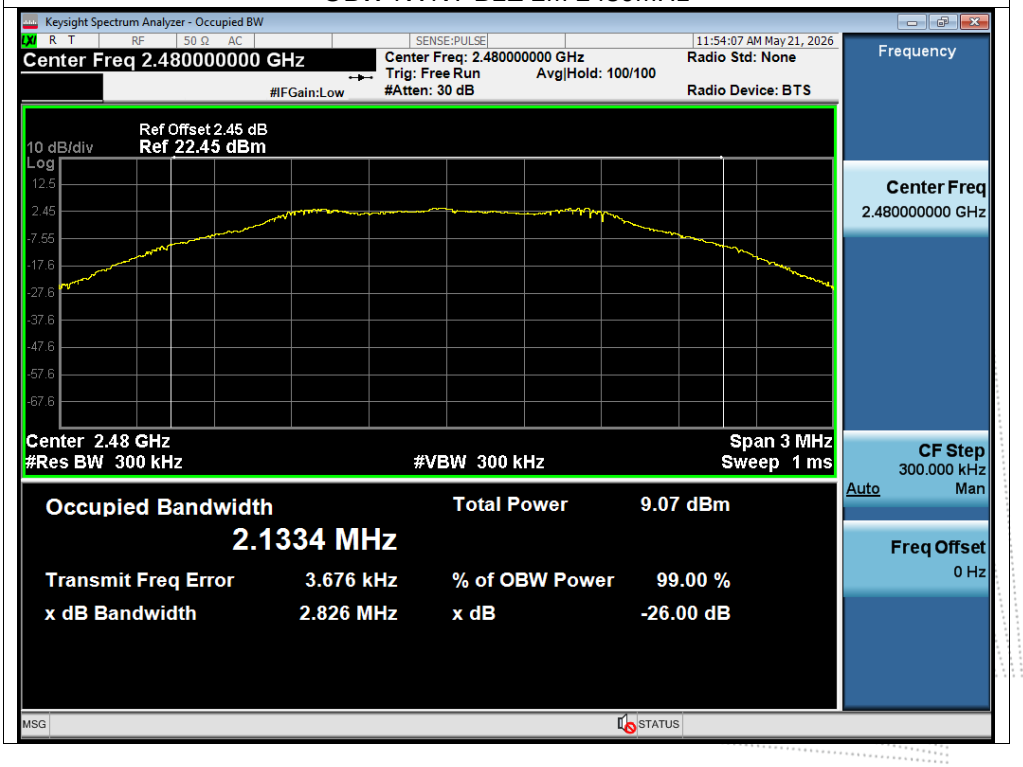


OBW NVNT BLE 2M 2402MHz



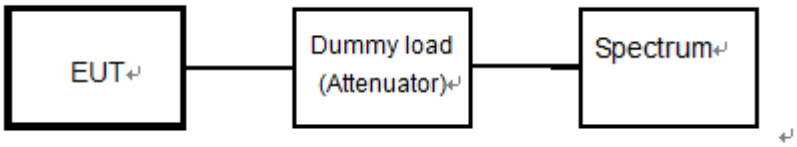
OBW NVNT BLE 2M 2440MHz

OBW NVNT BLE 2M 2480MHz



10. Unwanted Emission Intensity Measurement

10.1 Block Diagram Of Test Setup



10.2 Limit

Item	Limits
TX Spurious Emission	≦ 0.25 μW(-36dBm) (30MHz≦f≦1000MHz)
	≦2.5 μW (-26dBm) (1000MHz<f≦2387MHz)
	≦25 μW(-16dBm) (2387MHz<f≦2400MHz)
	≦25 μW (-16dBm) (2483.5MHz≦f<2496.5MHz)
	≦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

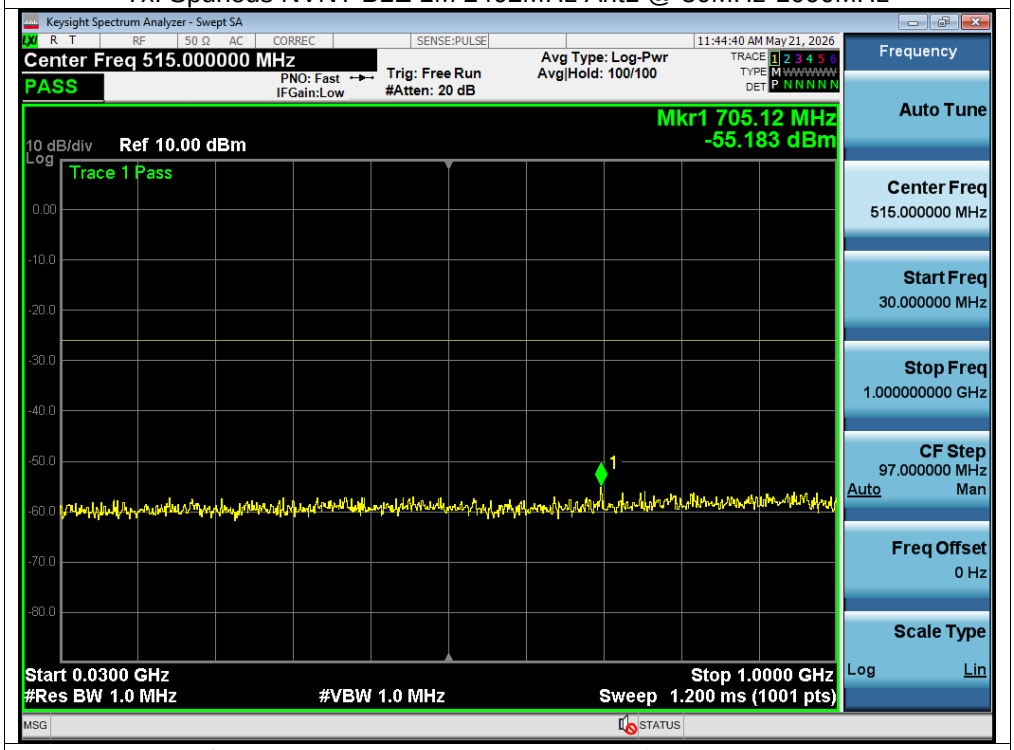
Temperature:	26^{0}C		
Humidity:	54% RH	Test Voltage	DC 12V
Operation Mode:	GFSK TX ; Normal Voltage		

Mode	Frequency (MHz)	Range (MHz)	Emission Frequency (MHz)	Max Peak Value (dBm)	Max RMS Value (dBm)	Max Peak Value (uW)	Max RMS Value (uW)	Limit Start(uW)	Limit Stop (uW)	Verdict
BLE 1M	2402	30-1000	705.12	-55.18	NA	0.003	NA	2.5	2.5	Pass
BLE 1M	2402	1000-2387	2370.36	-49.90	NA	0.0102	NA	2.5	2.5	Pass
BLE 1M	2402	2387-2400	2400.00	-27.52	NA	1.7701	NA	25	25	Pass
BLE 1M	2402	2483.5-2496.5	2490.22	-52.11	NA	0.0062	NA	25	25	Pass
BLE 1M	2402	2496.5-13000	7212.57	-50.01	NA	0.01	NA	2.5	2.5	Pass
BLE 1M	2440	30-1000	914.64	-55.56	NA	0.0028	NA	2.5	2.5	Pass
BLE 1M	2440	1000-2387	2345.39	-50.57	NA	0.0088	NA	2.5	2.5	Pass
BLE 1M	2440	2387-2400	2391.99	-49.15	NA	0.0122	NA	25	25	Pass
BLE 1M	2440	2483.5-2496.5	2487.89	-50.02	NA	0.01	NA	25	25	Pass
BLE 1M	2440	2496.5-13000	7317.61	-49.24	NA	0.0119	NA	2.5	2.5	Pass
BLE 1M	2480	30-1000	725.49	-55.96	NA	0.0025	NA	2.5	2.5	Pass
BLE 1M	2480	1000-2387	2345.39	-51.22	NA	0.0076	NA	2.5	2.5	Pass
BLE 1M	2480	2387-2400	2399.69	-50.00	NA	0.01	NA	25	25	Pass
BLE 1M	2480	2483.5-2496.5	2483.66	-36.80	NA	0.2089	NA	25	25	Pass
BLE 1M	2480	2496.5-13000	7443.65	-47.75	NA	0.0168	NA	2.5	2.5	Pass
BLE 2M	2402	30-1000	885.54	-55.23	NA	0.003	NA	2.5	2.5	Pass
BLE 2M	2402	1000-2387	2371.74	-51.07	NA	0.0078	NA	2.5	2.5	Pass
BLE 2M	2402	2387-2400	2400.00	-14.36	-18.61	36.6438	13.7721	25	25	Pass
BLE 2M	2402	2483.5-2496.5	2485.65	-51.90	NA	0.0065	NA	25	25	Pass
BLE 2M	2402	2496.5-13000	5069.86	-50.45	NA	0.009	NA	2.5	2.5	Pass
BLE 2M	2440	30-1000	919.49	-56.12	NA	0.0024	NA	2.5	2.5	Pass
BLE 2M	2440	1000-2387	2345.39	-50.82	NA	0.0083	NA	2.5	2.5	Pass
BLE 2M	2440	2387-2400	2399.91	-48.83	NA	0.0131	NA	25	25	Pass

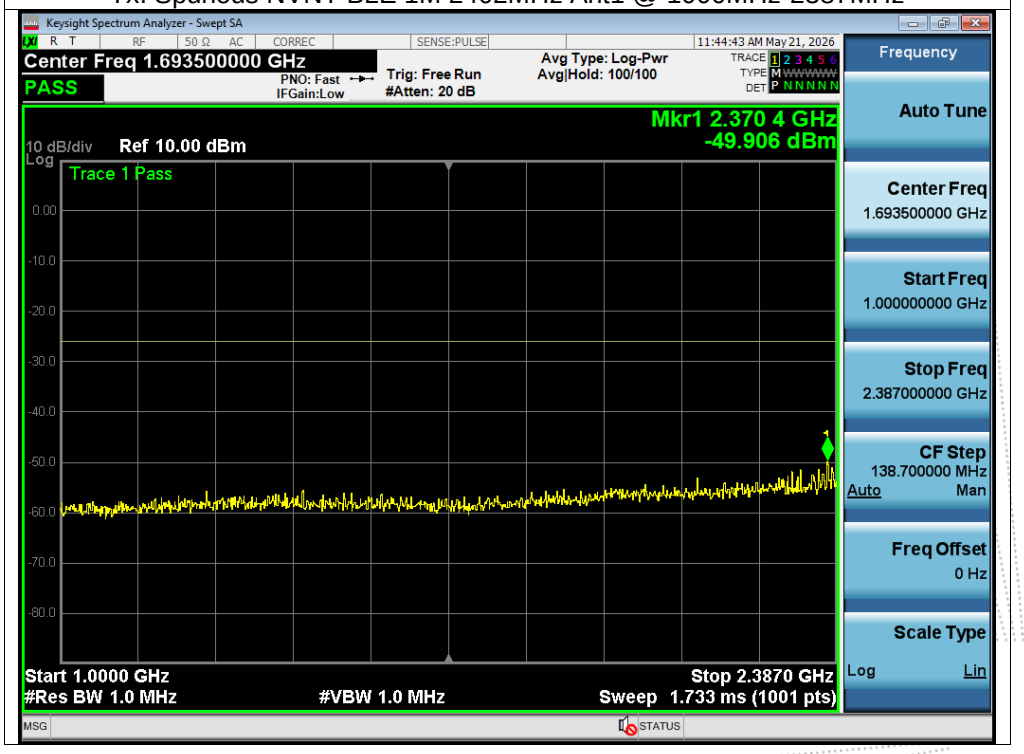
BLE 2M	2440	2483.5-2496.5	2488.56	-49.69	NA	0.0107	NA	25	25	Pass
BLE 2M	2440	2496.5-13000	7317.61	-49.31	NA	0.0117	NA	2.5	2.5	Pass
BLE 2M	2480	30-1000	950.53	-55.78	NA	0.0026	NA	2.5	2.5	Pass
BLE 2M	2480	1000-2387	2385.61	-50.64	NA	0.0086	NA	2.5	2.5	Pass
BLE 2M	2480	2387-2400	2399.61	-50.13	NA	0.0097	NA	25	25	Pass
BLE 2M	2480	2483.5-2496.5	2484.46	-38.67	NA	0.1358	NA	25	25	Pass
BLE 2M	2480	2496.5-13000	2496.50	-49.47	NA	0.0113	NA	2.5	2.5	Pass

Test Graphs

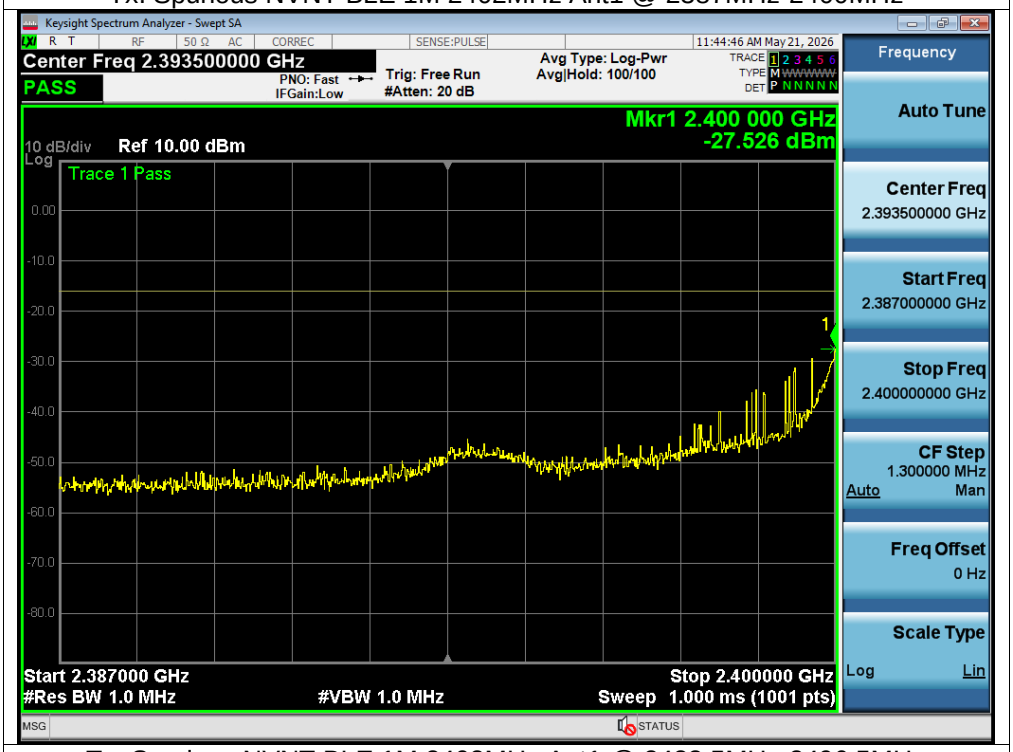
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 @ 30MHz-1000MHz



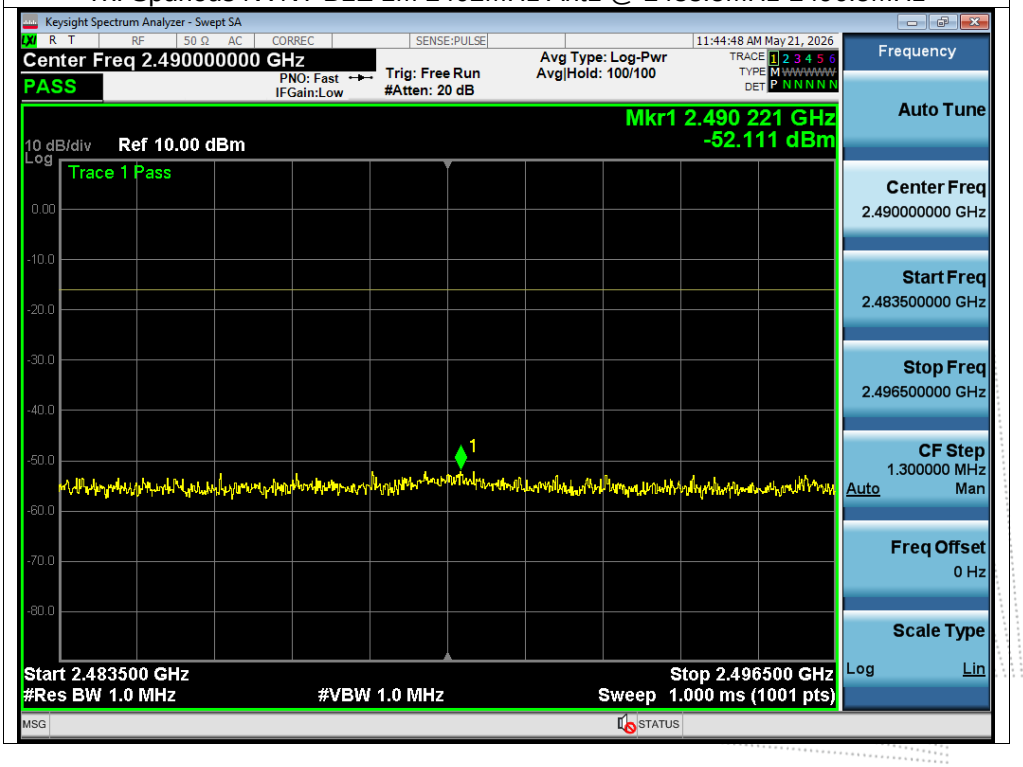
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 @ 1000MHz-2387MHz



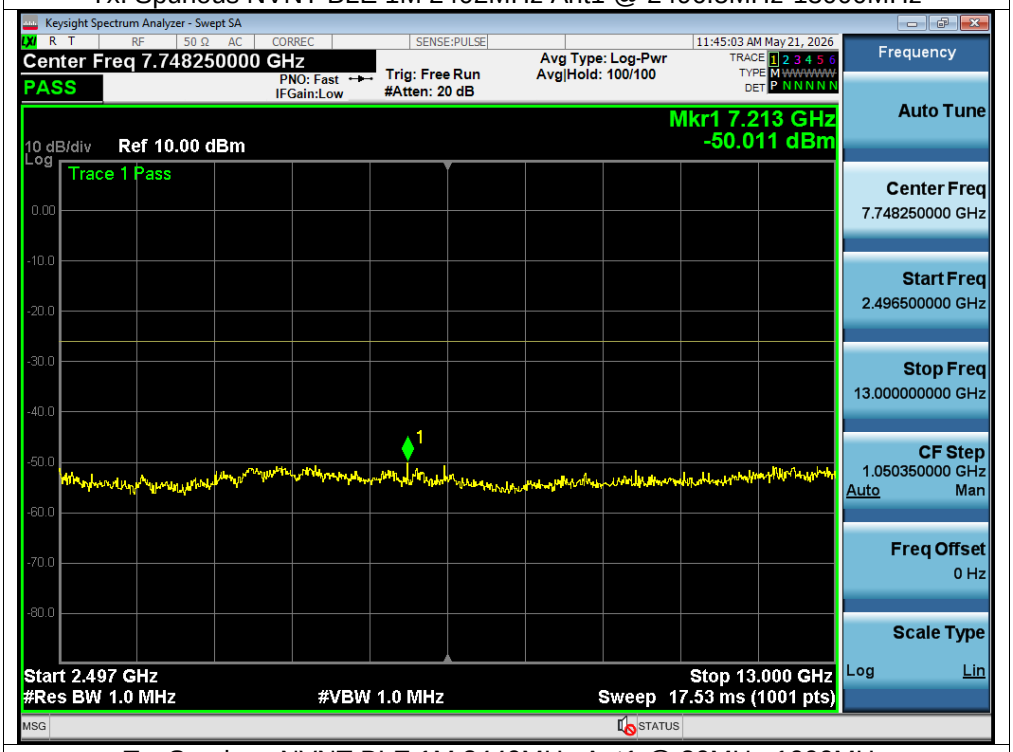
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 @ 2387MHz-2400MHz



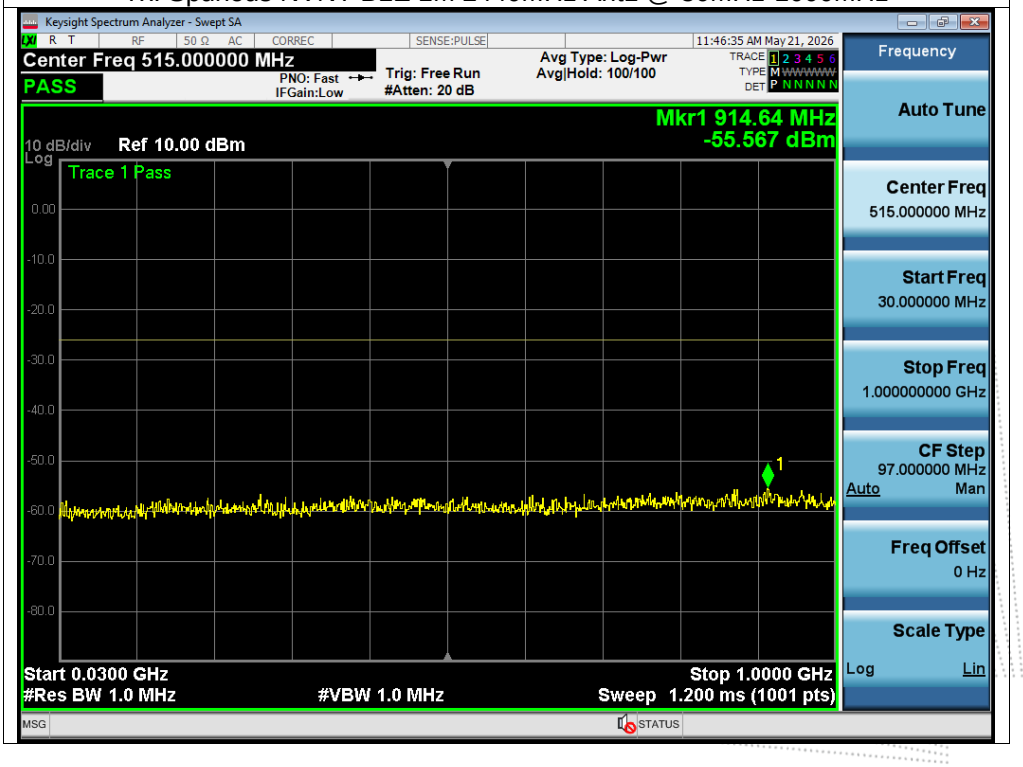
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 @ 2483.5MHz-2496.5MHz



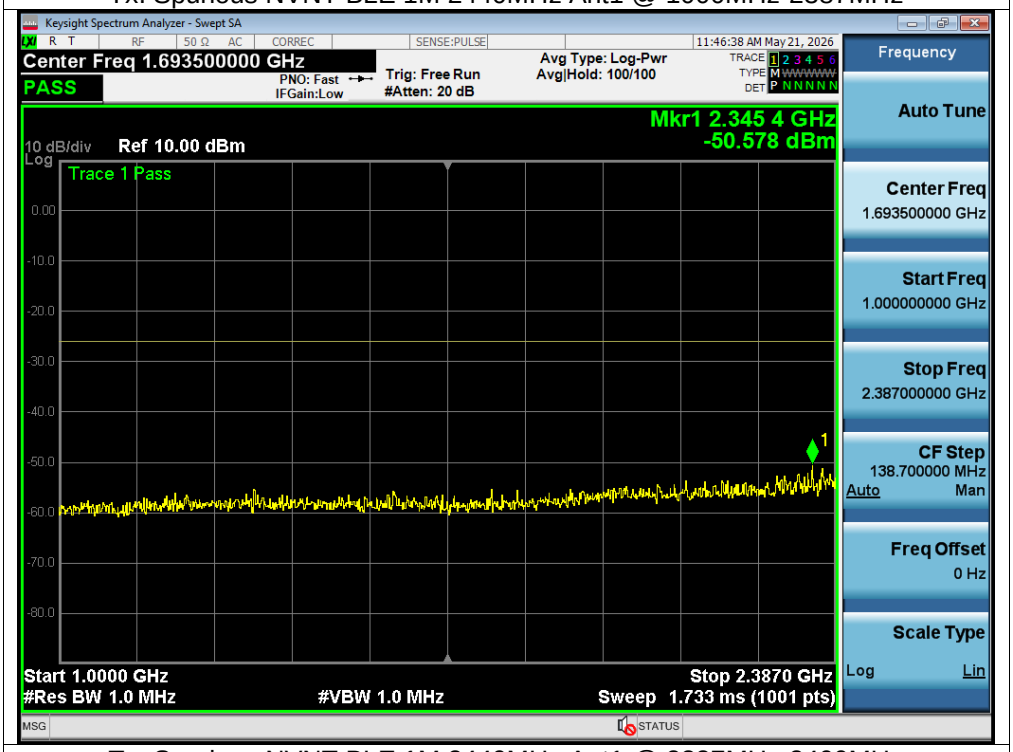
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 @ 2496.5MHz-13000MHz



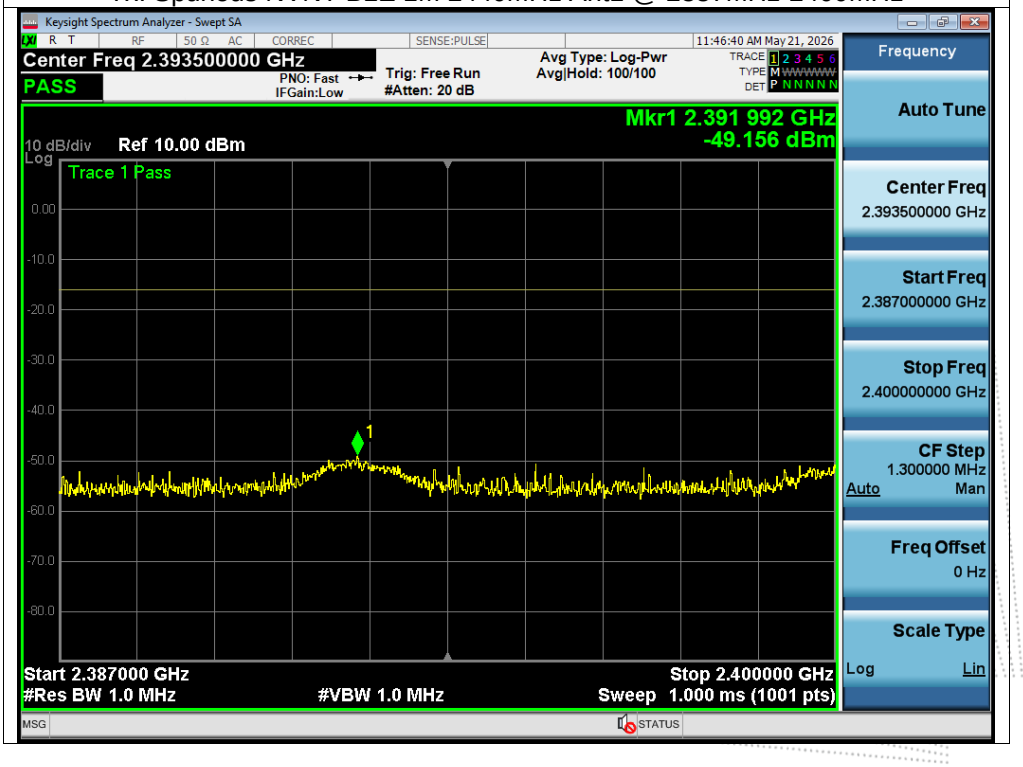
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 @ 30MHz-1000MHz



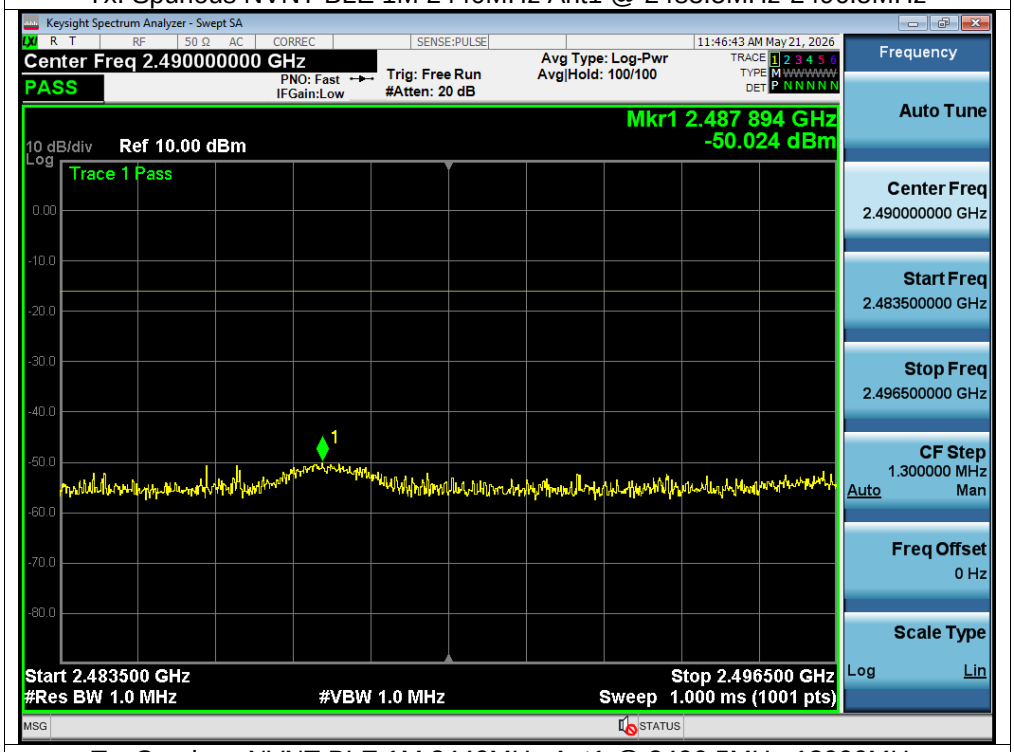
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 @ 1000MHz-2387MHz



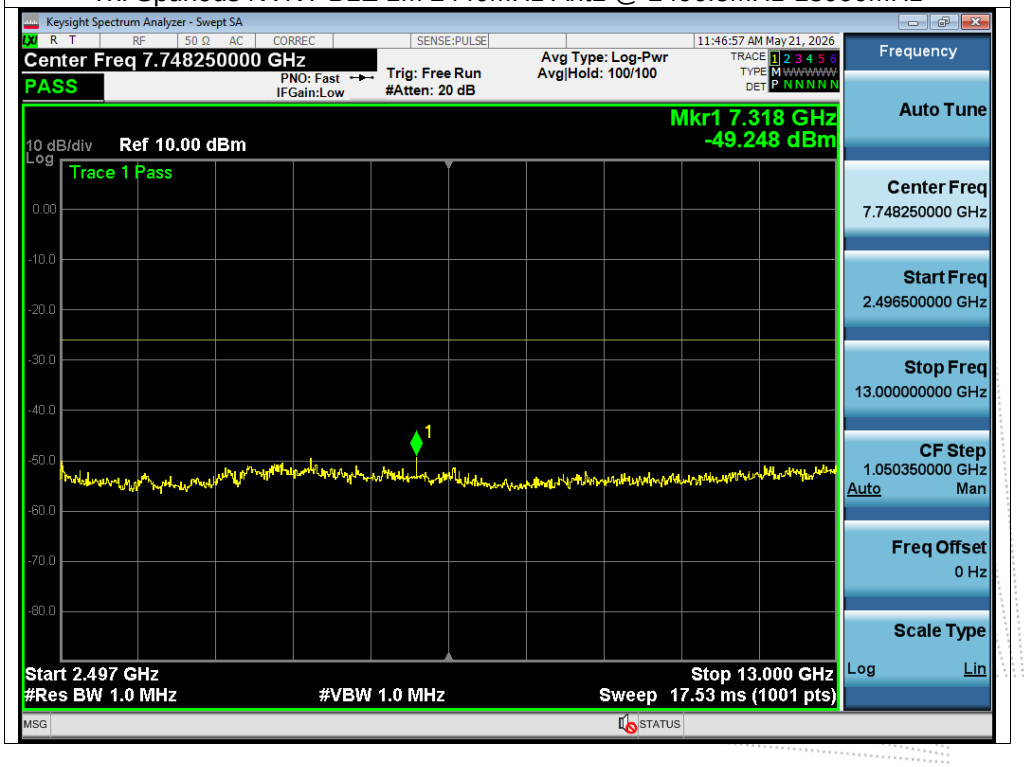
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 @ 2387MHz-2400MHz



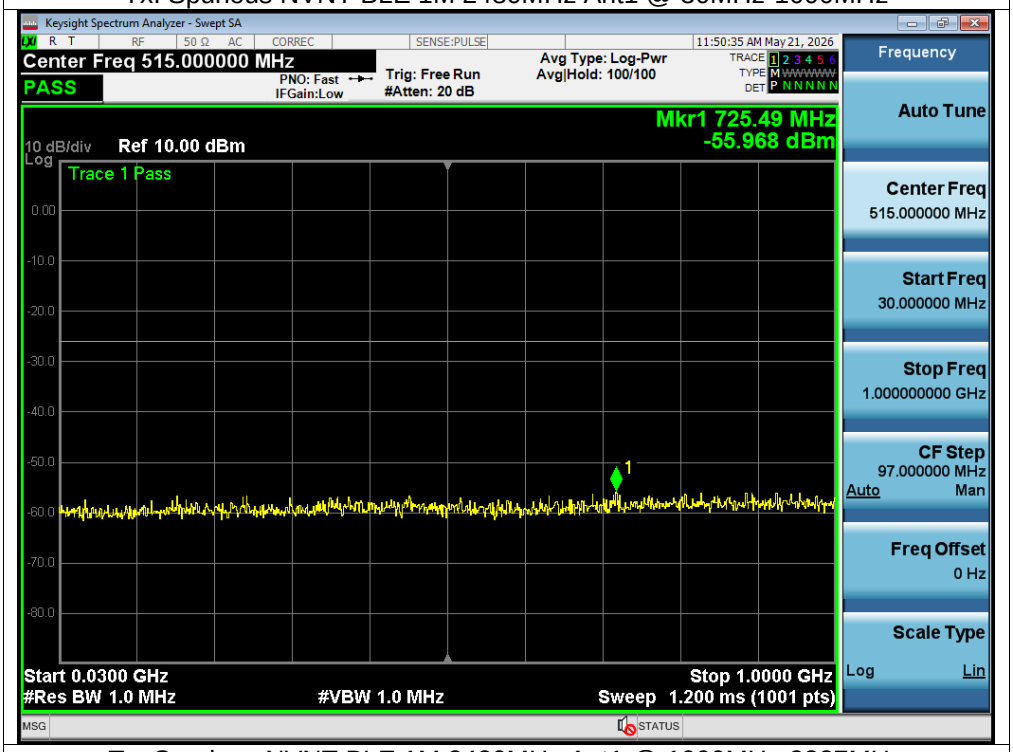
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 @ 2483.5MHz-2496.5MHz



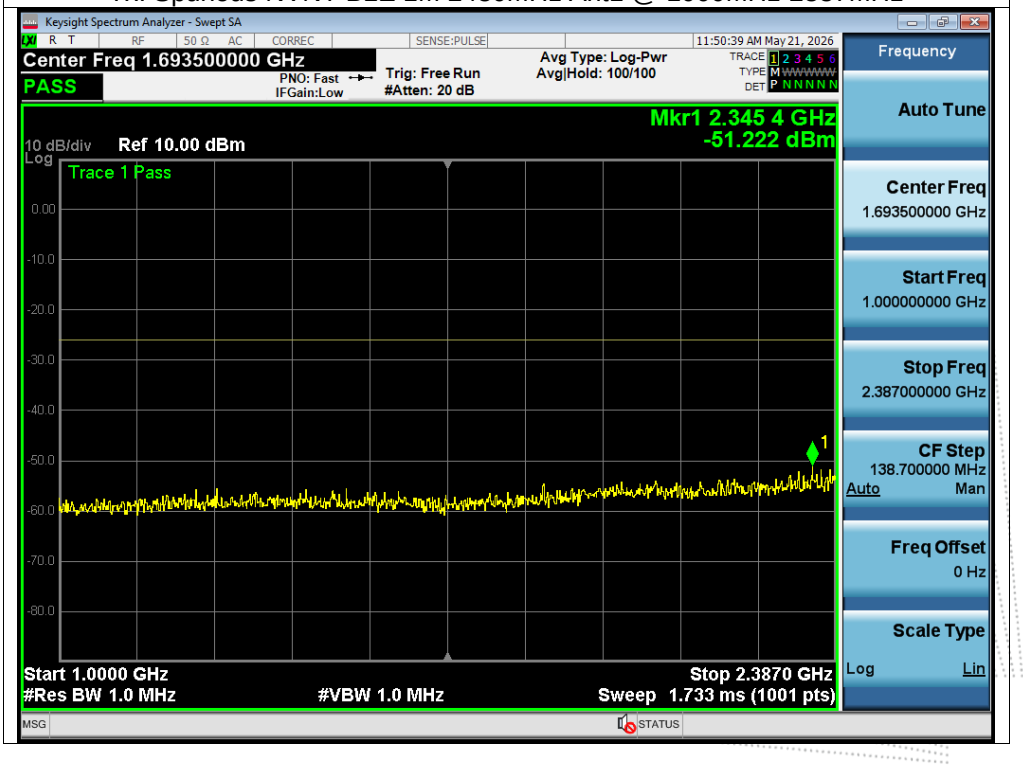
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 @ 2496.5MHz-13000MHz



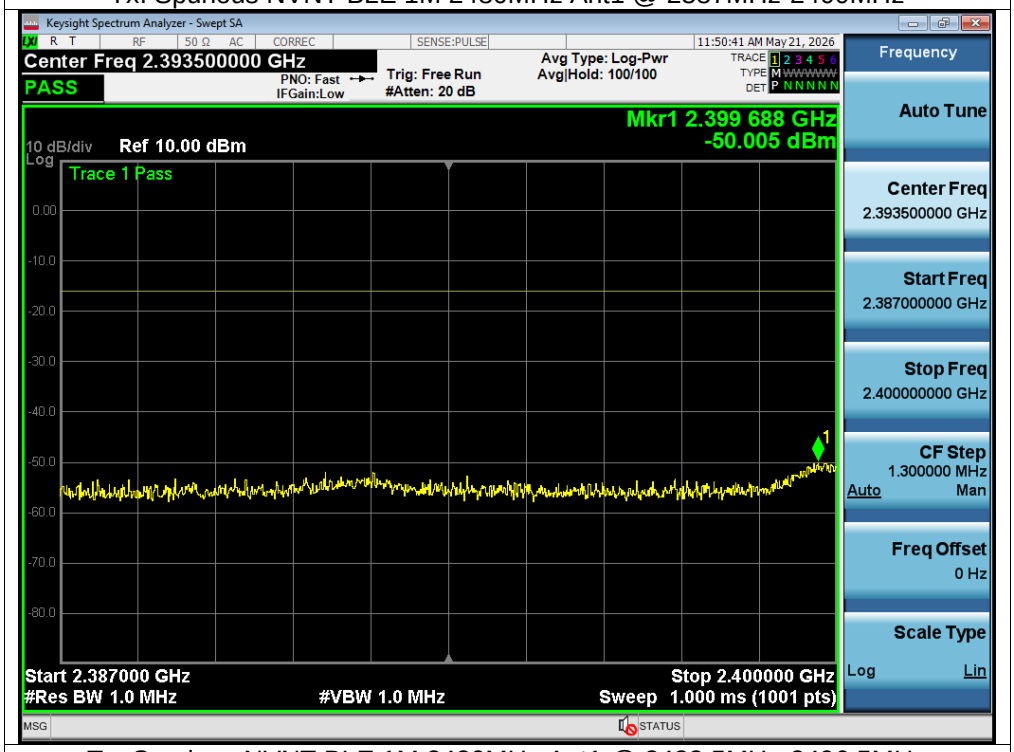
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 @ 30MHz-1000MHz



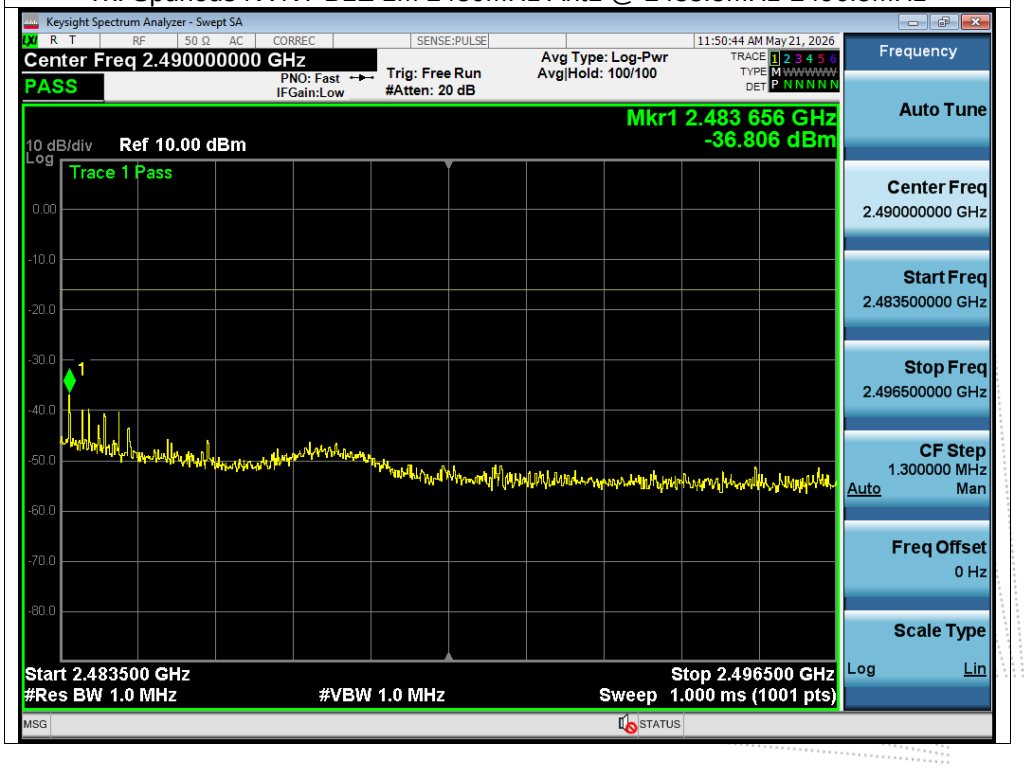
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 @ 1000MHz-2387MHz



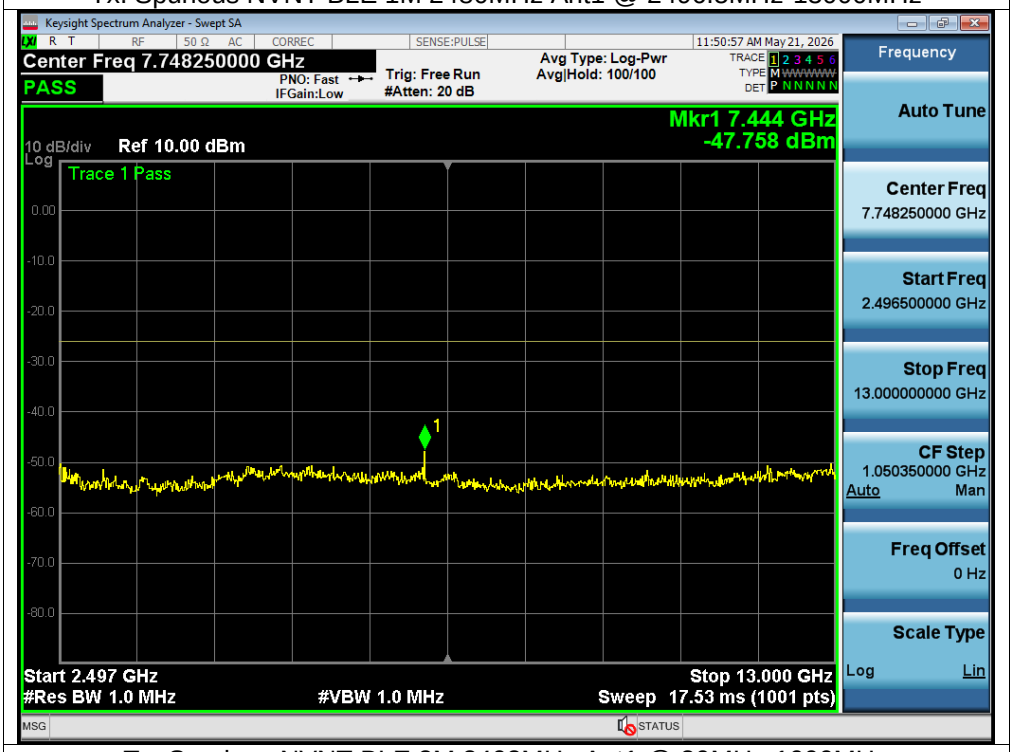
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 @ 2387MHz-2400MHz



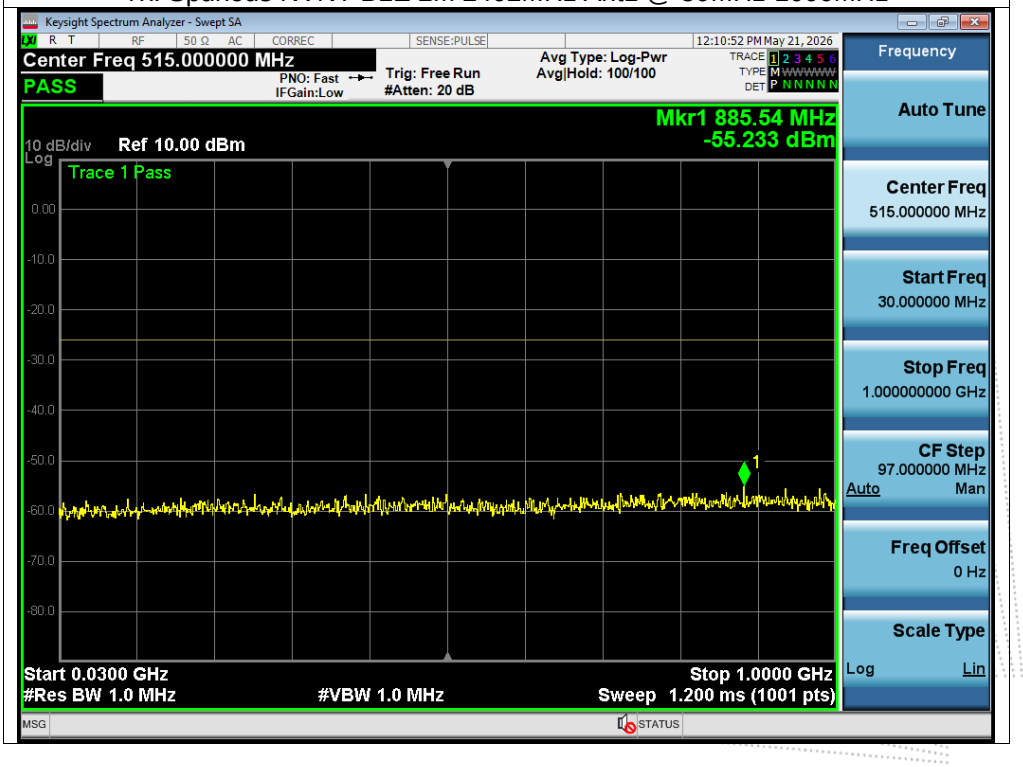
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 @ 2483.5MHz-2496.5MHz



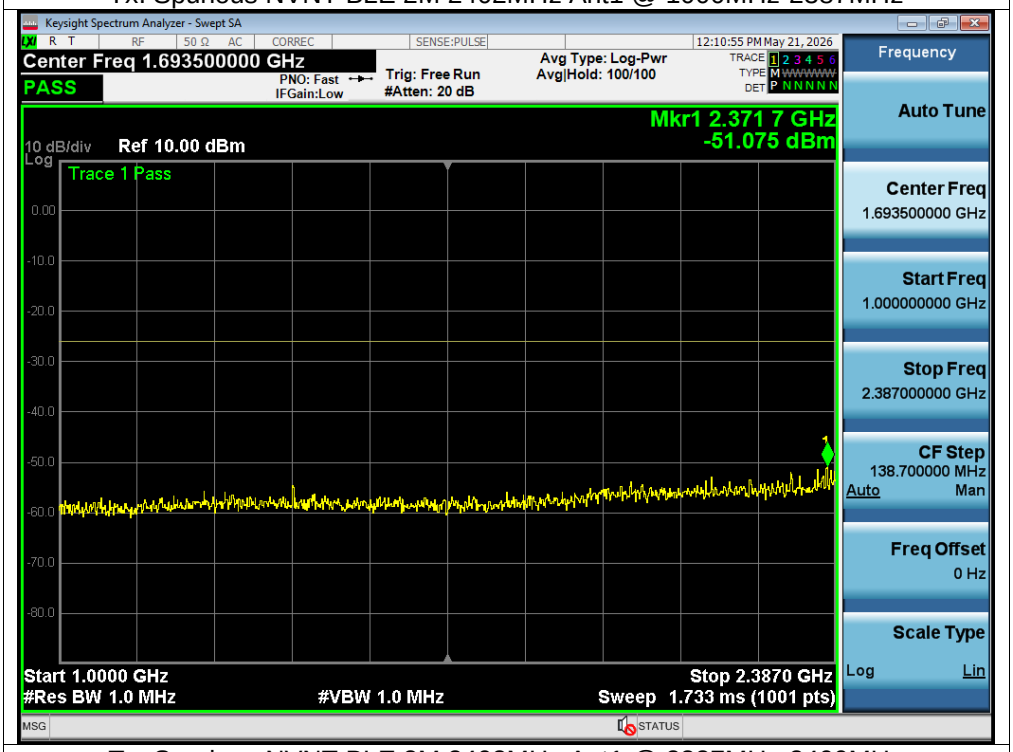
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 @ 2496.5MHz-13000MHz



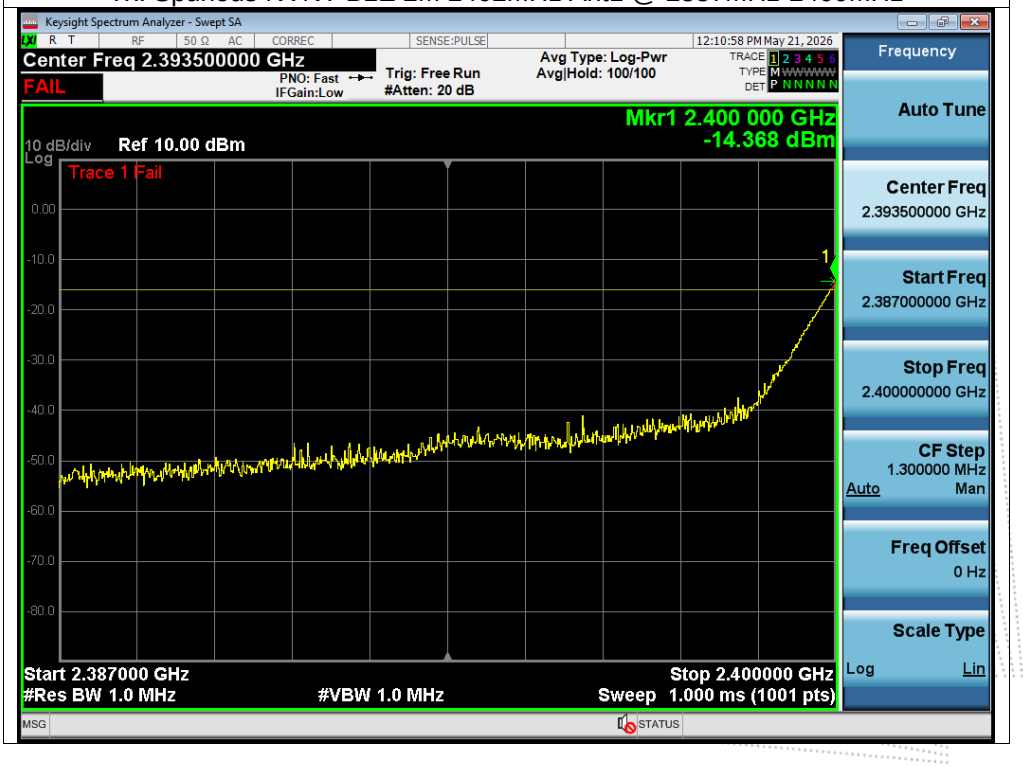
Tx. Spurious NVNT BLE 2M 2402MHz Ant1 @ 30MHz-1000MHz



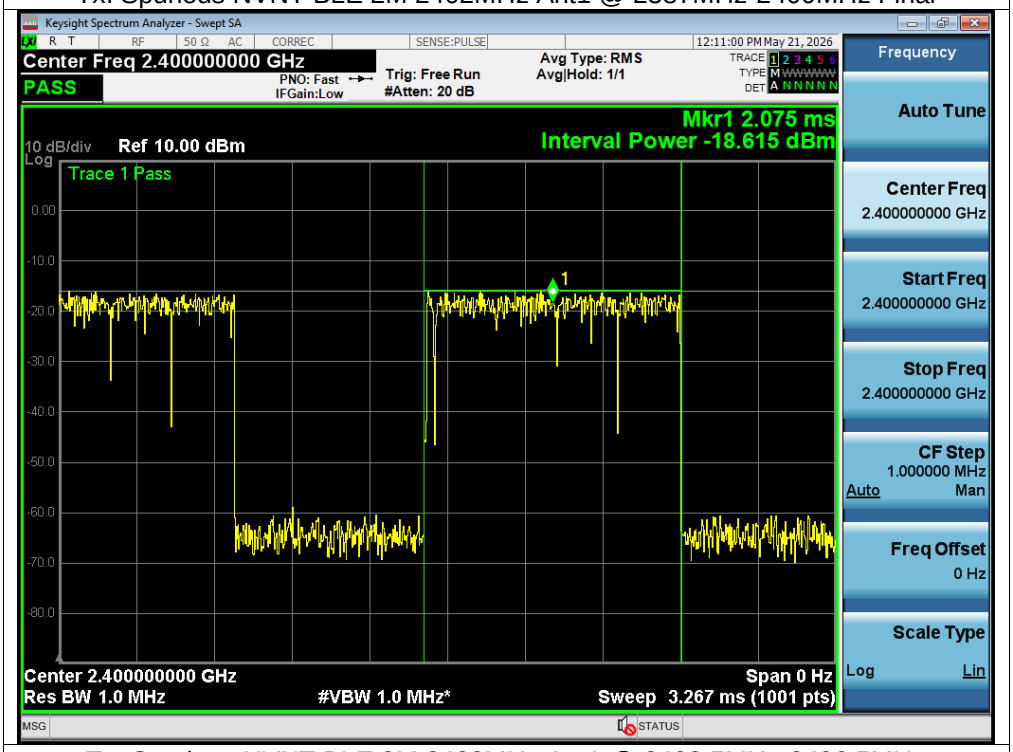
Tx. Spurious NVNT BLE 2M 2402MHz Ant1 @ 1000MHz-2387MHz



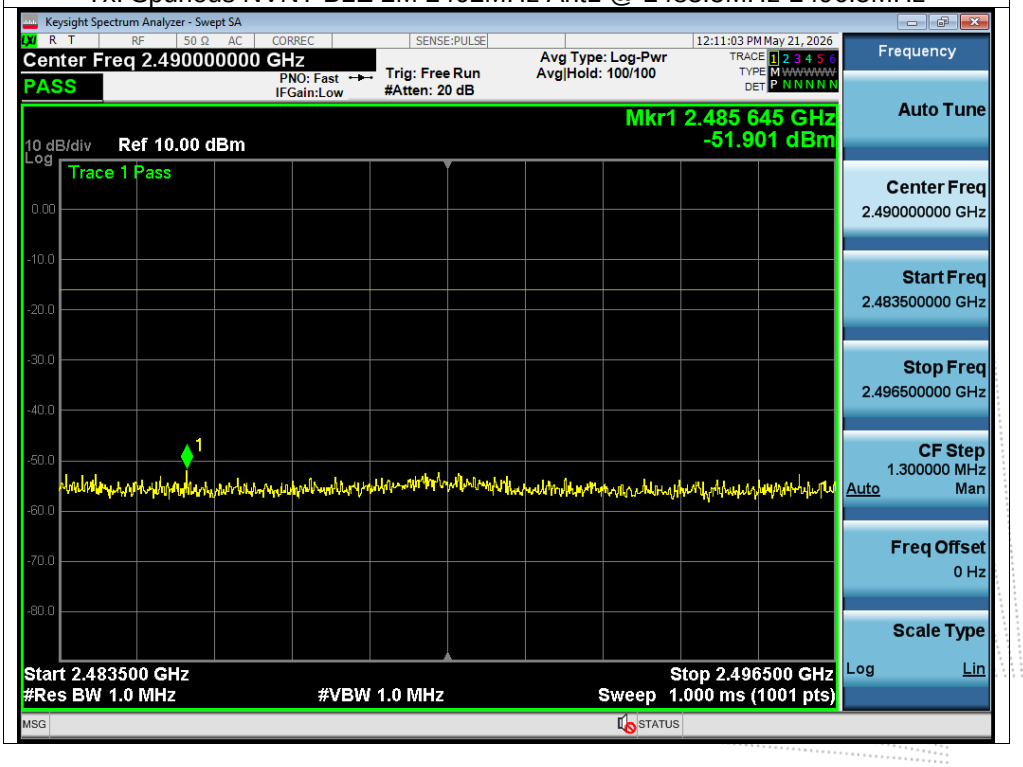
Tx. Spurious NVNT BLE 2M 2402MHz Ant1 @ 2387MHz-2400MHz



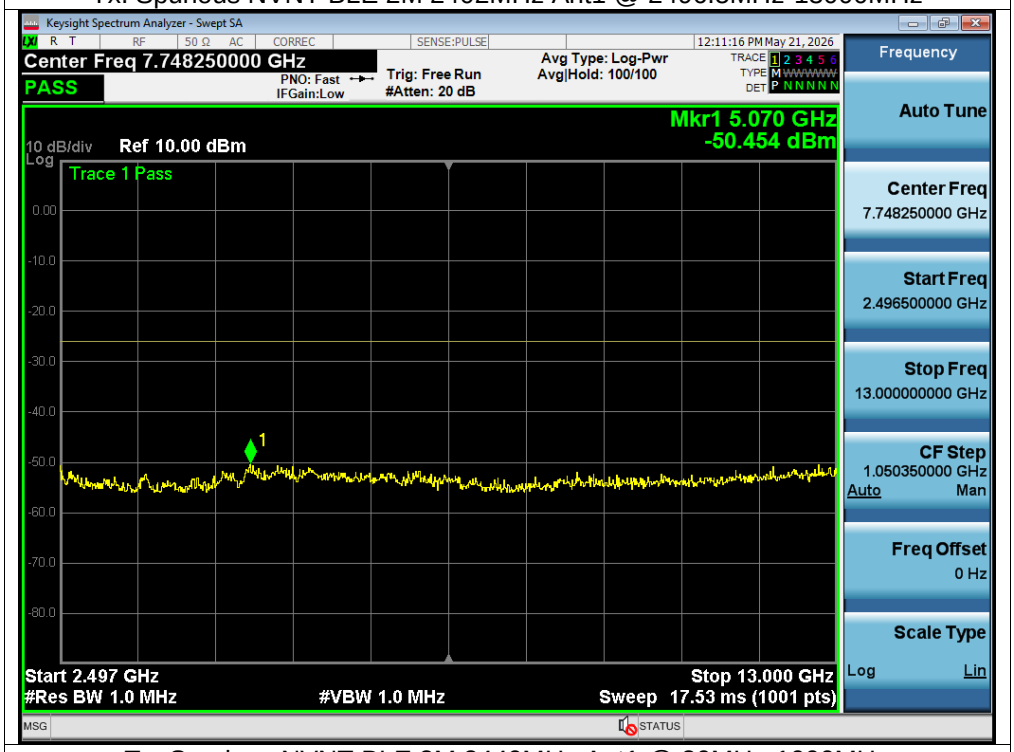
Tx. Spurious NVNT BLE 2M 2402MHz Ant1 @ 2387MHz-2400MHz Final



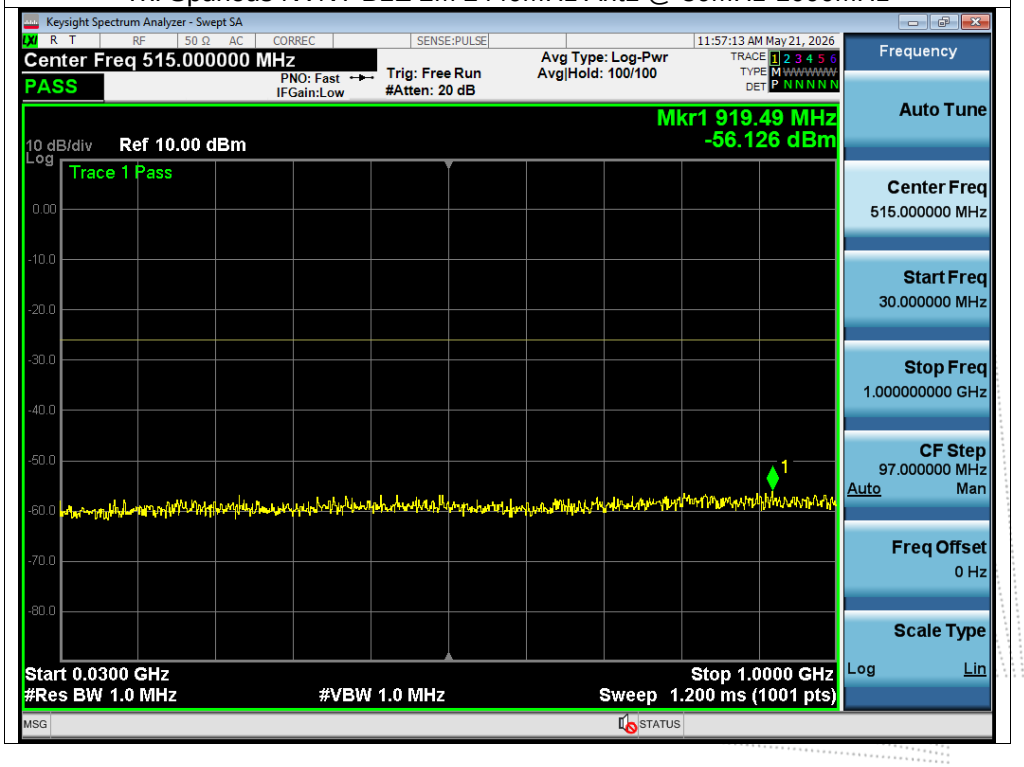
Tx. Spurious NVNT BLE 2M 2402MHz Ant1 @ 2483.5MHz-2496.5MHz



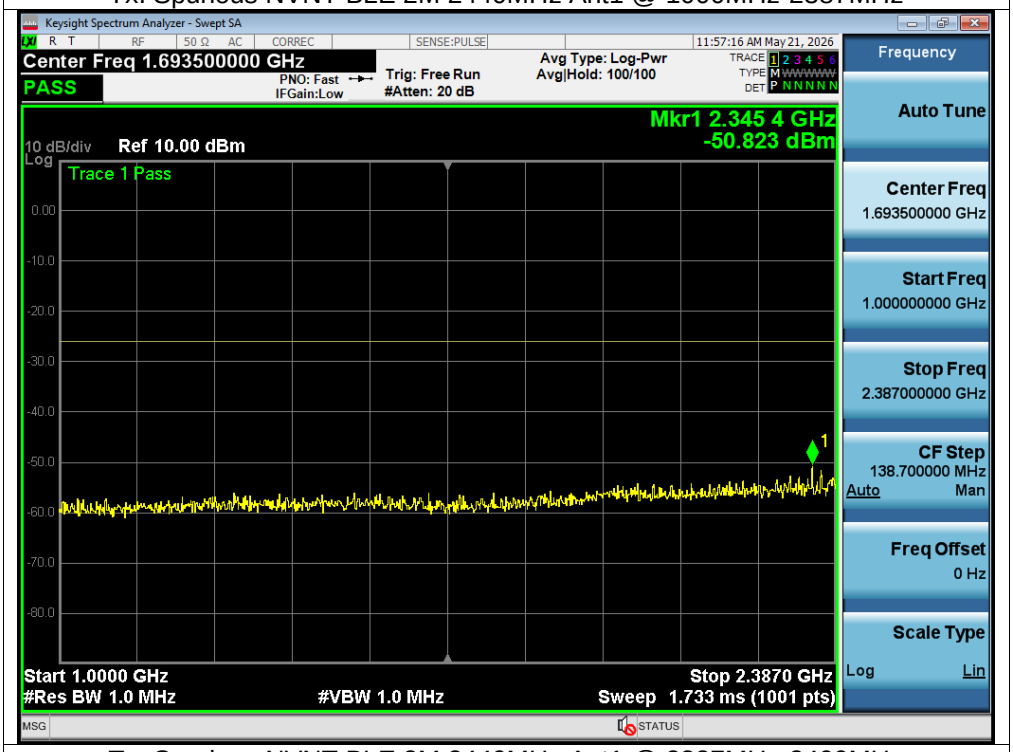
Tx. Spurious NVNT BLE 2M 2402MHz Ant1 @ 2496.5MHz-13000MHz



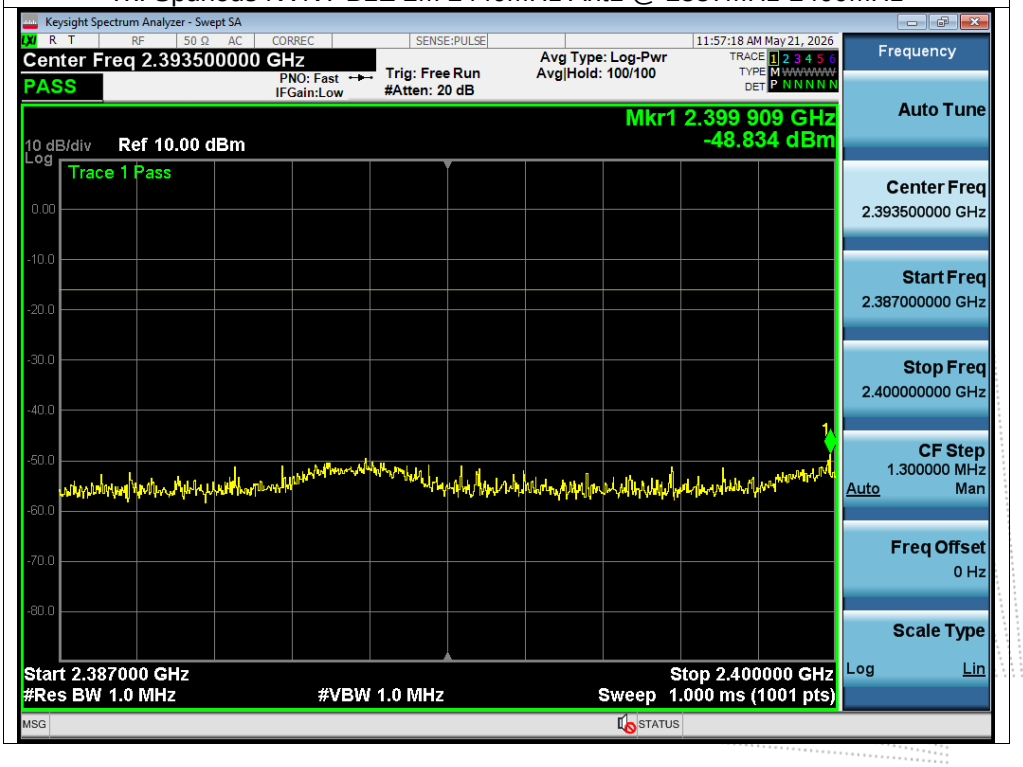
Tx. Spurious NVNT BLE 2M 2440MHz Ant1 @ 30MHz-1000MHz



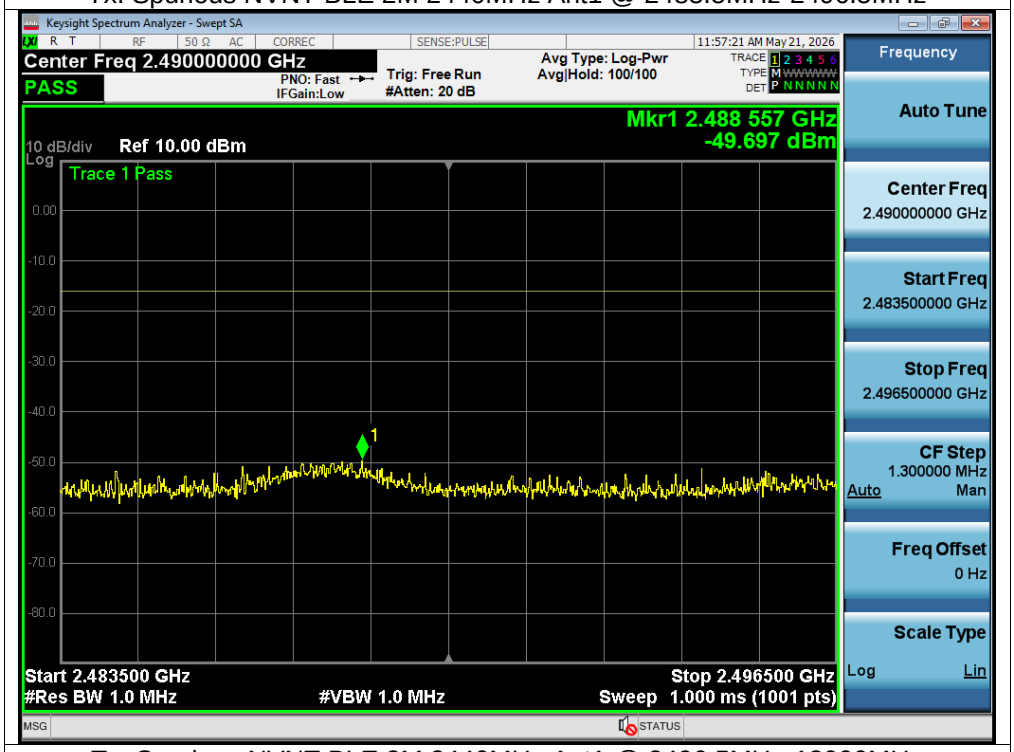
Tx. Spurious NVNT BLE 2M 2440MHz Ant1 @ 1000MHz-2387MHz



Tx. Spurious NVNT BLE 2M 2440MHz Ant1 @ 2387MHz-2400MHz

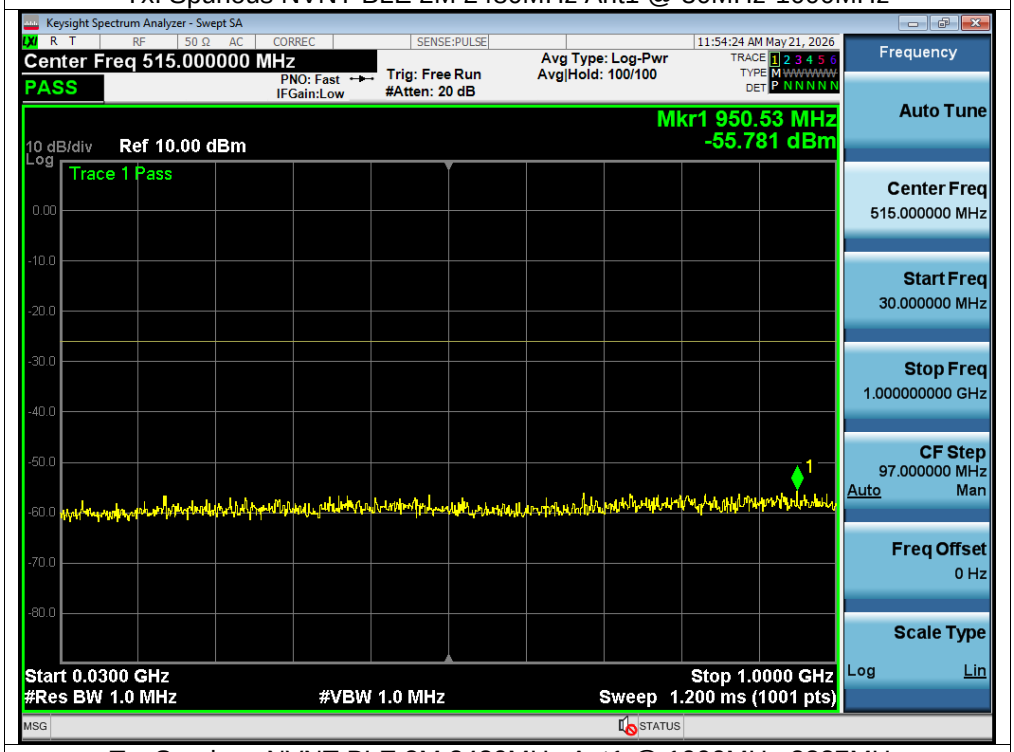


Tx. Spurious NVNT BLE 2M 2440MHz Ant1 @ 2483.5MHz-2496.5MHz

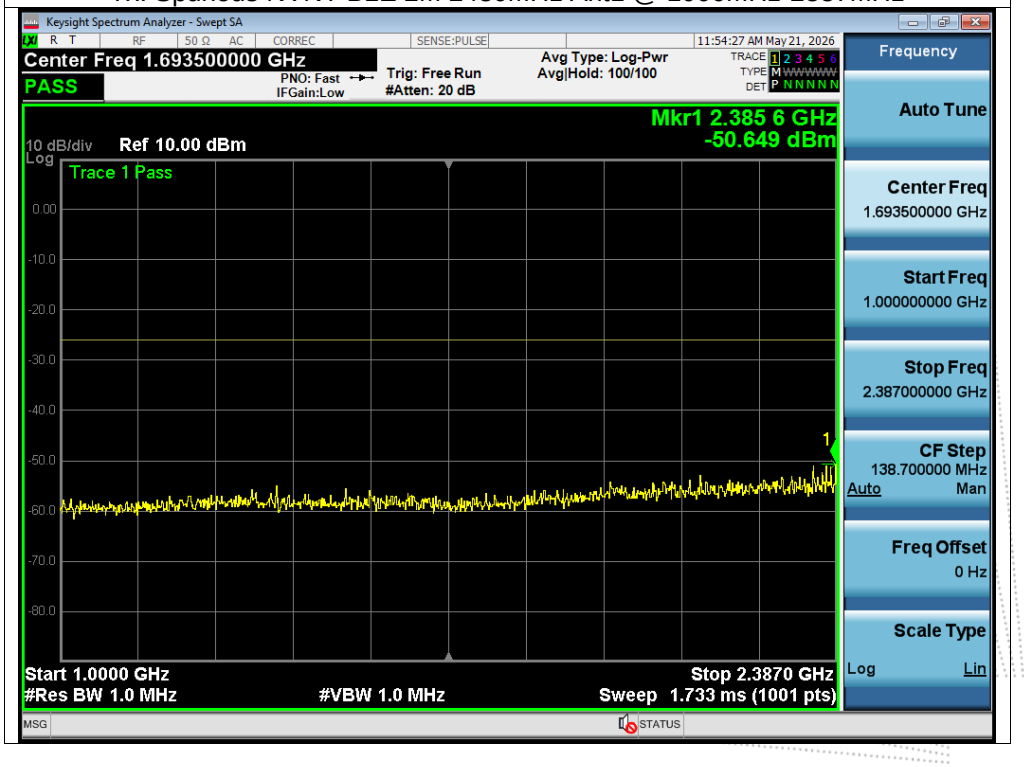


Tx. Spurious NVNT BLE 2M 2440MHz Ant1 @ 2496.5MHz-13000MHz

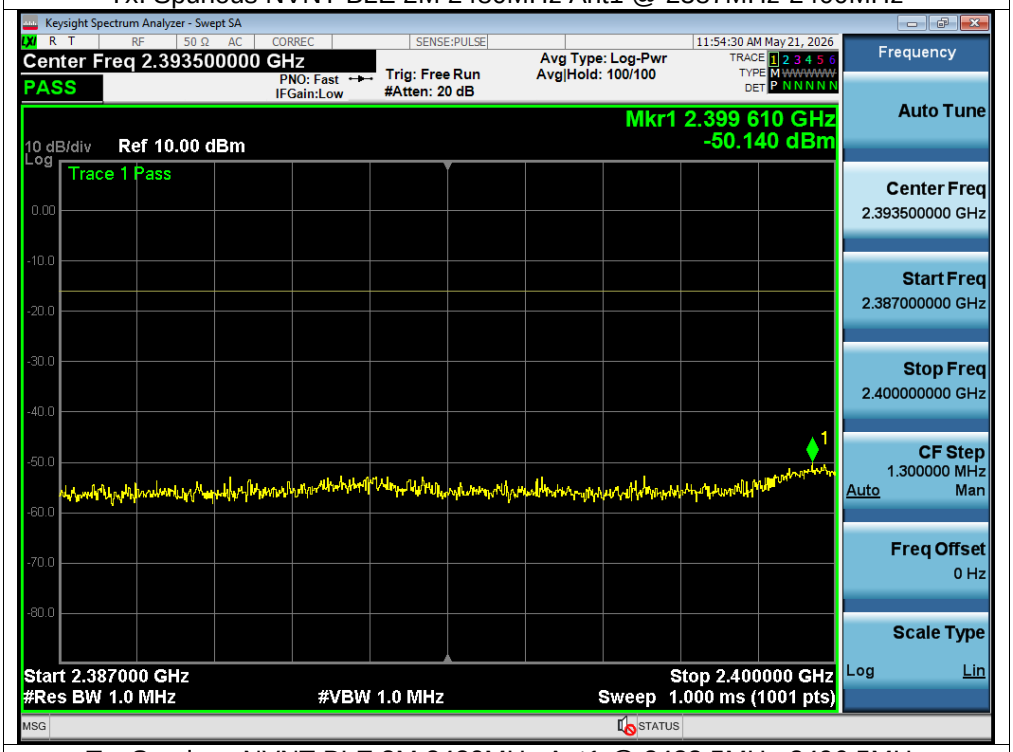
Tx. Spurious NVNT BLE 2M 2480MHz Ant1 @ 30MHz-1000MHz



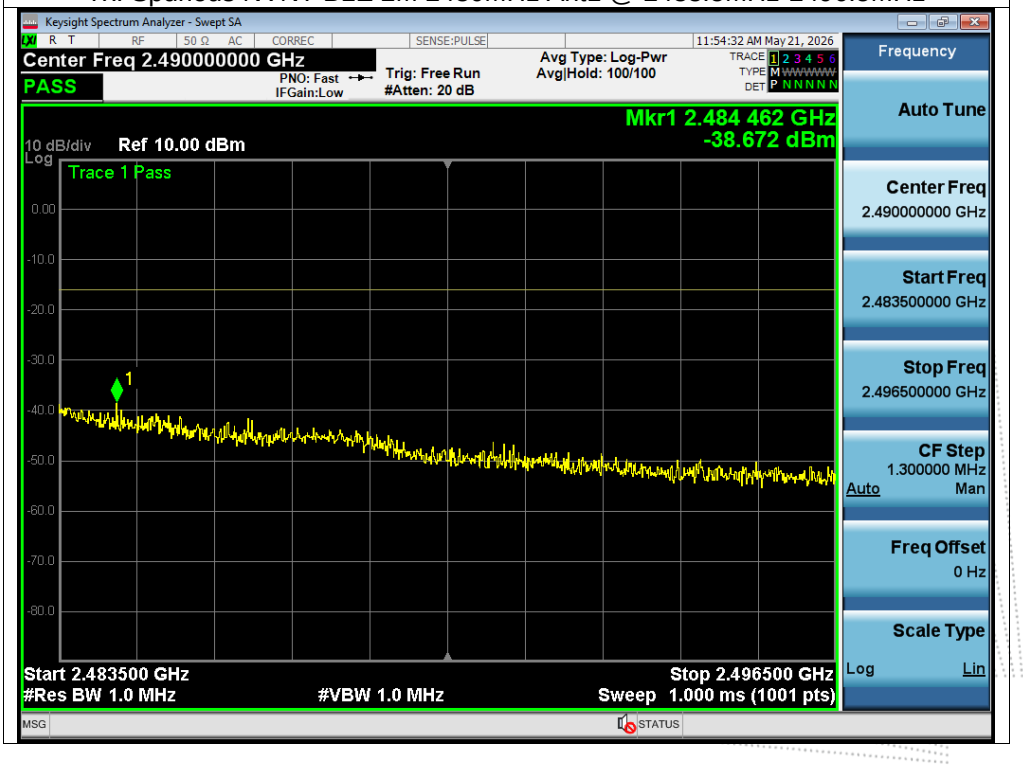
Tx. Spurious NVNT BLE 2M 2480MHz Ant1 @ 1000MHz-2387MHz



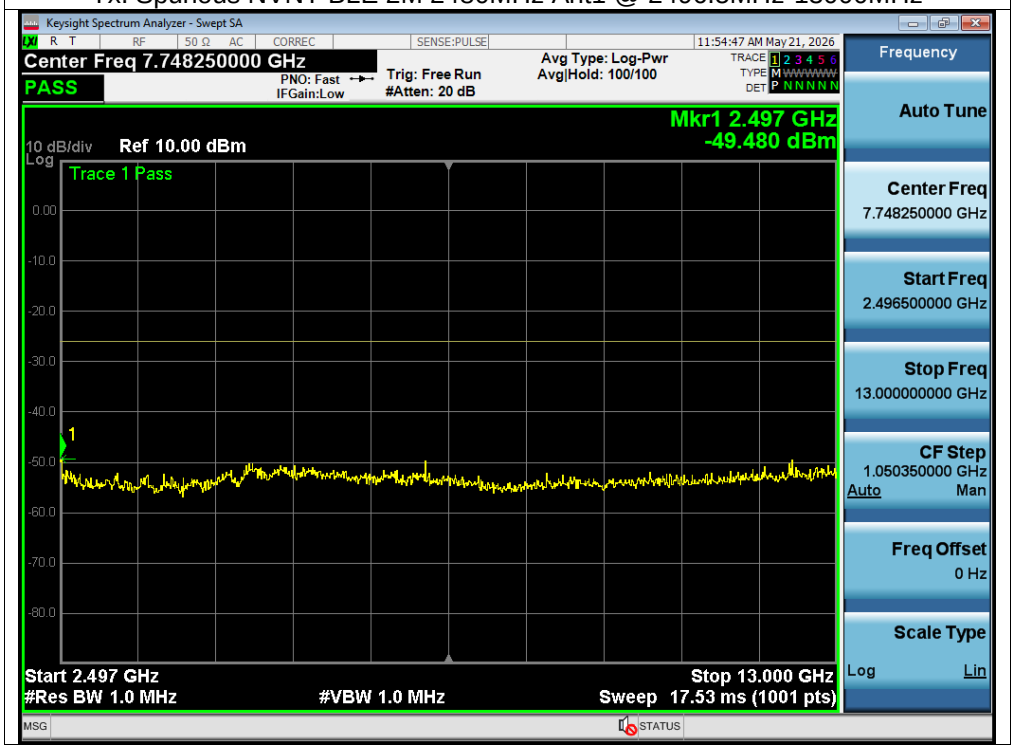
Tx. Spurious NVNT BLE 2M 2480MHz Ant1 @ 2387MHz-2400MHz



Tx. Spurious NVNT BLE 2M 2480MHz Ant1 @ 2483.5MHz-2496.5MHz

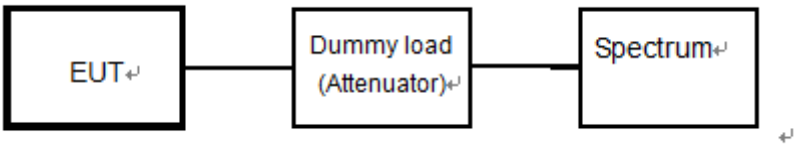


Tx. Spurious NVNT BLE 2M 2480MHz Ant1 @ 2496.5MHz-13000MHz



11. Imitation Of Collateral Emission Of Receiver Measurement

11.1 Block Diagram Of Test Setup



11.2 Limit

Item	Limits
RX Spurious Emission:	≦4nW (f<1GHz)
	≦20nW (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.

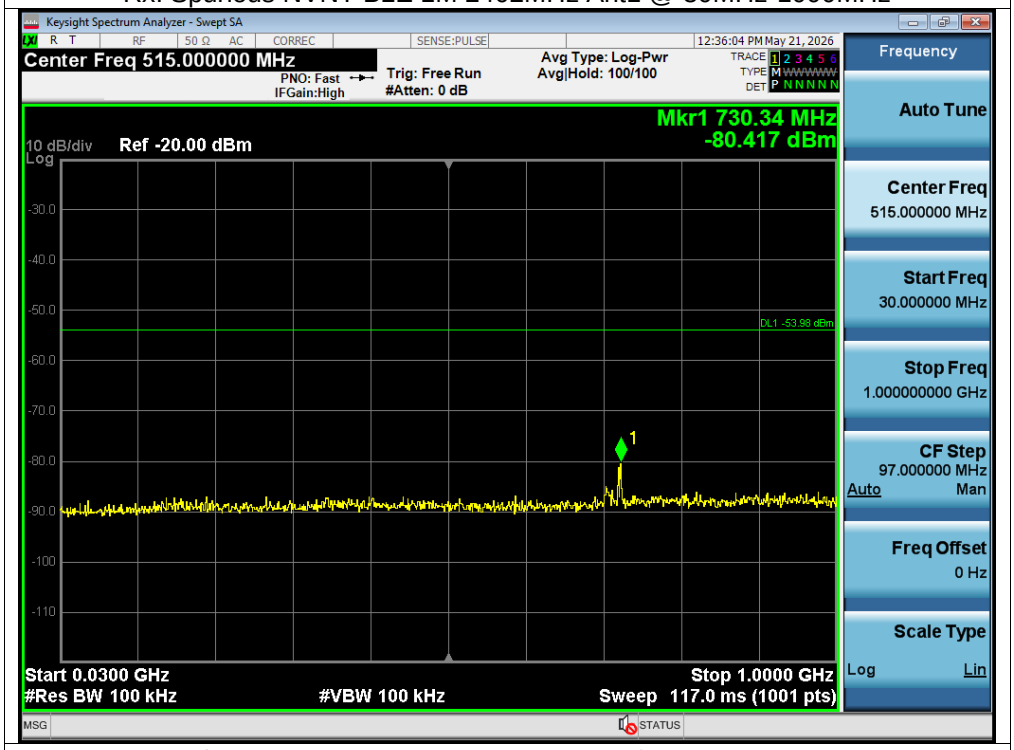
11.5 Test Result

Temperature:	26^{0}C		
Humidity:	54% RH	Test Voltage	DC 12V
Operation Mode:	GFSK Normal Voltage		

Mode	Frequency (MHz)	Range (MHz)	Emission Frequency (MHz)	Max Peak Value (dBm)	Max RMS Value (dBm)	Max Peak Value (nW)	Max RMS Value (nW)	Limit (nW)	Verdict
BLE 1M	2402	30-1000	730.34	-80.42	NA	0.0091	NA	4	Pass
BLE 1M	2402	1000-13000	5452.00	-71.06	NA	0.0783	NA	20	Pass
BLE 1M	2440	30-1000	704.15	-84.80	NA	0.0033	NA	4	Pass
BLE 1M	2440	1000-13000	5884.00	-70.52	NA	0.0887	NA	20	Pass
BLE 1M	2480	30-1000	715.79	-78.38	NA	0.0145	NA	4	Pass
BLE 1M	2480	1000-13000	2332.00	-67.22	NA	0.1897	NA	20	Pass
BLE 2M	2402	30-1000	727.43	-80.31	NA	0.0093	NA	4	Pass
BLE 2M	2402	1000-13000	5728.00	-70.84	NA	0.0824	NA	20	Pass
BLE 2M	2440	30-1000	728.40	-82.79	NA	0.0053	NA	4	Pass
BLE 2M	2440	1000-13000	5896.00	-70.80	NA	0.0832	NA	20	Pass
BLE 2M	2480	30-1000	728.40	-83.88	NA	0.0041	NA	4	Pass
BLE 2M	2480	1000-13000	12940.00	-70.49	NA	0.0893	NA	20	Pass

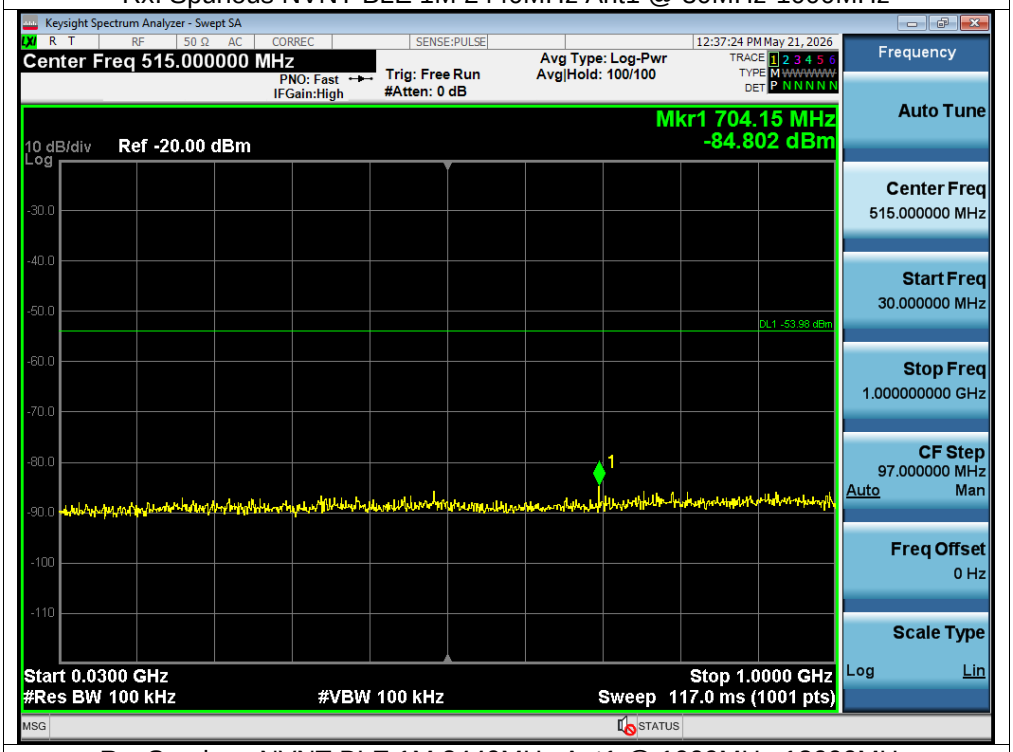
Test Graphs

Rx. Spurious NVNT BLE 1M 2402MHz Ant1 @ 30MHz-1000MHz

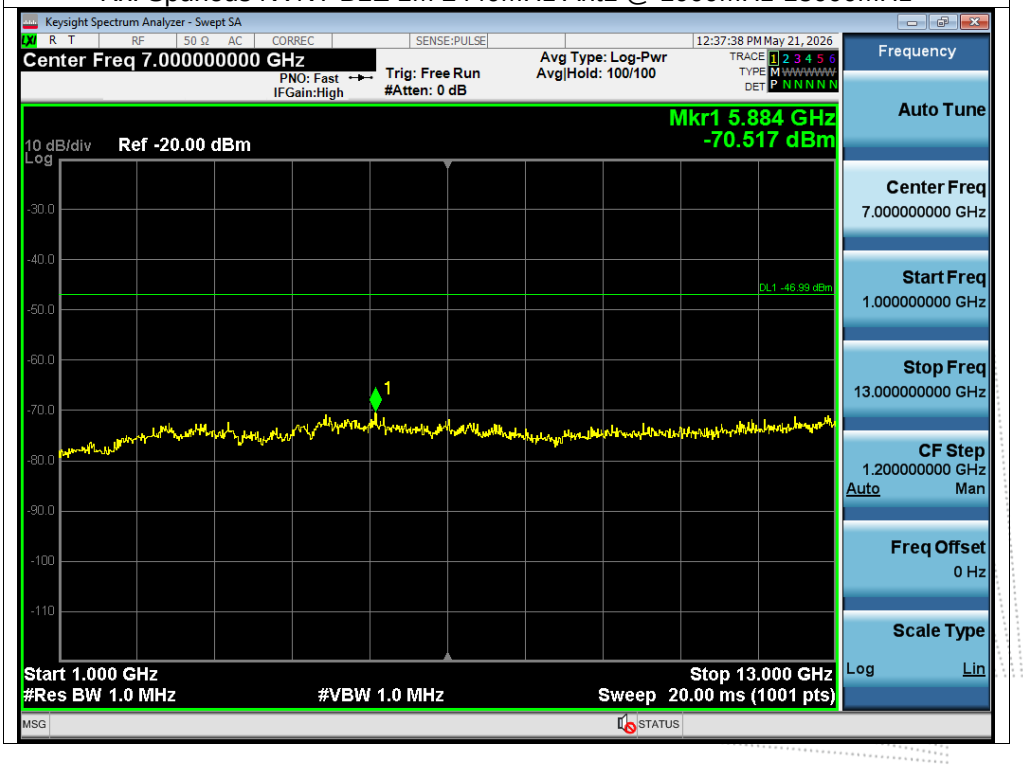


Rx. Spurious NVNT BLE 1M 2402MHz Ant1 @ 1000MHz-13000MHz

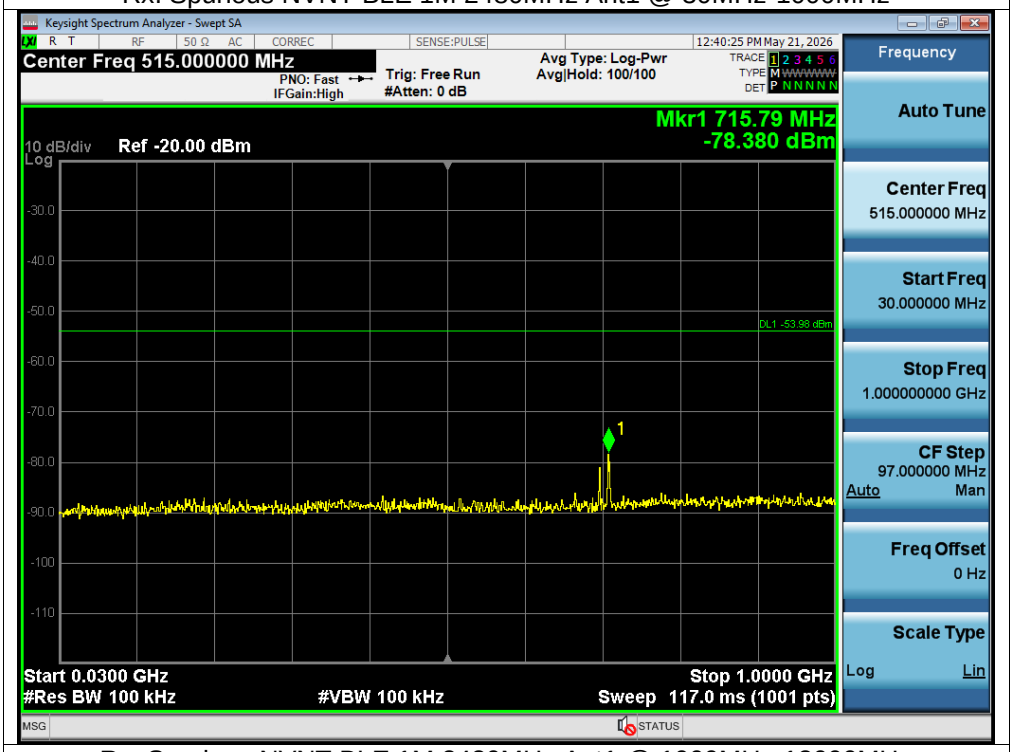
Rx. Spurious NVNT BLE 1M 2440MHz Ant1 @ 30MHz-1000MHz



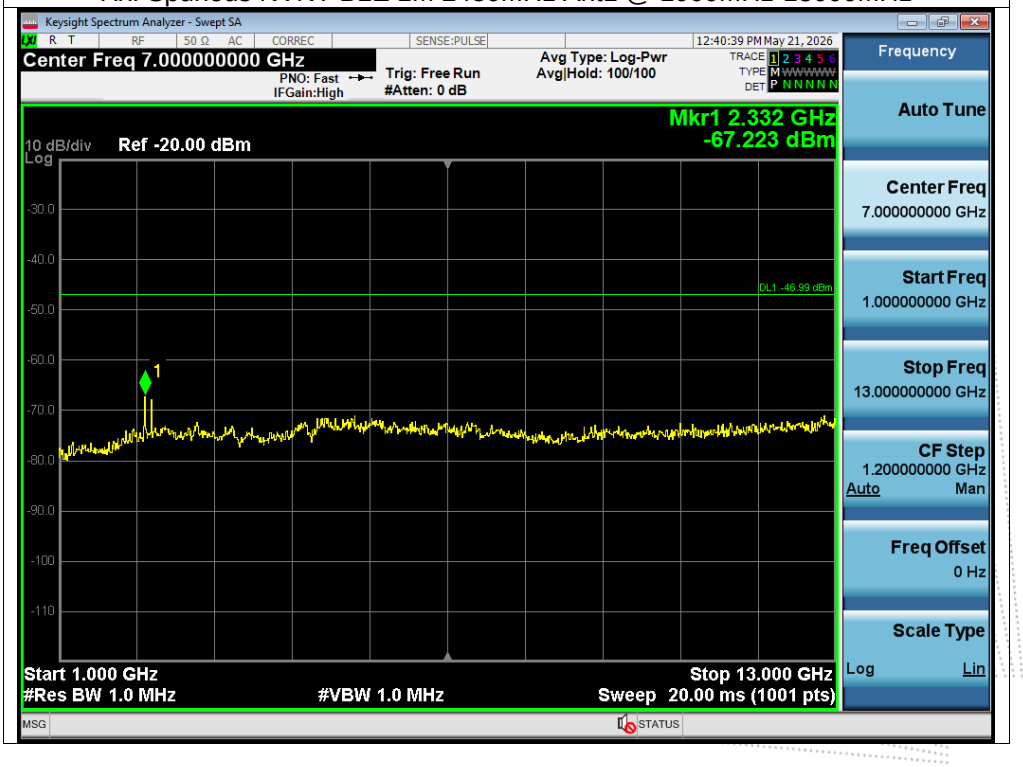
Rx. Spurious NVNT BLE 1M 2440MHz Ant1 @ 1000MHz-13000MHz



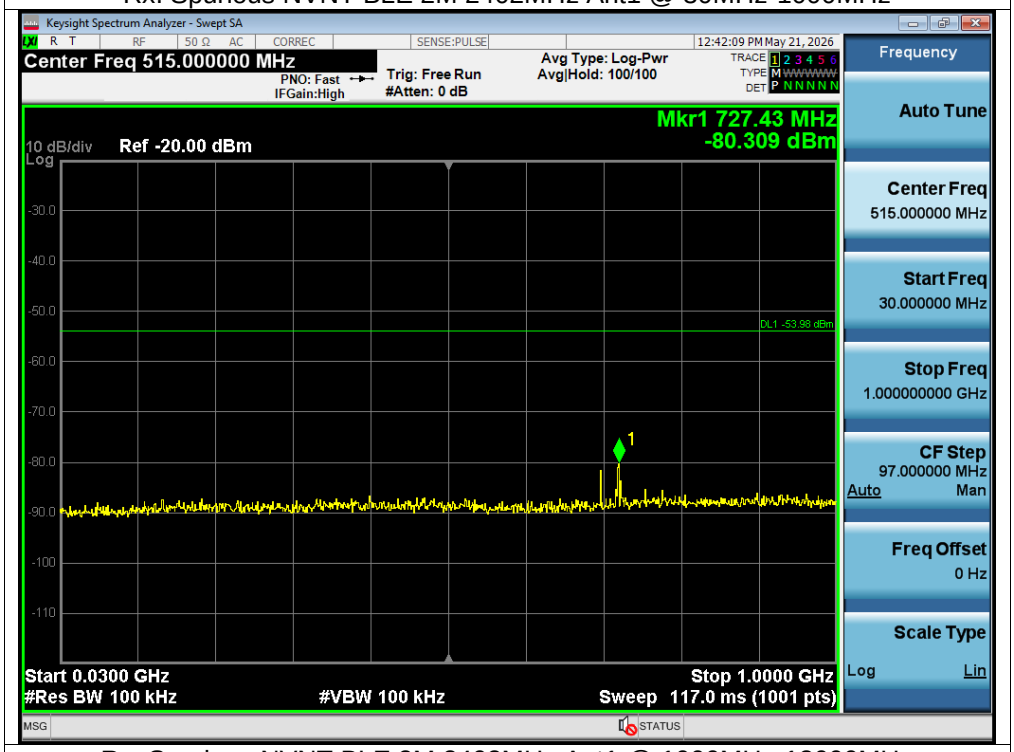
Rx. Spurious NVNT BLE 1M 2480MHz Ant1 @ 30MHz-1000MHz



Rx. Spurious NVNT BLE 1M 2480MHz Ant1 @ 1000MHz-13000MHz

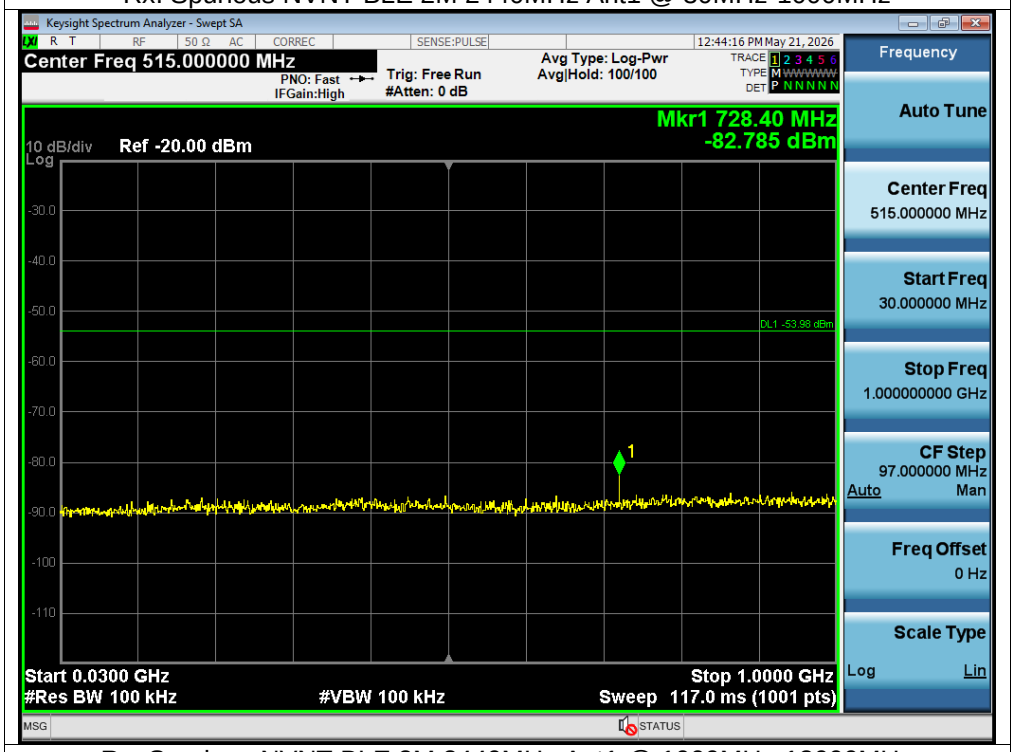


Rx. Spurious NVNT BLE 2M 2402MHz Ant1 @ 30MHz-1000MHz

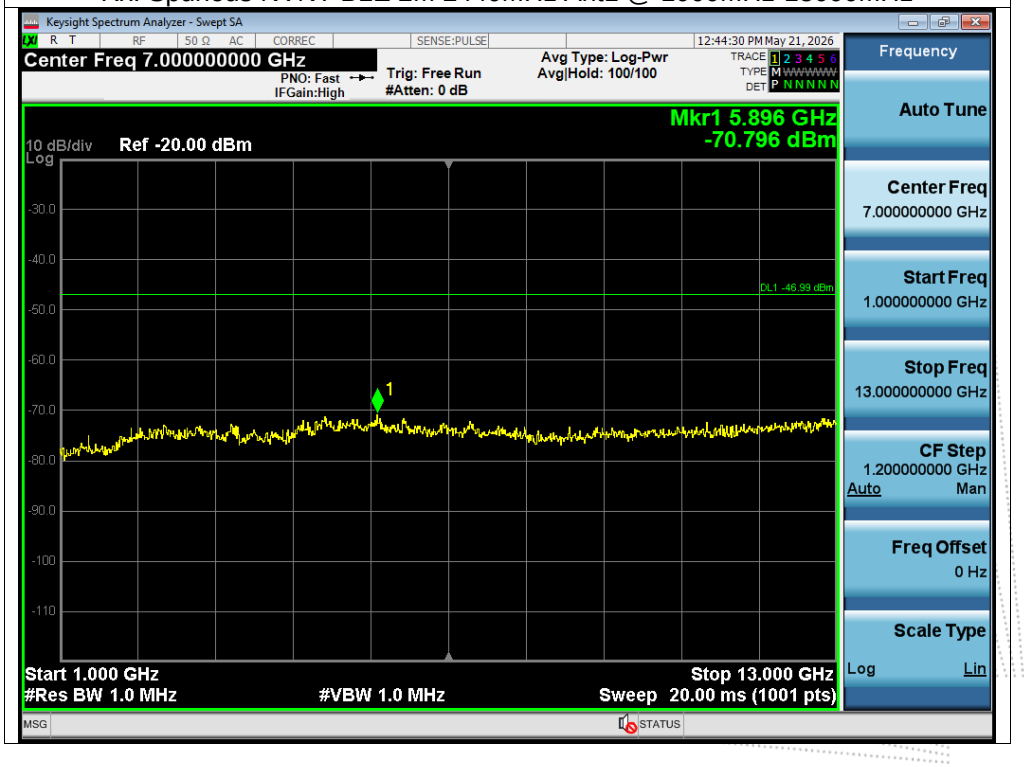


Rx. Spurious NVNT BLE 2M 2402MHz Ant1 @ 1000MHz-13000MHz

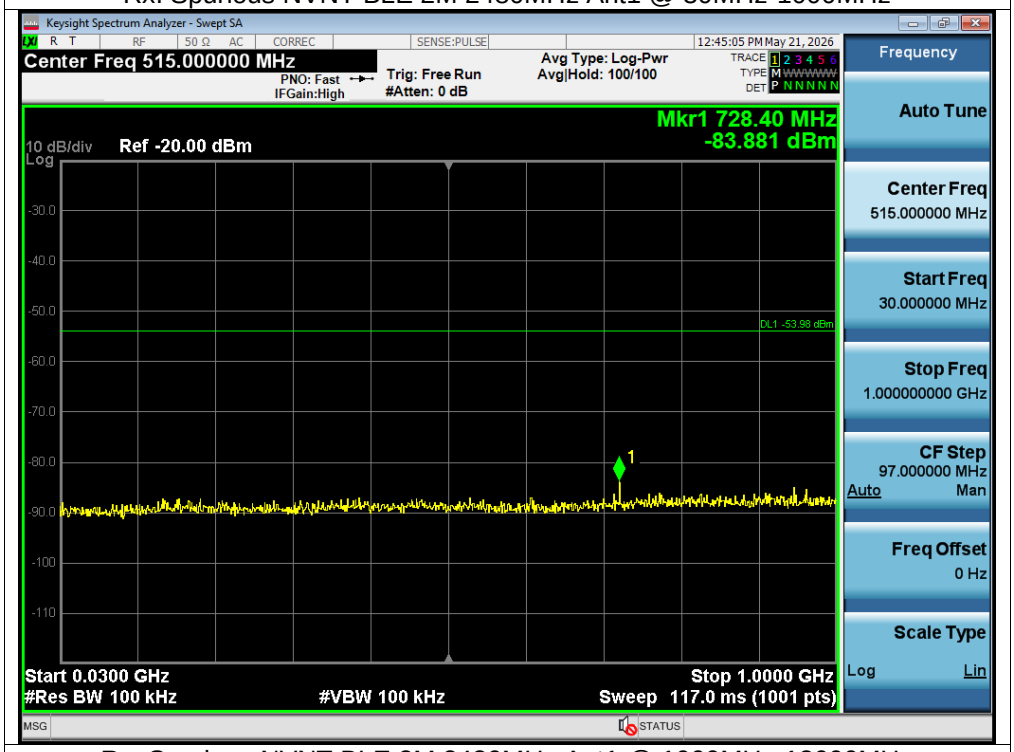
Rx. Spurious NVNT BLE 2M 2440MHz Ant1 @ 30MHz-1000MHz



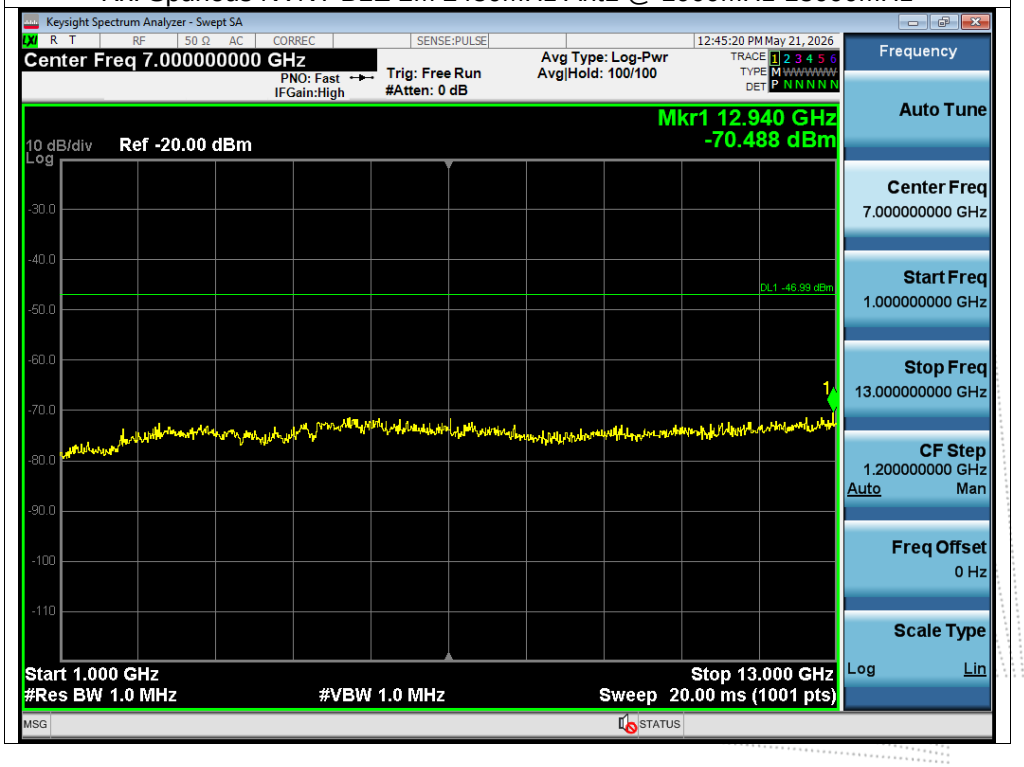
Rx. Spurious NVNT BLE 2M 2440MHz Ant1 @ 1000MHz-13000MHz



Rx. Spurious NVNT BLE 2M 2480MHz Ant1 @ 30MHz-1000MHz



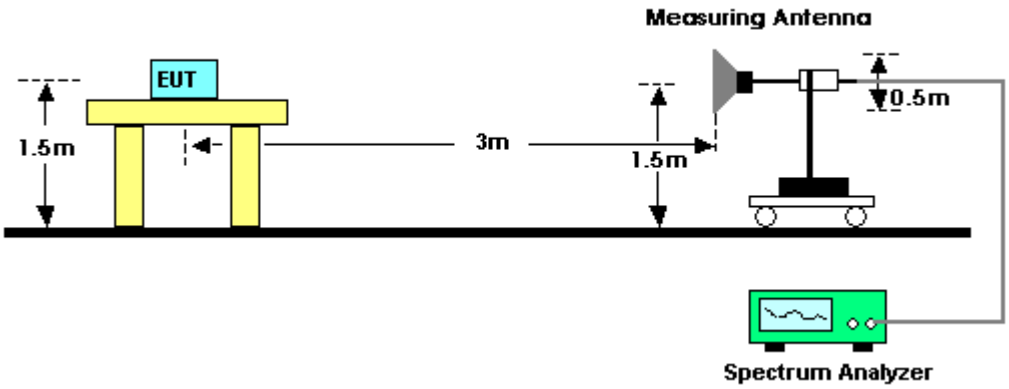
Rx. Spurious NVNT BLE 2M 2480MHz Ant1 @ 1000MHz-13000MHz



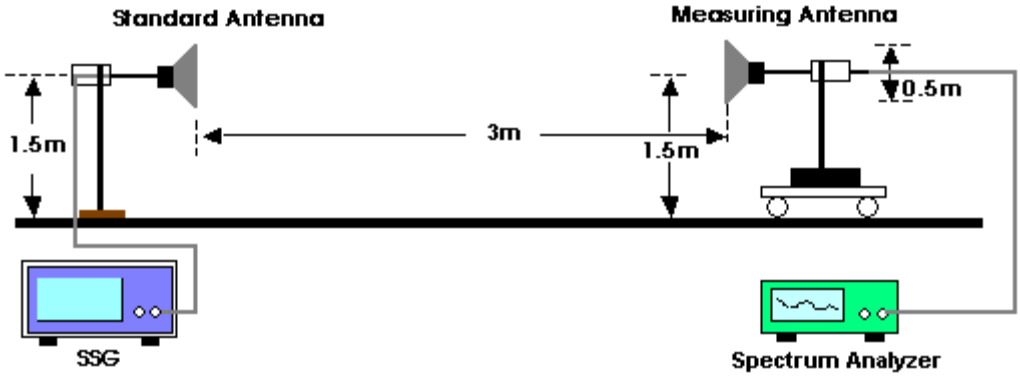
12. Transmission Antenna Gain (Eirp Antenna Power) Measurement

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

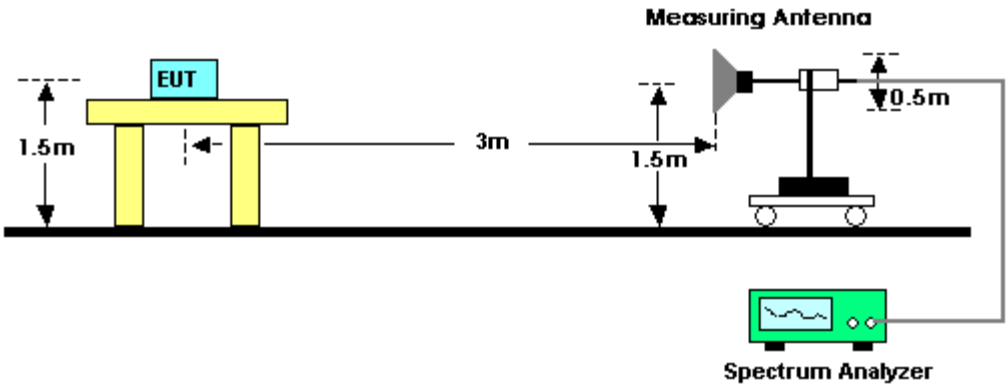
Temperature:	26^{0}C		
Humidity:	54 % RH	Test Voltage	DC 12V

Mode	Frequency (MHz)	Power (dBm/MHz)	Gain (dBi)	EIRP (dBm/MHz)	Limit (dBm/MHz)	Verdict
BLE 1M	2402	3.99	4.28	8.27	12.14	Pass
BLE 1M	2440	4.21	4.28	8.49		
BLE 1M	2480	3.85	4.28	8.13		
BLE 2M	2402	3.99	4.28	8.27		
BLE 2M	2440	4.18	4.28	8.46		
BLE 2M	2480	3.79	4.28	8.07		

Note:EIRP=Power+Gain

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.

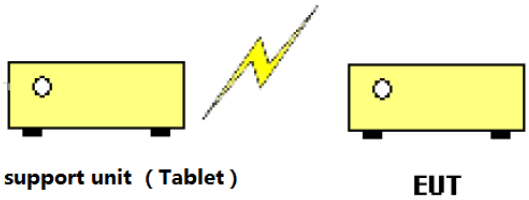
6. Calculate 3dB antenna beam width by the formula below 360/A (If A<1; then A=1).

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.

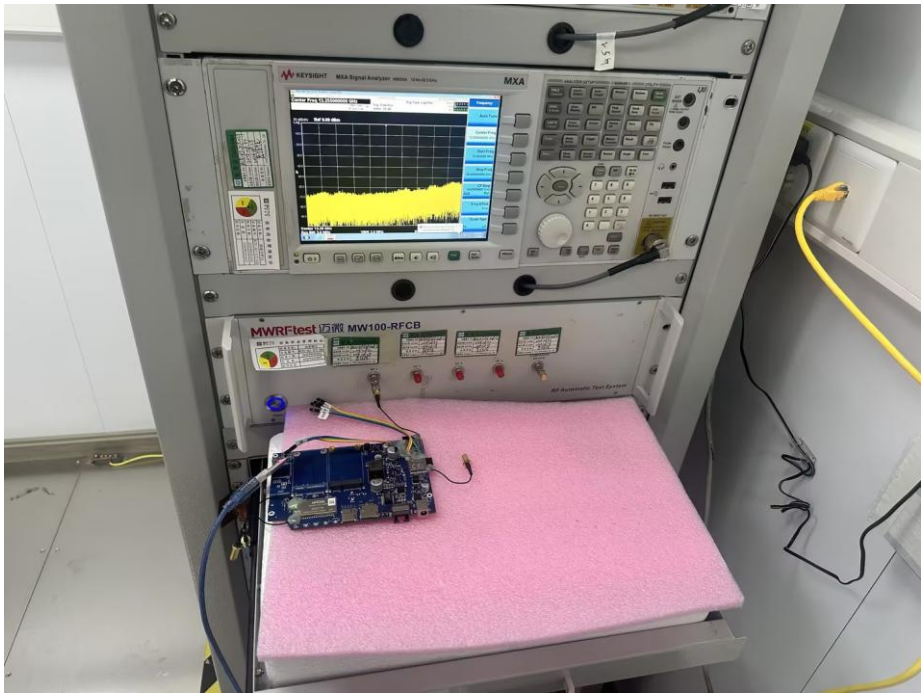
14.5 Test Result

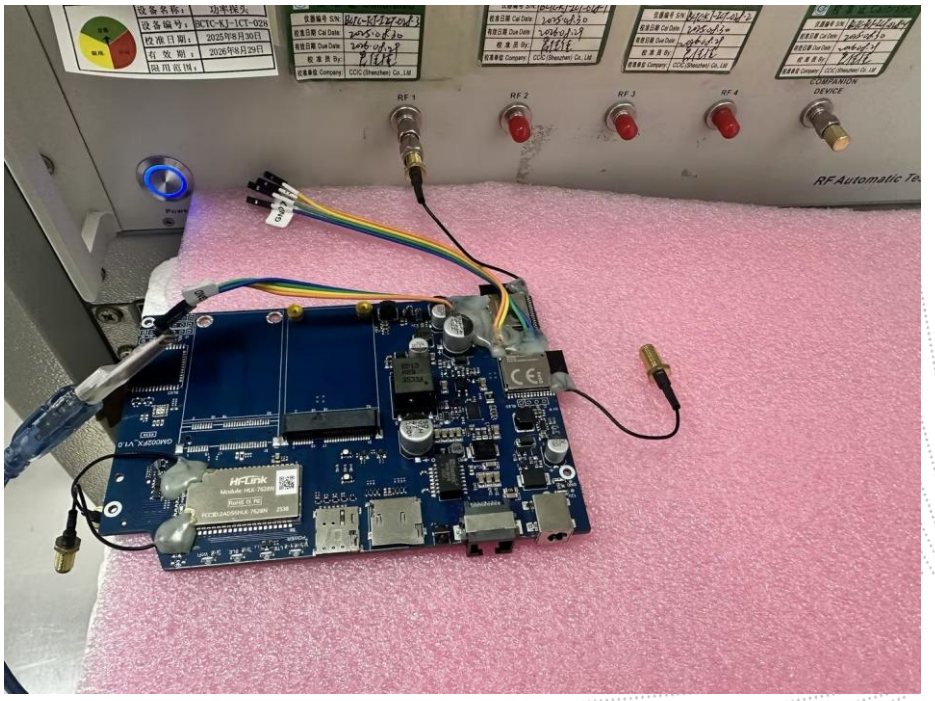
Temperature:	26^{0}C		
Humidity:	54 % RH	Test Voltage	DC 12V
Operation Mode:	GFSK		

Bluetooth Device Address: 52-54-96-BD-C6-17 PASS

15. 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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※※※※※ **END** ※※※※※