FCC TEST REPORT

FCC ID: 2AZFE-ONO3PRO

On Behalf of

Shenzhen Shadow Crown Technology Co.,Ltd.

LED Projector

Model No.: ONO3Pro, YG381, YG381M, YG391, YG371, YG561, YG211, L61Pro

Prepared for	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th floor, Industrial Building,Longwang Miao, Fuyong street, Baoan district , Shenzhen

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2404121-C01-R01
Date of Receipt	:	April 29, 2024
Date of Test	:	April 29, 2024 - June 24, 2024
Date of Report	:	June 24, 2024
Version Number	:	V0
Result		**Pass**

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TEST REPORT DECLARATION

Applicant	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th floor, Industrial Building,Longwang Miao, Fuyong street, Baoan district , Shenzhen
Manufacturer	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th floor, Industrial Building,Longwang Miao, Fuyong street, Baoan district , Shenzhen
EUT Description	:	LED Projector
(A) Model No.	:	ONO3Pro, YG381, YG381M, YG391, YG371, YG561, YG211, L61Pro
(B) Trademark	:	N/A

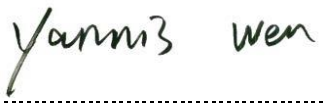
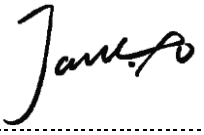
Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247,

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....…..:	Yannis Wen Project Engineer	
Approved by (name + signature)…....:	Jack Xu Project Manager	
Date of issue……..:	June 24, 2024	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	June 24, 2024	Initial released Issue	Yannis Wen

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Standards Paragraph	Result
Conducted Emission	FCC Part 15: 15.207 ANSI C63.10 :2013	P
6dB Bandwidth	FCC PART 15:15.247(a)(2) ANSI C63.10 :2013	P
Output Power	FCC Part 15: 15.247(b)(3) ANSI C63.10 :2013	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Conducted Spurious & Band Edge Emission	FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Power Spectral Density	FCC PART 15:15.247(e) ANSI C63.10 :2013	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Antenna Requirement	FCC Part 15: 15.203	P

Note:
1. P is an abbreviation for Pass.
2. F is an abbreviation for Fail.
3. N/A is an abbreviation for Not Applicable.
4. Decision rules for the conclusion of this test report: decision by actual test data without considering measurement uncertainty.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Description/PMN	:	LED Projector
Model Number/HVIN(s)	:	ONO3Pro, YG381, YG381M, YG391, YG371, YG561, YG211, L61Pro
Diff.	:	There is no difference between the models except the appearance color. So all the test were performed on the model ONO3Pro.
Test Voltage	:	AC 120V/60Hz
Radio Technology	:	2.4G WIFI
Operation frequency	:	2412MHz-2462MHz for IEEE 802.11 b, g. n/HT20 2422MHz~2452MHz for IEEE802.11n/HT40
Channel No.	:	802.11b/802.11g /802.11n(HT20): 11 802.11(HT40): 9
Modulation type	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n :OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna Type	:	Internal Antenna 1, max gain 4.73dBi, Internal Antenna 2, max gain 4.73dBi, The antenna MIMO combining gain is 7.74dBi. (Antenna information is provided by applicant.)
Software Version	:	V1.0
Hardware version/FVIN	:	V1.0

Remark:
1. The worst-case simultaneous transmission configuration was evaluated with no non-compliance found. Results in this report are only for 2.4G Wi-Fi function, and there is no other transmitter involved.

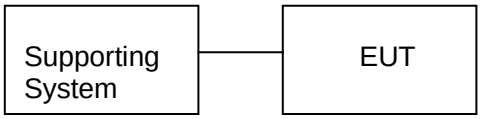
2.2. Accessories of Device (EUT)

Accessories	:	Remote control
Manufacturer	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Model	:	/
INPUT	:	/
OUTPUT	:	/

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1	Notebook PC	Lenovo	Thinkpad E14	N/A	N/A

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Mode	Data rate (Mbps)	Channel	Frequency (MHz)
IEEE 802.11b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11 n/HT20	6.5	Low :CH1	2412
	6.5	Middle: CH6	2437
	6.5	High: CH11	2462
IEEE 802.11 n/HT40	13	Low :CH3	2422
	13	Middle: CH6	2437
	13	High: CH9	2452
Note: According exploratory test, EUT will have maximum output power in those data rate. So those data rate were used for all test.			

Channel list:					
For IEEE 802.11b, g, n/HT20, n/HT40					
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
CH1	2412	CH5	2432	CH9	2452
CH2	2417	CH6	2437	CH10	2457
CH3	2422	CH7	2442	CH11	2462
CH4	2427	CH8	2447		

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	24℃
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	98kPa

2.7. Test Facility

Shenzhen Alpha Product Testing Co., Ltd

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103,
Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961
Designation Number: CN1236

July 15, 2019 Certificated by IC
Registration Number: 12135A

2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	1.63dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.74dB(Polarize: V)
	3.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (18GHz to 40GHz)	4.31 dB(Polarize: V)
	4.30 dB(Polarize: H)
Uncertainty for radio frequency	5.06×10^{-8}GHz
Uncertainty for conducted RF Power	0.40dB
Uncertainty for temperature	0.2℃
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2.9. Test Equipment List

Equipment	Manufacture	Model No.	Firmware version	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	/	N/A	2022.05.17	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	2.3	102137	2023.08.16	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2023.08.16	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-102082-Wa	2023.08.16	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2023.08.16	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2023.08.28	1Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2023.08.19	1Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00128	2023.08.19	1Year
RF Cable	Resenberger	Cable 1	/	RE1	2023.08.16	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2023.08.16	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2023.08.16	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2023.08.16	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2023.08.16	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2023.08.16	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2023.08.16	1Year
Horn Antenna	SCHWARZBECK	BBHA 9170	/	00946	2023.08.19	1Year
Preamplifier	SKET	LNPA_1840-50	/	SK2018101801	2023.08.16	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2023.08.16	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2023.08.16	1 Year
Temp. & Humid. Chamber	Teelong	TL-HW408S	/	TL-20191205-01	2023.07.25	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2023.08.16	1 Year
Adjustable attenuator	MWRFtest	N/A	/	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	/	N/A	N/A	N/A

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EZ-EMC	Farad	Alpha-3A1
CE	EZ-EMC	Farad	Alpha-3A1
RF-CE	MTS 8310	MW	V2.0.0.0

3. SPURIOUS EMISSION

3.1. Test Limits

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	
Note 1: The peak limit is 20 dB higher than the average limit			

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Table 5 – General field strength limits at frequencies above 30 MHz	
Frequency (MHz)	**Field strength (μV/m at 3 m)**
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

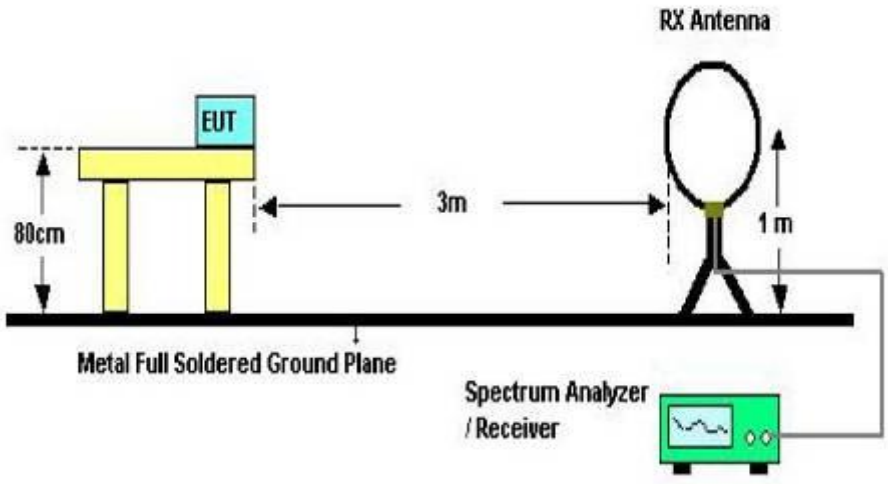
Table 6 – General field strength limits at frequencies below 30 MHz		
Frequency	**Magnetic field strength (H-Field) (μA/m)**	**Measurement distance (m)**
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

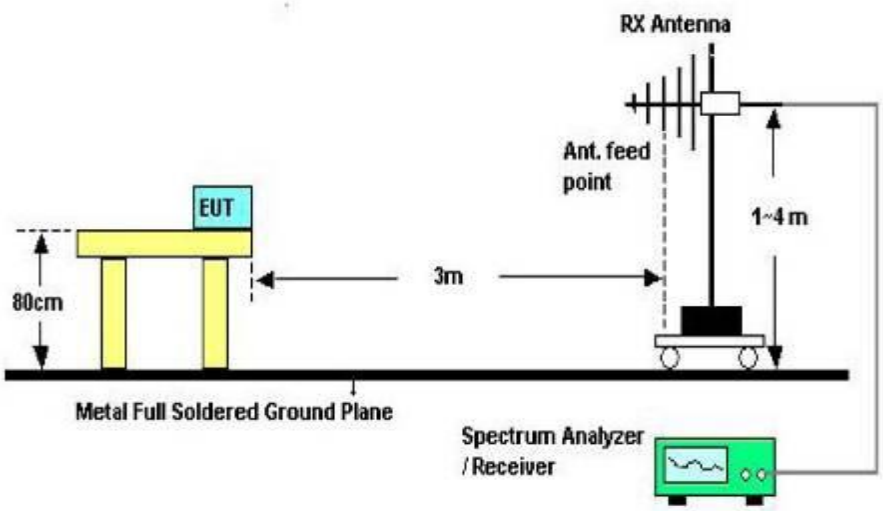
3.2. Test Procedure

The measuring distance of 3m shall be used for measurements at frequency up to 1GH and above 1GHz.
The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above1GHz testing, the table was rotated 360 degrees to determine the position of the highest radiation
The Test antenna shall vary between 1m and 4m, both Horizontal and Vertical antenna are set of make measurement.
The initial step in collecting radiated emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Quasi Peak Detector mode premeasured
If Peak value comply with QP limit below 1GHz, the EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
For the actual test configuration, please see the test setup photo.

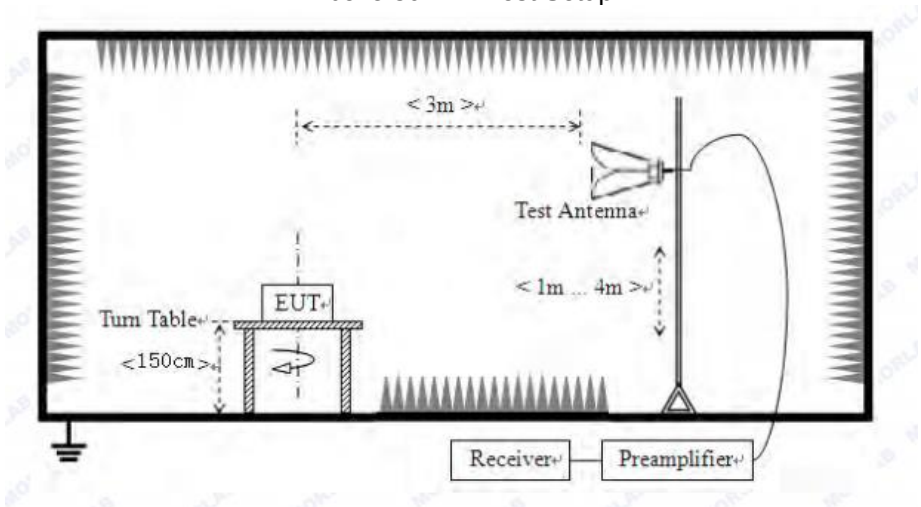
3.3. Test Setup



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.4. Test Results

Test Condition
Continual Transmitting in maximum power.

9KHz~150KHz	RBW200Hz	VBW1KHz
150KHz~30MHz	RBW9KHz	VBW 30KHz
30MHZ~1GHz	RBW120KHz	VBW 300KHz
Above1GHz	RBW1MHz	VBW 3MHz

We have scanned the EUT from 9kHz up to the 10th harmonic of the fundamental.

Detailed information please see the following page.

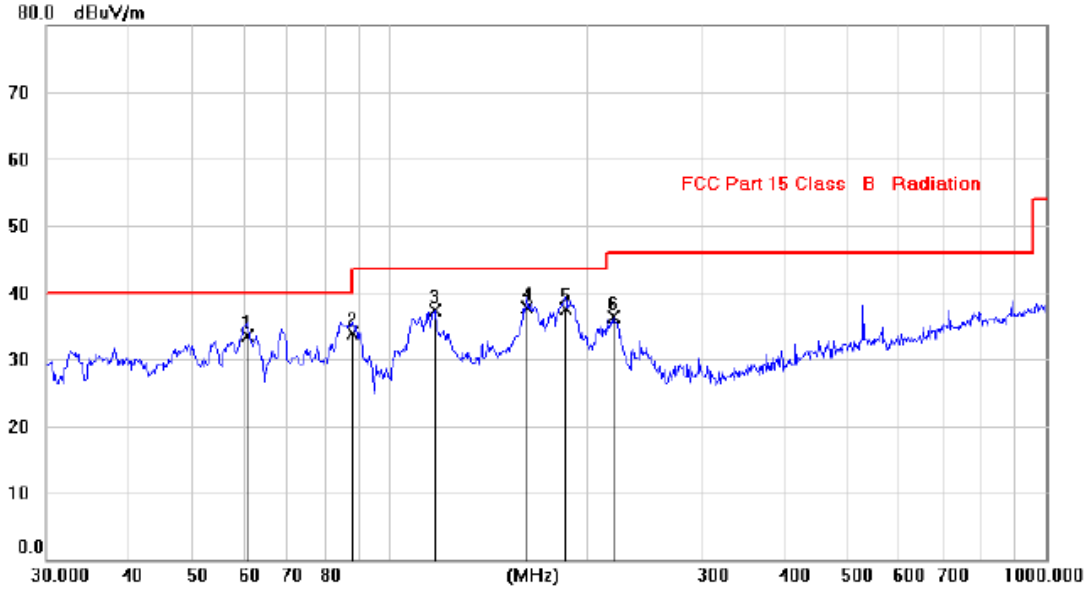
From 9KHz to 30MHz: Conclusion: PASS

Note: 1.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2. Except for mode b/g, other modes test the MIMO status.
3. All antennas have been tested, only the worst data of each pattern is reflected.

Test result for 802.11b (High Channel)

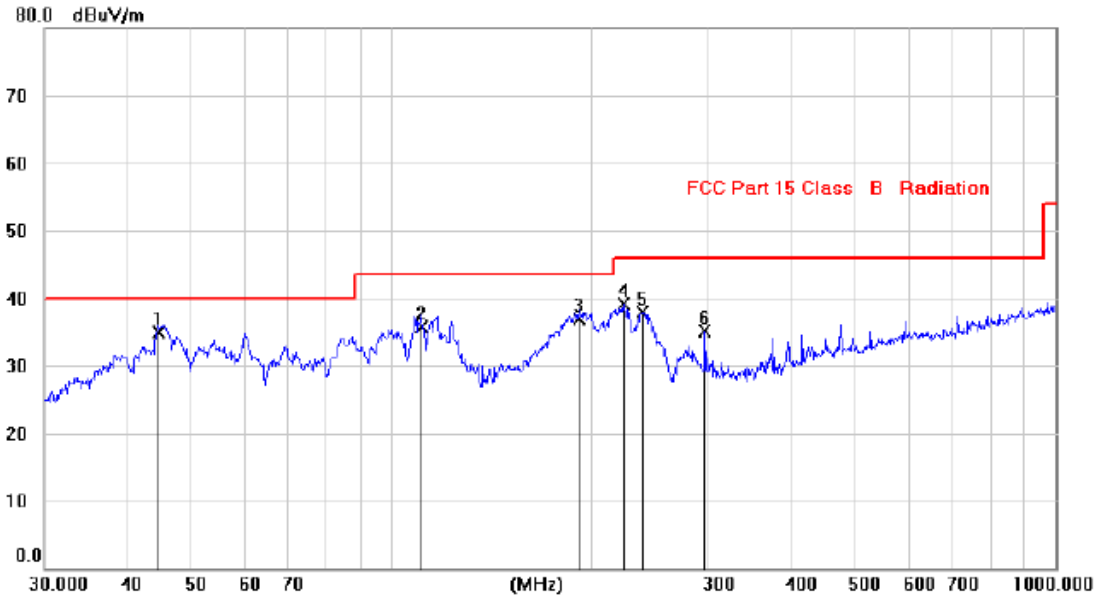
Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		60.6510	20.53	13.00	33.53	40.00	-6.47	QP
2		87.7630	23.91	10.03	33.94	40.00	-6.06	QP
3		117.2060	24.67	12.65	37.32	43.50	-6.18	peak
4	*	161.7572	22.85	14.83	37.68	43.50	-5.82	QP
5		185.6254	25.65	11.94	37.59	43.50	-5.91	QP
6		219.6519	24.59	11.65	36.24	46.00	-9.76	peak

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	44.5281	20.70	14.15	34.85	40.00	-5.15	QP
2		110.6170	23.84	11.90	35.74	43.50	-7.76	QP
3		192.2500	25.61	11.30	36.91	43.50	-6.59	QP
4		223.0475	27.20	11.85	39.05	46.00	-6.95	peak
5		238.5191	25.40	12.49	37.89	46.00	-8.11	peak
6		296.7033	21.11	13.97	35.08	46.00	-10.92	peak

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Note: Above is below 1GHz test data. All modes of two antennas have been tested, and only shown the worst case mode in this report. (**b 2412MHz for antenna 1)**

From 1G-25GHz

Test Mode: IEEE 802.11b TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824	44.18	V	33.95	10.18	34.26	54.05	74	-19.95	PK
4824	34.03	V	33.95	10.18	34.26	43.90	54	-10.10	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	44.86	H	33.95	10.18	34.26	54.73	74	-19.27	PK
4824	36.90	H	33.95	10.18	34.26	46.77	54	-7.23	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX Mid									
4874	43.44	V	33.93	10.2	34.29	53.28	74	-20.72	PK
4874	31.20	V	33.93	10.2	34.29	41.04	54	-12.96	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	46.64	H	33.93	10.2	34.29	56.48	74	-17.52	PK
4874	35.74	H	33.93	10.2	34.29	45.58	54	-8.42	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX High									
4924	45.80	V	33.98	10.22	34.25	55.75	74	-18.25	PK
4924	34.99	V	33.98	10.22	34.25	44.94	54	-9.06	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	48.19	H	33.98	10.22	34.25	58.14	74	-15.86	PK
4924	33.53	H	33.98	10.22	34.25	43.48	54	-10.52	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

Note:

1, Result = Read level + Antenna factor + cable loss-Amp factor

2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Test Mode: IEEE 802.11g TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824	44.03	V	33.95	10.18	34.26	53.90	74	-20.10	PK
4824	35.64	V	33.95	10.18	34.26	45.51	54	-8.49	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	44.72	H	33.95	10.18	34.26	54.59	74	-19.41	PK
4824	34.34	H	33.95	10.18	34.26	44.21	54	-9.79	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX Mid									
4874	43.35	V	33.93	10.2	34.29	53.19	74	-20.81	PK
4874	31.20	V	33.93	10.2	34.29	41.04	54	-12.96	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.56	H	33.93	10.2	34.29	55.40	74	-18.60	PK
4874	32.24	H	33.93	10.2	34.29	42.08	54	-11.92	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX High									
4924	45.60	V	33.98	10.22	34.25	55.55	74	-18.45	PK
4924	34.92	V	33.98	10.22	34.25	44.87	54	-9.13	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	48.93	H	33.98	10.22	34.25	58.88	74	-15.12	PK
4924	36.37	H	33.98	10.22	34.25	46.32	54	-7.68	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

Note:

1, Result = Read level + Antenna factor + cable loss-Amp factor

2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Test Mode: IEEE 802.11n HT20 TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824	45.63	V	33.95	10.18	34.26	55.50	74	-18.50	PK
4824	34.62	V	33.95	10.18	34.26	44.49	54	-9.51	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	45.08	H	33.95	10.18	34.26	54.95	74	-19.05	PK
4824	35.97	H	33.95	10.18	34.26	45.84	54	-8.16	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX Mid									
4874	45.20	V	33.93	10.2	34.29	55.04	74	-18.96	PK
4874	33.59	V	33.93	10.2	34.29	43.43	54	-10.57	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.66	H	33.93	10.2	34.29	55.50	74	-18.50	PK
4874	33.85	H	33.93	10.2	34.29	43.69	54	-10.31	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX High									
4924	44.65	V	33.98	10.22	34.25	54.60	74	-19.40	PK
4924	35.48	V	33.98	10.22	34.25	45.43	54	-8.57	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	45.94	H	33.98	10.22	34.25	55.89	74	-18.11	PK
4924	34.23	H	33.98	10.22	34.25	44.18	54	-9.82	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

Note:

1, Result = Read level + Antenna factor + cable loss-Amp factor

2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Test Mode: IEEE 802.11n HT40 TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4844	44.63	V	33.95	10.18	34.26	54.50	74	-19.50	PK
4844	35.13	V	33.95	10.18	34.26	45.00	54	-9.00	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
4844	44.99	H	33.95	10.18	34.26	54.86	74	-19.14	PK
4844	35.18	H	33.95	10.18	34.26	45.05	54	-8.95	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX Mid									
4874	44.36	V	33.93	10.2	34.29	54.20	74	-19.80	PK
4874	34.22	V	33.93	10.2	34.29	44.06	54	-9.94	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.77	H	33.93	10.2	34.29	55.61	74	-18.39	PK
4874	35.66	H	33.93	10.2	34.29	45.50	54	-8.50	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX High									
4924	44.62	V	33.98	10.22	34.25	54.57	74	-19.43	PK
4924	36.04	V	33.98	10.22	34.25	45.99	54	-8.01	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	49.03	H	33.98	10.22	34.25	58.98	74	-15.02	PK
4924	33.13	H	33.98	10.22	34.25	43.08	54	-10.92	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

Note:

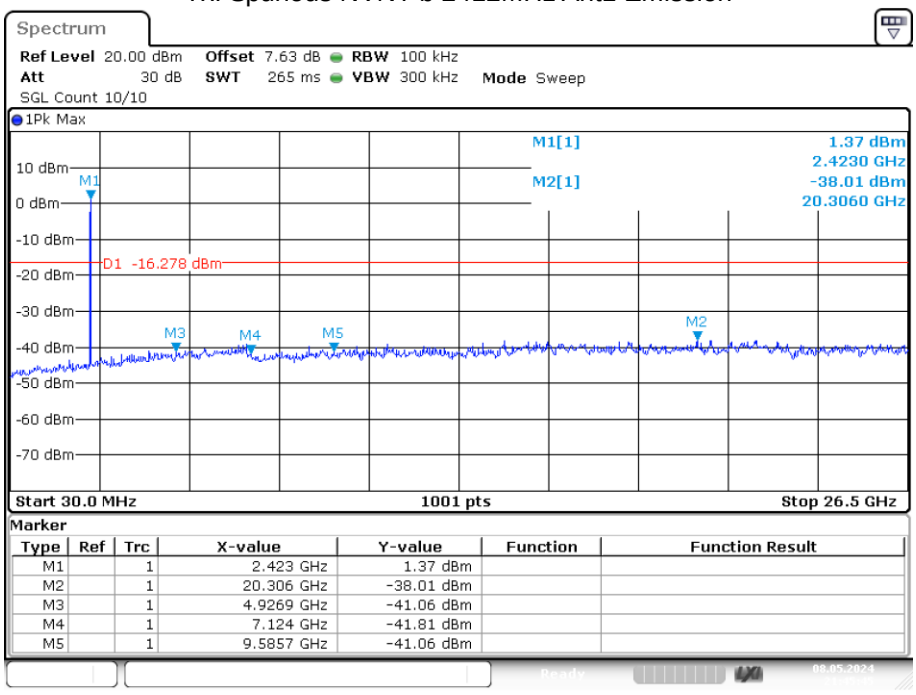
1, Result = Read level + Antenna factor + cable loss-Amp factor

2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: 1. Except for mode b&g, other modes test the MIMO status.
2. All antennas have been tested, only the worst data of each pattern is reflected. (**antenna 1)**

Conducted RF Spurious Emission

Tx. Spurious NVNT b 2412MHz Ant1 Emission

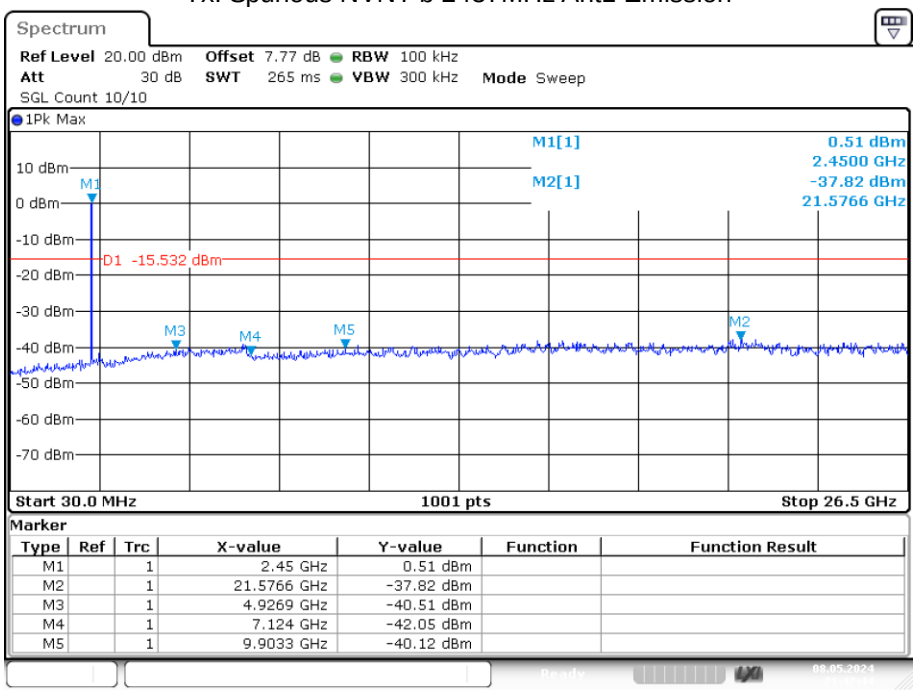


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	1.37 dBm		
M2		1	20.306 GHz	-38.01 dBm		
M3		1	4.9269 GHz	-41.06 dBm		
M4		1	7.124 GHz	-41.81 dBm		
M5		1	9.5857 GHz	-41.06 dBm		

Date: 8.MAY.2024 21:45:44

Tx. Spurious NVNT b 2437MHz Ant1 Emission

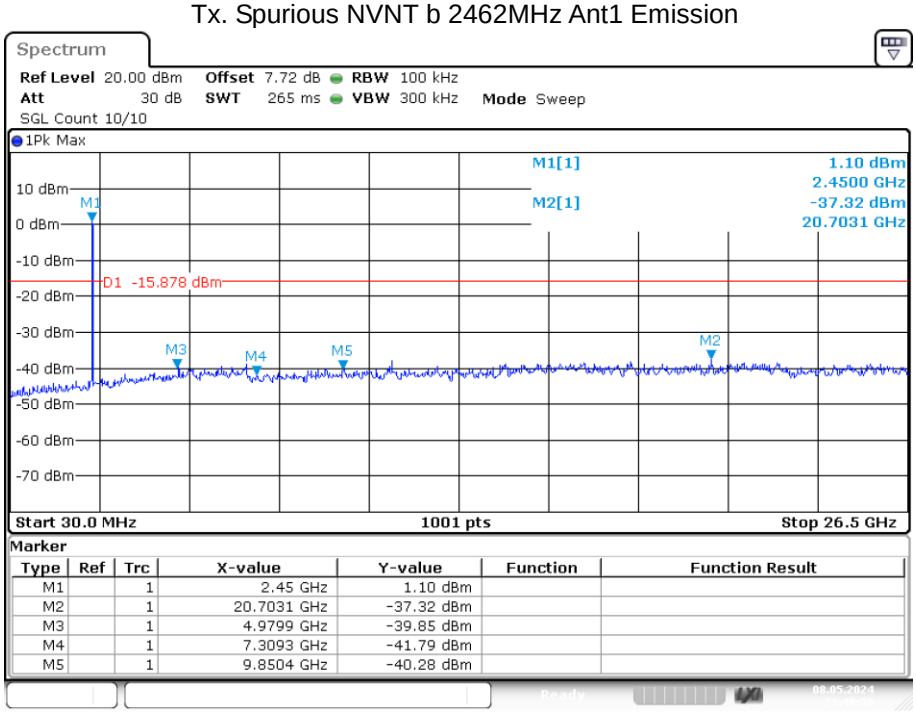


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	0.51 dBm		
M2		1	21.5766 GHz	-37.82 dBm		
M3		1	4.9269 GHz	-40.51 dBm		
M4		1	7.124 GHz	-42.05 dBm		
M5		1	9.9033 GHz	-40.12 dBm		

Date: 8.MAY.2024 21:47:43

Tx. Spurious NVNT b 2462MHz Ant1 Emission

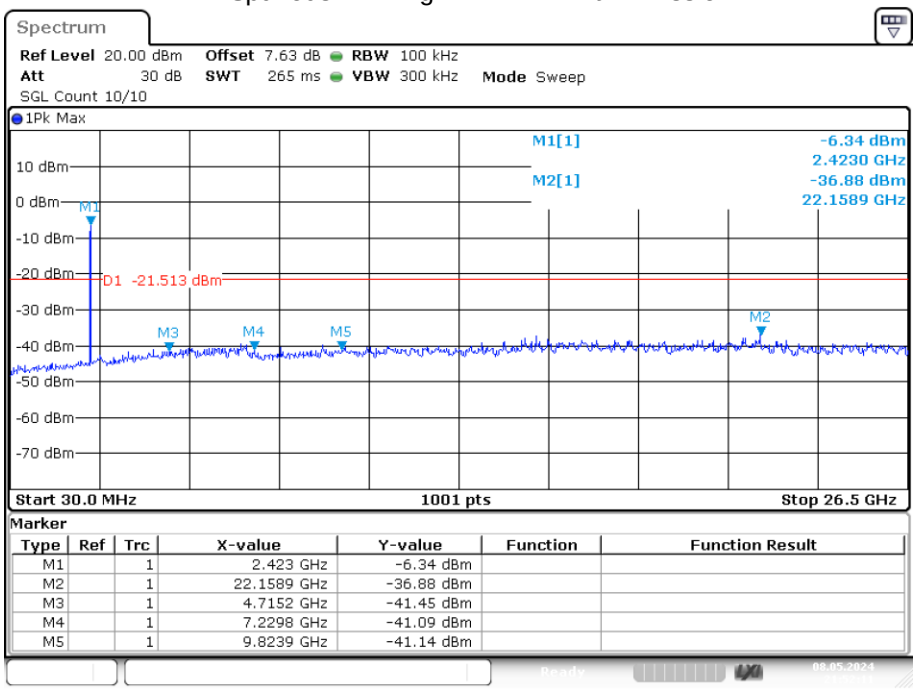


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	1.10 dBm		
M2		1	20.7031 GHz	-37.32 dBm		
M3		1	4.9799 GHz	-39.85 dBm		
M4		1	7.3093 GHz	-41.79 dBm		
M5		1	9.8504 GHz	-40.28 dBm		

Date: 8.MAY.2024 21:49:49

Tx. Spurious NVNT g 2412MHz Ant1 Emission

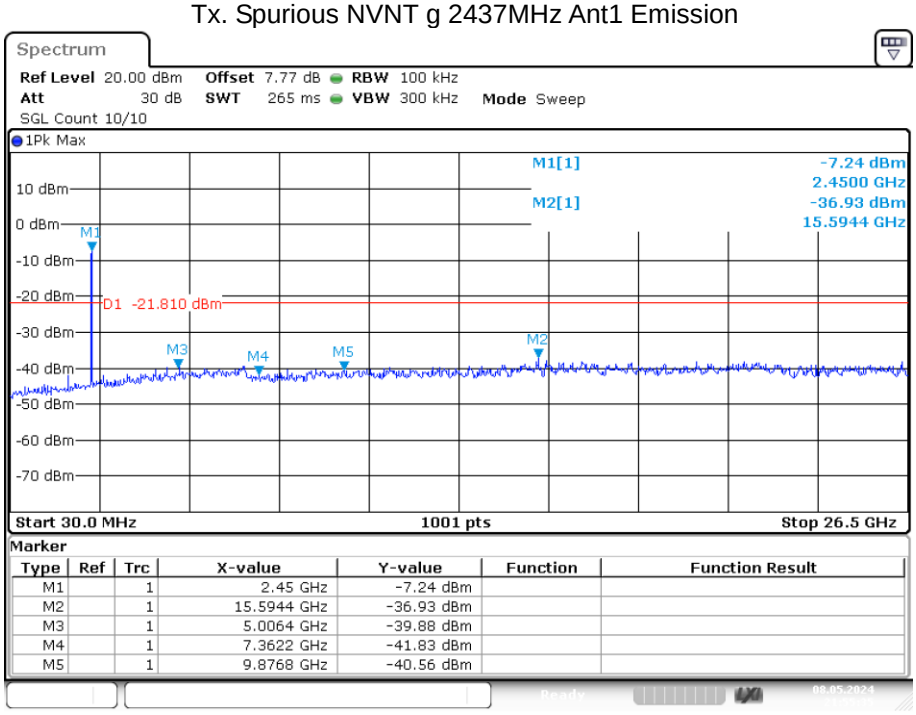


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-6.34 dBm		
M2		1	22.1589 GHz	-36.88 dBm		
M3		1	4.7152 GHz	-41.45 dBm		
M4		1	7.2298 GHz	-41.09 dBm		
M5		1	9.8239 GHz	-41.14 dBm		

Date: 8.MAY.2024 21:52:12

Tx. Spurious NVNT g 2437MHz Ant1 Emission

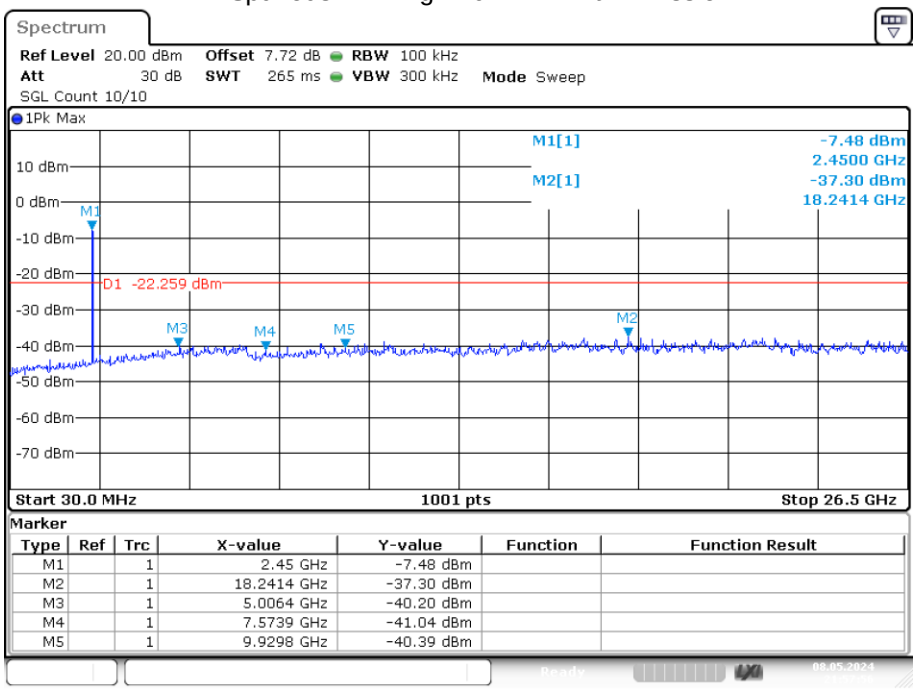


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-7.24 dBm		
M2		1	15.5944 GHz	-36.93 dBm		
M3		1	5.0064 GHz	-39.88 dBm		
M4		1	7.3622 GHz	-41.83 dBm		
M5		1	9.8768 GHz	-40.56 dBm		

Date: 8.MAY.2024 21:55:34

Tx. Spurious NVNT g 2462MHz Ant1 Emission

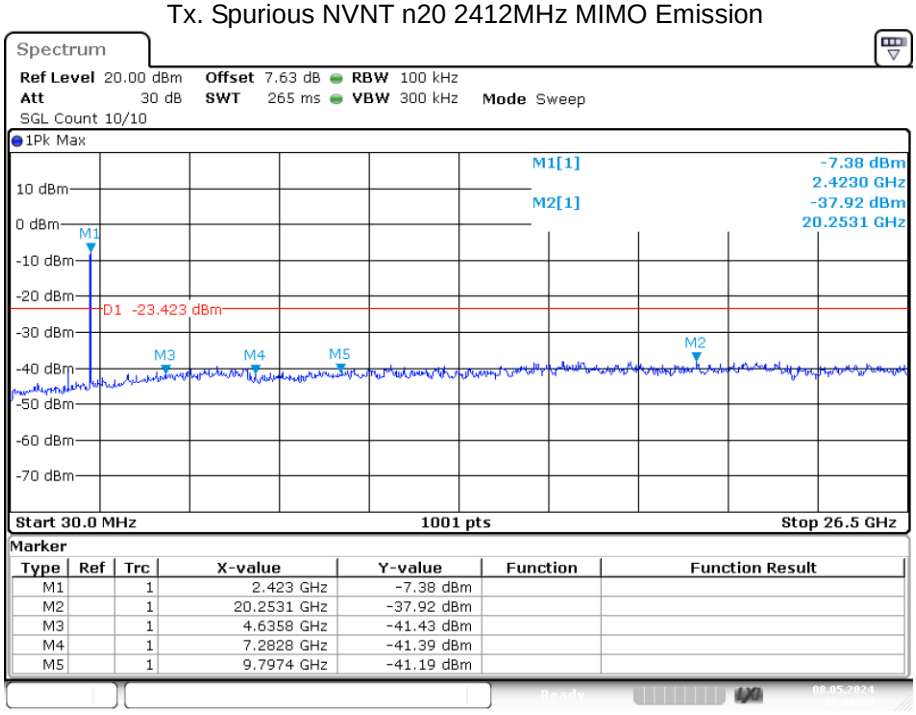


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-7.48 dBm		
M2		1	18.2414 GHz	-37.30 dBm		
M3		1	5.0064 GHz	-40.20 dBm		
M4		1	7.5739 GHz	-41.04 dBm		
M5		1	9.9298 GHz	-40.39 dBm		

Date: 8.MAY.2024 21:57:56

Tx. Spurious NVNT n20 2412MHz MIMO Emission

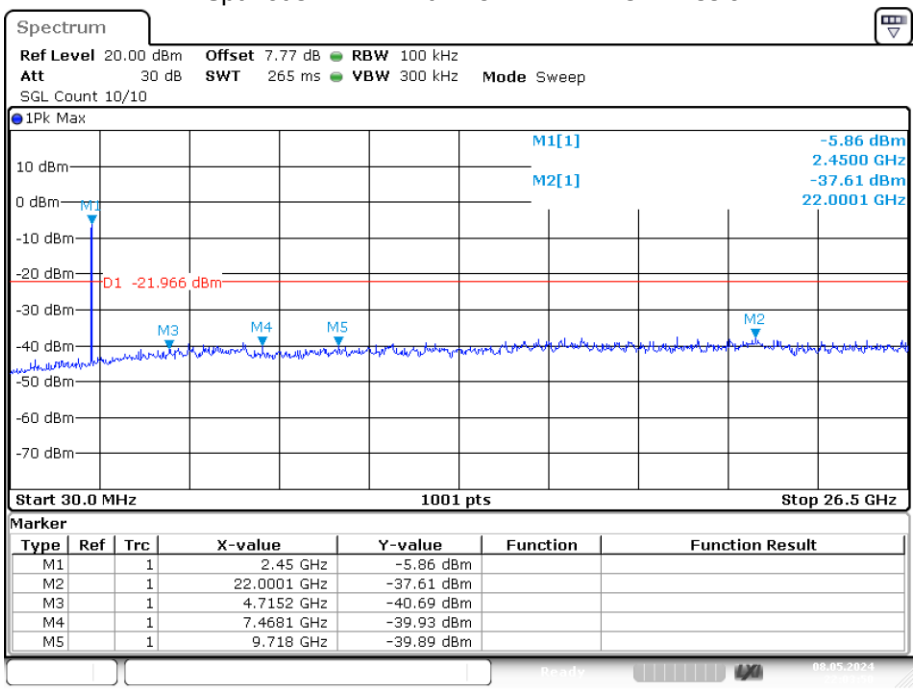


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-7.38 dBm		
M2		1	20.2531 GHz	-37.92 dBm		
M3		1	4.6358 GHz	-41.43 dBm		
M4		1	7.2828 GHz	-41.39 dBm		
M5		1	9.7974 GHz	-41.19 dBm		

Date: 8.MAY.2024 22:00:20

Tx. Spurious NVNT n20 2437MHz MIMO Emission

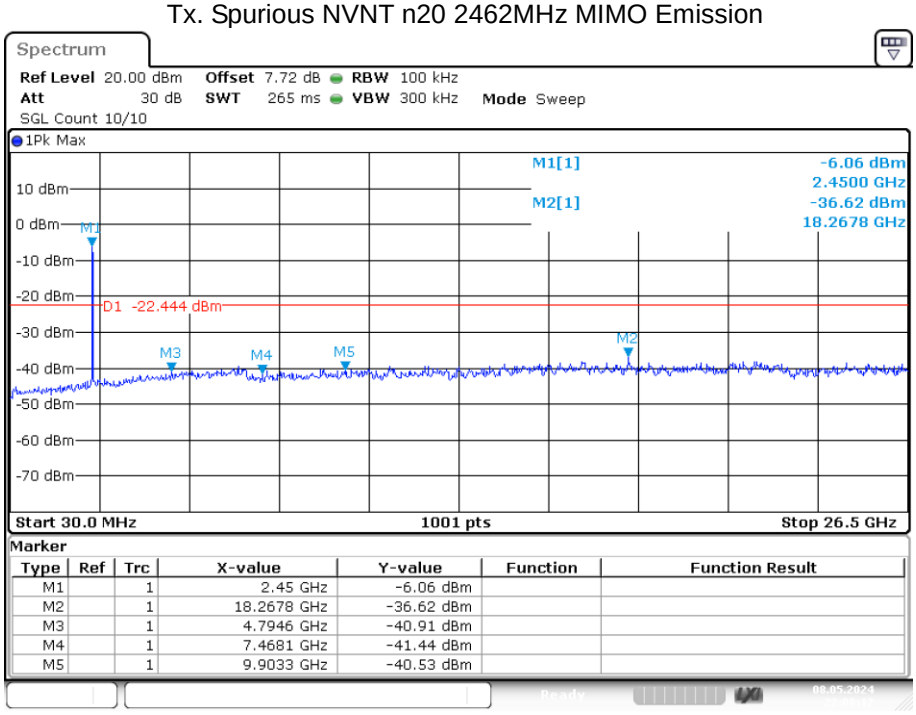


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-5.86 dBm		
M2		1	22.0001 GHz	-37.61 dBm		
M3		1	4.7152 GHz	-40.69 dBm		
M4		1	7.4681 GHz	-39.93 dBm		
M5		1	9.718 GHz	-39.89 dBm		

Date: 8.MAY.2024 22:03:49

Tx. Spurious NVNT n20 2462MHz MIMO Emission

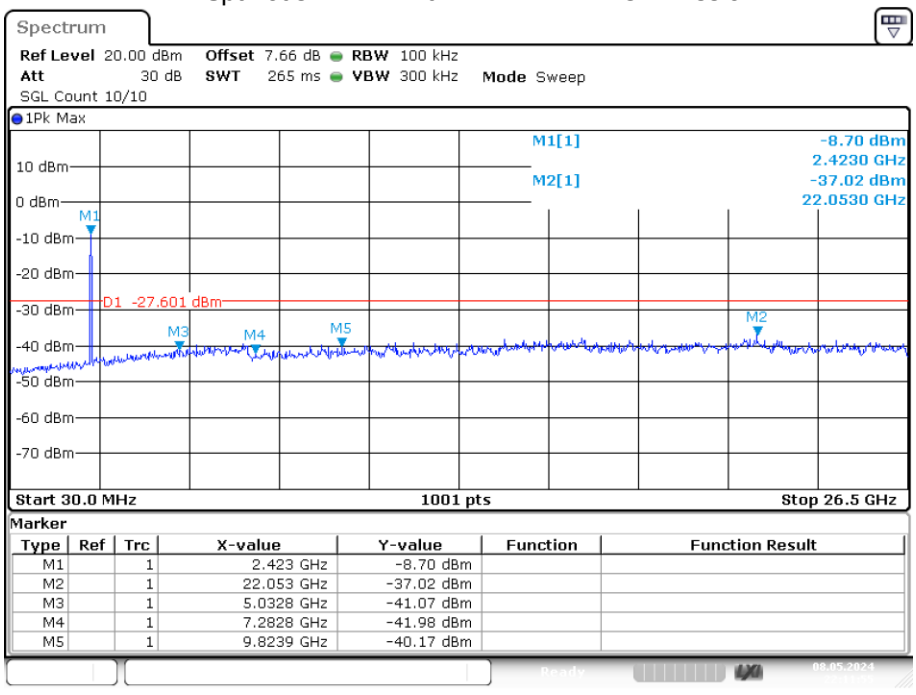


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-6.06 dBm		
M2		1	18.2678 GHz	-36.62 dBm		
M3		1	4.7946 GHz	-40.91 dBm		
M4		1	7.4681 GHz	-41.44 dBm		
M5		1	9.9033 GHz	-40.53 dBm		

Date: 8.MAY.2024 22:08:12

Tx. Spurious NVNT n40 2422MHz MIMO Emission

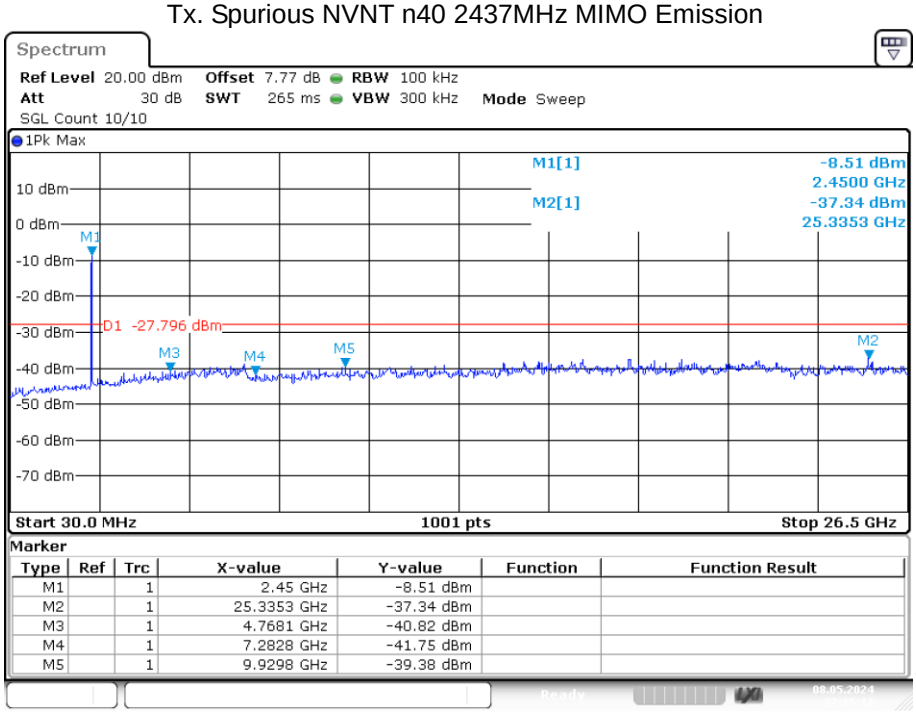


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-8.70 dBm		
M2		1	22.053 GHz	-37.02 dBm		
M3		1	5.0328 GHz	-41.07 dBm		
M4		1	7.2828 GHz	-41.98 dBm		
M5		1	9.8239 GHz	-40.17 dBm		

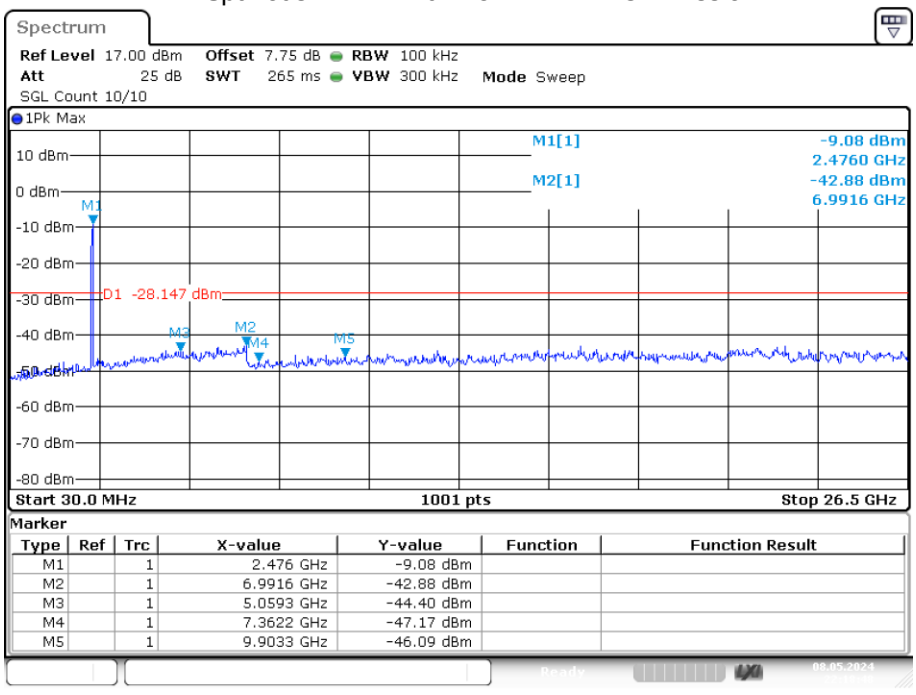
Date: 8.MAY.2024 22:11:55

Tx. Spurious NVNT n40 2437MHz MIMO Emission



Date: 8.MAY.2024 22:15:11

Tx. Spurious NVNT n40 2452MHz MIMO Emission



Date: 8.MAY.2024 22:18:48

Note: 1. Except for mode b/g, other modes test the MIMO status.
2. All antennas have been tested, only the worst data of each pattern is reflected. (**antenna 1)**

4. POWER LINE CONDUCTED EMISSION

4.1. Test Limits

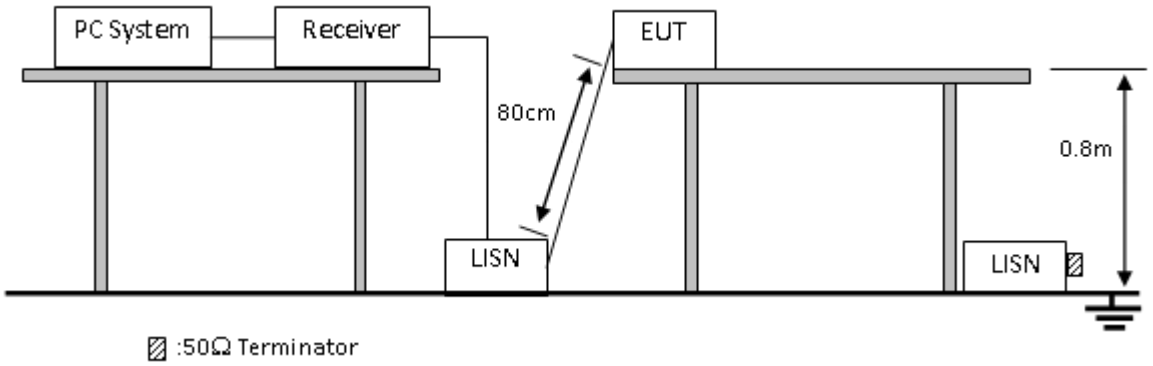
Frequency	Limits dB(μV)	
MHz	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.
3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.2. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Measurement.
The bandwidth of test receiver is set at 9 kHz.

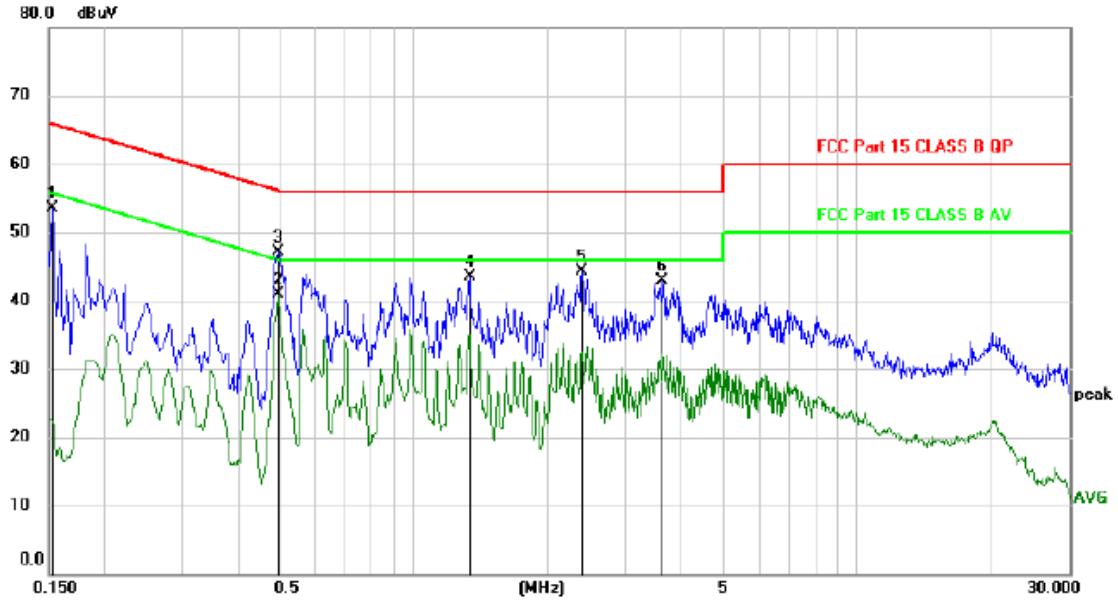
4.3. Test Setup



4.4. Test Results

Test result for 802.11b (2412MHz), AC 120V/ 60Hz

Line:

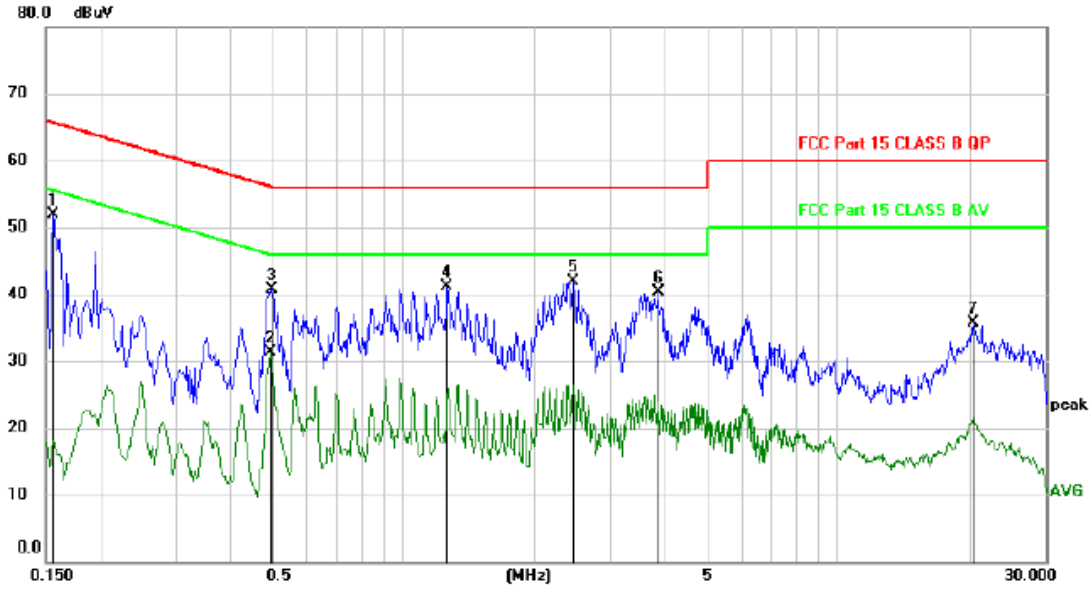


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1530	43.58	9.94	53.52	65.84	-12.32	peak	
2	*	0.4920	31.04	9.96	41.00	46.13	-5.13	AVG	
3		0.4950	37.08	9.96	47.04	56.08	-9.04	peak	
4		1.3320	33.52	9.90	43.42	56.00	-12.58	peak	
5		2.3850	34.34	9.90	44.24	56.00	-11.76	peak	
6		3.6390	32.93	9.96	42.89	56.00	-13.11	peak	

*:Maximum data x:Over limit !:over margin (Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Neutral:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1560	42.06	9.94	52.00	65.67	-13.67	peak	
2		0.4920	21.36	9.96	31.32	46.13	-14.81	AVG	
3		0.4980	30.73	9.96	40.69	56.03	-15.34	peak	
4		1.2600	31.29	9.89	41.18	56.00	-14.82	peak	
5		2.4510	31.93	9.90	41.83	56.00	-14.17	peak	
6		3.8460	30.43	9.96	40.39	56.00	-15.61	peak	
7		20.3940	25.21	10.47	35.68	60.00	-24.32	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Note: All modes of two antennas have been tested, and only shown the worst case mode in this report. (**b 2412MHz for antenna 1)**

5. CONDUCTED MAXIMUM OUTPUT POWER

5.1. Test limits

Please refer FCC PART 15: 15.247.

Regulation 15.247(b) The limit of Maximum Peak Output Power Measurement is 1W(30dBm).

5.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

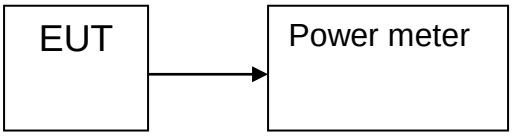
5.2.1 Place the EUT on the table and set it in transmitting mode.

5.2.2 Connected the EUT's antenna port to peak power meter by 20dB attenuator.

5.2.3 Measure out each mode and each bands peak output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

5.3. Test Setup



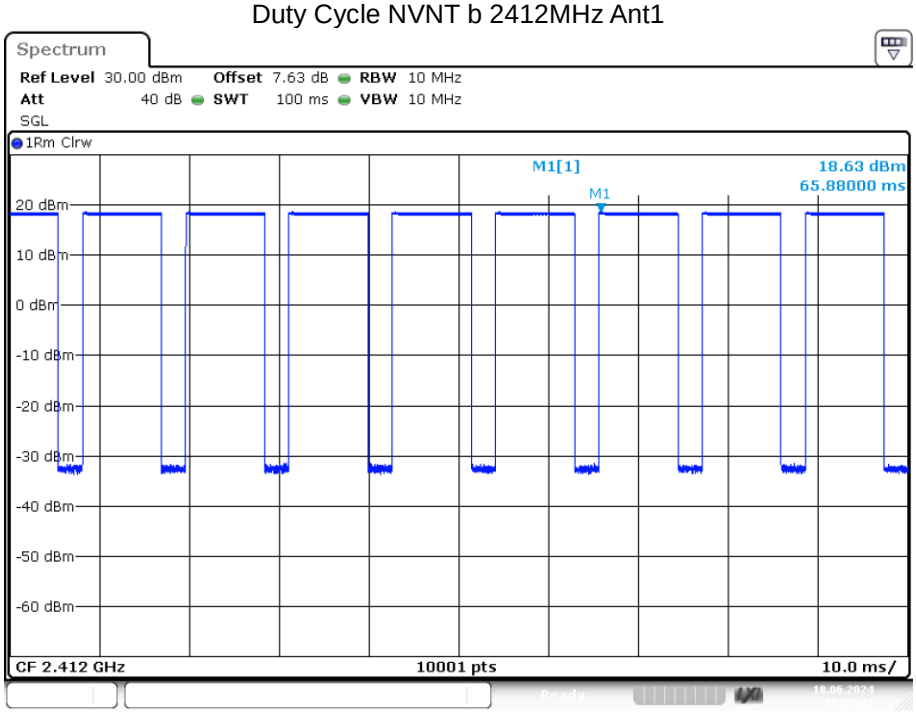
5.4. Test Results

Condition	Mode	Frequency (MHz)	Antenna	Antenna Gain(dBi)	Conducted Power (dBm)	EIRP Power (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	4.73	8.902	13.632	30	Pass
NVNT	b	2437	Ant1	4.73	8.984	13.714	30	Pass
NVNT	b	2462	Ant1	4.73	8.725	13.455	30	Pass
NVNT	g	2412	Ant1	4.73	10.022	14.752	30	Pass
NVNT	g	2437	Ant1	4.73	9.514	14.244	30	Pass
NVNT	g	2462	Ant1	4.73	9.261	13.991	30	Pass
NVNT	n20	2412	Ant1	4.73	9.113	13.843	30	Pass
NVNT	n20	2437	Ant1	4.73	9.582	14.312	30	Pass
NVNT	n20	2462	Ant1	4.73	8.961	13.691	30	Pass
NVNT	n40	2422	Ant1	4.73	9.88	14.61	30	Pass
NVNT	n40	2437	Ant1	4.73	10.103	14.833	30	Pass
NVNT	n40	2452	Ant1	4.73	8.902	15.4	30	Pass

Duty Cycle

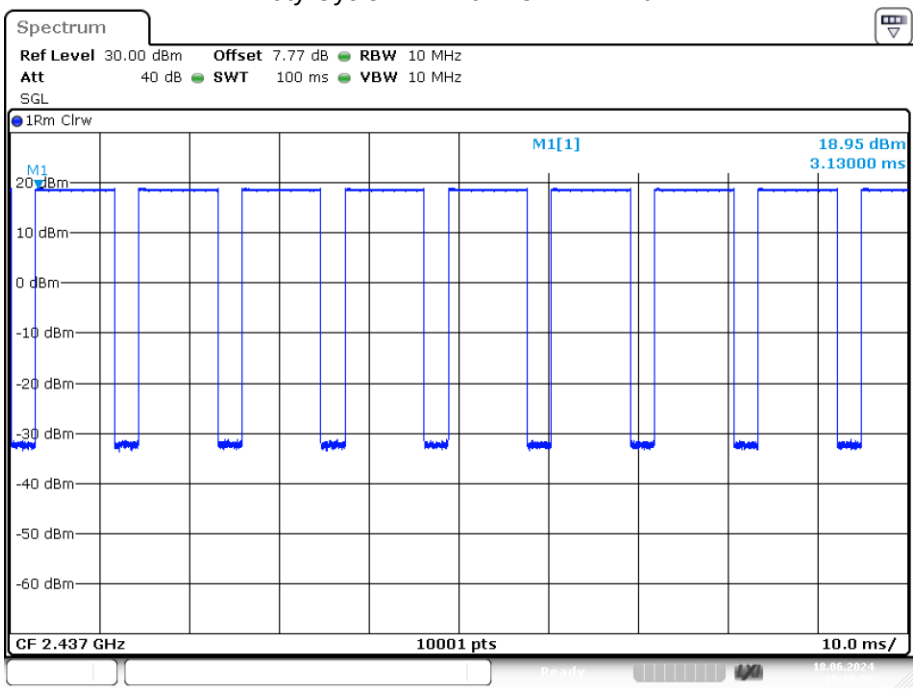
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)
NVNT	b	2412	Ant1	75.98	1.19
NVNT	b	2437	Ant1	75.98	1.19
NVNT	b	2462	Ant1	78.5	1.05
NVNT	g	2412	Ant1	92.55	0.34
NVNT	g	2437	Ant1	92.37	0.34
NVNT	g	2462	Ant1	92.53	0.34
NVNT	n20	2412	Ant1	77.19	1.12
NVNT	n20	2437	Ant1	77.52	1.11
NVNT	n20	2462	Ant1	78.33	1.06
NVNT	n40	2422	Ant1	77.41	1.11
NVNT	n40	2437	Ant1	76.68	1.15
NVNT	n40	2452	Ant1	76.94	1.14

Duty Cycle NVNT b 2412MHz Ant1



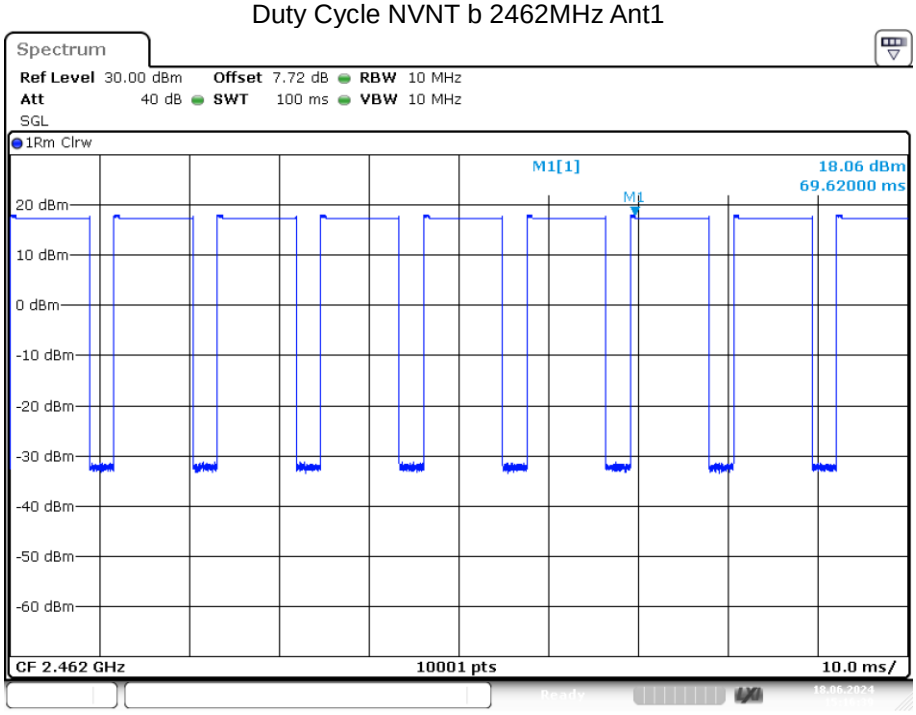
Date: 18.JUN.2024 15:14:20

Duty Cycle NVNT b 2437MHz Ant1



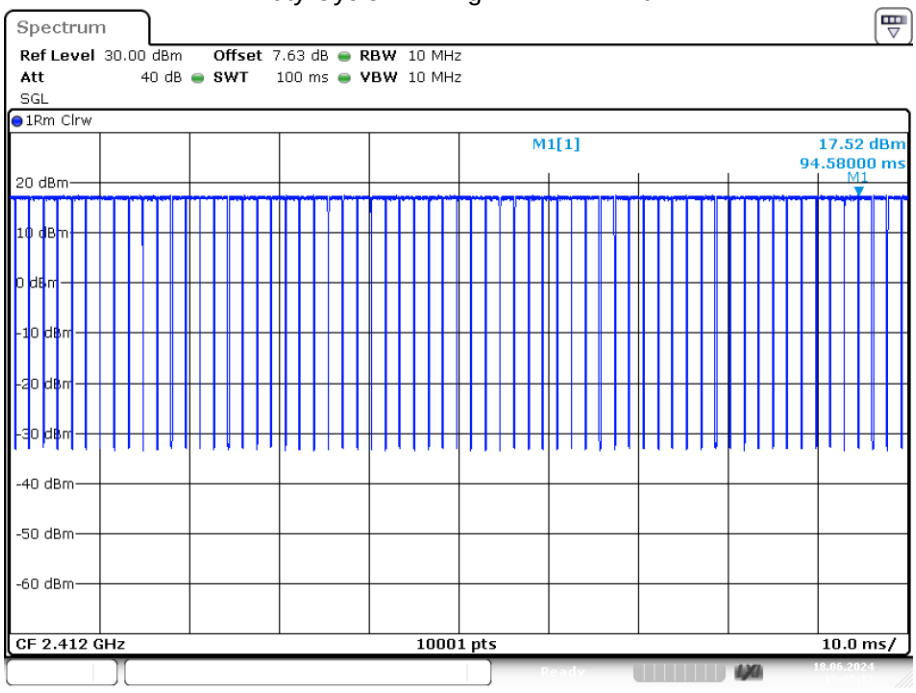
Date: 18.JUN.2024 15:15:59

Duty Cycle NVNT b 2462MHz Ant1



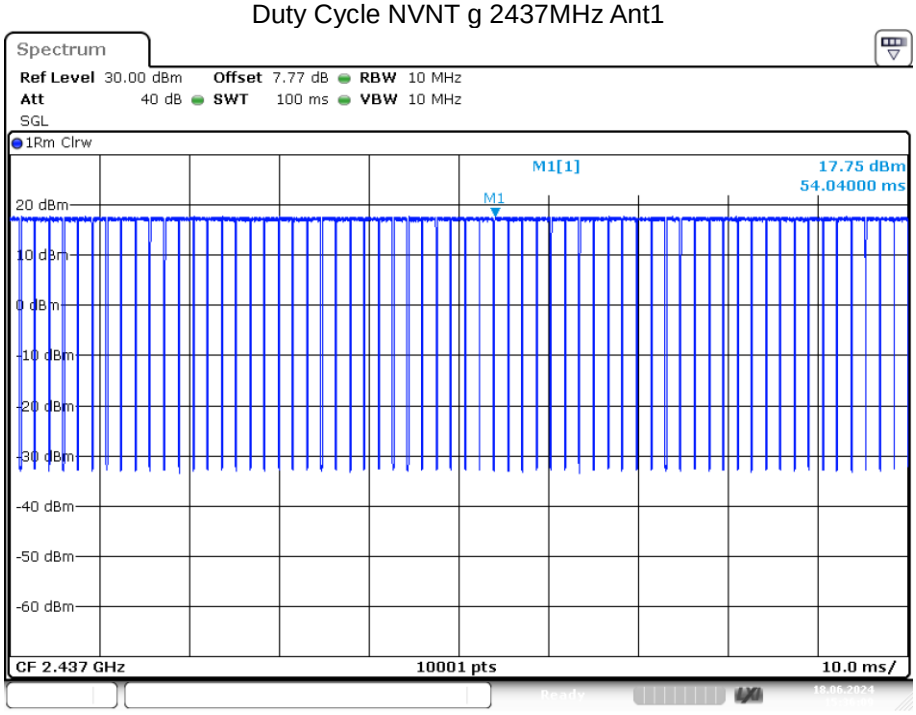
Date: 18.JUN.2024 15:16:39

Duty Cycle NVNT g 2412MHz Ant1



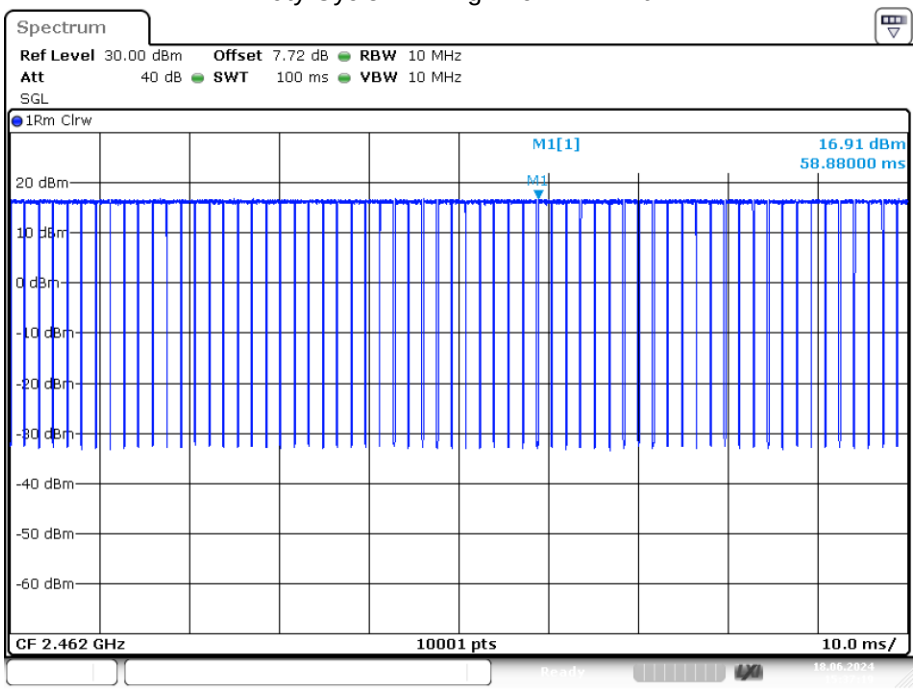
Date: 18.JUN.2024 15:35:12

Duty Cycle NVNT g 2437MHz Ant1



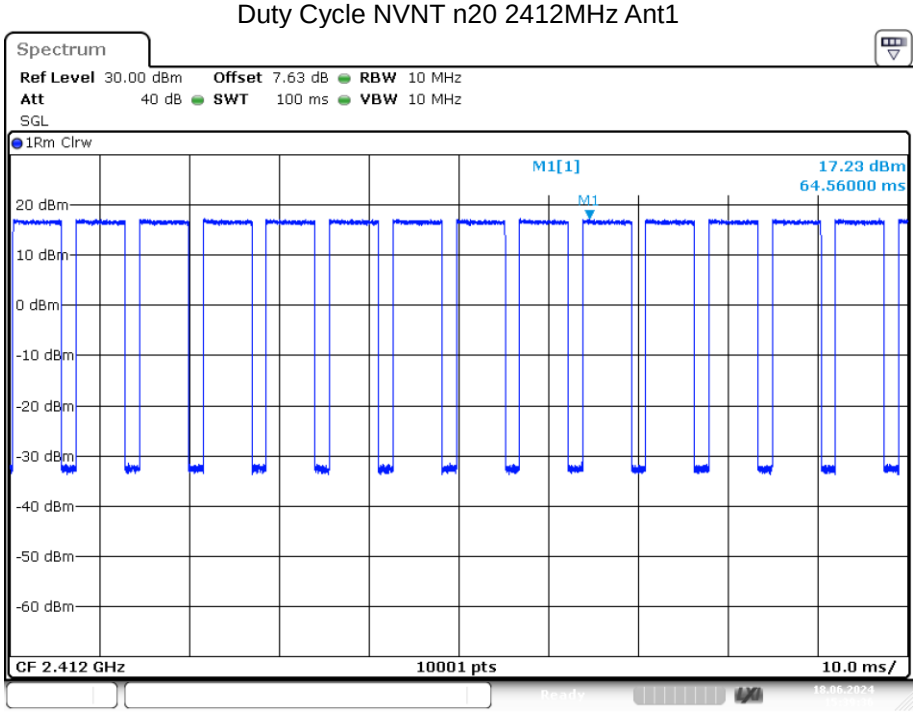
Date: 18.JUN.2024 15:36:09

Duty Cycle NVNT g 2462MHz Ant1



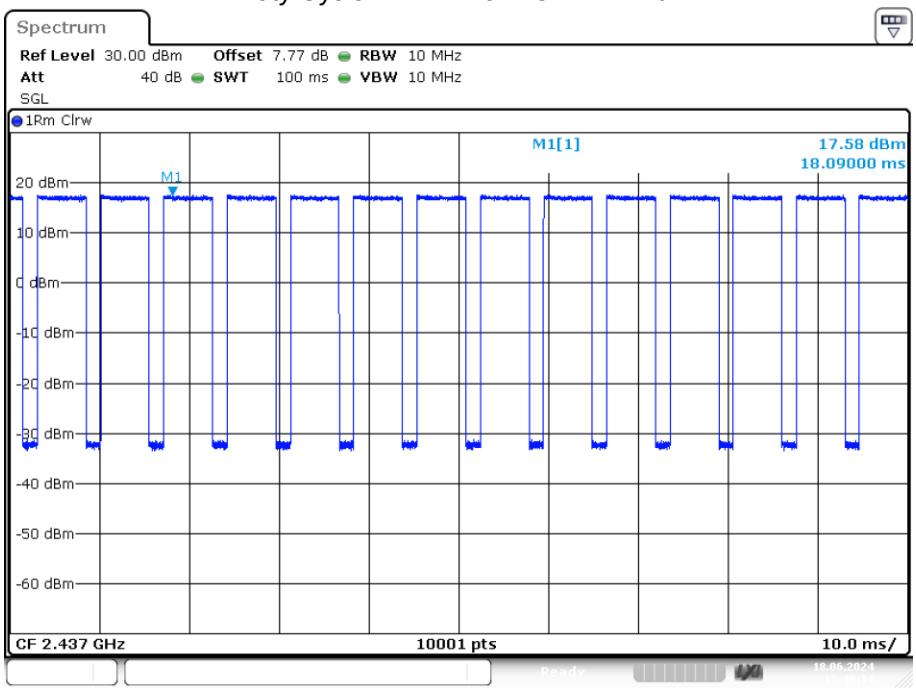
Date: 18.JUN.2024 15:37:20

Duty Cycle NVNT n20 2412MHz Ant1



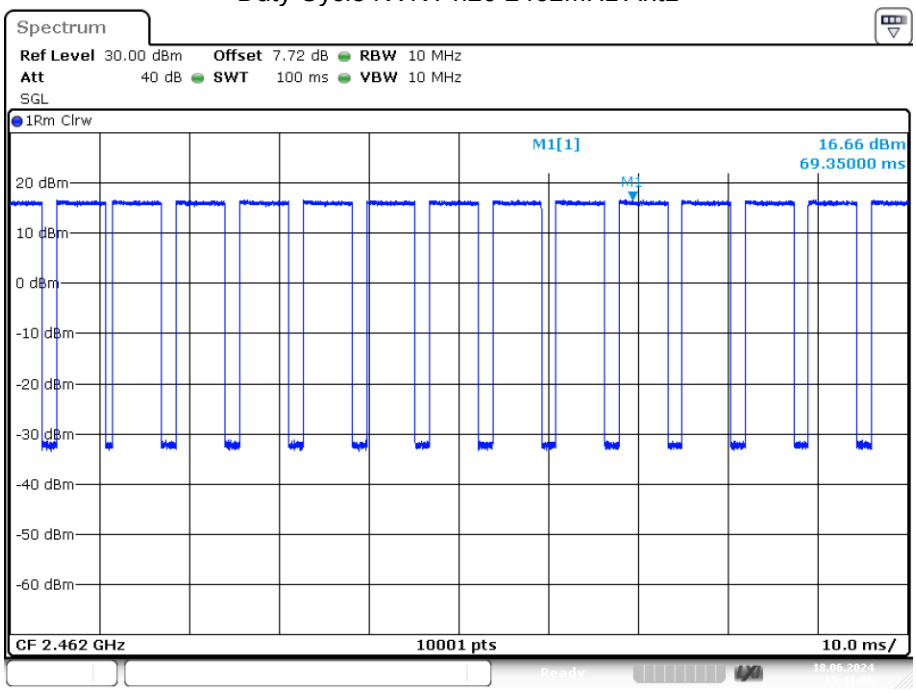
Date: 18.JUN.2024 15:39:36

Duty Cycle NVNT n20 2437MHz Ant1



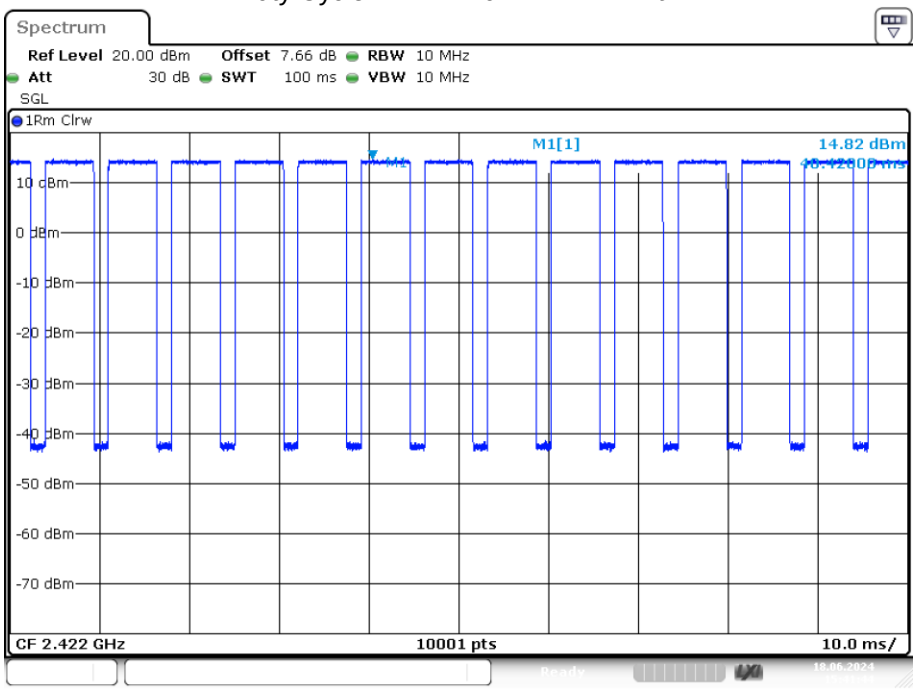
Date: 18.JUN.2024 15:40:13

Duty Cycle NVNT n20 2462MHz Ant1



Date: 18.JUN.2024 15:41:06

Duty Cycle NVNT n40 2422MHz Ant1



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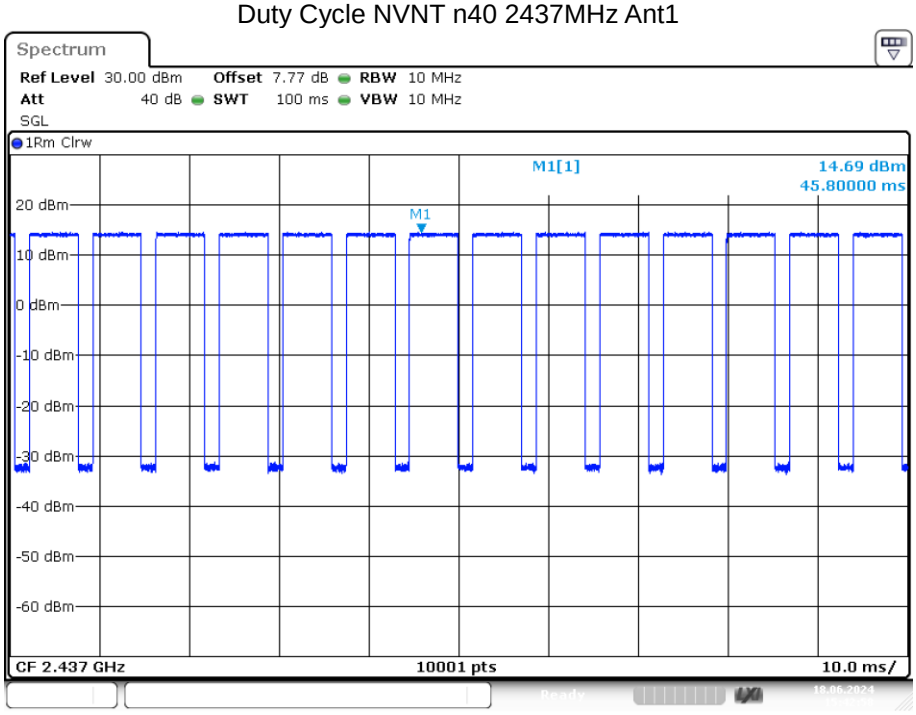
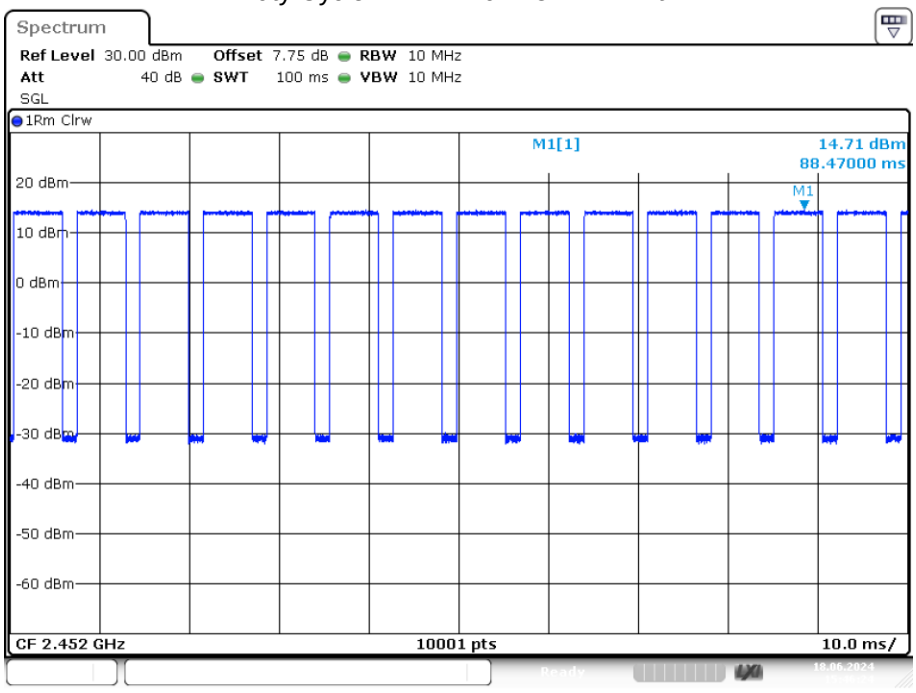
Duty Cycle NVNT n40 2437MHz Ant1



Date: 18.JUN.2024 15:42:58

Duty Cycle NVNT n40 2452MHz Ant1



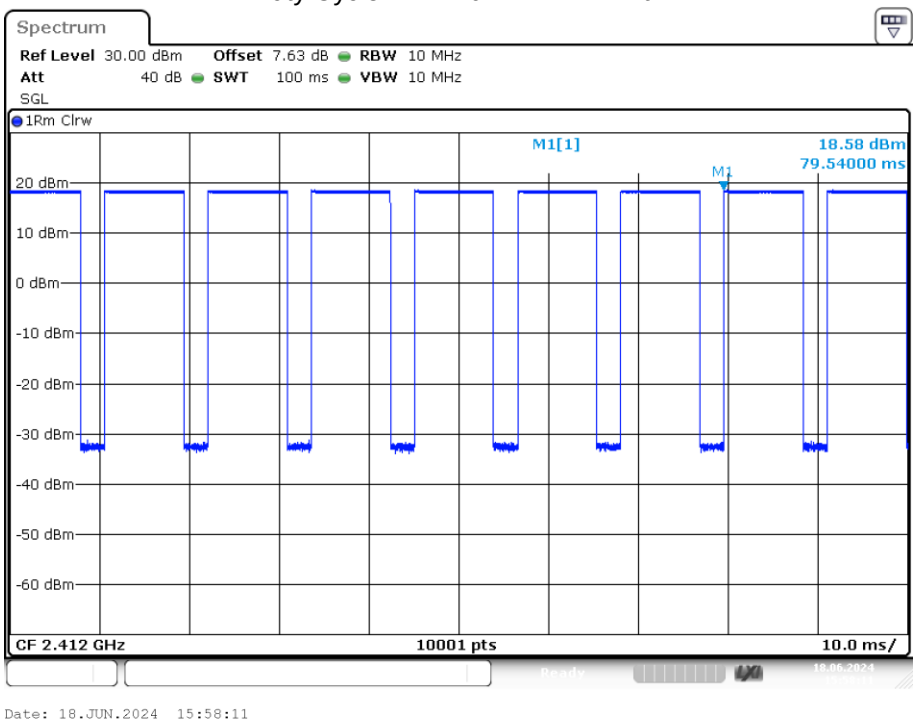
Date: 18.JUN.2024 15:46:24

Condition	Mode	Frequency (MHz)	Antenna	Antenna Gain(dBi)	Conducted Power (dBm)	EIRP Power (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	4.73	10.703	15.433	30	Pass
NVNT	b	2437	Ant1	4.73	10.627	15.357	30	Pass
NVNT	b	2462	Ant1	4.73	10.935	15.665	30	Pass
NVNT	g	2412	Ant1	4.73	11.185	15.915	30	Pass
NVNT	g	2437	Ant1	4.73	11.125	15.855	30	Pass
NVNT	g	2462	Ant1	4.73	10.31	15.04	30	Pass
NVNT	n20	2412	Ant1	4.73	10.171	14.901	30	Pass
NVNT	n20	2437	Ant1	4.73	9.935	14.665	30	Pass
NVNT	n20	2462	Ant1	4.73	10.219	14.949	30	Pass
NVNT	n40	2422	Ant1	4.73	10.374	15.104	30	Pass
NVNT	n40	2437	Ant1	4.73	10.424	15.154	30	Pass
NVNT	n40	2452	Ant1	4.73	10.266	15.266	30	Pass

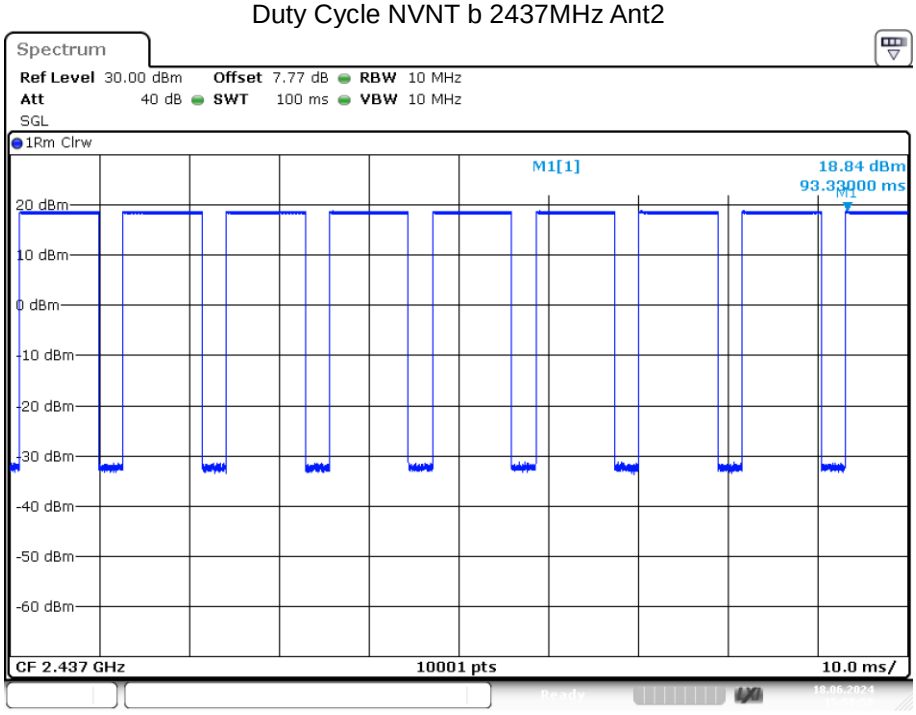
Duty Cycle

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)
NVNT	b	2412	Ant2	78.43	1.06
NVNT	b	2437	Ant2	77.55	1.1
NVNT	b	2462	Ant2	77.67	1.1
NVNT	g	2412	Ant2	92.44	0.34
NVNT	g	2437	Ant2	92.48	0.34
NVNT	g	2462	Ant2	92.3	0.35
NVNT	n20	2412	Ant2	76.63	1.16
NVNT	n20	2437	Ant2	77.23	1.12
NVNT	n20	2462	Ant2	76.14	1.18
NVNT	n40	2422	Ant2	76.25	1.18
NVNT	n40	2437	Ant2	77.35	1.12
NVNT	n40	2452	Ant2	77.38	1.11

Duty Cycle NVNT b 2412MHz Ant2

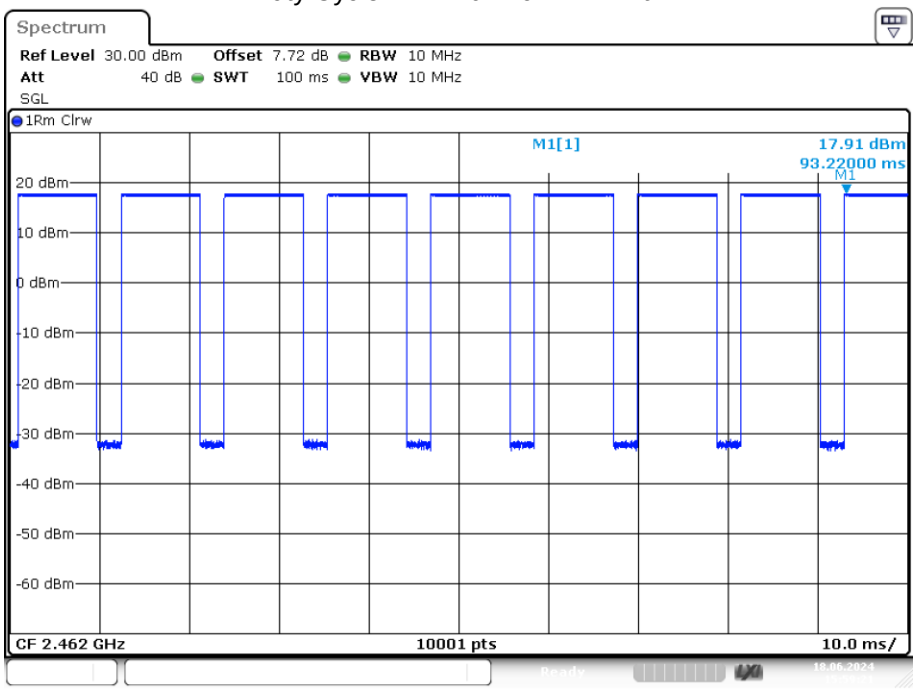


Duty Cycle NVNT b 2437MHz Ant2



Date: 18.JUN.2024 15:58:58

Duty Cycle NVNT b 2462MHz Ant2



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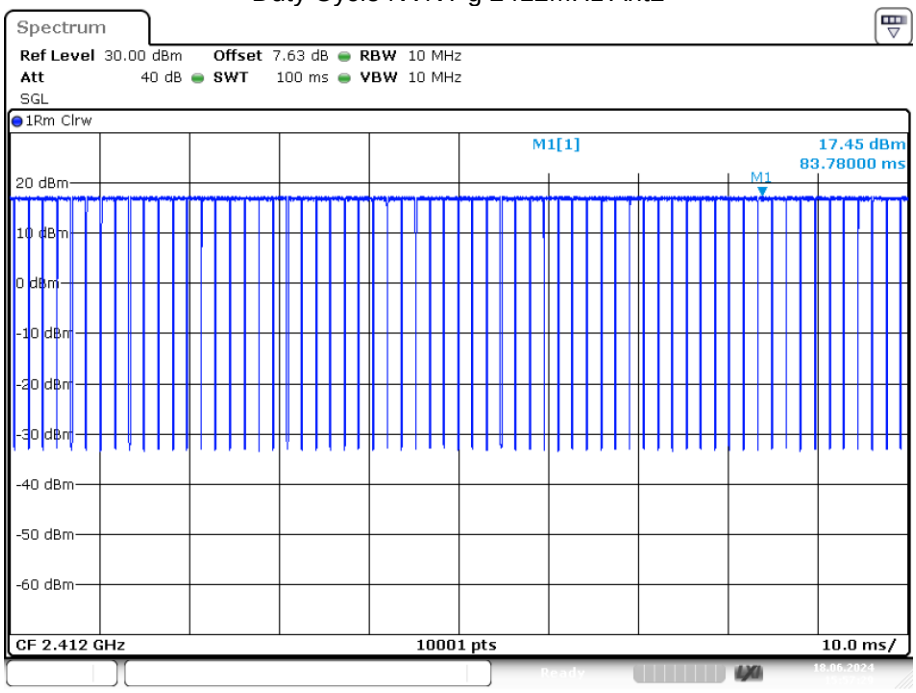
Duty Cycle NVNT g 2412MHz Ant2



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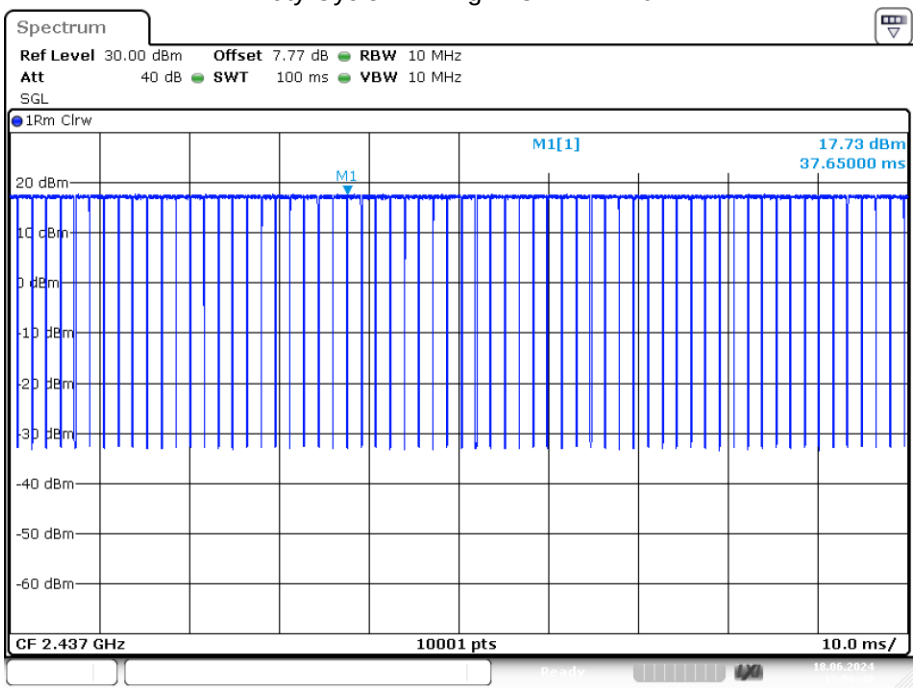
Duty Cycle NVNT g 2437MHz Ant2



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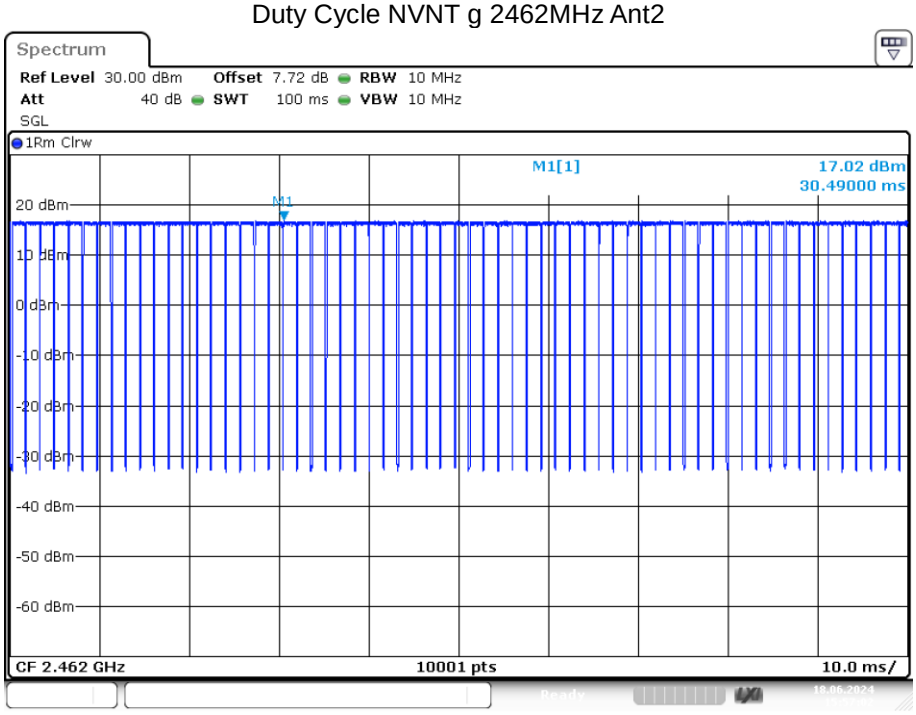
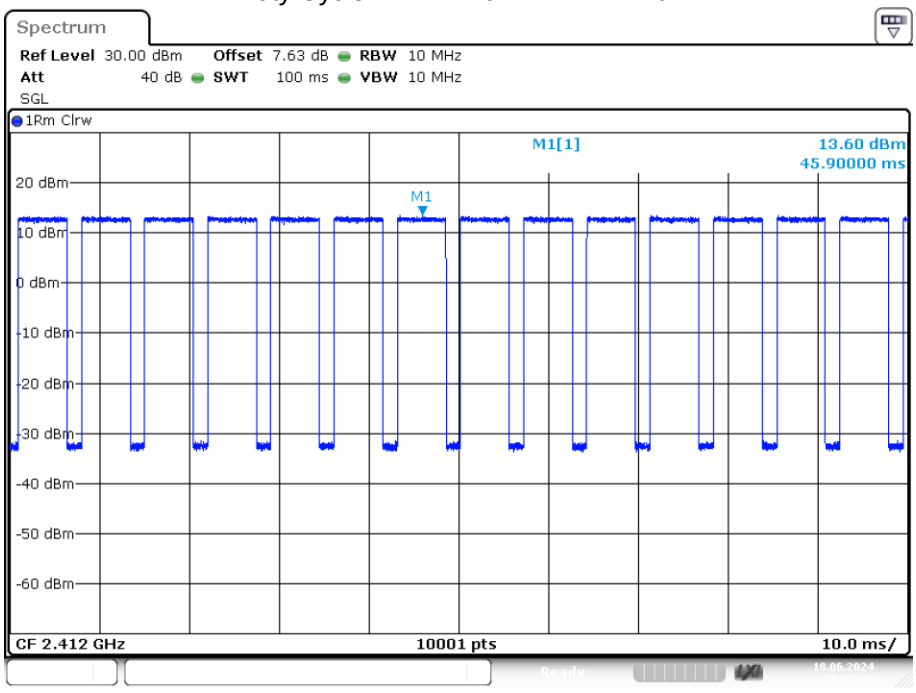
Duty Cycle NVNT g 2462MHz Ant2



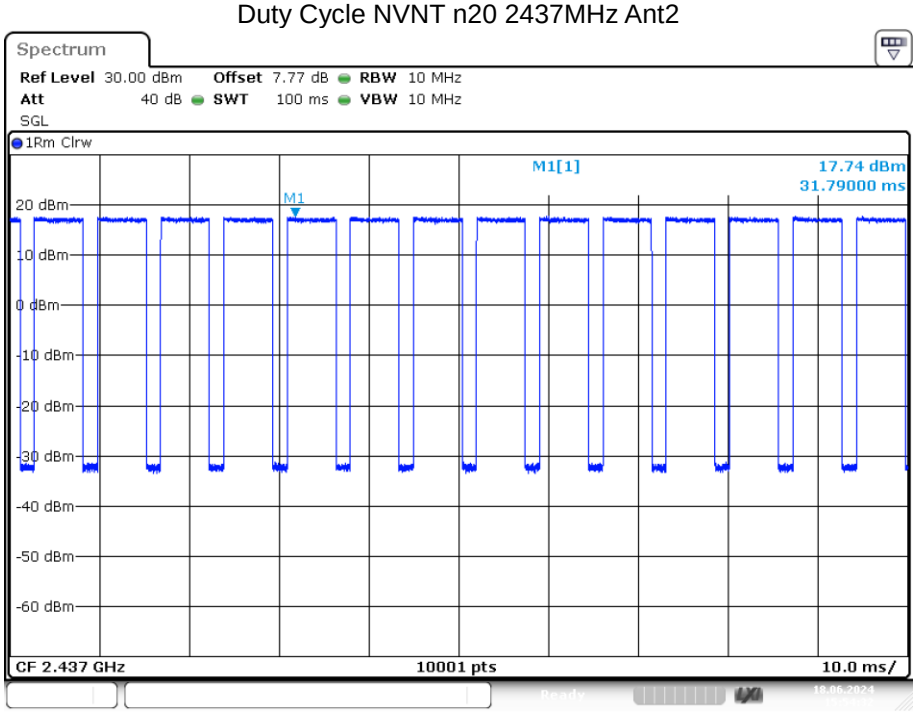
Date: 18.JUN.2024 15:57:02

Duty Cycle NVNT n20 2412MHz Ant2



Date: 18.JUN.2024 15:52:45

Duty Cycle NVNT n20 2437MHz Ant2



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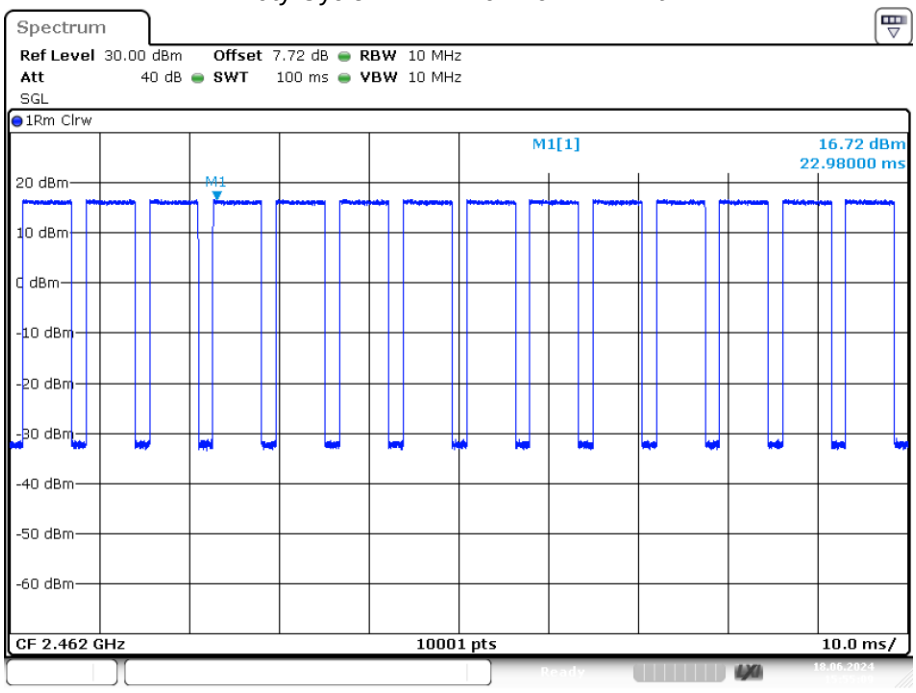
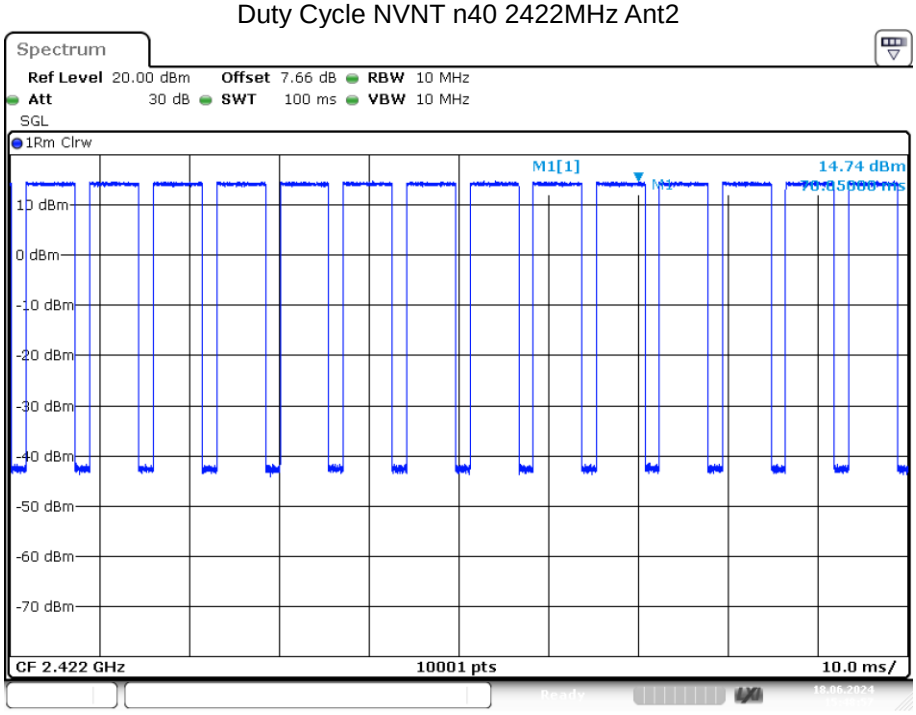
Duty Cycle NVNT n20 2462MHz Ant2



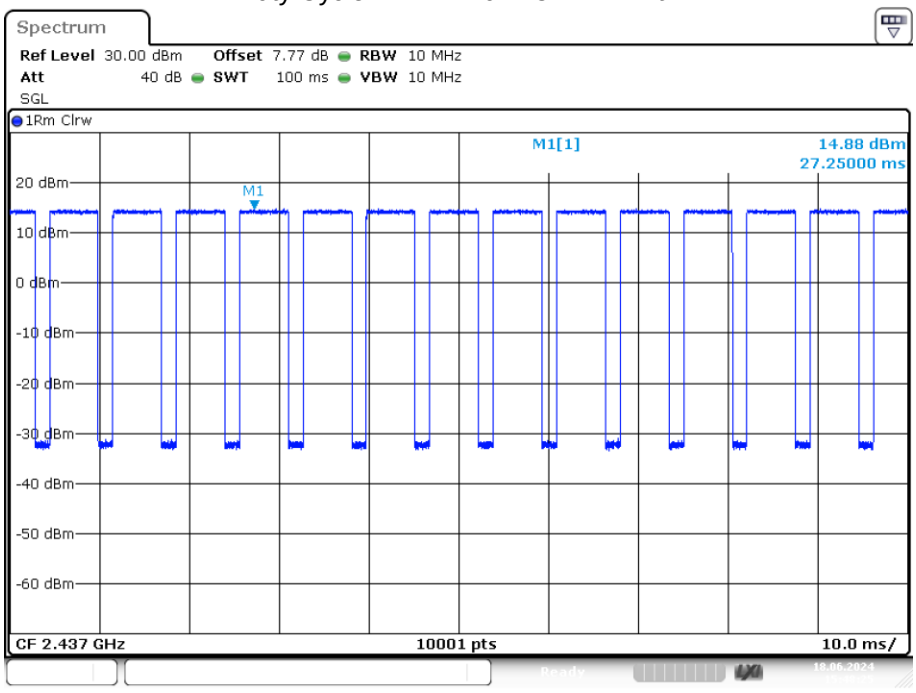
Date: 18.JUN.2024 15:55:09

Duty Cycle NVNT n40 2422MHz Ant2



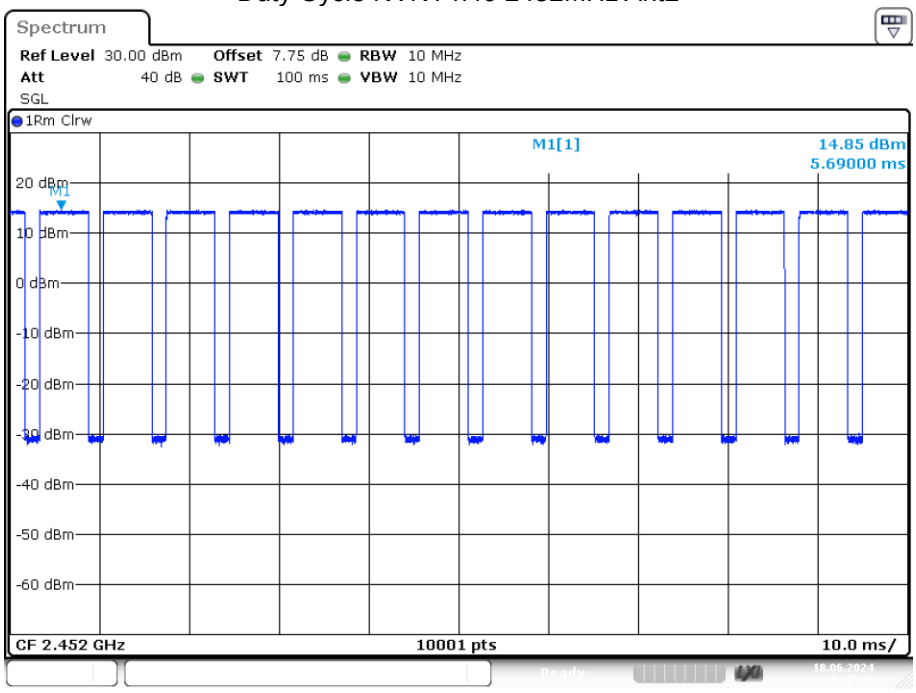
Date: 18.JUN.2024 15:48:57

Duty Cycle NVNT n40 2437MHz Ant2



Date: 18.JUN.2024 15:48:25

Duty Cycle NVNT n40 2452MHz Ant2



Condition	Mode	Frequency (MHz)	Antenna	Conducted power	Limit (dBm)	Verdict
NVNT	n20	2412	MIMO	12.684	28.26	Pass
NVNT	n20	2437	MIMO	12.772	28.26	Pass
NVNT	n20	2462	MIMO	12.646	28.26	Pass
NVNT	n40	2422	MIMO	13.144	28.26	Pass
NVNT	n40	2437	MIMO	13.277	28.26	Pass
NVNT	n40	2452	MIMO	12.648	28.26	Pass

Note: 1. Directional gain=7.74dBi, so the Conducted Power Limit need to reduce1.74.

6. PEAK POWER SPECTRAL DENSITY

6.1. Test limits

6.1.1 Please refer FCC PART 15: 15.247.

6.1.2 For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

6.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

6.2.1 Place the EUT on the table and set it in transmitting mode.

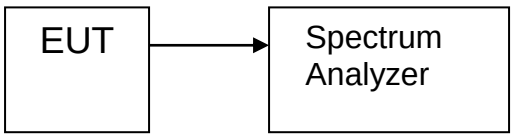
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 100kHz(Set the RBW to: 3 kHz≤RBW≤100 kHz.), VBW = 300kHz(Set the VBW≥3×RBW), span≥1.5×DTS bandwidth., detail see the test plot.

6.2.4 Record the max reading.

6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

6.3. Test Setup



6.4. Test Results

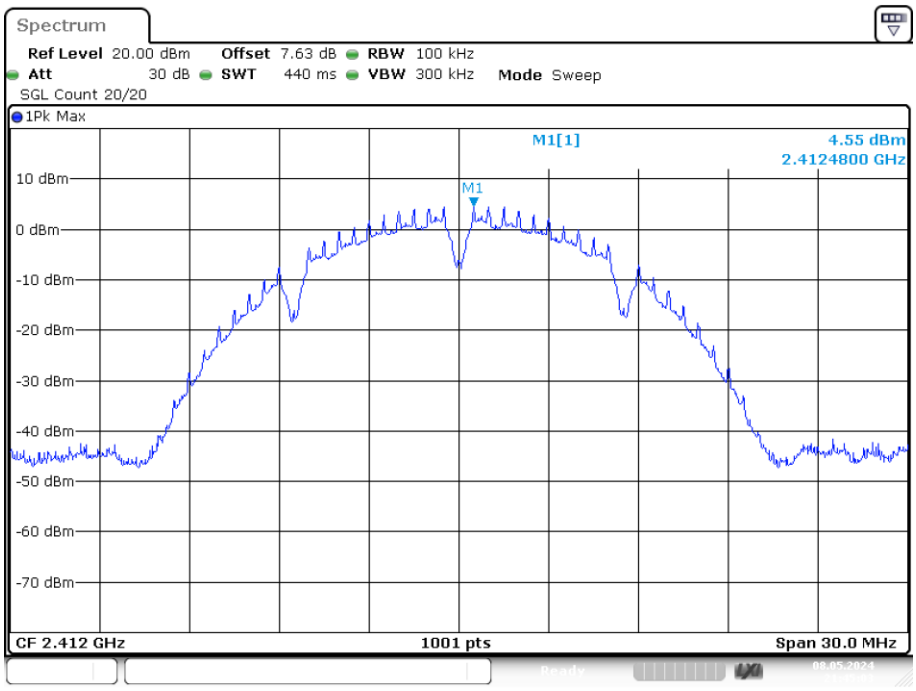
Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	4.549	8	Pass
NVNT	b	2437	Ant1	4.654	8	Pass
NVNT	b	2462	Ant1	4.605	8	Pass
NVNT	g	2412	Ant1	-3.022	8	Pass
NVNT	g	2437	Ant1	-1.947	8	Pass
NVNT	g	2462	Ant1	-2.11	8	Pass
NVNT	n20	2412	Ant1	-2.213	8	Pass
NVNT	n20	2437	Ant1	-1.872	8	Pass
NVNT	n20	2462	Ant1	-2.238	8	Pass
NVNT	n40	2422	Ant1	-7.799	8	Pass
NVNT	n40	2437	Ant1	-7.877	8	Pass
NVNT	n40	2452	Ant1	-6.942	8	Pass

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant2	6.069	8	Pass
NVNT	b	2437	Ant2	5.955	8	Pass
NVNT	b	2462	Ant2	6.287	8	Pass
NVNT	g	2412	Ant2	-2.059	8	Pass
NVNT	g	2437	Ant2	-0.477	8	Pass
NVNT	g	2462	Ant2	-1.385	8	Pass
NVNT	n20	2412	Ant2	-1.466	8	Pass
NVNT	n20	2437	Ant2	-1.497	8	Pass
NVNT	n20	2462	Ant2	-1.354	8	Pass
NVNT	n40	2422	Ant2	-6.828	8	Pass
NVNT	n40	2437	Ant2	-6.545	8	Pass
NVNT	n40	2452	Ant2	-6.341	8	Pass

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	n20	2412	MIMO	1.187	6.26	Pass
NVNT	n20	2437	MIMO	1.330	6.26	Pass
NVNT	n20	2462	MIMO	1.237	6.26	Pass
NVNT	n40	2422	MIMO	-4.276	6.26	Pass
NVNT	n40	2437	MIMO	-4.150	6.26	Pass
NVNT	n40	2452	MIMO	-3.621	6.26	Pass

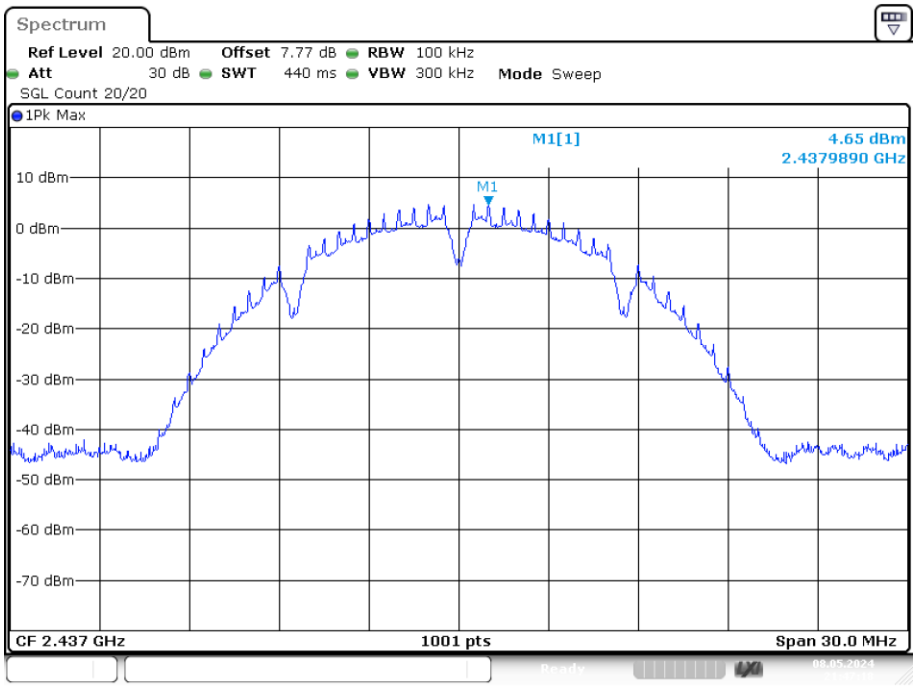
Note: 1. Directional gain=7.74dBi, so the Conducted Power Limit need to reduce 1.74.

PSD NVNT b 2412MHz Ant1



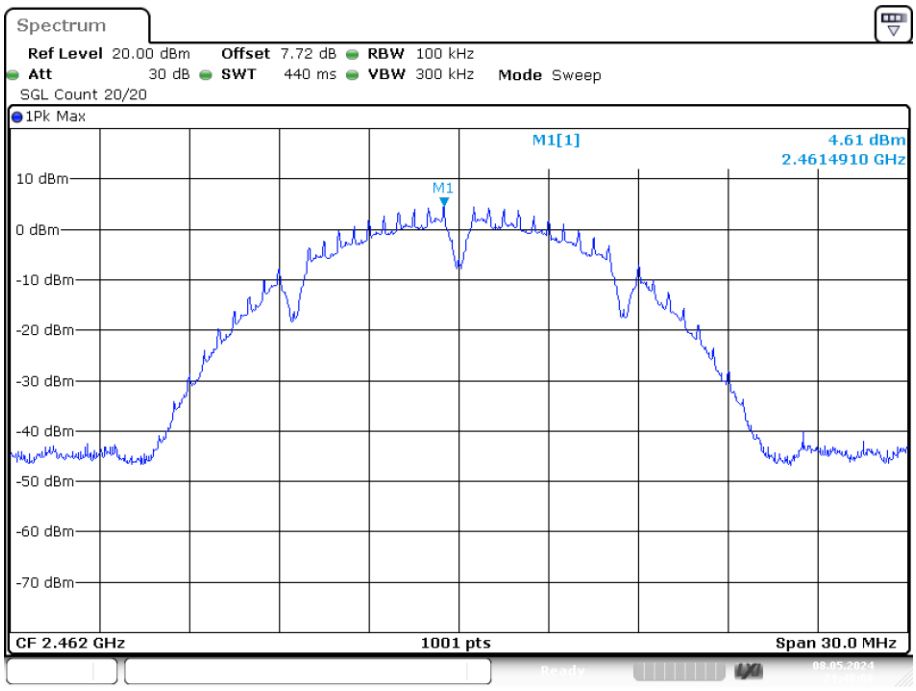
Date: 8.MAY.2024 21:45:03

PSD NVNT b 2437MHz Ant1



Date: 8.MAY.2024 21:47:17

PSD NVNT b 2462MHz Ant1



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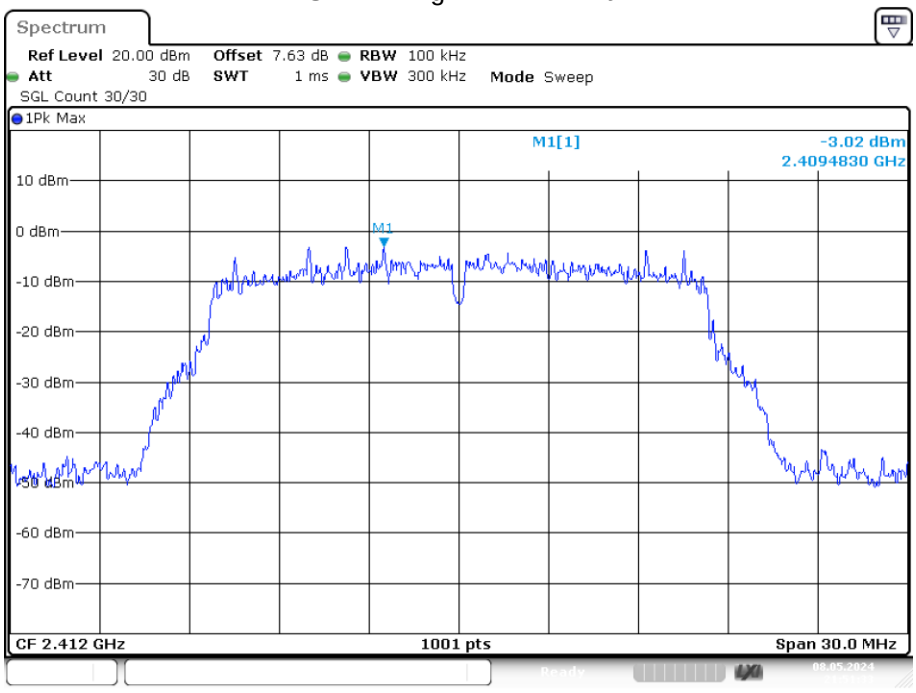
PSD NVNT g 2412MHz Ant1



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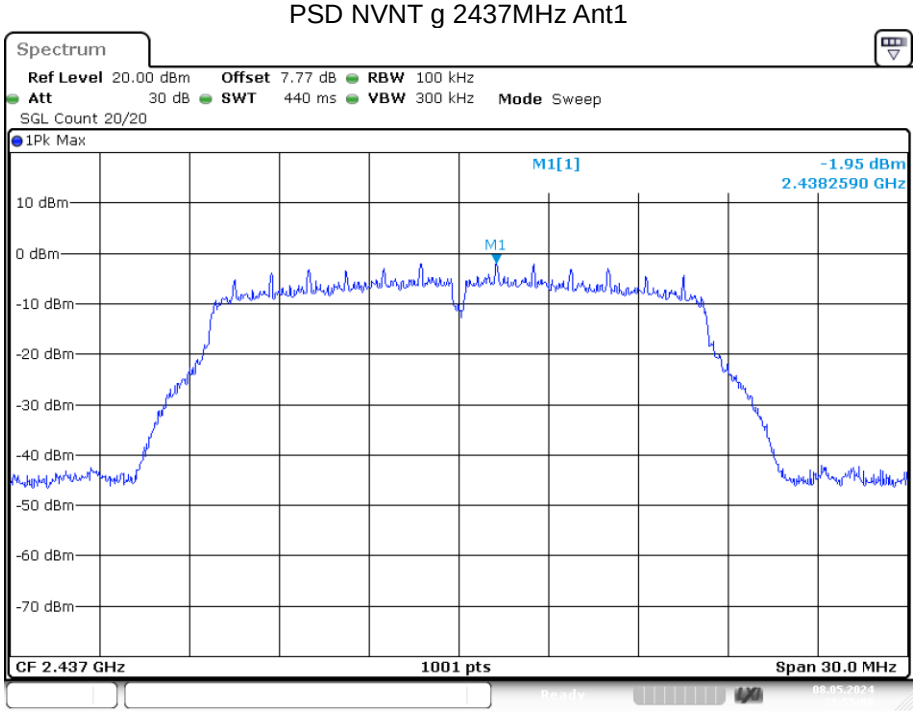
PSD NVNT g 2437MHz Ant1



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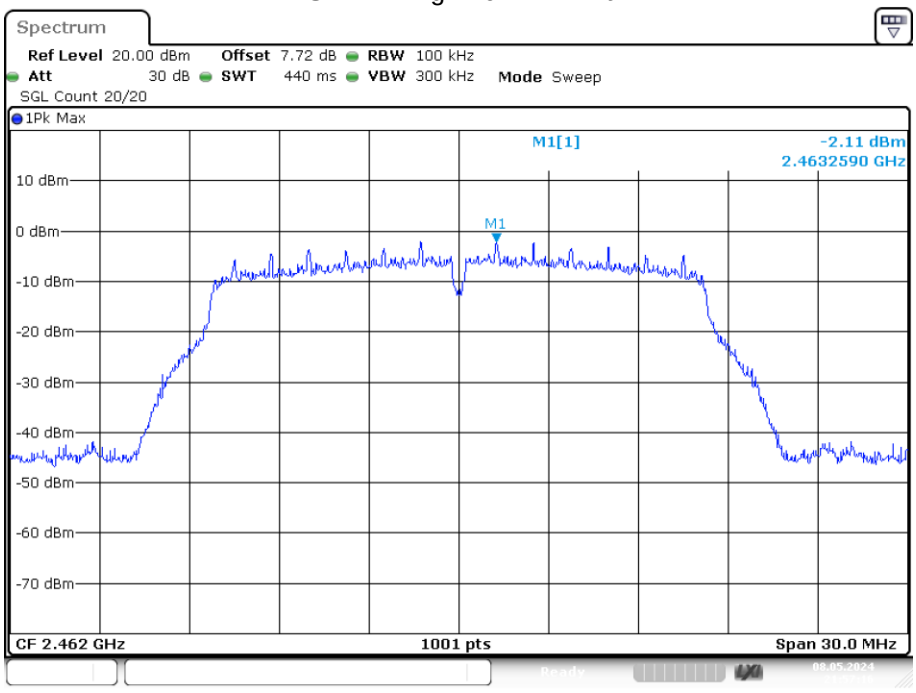
PSD NVNT g 2462MHz Ant1



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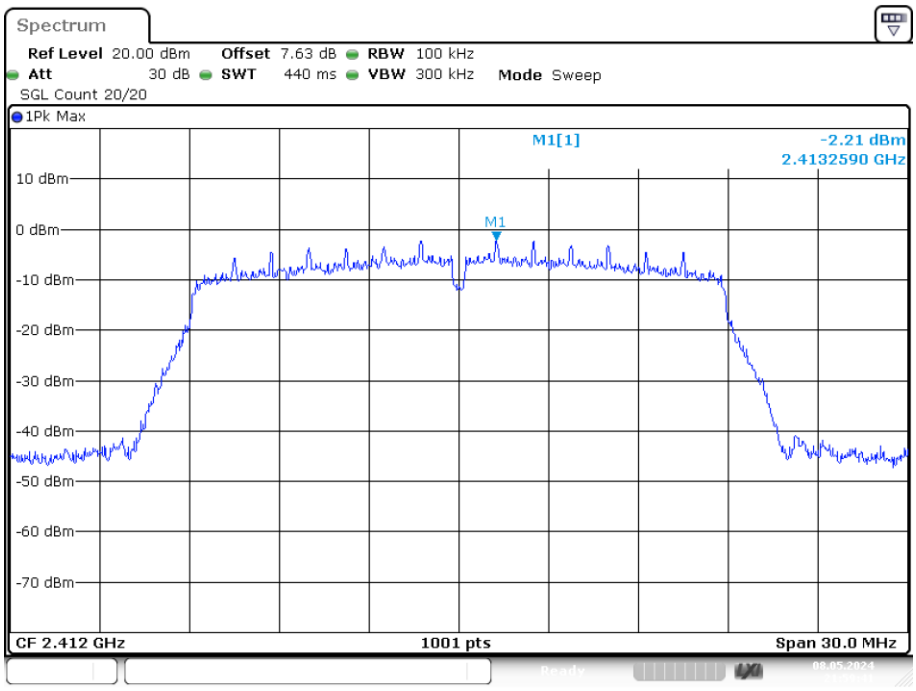
PSD NVNT n20 2412MHz Ant1



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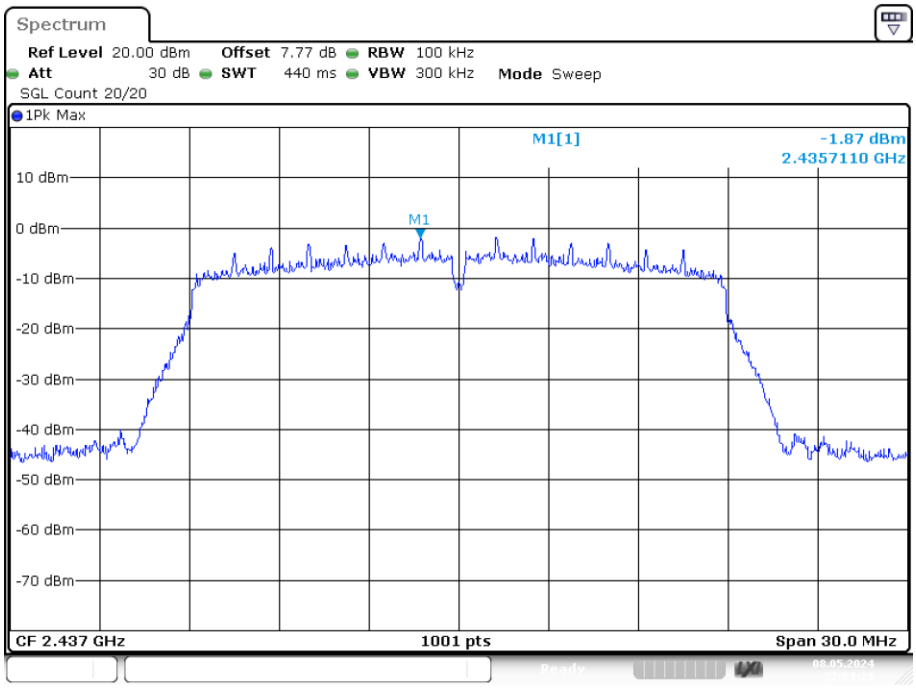
PSD NVNT n20 2437MHz Ant1



Date: 8.MAY.2024 22:03:23

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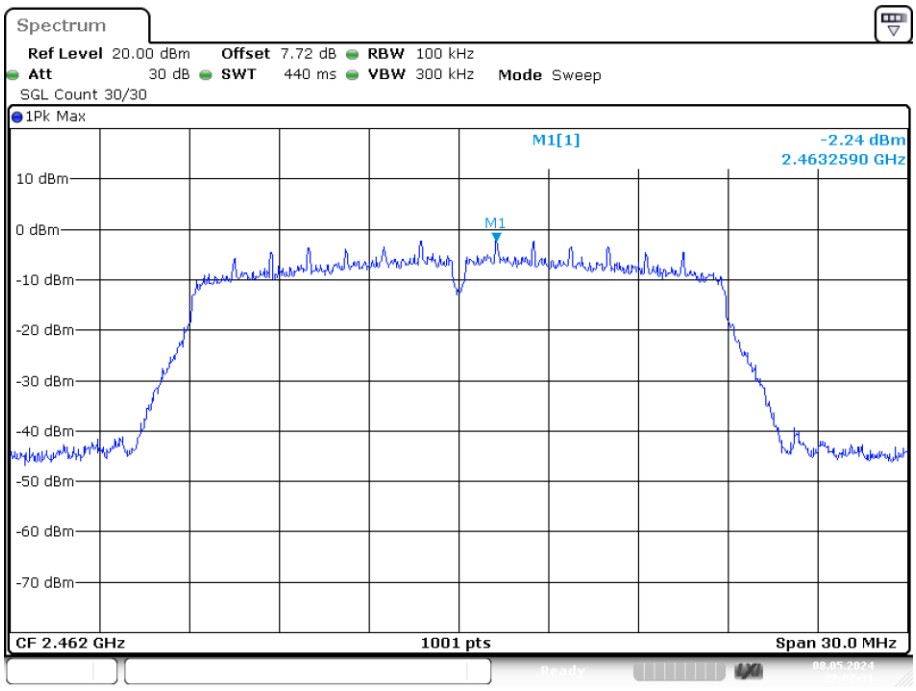

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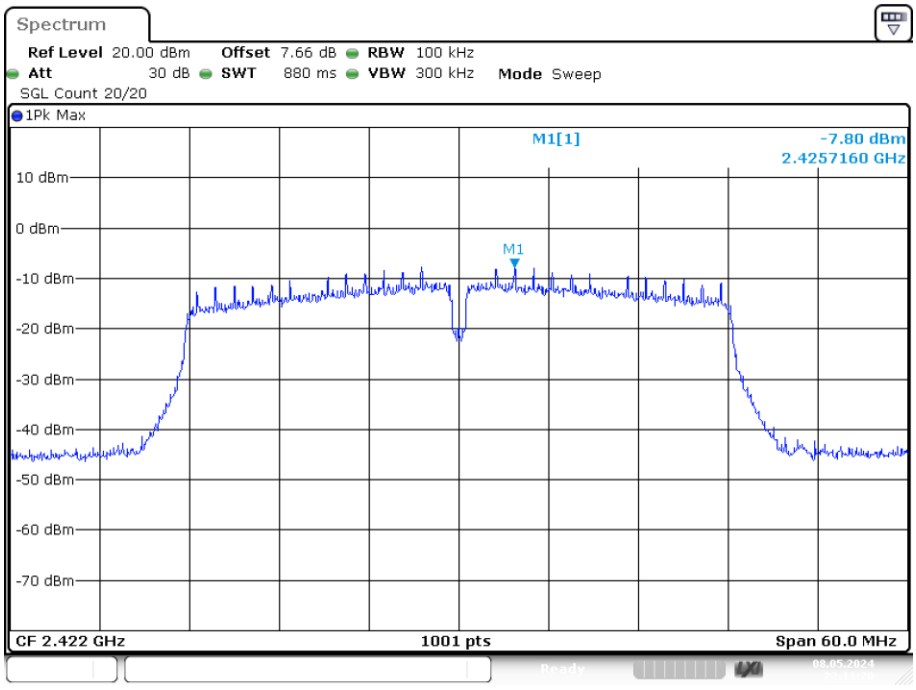
PSD NVNT n40 2422MHz Ant1



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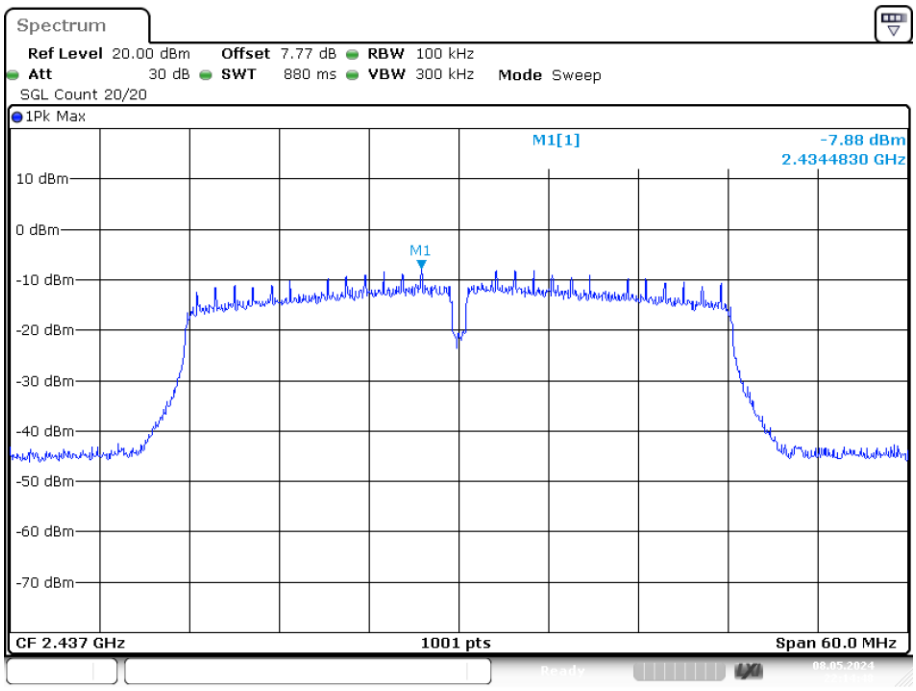
PSD NVNT n40 2437MHz Ant1



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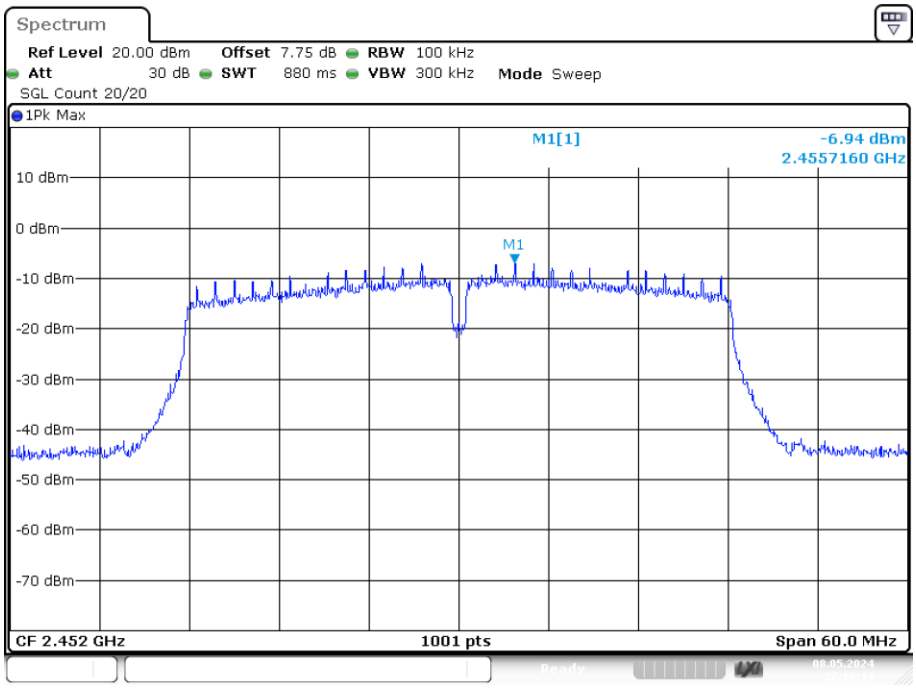
PSD NVNT n40 2452MHz Ant1



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