FCC PART 15.247
TEST REPORT

On Behalf of

Fujian Youtong Industries Co., Ltd.

North part of 1st, 2nd-3rd floor, Building 1#, M9511 industries Park, No.18, Majiang Road, Mawei District, Fuzhou City, Fujian, China

FCC ID: 2AQBD-60233
Model: YT60233

May 20, 2024

This Report Concerns:	**Equipment Type:**
☒ Original Report	weather station

Test Engineer:	LBi Li / LBi Li
Report Number:	**QCT24ER-1546E-01**
Test Date:	May 07 ~ May 20, 2024
Reviewed By:	Gordon Tan/ Gordon.Tan
Approved By:	Kendy Wang / Kendy Wang
Prepared By:	**Shenzhen QC Testing Laboratory Co., Ltd.** East of 1/F., Building E, Xinghong Science Park, No.111, Shuiku Road, Fenghuanggang, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China **Tel: 0755-23008269** **Fax: 0755-23726780**

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Revision History of This Test Report

Report Number	Description	Issued Date
QCT24ER-1546E-01	Initial Issue	2024-5-20

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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Description	weather station
Model No.	YT60233
Tested Model	YT60233
Sample(s) Status	Engineer sample
Operation Frequency:	802.11b/802.11g/802.11n(HT20): 2412MHz~2462MHz
Channel numbers:	802.11b/802.11g /802.11n(HT20)/: 11
Channel separation:	5MHz
Modulation type:	802.11b: Direct Sequence Spread Spectrum (DSSS) 802.11g/802.11n(H20): Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	PCB Print Antenna
Antenna gain*1:	1.8dBi
Input voltage:	DC 5V (Powered by adapter), DC 4.5V (3*1.5V AAA battery)
Adaptor Information:	Model: XZ0500-1000U Input: 100-240VAC 50/60Hz 0.4A Output: 5.0V ⎓ 1.0A, 5.0W
Trade Mark:	N/A
Applicant:	Fujian Youtong Industries Co., Ltd.
Address:	North part of 1st, 2nd-3rd floor, Building 1#, M9511 industries Park, No.18, Majiang Road,Mawei District, Fuzhou City, Fujian, China
Manufacturer:	Fujian Youtong Industries Co., Ltd.
Address:	North part of 1st, 2nd-3rd floor, Building 1#, M9511 industries Park, No.18, Majiang Road,Mawei District, Fuzhou City, Fujian, China
Sample No.:	Y24E1546E01YN（standalone DC version）, Y24E1546E02YN（DC plus battery version）

Note: *1This information provided by Manufacturer, SZ QC Lab is not responsible for the accuracy of this information.

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1.2 System Test Configuration

1.2.1 Channel List

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)
	802.11b/802.11g/802.11n(HT20)
Lowest channel	2412MHz
Middle channel	2437MHz
Highest channel	2462MHz

1.2.2 EUT Exercise Software

The device was tested with the worst case was performed as below:

Test Mode	Data Rate	Power Level
802.11b	1Mbps	15
802.11g	6Mbps	15
802.11n(HT20)	6.5Mbps	15

" BLDevCube " exercise software was made to the EUT tested. The software and power level was provided by the applicant.

1.2.3 Support Equipment

Manufacturer	Description	Model	Serial Number
/	/	/	/

1.2.4 Test mode

Transmitting mode: Keep the EUT in continuously transmitting.

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1.3 Test Facility

Test Firm : Shenzhen QC Testing Laboratory Co., Ltd.

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19. The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

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

CNAS – Registration No.: L8464

The EMC Laboratory has been accredited by CNAS, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

A2LA Certificate Number: 6759.01

The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 561109

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 29628

CAB identifier: CN0141

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

1.4 Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±1.42 x10^{-4}%
RF output power, conducted	±1.06dB
Power Spectral Density, conducted	±1.06dB
Unwanted Emissions, conducted	±2.51dB
AC Power Line Conducted Emission	±1.80dB
Radiated Spurious Emission test (9kHz-30MHz)	±2.66dB
Radiated Spurious Emission test (30MHz-1000MHz)	±4.04dB
Radiated Spurious Emission test (1000MHz-18000MHz)	±4.70 dB
Radiated Spurious Emission test (18GHz-40GHz)	±4.80dB
Temperature	±0.8℃
Humidity	±3.2%
DC and low frequency voltages	±0.1%
Time	±5%
Duty cycle	±5%

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

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2. Summary of Test Results

Test Item	Section	Result
Antenna Requirement	FCC part 15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	FCC part 15.207	Pass
Conducted Peak Output Power	FCC part 15.247 (b)(3)	Pass
Channel Bandwidth & 99% Occupied Bandwidth	FCC part 15.247 (a)(2)	Pass
Power Spectral Density	FCC part 15.247 (e)	Pass
Band Edge	FCC part 15.247(d)	Pass
Spurious Emissions	FCC part 15.205/15.209	Pass

Note: 1. Pass: The EUT complies with the essential requirements in the standard.

2.Test according to ANSI C63.10:2013

3.. All indications of Pass/Fail in this report are opinions expressed by Shenzhen QC Testing Laboratory Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.

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3. List of Test and Measurement Instruments

3.1 Conducted Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	EMI Test Receiver	R&S	ESIB 7	2277573376	2024.03.14	2025.03.13
2	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101820	2023.08.21	2024.08.20
3	Artificial Mains Network	SCHWARZBECK	NSLK8126	8126200	2024.03.14	2025.03.13
4	PULSE LIMITER	R&S	ESH3-Z2	100058	2024.03.14	2025.03.13
Conducted Emission Measurement Software: TS						

3.2 Radiated Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Spectrum Analyzer	ROHDE&SCHWARZ	FSV 40	101458	2024.03.14	2025.03.13
2.	Loop Antenna	EMCO	6502	2133	2022.07.23	2024.07.22
3.	Logarithmic compound broadband Antenna	SCKWARZBECK	VULB9168	VULB9168-1-588	2023.04.01	2025.03.31
4.	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB 7	2277573376	2024.03.14	2025.03.13
5.	EMI Test Receiver	R&S	ESPI	101131	2024.03.14	2025.03.13
6.	Horn Antenna	SCHWARZBECK	BBHA9120D	02069	2023.04.01	2025.03.31
7.	Horn Antenna	COM-MW	ZLB7-18-40G -950	12221225	2023.01.12	2025.01.09
8.	Amplifier	R&S	BBV9721	9721-031	2024.03.14	2025.03.13
9.	Amplifier	HPX	BP-01G-18G	210902	2024.03.14	2025.03.13
10.	Pre-amplifier	COM-MW	DLAN-18000 -40000-02	10229104	2024.03.14	2025.03.13
11.	966 Chamber	ZhongYu Electron	9*6*6	/	2022.07.25	2025.07.24
Radiated Emission Measurement Software: EZ_EMC						

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3.3 RF Conducted test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Wideband Radio Communication Tester	Rohde & Schwarz	CW500	151583	2024.03.14	2025.03.13
2.	Spectrum Analyzer	ROHDE& SCHWARZ	FSV 40	101458	2024.03.14	2025.03.13
3.	Signal Generator	Agilent	N5182A	MY50141563	2024.03.14	2025.03.13
4.	RF Automatic Test System	MW	MW100-RFCB/ MW100-PSB	MW2007004	2024.03.14	2025.03.13
RF Conducted Measurement Software: MTS 8310						

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4. Antenna requirement

Standard requirement: FCC Part15 C Section 15.203 /247(c)

15.203 requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(c) (1)(i) requirement:
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

EUT Antenna: The Ant is PCB Print Antenna, the best case gain of the antenna is 1.8dBi, reference to the Internal photo for details.

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5. Conducted Emissions

5.1 Applicable Standard

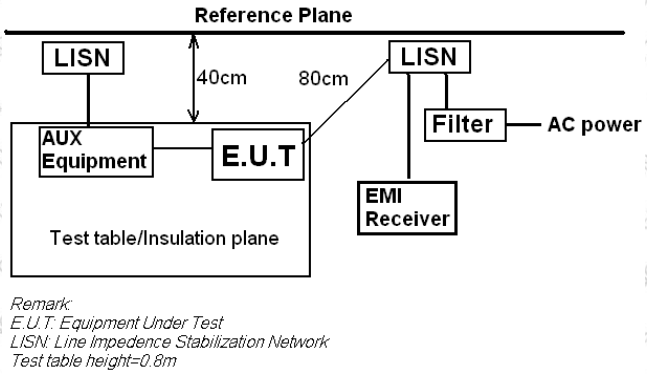
FCC Part15 C Section 15.207

5.2 Limit

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Note *: The level decreases linearly with the logarithm of the frequency.

5.3 Test setup



Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

5.4 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.
RBW=9 kHz, VBW=30 kHz, Sweep time=auto

5.5 Test procedure

1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

5.6 Test Data

Temperature	25.4 ℃	Humidity	55%
ATM Pressure	101.1kPa	Antenna Gain	1.8dBi
Test by	LBi Li	Test result	PASS

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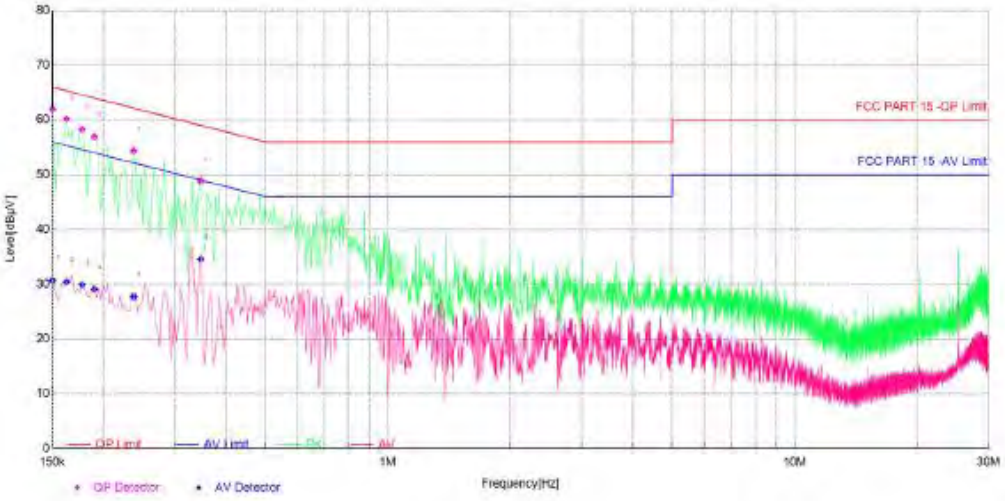
Measurement data:

Pre-scan all test modes, found worst case at 802.11b mode 2412MHz, and so only show the test result of 802.11b mode 2412MHz

Line:



Final Data List

NO.	Freq. [MHz]	Factor[dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Phase	Verdict
1	0.15	10.46	61.99	66.00	4.01	30.73	56.00	25.27	L	PASS
2	0.1625	10.51	60.18	65.34	5.16	30.42	55.34	24.92	L	PASS
3	0.1775	10.57	58.28	64.60	6.32	29.93	54.60	24.67	L	PASS
4	0.19	10.62	56.93	64.04	7.11	29.08	54.04	24.96	L	PASS
5	0.2375	10.66	54.33	62.18	7.85	27.72	52.18	24.46	L	PASS
6	0.3475	10.70	48.76	59.02	10.26	34.57	49.02	14.45	L	PASS

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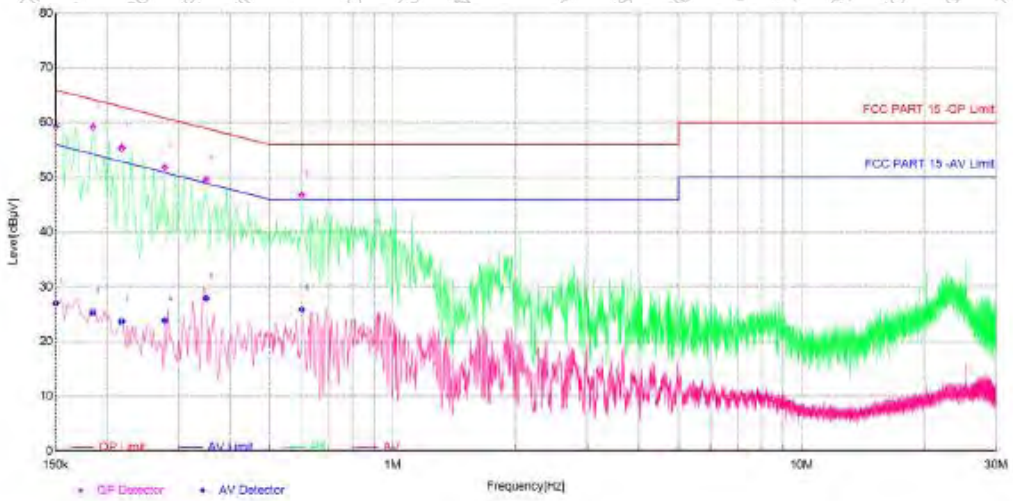
Neutral:



Final Data List										
NO.	Freq. [MHz]	Factor[dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Phase	Verdict
1	0.15	10.36	59.31	66.00	6.69	27.01	56.00	28.99	N	PASS
2	0.185	10.44	59.21	64.26	5.05	25.28	54.26	28.98	N	PASS
3	0.2175	10.54	55.38	62.91	7.53	23.69	52.91	29.22	N	PASS
4	0.2775	10.75	51.83	60.89	9.06	23.87	50.89	27.02	N	PASS
5	0.35	10.70	49.51	58.96	9.45	27.93	48.96	21.03	N	PASS
6	0.6	10.63	46.74	56.00	9.26	25.84	46.00	20.16	N	PASS

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

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6. Conducted Peak Output Power

6.1 Applicable Standard

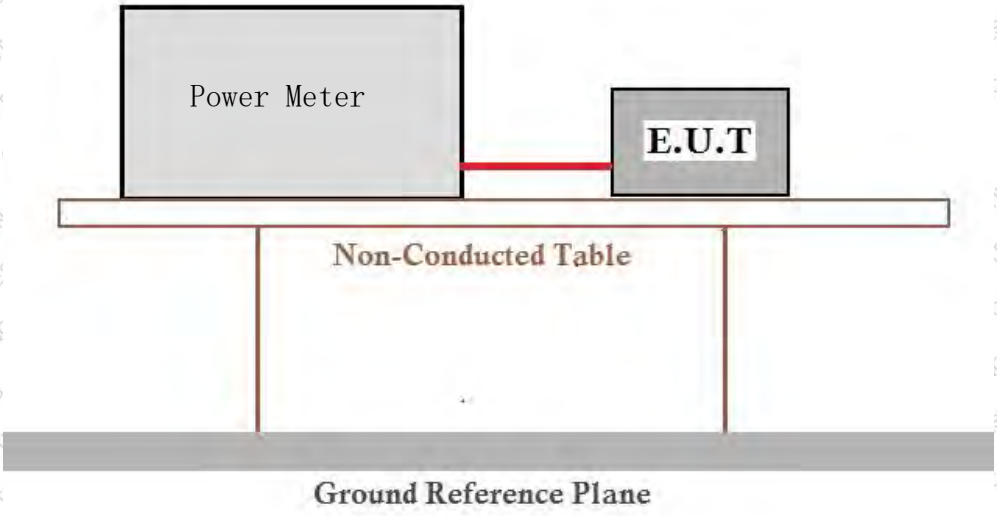
FCC Part15 C Section 15.247 (b)(3)

6.2 Limit

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

6.3 Test setup



6.4 Test Data

Temperature	23.2 ℃	Humidity	49 %
ATM Pressure	101.1kPa	Antenna Gain	1.8dBi
Test by	LBi Li	Test result	PASS

Please refer to following table and plots.

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Output Power:

Modulation	CH No.	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Verdict
802.11b	01	2412	15.57	≤30	PASS
	06	2437	16.29	≤30	PASS
	11	2462	16.17	≤30	PASS
802.11g	01	2412	14.96	≤30	PASS
	06	2437	15.00	≤30	PASS
	11	2462	14.68	≤30	PASS
802.11 n(HT20)	01	2412	15.83	≤30	PASS
	06	2437	15.86	≤30	PASS
	11	2462	15.50	≤30	PASS

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7. Channel Bandwidth & 99% Occupied Bandwidth

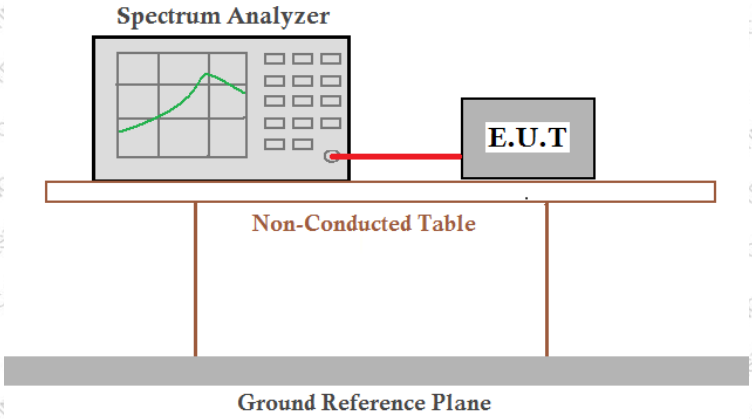
7.1 Applicable Standard

FCC Part15 C Section 15.247 (a)(2)

7.2 Limit

The minimum 6 dB bandwidth shall be 500 kHz.

7.3 Test setup



7.4 Test Procedure

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

• The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.

• The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

7.5 Test Data

Temperature	23.2 ℃	Humidity	49 %
ATM Pressure	101.1kPa	Antenna Gain	1.8dBi
Test by	LBi Li	Test result	PASS

Please refer to following table and plots.

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DTS Bandwidth:

Modulation	CH No.	Frequency (MHz)	DTS Bandwidth (MHz)	Limit (MHz)	Verdict
802.11b	01	2412	8.526	0.5	PASS
	06	2437	8.502	0.5	PASS
	11	2462	8.538	0.5	PASS
802.11g	01	2412	15.633	0.5	PASS
	06	2437	15.45	0.5	PASS
	11	2462	15.093	0.5	PASS
802.11 n(HT20)	01	2412	16.284	0.5	PASS
	06	2437	16.056	0.5	PASS
	11	2462	15.309	0.5	PASS

99% Occupied Bandwidth:

Modulation	CH No.	Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Verdict
802.11b	01	2412	12.662	---	PASS
	06	2437	12.803	---	PASS
	11	2462	12.854	---	PASS
802.11g	01	2412	16.402	---	PASS
	06	2437	16.42	---	PASS
	11	2462	16.435	---	PASS
802.11 n(HT20)	01	2412	17.512	---	PASS
	06	2437	17.563	---	PASS
	11	2462	17.575	---	PASS

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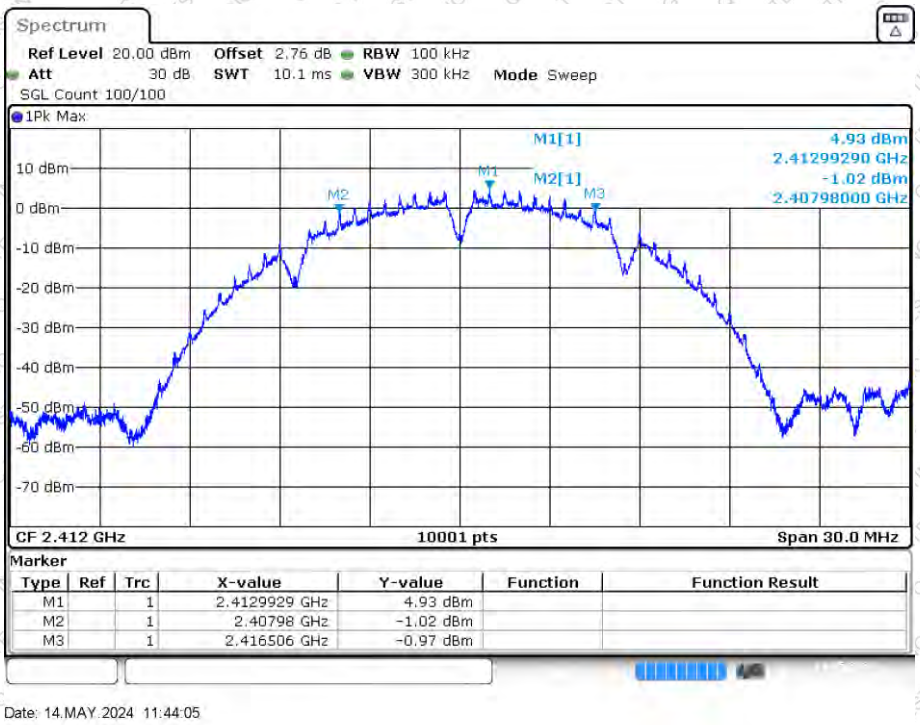
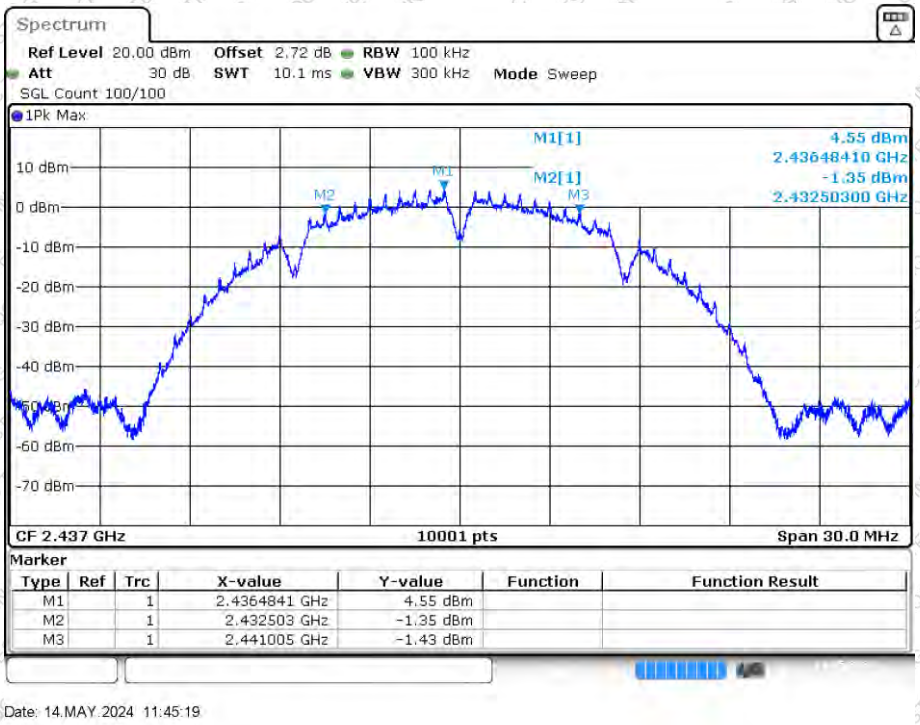
-6dB Bandwidth NVNT b 2412MHz Ant1



-6dB Bandwidth NVNT b 2437MHz Ant1



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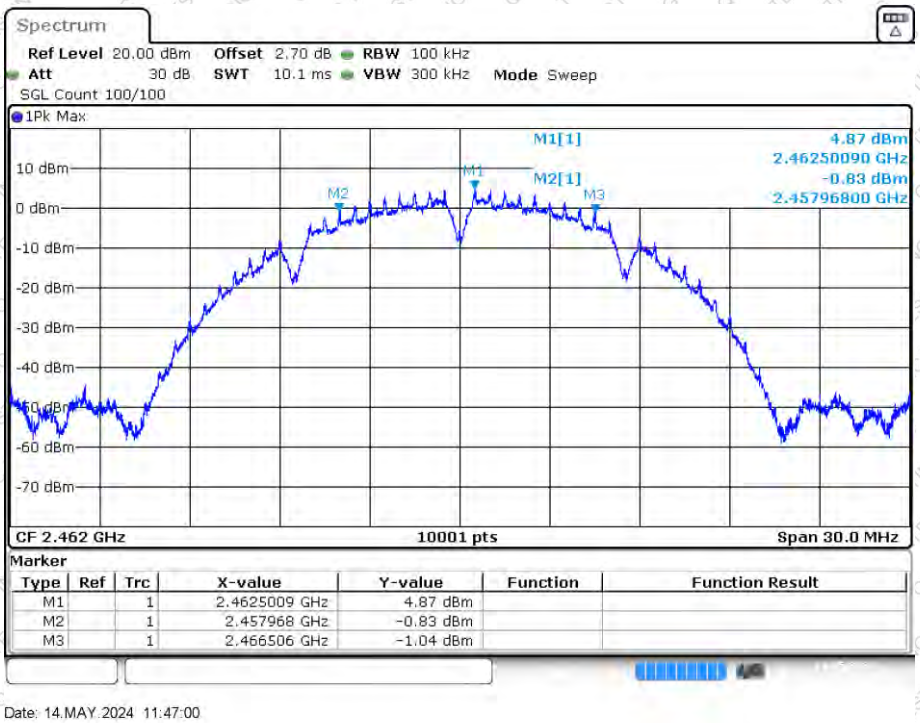
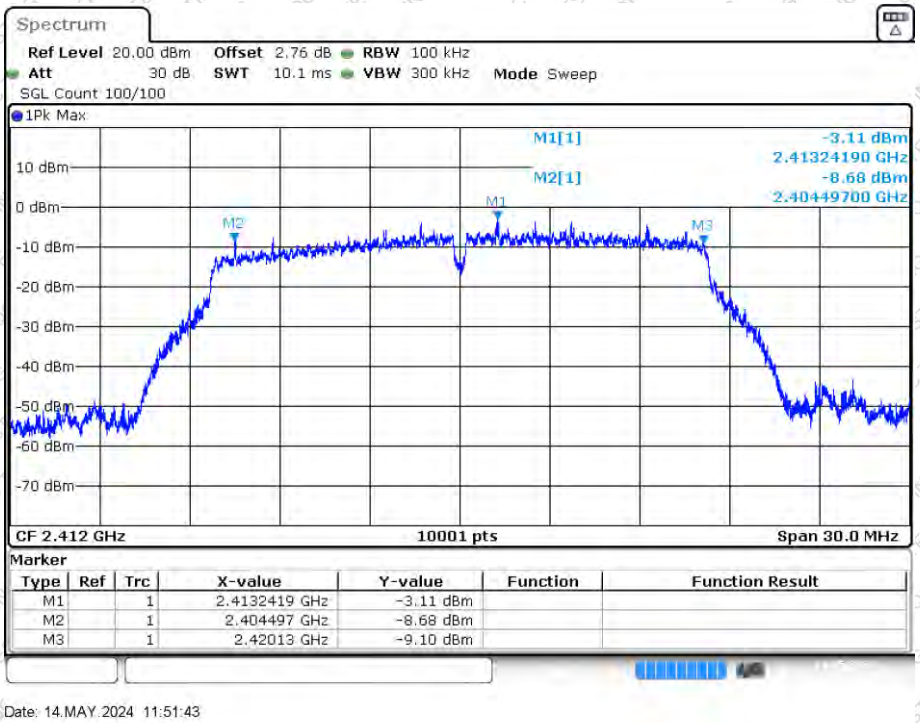
-6dB Bandwidth NVNT b 2462MHz Ant1



-6dB Bandwidth NVNT g 2412MHz Ant1



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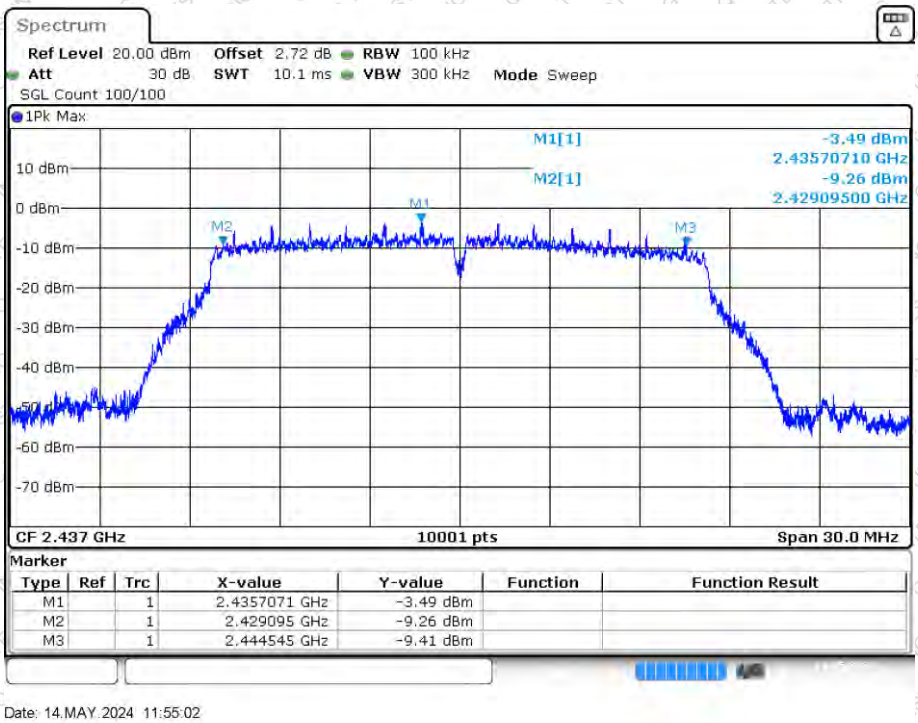
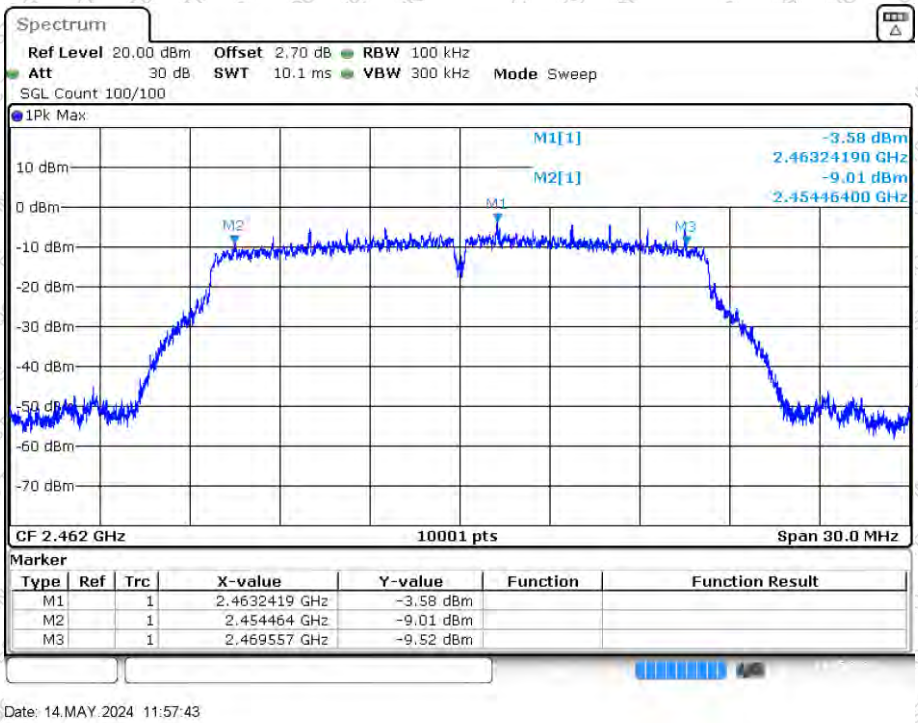
-6dB Bandwidth NVNT g 2437MHz Ant1



-6dB Bandwidth NVNT g 2462MHz Ant1



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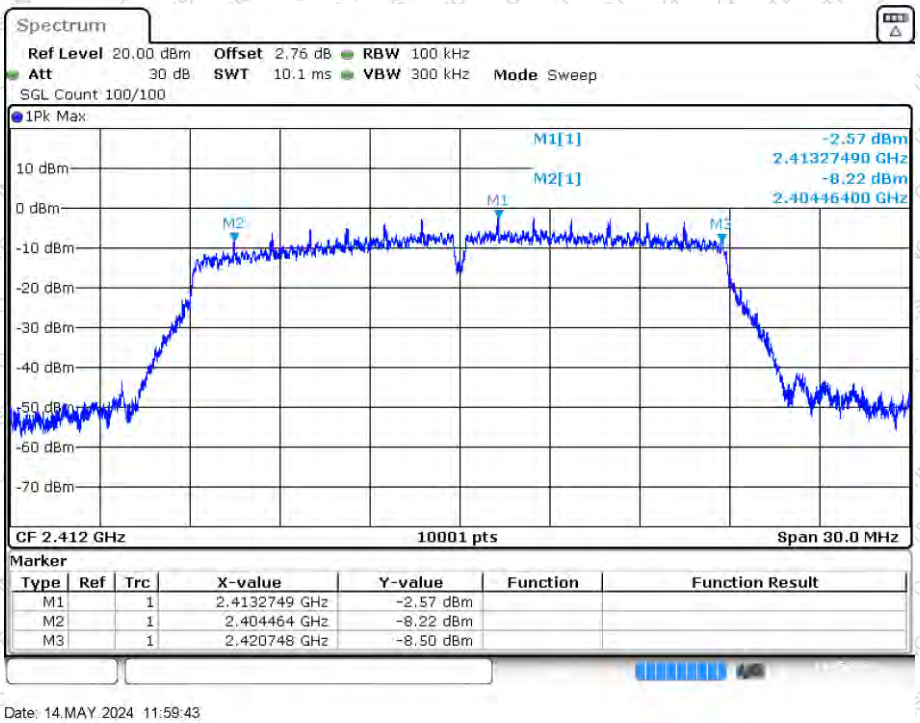
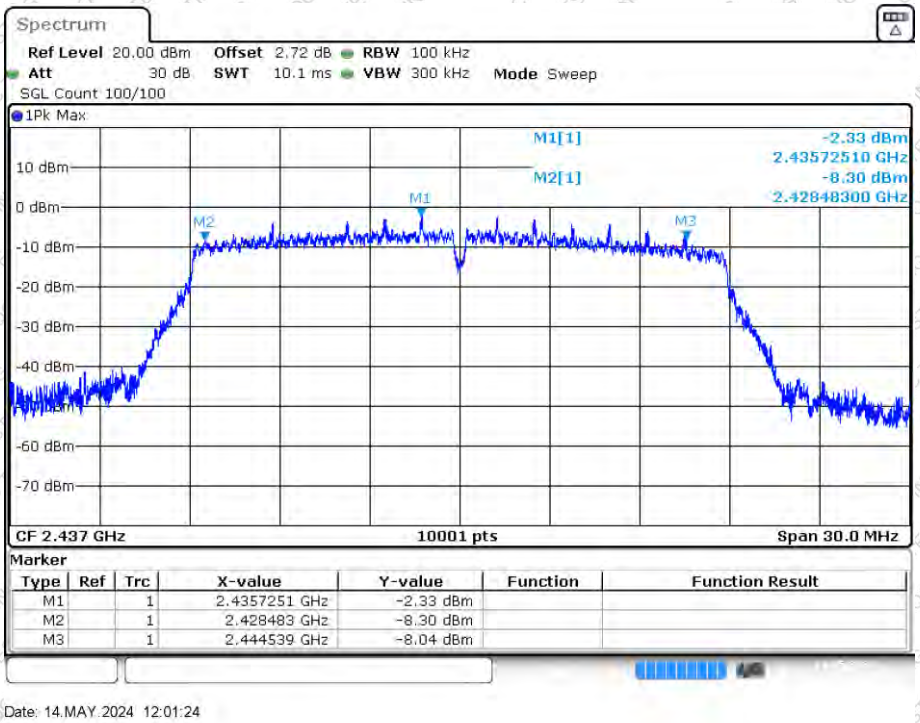
-6dB Bandwidth NVNT n20 2412MHz Ant1



-6dB Bandwidth NVNT n20 2437MHz Ant1



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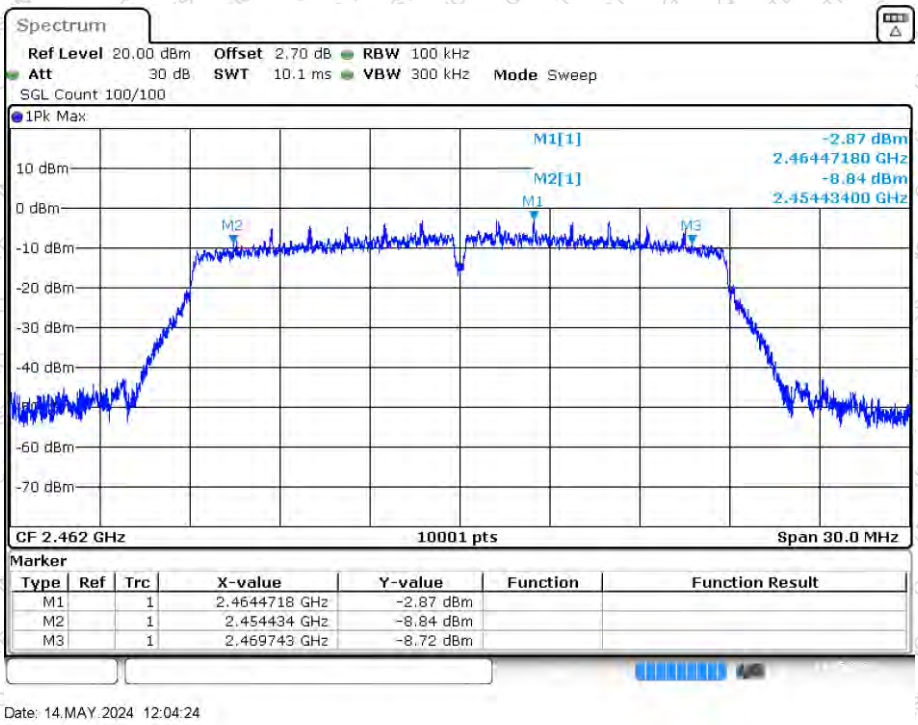
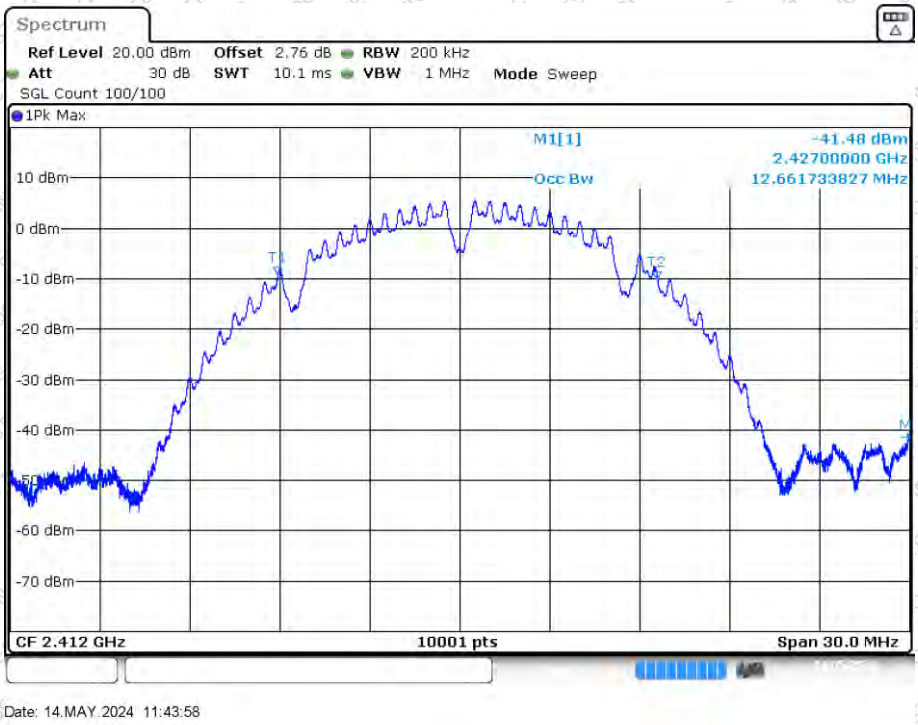
-6dB Bandwidth NVNT n20 2462MHz Ant1



OBW NVNT b 2412MHz Ant1



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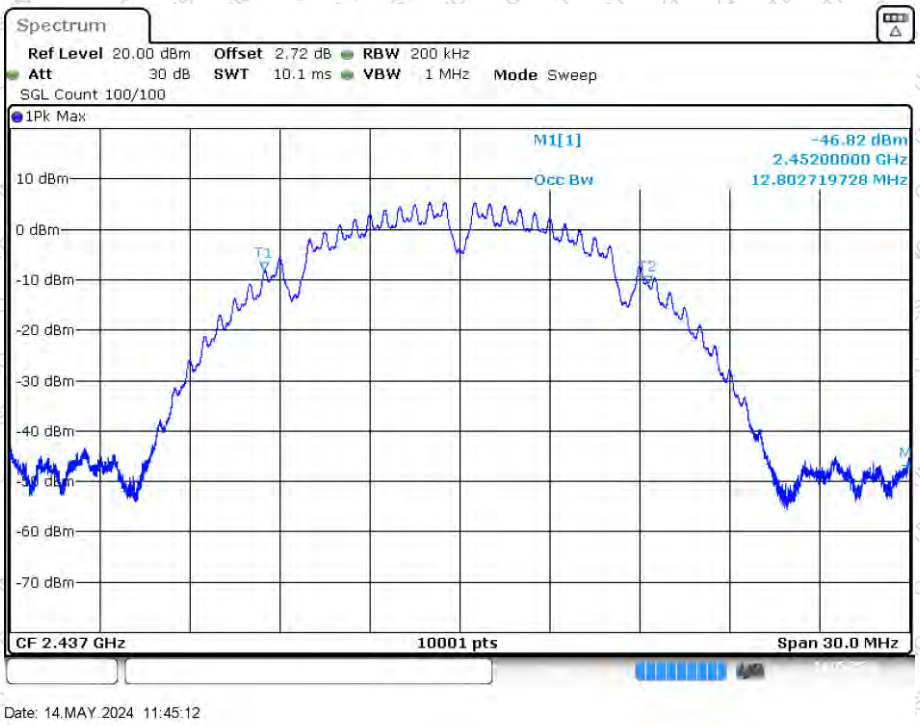
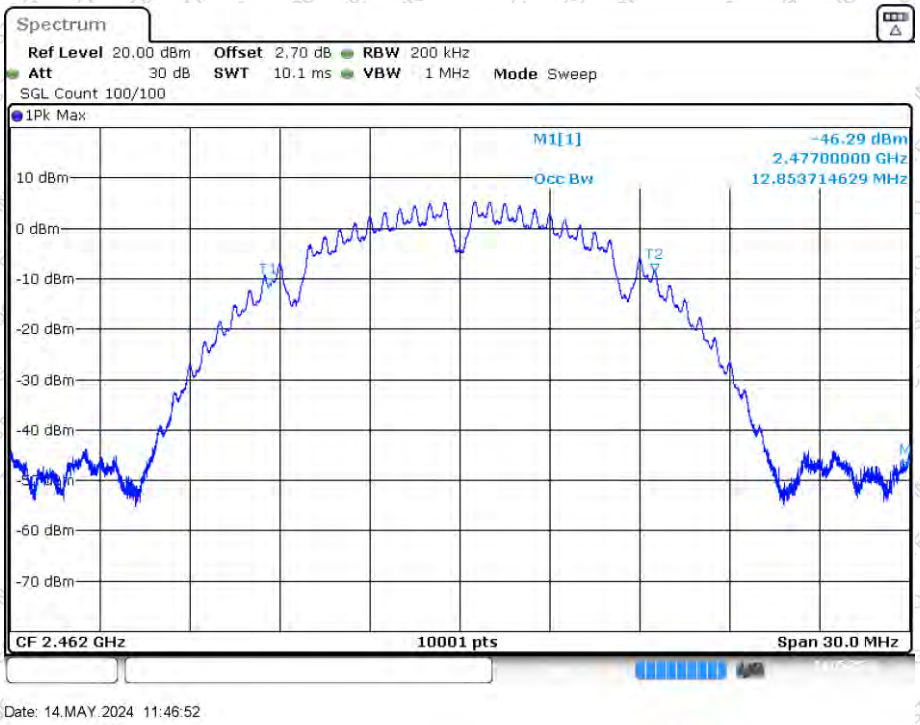
OBW NVNT b 2437MHz Ant1



OBW NVNT b 2462MHz Ant1



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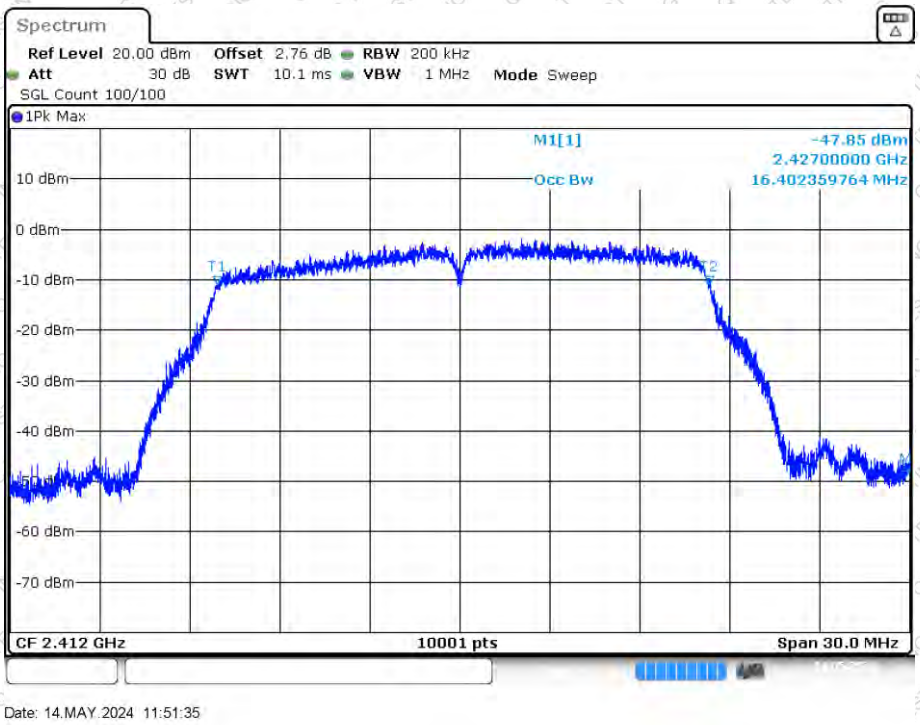
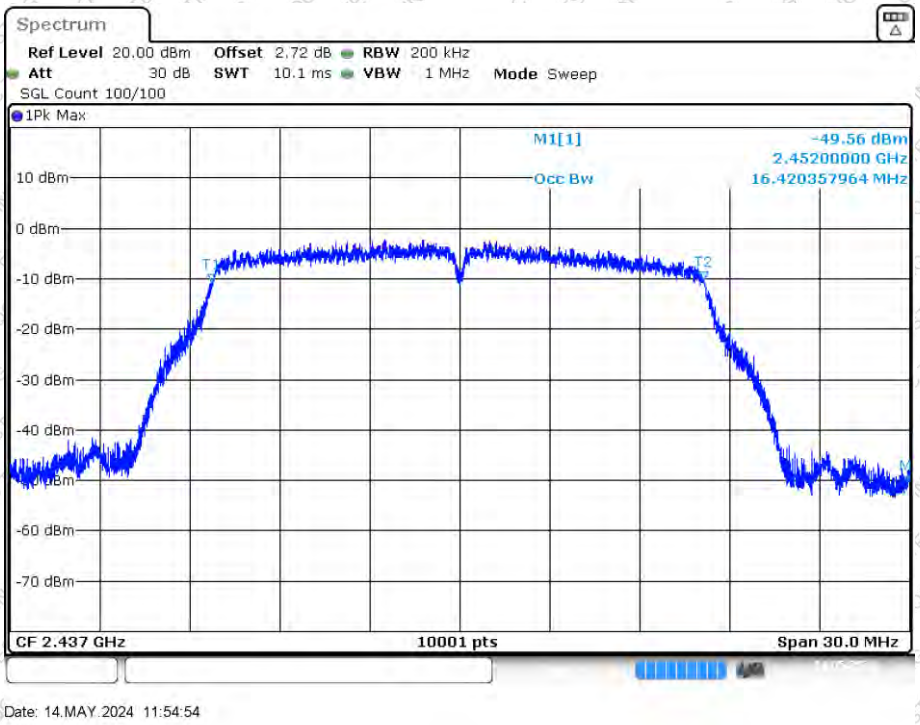
OBW NVNT g 2412MHz Ant1



OBW NVNT g 2437MHz Ant1



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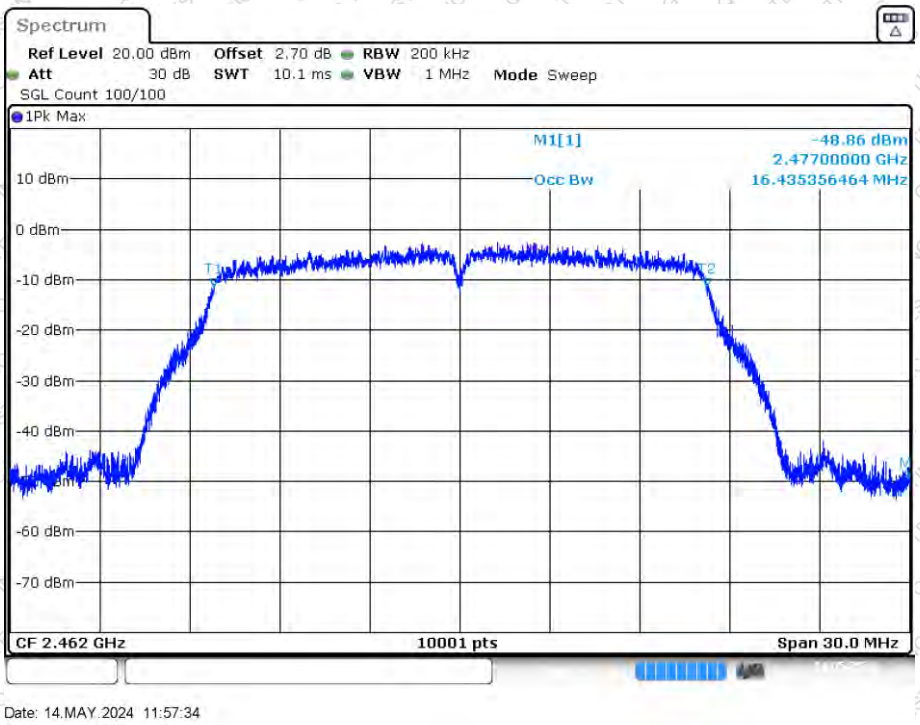
OBW NVNT g 2462MHz Ant1



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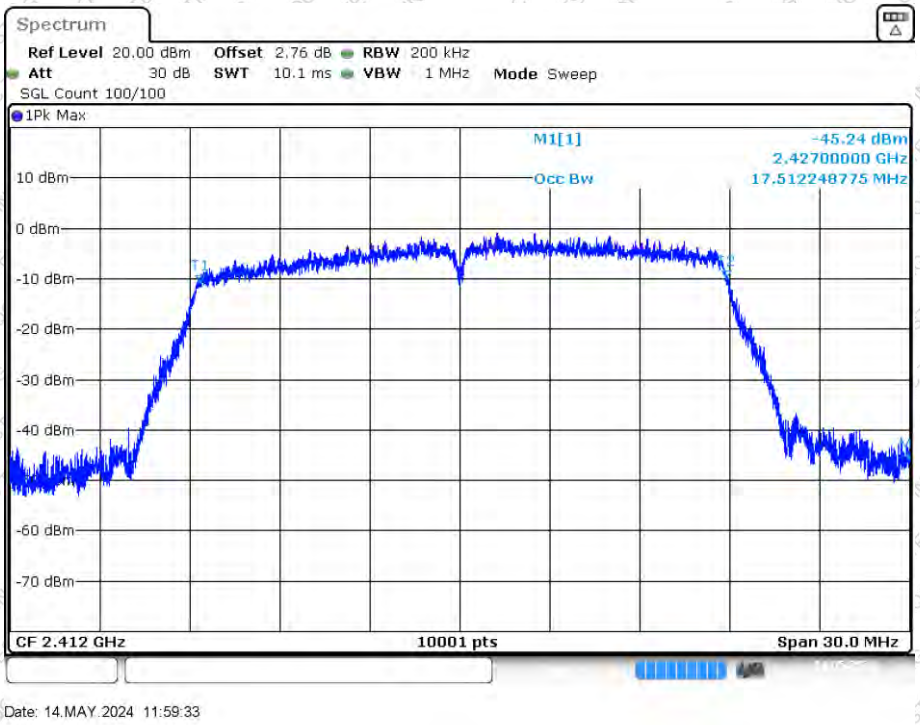

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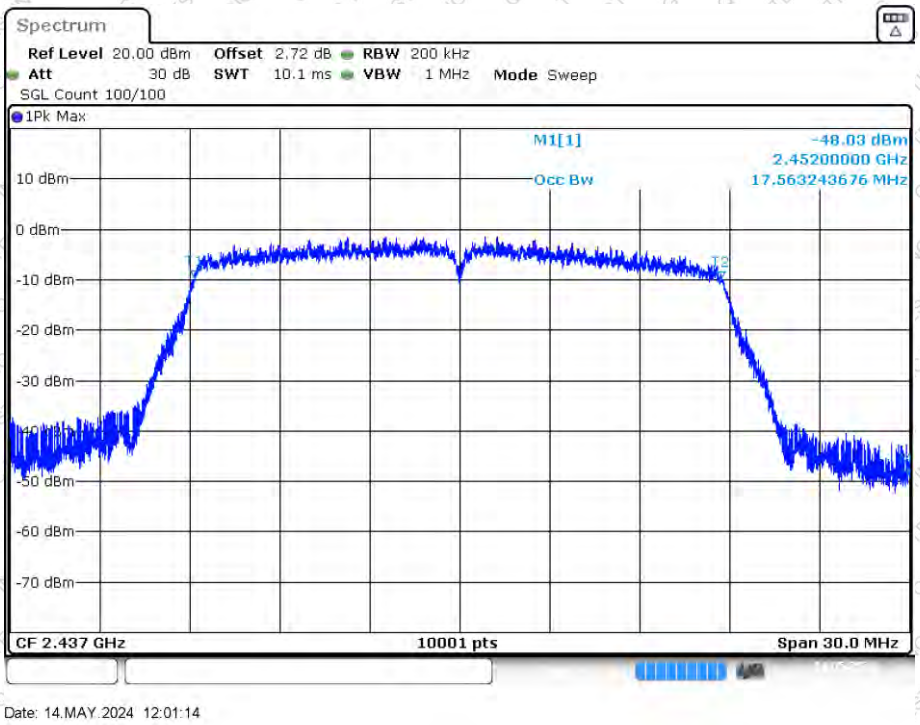
OBW NVNT n20 2437MHz Ant1



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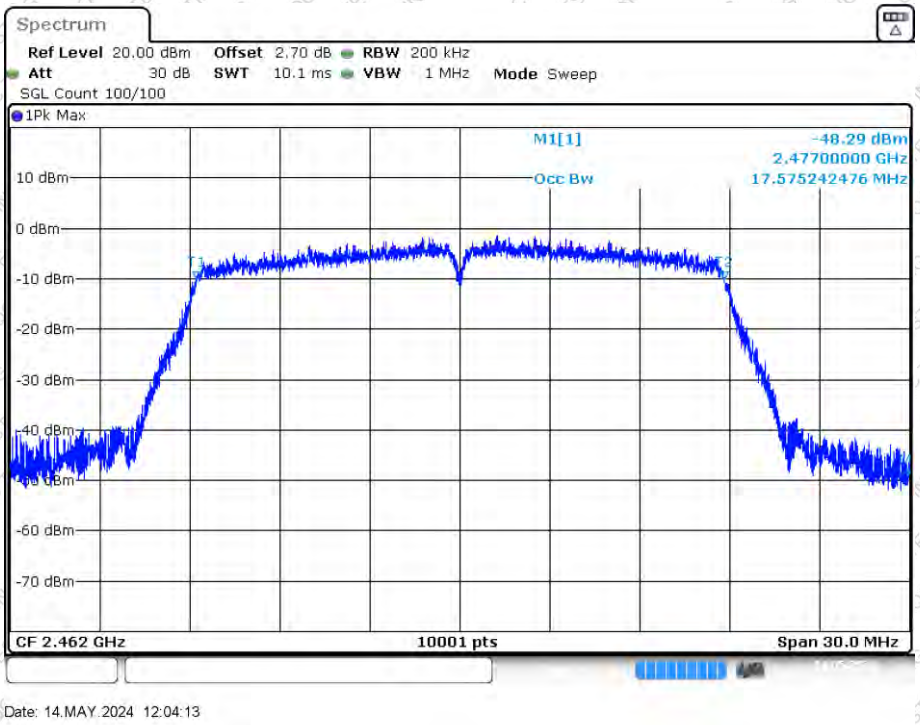

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8. Power Spectral Density

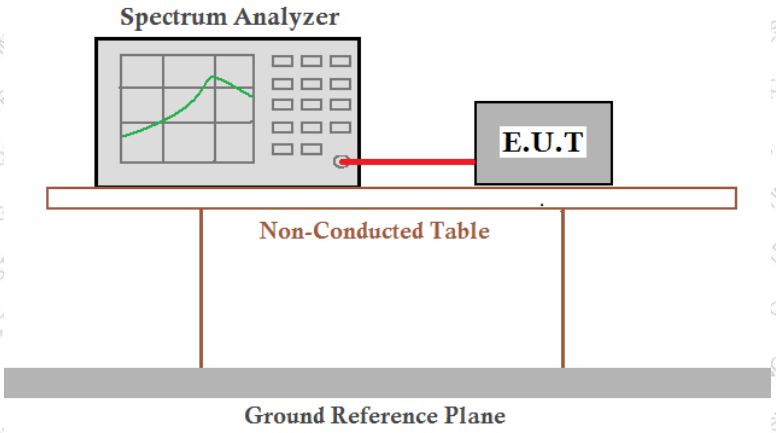
8.1 Applicable Standard

FCC Part15 C Section 15.247 (e)

8.2 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

8.3 Test setup



8.4 Test Procedure

Refer to KDB558074 D01 15.247 Meas Guidance v05r02

8.5 Test Data

Temperature	23.2 ℃	Humidity	49 %
ATM Pressure	101.1kPa	Antenna Gain	1.8dBi
Test by	LBi Li	Test result	PASS

Please refer to following table and plots.

Modulation	Frequency (MHz)	Max PSD (dBm)	Limit (dBm)	Result
802.11b	2412	-9.24	8	Pass
	2437	-8.89	8	
	2462	-10.04	8	
802.11g	2412	-16.91	8	Pass
	2437	-17.27	8	
	2462	-17.99	8	
802.11 n(HT20)	2412	-17.12	8	Pass
	2437	-16.54	8	
	2462	-17.23	8	

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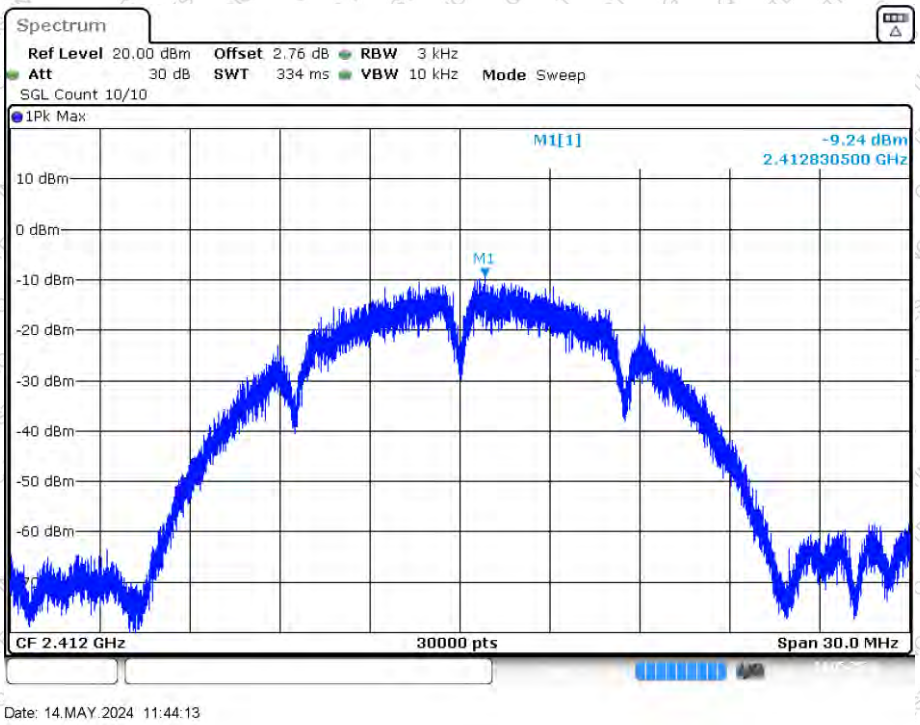
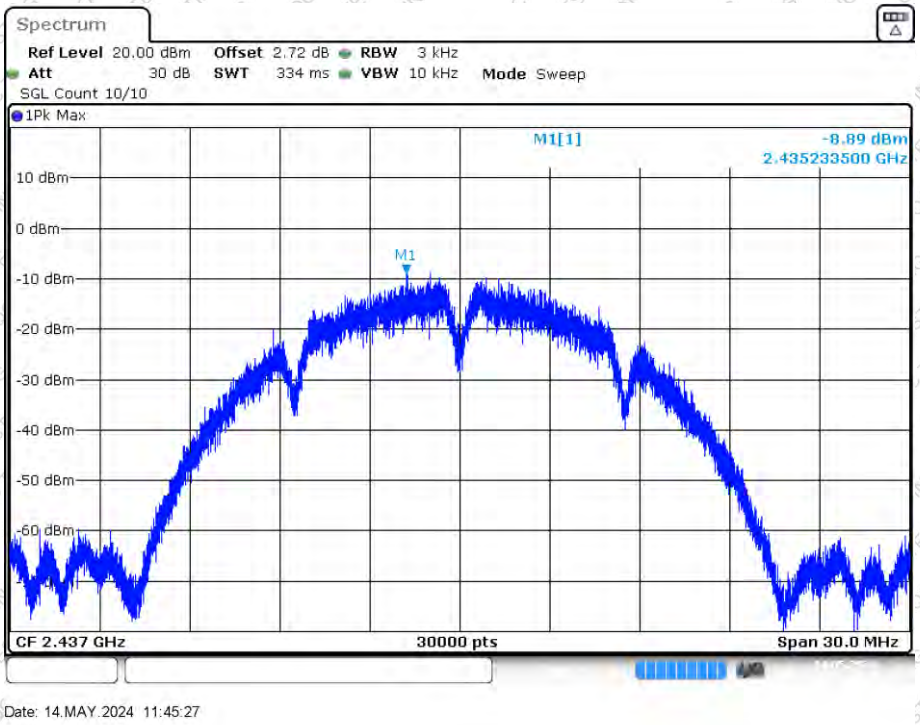
PSD NVNT b 2412MHz Ant1



PSD NVNT b 2437MHz Ant1



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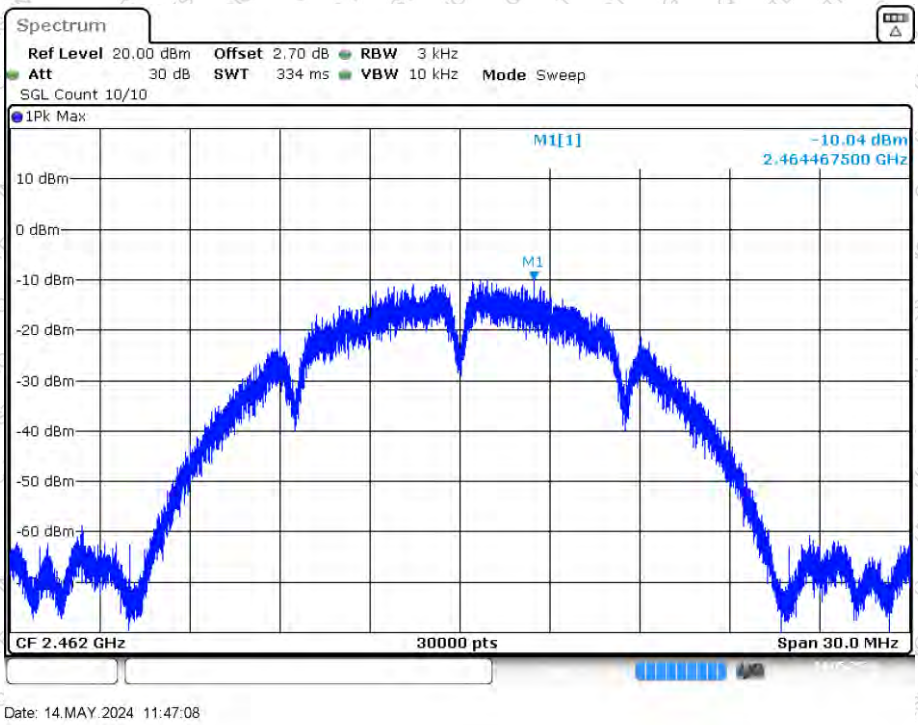
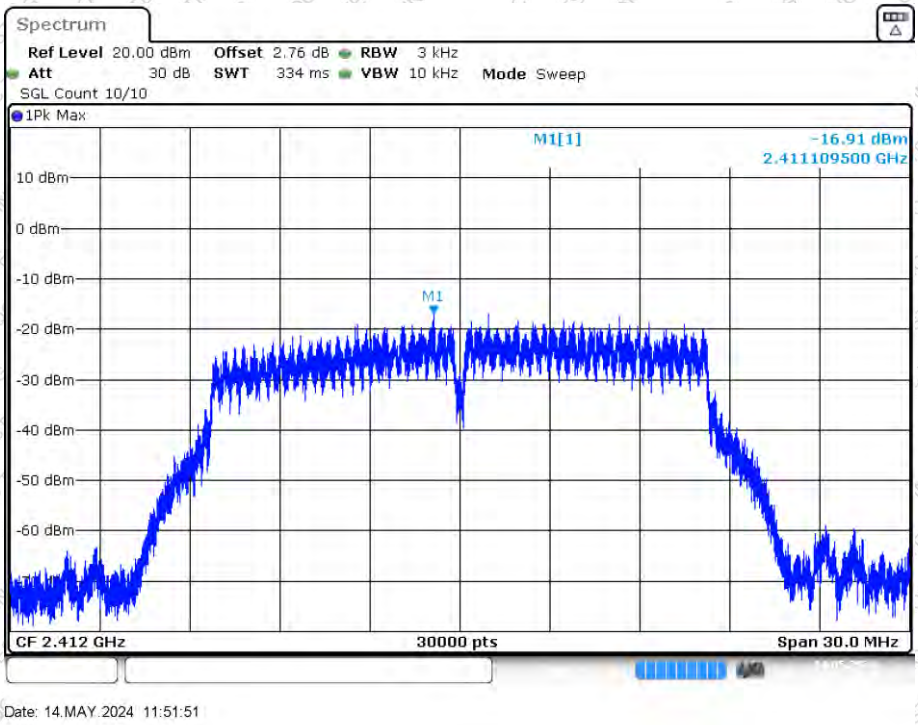
PSD NVNT b 2462MHz Ant1



PSD NVNT g 2412MHz Ant1



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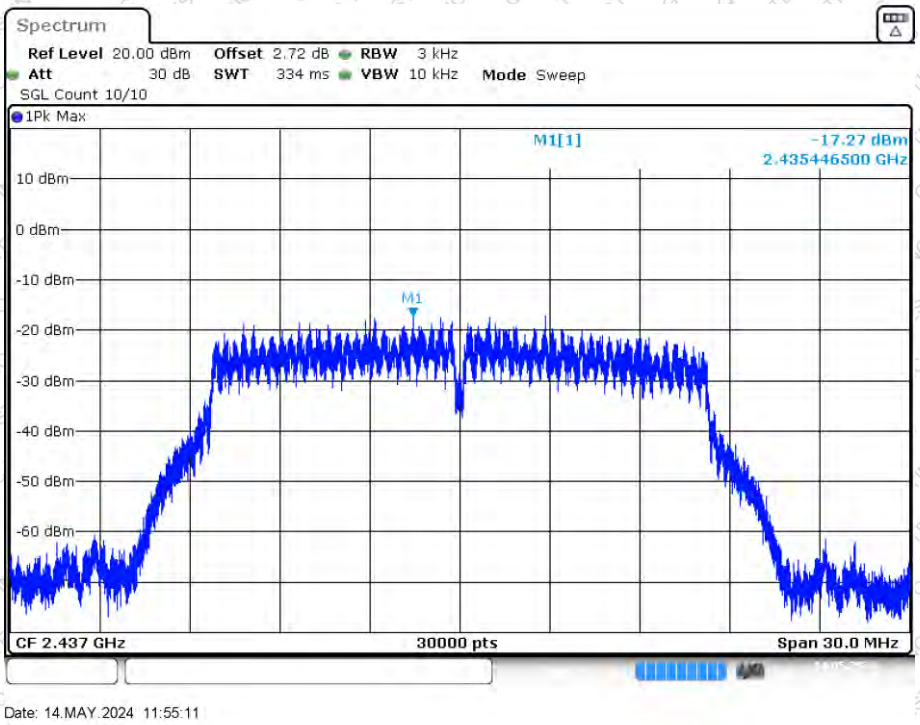
PSD NVNT g 2437MHz Ant1



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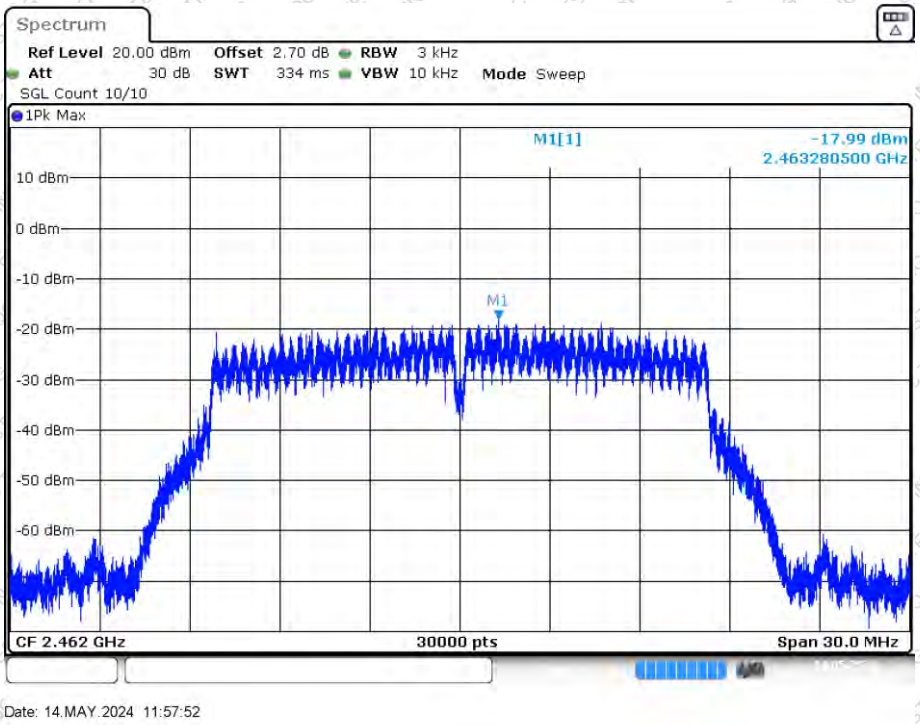

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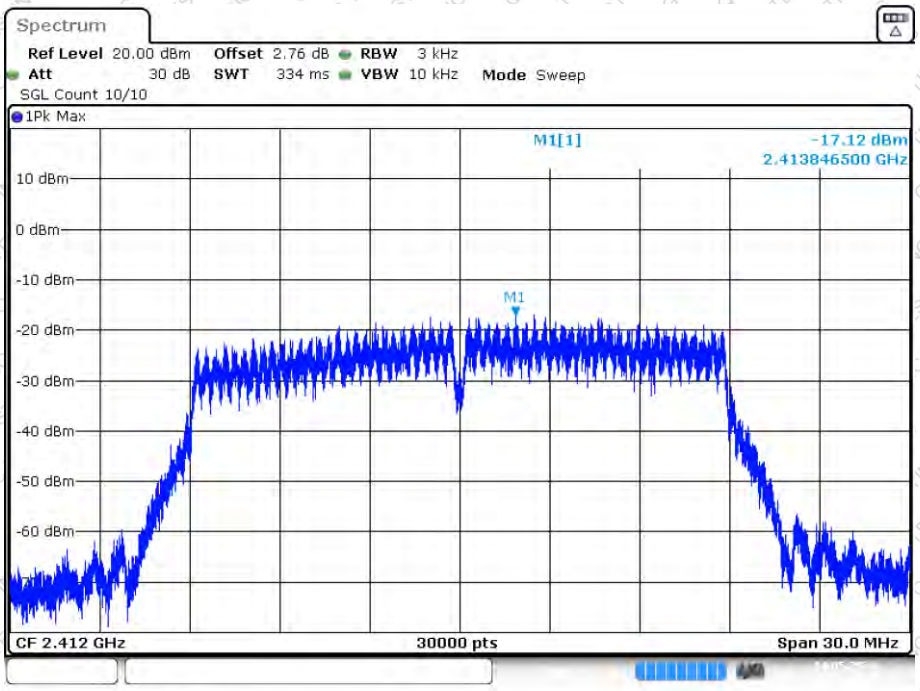
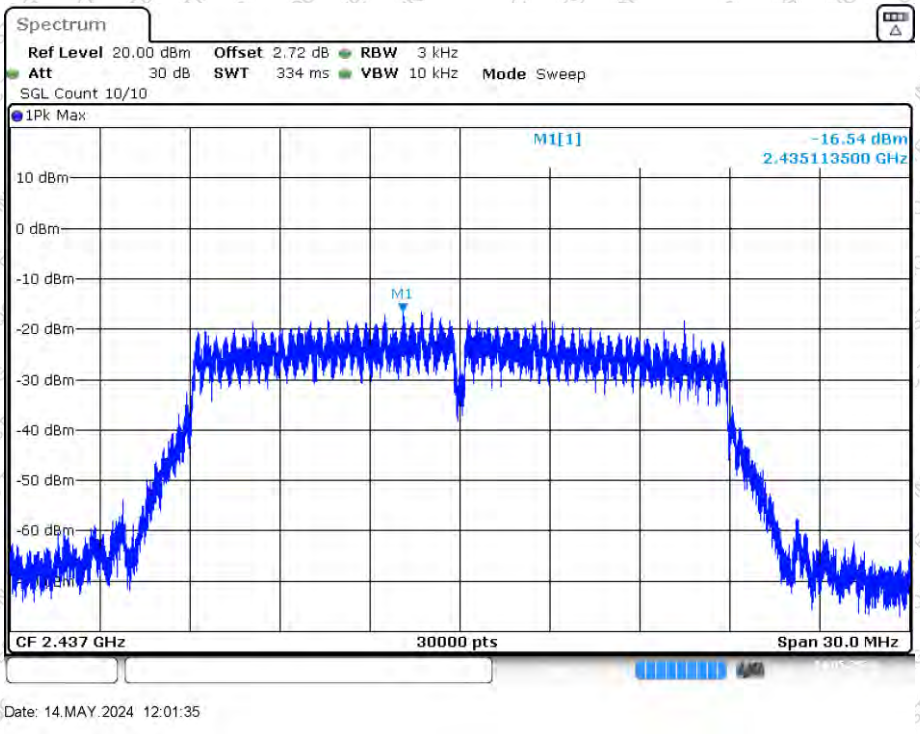
PSD NVNT n20 2412MHz Ant1



PSD NVNT n20 2437MHz Ant1



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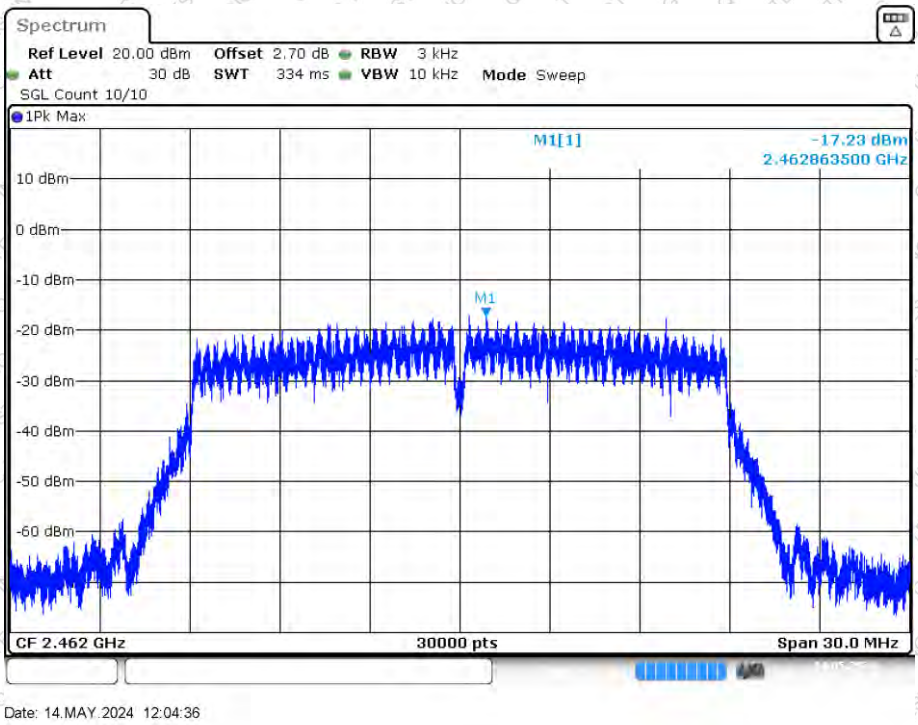
PSD NVNT n20 2462MHz Ant1



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9. Spurious Emission in Non-restricted & restricted Bands

9.1 Conducted Emission Method

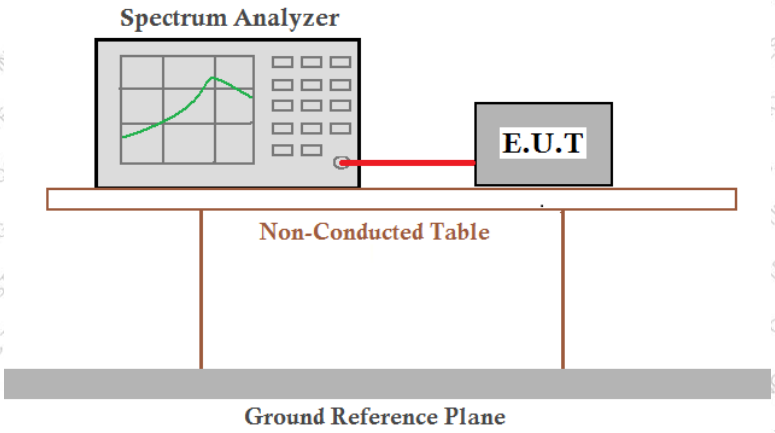
9.1.1 Applicable Standard

FCC Part15 C Section 15.247 (d)

9.1.2 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

9.1.3 Test setup



9.1.4 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- Repeat above procedures until all measured frequencies were complete.

9.1.5 Test Data

Temperature	23.2 ℃	Humidity	49 %
ATM Pressure	101.1kPa	Antenna Gain	1.8dBi
Test by	LBi Li	Test result	PASS

Please refer to following plots.

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Band Edge:

Modulation	CH No.	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
802.11b	01	2412	-58.28	-20	PASS
	11	2462	-57.98	-20	PASS
802.11g	01	2412	-50.93	-20	PASS
	11	2462	-49.05	-20	PASS
802.11 n(HT20)	01	2412	-52.07	-20	PASS
	11	2462	-50.86	-20	PASS

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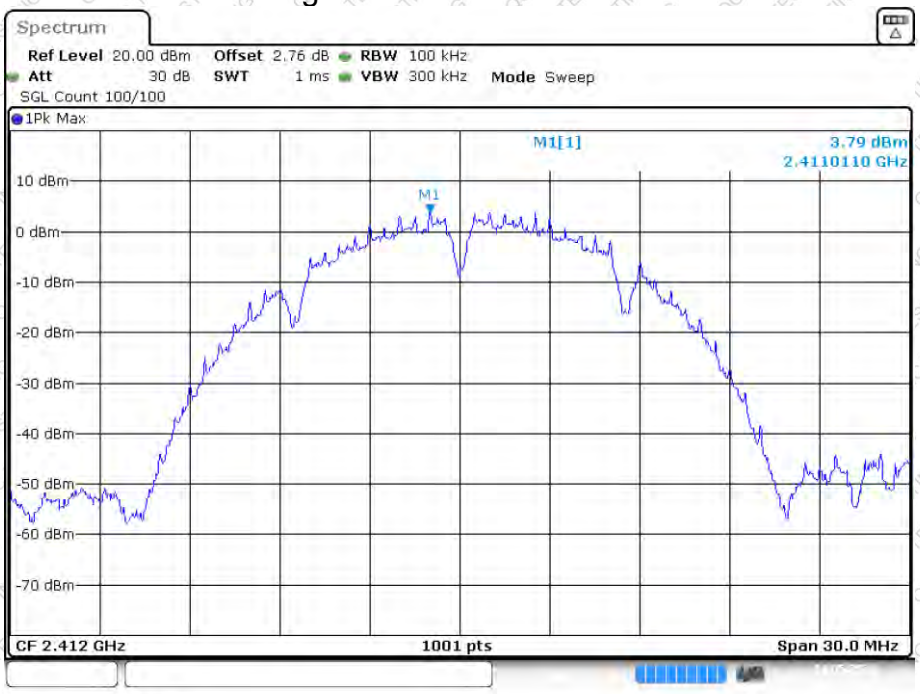
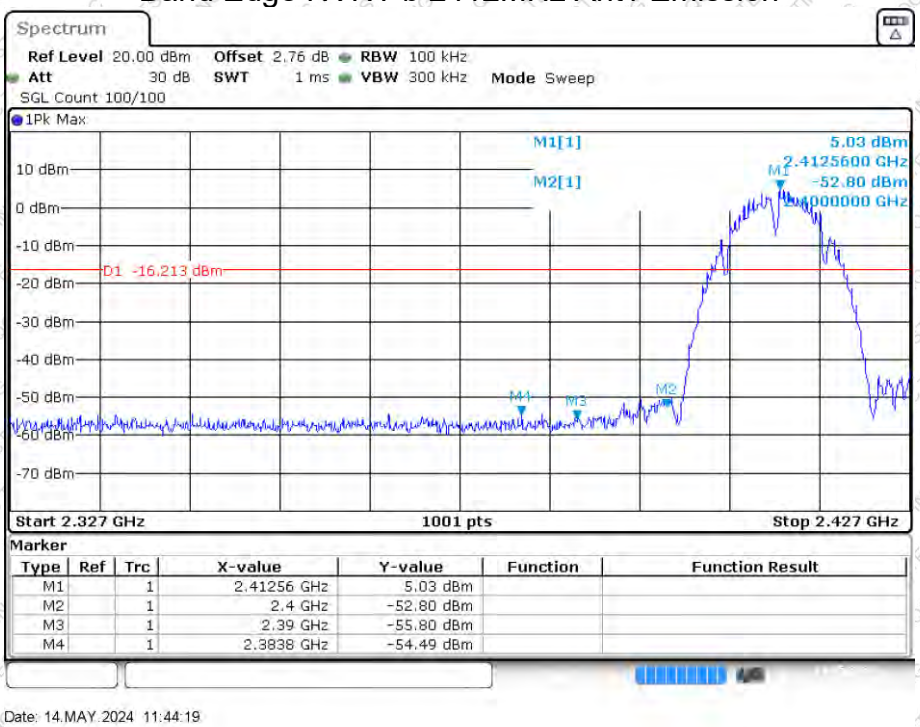
Band Edge NVNT b 2412MHz Ant1 Ref



Date: 14.MAY.2024 11:44:17

Band Edge NVNT b 2412MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41256 GHz	5.03 dBm		
M2		1	2.4 GHz	-52.80 dBm		
M3		1	2.39 GHz	-55.80 dBm		
M4		1	2.3838 GHz	-54.49 dBm		

Date: 14.MAY.2024 11:44:19

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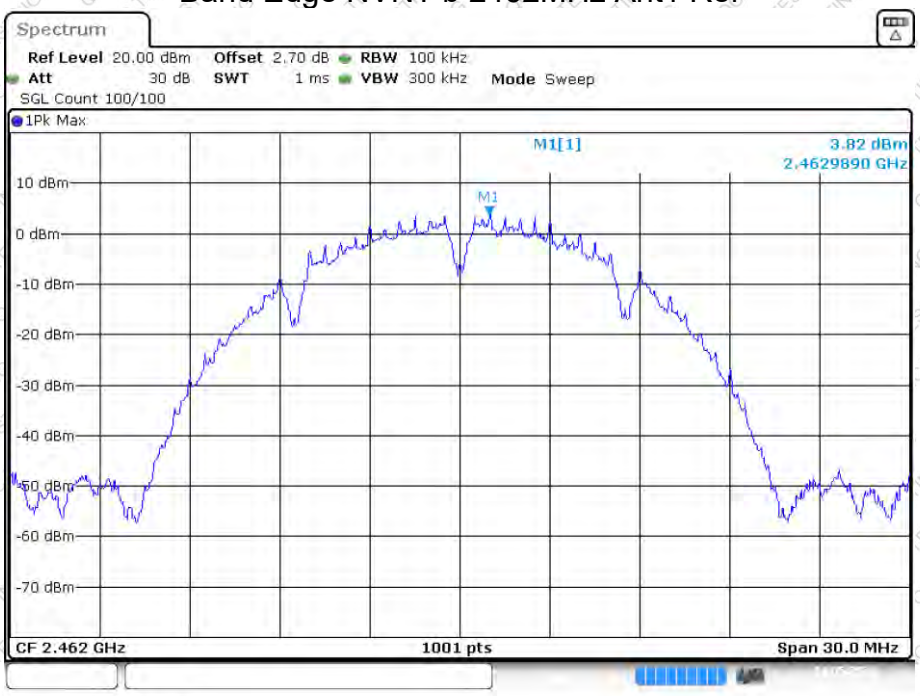
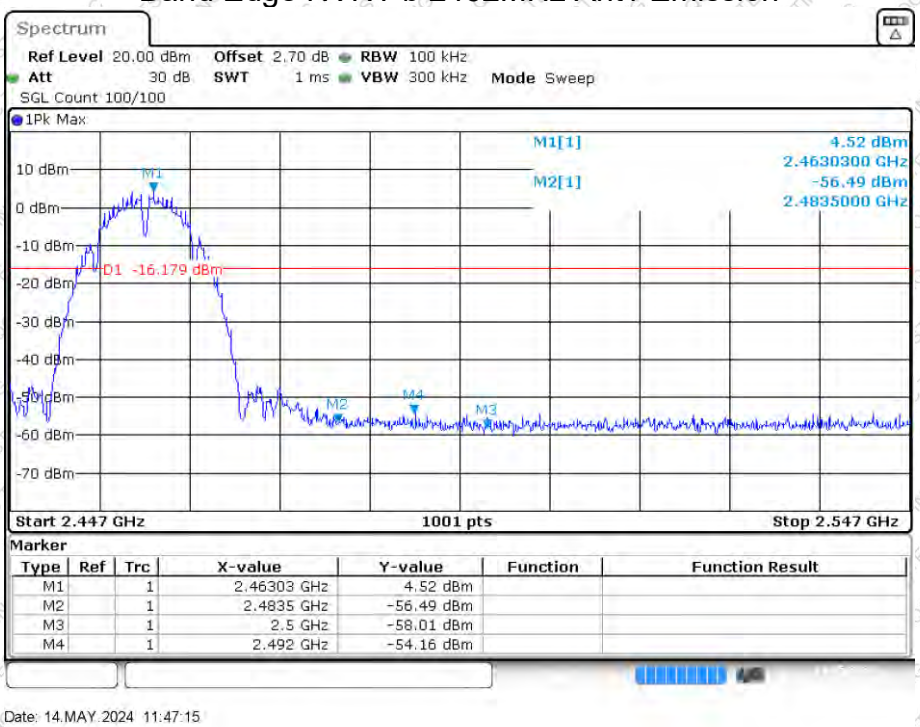
Band Edge NVNT b 2462MHz Ant1 Ref



Band Edge NVNT b 2462MHz Ant1 Emission



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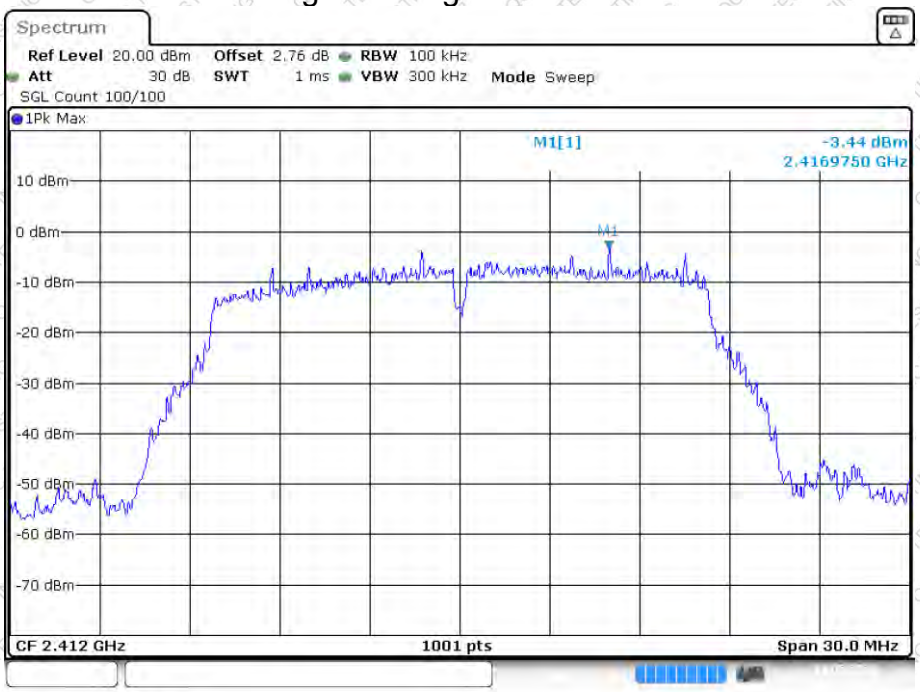
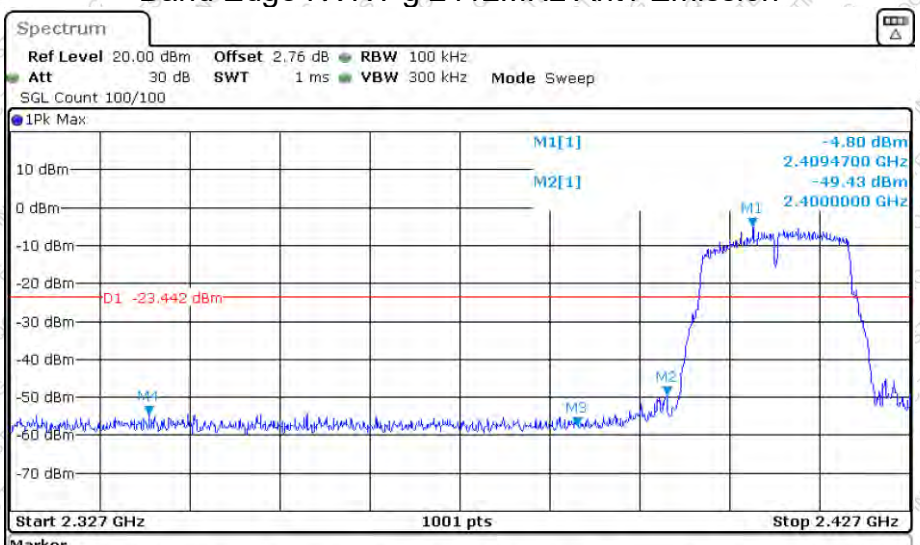
Band Edge NVNT g 2412MHz Ant1 Ref



Date: 14.MAY.2024 11:51:56

Band Edge NVNT g 2412MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40947 GHz	-4.80 dBm		
M2		1	2.4 GHz	-49.43 dBm		
M3		1	2.39 GHz	-57.39 dBm		
M4		1	2.3425 GHz	-54.37 dBm		

Date: 14.MAY.2024 11:51:58

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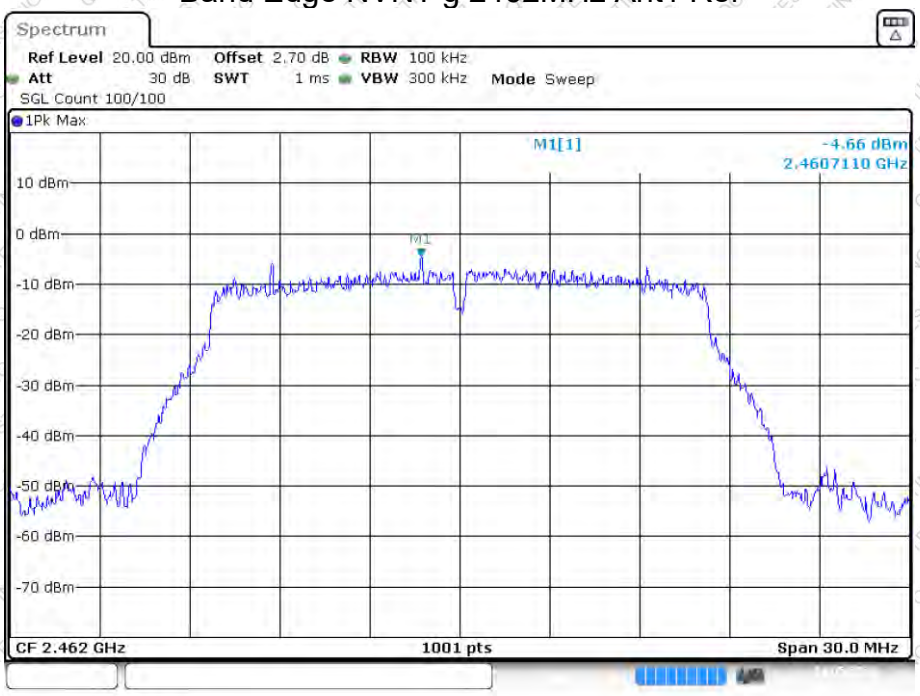
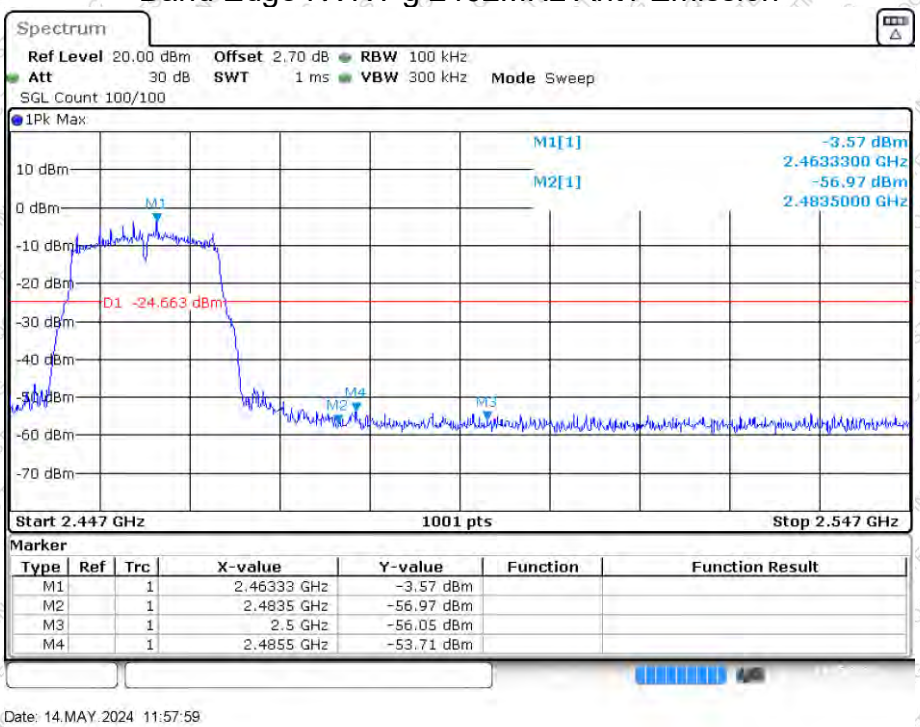
Band Edge NVNT g 2462MHz Ant1 Ref



Band Edge NVNT g 2462MHz Ant1 Emission



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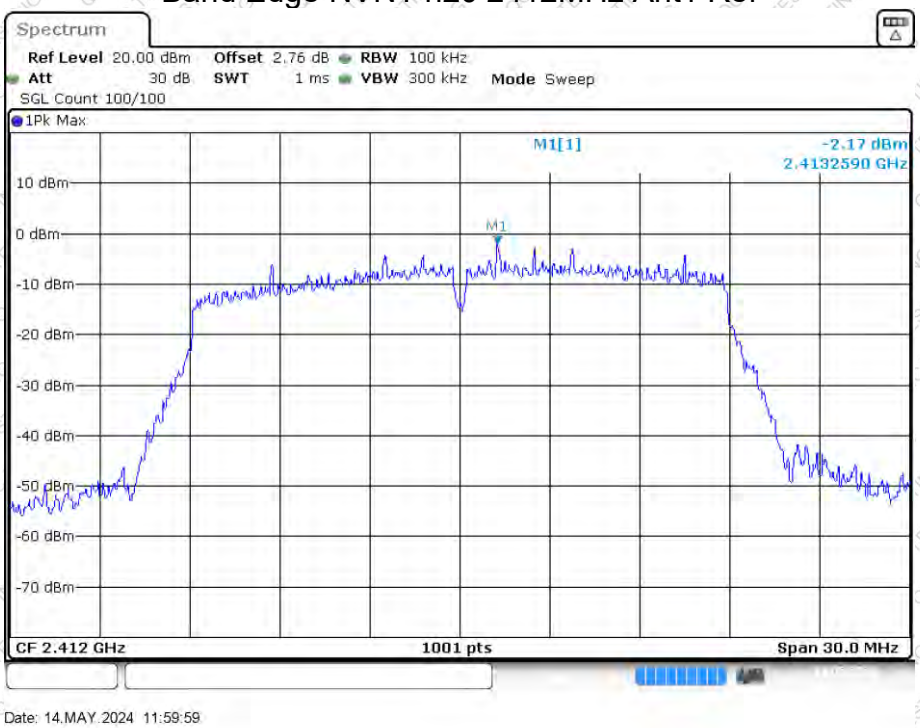
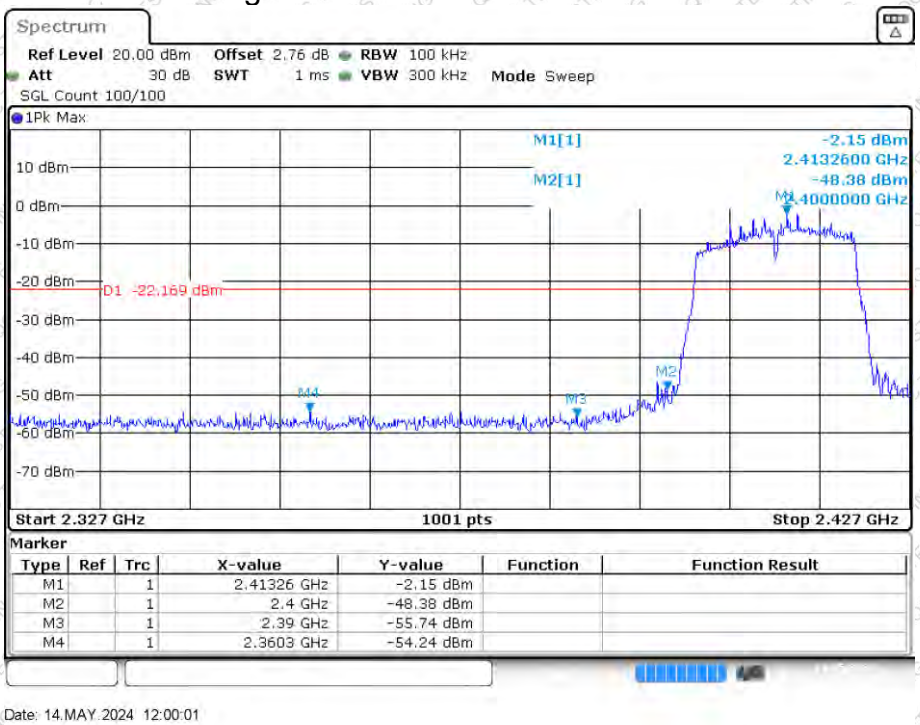
Band Edge NVNT n20 2412MHz Ant1 Ref



Band Edge NVNT n20 2412MHz Ant1 Emission



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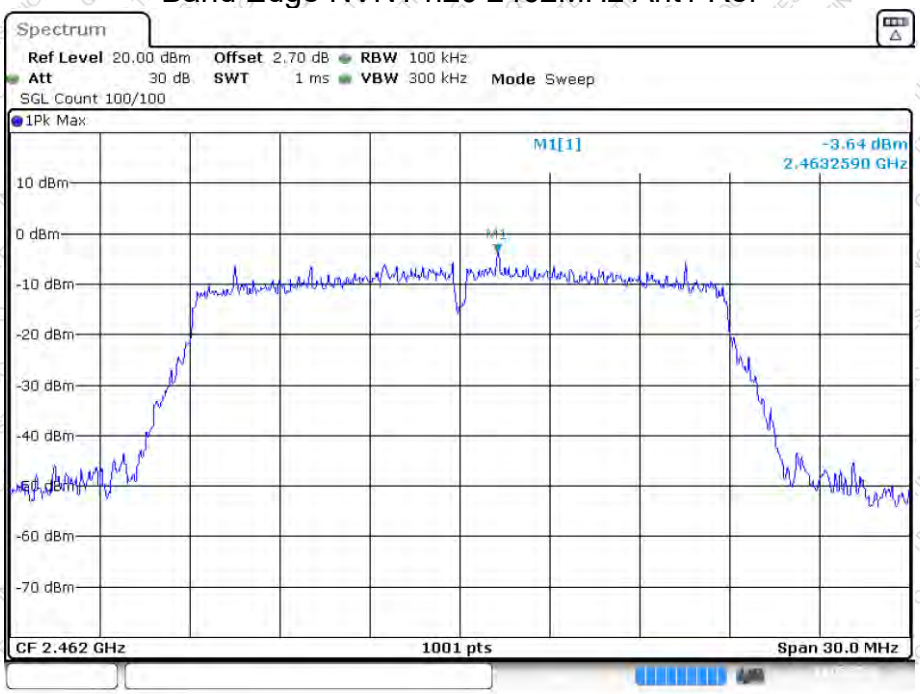
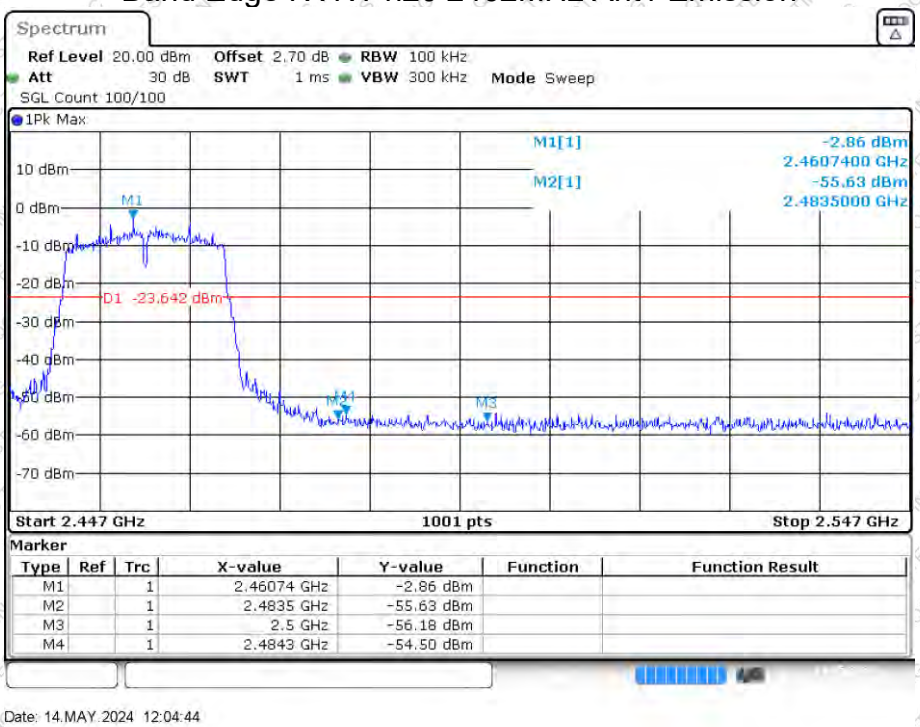
Band Edge NVNT n20 2462MHz Ant1 Ref



Band Edge NVNT n20 2462MHz Ant1 Emission



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Conducted RF Spurious Emission

Modulation	CH No.	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
802.11b	01	2412	-51.17	-20	Pass
	06	2437	-50.84	-20	Pass
	11	2462	-51.83	-20	Pass
802.11g	01	2412	-43.85	-20	Pass
	06	2437	-42.52	-20	Pass
	11	2462	-42.7	-20	Pass
802.11 n(HT20)	01	2412	-43.93	-20	Pass
	06	2437	-44.01	-20	Pass
	11	2462	-43.37	-20	Pass

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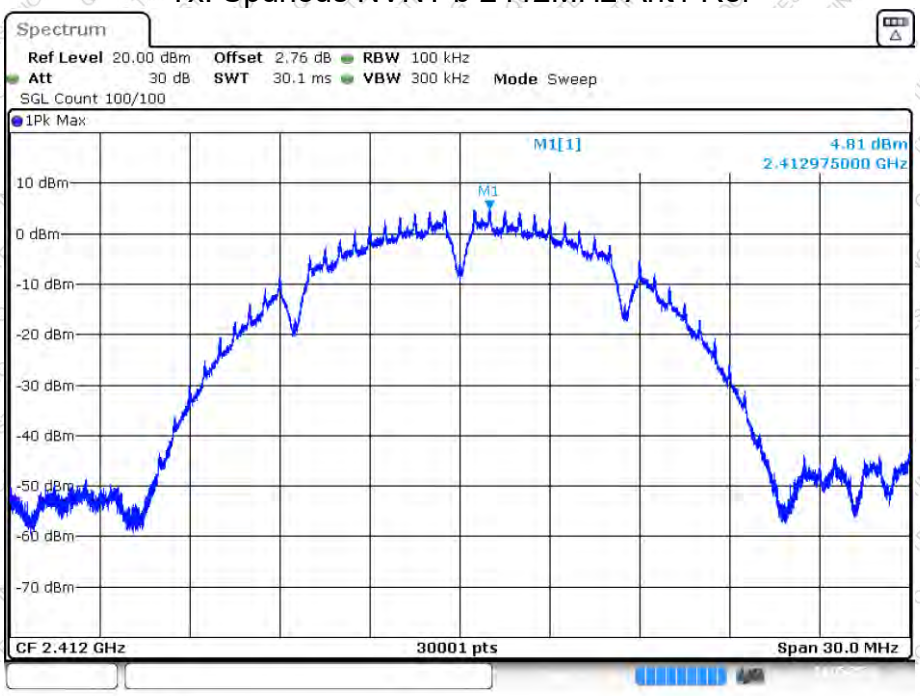
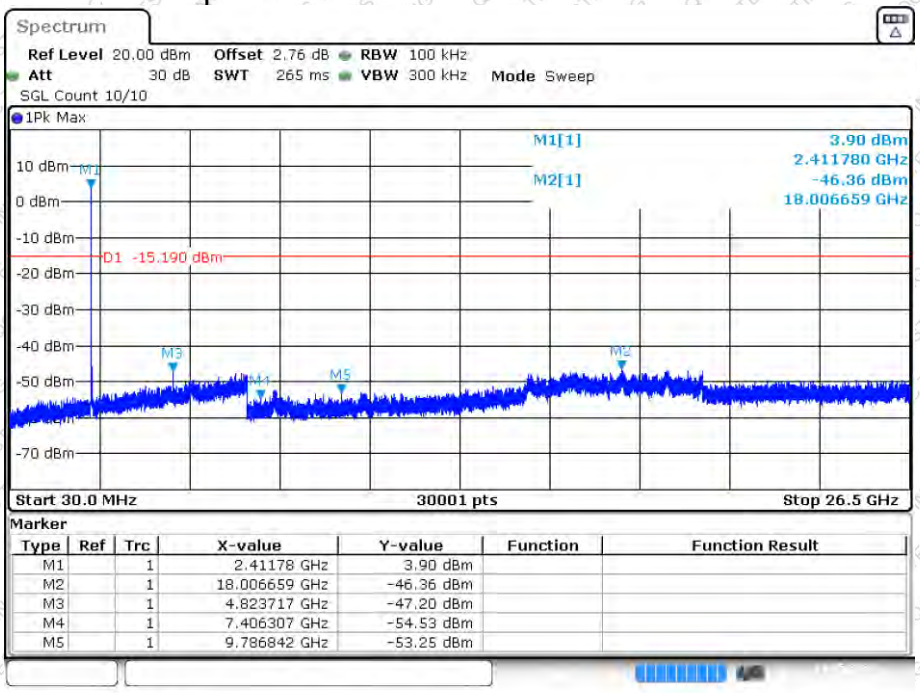
Tx. Spurious NVNT b 2412MHz Ant1 Ref



Date: 14.MAY.2024 11:44:27

Tx. Spurious NVNT b 2412MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41178 GHz	3.90 dBm		
M2		1	18.006659 GHz	-46.36 dBm		
M3		1	4.823717 GHz	-47.20 dBm		
M4		1	7.406307 GHz	-54.53 dBm		
M5		1	9.786842 GHz	-53.25 dBm		

Date: 14.MAY.2024 11:44:40

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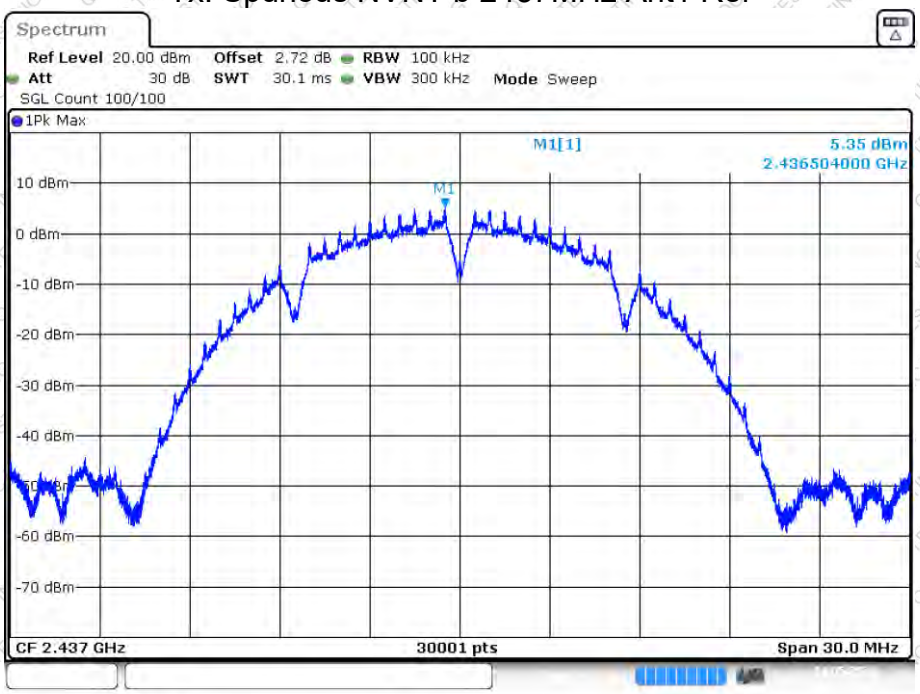
Tx. Spurious NVNT b 2437MHz Ant1 Ref



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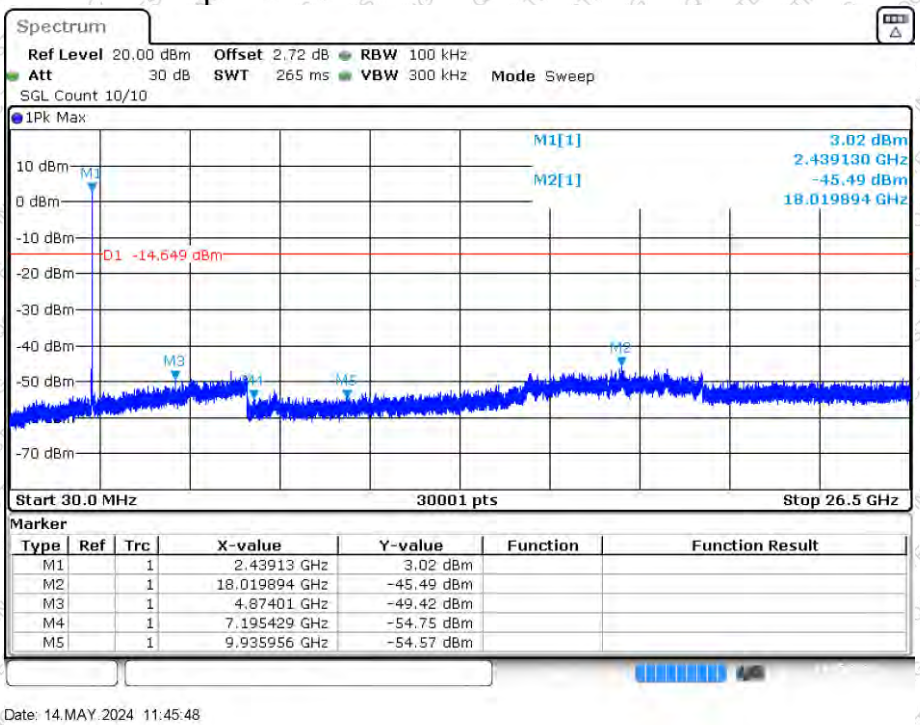

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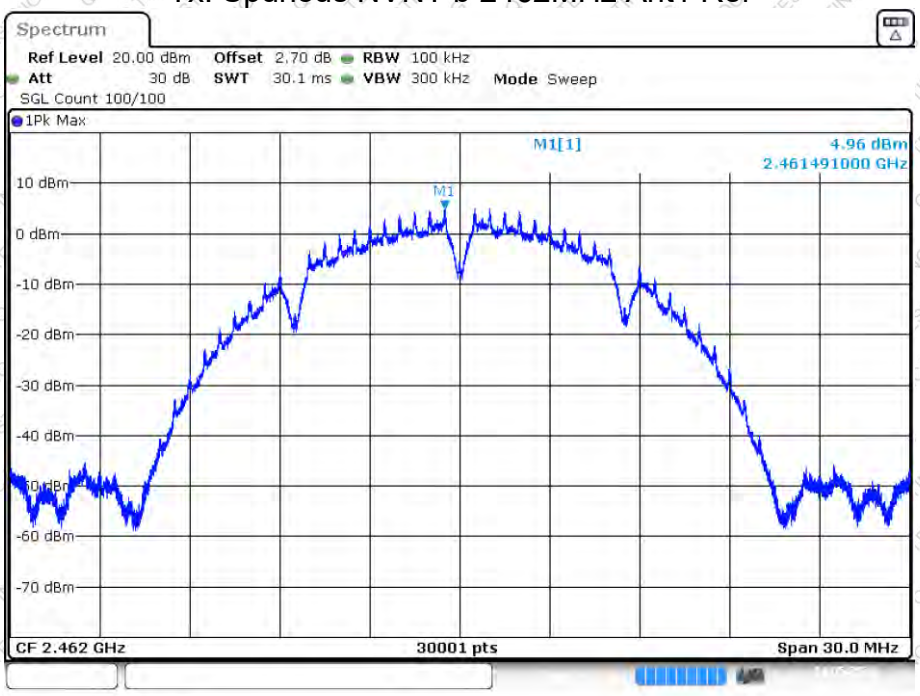
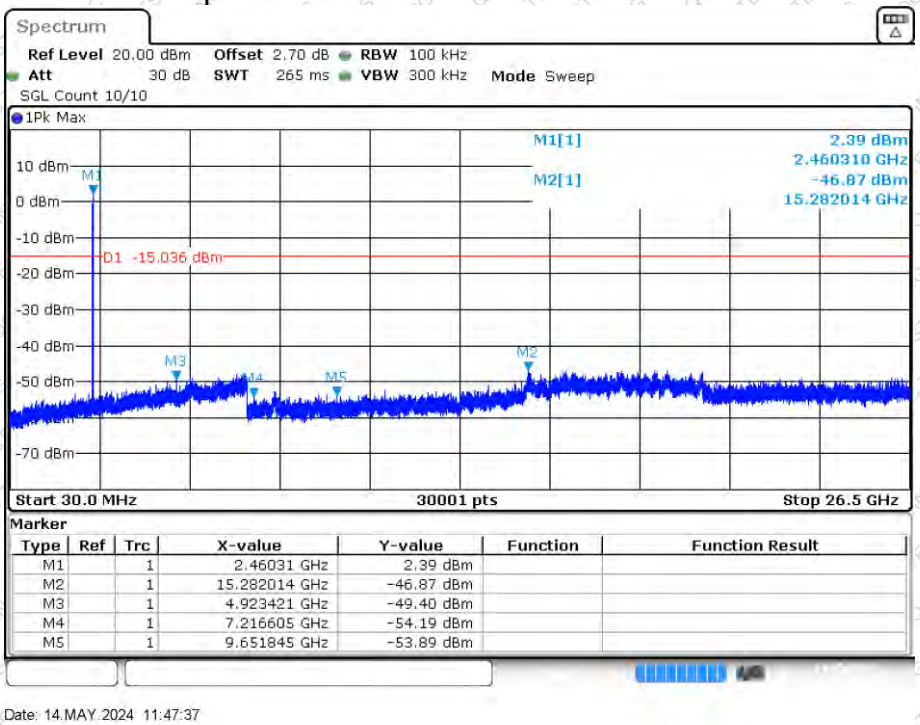
Tx. Spurious NVNT b 2462MHz Ant1 Ref



Tx. Spurious NVNT b 2462MHz Ant1 Emission



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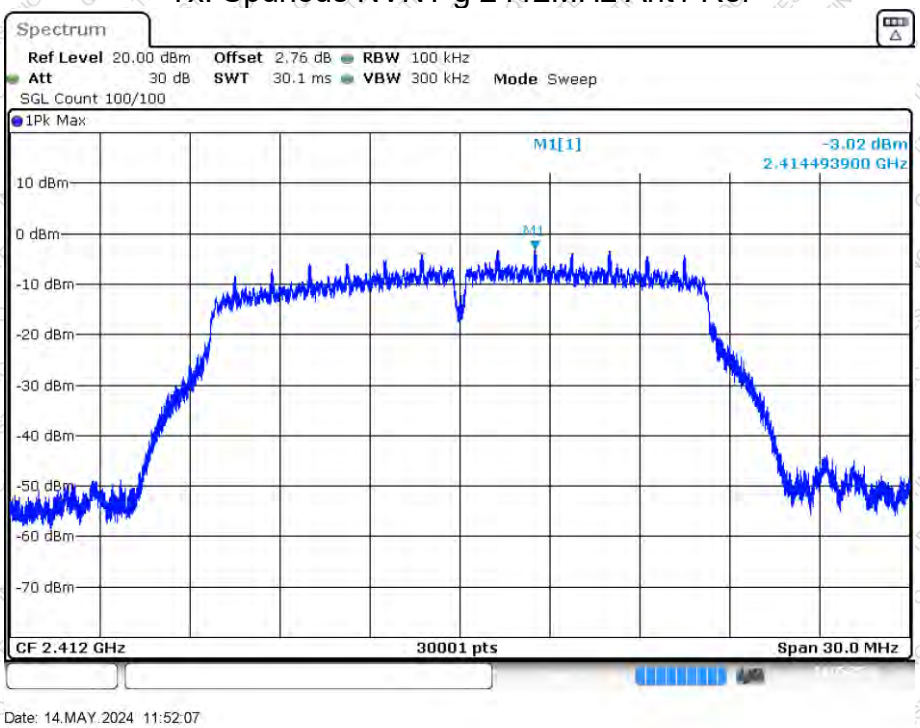
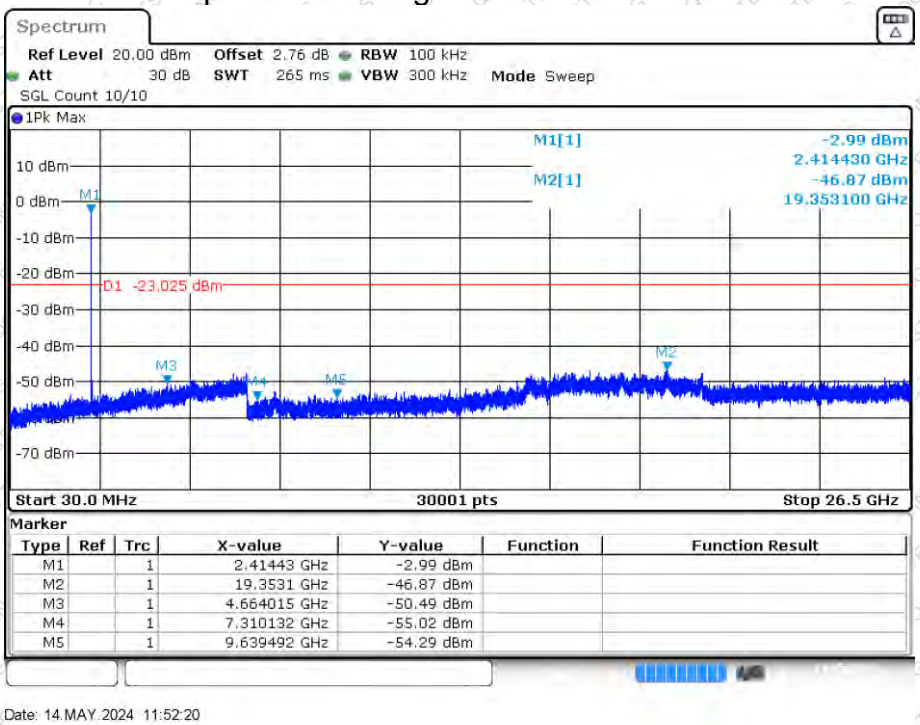
Tx. Spurious NVNT g 2412MHz Ant1 Ref



Tx. Spurious NVNT g 2412MHz Ant1 Emission



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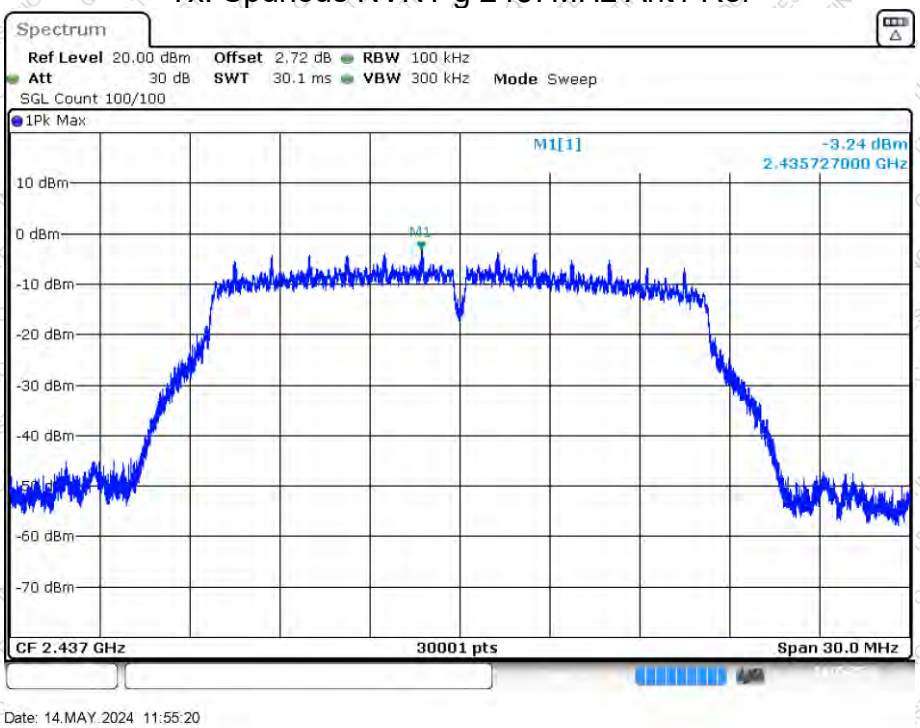
Tx. Spurious NVNT g 2437MHz Ant1 Ref



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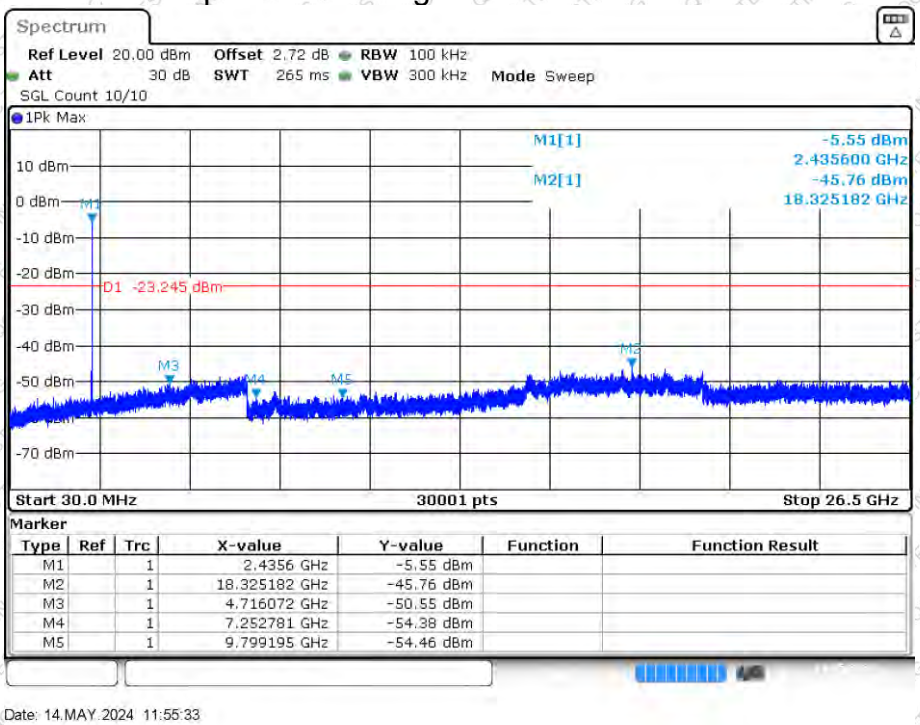

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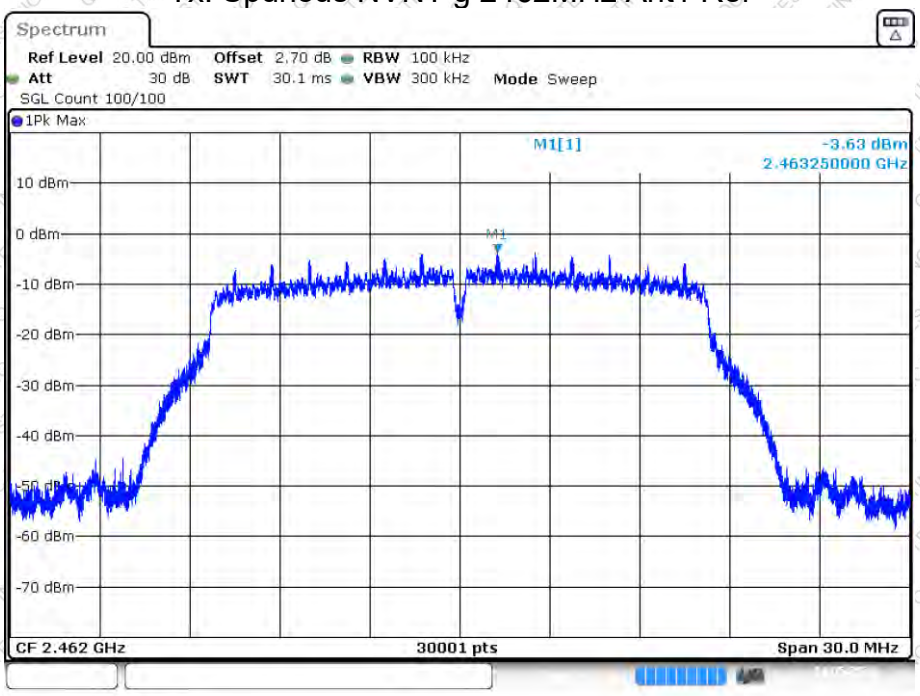
Tx. Spurious NVNT g 2462MHz Ant1 Ref



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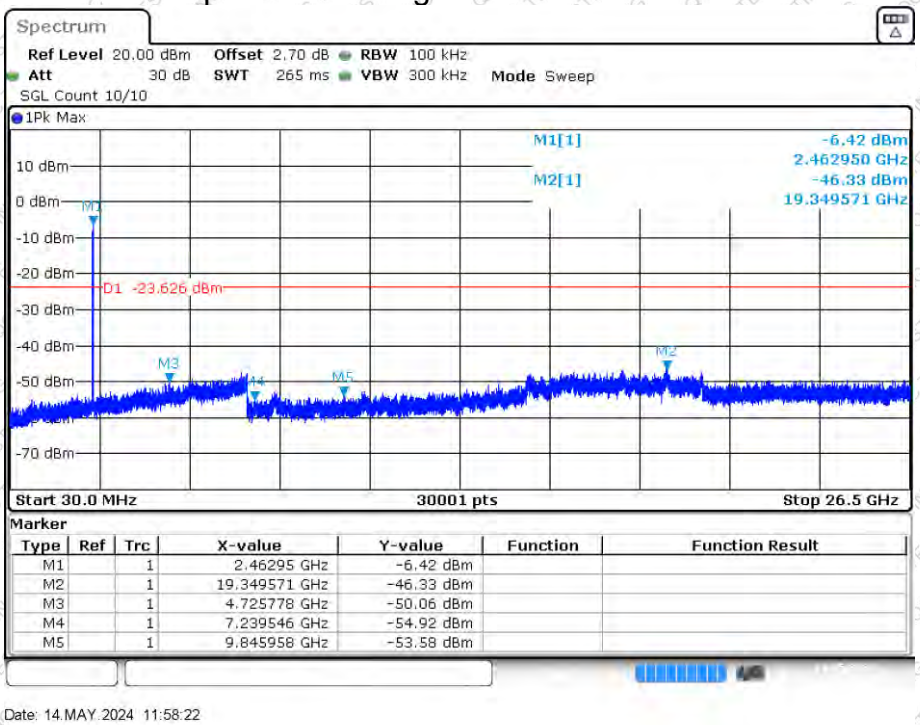

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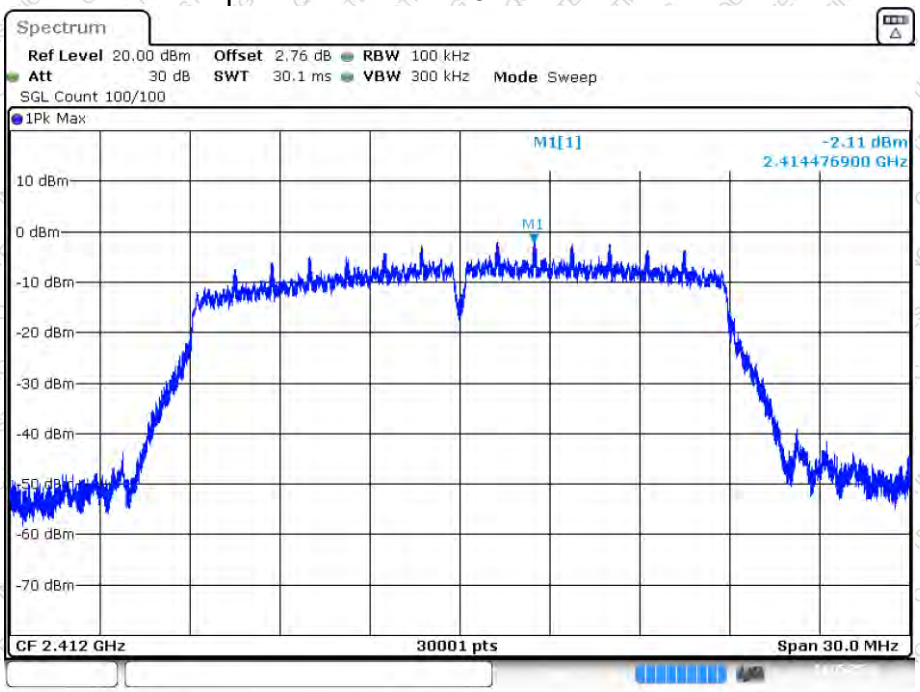
Tx. Spurious NVNT n20 2412MHz Ant1 Ref



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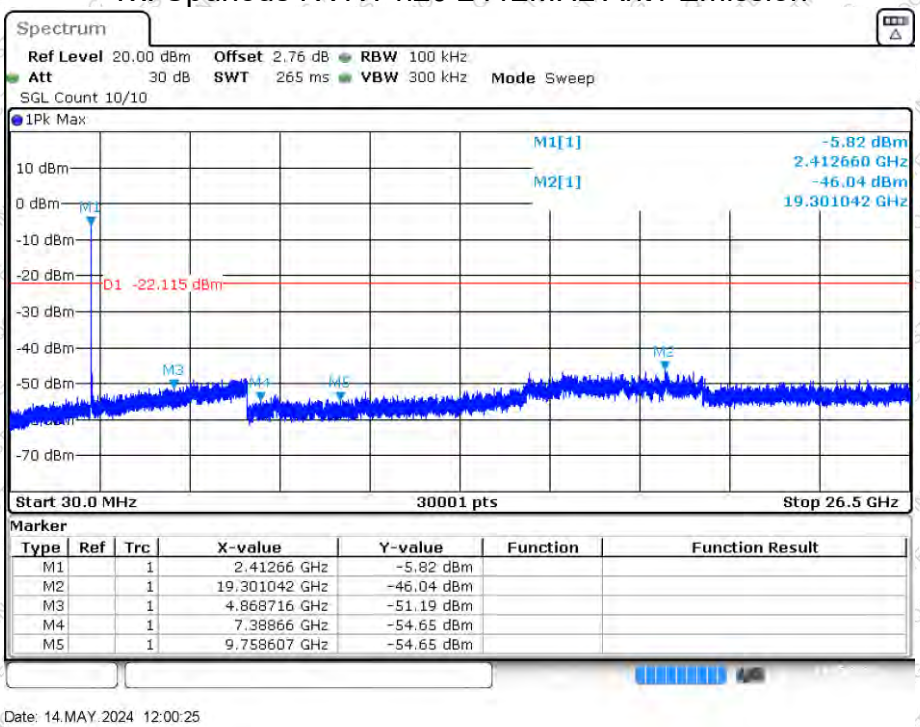

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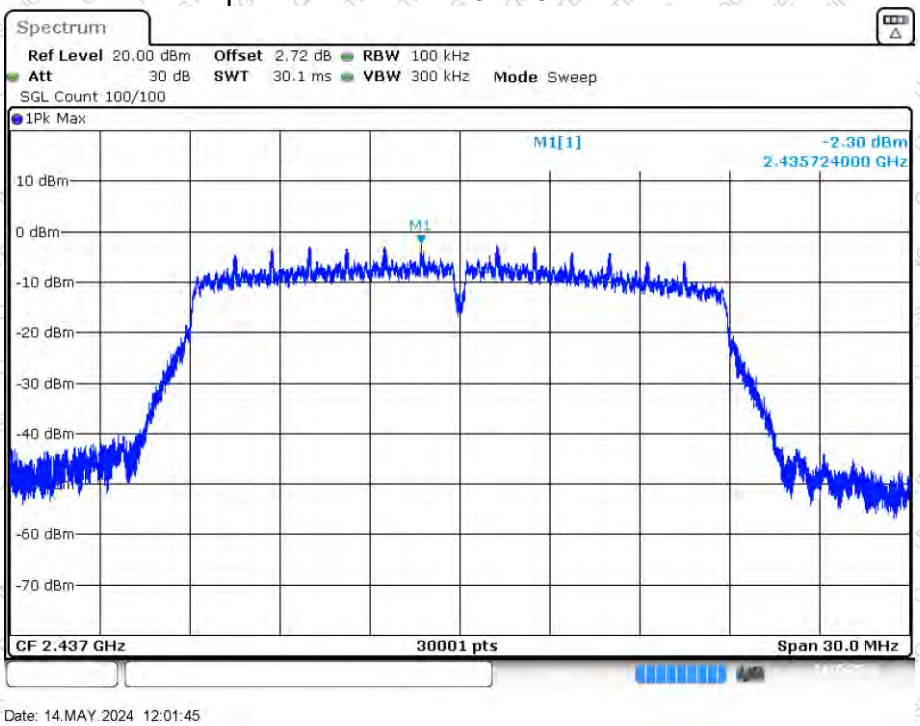
Tx. Spurious NVNT n20 2437MHz Ant1 Ref



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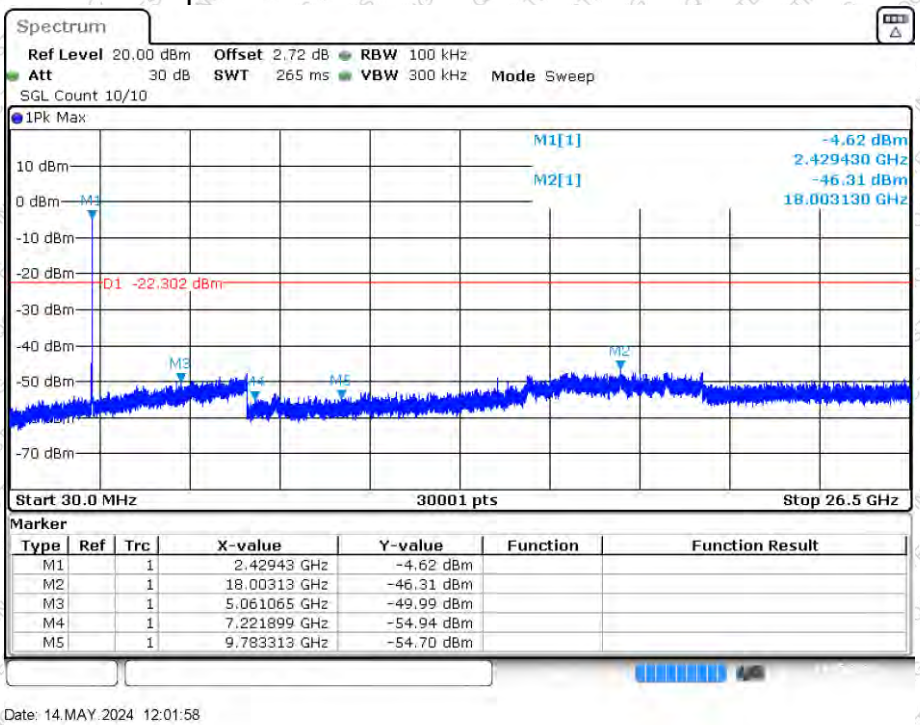

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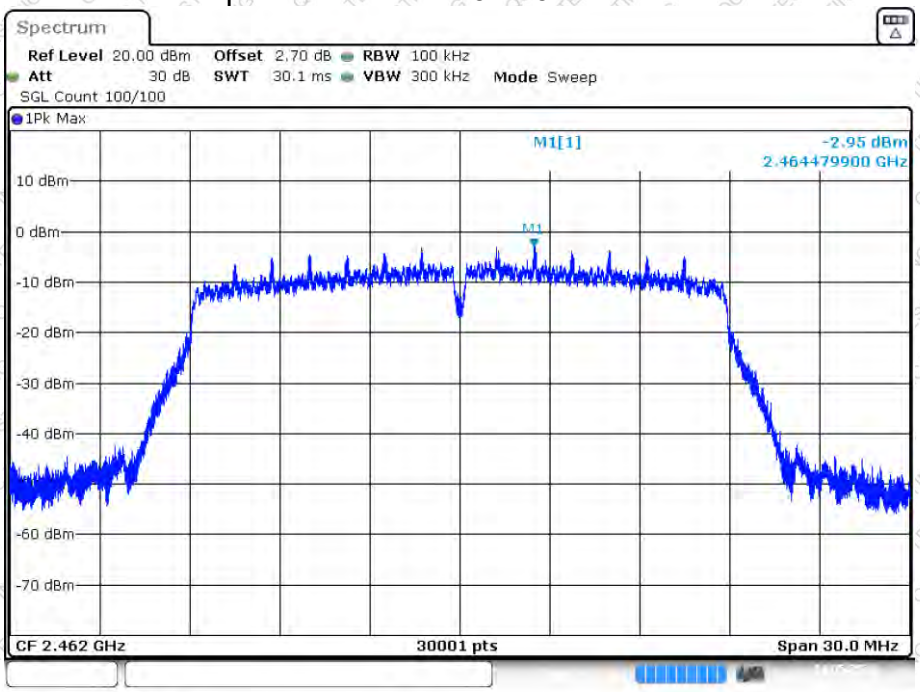
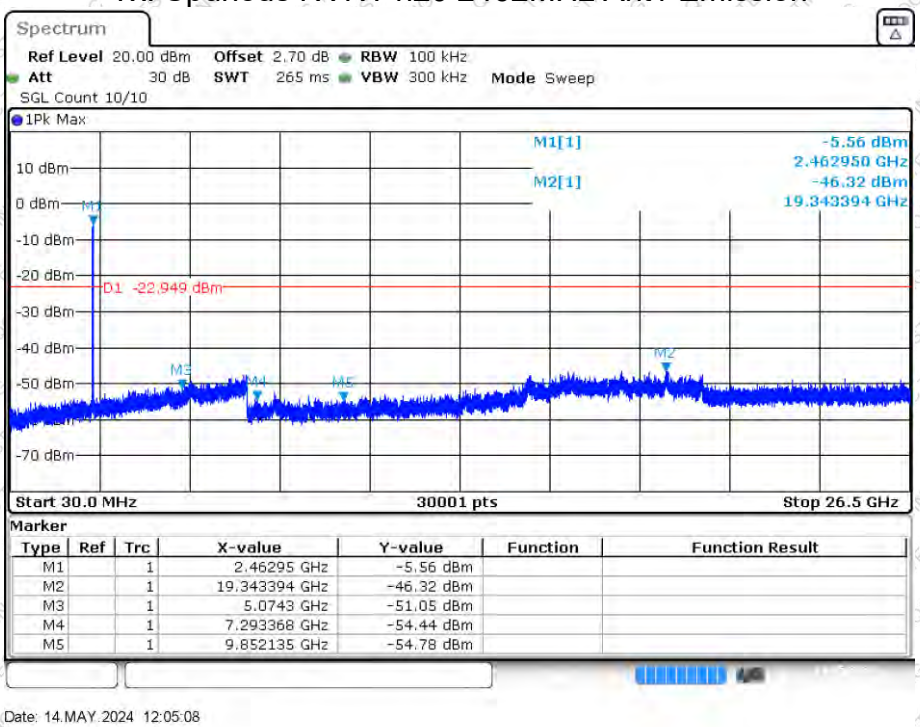
Tx. Spurious NVNT n20 2462MHz Ant1 Ref



Tx. Spurious NVNT n20 2462MHz Ant1 Emission



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9.2 Radiated Emission Method

9.2.1 Applicable Standard

FCC Part15 C Section 15.209 and 15.205

9.2.2 Limit

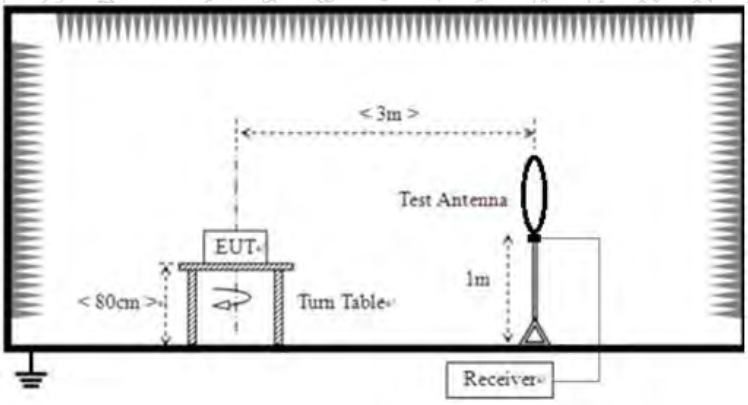
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m

Frequency	Field Strengths Limits (μV/m at 3 m)	Field Strengths Limits (dBμV/m at 3 m)	Remark
30 – 88	100	40.0	Quasi-peak
88 – 216	150	43.5	Quasi-peak
216 – 960	200	46.0	Quasi-peak
Above 960	500	54.0	Quasi-peak
Above 1GHz	/	74.0	Peak
		54.0	Average

Note: dBμV/m =20log(μV/m)

9.2.3 Test setup

For radiated emissions from 9kHz to 30MHz



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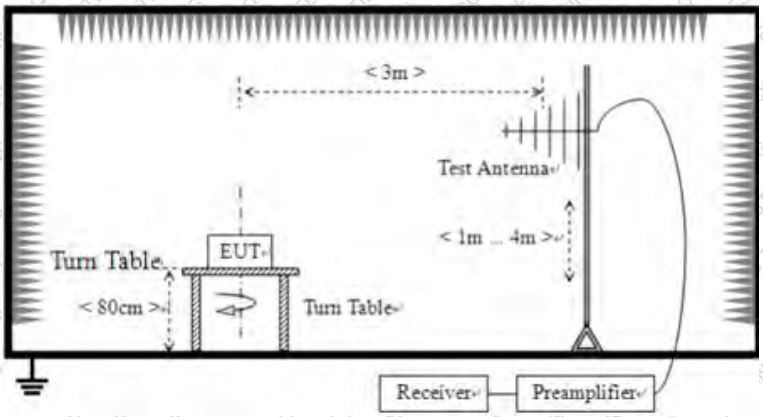
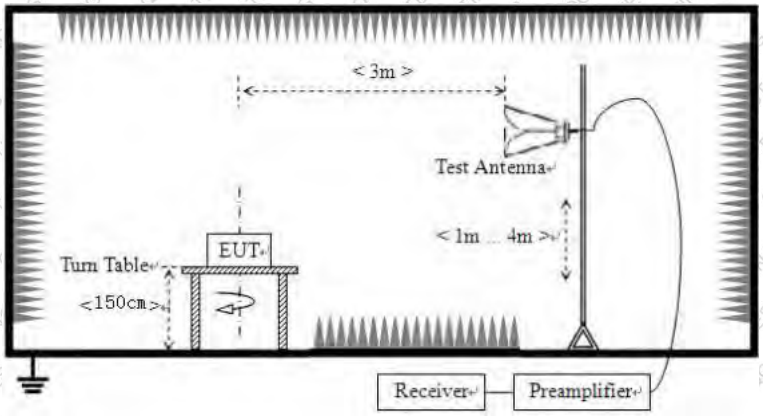
For radiated emissions from 30MHz to1GHz



For radiated emissions above 1GHz



9.2.4 EMI Test Receiver Setup

Frequency	RBW	VBW	IF B/W	Measurement
9KHz-150KHz	200Hz	600Hz	/	QP
150KHz-30MHz	9KHz	30KHz	/	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1 MHz	10 Hz	/	Average

Remark: For the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission test in these three bands are based on measurements employing an average detector.

9.2.5 Test procedure

- The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.

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- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

9.2.6 Test Data

Temperature	26.3 ℃	Humidity	50 %
ATM Pressure	101.1kPa	Antenna Gain	1.8dBi
Test by	LBi Li	Test result	PASS

Test voltage: AC 120V/60Hz.

Remarks:

1. Both the standalone DC version and the DC + battery version were pre-tested and worst-case scenarios were recorded.
2. During the test, pre-scan the all modulation, and found the 802.11b modulation which it is worse case.
3. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.
4. The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

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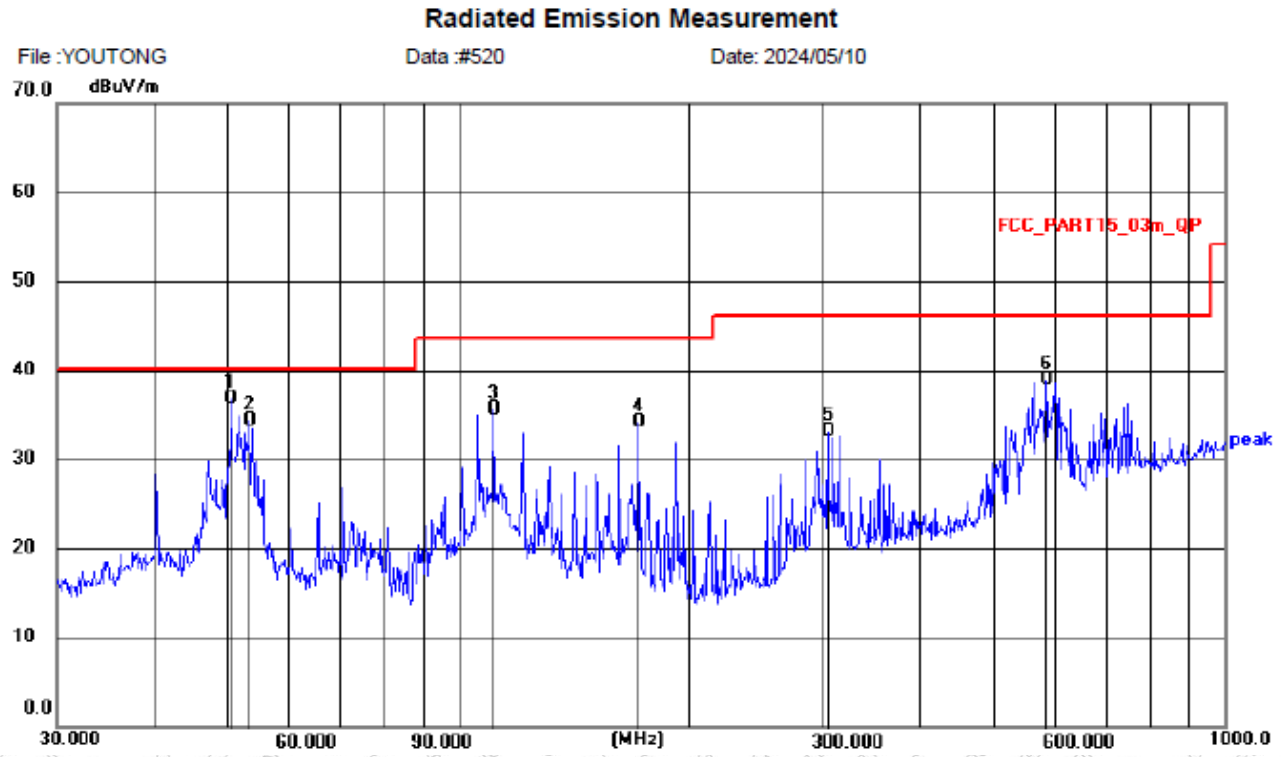
Below 1GHz

Pre-scan all test modes, found worst case at 802.11b mode 2412MHz, and so only show the test result of 802.11b mode 2412MHz

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	50.5859	22.49	14.39	36.88	40.00	3.12	QP
2	53.5052	20.19	14.14	34.33	40.00	5.67	QP
3	111.3468	23.34	12.32	35.66	43.50	7.84	QP
4	171.9944	21.17	13.04	34.21	43.50	9.29	QP
5	303.5437	18.75	14.38	33.13	46.00	12.87	QP
6	584.7894	17.88	21.05	38.93	46.00	7.07	QP

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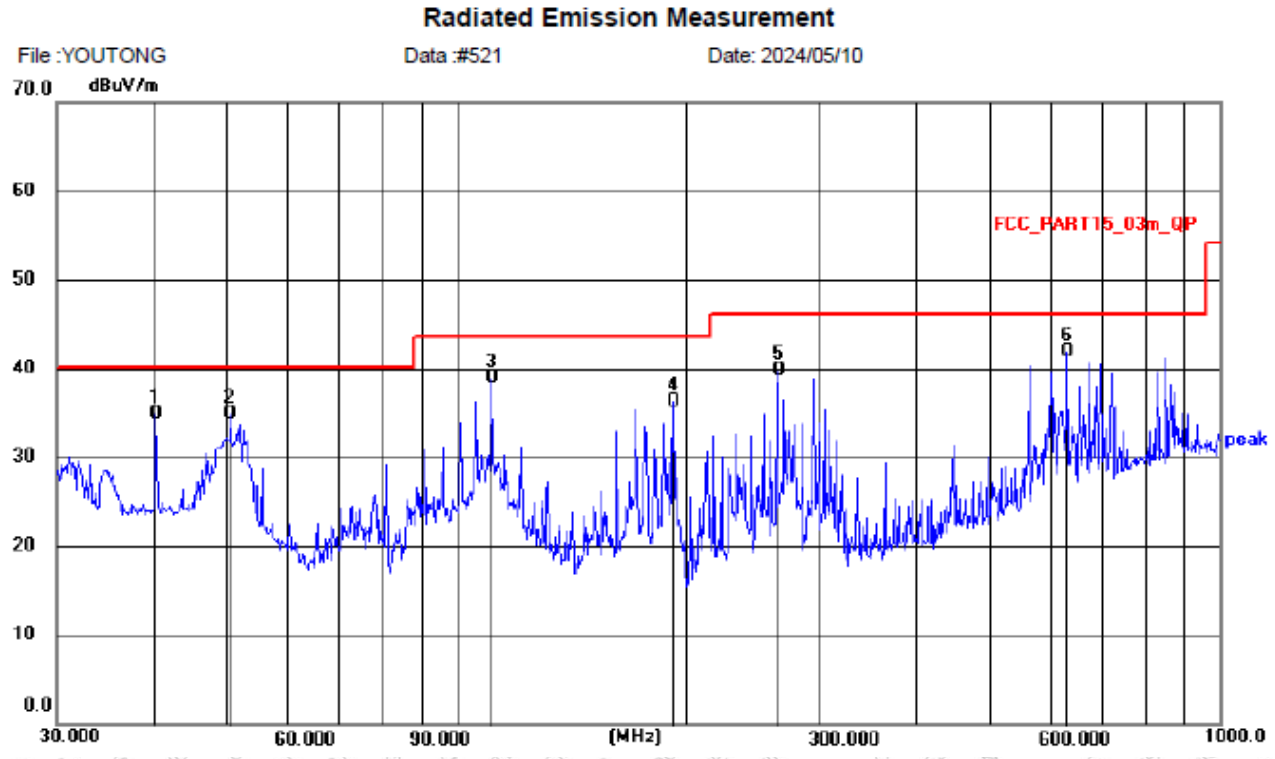
Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	40.4170	20.28	14.59	34.87	40.00	5.13	QP
2	50.5859	20.48	14.39	34.87	40.00	5.13	QP
3	111.3468	26.68	12.32	39.00	43.50	4.50	QP
4	192.4182	24.82	11.45	36.27	43.50	7.23	QP
5	263.8190	26.38	13.46	39.84	46.00	6.16	QP
6 *	631.6883	20.06	21.78	41.84	46.00	4.16	QP

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Above 1GHz:

Frequency (MHz)	Read Level (dBμV)	polarization	Factor (dB/m)	Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector
11b Low Channel							
2310	38.97	H	0.94	39.91	74	34.09	peak
2310	37.41	V	0.92	38.33	74	35.67	peak
2390	42.47	H	1.16	43.63	74	30.37	peak
2390	42.62	V	1.1	43.72	74	30.28	peak
4824	44.54	H	-4.29	40.25	74	33.75	peak
4824	46.12	V	-4.43	41.69	74	32.31	peak
11b Middle Channel							
4874	44.67	H	-4.12	40.55	74	33.45	peak
4874	44.03	V	-4.25	39.78	74	34.22	peak
11b High Channel							
2483.5	38.61	H	1.4	40.01	74	33.99	peak
2483.5	38.59	V	1.3	39.89	74	34.11	peak
2500	40.03	H	1.43	41.46	74	32.54	peak
2500	40.09	V	1.33	41.42	74	32.58	peak
4924	46.45	H	-3.94	42.51	74	31.49	peak
4924	45.58	V	-4.06	41.52	74	32.48	peak
11g Low Channel							
2310	41.04	H	0.94	41.98	74	32.02	peak
2310	39.87	V	0.92	40.79	74	33.21	peak
2390	38.76	H	1.16	39.92	74	34.08	peak
2390	40.66	V	1.1	41.76	74	32.24	peak
4824	43.88	H	-4.29	39.59	74	34.41	peak
4824	45.52	V	-4.43	41.09	74	32.91	peak
11g Middle Channel							
4874	45.17	H	-4.12	41.05	74	32.95	peak
4874	44.03	V	-4.25	39.78	74	34.22	peak
11g High Channel							
2483.5	42.45	H	1.4	43.85	74	30.15	peak
2483.5	32.55	H	1.4	33.95	54	20.05	AVG
2483.5	42.50	V	1.3	43.80	74	30.20	peak
2500	42.18	H	1.43	43.61	74	30.39	peak
2500	43.35	V	1.33	44.68	74	29.32	peak
4924	43.04	H	-3.94	39.10	74	34.90	peak
4924	42.82	V	-4.06	38.76	74	35.24	peak
11n20 Low Channel							
2310	40.71	H	0.94	41.65	74	32.35	peak
2310	36.15	V	0.92	37.07	74	36.93	peak
2390	41.55	H	1.16	42.71	74	31.29	peak
2390	39.41	V	1.1	40.51	74	33.49	peak
4824	43.66	H	-4.29	39.37	74	34.63	peak
4824	43.95	V	-4.43	39.52	74	34.48	peak
11n20 Middle Channel							

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4874	44.17	H	-4.12	40.05	74	33.95	peak
4874	42.53	V	-4.25	38.28	74	35.72	peak
11n20 High Channel							
2483.5	40.48	H	1.4	41.88	74	32.12	peak
2483.5	40.63	V	1.3	41.93	74	32.07	peak
2500	40.05	H	1.43	41.48	74	32.52	peak
2500	39.24	V	1.33	40.57	74	33.43	peak
4924	44.27	H	-3.94	40.33	74	33.67	peak
4924	43.99	V	-4.06	39.93	74	34.07	peak

Remarks:

1. Level =Receiver Read level + Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

---------- THE END OF TEST REPORT ----------

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