

TEST REPORT

Report No.: 8326EU010302H

Applicant: Woan Technology (Shenzhen) Co., Ltd.

Address: Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang Sub-district,
Bao'an District, Shenzhen, Guangdong, P.R.China,
518100

Product Name: SwitchBot Hub 3

Model No.: W7202100 (refer to clause 2.4)

Trademark: SwitchBot

Test Standard(s): EN 50665: 2017
EN IEC 62311: 2020

Date of Receipt: Jan. 03, 2025

Test Date: Jan. 03, 2025 – Jan. 17, 2025

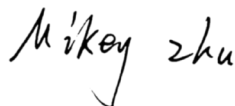
Date of Issue: Jan. 22, 2025

ISSUED BY:

SHENZHEN EU TESTING LABORATORY LIMITED



Prepared by:



Mikey Zhu/ Engineer

Reviewed and Approved by:



Sally Zhang/ Manager

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V0	Jan. 22, 2025	Original	Valid



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2 General Information

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description of E.U.T.

Product Name	SwitchBot Hub 3
Model No. Under Test	W7202100
List Model No.	W7202101, W7202102, W7202103, W7202104, W7202105
Description of Model differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in appearance and model name. (this information provided by the customer)
Rating(s)	Input: 5.0V --- 2.0A Output: 5V --- 0.5A, 2.5W (Adapter Input: 100-240V~, 50/60Hz, 0.35A Max; Output: 5.0V --- 2.0A 10.0W)
Adapter	Model: KA12C-0502000EU Input: 100-240V~, 50/60Hz, 0.35A Max Output: 5.0V --- 2.0A, 10.0W Manufacturer: SHENZHEN KEYU POWER SUPPLY TECHNOLOGY CO., LTD.
Test Sample No.	-1/2(Normal Sample), -2/2(Engineering Sample)
Hardware Version	N/A
Software Version	N/A
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.5 Technical Information of E.U.T.

Network and Wireless Connectivity			Bluetooth (BDR+EDR+BLE) WiFi 2.4G: 802.11b, 802.11g, 802.11n(HT20/40)
Antenna Type	Bluetooth		FPC Antenna
	WiFi		
Antenna Gain	Bluetooth	BDR&EDR	2.67 dBi Max.
		BLE1	4.45 dBi Max.
		BLE2	2.67 dBi Max.
	WiFi 2.4G		3.14 dBi Max.

3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

No.	Identity	Document Title
1	EN 50665: 2017	Generic standard for assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)
2	EN IEC 62311: 2020	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)

Remark:

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

3.2 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China

4 Test Configuration

4.1 Test Environment

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	30% to 60%	
Atmospheric Pressure	86 kPa to 106 kPa	
Temperature	NT (Normal Temperature)	+15°C to +35°C
Working Voltage of the EUT	NV (Normal Voltage)	230VAC, 50Hz for adapter

4.2 Test Equipment

No.	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Electric and Magnetic Field Probe - Analyzer	Narda	EHP-200A	EE-405	2025/02/13	1 Year

4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Adapter	refer to clause 2.4	refer to clause 2.4	--

5 Test requirements

5.1 Test Limit

Basic restriction for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (mA/m ²)	Whole body average SAR(W/kg)	Localised SAR (head and trunk)(W/kg)	Localised SAR (limbs) (W/kg)	Power density, S (W/m ²)
0Hz	40	--	--	--	--	--
>0-1Hz	--	8	--	--	--	--
1-4Hz	--	8/f	--	--	--	--
4-1000Hz	--	2	--	--	--	--
1000Hz-100kHz	--	f/500	--	--	--	--
100kHz-10MHz	--	f/500	0.08	2	4	--
10MHz-10GHz	--	--	0.08	2	4	--
10-300GHz	--	--	--	--	--	10

Notes:

1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm² perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by $\sqrt{2}$ (=1.414). For pulses of duration t_p the equivalent frequency to apply in the basic restrictions should be calculated as $f=1/(2t_p)$.
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.
8. For pulses of duration t_p the equivalent frequency to apply in the basic restrictions should be calculated as $f=1/(2t_p)$. Additionally, for pulsed exposures, in the frequency range 0.3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg⁻¹ averaged over 10g of tissue.

Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (uT)	Equivalent plane wave power density Seq(W/m ²)
0-1Hz	--	3.2×10^4	4×10^4	--
1-8Hz	10000	$3.2 \times 10^4 / f^2$	$4 \times 10^4 / f^2$	--
8-25Hz	10000	4000/f	5000/f	--
0.025-0.8KHz	250/f	4/f	5/f	--
0.8-3KHz	250/f	5	6.25	--
3-150KHz	87	5	6.25	--
0.15-1MHz	87	0.73/f	0.92/f	--
1-10MHz	$87/f^{1/2}$	0.73/f	0.92/f	--
10-400MHz	28	0.073	0.092	2
400-2000MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	f/200
2-300GHz	61	0.16	0.20	10

Notes:

1. As indicated in the frequency range column.
2. For frequencies between 100kHz and 10GHz, Seq, E2, H2 and B2 are to be averaged over any six-minute period.
3. For frequencies exceeding 10GHz, Seq, E2, H2 and B2 are to be averaged over any 68/f1.05-minute period (.in GHz).
4. No E-field value is provided for frequencies <1Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 20kV/m. Spark discharges causing stress or annoyance should be avoided.

5.2 Test Result

Output Power

BT			
Mode	BDR&EDR		
	GFSK	$\pi/4$ -DQPSK	8DPSK
EIRP (dBm)	1.08	-0.37	-0.35
Mode	BLE 1		
	Low	Middle	High
EIRP (dBm)	1.77	0.84	0.34
Mode	BLE 2		
	Low	Low	Low
EIRP (dBm)	1.08	1.01	1.40
Note: This report listed the maximal case power value, please refer to 8326EU010302W1&8326EU010302W2 report for more details.			

WiFi 2.4G (worst case: 802.11b modulation)	
Mode	802.11b
EIRP (dBm)	16.08
Note: This report listed the maximal case power value, please refer to 8326EU010302W3 report for more details.	

Assessment Result

Mode	Max. EIRP (dBm)	Antenna Gain (dBi)	Distance (cm)	Limit of Power Density (W/m ²)	Calculated RF Exposure (W/m ²)	Verdict
BDR&EDR	1.08	2.67	20	10	0.003	Pass
BLE 1	1.77	4.45	20	10	0.003	Pass
BLE 2	1.40	2.67	20	10	0.003	Pass
WiFi 2.4G	16.08	3.14	20	10	0.081	Pass

Conclusion

This EUT is deemed to comply with the reference level limits by Council Recommendation 1999/519/EC, therefore the basic restrictions are compliant with human exposure limits.

STATEMENT

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--- End of Report ---

TEST REPORT

Report No.: 8326EU010302W1

Applicant: Woan Technology (Shenzhen) Co., Ltd.

Address: Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang Sub-district,
Bao'an District, Shenzhen, Guangdong, P.R.China,
518100

Product Name: SwitchBot Hub 3

Model No.: W7202100 (refer to clause 2.4)

Trademark: SwitchBot

Test Standard(s): ETSI EN 300 328 V2.2.2 (2019-07)

Date of Receipt: Jan. 03, 2025

Test Date: Jan. 03, 2025 – Jan. 17, 2025

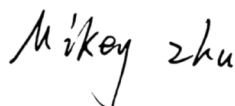
Date of Issue: Jan. 22, 2025

ISSUED BY:

SHENZHEN EU TESTING LABORATORY LIMITED



Prepared by:



Mikey Zhu/ Engineer

Reviewed and Approved by:



Sally Zhang/ Manager

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2 General Information

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description of E.U.T.

Product Name	SwitchBot Hub 3
Model No. Under Test	W7202100
List Model No.	W7202101, W7202102, W7202103, W7202104, W7202105
Description of Model differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in appearance and model name. (this information provided by the customer)
Rating(s)	Input: 5.0V $\rightarrow$ 2.0A Output: 5V $\rightarrow$ 0.5A, 2.5W (Adapter Input: 100-240V~, 50/60Hz, 0.35A Max; Output: 5.0V $\rightarrow$ 2.0A 10.0W)
Adapter	Model: KA12C-0502000EU Input: 100-240V~, 50/60Hz, 0.35A Max Output: 5.0V $\rightarrow$ 2.0A, 10.0W Manufacturer: SHENZHEN KEYU POWER SUPPLY TECHNOLOGY CO., LTD.
Test Sample No.	-1/2(Normal Sample), -2/2(Engineering Sample)
Hardware Version	N/A
Software Version	N/A
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.5 Technical Information of E.U.T.

Network and Wireless Connectivity	Bluetooth (BDR+EDR+BLE) WiFi 2.4G: 802.11b, 802.11g, 802.11n(HT20/40)
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The requirement for the following technical information of the EUT was tested in this report:

Technology	Bluetooth
Operation Mode	☒ BDR ☒ EDR ☐ BLE
Modulation Technology	FHSS
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Operating Frequency	2402-2480MHz
Transfer Rate	DH5: 1 Mbps 2DH5: 2 Mbps 3DH5: 3 Mbps
Number of Channel	79
Antenna Type	FPC Antenna
Antenna Gain	2.67 dBi Max.
RF Output Power (EIRP):	1.08 dBm Max.
Receiver Category	2

All channels were listed on the following table:

Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)
0	2402	21	2423	42	2444	63	2465
1	2403	22	2424	43	2445	64	2466
2	2404	23	2425	44	2446	65	2467
3	2405	24	2426	45	2447	66	2468
4	2406	25	2427	46	2448	67	2469
5	2407	26	2428	47	2449	68	2470
6	2408	27	2429	48	2450	69	2471
7	2409	28	2430	49	2451	70	2472
8	2410	29	2431	50	2452	71	2473
9	2411	30	2432	51	2453	72	2474
10	2412	31	2433	52	2454	73	2475
11	2413	32	2434	53	2455	74	2476
12	2414	33	2435	54	2456	75	2477
13	2415	34	2436	55	2457	76	2478
14	2416	35	2437	56	2458	77	2479
15	2417	36	2438	57	2459	78	2480
16	2418	37	2439	58	2460	-	-
17	2419	38	2440	59	2461	-	-
18	2420	39	2441	60	2462	-	-
19	2421	40	2442	61	2463	-	-
20	2422	41	2443	62	2464	-	-

3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

No.	Identity	Document Title
1	ETSI EN 300 328 V2.2.2 (2019-07)	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

Remark:

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

3.2 Test Verdict

No.	Test Items	Clause No.	Verdict
Transmitter Items			
1	RF output power	4.3.1.2	PASS
2	Duty Cycle, Tx-sequence, Tx-gap	4.3.1.3	N/A
3	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	4.3.1.4	PASS
4	Hopping Frequency Separation	4.3.1.5	PASS
5	Medium Utilization (MU) factor	4.3.1.6	N/A
6	Adaptivity (Adaptive Frequency Hopping)	4.3.1.7	N/A
7	Occupied Channel Bandwidth	4.3.1.8	PASS
8	Transmitter unwanted emissions in the out-of-band domain	4.3.1.9	PASS
9	Transmitter unwanted emissions in the spurious domain	4.3.1.10	PASS
Receiver Items			
10	Receiver spurious emissions	4.3.1.11	PASS
11	Receiver Blocking	4.3.2.12	PASS
12	Geo-location capability	4.3.2.13	N/A

Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.

3.3 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China

4 Test Configuration

4.1 Test Environment

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	30% to 60%	
Atmospheric Pressure	86 kPa to 106 kPa	
Temperature	NT (Normal Temperature)	+15°C to +35°C
	Extreme Temperature	-10°C ~ 50°C Note ¹
Working Voltage of the EUT	NV (Normal Voltage)	230 VAC, 50Hz
	LV (Low Voltage)	207 VAC, 50Hz
	HV (High Voltage)	253 VAC, 50Hz
Note ¹ : The HT 50°C and LT -10°C was declared by manufacturer.		

4.2 Test Equipment

Radio Frequency (RF) Test					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2025/01/08	2026/01/07
Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	EE-007	2023/01/14	2026/01/13
Double Ridged Horn Antenna	A-INFOMW	LB-10180-NF	EE-008	2023/01/12	2026/01/11
Pre-amplifier	Agilent	8447D	EE-009	2025/01/08	2026/01/07
Pre-amplifier	Agilent	8449B	EE-010	2025/01/08	2026/01/07
MXA Signal Analyzer	Agilent	N9020A	EE-011	2025/01/08	2026/01/07
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2025/01/08	2026/01/07
Test Software	Farad	EZ-EMC	EE-015	N.C.R	N.C.R
MIMO Power Measurement Module	TSTPASS	TSPS 2023R	EE-016	2025/01/08	2026/01/07
RF Test Software	TSTPASS	TS32893 V2.0	EE-017	N.C.R	N.C.R
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	EE-402	2024/02/15	2025/02/14
MXG RF Analog Signal Generator	Agilent	N5181A	EE-406	2024/02/15	2025/02/14
Power Meter	Anritsu	ML2495A	EE-416	2024/02/15	2025/02/14
Constant Temperature Humidity Chamber	Guangxin	GXP-401	ES-002	2024/07/30	2025/07/29

4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Adapter	refer to clause 2.4	refer to clause 2.4	--

4.4 Test Mode

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

No.	Test Modes	Description
TM1	TX-GFSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.
TM2	TX-GFSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation.
TM3	TX- $\pi/4$ -DQPSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with $\pi/4$ -DQPSK modulation.
TM4	TX- $\pi/4$ -DQPSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with $\pi/4$ -DQPSK modulation.
TM5	TX-8DPSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with 8DPSK modulation.
TM6	TX-8DPSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with 8DPSK modulation.

4.5 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

Test Item	Measurement Uncertainty
Conducted Emission	2.64 dB
Occupied Channel Bandwidth	2.8 %
RF output power, conducted	0.68 dB
Power Spectral Density, conducted	1.37 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.11 dB
Temperature	0.8°C
Humidity	4%

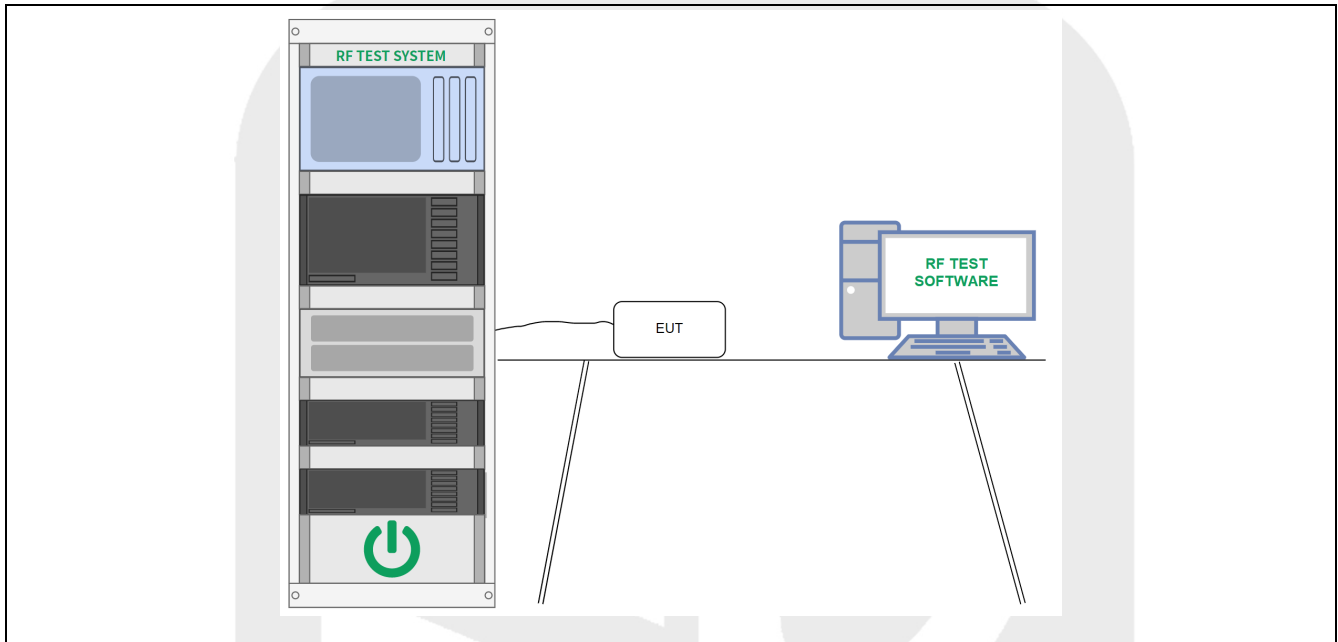
5 Test Items

5.1 RF Output Power

5.1.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.2
Test Requirement	The RF output power for non-FHSS equipment shall be equal to or less than 20 dBm.

5.1.2 Test Setup Diagram



5.1.3 Test Procedure

Refer to clause 5.4.2.2.1 of ETSI EN 300 328 V2.2.2:

1. Run a test program to control EUT transmitting at specific channel.
2. Connect the power sensor to the transmit port
3. Power Meter was setting as below:
Sample speed: 1 MS/s
Number of bursts: at least 10bursts
Detector: RMS
4. A power meter was used to read the response of the power sensor
5. Define Start time and Stop time of a burst by 30dB below the highest value of the stores samples.
6. Find the highest burst value
7. Record the power level
EIRP = antenna gain + power level of step 7.

5.1.4 Test Data

PASS.

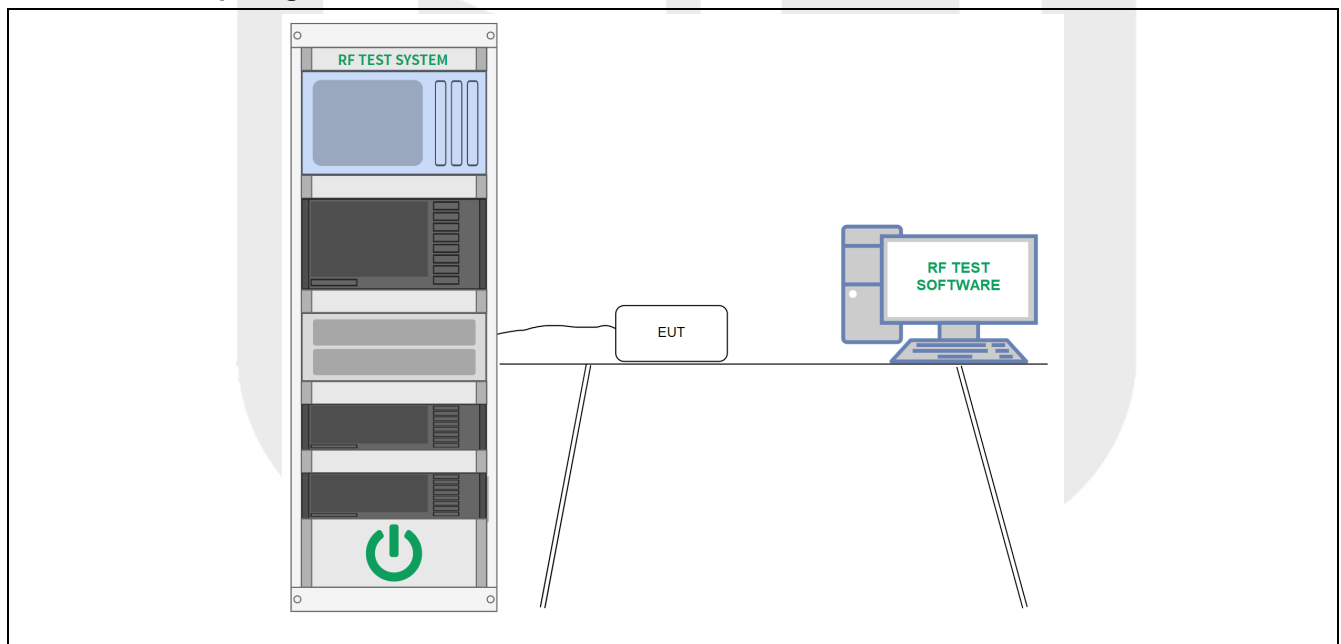
Please refer to Annex D for details.

5.2 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

5.2.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.4
Test Requirement	Adaptive FHSS equipment shall be capable of operating over a minimum of 70 % of the band specified in table 1. The Accumulated Transmit Time on any hopping frequency shall not be greater than 400 ms within any observation period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. In order for the FHSS equipment to comply with the Frequency Occupation requirement, it shall meet either of the following two options: Option 1: Each hopping frequency of the Hopping Sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use. Option 2: The occupation probability for each frequency shall be between $((1 / U) \times 25 \%)$ and 77 % where U is the number of hopping frequencies in use. The Hopping Sequence(s) shall contain at least N hopping frequencies at all times, where N is either 15 or the result of 15 MHz divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.

5.2.2 Test Setup Diagram



5.2.3 Test Procedure

Refer to clause 5.4.4 of ETSI EN 300 328 V2.2.2:

The output of the transmitter shall be connected to a spectrum analyser or equivalent.

The analyser shall be set as follows:

- Centre Frequency: Equal to the hopping frequency being investigated
- Frequency Span: 0 Hz
- RBW: ~ 50 % of the Occupied Channel Bandwidth
- VBW: $\geq$ RBW
- Detector Mode: RMS
- Sweep time: Equal to the applicable observation period (see clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2)
- Number of sweep points: 30 000
- Trace mode: Clear/Write
- Trigger: Free Run

Make the following changes on the analyser:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- RBW: ~ 50 % of the Occupied Channel Bandwidth (single hopping frequency)
- VBW: $\geq$ RBW
- Detector Mode: Peak
- Sweep time: 1 s; this setting may result in long measuring times. To avoid such long measuring times, an FFT analyser may be used
- Number of sweep points: ~ 400 / Occupied Channel Bandwidth (MHz); the number of sweep points may need to be further increased in case of overlapping channels
- Trace mode: Max Hold
- Trigger: Free Run

5.2.4 Test Data

PASS.

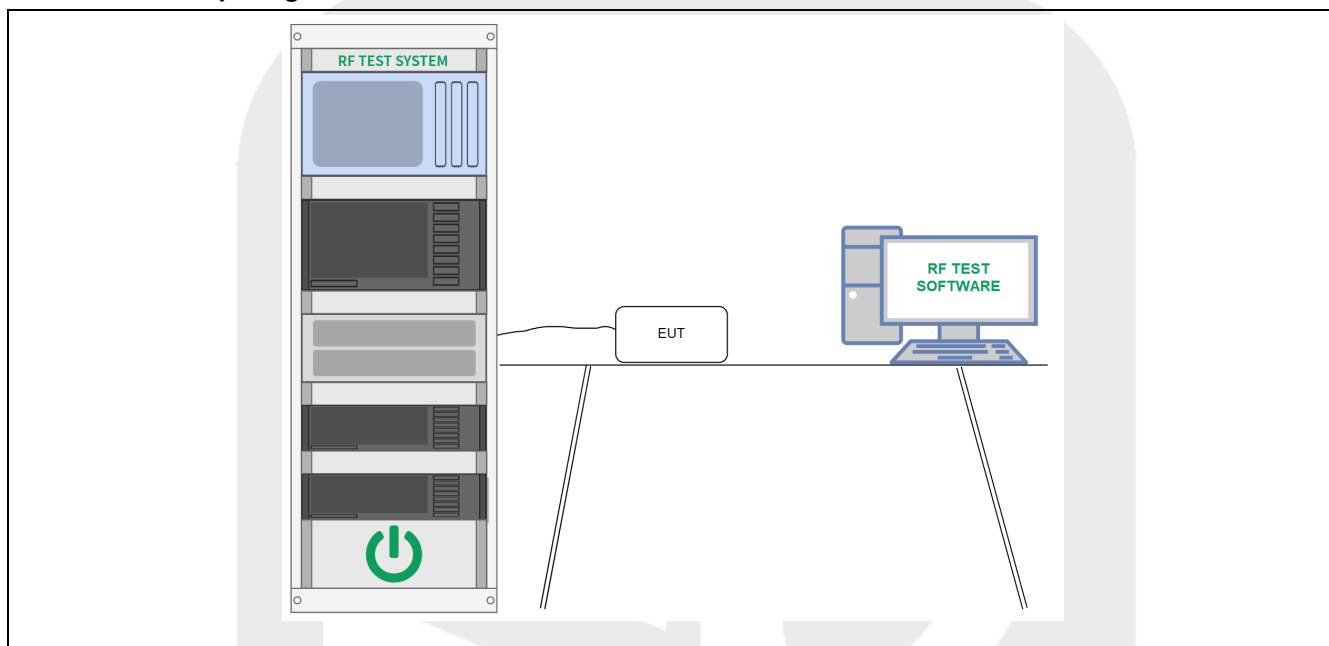
Please refer to Annex D for details.

5.3 Hopping Frequency Separation

5.3.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.5
Test Requirement	The Hopping Frequency Separation is the frequency separation between two adjacent hopping frequencies. For adaptive FHSS equipment, the minimum Hopping Frequency Separation shall be 100 kHz.

5.3.2 Test Setup Diagram



5.3.3 Test Procedure

Refer to clause 5.4.4 of ETSI EN 300 328 V2.2.2:

The test procedure shall be as follows:

Step 1:

- The output of the transmitter shall be connected to a spectrum analyzer or equivalent.
- The analyzer shall be set as follows:
 - Centre Frequency: Centre of the two adjacent hopping frequencies
 - Frequency Span: Sufficient to see the complete power envelope of both hopping frequencies
 - RBW: 1 % of the span(30KHz)
 - VBW: 3 × RBW(100KHz)
 - Detector Mode: Max Peak
 - Trace Mode: Max Hold
 - Sweep Time: Auto
- Step 2:

- Wait for the trace to stabilize.

Use the marker-delta function to determine the Hopping Frequency Separation between the center of the two adjacent hopping frequencies (e.g. by identifying peaks or notches at the centre of the power envelope for the two adjacent signals). This value shall be compared with the limits defined in clause 4.3.1.5.3 and shall be recorded in the test report.

5.3.4 Test Data

PASS.

Please refer to Annex D for details.

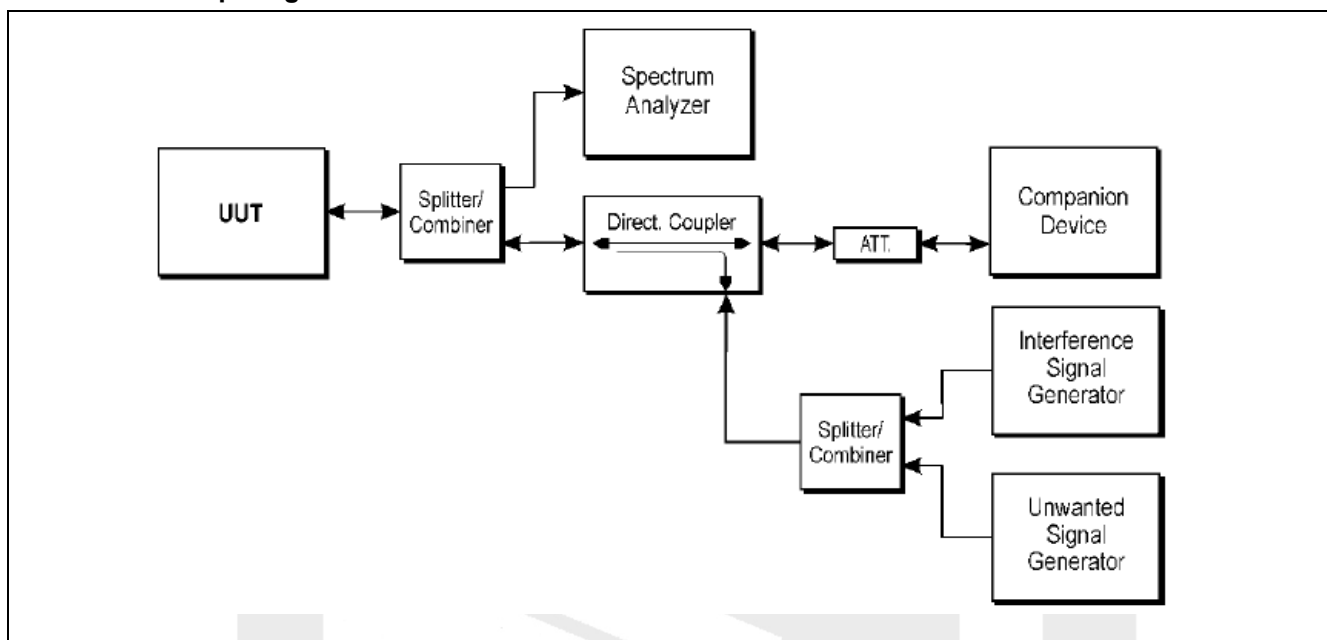


5.4 Adaptivity

5.4.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.7
Test Requirement	These measurements shall only be performed at normal test conditions. When supported by the operating frequency range of the equipment, this test shall be performed on two operating (hopping) frequencies randomly selected from the operating frequencies used by the equipment. The first (lower) frequency shall be randomly selected within the range 2 400 MHz to 2 442 MHz while the second (higher) frequency shall be randomly selected within the range 2 442 MHz to 2 483,5 MHz. The equipment shall be in a normal operating (hopping) mode. For equipment which can operate in an adaptive and a non-adaptive mode, it shall be verified that prior to the test, the equipment is operating in the adaptive mode. The equipment shall be configured in a mode that results in the longest Channel Occupancy Time. Non-LBT based Detect and Avoid: 1 The frequency shall remain unavailable for a minimum time equal to 1 second after which the channel maybe considered again as an 'available' channel; 2 COT ≤ 40 ms; 3 Idle Period = 5% of COT; 4 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{\text{out}})$ (P_{out} in mW E.I.R.P) LBT based Detect and Avoid (Frame Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time ≤ 18 us; 2 CCA observation time declared by the supplier; 3 COT = 1~10 ms; 4 Idle Period $\geq 5\%$ of COT; 5 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{\text{out}})$ (P_{out} in mW E.I.R.P) LBT based Detect and Avoid (Load Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time ≥ 18 us; 2 CCA declared by the manufacturer; 3 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{\text{out}})$ (P_{out} in mW E.I.R.P) Short Control Signalling Transmissions: Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within any bservation period of 50ms.

5.4.2 Test Setup Diagram



5.4.3 Test Procedure

Refer to clause 5.4.6 of ETSI EN 300 328 V2.2.2 for details.

5.4.4 Test Data

Not applicable

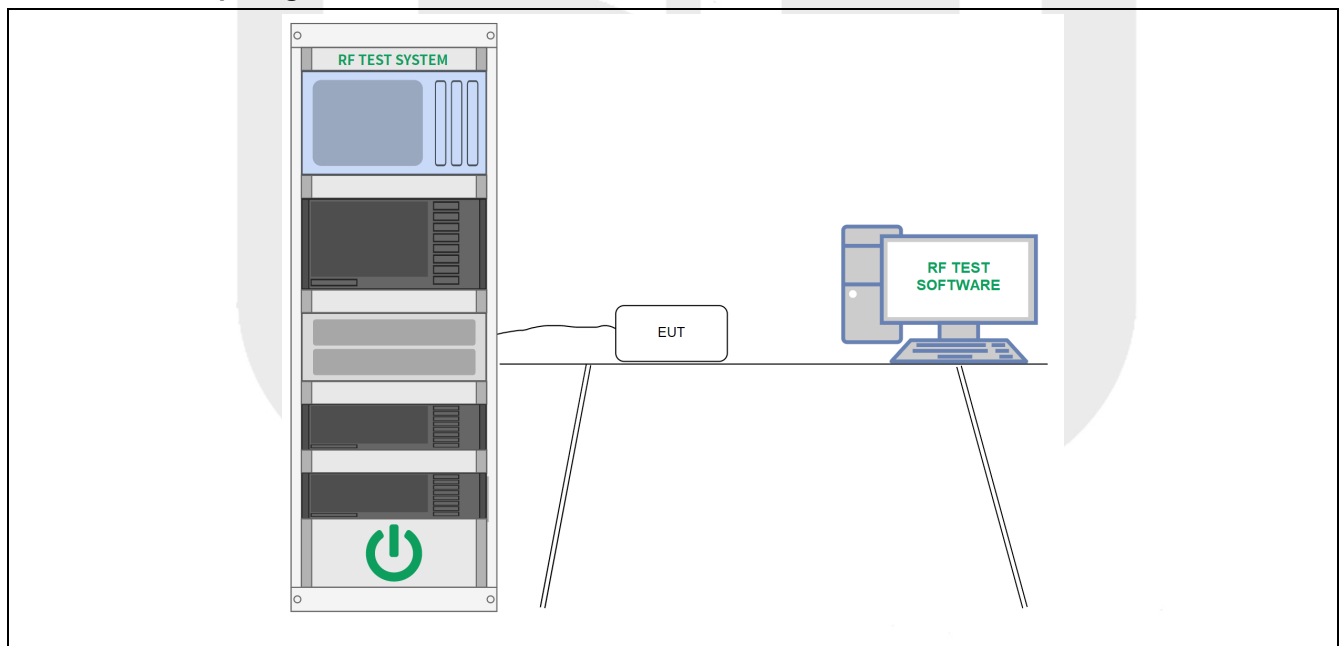
The maximum output power of EUT is less than 10dBm, so not applicable.

5.5 Occupied Channel Bandwidth

5.5.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.8		
Test Requirement	The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal. The Occupied Channel Bandwidth shall be within the band given in table 1. In addition, for non-adaptive non-FHSS equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth shall be equal to or less than 5 MHz.		
	Condition		Limit
	All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz.
	Additional requirement	For non-adaptive using wide band modulations other than FHSS system and e.i.r.p >10dBm	Less than 20MHz
		For non-adaptive Frequency Hoppingsystem and e.i.r.p >10dBm.	Less than 5MHz

5.5.2 Test Setup Diagram



5.5.3 Test Procedure

Refer to clause 5.4.7 of ETSI EN 300 328 V2.2.2:

Connect the UUT to the spectrum analyser and use the following settings:

Centre Frequency: The centre frequency of the channel under test

Resolution BW: ~ 1 % of the span without going below 1 %

Video BW: 3×RBW

Frequency Span: 2 × Nominal Channel Bandwidth

Detector Mode: RMS

Trace Mode: Max Hold

Sweep time: 1 s

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

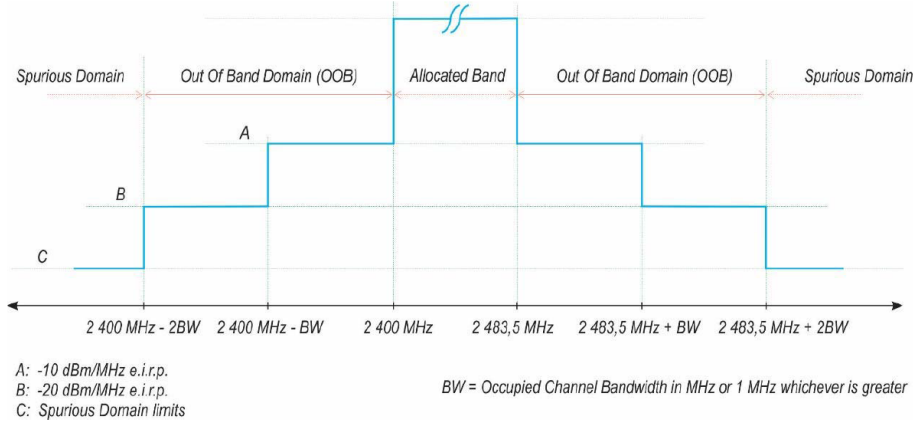
5.5.4 Test Data

PASS.

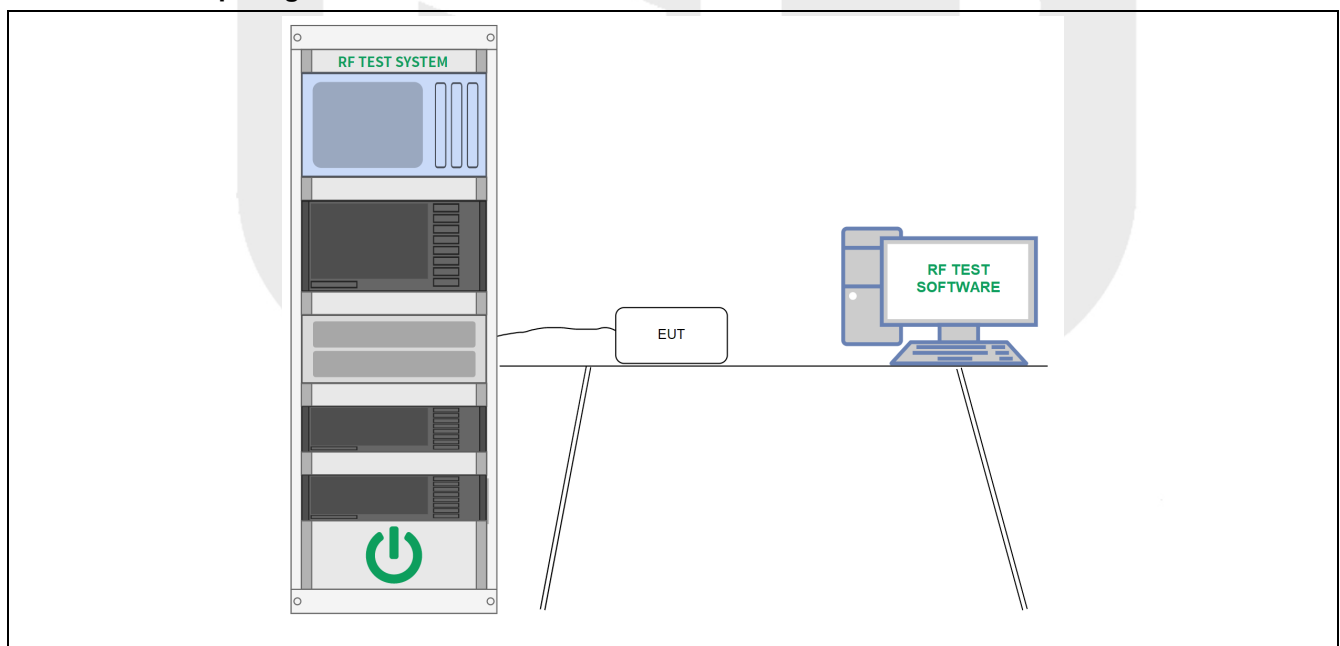
Please refer to Annex D for details.

5.6 Transmitter Unwanted Emissions in the out-of-band Domain

5.6.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.9
Test Requirement	Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the allocated band, but excluding unwanted emissions in the spurious domain. The transmitter unwanted emissions in the out-of-band domain shall not exceed the values provided by the mask in figure 1.  Figure 1: Transmit mask

5.6.2 Test Setup Diagram



5.6.3 Test Procedure

Refer to clause 5.4.8 of ETSI EN 300 328 V2.2.2:

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:
 - Measurement Mode: Time Domain Power
 - Centre Frequency: 2 484 MHz
 - Span: Zero Span
 - Resolution BW: 1 MHz
 - Filter mode: Channel filter
 - Video BW: 3 MHz
 - Detector Mode: RMS
 - Trace Mode: Max Hold
 - Sweep Mode: Single Sweep
 - Sweep Points: Sweep time [μs] / (1 μs) with a maximum of 30 000
 - Trigger Mode: Video
 - Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power.

Step 2 (segment 2 483,5 MHz to 2 483,5 MHz + BW):

- The measurement shall be performed and repeated while the trigger level is increased until no triggering takes place.
- For FHSS equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
 - Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
- Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
- Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3 (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW):

- Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

- Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2 BW to 2 400 MHz - BW):

- Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2 BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2 BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 6:

- In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain G in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
 - In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain G in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
- Comparison with the applicable limits shall be done using any of the options given below:
- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain Y in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.
 - Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by $10 \times \log_{10}(A_{ch})$ and the additional beamforming gain Y in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE: A_{ch} refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

5.6.4 Test Data

PASS.

Please refer to Annex D for details.

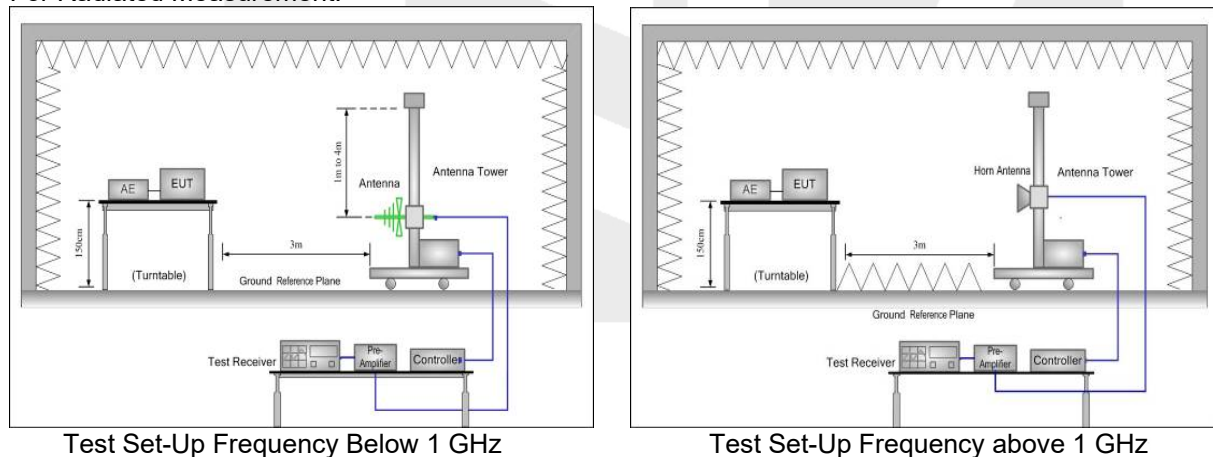
5.7 Transmitter Unwanted Emissions in the Spurious Domain

5.7.1 Test Requirement

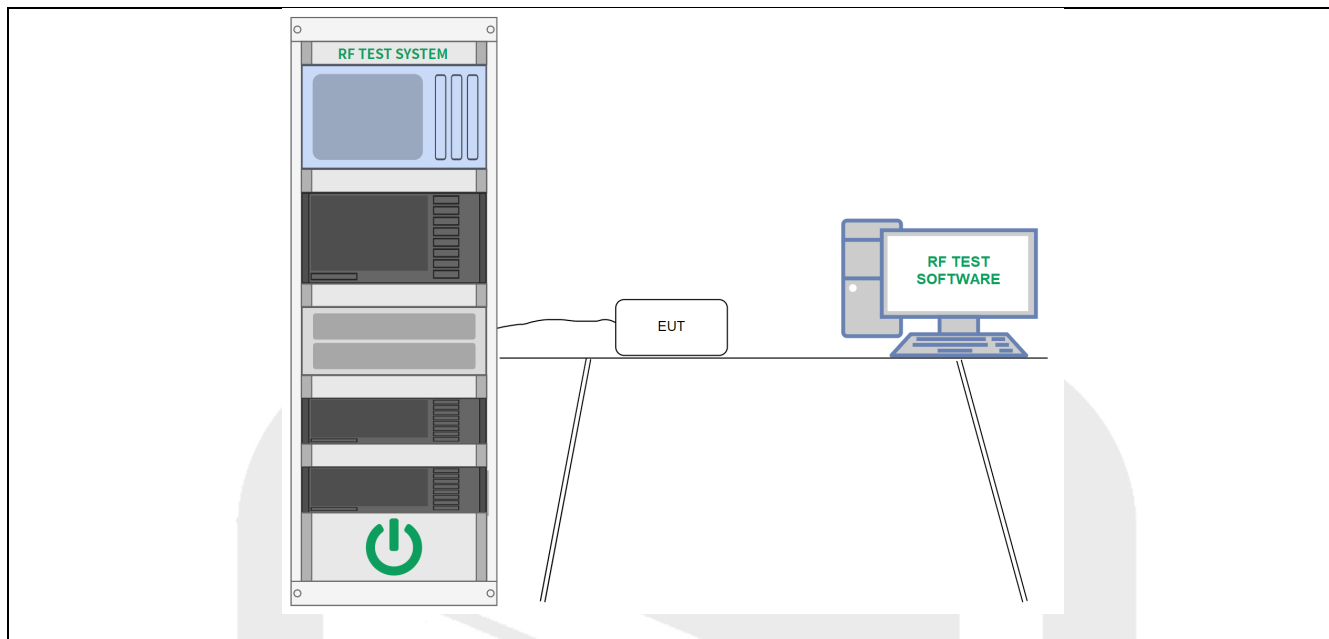
Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.10																																	
Test Requirement	The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 4. In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz. Table 4: Transmitter limits for spurious emissions... <table><tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr><tr><td>30 MHz to 47 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>47 MHz to 74 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>74 MHz to 87,5 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>87,5 MHz to 118 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>118 MHz to 174 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>174 MHz to 230 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>230 MHz to 470 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>470 MHz to 694 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>694 MHz to 1 GHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>1 GHz to 12,75 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr></table>	Frequency range	Maximum power	Bandwidth	30 MHz to 47 MHz	-36 dBm	100 kHz	47 MHz to 74 MHz	-54 dBm	100 kHz	74 MHz to 87,5 MHz	-36 dBm	100 kHz	87,5 MHz to 118 MHz	-54 dBm	100 kHz	118 MHz to 174 MHz	-36 dBm	100 kHz	174 MHz to 230 MHz	-54 dBm	100 kHz	230 MHz to 470 MHz	-36 dBm	100 kHz	470 MHz to 694 MHz	-54 dBm	100 kHz	694 MHz to 1 GHz	-36 dBm	100 kHz	1 GHz to 12,75 GHz	-30 dBm	1 MHz
	Frequency range	Maximum power	Bandwidth																															
	30 MHz to 47 MHz	-36 dBm	100 kHz																															
	47 MHz to 74 MHz	-54 dBm	100 kHz																															
	74 MHz to 87,5 MHz	-36 dBm	100 kHz																															
	87,5 MHz to 118 MHz	-54 dBm	100 kHz																															
	118 MHz to 174 MHz	-36 dBm	100 kHz																															
	174 MHz to 230 MHz	-54 dBm	100 kHz																															
	230 MHz to 470 MHz	-36 dBm	100 kHz																															
	470 MHz to 694 MHz	-54 dBm	100 kHz																															
694 MHz to 1 GHz	-36 dBm	100 kHz																																
1 GHz to 12,75 GHz	-30 dBm	1 MHz																																

5.7.2 Test Setup Diagram

For Radiated Measurement:



For Conducted Measurement:



5.7.3 Test Procedure

Refer to clause 5.4.9 of ETSI EN 300 328 V2.2.2:

Step 1:

The sensitivity of the measurement set-up should be such that the noise floor is at least 12 dB below the limits given in table 4 or table 12.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 19\,400$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.

For FHSS equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

The above sweep time setting may result in long measuring times in case of FHSS equipment. To avoid such long measuring times, an FFT analyser may be used.

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 1 MHz

- Video bandwidth: 3 MHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 23\,500$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

Step 4:

- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach). The limits used to identify emissions during this pre-scan need to be reduced by $10 \times \log_{10}(\text{Ach})$.

5.7.4 Test Data**PASS.**

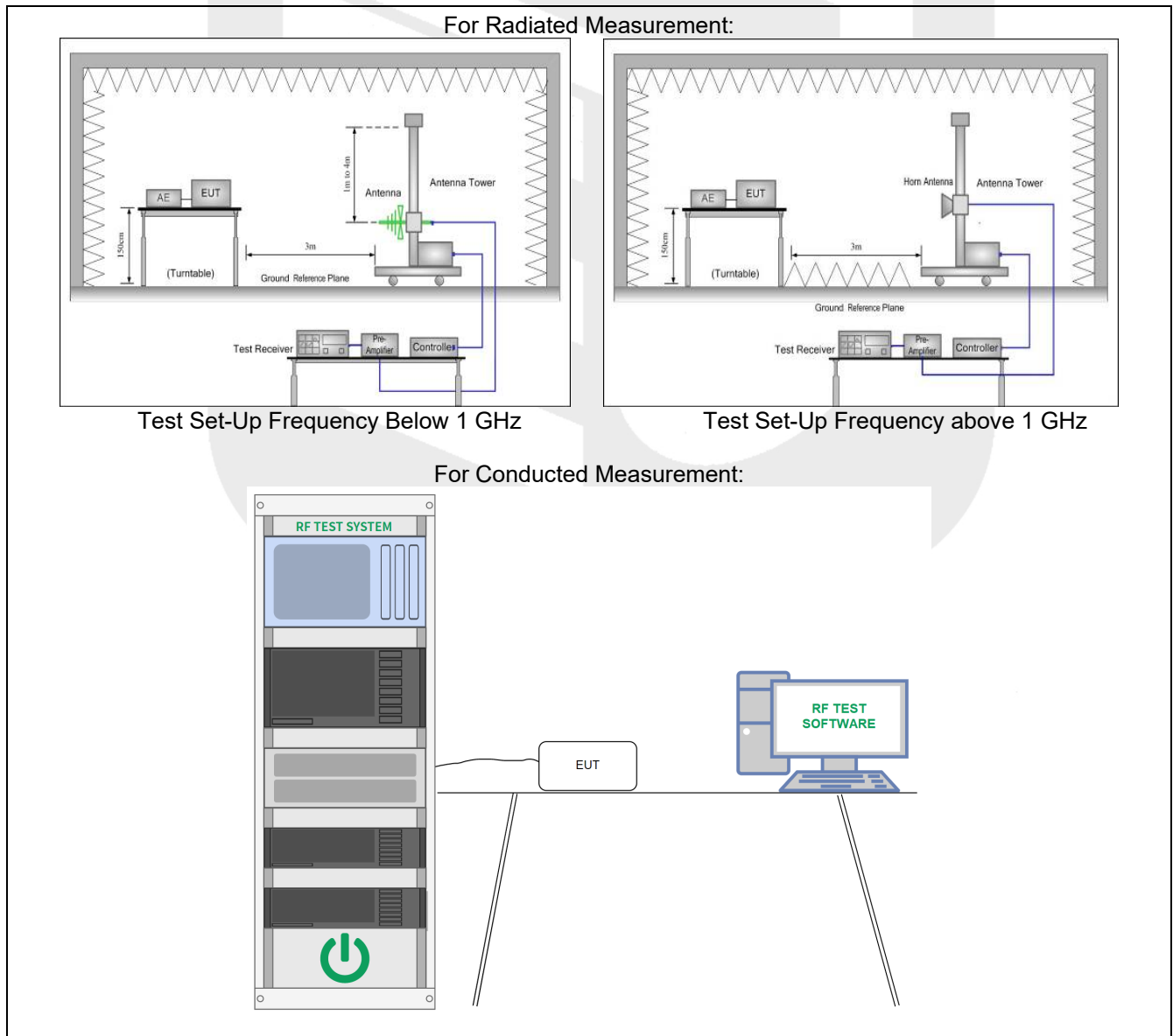
Please refer to Annex D for details.

5.8 Receiver Spurious Emissions

5.8.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.11									
Test Requirement	The spurious emissions of the receiver shall not exceed the values given in table 5. In case of FHSS equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz. Table 5: Spurious emission limits for receivers <table><tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr><tr><td>30 MHz to 1 GHz</td><td>-57 dBm</td><td>100 kHz</td></tr><tr><td>1 GHz to 12,75 GHz</td><td>-47 dBm</td><td>1 MHz</td></tr></table>	Frequency range	Maximum power	Bandwidth	30 MHz to 1 GHz	-57 dBm	100 kHz	1 GHz to 12,75 GHz	-47 dBm	1 MHz
Frequency range	Maximum power	Bandwidth								
30 MHz to 1 GHz	-57 dBm	100 kHz								
1 GHz to 12,75 GHz	-47 dBm	1 MHz								

5.8.2 Test Setup Diagram



5.8.3 Test Procedure

Refer to clause 5.4.10 of ETSI EN 300 328 V2.2.2.

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in table 5 or table 13.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 19\,400$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.

For FHSS equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

The above sweep time setting may result in long measuring times in case of FHSS equipment. To avoid such long measuring times, an FFT analyser may be used.

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 3 MHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 23\,500$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

Step 4:

- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach). The limits used to identify emissions during this pre-scan need to be reduced by $10 \times \log_{10}(\text{Ach})$.

5.8.4 Test Data

PASS.

Please refer to Annex D for details.

5.9 Receiver Blocking

5.9.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.12										
Test Requirement	Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) on frequencies other than those of the operating band and spurious responses. For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %. For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment. While maintaining the minimum performance criteria as defined in clause 4.3.1.12.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 6, table 7 or table 8. Table 6: Receiver Blocking parameters for Receiver Category 1 equipment <table><tr><th>Wanted signal mean power from companion device (dBm) (see notes 1 and 4)</th><th>Blocking signal frequency (MHz)</th><th>Blocking signal power (dBm) (see note 4)</th><th>Type of blocking signal</th></tr><tr><td>(-133 dBm + 10 × log₁₀(OCBW)) or -68 dBm whichever is less (see note 2)</td><td>2 380 2 504</td><td rowspan="2">-34</td><td rowspan="2">CW</td></tr><tr><td>(-139 dBm + 10 × log₁₀(OCBW)) or -74 dBm whichever is less (see note 3)</td><td>2 300 2 330 2 360 2 524 2 584 2 674</td></tr></table> NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.	Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal	(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW	(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674
	Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal							
	(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW							
	(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674									

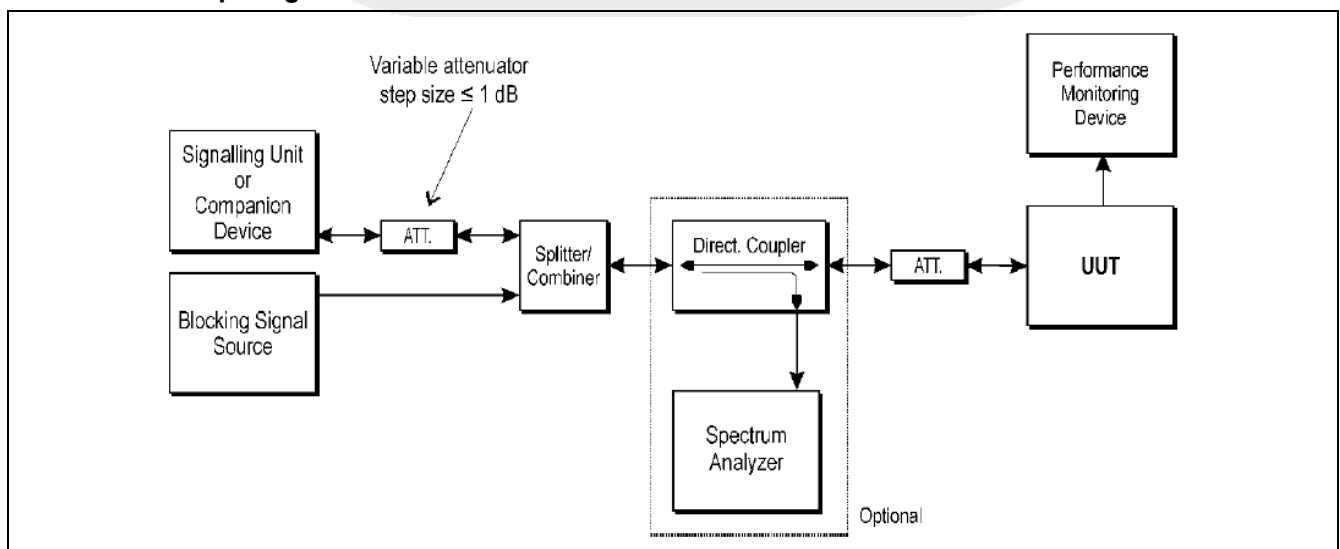
Table 7: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + $10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB}$) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 26 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Table 8: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + $10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB}$) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative the test may be performed using a wanted signal up to $P_{\min} + 30 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

5.9.2 Test Setup Diagram



5.9.3 Test Procedure

Refer to clause 5.4.11 of ETSI EN 300 328 V2.2.2:

Step 1:

- For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed.

Step 2:

- The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

- With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.
- Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.
- When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min} . This signal level (P_{min}) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

- The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6.

Step 5:

- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:
 - For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.
 - For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:
 - For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.
 - For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.

- It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

Step 6:

- Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 7:

- For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed.

Step 8:

- It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

5.9.4 Test Data

PASS.

Please refer to Annex D for details.

ANNEX A TEST SETUP PHOTOS

PHOTO 1

Radiated Emission
Below 1GHz

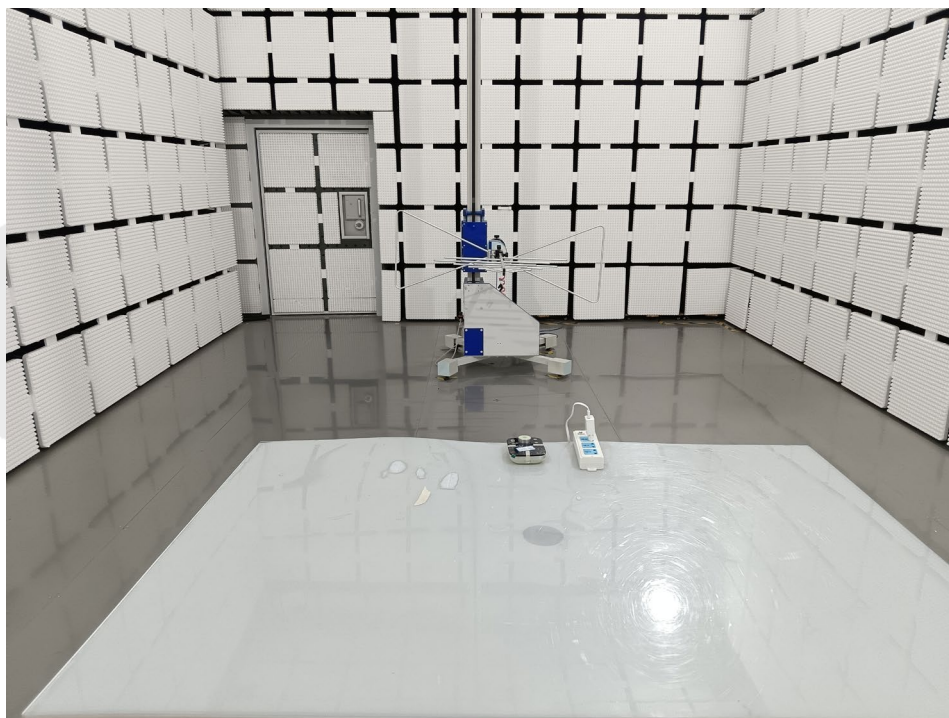
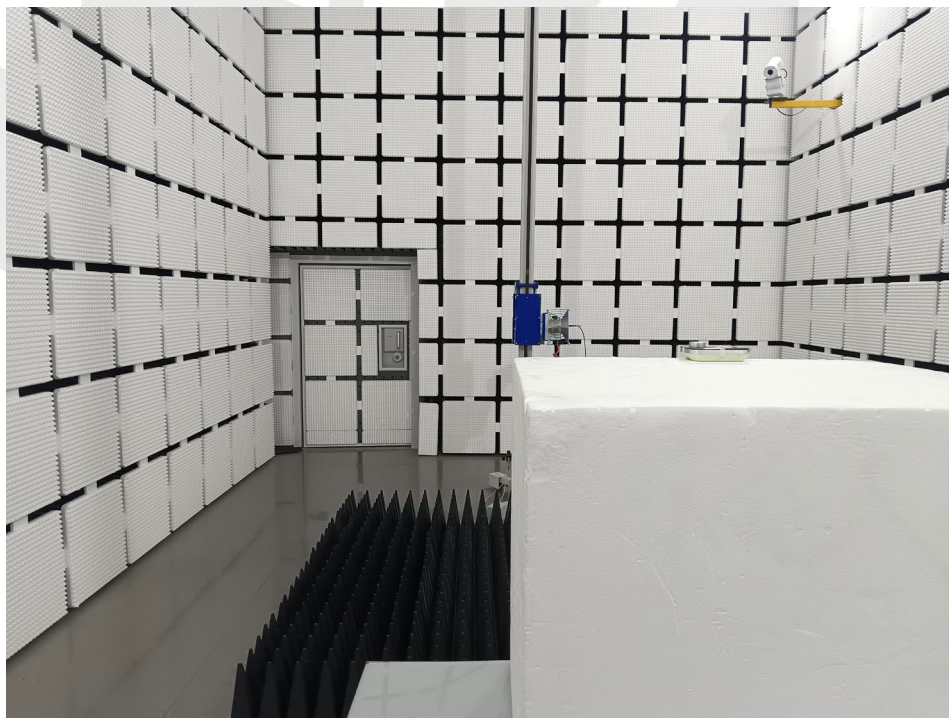


PHOTO 2

Radiated Emission
Above 1GHz



ANNEX B EXTERNAL PHOTOS

Please refer to the document “8326EU010302E.PDF”

ANNEX C INTERNAL PHOTOS

Please refer to the document “8326EU010302E.PDF”



ANNEX D TEST DATA**Test Summary**

Item	Result
RF Output Power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization	Pass
Accumulated Transmit Time, Frequency Occupation And Hopping Sequence	Pass
Hopping Frequency Separation	Pass
Occupied Channel Bandwidth	Pass
Transmitter Unwanted Emissions In The Out-Of-Band Domain	Pass
Transmitter Unwanted Emissions In The Spurious Domain	Pass
Receiver Spurious Emissions	Pass
Adaptivity (Channel Access Mechanism)	N/A
Receiver Blocking	Pass

1. RF Output Power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization

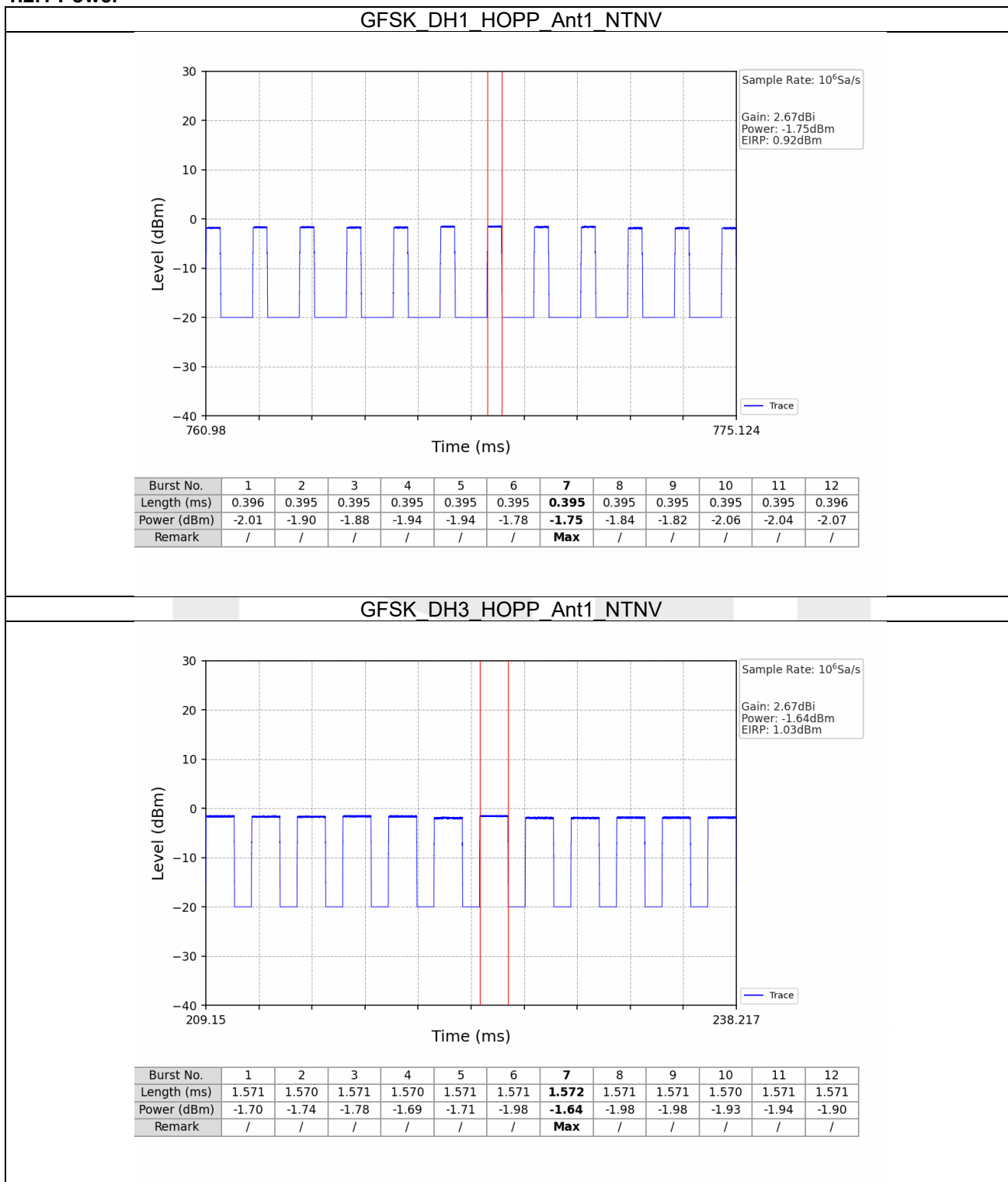
1.1 Test Result

1.1.1 Power

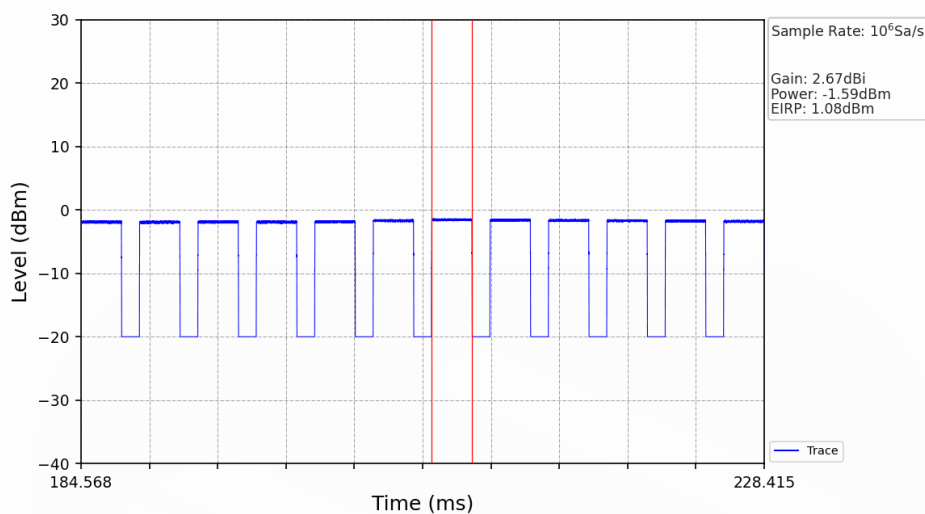
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Gain (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NTNV	GFSK	SISO	HOPP	DH1	1	2.67	-1.75	0.92	<=20	Pass
				DH3	1	2.67	-1.64	1.03	<=20	Pass
				DH5	1	2.67	-1.59	1.08	<=20	Pass
	π /4-DQPSK	SISO	HOPP	2DH1	1	2.67	-3.08	-0.41	<=20	Pass
				2DH3	1	2.67	-3.61	-0.94	<=20	Pass
				2DH5	1	2.67	-3.81	-1.14	<=20	Pass
	8DPSK	SISO	HOPP	3DH1	1	2.67	-3.02	-0.35	<=20	Pass
				3DH3	1	2.67	-3.56	-0.89	<=20	Pass
				3DH5	1	2.67	-3.73	-1.06	<=20	Pass
HTNV	GFSK	SISO	HOPP	DH1	1	2.67	-1.76	0.91	<=20	Pass
				DH3	1	2.67	-1.62	1.05	<=20	Pass
				DH5	1	2.67	-1.59	1.08	<=20	Pass
	π /4-DQPSK	SISO	HOPP	2DH1	1	2.67	-3.09	-0.42	<=20	Pass
				2DH3	1	2.67	-3.57	-0.90	<=20	Pass
				2DH5	1	2.67	-3.74	-1.07	<=20	Pass
	8DPSK	SISO	HOPP	3DH1	1	2.67	-3.05	-0.38	<=20	Pass
				3DH3	1	2.67	-3.59	-0.92	<=20	Pass
				3DH5	1	2.67	-3.68	-1.01	<=20	Pass
LTNV	GFSK	SISO	HOPP	DH1	1	2.67	-1.75	0.92	<=20	Pass
				DH3	1	2.67	-1.62	1.05	<=20	Pass
				DH5	1	2.67	-1.59	1.08	<=20	Pass
	π /4-DQPSK	SISO	HOPP	2DH1	1	2.67	-3.04	-0.37	<=20	Pass
				2DH3	1	2.67	-3.59	-0.92	<=20	Pass
				2DH5	1	2.67	-3.69	-1.02	<=20	Pass
	8DPSK	SISO	HOPP	3DH1	1	2.67	-3.02	-0.35	<=20	Pass
				3DH3	1	2.67	-3.55	-0.88	<=20	Pass
				3DH5	1	2.67	-3.71	-1.04	<=20	Pass
Note1: E.I.R.P = Measured Power + Antenna Gain										

1.2 Test Graph

1.2.1 Power

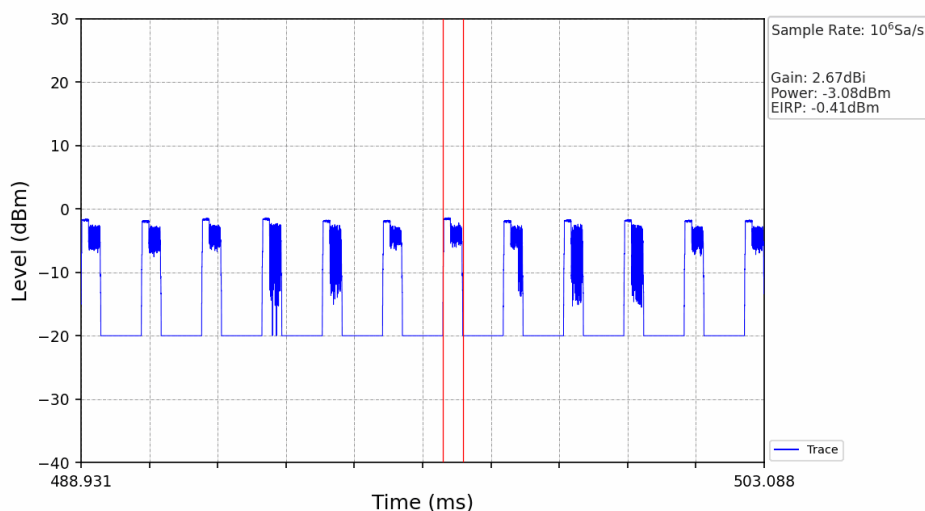


GFSK_DH5_HOPP_Ant1_NTNV



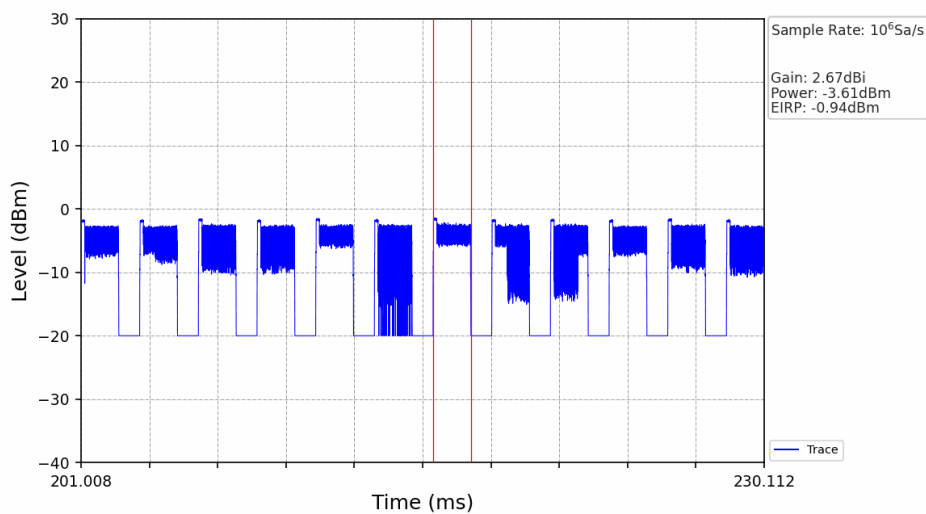
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Power (dBm)	-1.92	-1.92	-1.91	-1.91	-1.87	-1.71	-1.59	-1.64	-1.69	-1.73	-1.78	-1.82
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

π/4-DQPSK_2DH1_HOPP_Ant1_NTNV



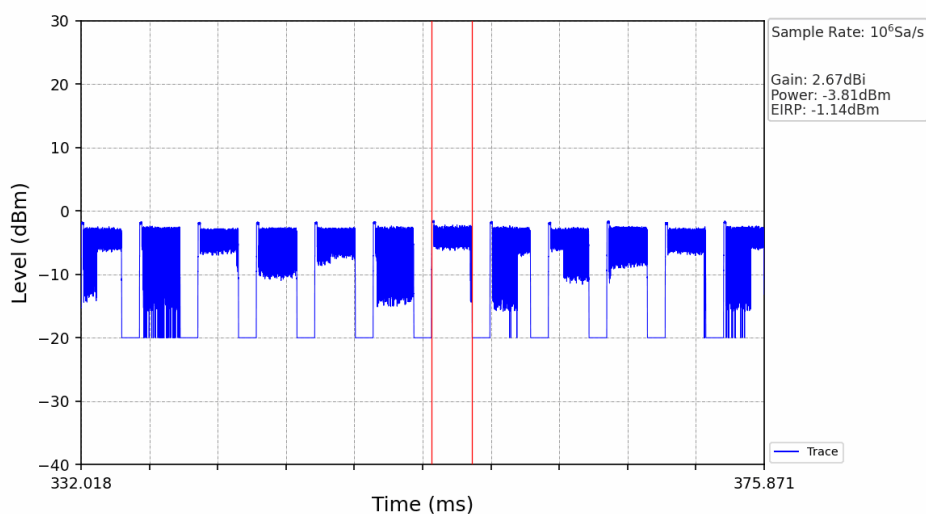
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Length (ms)	0.409	0.409	0.409	0.410	0.410	0.409	0.409	0.409	0.409	0.410	0.409	0.409
Power (dBm)	-3.43	-3.65	-3.29	-3.98	-4.30	-3.46	-3.08	-3.68	-4.26	-4.30	-3.58	-3.57
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π /4-DQPSK_2DH3_HOPP_Ant1_NTNV



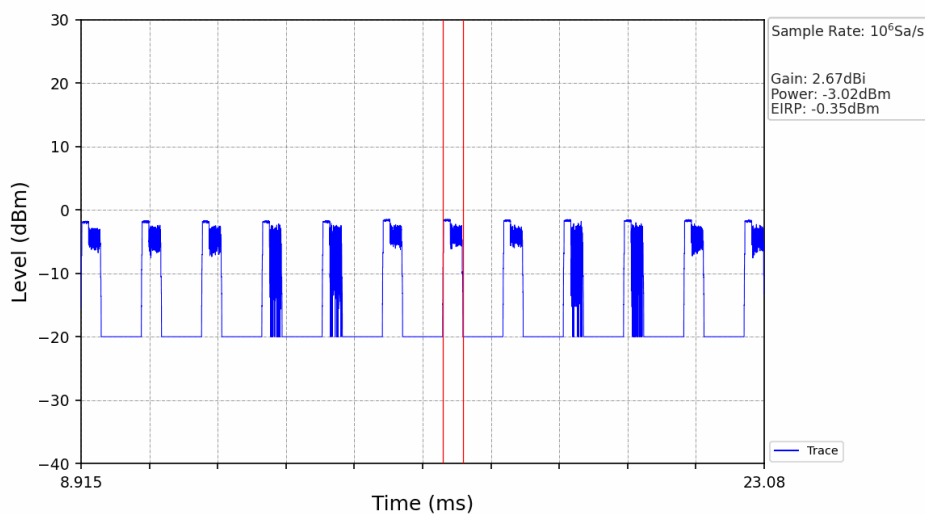
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Power (dBm)	-4.43	-4.54	-4.79	-4.90	-3.79	-5.65	-3.61	-4.86	-5.05	-4.40	-4.75	-5.01
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

π /4-DQPSK_2DH5_HOPP_Ant1_NTNV



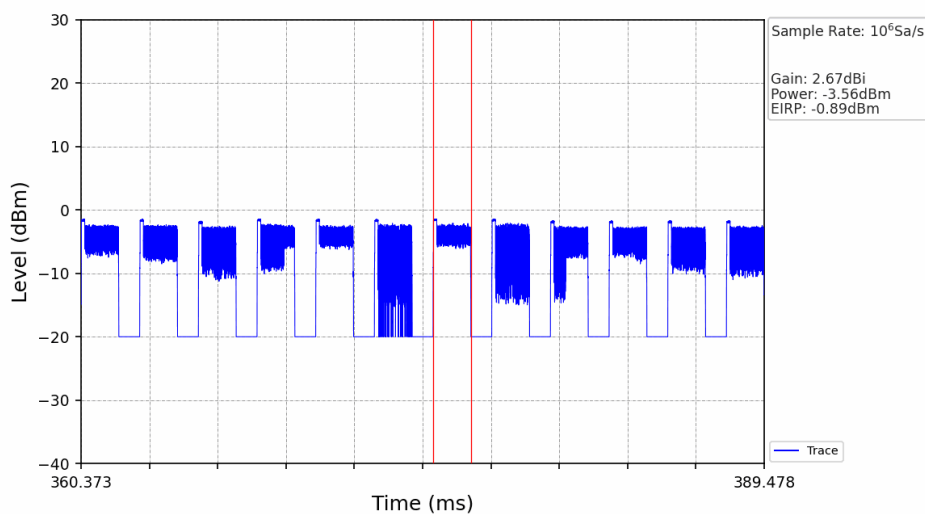
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Length (ms)	2.609	2.609	2.609	2.608	2.609	2.609	2.609	2.609	2.609	2.608	2.609	2.609
Power (dBm)	-4.58	-5.79	-4.26	-5.17	-4.54	-5.59	-3.81	-5.23	-4.88	-4.76	-4.36	-5.00
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8DPSK_3DH1_HOPP_Ant1_NTNV



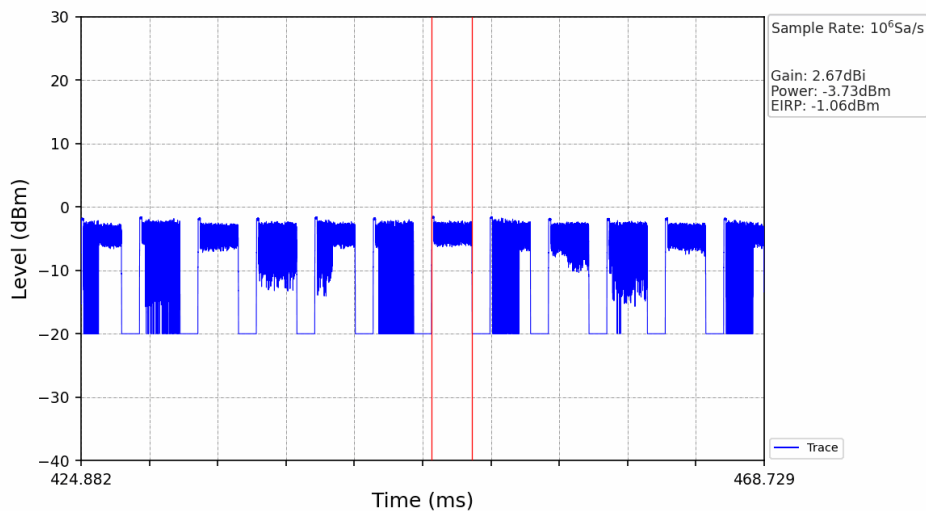
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Power (dBm)	-3.51	-3.53	-3.59	-4.34	-4.25	-3.14	-3.02	-3.20	-4.19	-4.18	-3.39	-3.44
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

8DPSK_3DH3_HOPP_Ant1_NTNV



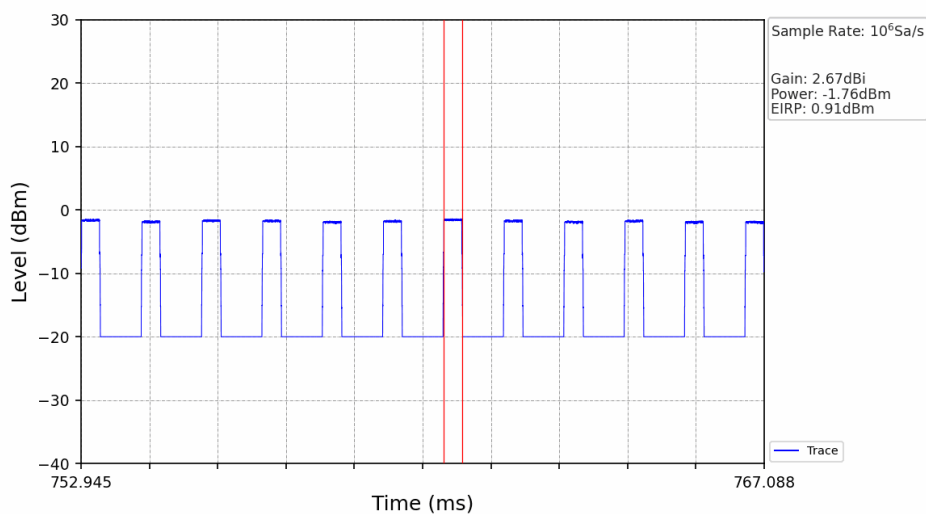
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.609	1.609	1.608	1.609	1.609	1.610	1.609	1.609	1.608	1.609	1.609	1.609
Power (dBm)	-4.06	-4.39	-5.05	-4.32	-3.79	-5.44	-3.56	-5.18	-4.81	-4.43	-4.87	-4.96
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

8DPSK_3DH5_HOPP_Ant1_NTNV



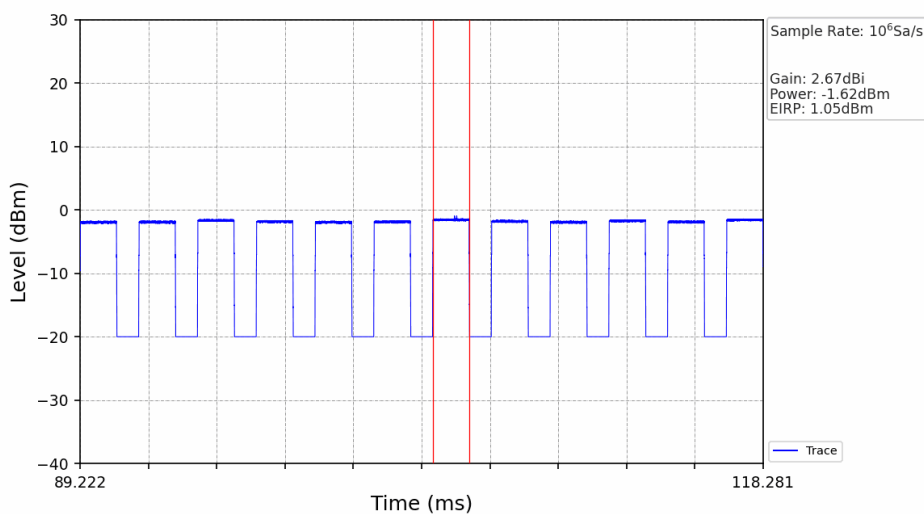
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Power (dBm)	-4.80	-5.32	-4.21	-5.19	-4.37	-5.70	-3.73	-5.10	-4.67	-5.40	-4.26	-5.26
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

GFSK_DH1_HOPP_Ant1_HTNV



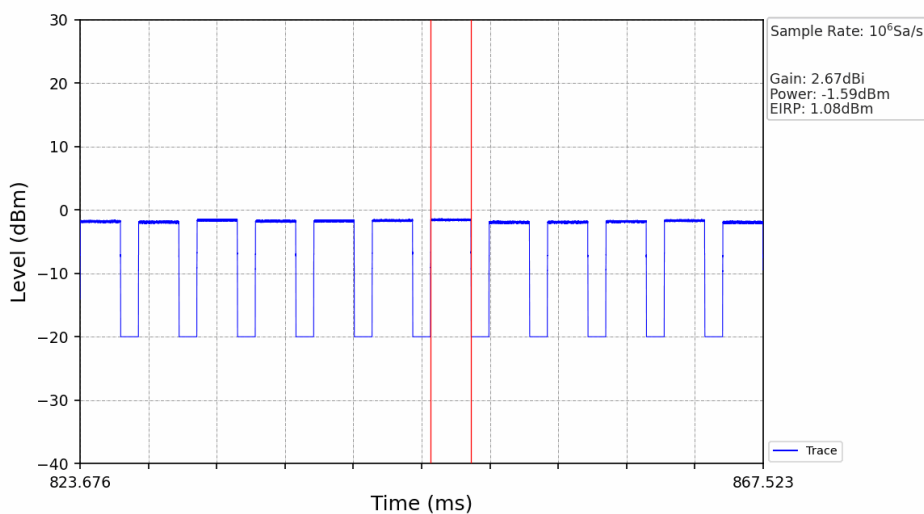
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Length (ms)	0.395	0.395	0.395	0.396	0.395	0.395	0.395	0.395	0.396	0.396	0.395	0.395
Power (dBm)	-1.84	-2.07	-1.90	-1.96	-2.11	-1.99	-1.76	-1.94	-2.10	-1.97	-2.10	-2.11
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

GFSK_DH3_HOPP_Ant1_HTNV



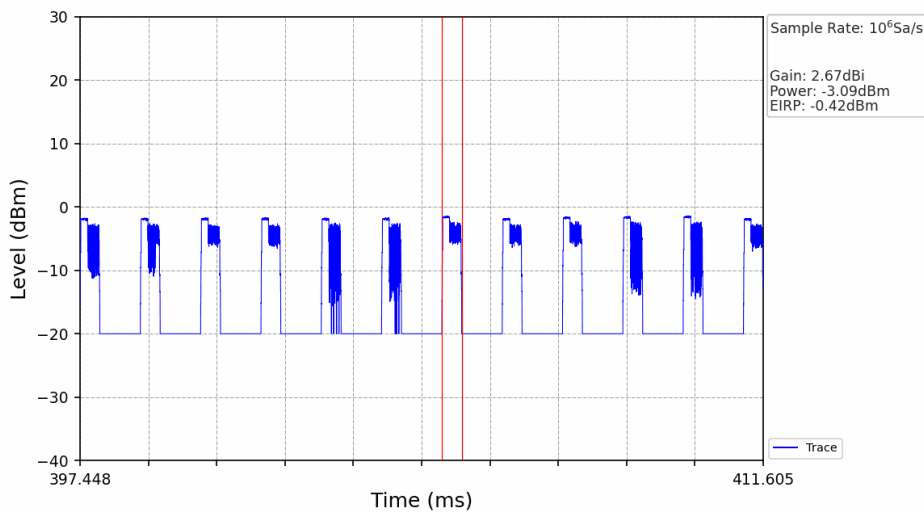
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Length (ms)	1.563	1.563	1.563	1.564	1.563	1.563	1.563	1.563	1.563	1.564	1.563	1.563
Power (dBm)	-1.96	-1.94	-1.70	-1.89	-1.96	-1.92	-1.62	-1.84	-1.95	-1.77	-1.92	-1.65
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

GFSK_DH5_HOPP_Ant1_HTNV



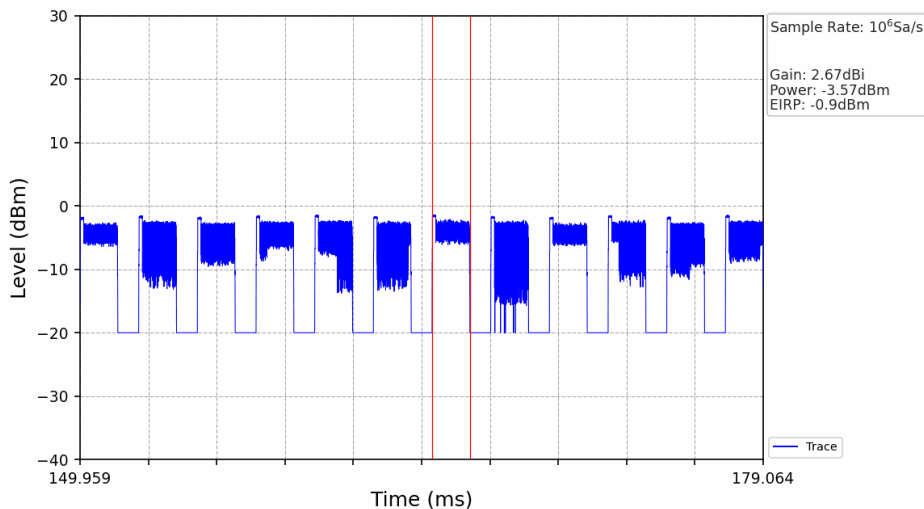
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.603	2.603	2.604	2.603	2.603	2.603	2.603	2.603	2.603	2.603	2.603	2.602
Power (dBm)	-1.84	-1.92	-1.65	-1.79	-1.78	-1.70	-1.59	-1.94	-1.93	-1.85	-1.71	-1.93
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

π /4-DQPSK_2DH1_HOPP_Ant1_HTNV



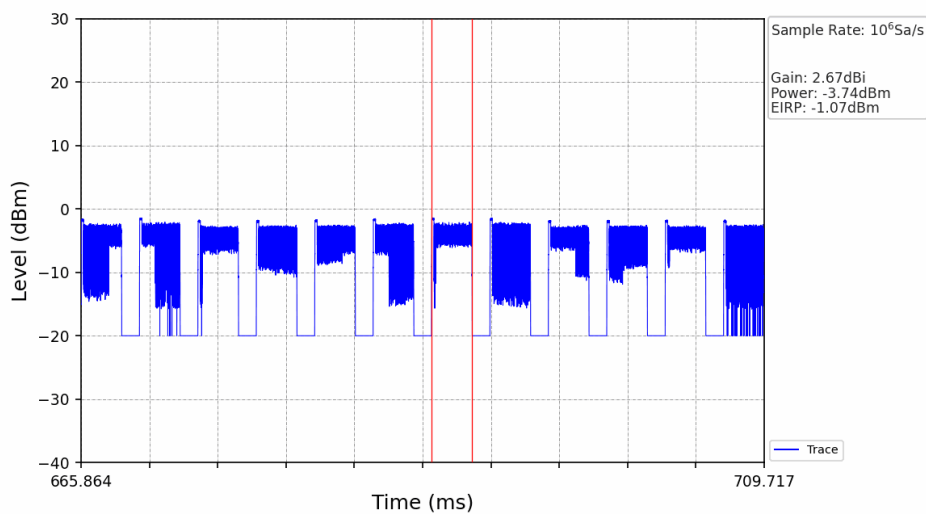
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.409	0.409	0.409	0.409	0.410	0.410	0.409	0.409	0.409	0.409	0.409	0.409
Power (dBm)	-4.06	-3.79	-3.48	-3.47	-4.36	-4.34	-3.09	-3.41	-3.22	-3.97	-3.94	-3.57
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

π /4-DQPSK_2DH3_HOPP_Ant1_HTNV



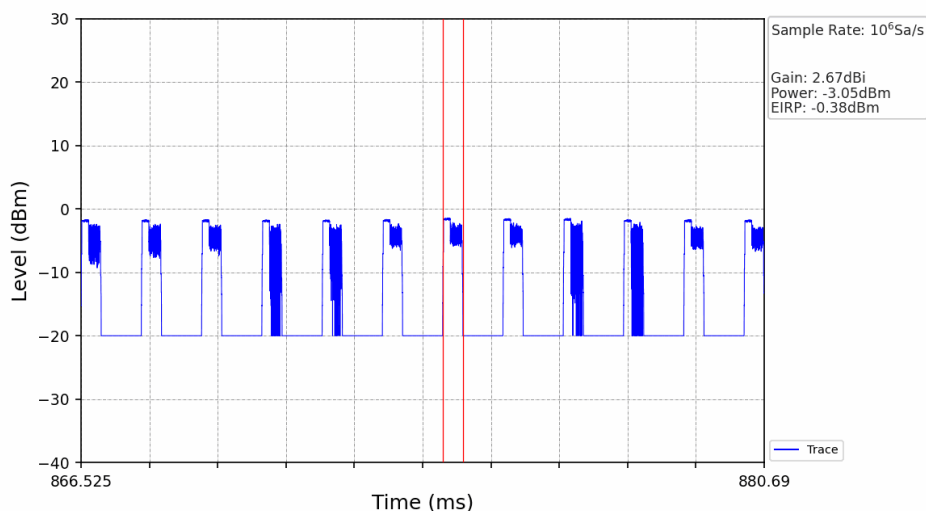
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Length (ms)	1.609	1.609	1.609	1.609	1.609	1.609	1.609	1.610	1.609	1.609	1.608	1.609
Power (dBm)	-4.01	-5.13	-4.83	-4.13	-4.60	-5.09	-3.57	-5.65	-4.10	-4.72	-5.01	-4.44
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

π /4-DQPSK_2DH5_HOPP_Ant1_HTNV



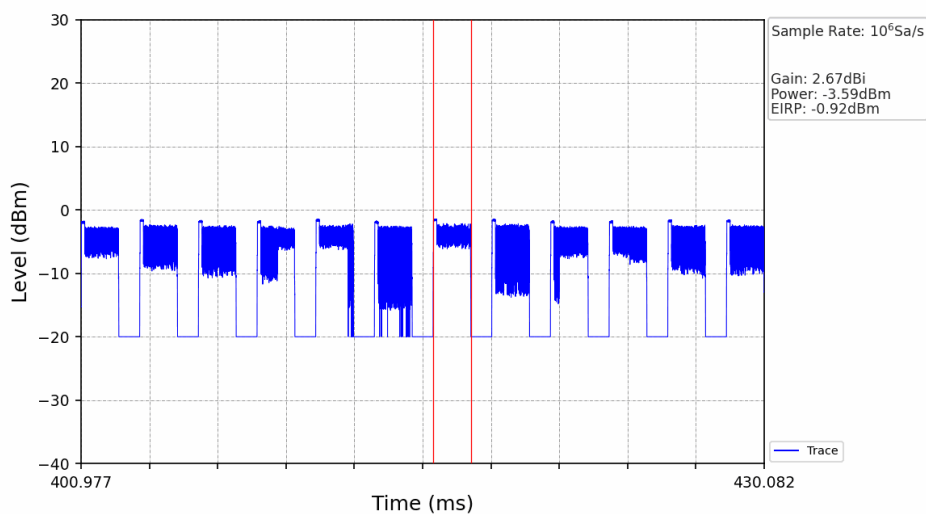
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.609	2.609	2.609	2.608	2.609	2.609	2.609	2.609	2.609	2.608	2.609	2.609
Power (dBm)	-4.90	-4.76	-4.38	-5.15	-4.62	-5.03	-3.74	-5.40	-4.50	-5.11	-4.29	-5.89
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

8DPSK_3DH1_HOPP_Ant1_HTNV



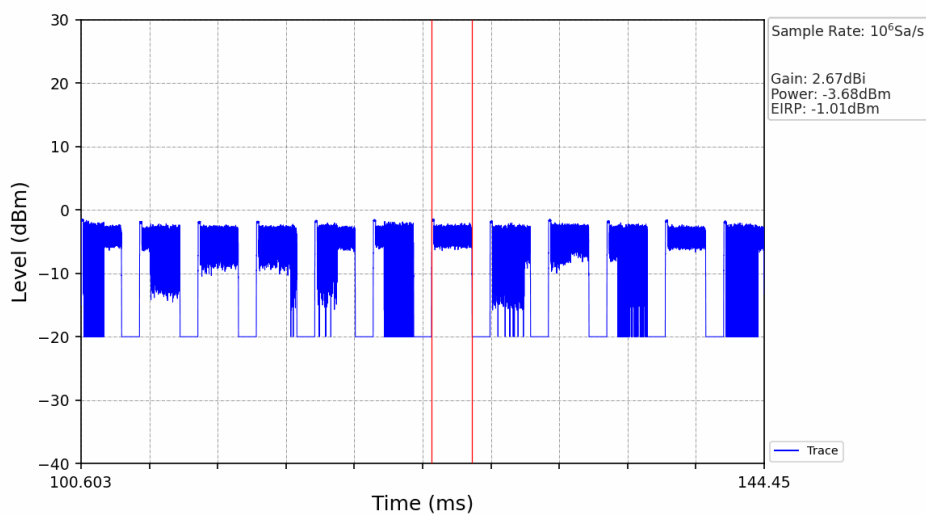
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.417	0.417	0.417	0.418	0.418	0.417	0.417	0.417	0.418	0.418	0.417	0.417
Power (dBm)	-3.76	-3.63	-3.51	-4.41	-4.26	-3.31	-3.05	-3.19	-4.08	-4.36	-3.50	-3.56
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

8DPSK_3DH3_HOPP_Ant1_HTNV



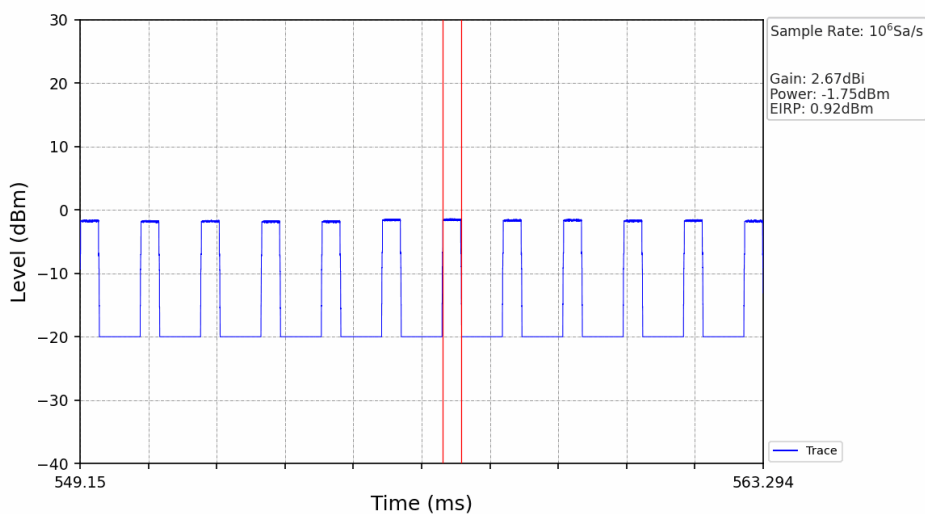
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.609	1.609	1.608	1.609	1.609	1.610	1.609	1.609	1.608	1.609	1.608	1.609
Power (dBm)	-4.42	-4.65	-4.89	-4.54	-3.92	-5.63	-3.59	-5.16	-4.58	-4.47	-4.78	-4.77
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

8DPSK_3DH5_HOPP_Ant1_HTNV



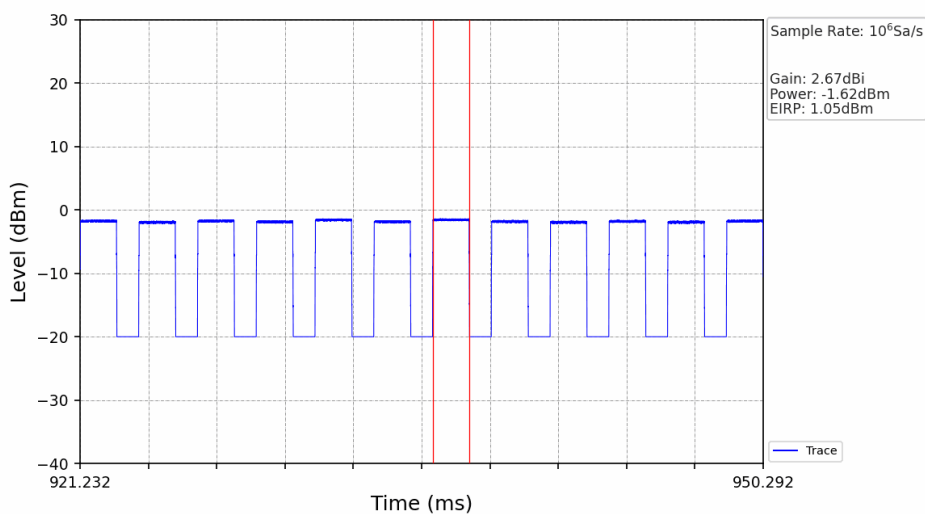
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Length (ms)	2.603	2.603	2.603	2.603	2.603	2.603	2.603	2.602	2.603	2.603	2.603	2.603
Power (dBm)	-4.63	-5.10	-4.78	-4.91	-4.68	-5.11	-3.68	-5.45	-4.29	-5.43	-4.01	-5.68
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

GFSK_DH1_HOPP_Ant1_LTNV



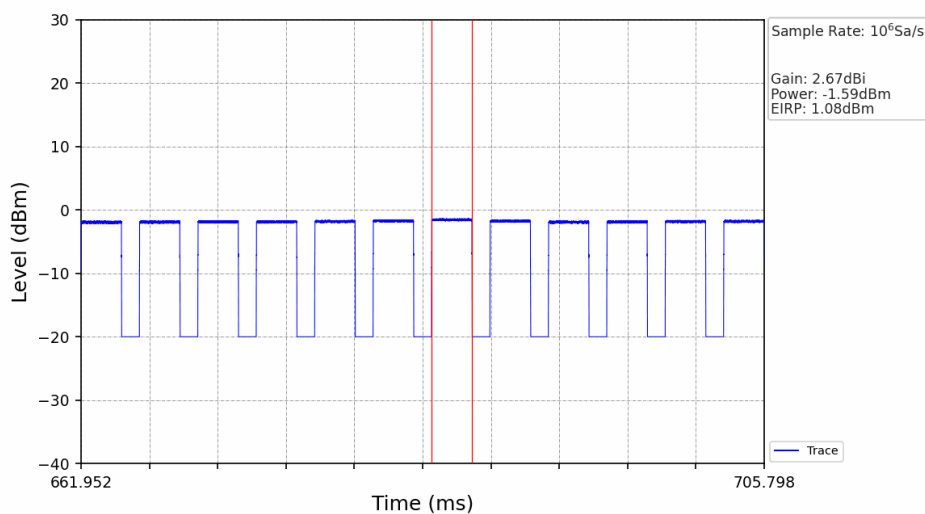
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.395	0.395	0.395	0.396	0.396	0.395	0.395	0.395	0.395	0.395	0.396	0.396
Power (dBm)	-1.94	-2.01	-1.99	-2.05	-2.04	-1.78	-1.75	-1.86	-1.83	-1.93	-1.90	-1.98
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

GFSK_DH3_HOPP_Ant1_LTNV



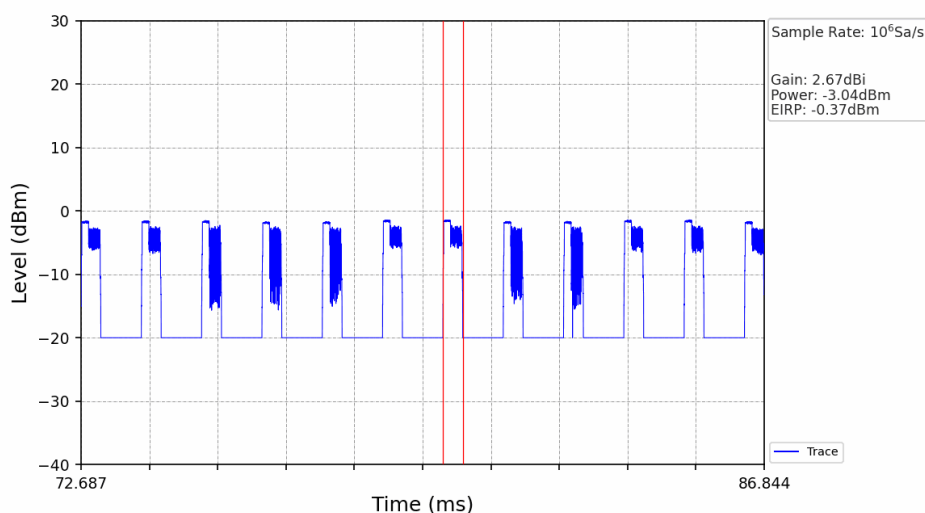
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.563	1.563	1.563	1.563	1.563	1.564	1.563	1.563	1.562	1.563	1.563	1.564
Power (dBm)	-1.81	-1.96	-1.80	-1.92	-1.63	-1.91	-1.62	-1.86	-1.95	-1.83	-1.95	-1.81
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

GFSK_DH5_HOPP_Ant1_LTNV



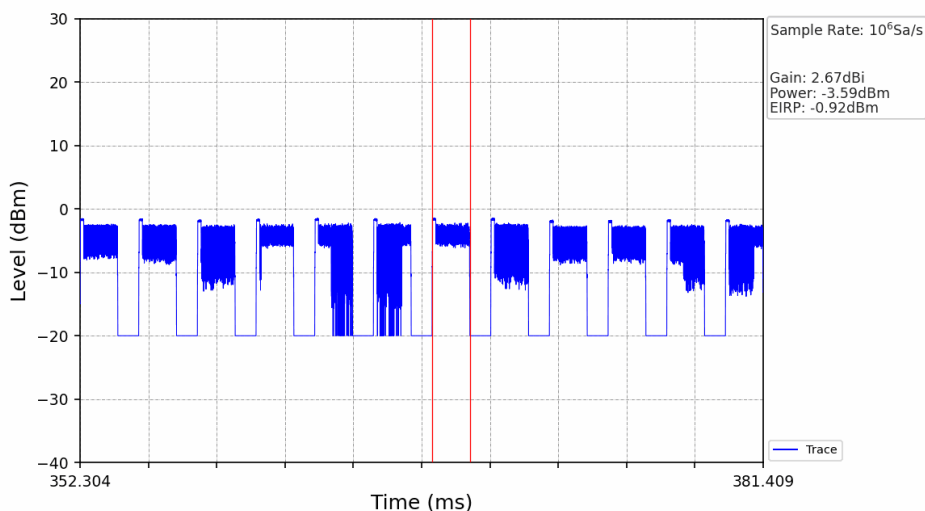
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.602	2.603	2.603	2.603	2.603	2.603	2.603	2.603	2.603	2.603	2.603	2.602
Power (dBm)	-1.94	-1.92	-1.88	-1.89	-1.83	-1.76	-1.59	-1.79	-1.93	-1.91	-1.84	-1.82
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

π /4-DQPSK_2DH1_HOPP_Ant1_LTNV



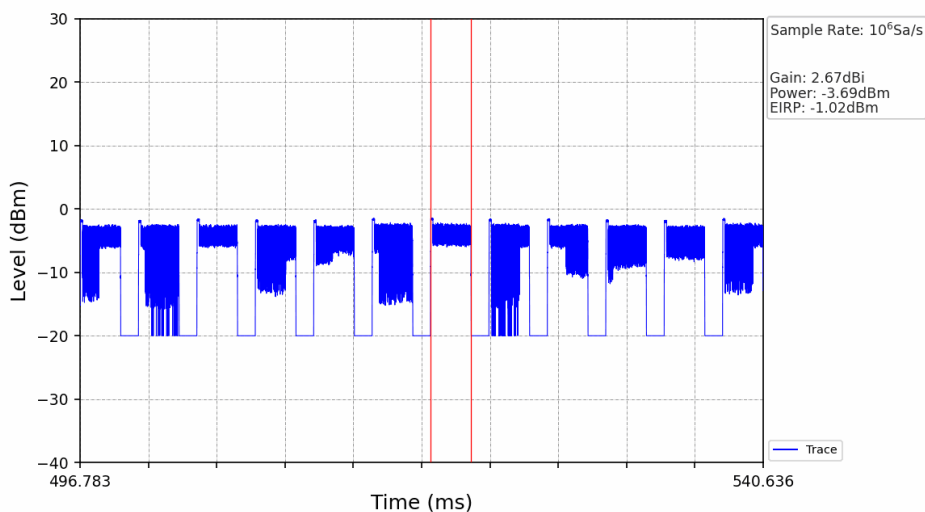
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.409	0.409	0.410	0.410	0.409	0.409	0.409	0.409	0.409	0.409	0.409	0.409
Power (dBm)	-3.35	-3.42	-4.10	-4.28	-4.23	-3.10	-3.04	-4.17	-4.27	-3.28	-3.28	-3.53
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

π /4-DQPSK_2DH3_HOPP_Ant1_LTNV



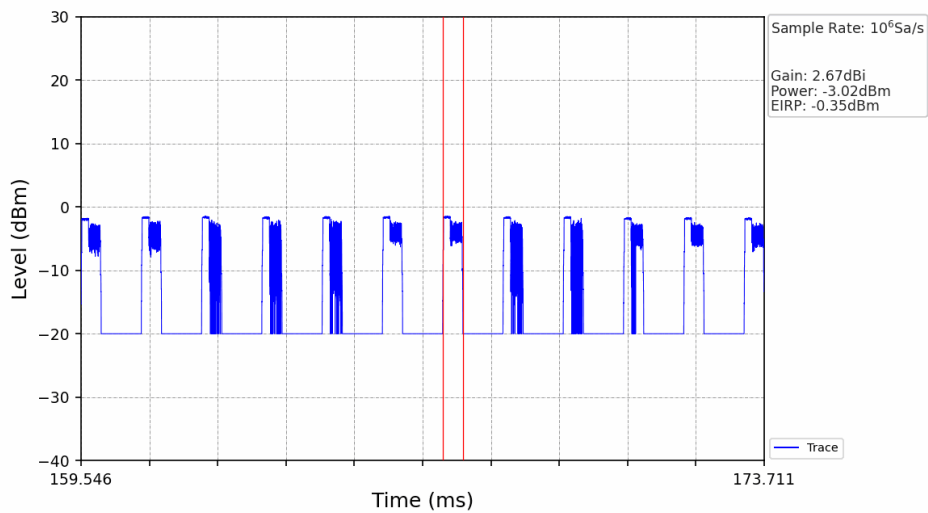
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.609	1.609	1.609	1.609	1.609	1.609	1.609	1.609	1.609	1.609	1.609	1.609
Power (dBm)	-4.33	-4.52	-5.23	-3.89	-4.67	-4.95	-3.59	-4.99	-4.68	-4.66	-5.01	-4.90
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

π /4-DQPSK_2DH5_HOPP_Ant1_LTNV



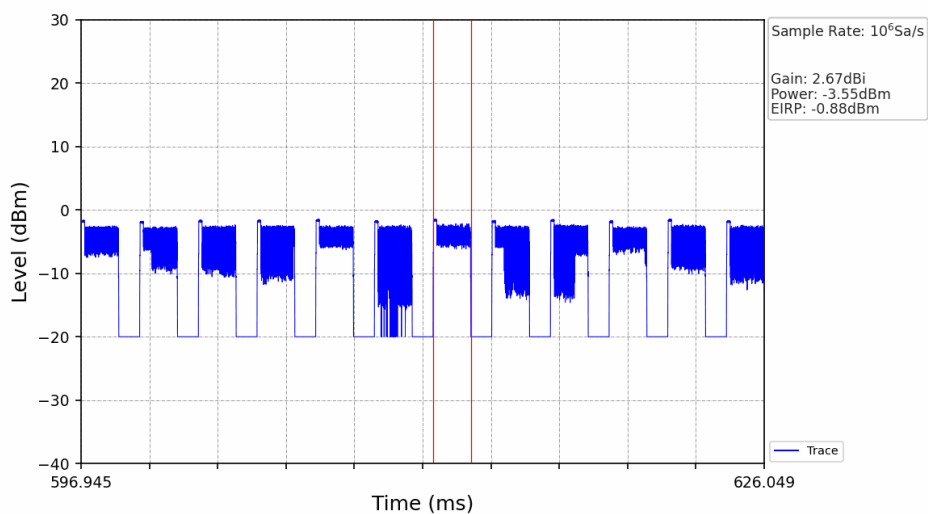
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.609	2.609	2.609	2.608	2.609	2.609	2.609	2.609	2.609	2.608	2.609	2.609
Power (dBm)	-4.68	-5.70	-3.95	-5.32	-4.59	-5.22	-3.69	-5.20	-4.52	-4.94	-4.68	-4.83
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

8DPSK_3DH1_HOPP_Ant1_LTNV



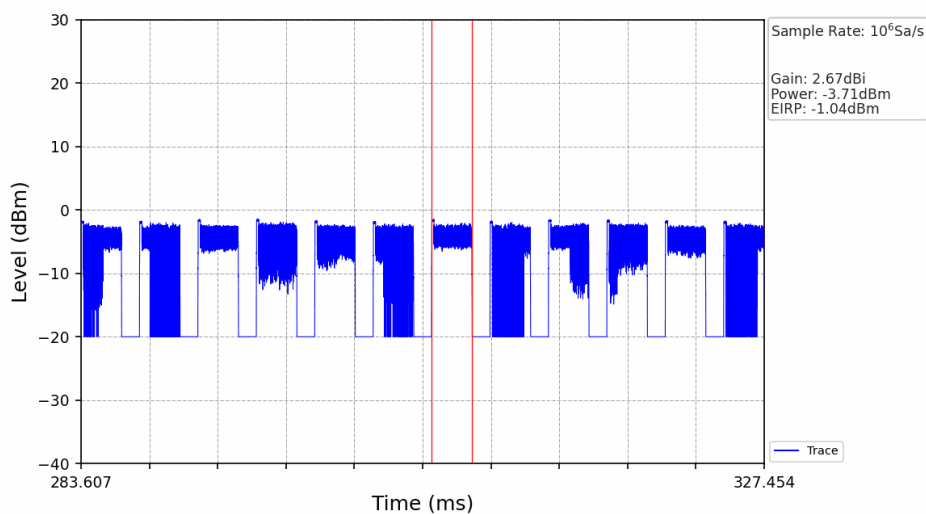
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.417	0.417	0.417	0.418	0.418	0.417	0.417	0.417	0.418	0.417	0.417	0.417
Power (dBm)	-3.65	-3.40	-4.08	-4.21	-4.09	-3.18	-3.02	-4.11	-4.23	-3.86	-3.43	-3.52
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

8DPSK_3DH3_HOPP_Ant1_LTNV



Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.608	1.609	1.608	1.609	1.609	1.610	1.609	1.609	1.608	1.609	1.609	1.609
Power (dBm)	-4.26	-4.68	-4.86	-4.89	-3.79	-5.63	-3.55	-4.90	-4.76	-4.15	-4.66	-5.11
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

8DPSK_3DH5_HOPP_Ant1_LTNV



Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	2.603	2.603	2.603	2.602	2.603	2.603	2.603	2.602	2.603	2.602	2.603	2.603
Power (dBm)	-4.84	-5.47	-3.95	-4.89	-4.53	-5.45	-3.71	-5.58	-4.44	-4.74	-4.32	-5.55
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2. Accumulated Transmit Time, Frequency Occupation And Hopping Sequence

2.1 Test Result

2.1.1 ATT-Ant1

Ant1										
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	HOPP Num_Mini	Data Points Of T_on	Duration Of One Point (ms)	Accumulated Transmit Time (ms)		Verdict
								Result	Limit	
NTNV	GFSK	SISO	HOPP	DH1	79	317	1.053	333.801	<=400	Pass
				DH3	79	247	1.053	260.091	<=400	Pass
				DH5	79	268	1.053	282.204	<=400	Pass
	π /4-DQPSK	SISO	HOPP	2DH1	79	319	1.053	335.907	<=400	Pass
				2DH3	79	239	1.053	251.667	<=400	Pass
				2DH5	79	263	1.053	276.939	<=400	Pass
	8DPSK	SISO	HOPP	3DH1	79	318	1.053	334.854	<=400	Pass
				3DH3	79	247	1.053	260.091	<=400	Pass
				3DH5	79	263	1.053	276.939	<=400	Pass

2.1.2 FO-Ant1

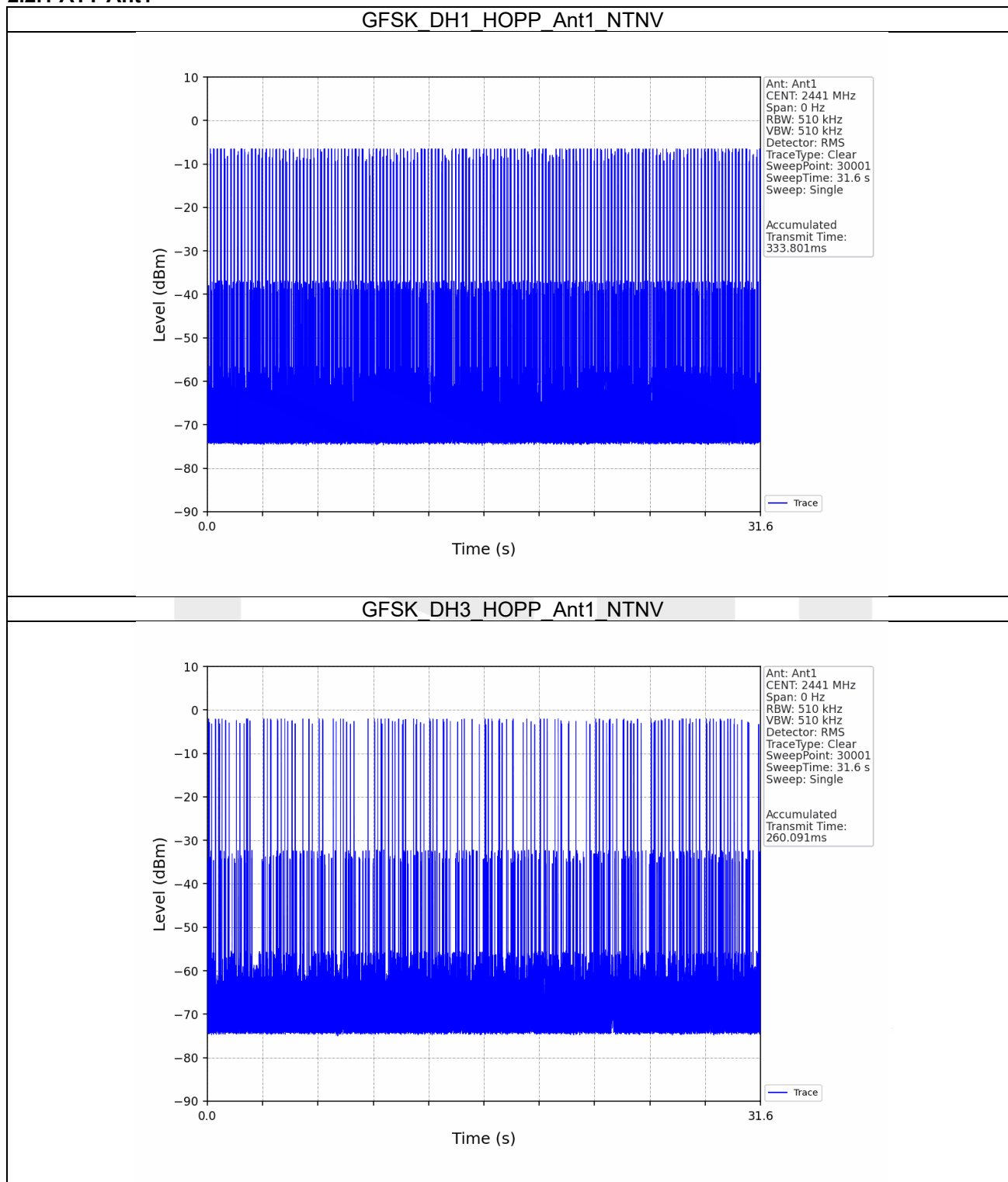
Ant1									
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	HOPP Num_Mini	Dwell Time (ms)	Frequency Occupation (N)		Verdict
							Result	Limit	
NTNV	GFSK	SISO	HOPP	DH1	79	1.250	4	>=1	Pass
				DH3	79	2.500	3	>=1	Pass
				DH5	79	3.749	3	>=1	Pass
	$\pi/4$ -DQPSK	SISO	HOPP	2DH1	79	1.250	4	>=1	Pass
				2DH3	79	2.500	4	>=1	Pass
				2DH5	79	3.749	5	>=1	Pass
	8DPSK	SISO	HOPP	3DH1	79	1.250	4	>=1	Pass
				3DH3	79	2.500	5	>=1	Pass
				3DH5	79	3.735	2	>=1	Pass

2.1.3 HS-Ant1

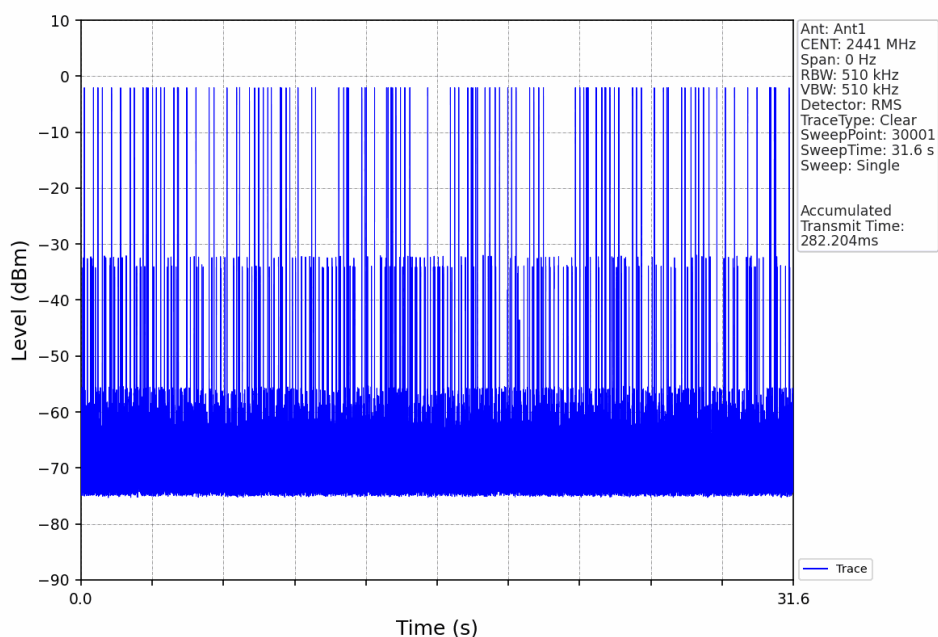
Ant1									
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	HOPP Num (N)		-20 dB Bandwidth (MHz)		Verdict
					Result	Limit	Result	Limit	
NTNV	GFSK	SISO	HOPP	DH5	79	>=15	79.575	>=58.45	Pass
	$\pi/4$ -DQPSK	SISO	HOPP	2DH5	79	>=15	80.051	>=58.45	Pass
	8DPSK	SISO	HOPP	3DH5	79	>=15	80.110	>=58.45	Pass

2.2 Test Graph

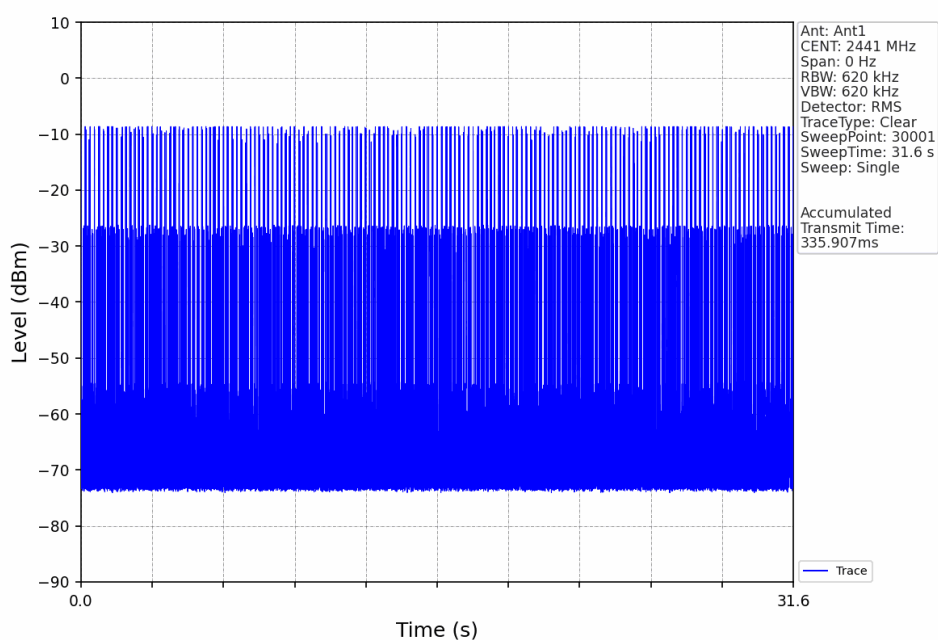
2.2.1 ATT-Ant1



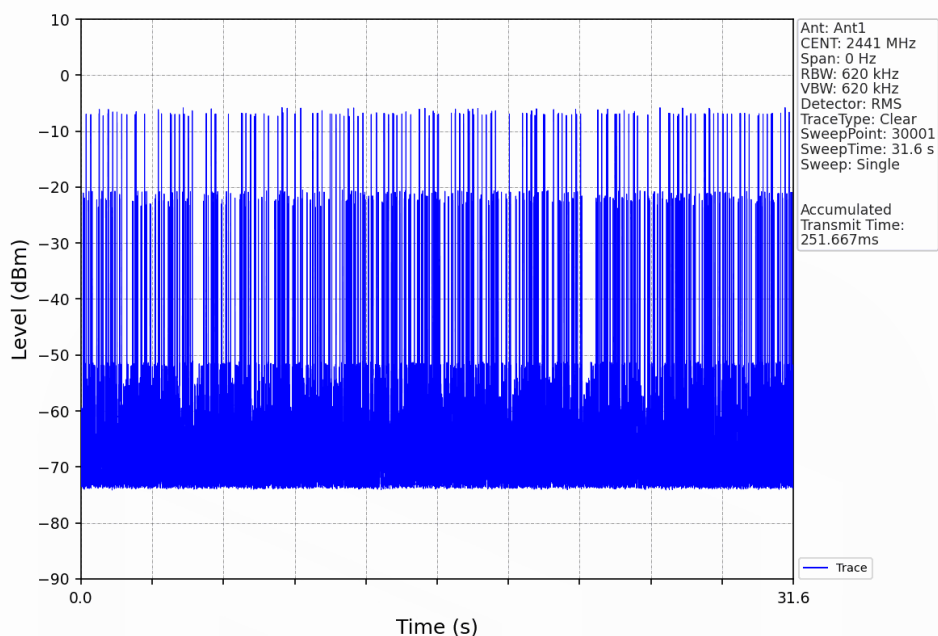
GFSK_DH5_HOPP_Ant1_NTNV



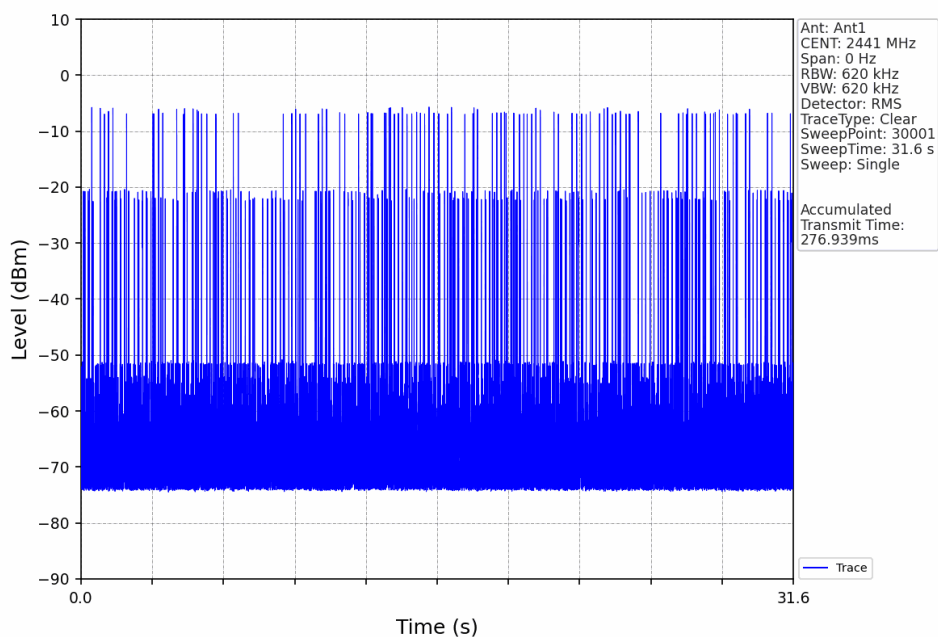
II /4-DQPSK_2DH1_HOPP_Ant1_NTNV



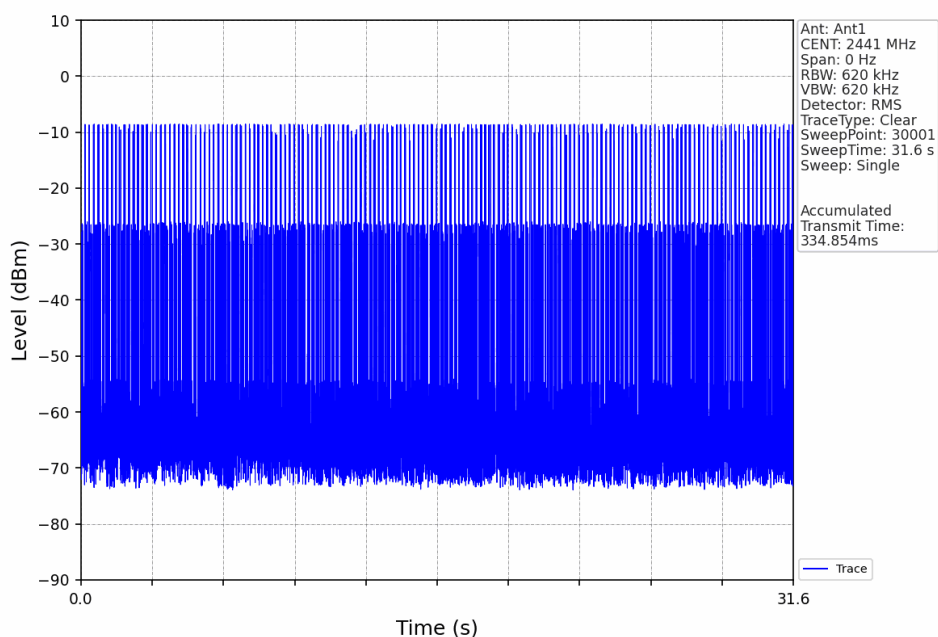
π /4-DQPSK_2DH3_HOPP_Ant1_NTNV



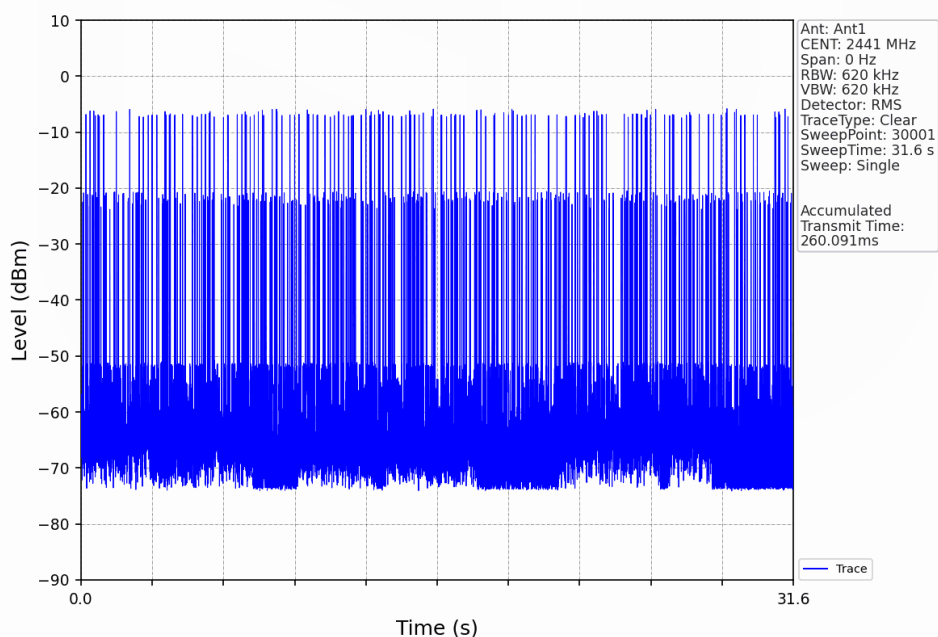
π /4-DQPSK_2DH5_HOPP_Ant1_NTNV

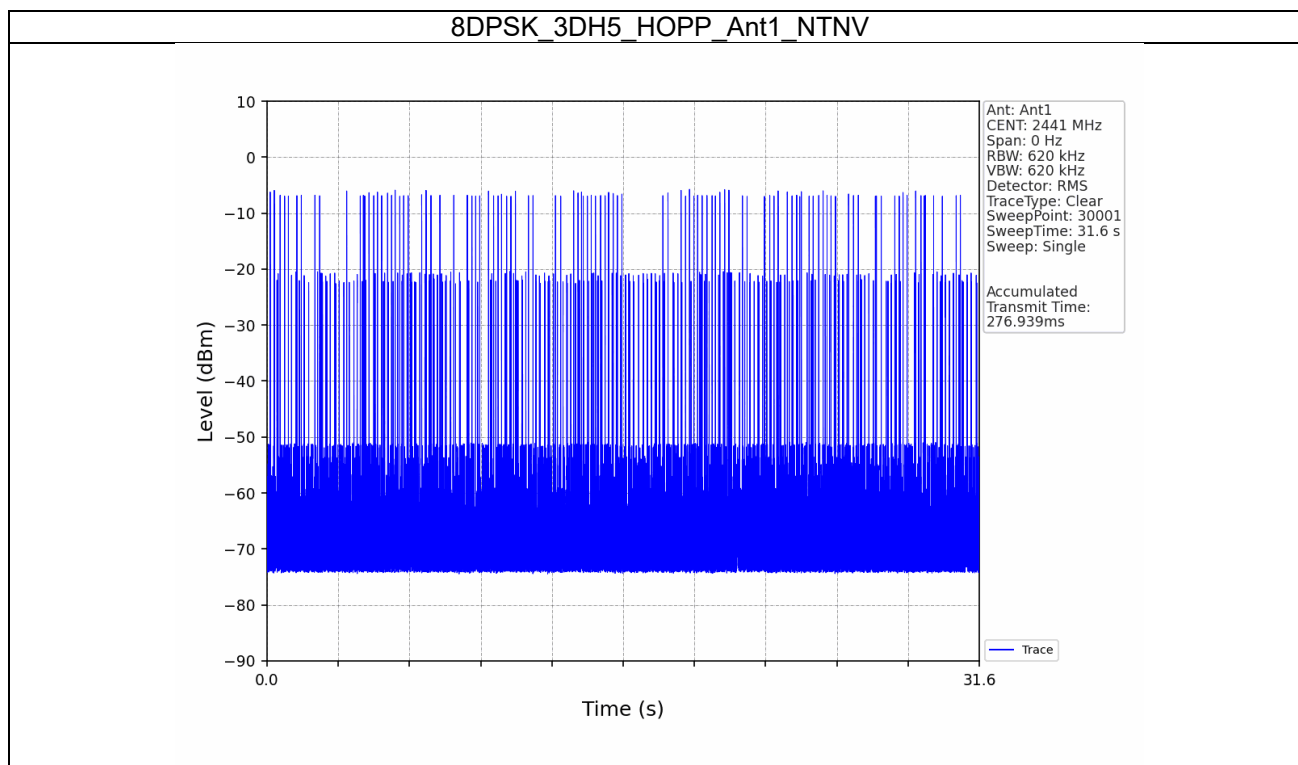


8DPSK_3DH1_HOPP_Ant1_NTNV

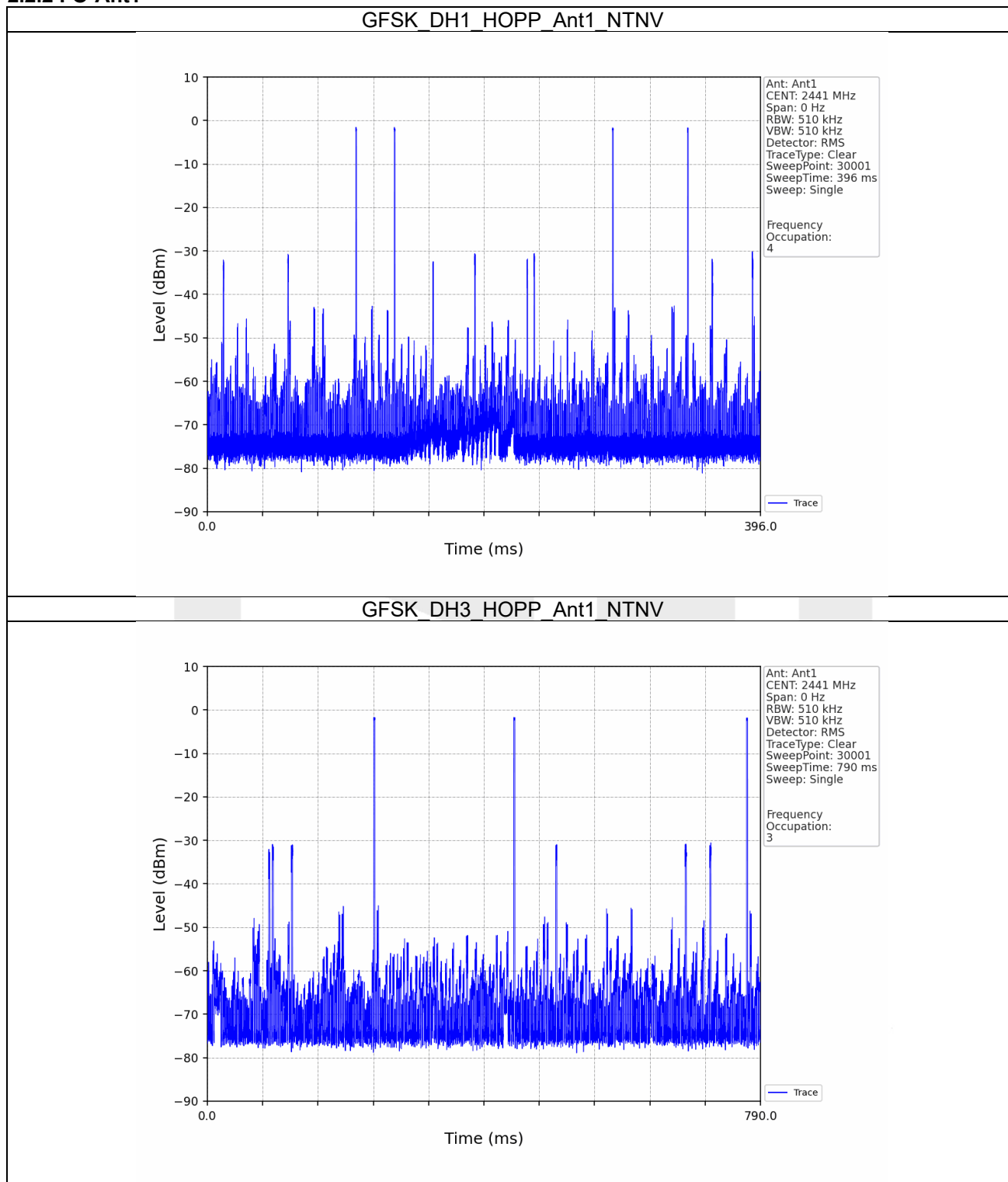


8DPSK_3DH3_HOPP_Ant1_NTNV

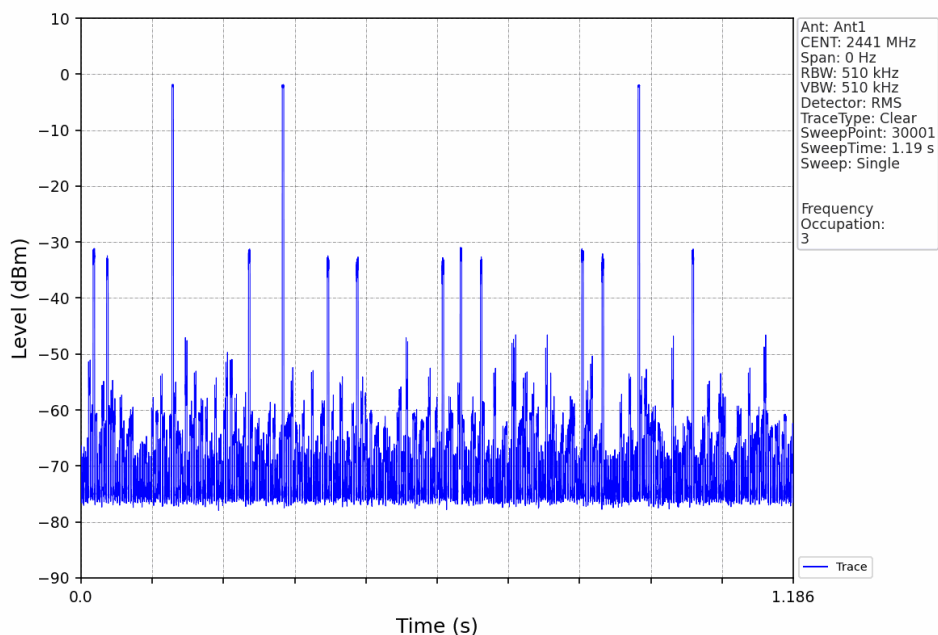




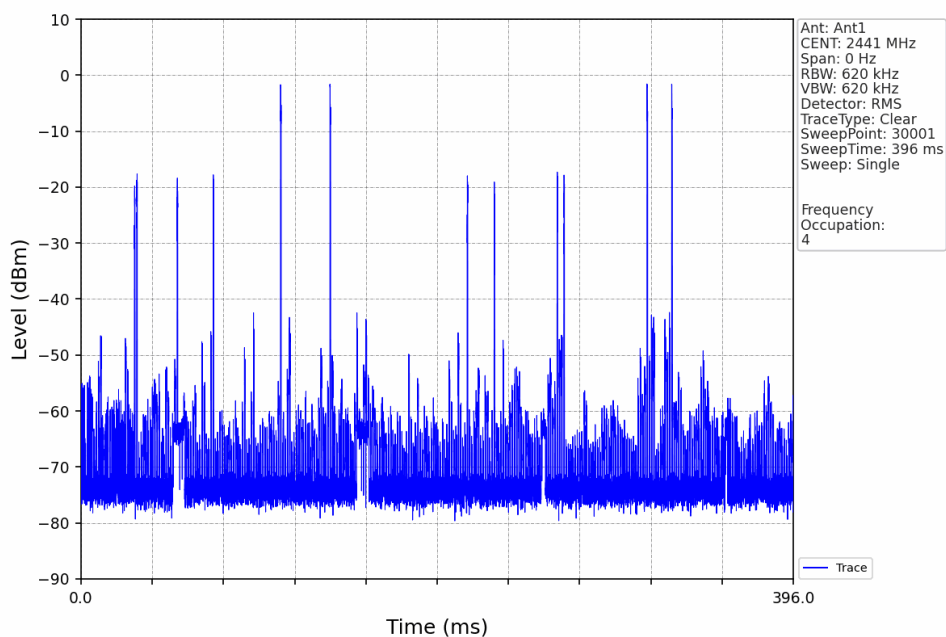
2.2.2 FO-Ant1



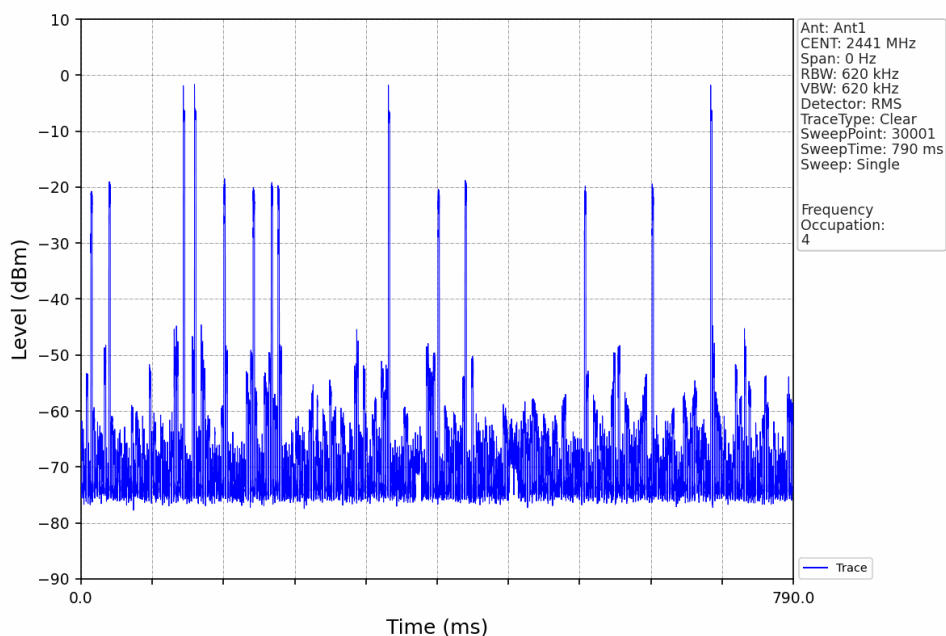
GFSK_DH5_HOPP_Ant1_NTNV



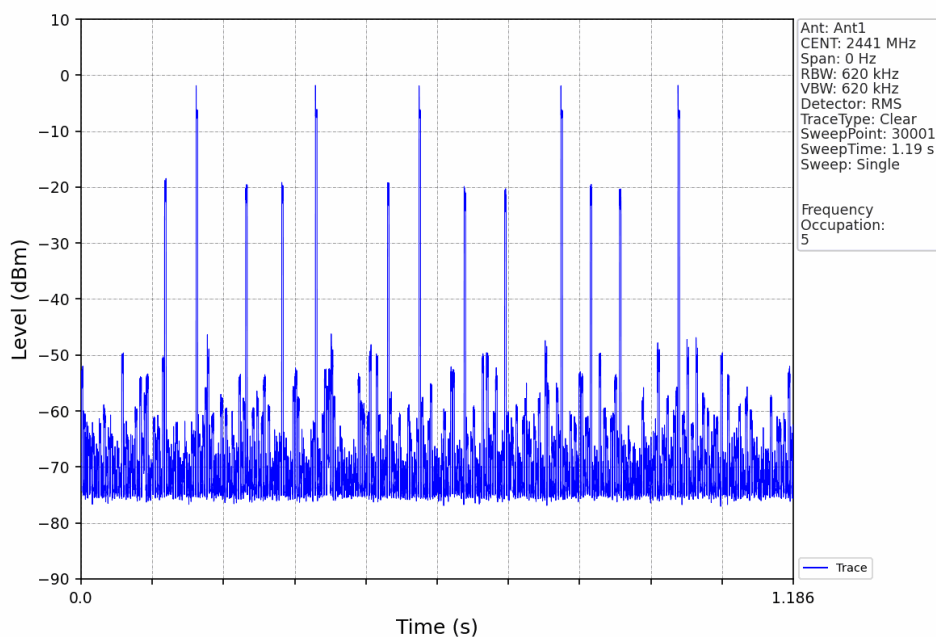
II /4-DQPSK_2DH1_HOPP_Ant1_NTNV



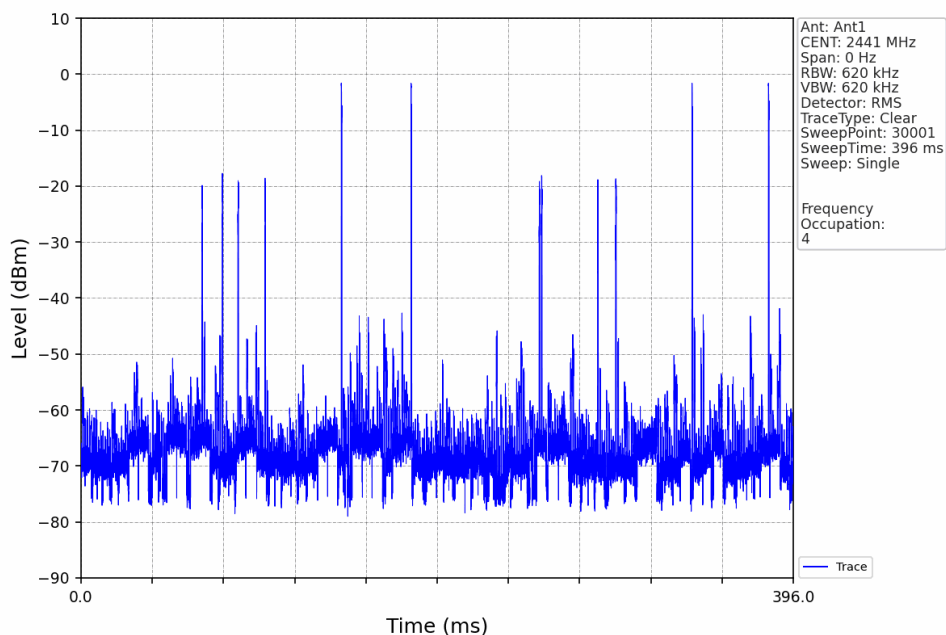
π /4-DQPSK_2DH3_HOPP_Ant1_NTNV



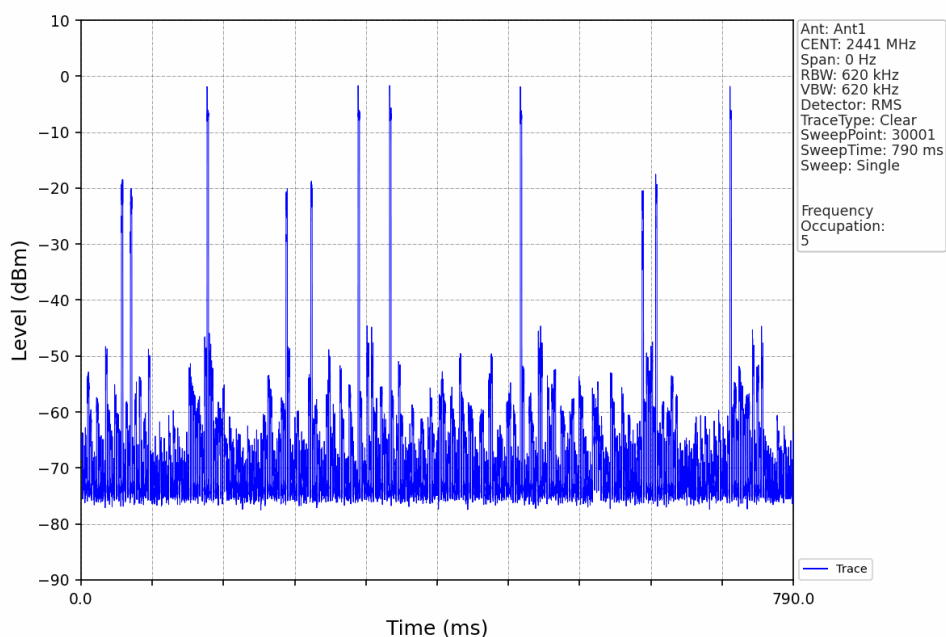
π /4-DQPSK_2DH5_HOPP_Ant1_NTNV

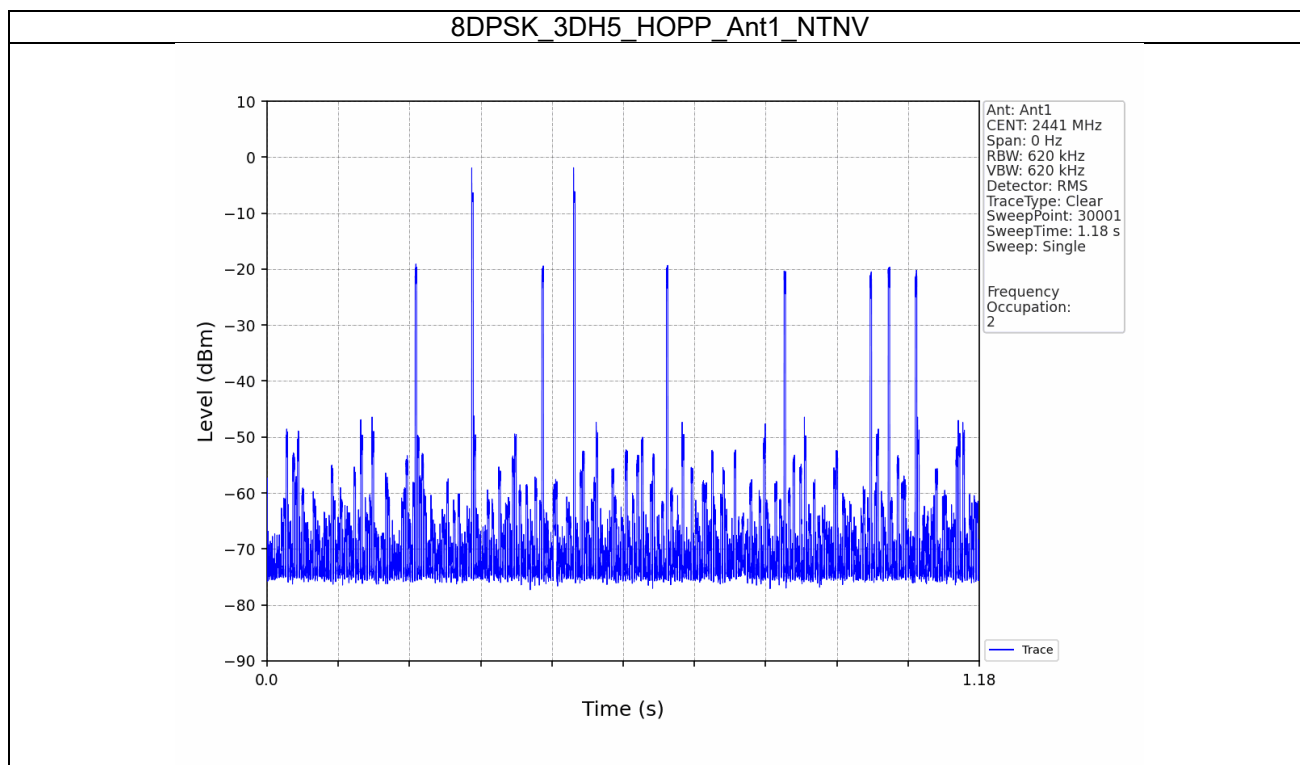


8DPSK_3DH1_HOPP_Ant1_NTNV

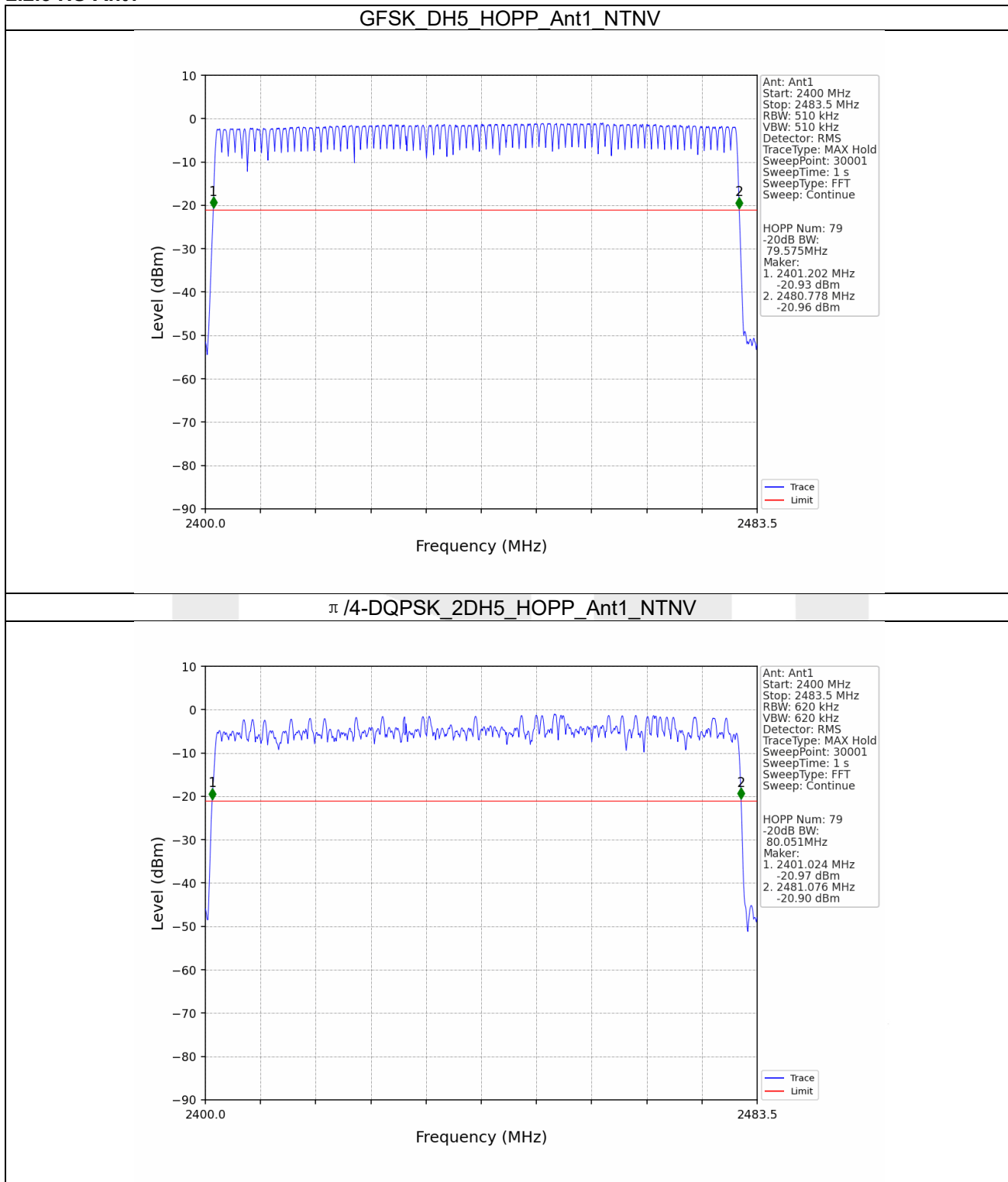


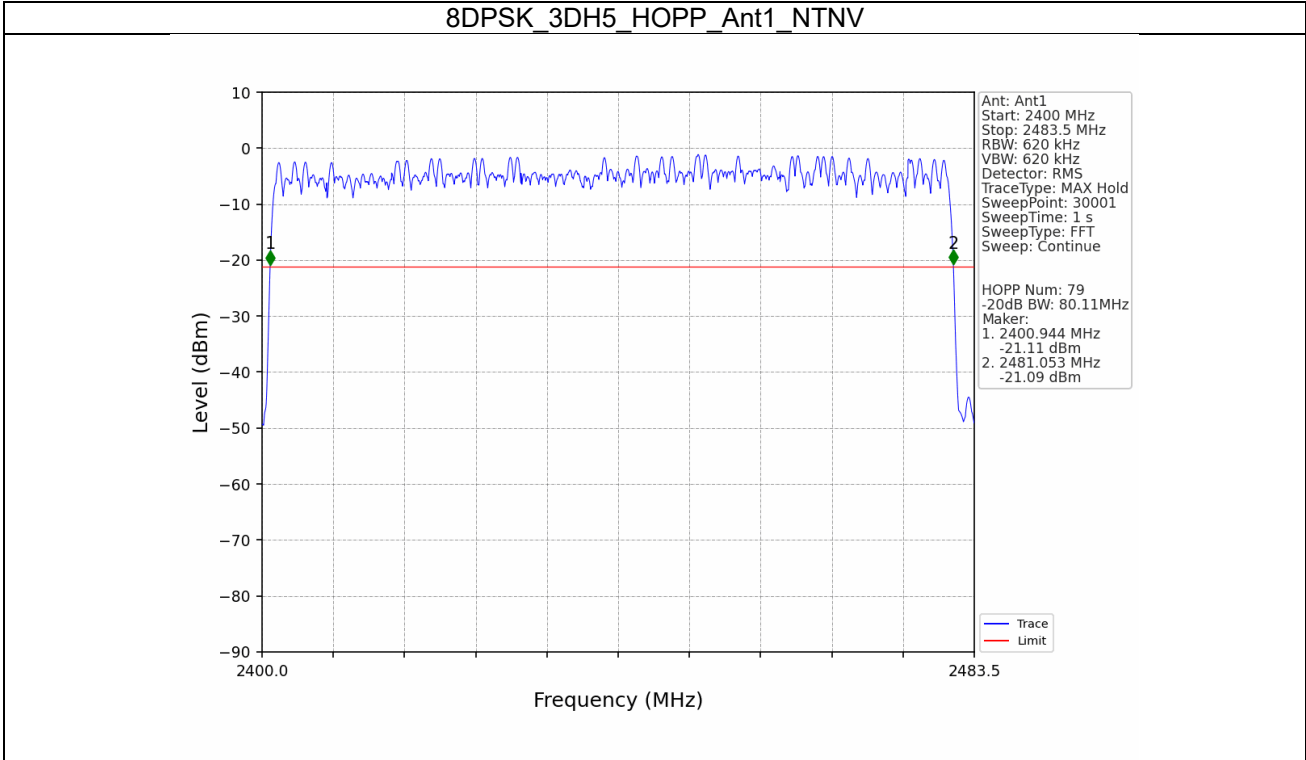
8DPSK_3DH3_HOPP_Ant1_NTNV





2.2.3 HS-Ant1





3. Hopping Frequency Separation

3.1 Test Result

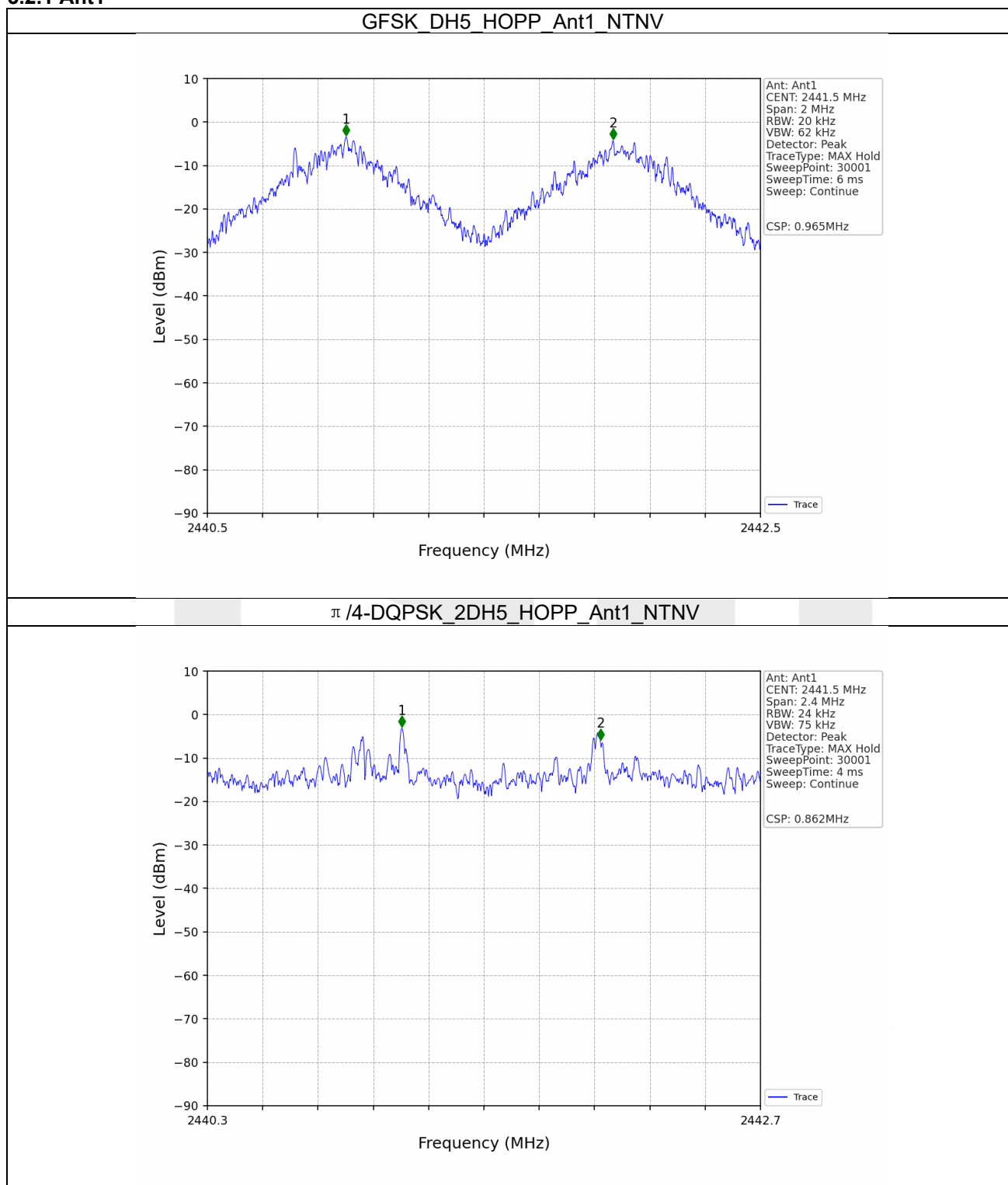
3.1.1 Ant1

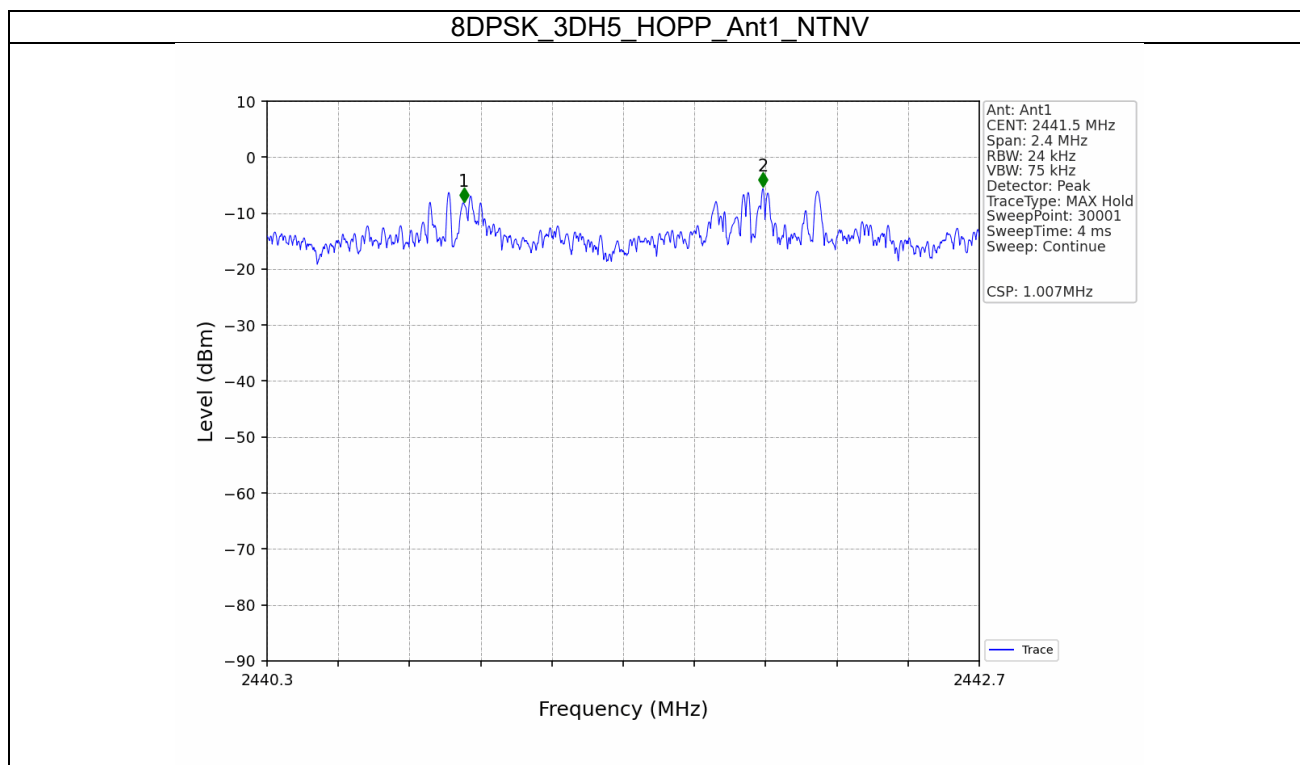
Ant1							
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	Limit (MHz)	Verdict
NTNV	GFSK	SISO	HOPP	DH5	0.965	≥ 0.1	Pass
	$\pi/4$ -DQPSK	SISO	HOPP	2DH5	0.862	≥ 0.1	Pass
	8DPSK	SISO	HOPP	3DH5	1.007	≥ 0.1	Pass



3.2 Test Graph

3.2.1 Ant1





4. Occupied Channel Bandwidth

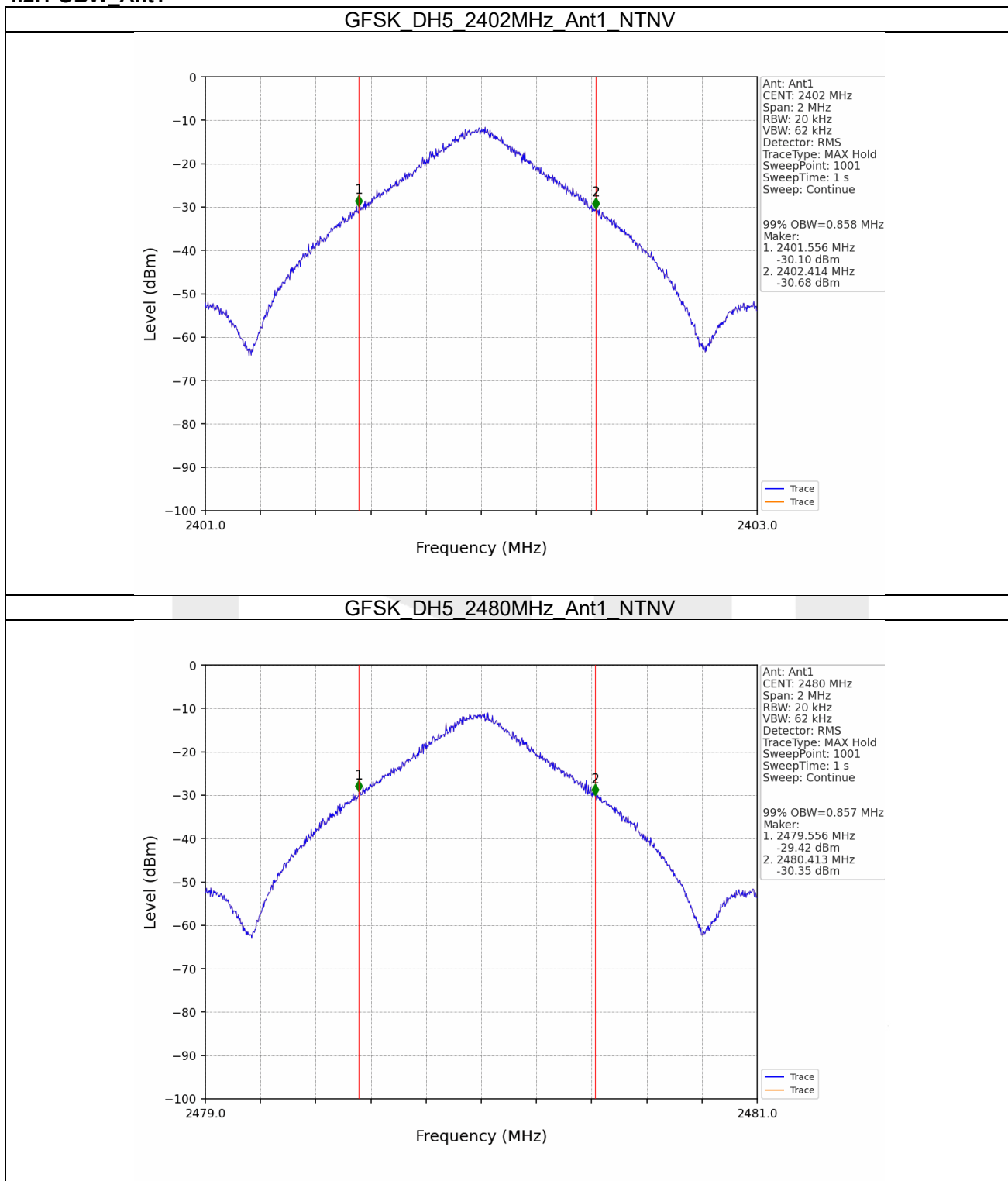
4.1 Test Result

4.1.1 OBW_Ant1

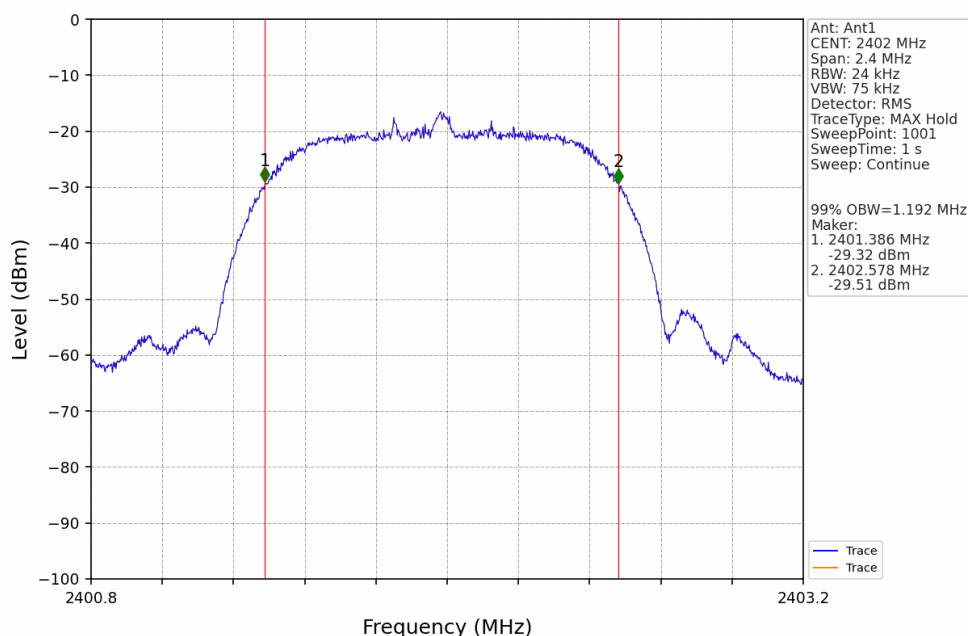
Ant1									
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	OBW (MHz)	Frequency Range (MHz)			Verdict
					Result	FL	FH	Limit	
NTNV	GFSK	SISO	2402	DH5	0.858	2401.556	/	>=2400	Pass
			2480	DH5	0.857	/	2480.413	<=2483.5	Pass
	$\pi/4$ -DQPSK	SISO	2402	2DH5	1.192	2401.386	/	>=2400	Pass
			2480	2DH5	1.192	/	2480.579	<=2483.5	Pass
	8DPSK	SISO	2402	3DH5	1.192	2401.387	/	>=2400	Pass
			2480	3DH5	1.193	/	2480.579	<=2483.5	Pass

4.2 Test Graph

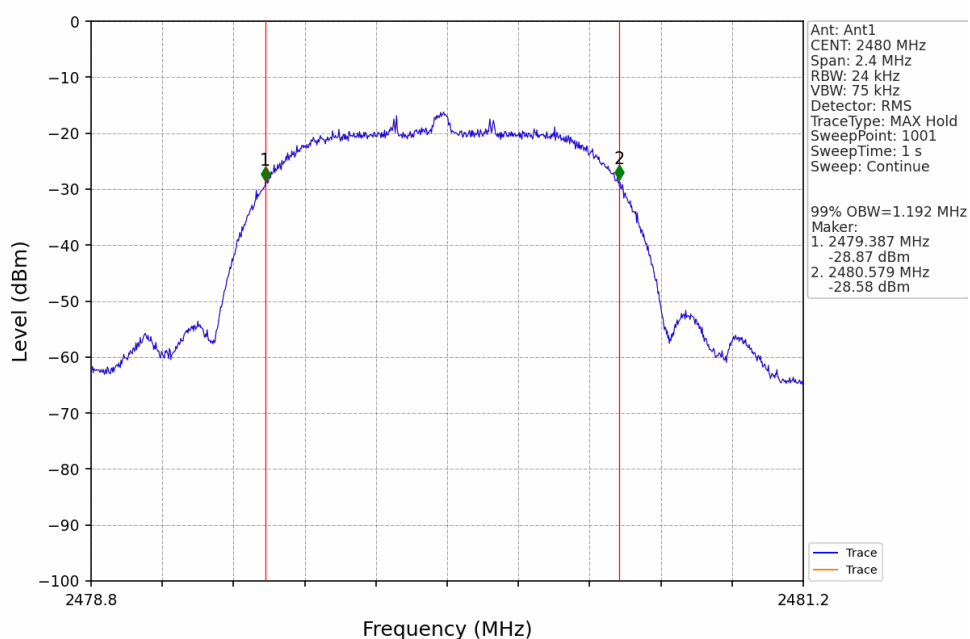
4.2.1 OBW_Ant1



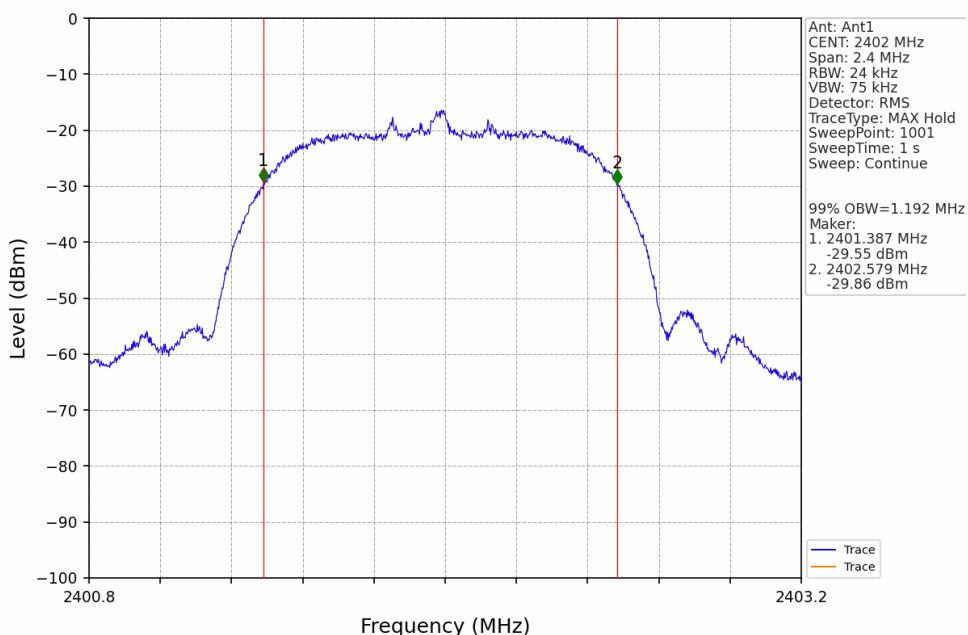
π /4-DQPSK_2DH5_2402MHz_Ant1_NTNV



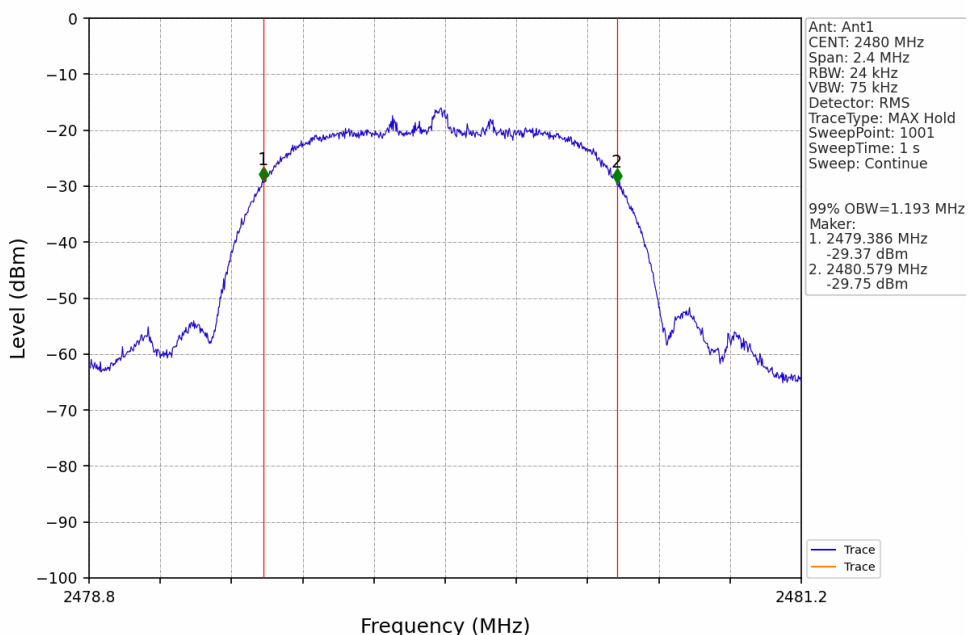
π /4-DQPSK_2DH5_2480MHz_Ant1_NTNV



8DPSK_3DH5_2402MHz_Ant1_NTNV



8DPSK_3DH5_2480MHz_Ant1_NTNV



5. Transmitter Unwanted Emissions In The Out-Of-Band Domain

5.1 Test Result

5.1.1 GFSK-Ant1_NTNV

Ant1_NTNV								
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
GFSK	SISO	HOPP	DH5	1	2398.500	-68.96	<=-20	Pass
					2399.500	-68.15	<=-10	Pass
		HOPP	DH5	1	2484.000	-55.41	<=-10	Pass
					2485.000	-55.44	<=-20	Pass

5.1.2 π /4-DQPSK-Ant1_NTNV

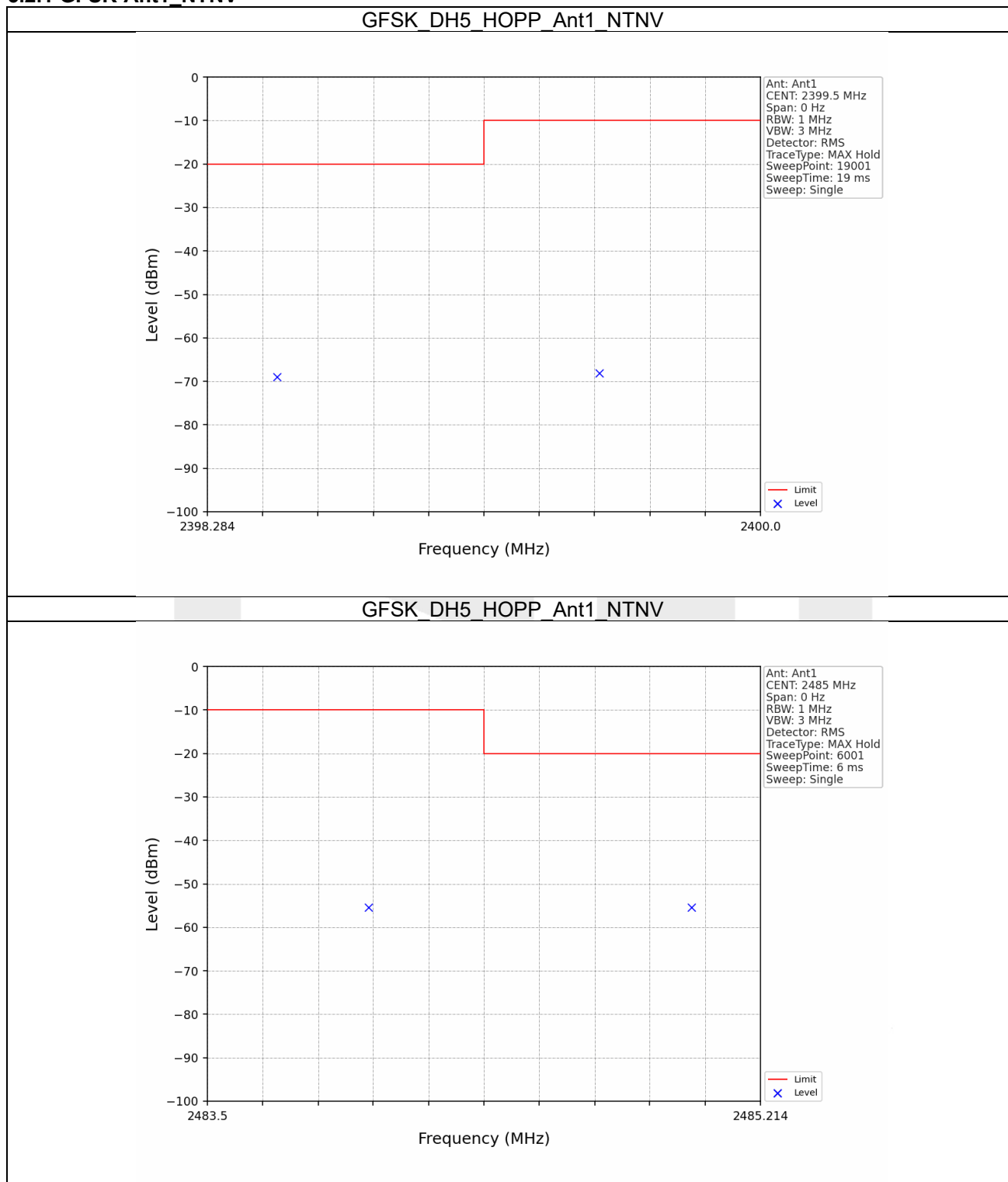
Ant1_NTNV								
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
π /4-DQPSK	SISO	HOPP	2DH5	1	2398.116	-69.08	<=-20	Pass
					2398.308	-69.07	<=-20	Pass
					2399.308	-68.90	<=-10	Pass
					2399.500	-68.84	<=-10	Pass
		HOPP	2DH5	1	2484.000	-51.83	<=-10	Pass
					2484.192	-52.44	<=-10	Pass
					2485.192	-52.55	<=-20	Pass
					2485.384	-52.65	<=-20	Pass

5.1.3 8DPSK-Ant1_NTNV

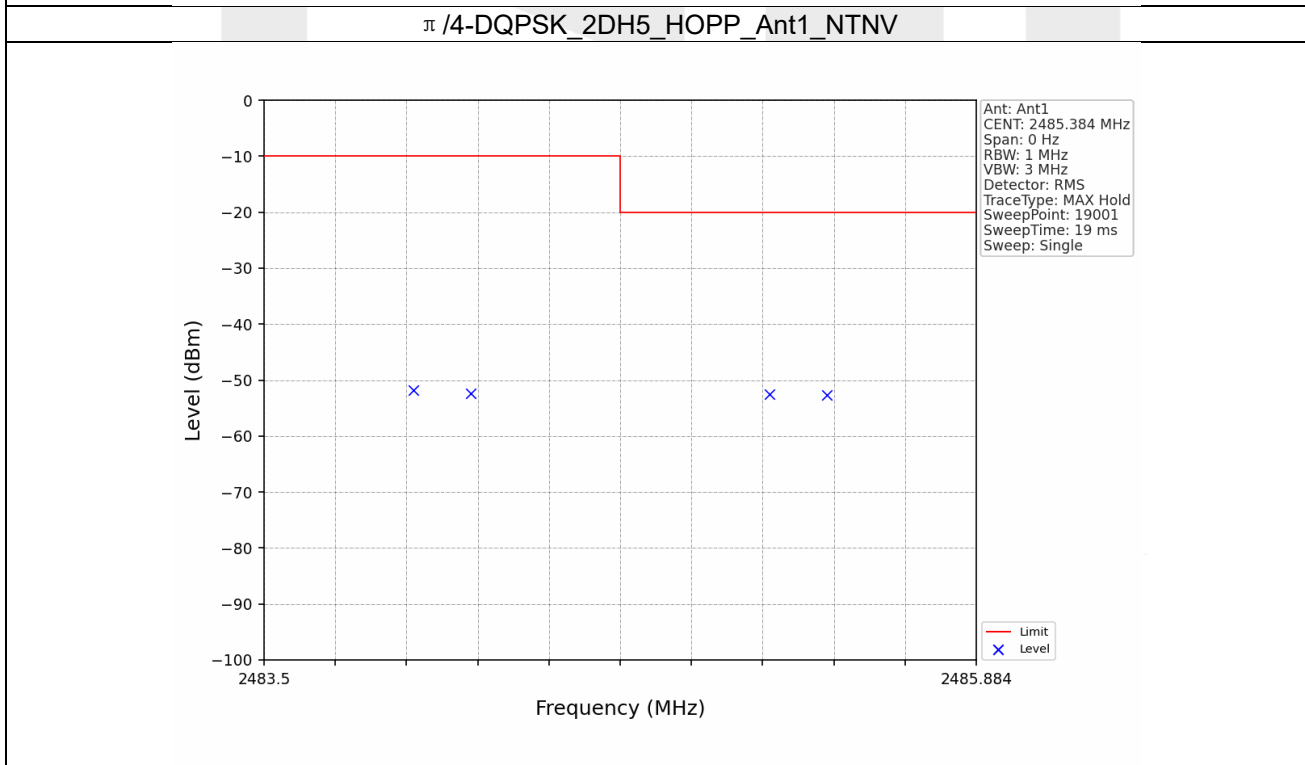
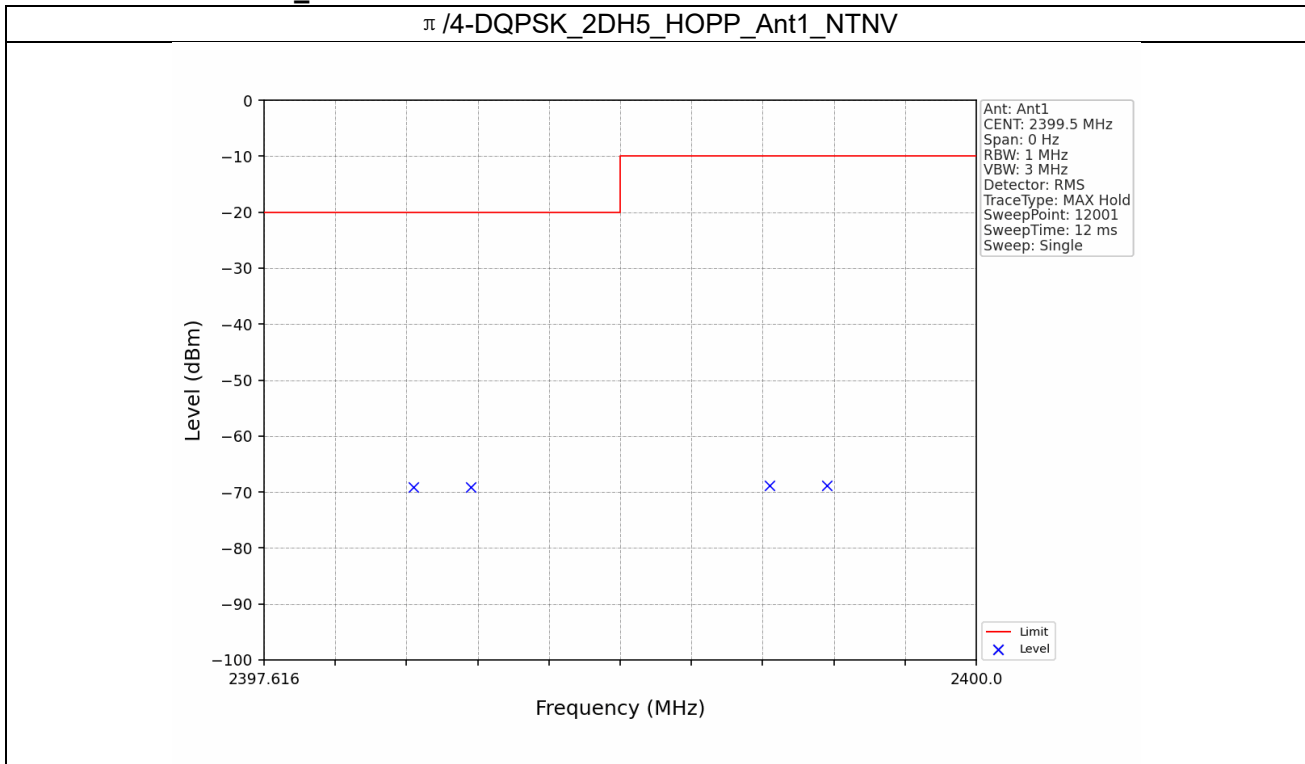
Ant1_NTNV								
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
8DPSK	SISO	HOPP	3DH5	1	2398.116	-69.12	<=-20	Pass
					2398.308	-69.18	<=-20	Pass
					2399.308	-68.84	<=-10	Pass
					2399.500	-68.80	<=-10	Pass
		HOPP	3DH5	1	2484.000	-51.43	<=-10	Pass
					2484.193	-52.32	<=-10	Pass
					2485.193	-52.63	<=-20	Pass
					2485.386	-52.46	<=-20	Pass

5.2 Test Graph

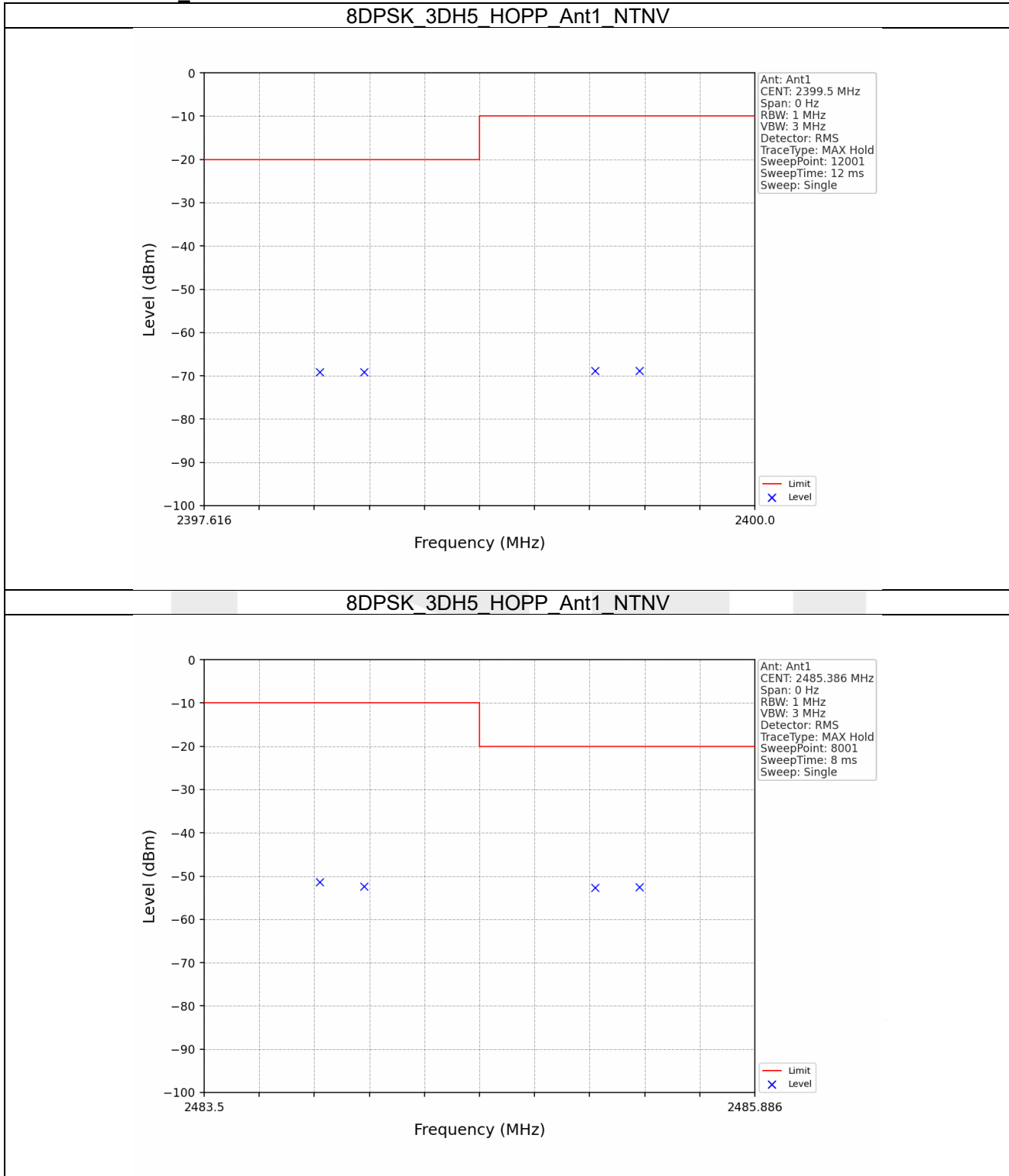
5.2.1 GFSK-Ant1_NTNV



5.2.2 π /4-DQPSK-Ant1_NTNV



5.2.3 8DPSK-Ant1_NTNV



6. Transmitter Unwanted Emissions In The Spurious Domain

6.1 Test Result

6.1.1 TxSe

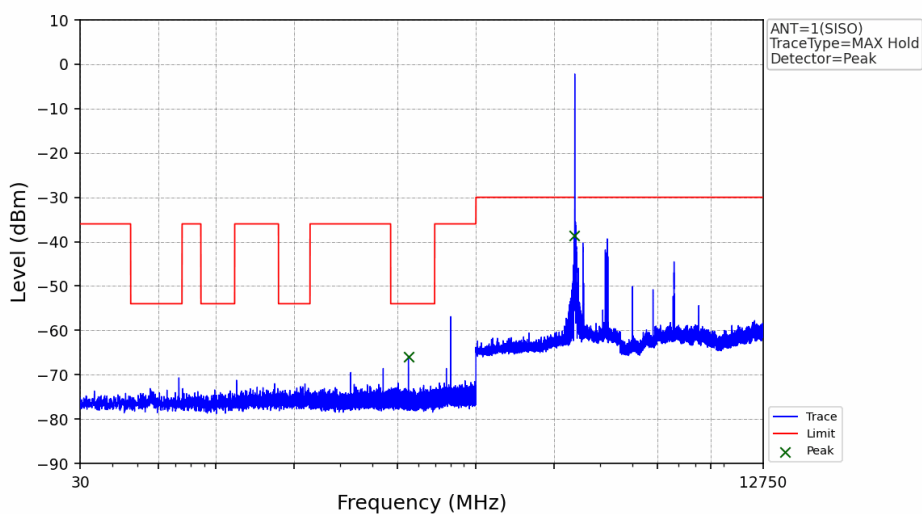
ENV	Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Test Result	Limit	Verdict
NTNV	GFSK	SISO	2402	DH5	1	Refer To Test Graph		Pass
			2480	DH5	1	Refer To Test Graph		Pass
	π /4-DQPSK	SISO	2402	2DH5	1	Refer To Test Graph		Pass
			2480	2DH5	1	Refer To Test Graph		Pass
	8DPSK	SISO	2402	3DH5	1	Refer To Test Graph		Pass
			2480	3DH5	1	Refer To Test Graph		Pass



6.2 Test Graph

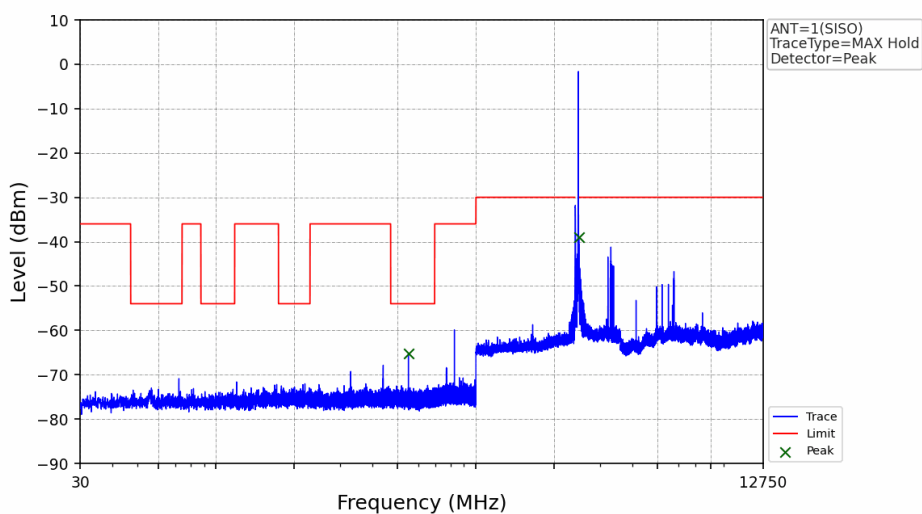
6.2.1 TxSe

GFSK_DH5_2402MHz_Ant1_NTNV



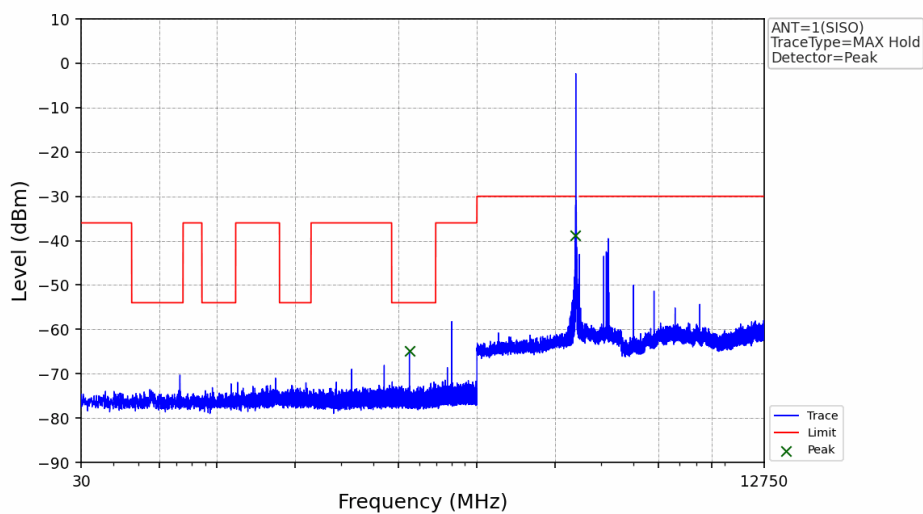
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-65.87	/	-54	Pass
1000	12750	1	3	2393.500	-38.57	/	-30	Pass

GFSK_DH5_2480MHz_Ant1_NTNV



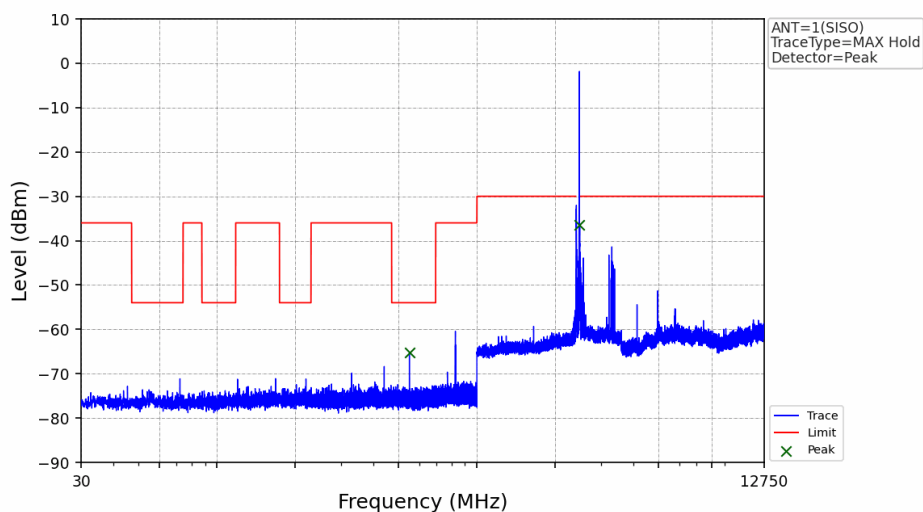
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-65.27	/	-54	Pass
1000	12750	1	3	2489.000	-39.06	/	-30	Pass

$\pi/4$ -DQPSK_2DH5_2402MHz_Ant1_NTNV



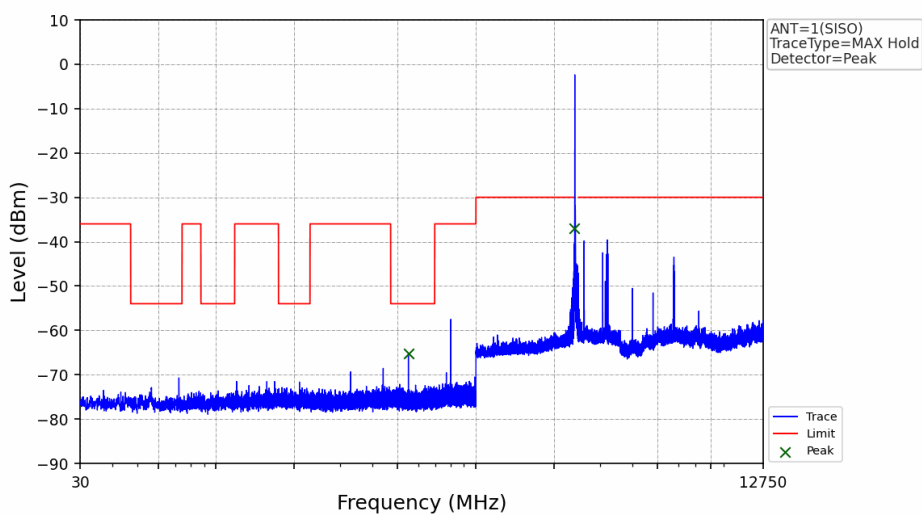
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-64.82	/	-54	Pass
1000	12750	1	3	2396.500	-38.88	/	-30	Pass

$\pi/4$ -DQPSK_2DH5_2480MHz_Ant1_NTNV



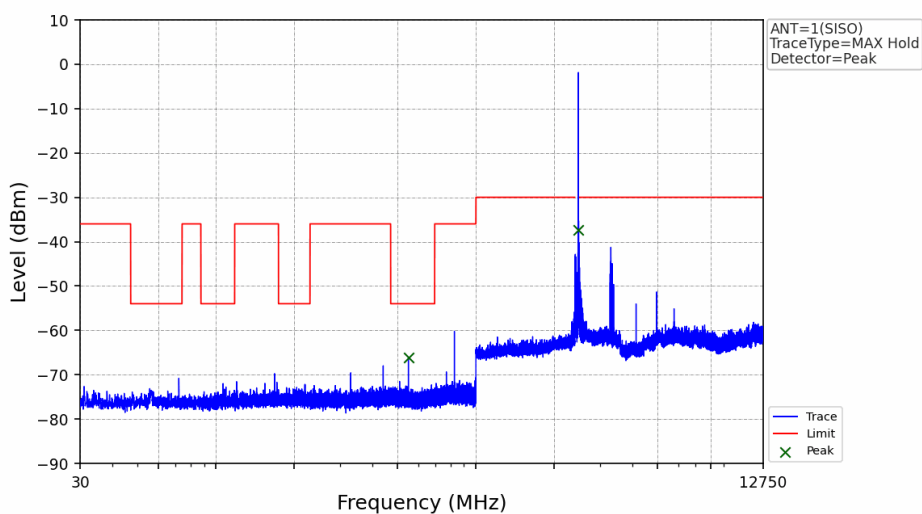
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-65.29	/	-54	Pass
1000	12750	1	3	2486.500	-36.44	/	-30	Pass

8DPSK_3DH5_2402MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-65.25	/	-54	Pass
1000	12750	1	3	2397.500	-37.05	/	-30	Pass

8DPSK_3DH5_2480MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-66.08	/	-54	Pass
1000	12750	1	3	2486.000	-37.38	/	-30	Pass

7. Receiver Spurious Emissions

7.1 Test Result

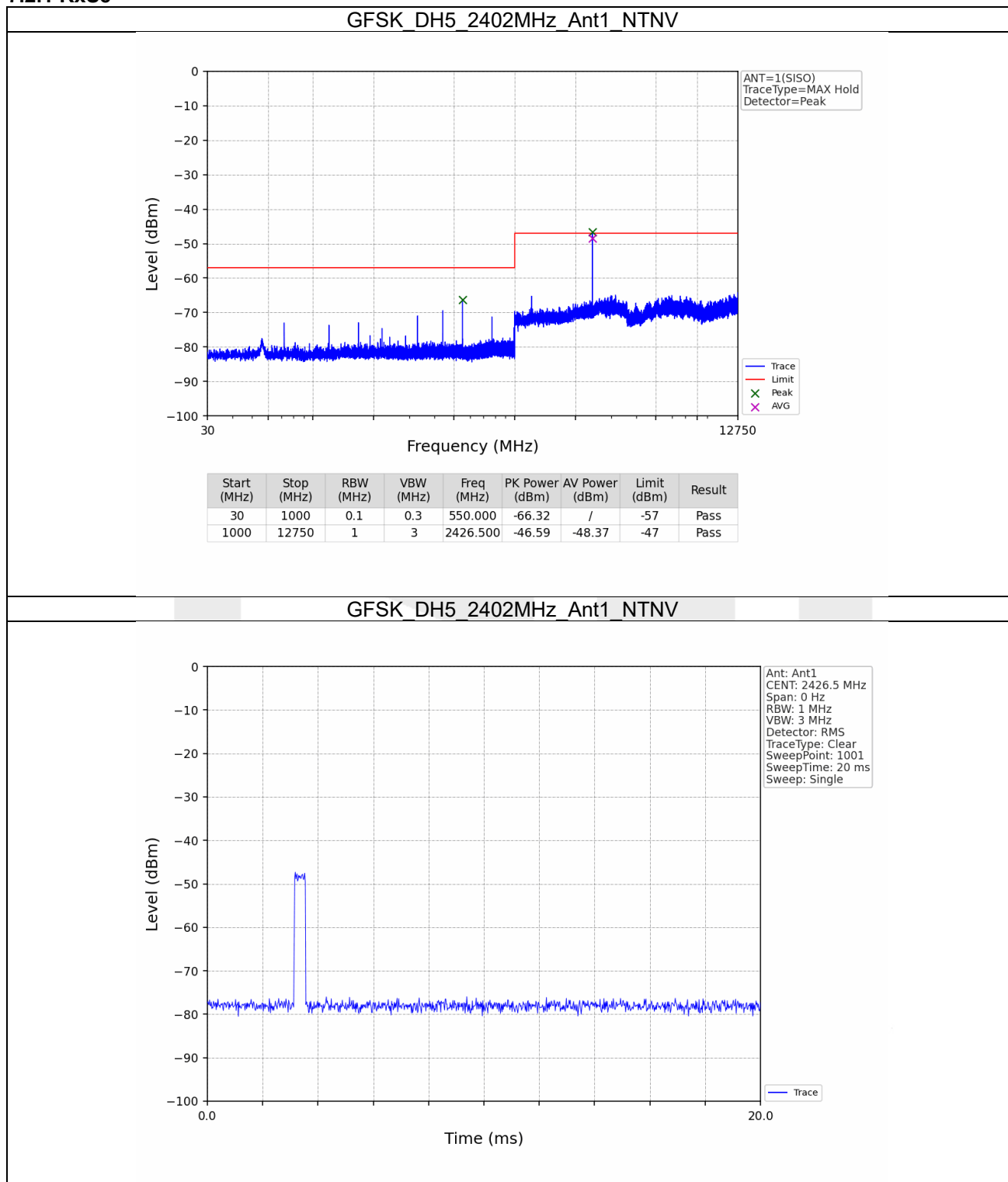
7.1.1 RxSe

ENV	Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Test Result	Limit	Verdict
NTNV	GFSK	SISO	2402	DH5	1	Refer To Test Graph		Pass
			2480	DH5	1	Refer To Test Graph		Pass
	$\pi/4$ -DQPSK	SISO	2402	2DH5	1	Refer To Test Graph		Pass
			2480	2DH5	1	Refer To Test Graph		Pass
	8DPSK	SISO	2402	3DH5	1	Refer To Test Graph		Pass
			2480	3DH5	1	Refer To Test Graph		Pass

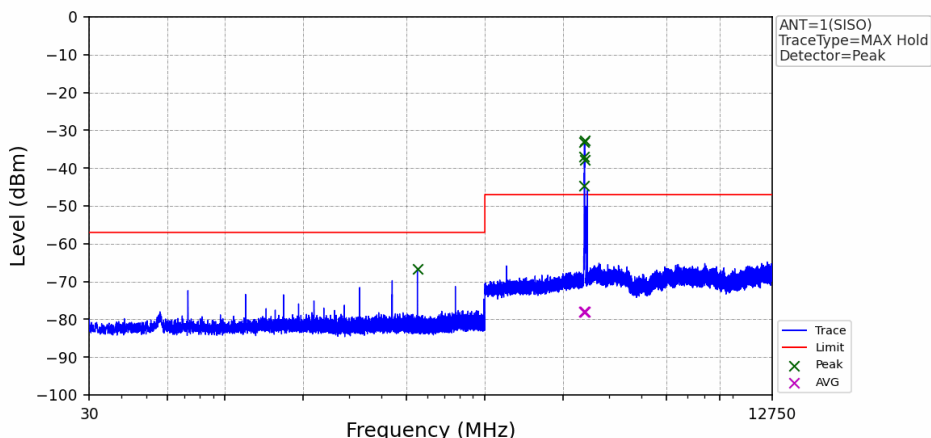


7.2 Test Graph

7.2.1 RxSe

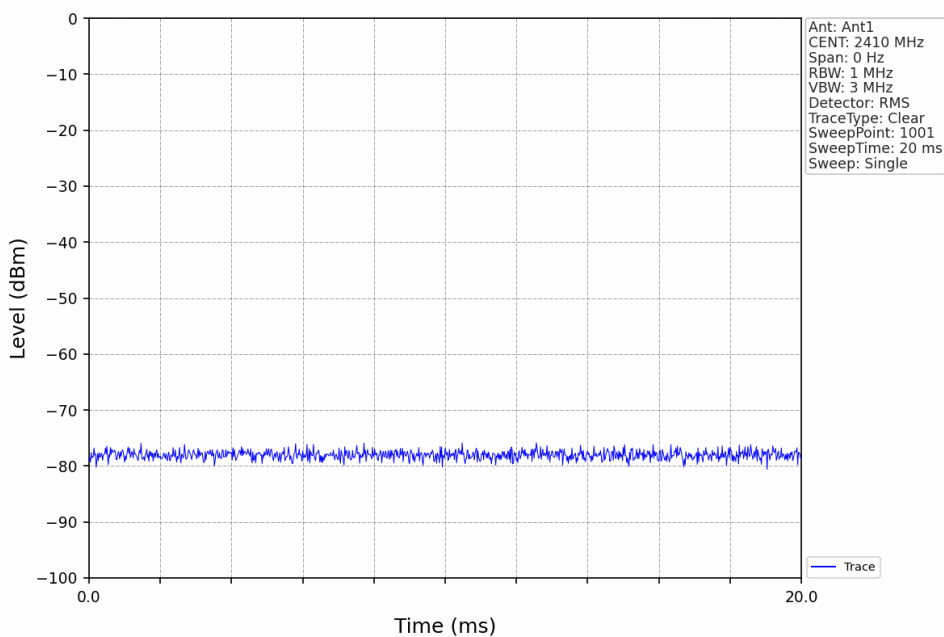


GFSK_DH5_2480MHz_Ant1_NTNV

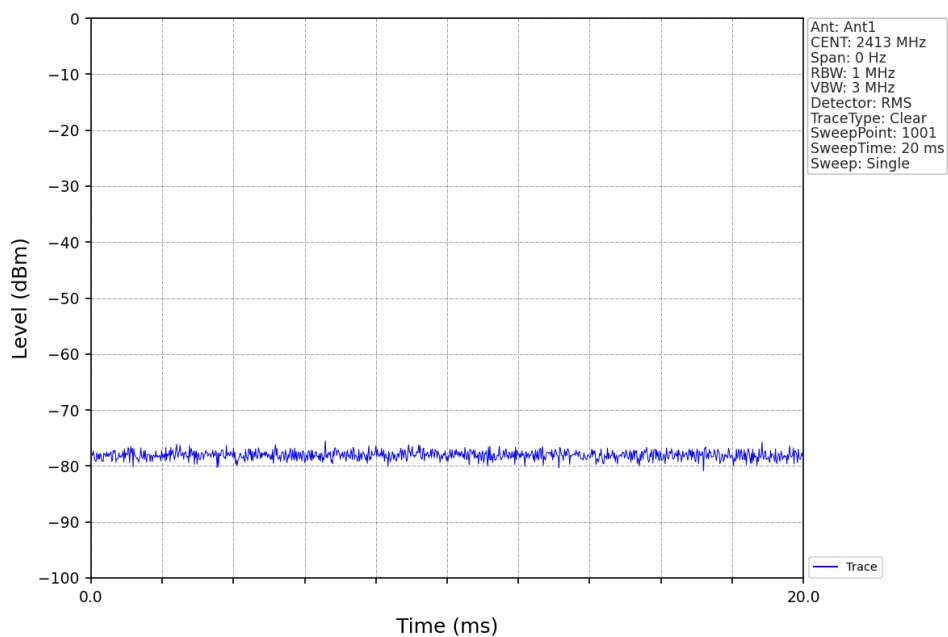


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-66.73	/	-57	Pass
1000	12750	1	3	2410.000	-44.60	-77.97	-47	Pass
1000	12750	1	3	2413.000	-36.93	-78.01	-47	Pass
1000	12750	1	3	2416.000	-33.11	-77.97	-47	Pass
1000	12750	1	3	2419.000	-32.73	-77.95	-47	Pass
1000	12750	1	3	2422.000	-37.81	-77.99	-47	Pass

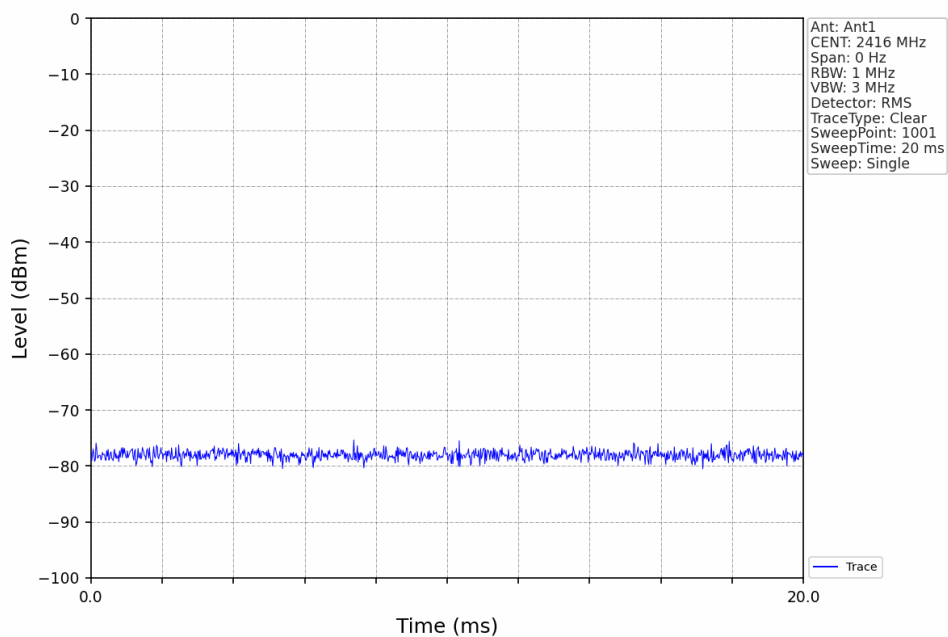
GFSK_DH5_2480MHz_Ant1_NTNV



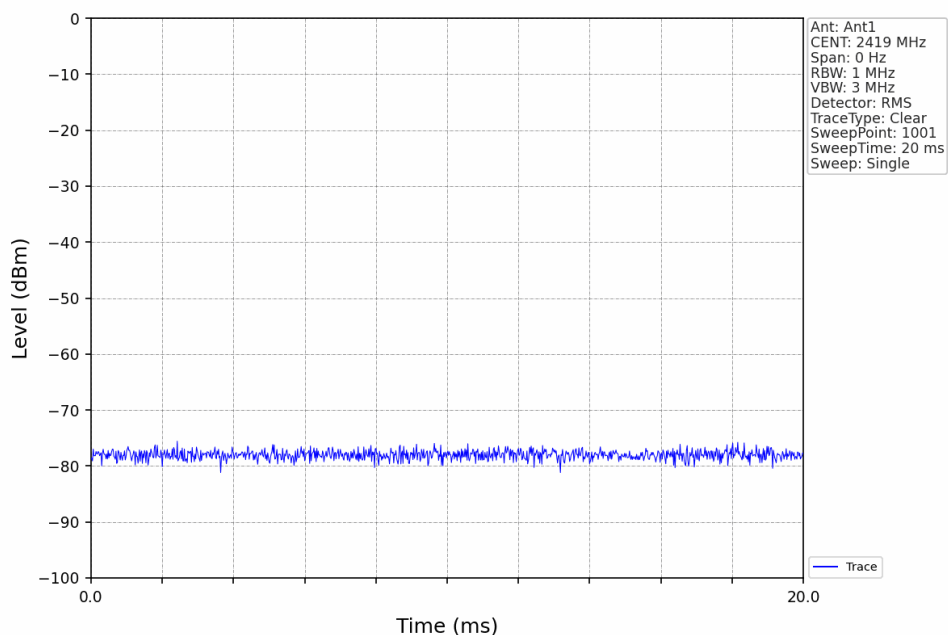
GFSK_DH5_2480MHz_Ant1_NTNV



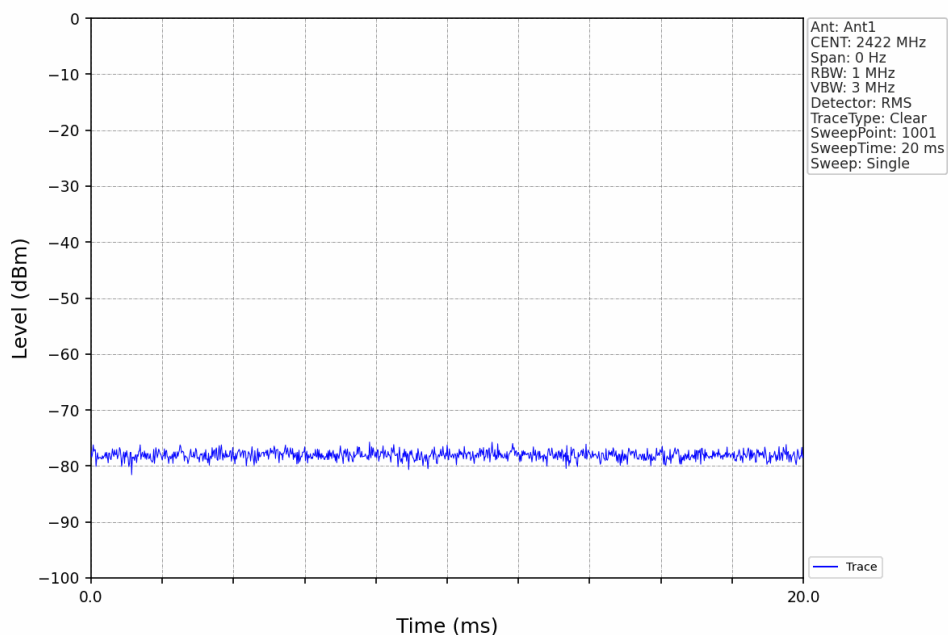
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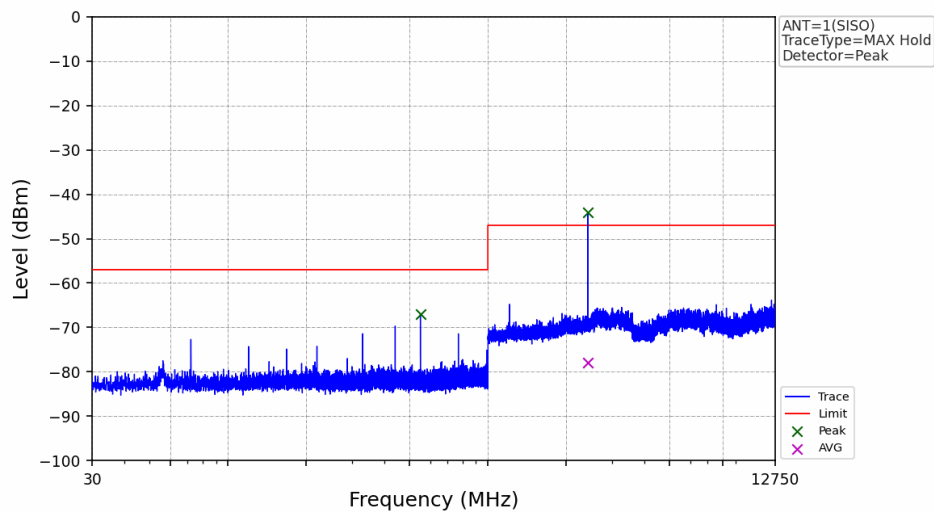
GFSK_DH5_2480MHz_Ant1_NTNV



GFSK_DH5_2480MHz_Ant1_NTNV

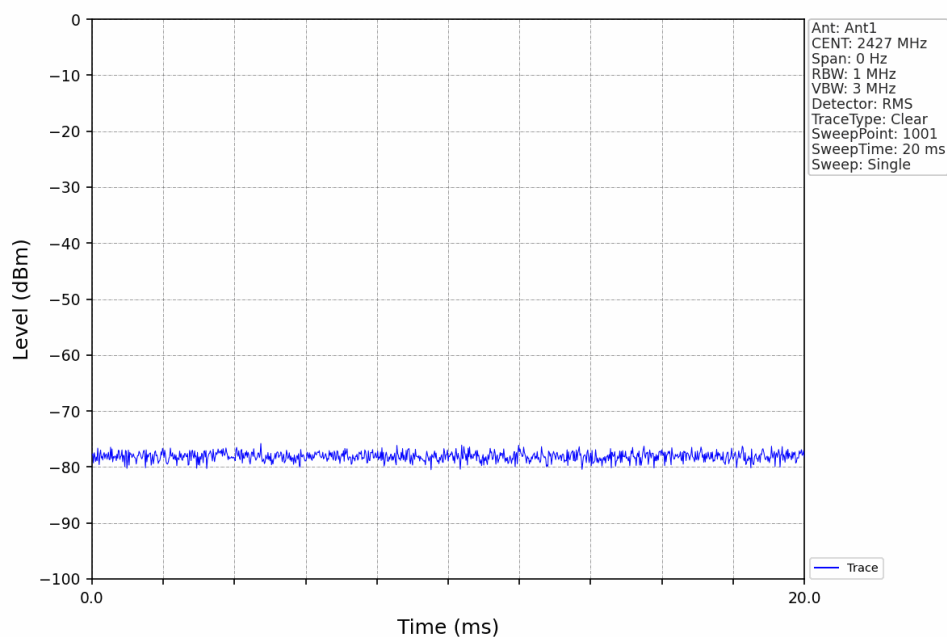


π /4-DQPSK_2DH5_2402MHz_Ant1_NTNV

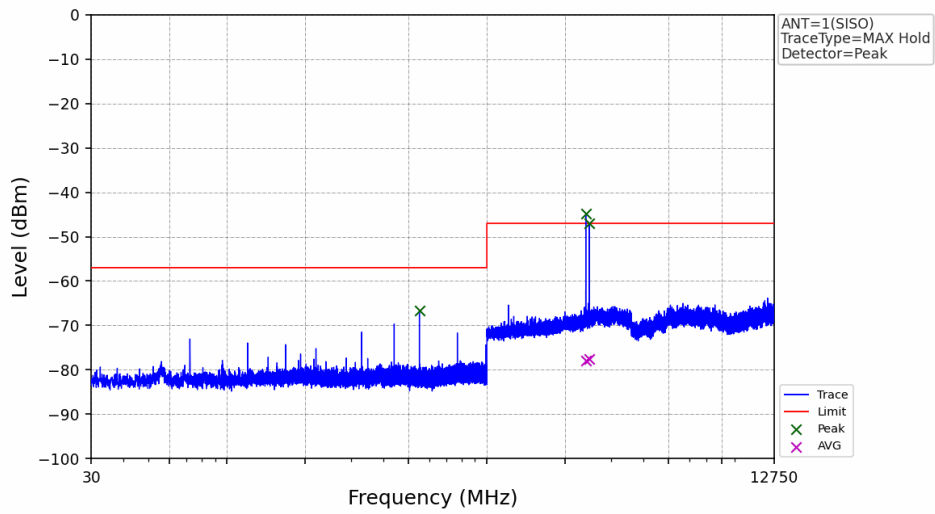


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-67.01	/	-57	Pass
1000	12750	1	3	2427.000	-44.17	-78.05	-47	Pass

π /4-DQPSK_2DH5_2402MHz_Ant1_NTNV

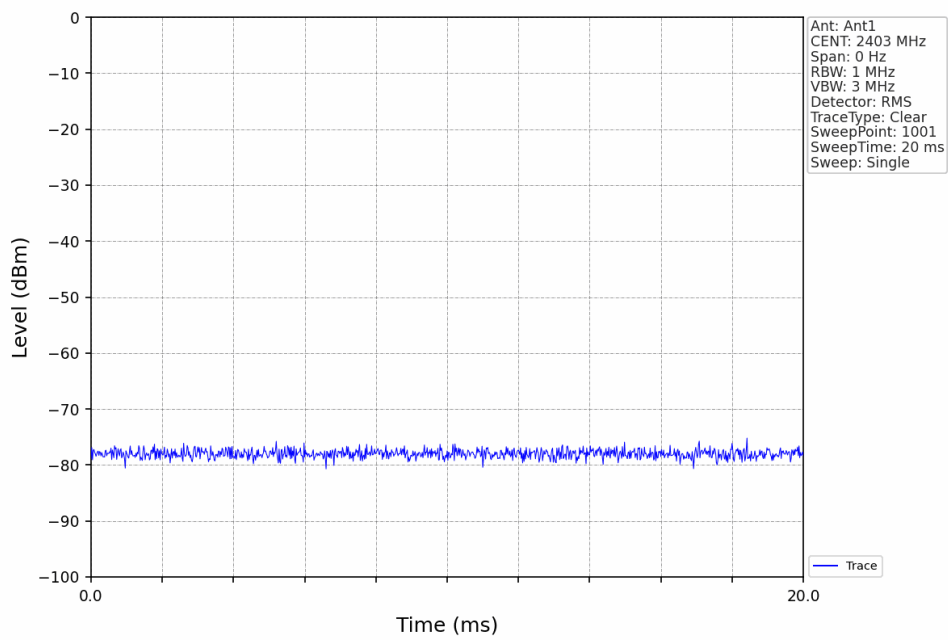


π /4-DQPSK_2DH5_2480MHz_Ant1_NTNV

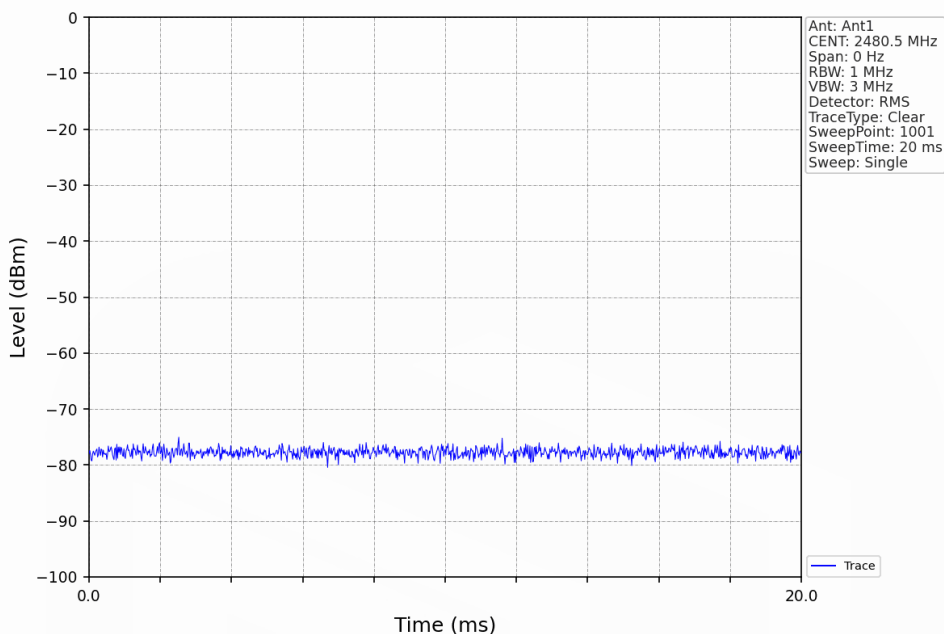


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-66.75	/	-57	Pass
1000	12750	1	3	2403.000	-44.75	-77.93	-47	Pass
1000	12750	1	3	2480.500	-46.97	-77.68	-47	Pass

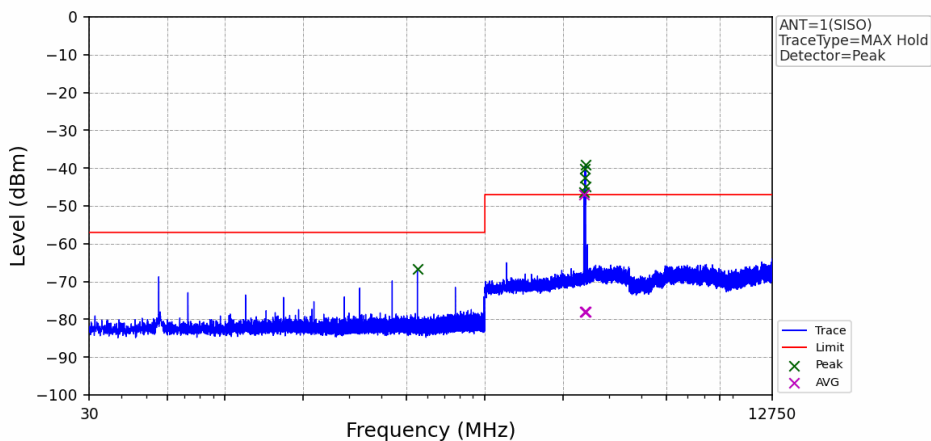
π /4-DQPSK_2DH5_2480MHz_Ant1_NTNV



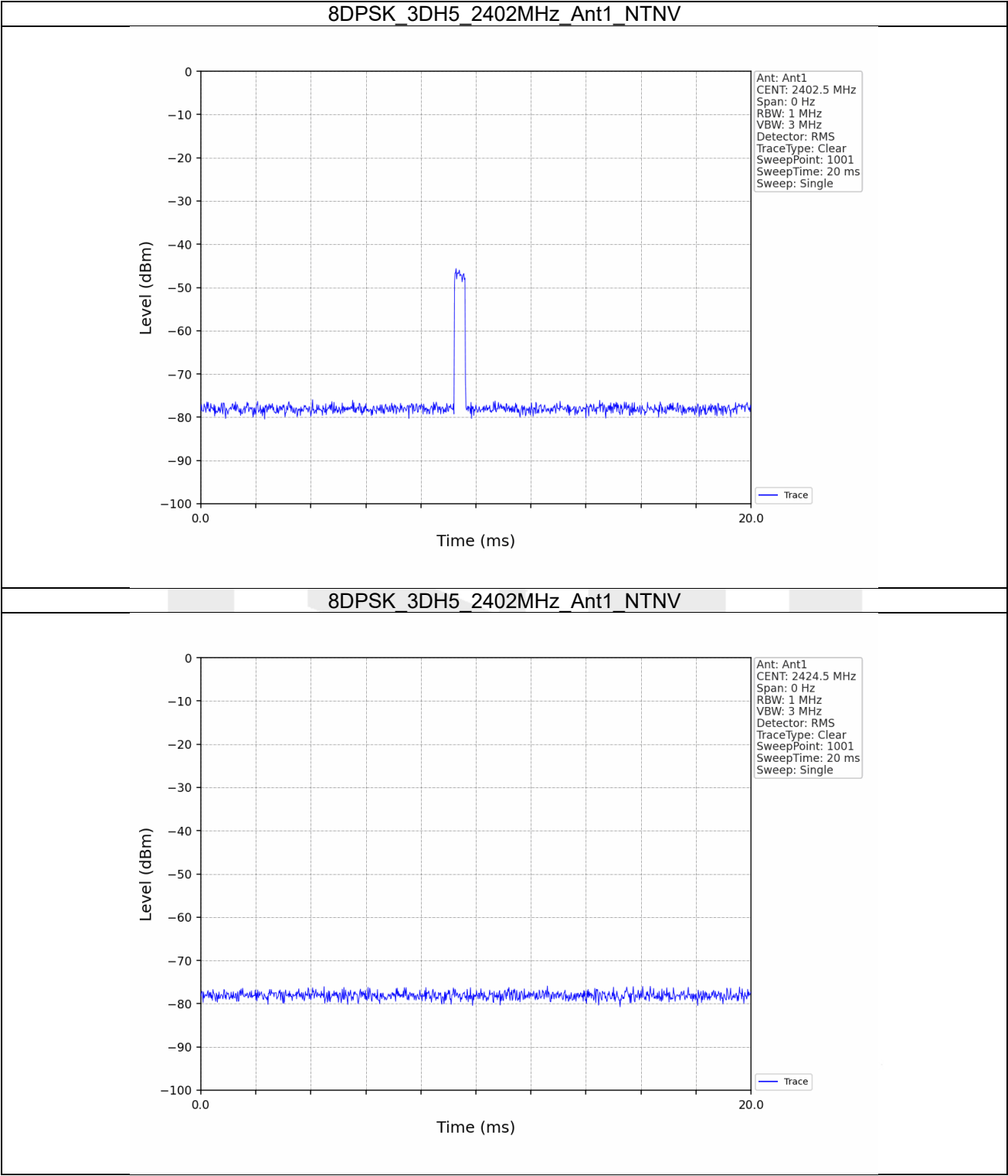
$\pi/4$ -DQPSK_2DH5_2480MHz_Ant1_NTNV



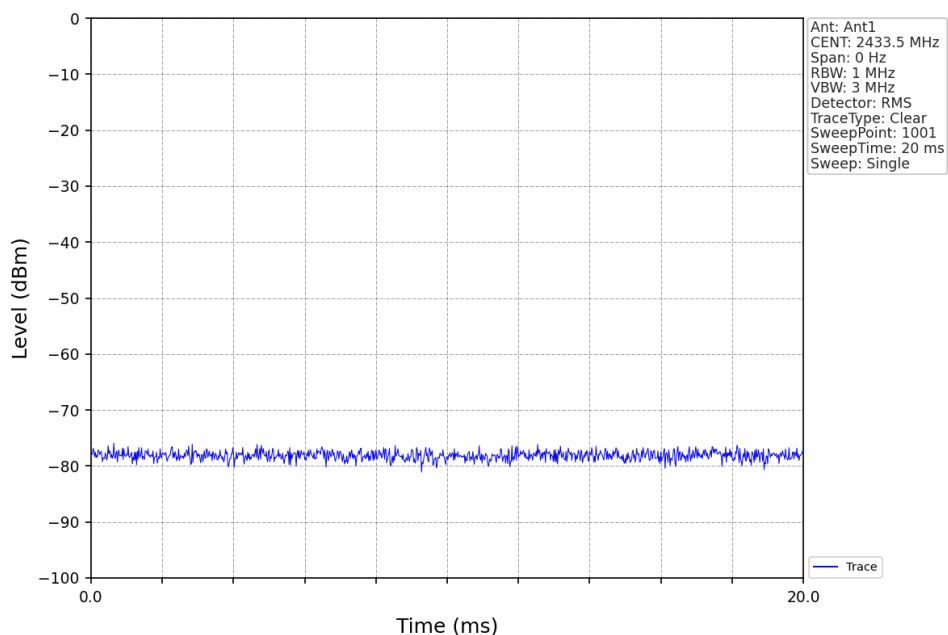
8DPSK_3DH5_2402MHz_Ant1_NTNV



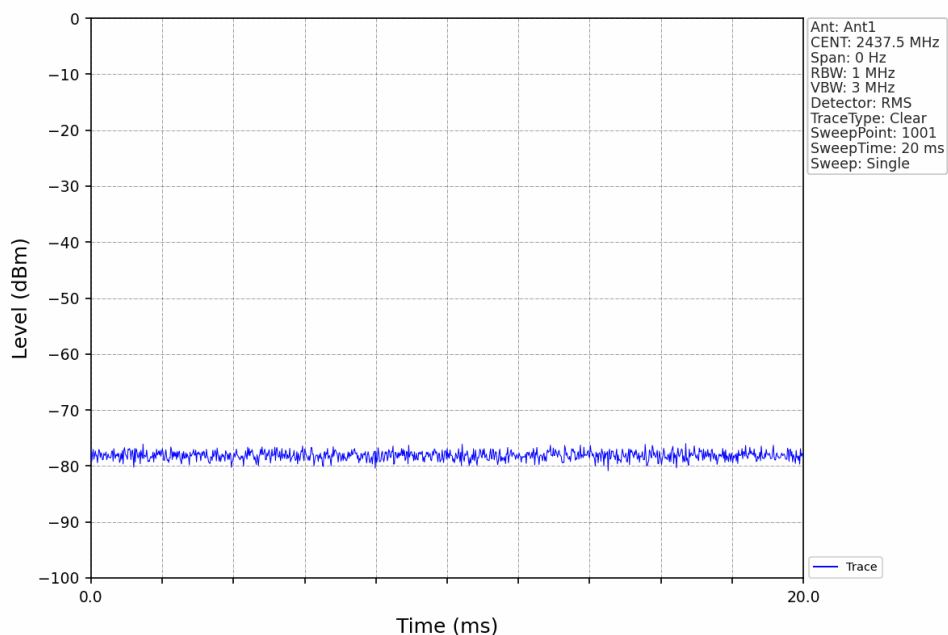
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-66.62	/	-57	Pass
1000	12750	1	3	2402.500	-46.42	-47.07	-47	Pass
1000	12750	1	3	2424.500	-40.18	-78.02	-47	Pass
1000	12750	1	3	2433.500	-42.50	-78.06	-47	Pass
1000	12750	1	3	2437.500	-39.09	-78.06	-47	Pass
1000	12750	1	3	2441.500	-44.92	-78.05	-47	Pass



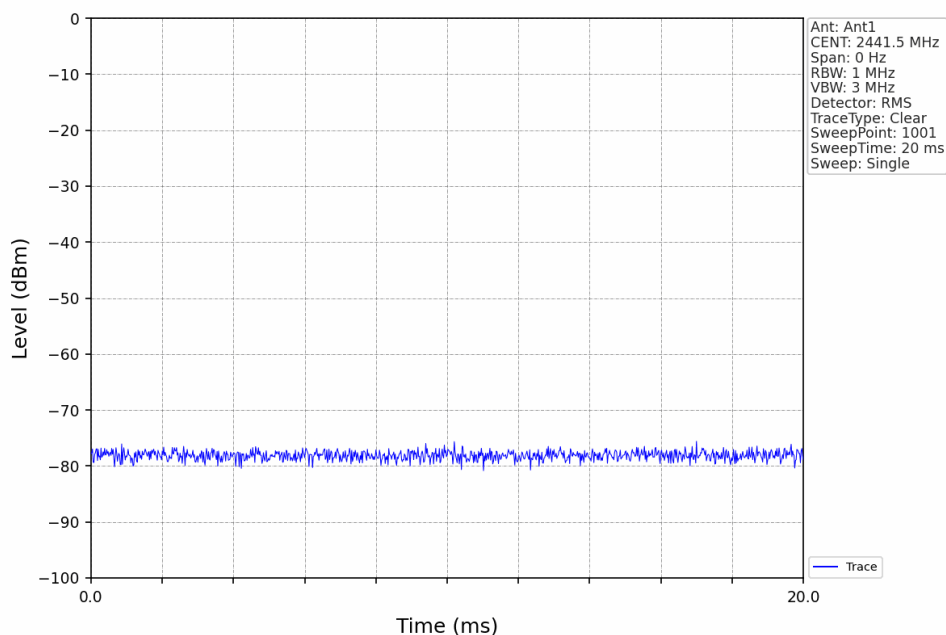
8DPSK_3DH5_2402MHz_Ant1_NTNV



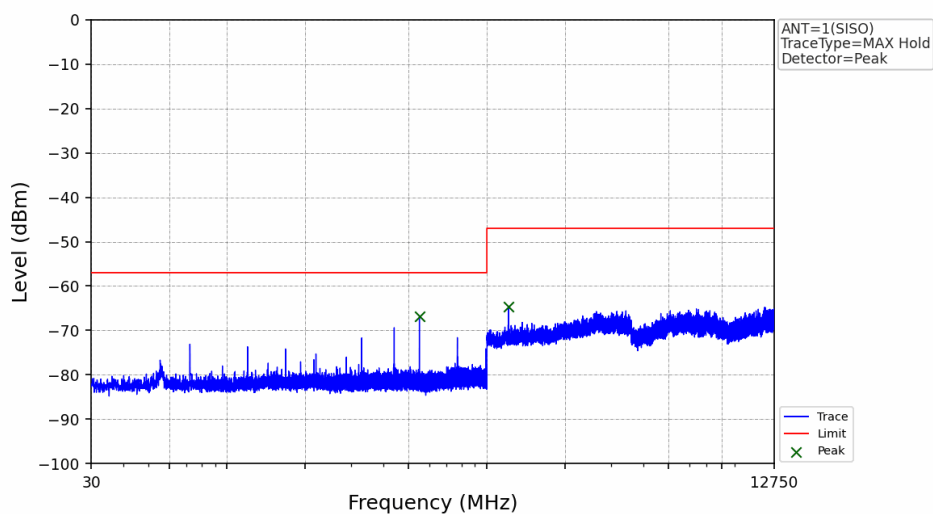
8DPSK_3DH5_2402MHz_Ant1_NTNV



8DPSK_3DH5_2402MHz_Ant1_NTNV



8DPSK_3DH5_2480MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-66.87	/	-57	Pass
1000	12750	1	3	1210.500	-64.60	/	-47	Pass

8. Receiver Blocking

Ant1									
ENV	Mode	TX Type	Frequency (MHz)	Wanted signal level (dBm)	Blocking Signal		PER (%)	Limit (%)	Verdict
					Frequency (MHz)	Power (dBm)			
NTNV	GFSK	SISO	2402	-67.00	2380	-31.33	0.07	<=10	Pass
					2504		0.08	<=10	Pass
					2300		0.07	<=10	Pass
					2584		0.11	<=10	Pass
			2480	-67.00	2380	-31.33	0.08	<=10	Pass
					2504		0.10	<=10	Pass
					2300		0.10	<=10	Pass
					2584		0.08	<=10	Pass

Note1: Receiver Category =2.

STATEMENT

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
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3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
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7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--- End of Report ---

TEST REPORT

Report No.: 8326EU010302W2

Applicant: Woan Technology (Shenzhen) Co., Ltd.

Address: Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang Sub-district,
Bao'an District, Shenzhen, Guangdong, P.R.China,
518100

Product Name: SwitchBot Hub 3

Model No.: W7202100 (refer to clause 2.4)

Trademark: SwitchBot

Test Standard(s): ETSI EN 300 328 V2.2.2 (2019-07)

Date of Receipt: Jan. 03, 2025

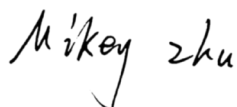
Test Date: Jan. 03, 2025 – Jan. 17, 2025

Date of Issue: Jan. 22, 2025

ISSUED BY:
SHENZHEN EU TESTING LABORATORY LIMITED



Prepared by:



Mikey Zhu/ Engineer

Reviewed and Approved by:



Sally Zhang/ Manager

Revision Record

Report Version	Issued Date	Description	Status
V0	Jan. 22, 2025	Original	Valid



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2 General Information

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description of E.U.T.

Product Name	SwitchBot Hub 3
Model No. Under Test	W7202100
List Model No.	W7202101, W7202102, W7202103, W7202104, W7202105
Description of Model differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in appearance and model name. (this information provided by the customer)
Rating(s)	Input: 5.0V---2.0A Output: 5V---0.5A, 2.5W (Adapter Input: 100-240V~, 50/60Hz, 0.35A Max; Output: 5.0V---2.0A 10.0W)
Adapter	Model: KA12C-0502000EU Input: 100-240V~, 50/60Hz, 0.35A Max Output: 5.0V---2.0A, 10.0W Manufacturer: SHENZHEN KEYU POWER SUPPLY TECHNOLOGY CO., LTD.
Test Sample No.	-1/2(Normal Sample), -2/2(Engineering Sample)
Hardware Version	N/A
Software Version	N/A
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.5 Technical Information of E.U.T.

Network and Wireless Connectivity	Bluetooth (BDR+EDR+BLE) WiFi 2.4G: 802.11b, 802.11g, 802.11n(HT20/40)
-----------------------------------	--

The requirement for the following technical information of the EUT was tested in this report:

Technology	Bluetooth
Operation Mode	☐ BDR ☐ EDR ☒ BLE
Modulation Type	GFSK
Operating Frequency	2402-2480MHz
Transfer Rate	1/2 Mbps
Number of Channel	40
Antenna Type	FPC Antenna
Antenna Gain	BLE 1: 4.45 dBi Max. BLE 2: 2.76 dBi Max.
RF Output Power (EIRP)	BLE 1: 1.77 dBi Max. BLE 2: 1.40 dBi Max.
Receiver Category	2

All channel was listed on the following table:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
00	2402	08	2418	16	2434	24	2450	32	2466
01	2404	09	2420	17	2436	25	2452	33	2468
02	2406	10	2422	18	2438	26	2454	34	2470
03	2408	11	2424	19	2440	27	2456	35	2472
04	2410	12	2426	20	2442	28	2458	36	2474
05	2412	13	2428	21	2444	29	2460	37	2476
06	2414	14	2430	22	2446	30	2462	38	2478
07	2416	15	2432	23	2448	31	2464	39	2480

3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

No.	Identity	Document Title
1	ETSI EN 300 328 V2.2.2 (2019-07)	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

Remark:

1. Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.
2. According to clause 6 of test standard AS/NZS 4268:2017+ A1:2021, the ETSI standard is selected to be applied to the test and evaluation of this sample.

3.2 Test Verdict

No.	Test Items	Clause No.	Verdict
Transmitter Items			
1	RF Output Power	4.3.1.2	PASS
2	Power Spectral Density	4.3.1.3	PASS
3	Duty Cycle, TX-Sequence, TX-gap	4.3.1.4	N/A
4	Medium Utilization (MU) factor	4.3.1.5	N/A
5	Adaptivity	4.3.1.6	N/A
6	Occupied Channel Bandwidth	4.3.1.7	PASS
7	Transmitter Unwanted Emissions in the Out-Of-Band Domain	4.3.1.8	PASS
8	Transmitter Unwanted Emissions in the Spurious Domain	4.3.1.9	PASS
Receiver Items			
9	Receiver spurious emissions	4.3.1.11	PASS
10	Receiver Blocking	4.3.2.12	PASS
11	Geo-location capability	4.3.2.13	N/A

Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.

3.3 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China

4 Test Configuration

4.1 Test Environment

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	30% to 60%	
Atmospheric Pressure	86 kPa to 106 kPa	
Temperature	NT (Normal Temperature)	+15°C to +35°C
	Extreme Temperature	-10°C ~ 50°C Note ¹
Working Voltage of the EUT	NV (Normal Voltage)	230 VAC, 50Hz
	LV (Low Voltage)	207 VAC, 50Hz
	HV (High Voltage)	253 VAC, 50Hz
Note ¹ : The HT 50°C and LT -10°C was declared by manufacturer.		

4.2 Test Equipment

Radio Frequency (RF) Test					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2025/01/08	2026/01/07
Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	EE-007	2023/01/14	2026/01/13
Double Ridged Horn Antenna	A-INFOMW	LB-10180-NF	EE-008	2023/01/12	2026/01/11
Pre-amplifier	Agilent	8447D	EE-009	2025/01/08	2026/01/07
Pre-amplifier	Agilent	8449B	EE-010	2025/01/08	2026/01/07
MXA Signal Analyzer	Agilent	N9020A	EE-011	2025/01/08	2026/01/07
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2025/01/08	2026/01/07
Test Software	Farad	EZ-EMC	EE-015	N.C.R	N.C.R
MIMO Power Measurement Module	TSTPASS	TSPS 2023R	EE-016	2025/01/08	2026/01/07
RF Test Software	TSTPASS	TS32893 V2.0	EE-017	N.C.R	N.C.R
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	EE-402	2024/02/15	2025/02/14
MXG RF Analog Signal Generator	Agilent	N5181A	EE-406	2024/02/15	2025/02/14
Power Meter	Anritsu	ML2495A	EE-416	2024/02/15	2025/02/14
Constant Temperature Humidity Chamber	Guangxin	GXP-401	ES-002	2024/07/30	2025/07/29

4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Adapter	refer to clause 2.4	refer to clause 2.4	--

4.4 Test Mode

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

No.	Test Modes	Description
TM1	TX-GFSK (1 Mbps)	Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation with 1 Mbps rate.
TM2	TX-GFSK (2 Mbps)	Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation with 2 Mbps rate.

4.5 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

Test Item	Measurement Uncertainty
Conducted Emission	2.64 dB
Occupied Channel Bandwidth	2.8 %
RF output power, conducted	0.68 dB
Power Spectral Density, conducted	1.37 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.11 dB
Temperature	0.8°C
Humidity	4%

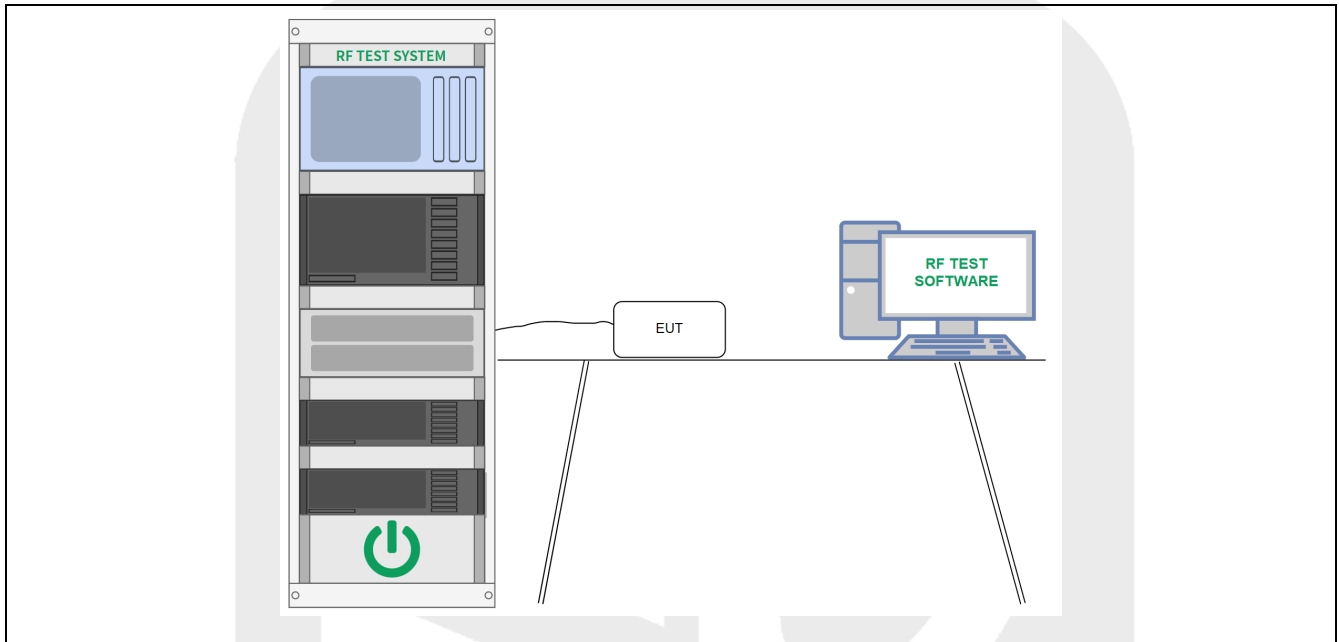
5 Test Items

5.1 RF Output Power

5.1.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.2
Test Requirement	The RF output power for non-FHSS equipment shall be equal to or less than 20 dBm.

5.1.2 Test Setup Diagram



5.1.3 Test Procedure

Refer to clause 5.4.2.2.1 of ETSI EN 300 328 V2.2.2:

1. Run a test program to control EUT transmitting at specific channel.
2. Connect the power sensor to the transmit port
3. Power Meter was setting as below:
Sample speed: 1 MS/s
Number of bursts: at least 10bursts
Detector: RMS
4. A power meter was used to read the response of the power sensor
5. Define Start time and Stop time of a burst by 30dB below the highest value of the stores samples.
6. Find the highest burst value
7. Record the power level
EIRP = antenna gain + power level of step 7.

5.1.4 Test Data

PASS.

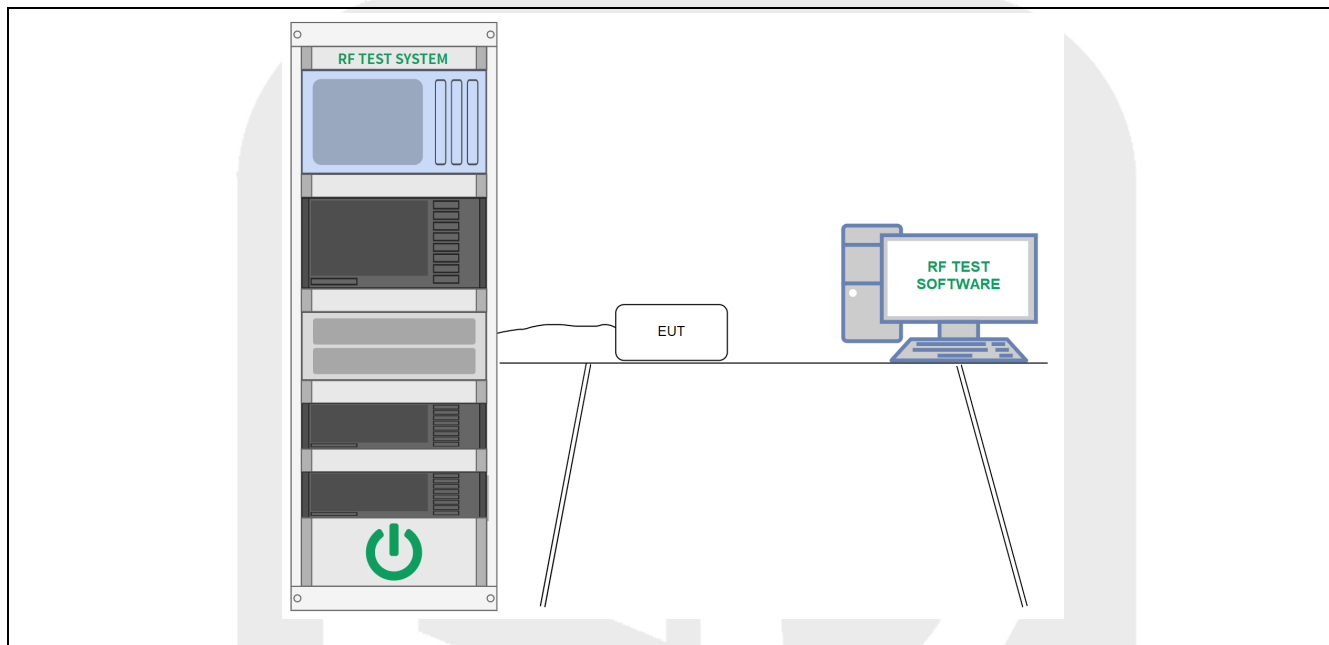
Please refer to Annex D for details.

5.2 Power Spectral Density

5.2.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 5.4.3.2.
Test Requirement	The Power Spectral Density (PSD) is the mean equivalent isotropically radiated power (e.i.r.p.) spectral density in a 1 MHz bandwidth during a transmission burst. The maximum Power Spectral Density for non-FHSS equipment is 10 dBm per MHz.

5.2.2 Test Setup Diagram



5.2.3 Test Procedure

Refer to clause 5.4.3 of ETSI EN 300 328 V2.2.2:

The test procedure shall be as follows:

Connect the UUT to the spectrum analyser and use the following settings:

Start Frequency: 2 400 MHz

Stop Frequency: 2 483,5 MHz

Resolution BW: 10 kHz

Video BW: 30 kHz

Sweep Points: >8 350; for spectrum analysers not supporting this number of sweep points, the frequency band may be segmented.

Detector: RMS

Trace Mode: Max Hold

5.2.4 Test Data

PASS.

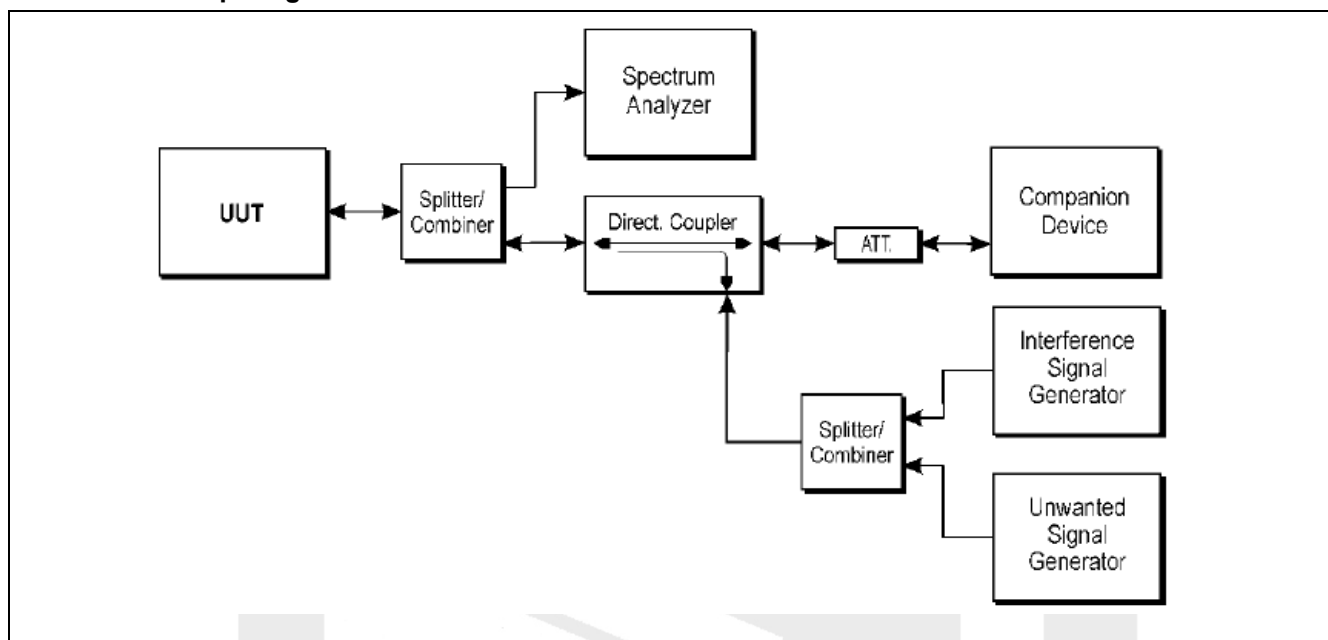
Please refer to Annex D for details.

5.3 Adaptivity

5.3.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.6
Test Requirement	These measurements shall only be performed at normal test conditions. When supported by the operating frequency range of the equipment, this test shall be performed on two operating (hopping) frequencies randomly selected from the operating frequencies used by the equipment. The first (lower) frequency shall be randomly selected within the range 2 400 MHz to 2 442 MHz while the second (higher) frequency shall be randomly selected within the range 2 442 MHz to 2 483,5 MHz. The equipment shall be in a normal operating (hopping) mode. For equipment which can operate in an adaptive and a non-adaptive mode, it shall be verified that prior to the test, the equipment is operating in the adaptive mode. The equipment shall be configured in a mode that results in the longest Channel Occupancy Time.
	Non-LBT based Detect and Avoid: 1 The frequency shall remain unavailable for a minimum time equal to 1 second after which the channel maybe considered again as an ‘available’ channel; 2 $COT \leq 40\text{ ms}$; 3 Idle Period = 5% of COT; 4 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{out})$(Pout in mW E.I.R.P)
	LBT based Detect and Avoid (Frame Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time $\leq 18\text{ us}$; 2 CCA observation time declared by the supplier; 3 $COT = 1 \sim 10\text{ ms}$; 4 Idle Period $\geq 5\%$ of COT; 5 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{out})$(Pout in mW E.I.R.P)
	LBT based Detect and Avoid (Load Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time $\geq 18\text{ us}$; 2 CCA declared by the manufacturer; 3 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{out})$(Pout in mW E.I.R.P)
	Short Control Signalling Transmissions: Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within any bservation period of 50ms.

5.3.2 Test Setup Diagram



5.3.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.6.2.

5.3.4 Test Data

Not applicable

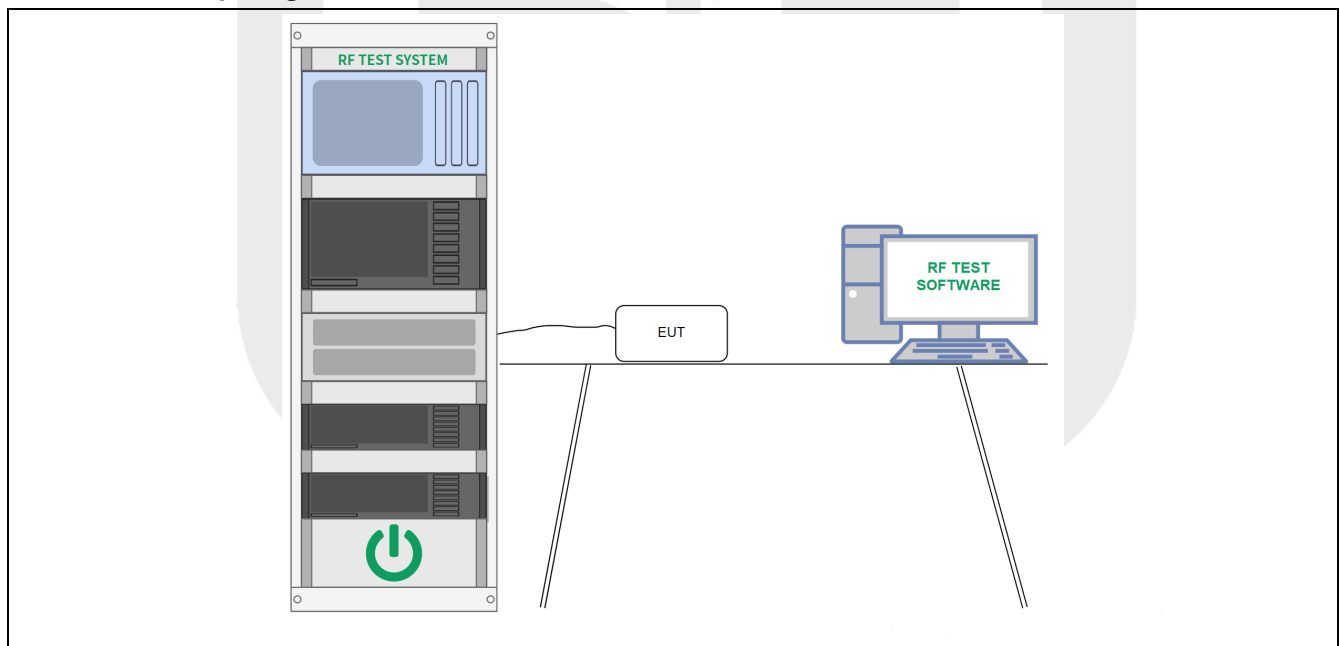
The maximum output power of EUT is less than 10dBm, so not applicable.

5.4 Occupied Channel Bandwidth

5.4.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.7		
Test Requirement	The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal. The Occupied Channel Bandwidth shall be within the band given in table 1. In addition, for non-adaptive non-FHSS equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth shall be equal to or less than 5 MHz.		
	Condition		Limit
	All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz.
	Additional requirement	For non-adaptive using wide band modulations other than FHSS system and e.i.r.p >10dBm.	Less than 20MHz
		For non-adaptive Frequency Hoppingsystem and e.i.r.p >10dBm.	Less than 5MHz

5.4.2 Test Setup Diagram



5.4.3 Test Procedure

Refer to clause 5.4.7 of ETSI EN 300 328 V2.2.2:

Connect the UUT to the spectrum analyser and use the following settings:

Centre Frequency: The centre frequency of the channel under test

Resolution BW: ~ 1 % of the span without going below 1 %

Video BW: 3×RBW

Frequency Span: 2 × Nominal Channel Bandwidth

Detector Mode: RMS

Trace Mode: Max Hold

Sweep time: 1 s

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

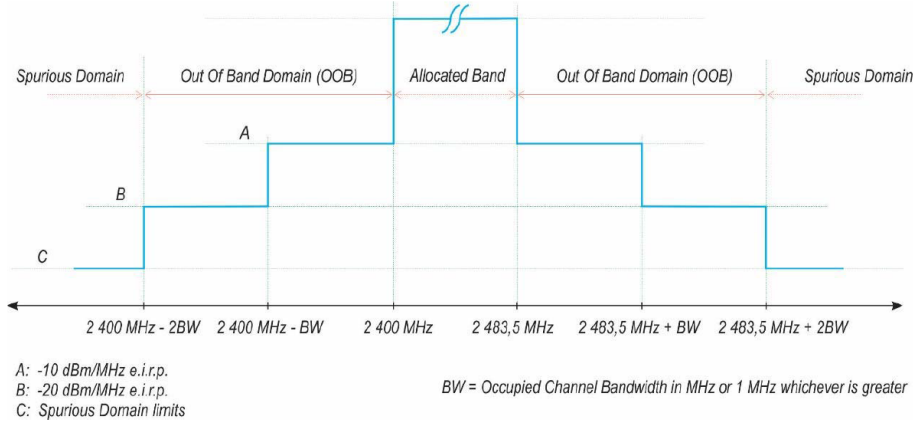
5.4.4 Test Data

PASS.

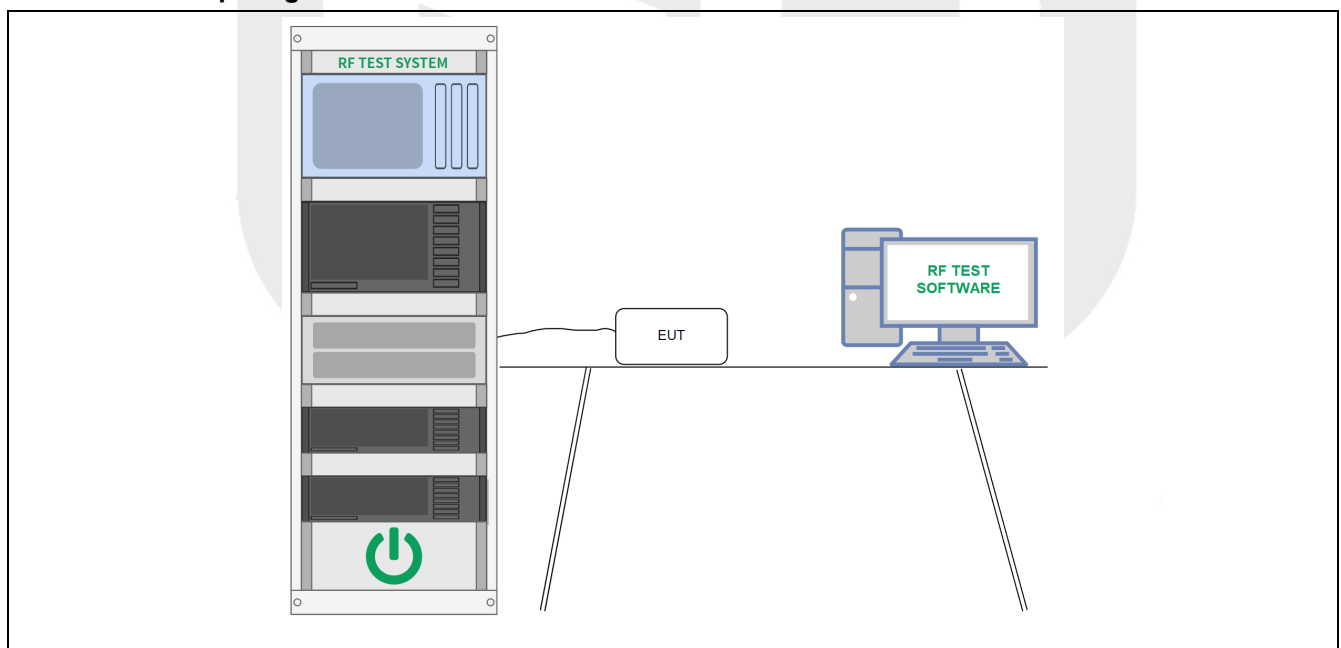
Please refer to Annex D for details.

5.5 Transmitter Unwanted Emissions in the out-of-band Domain

5.5.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.9
Test Requirement	Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the allocated band, but excluding unwanted emissions in the spurious domain. The transmitter unwanted emissions in the out-of-band domain shall not exceed the values provided by the mask in figure 1.  Figure 1: Transmit mask

5.5.2 Test Setup Diagram



5.5.3 Test Procedure

Refer to clause 5.4.8 of ETSI EN 300 328 V2.2.2:

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:
 - Measurement Mode: Time Domain Power
 - Centre Frequency: 2 484 MHz
 - Span: Zero Span
 - Resolution BW: 1 MHz
 - Filter mode: Channel filter
 - Video BW: 3 MHz
 - Detector Mode: RMS
 - Trace Mode: Max Hold
 - Sweep Mode: Single Sweep
 - Sweep Points: Sweep time [μs] / (1 μs) with a maximum of 30 000
 - Trigger Mode: Video
 - Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power.

Step 2 (segment 2 483,5 MHz to 2 483,5 MHz + BW):

- The measurement shall be performed and repeated while the trigger level is increased until no triggering takes place.
- For FHSS equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
 - Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
- Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
- Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3 (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW):

- Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

- Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2 BW to 2 400 MHz - BW):

- Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2 BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2 BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 6:

- In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain G in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
 - In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain G in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
- Comparison with the applicable limits shall be done using any of the options given below:
- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain Y in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.
 - Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by $10 \times \log_{10}(A_{ch})$ and the additional beamforming gain Y in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE: A_{ch} refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

5.5.4 Test Data

PASS.

Please refer to Annex D for details.

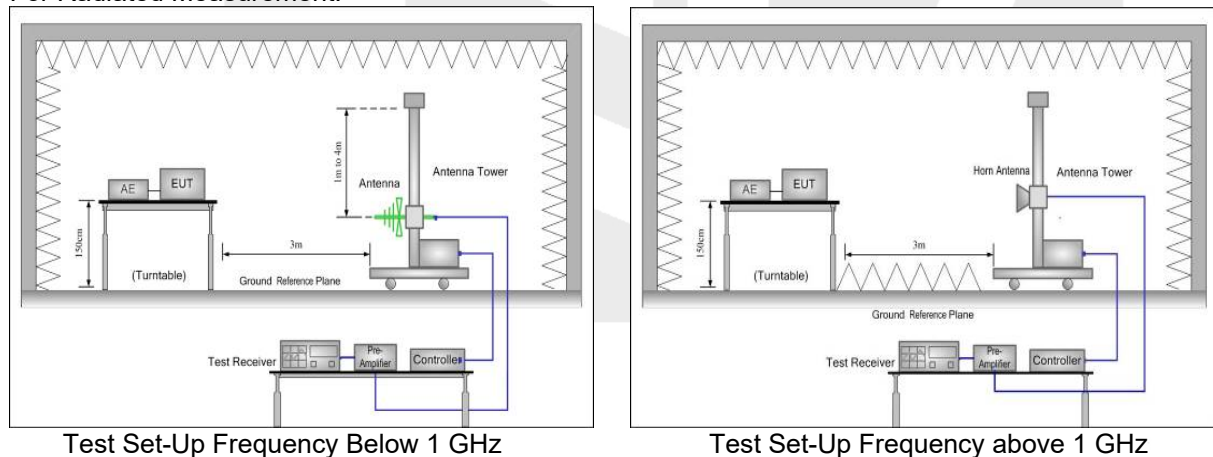
5.6 Transmitter Unwanted Emissions in the Spurious Domain

5.6.1 Test Requirement

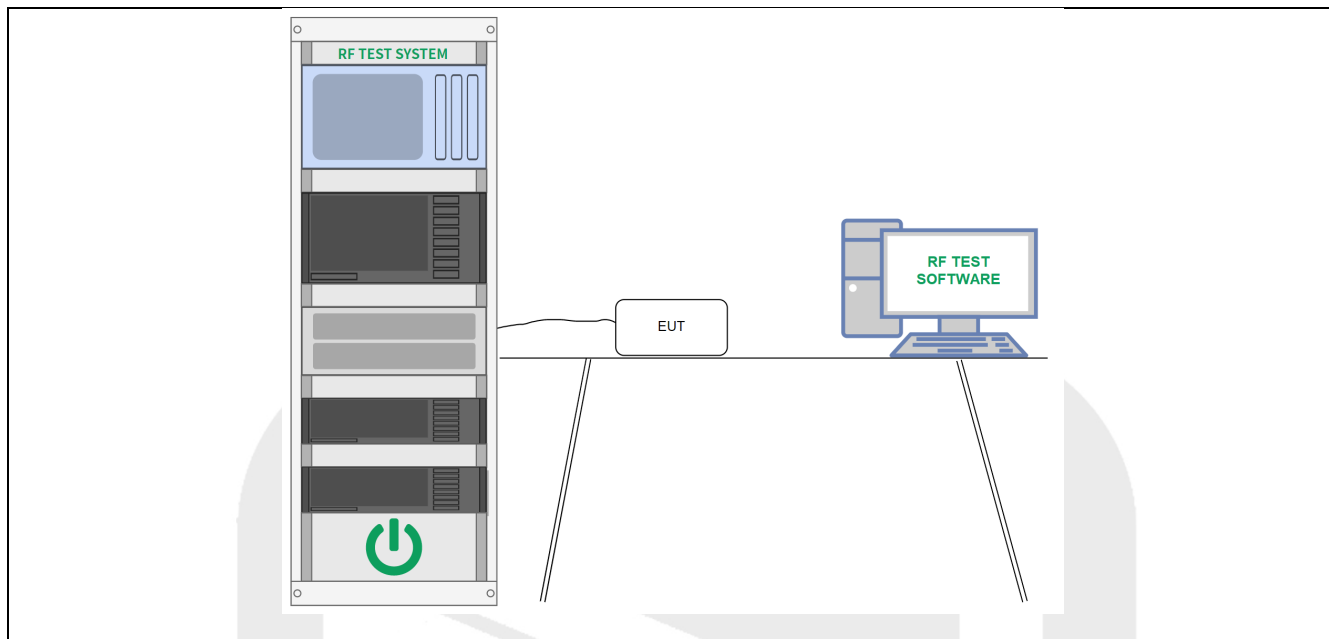
Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.10																																												
Test Requirement	The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 4. In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz. Table 4: Transmitter limits for spurious emissions... <table><tr><th></th><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr><tr><td></td><td>30 MHz to 47 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>Hz</td><td>47 MHz to 74 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>0 kHz</td><td>74 MHz to 87,5 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>100 kHz</td><td>87,5 MHz to 118 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>100 kHz</td><td>118 MHz to 174 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>100 kHz</td><td>174 MHz to 230 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>100 kHz</td><td>230 MHz to 470 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>100 kHz</td><td>470 MHz to 694 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>100 kHz</td><td>694 MHz to 1 GHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>100 kHz</td><td>1 GHz to 12,75 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr></table>		Frequency range	Maximum power	Bandwidth		30 MHz to 47 MHz	-36 dBm	100 kHz	Hz	47 MHz to 74 MHz	-54 dBm	100 kHz	0 kHz	74 MHz to 87,5 MHz	-36 dBm	100 kHz	100 kHz	87,5 MHz to 118 MHz	-54 dBm	100 kHz	100 kHz	118 MHz to 174 MHz	-36 dBm	100 kHz	100 kHz	174 MHz to 230 MHz	-54 dBm	100 kHz	100 kHz	230 MHz to 470 MHz	-36 dBm	100 kHz	100 kHz	470 MHz to 694 MHz	-54 dBm	100 kHz	100 kHz	694 MHz to 1 GHz	-36 dBm	100 kHz	100 kHz	1 GHz to 12,75 GHz	-30 dBm	1 MHz
		Frequency range	Maximum power	Bandwidth																																									
		30 MHz to 47 MHz	-36 dBm	100 kHz																																									
	Hz	47 MHz to 74 MHz	-54 dBm	100 kHz																																									
	0 kHz	74 MHz to 87,5 MHz	-36 dBm	100 kHz																																									
	100 kHz	87,5 MHz to 118 MHz	-54 dBm	100 kHz																																									
	100 kHz	118 MHz to 174 MHz	-36 dBm	100 kHz																																									
	100 kHz	174 MHz to 230 MHz	-54 dBm	100 kHz																																									
	100 kHz	230 MHz to 470 MHz	-36 dBm	100 kHz																																									
	100 kHz	470 MHz to 694 MHz	-54 dBm	100 kHz																																									
100 kHz	694 MHz to 1 GHz	-36 dBm	100 kHz																																										
100 kHz	1 GHz to 12,75 GHz	-30 dBm	1 MHz																																										

5.6.2 Test Setup Diagram

For Radiated Measurement:



For Conducted Measurement:



5.6.3 Test Procedure

Refer to clause 5.4.9 of ETSI EN 300 328 V2.2.2:

Step 1:

The sensitivity of the measurement set-up should be such that the noise floor is at least 12 dB below the limits given in table 4 or table 12.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 19\,400$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.

For FHSS equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

The above sweep time setting may result in long measuring times in case of FHSS equipment. To avoid such long measuring times, an FFT analyser may be used.

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 1 MHz

- Video bandwidth: 3 MHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 23\,500$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

Step 4:

- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach). The limits used to identify emissions during this pre-scan need to be reduced by $10 \times \log_{10}(\text{Ach})$.

5.6.4 Test Data**PASS.**

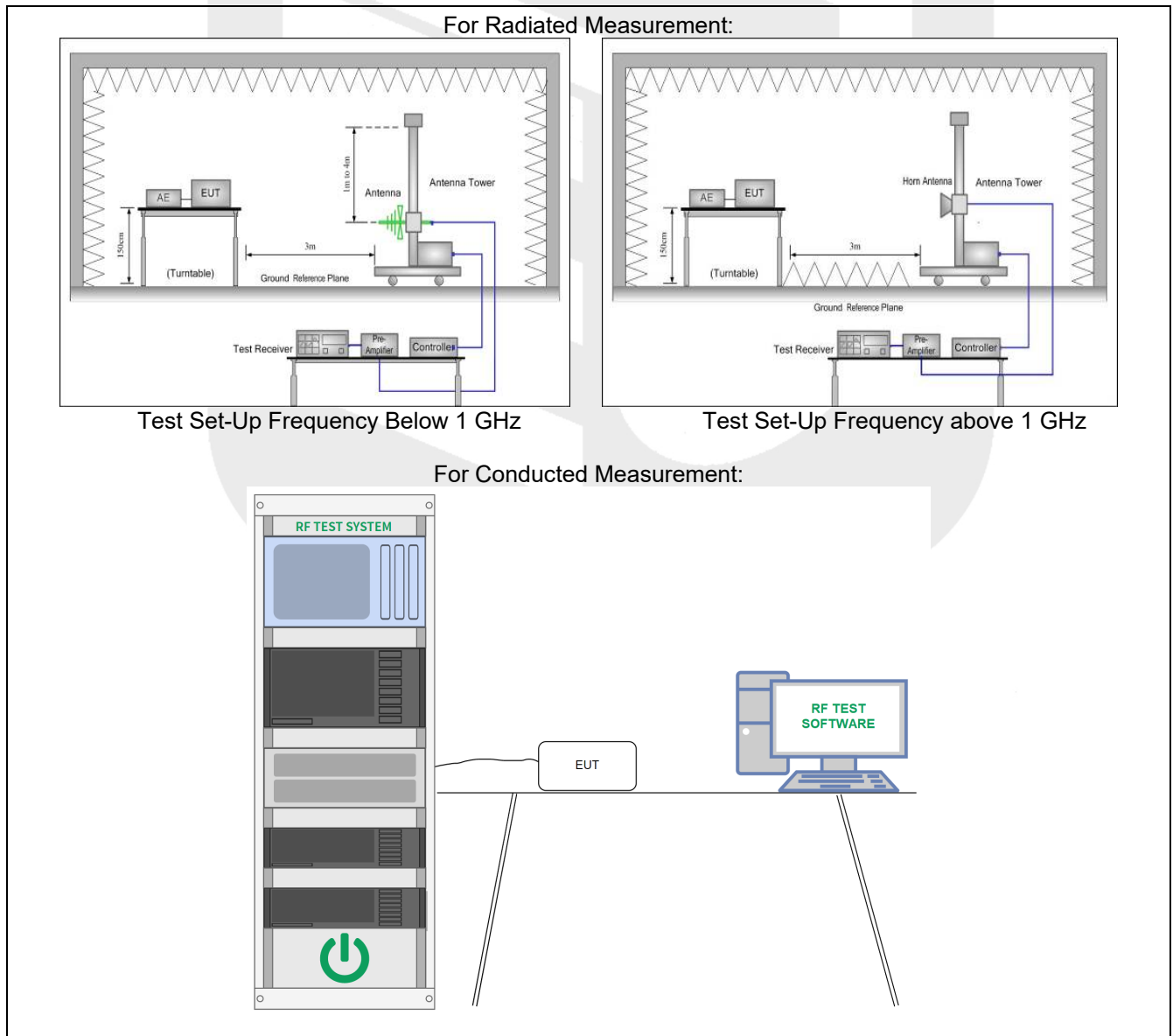
Please refer to Annex D for details.

5.7 Receiver Spurious Emissions

5.7.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.11									
Test Requirement	The spurious emissions of the receiver shall not exceed the values given in table 5. In case of FHSS equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz. Table 5: Spurious emission limits for receivers <table><tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr><tr><td>30 MHz to 1 GHz</td><td>-57 dBm</td><td>100 kHz</td></tr><tr><td>1 GHz to 12,75 GHz</td><td>-47 dBm</td><td>1 MHz</td></tr></table>	Frequency range	Maximum power	Bandwidth	30 MHz to 1 GHz	-57 dBm	100 kHz	1 GHz to 12,75 GHz	-47 dBm	1 MHz
Frequency range	Maximum power	Bandwidth								
30 MHz to 1 GHz	-57 dBm	100 kHz								
1 GHz to 12,75 GHz	-47 dBm	1 MHz								

5.7.2 Test Setup Diagram



5.7.3 Test Procedure

Refer to clause 5.4.10 of ETSI EN 300 328 V2.2.2.

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in table 5 or table 13.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 19\,400$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.

For FHSS equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

The above sweep time setting may result in long measuring times in case of FHSS equipment. To avoid such long measuring times, an FFT analyser may be used.

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 3 MHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 23\,500$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

Step 4:

- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach). The limits used to identify emissions during this pre-scan need to be reduced by $10 \times \log_{10}(\text{Ach})$.

5.7.4 Test Data

PASS.

Please refer to Annex D for details.

5.8 Receiver Blocking

5.8.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.1.12										
Test Requirement	Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) on frequencies other than those of the operating band and spurious responses. For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %. For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment. While maintaining the minimum performance criteria as defined in clause 4.3.1.12.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 6, table 7 or table 8. Table 6: Receiver Blocking parameters for Receiver Category 1 equipment <table><tr><th>Wanted signal mean power from companion device (dBm) (see notes 1 and 4)</th><th>Blocking signal frequency (MHz)</th><th>Blocking signal power (dBm) (see note 4)</th><th>Type of blocking signal</th></tr><tr><td>(-133 dBm + 10 × log₁₀(OCBW)) or -68 dBm whichever is less (see note 2)</td><td>2 380 2 504</td><td rowspan="2">-34</td><td rowspan="2">CW</td></tr><tr><td>(-139 dBm + 10 × log₁₀(OCBW)) or -74 dBm whichever is less (see note 3)</td><td>2 300 2 330 2 360 2 524 2 584 2 674</td></tr></table> NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.	Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal	(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW	(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674
	Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal							
(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW								
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674										

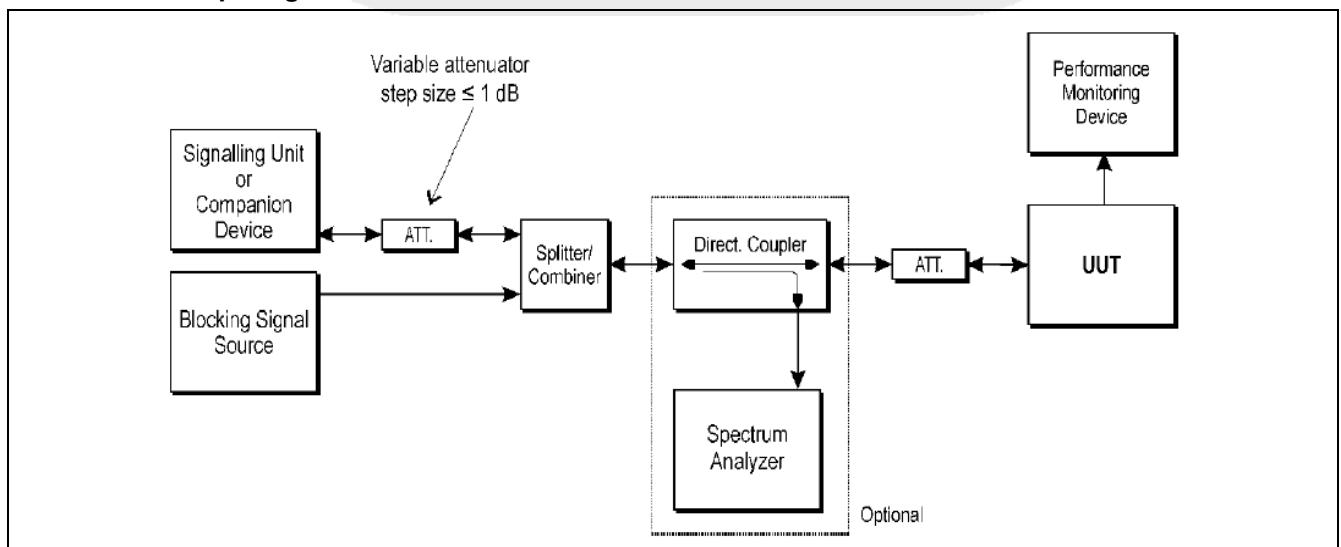
Table 7: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + $10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB}$) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 26 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Table 8: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + $10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB}$) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 30 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

5.8.2 Test Setup Diagram



5.8.3 Test Procedure

Refer to clause 5.4.11 of ETSI EN 300 328 V2.2.2:

Step 1:

- For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed.

Step 2:

- The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

- With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.
- Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.
- When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min} . This signal level (P_{min}) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

- The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6.

Step 5:

- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:
 - For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.
 - For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:
 - For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.
 - For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.

- It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

Step 6:

- Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 7:

- For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed.

Step 8:

- It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

5.8.4 Test Data

PASS.

Please refer to Annex D for details.

ANNEX A TEST SETUP PHOTOS

PHOTO 1

Radiated Emission
Below 1GHz

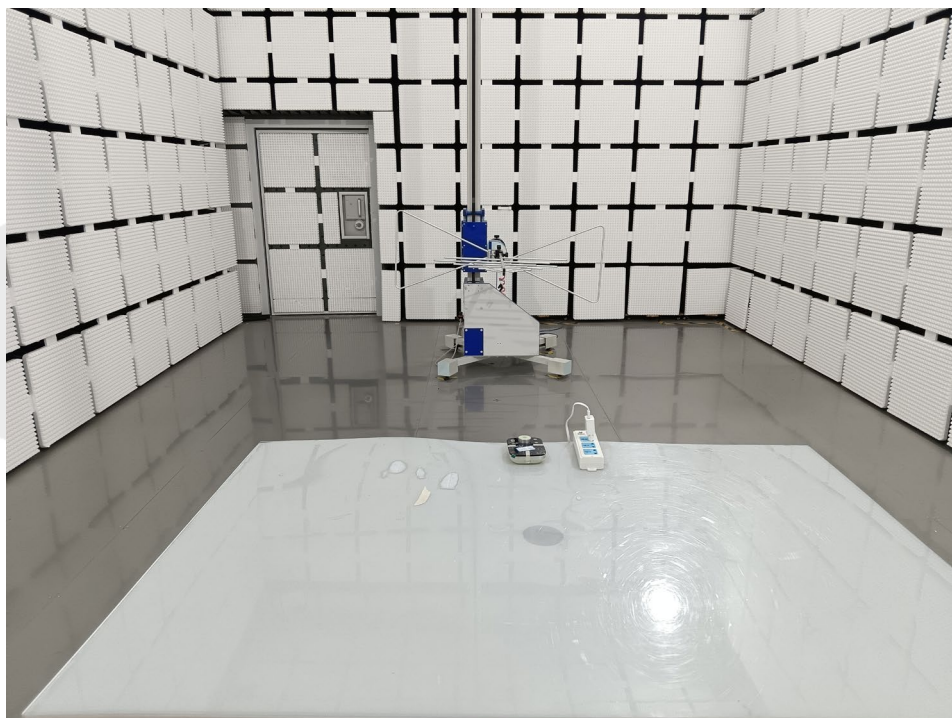
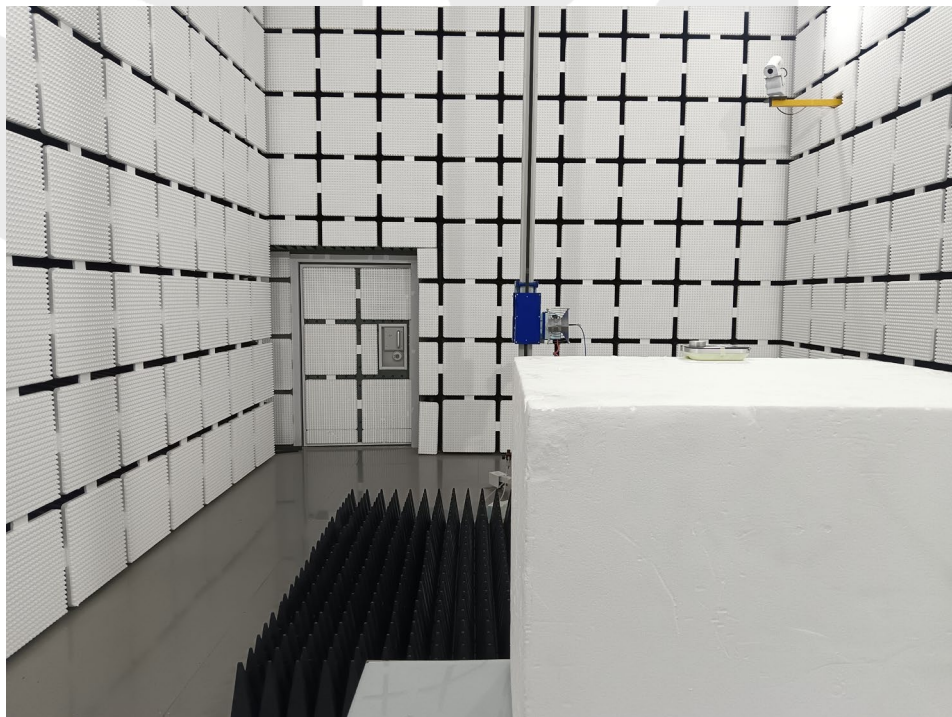


PHOTO 1

Radiated Emission
Above 1GHz



ANNEX B EXTERNAL PHOTOS

Please refer to the document “8326EU010302E.PDF”

ANNEX C INTERNAL PHOTOS

Please refer to the document “8326EU010302E.PDF”



ANNEX D TEST DATA**Test Summary**

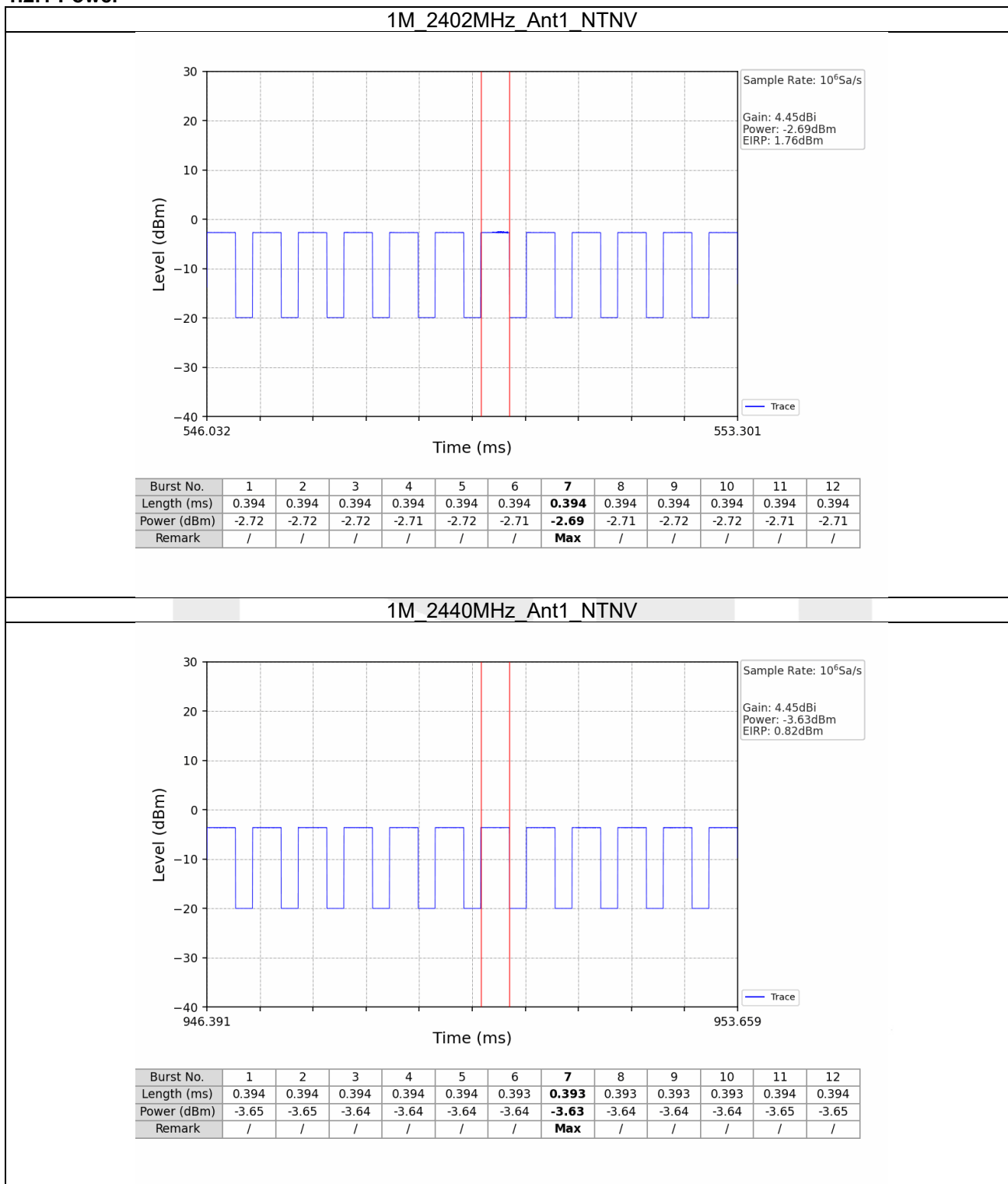
Item	Result
RF Output Power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization	Pass
Power Spectral Density	Pass
Occupied Channel Bandwidth	Pass
Transmitter Unwanted Emissions In The Out-Of-Band Domain	Pass
Transmitter Unwanted Emissions In The Spurious Domain	Pass
Receiver Spurious Emissions	Pass
Adaptivity (Channel Access Mechanism)	N/A
Receiver Blocking	Pass

BLE 1:
1. RF Output Power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization
1.1 Test Result
1.1.1 Power

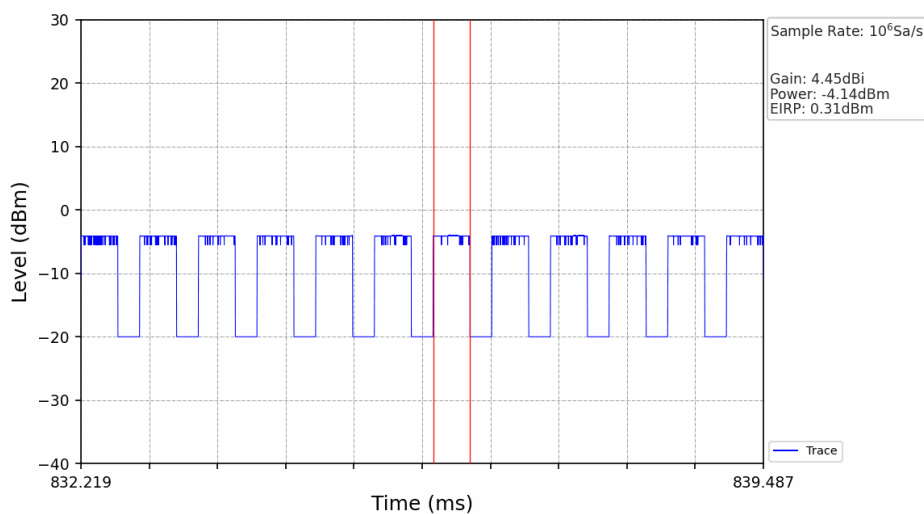
ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NTNV	1M	SISO	2402	1	4.45	-2.69	1.76	<=20	Pass
			2440	1	4.45	-3.63	0.82	<=20	Pass
			2480	1	4.45	-4.14	0.31	<=20	Pass
	2M	SISO	2402	1	4.45	-2.68	1.77	<=20	Pass
			2440	1	4.45	-3.61	0.84	<=20	Pass
			2480	1	4.45	-4.12	0.33	<=20	Pass
HTNV	1M	SISO	2402	1	4.45	-2.70	1.75	<=20	Pass
			2440	1	4.45	-3.63	0.82	<=20	Pass
			2480	1	4.45	-4.13	0.32	<=20	Pass
	2M	SISO	2402	1	4.45	-2.69	1.76	<=20	Pass
			2440	1	4.45	-3.61	0.84	<=20	Pass
			2480	1	4.45	-4.12	0.33	<=20	Pass
LTVN	1M	SISO	2402	1	4.45	-2.69	1.76	<=20	Pass
			2440	1	4.45	-3.63	0.82	<=20	Pass
			2480	1	4.45	-4.14	0.31	<=20	Pass
	2M	SISO	2402	1	4.45	-2.69	1.76	<=20	Pass
			2440	1	4.45	-3.61	0.84	<=20	Pass
			2480	1	4.45	-4.11	0.34	<=20	Pass
Note1: E.I.R.P = Measured Power + Antenna Gain									

1.2 Test Graph

1.2.1 Power

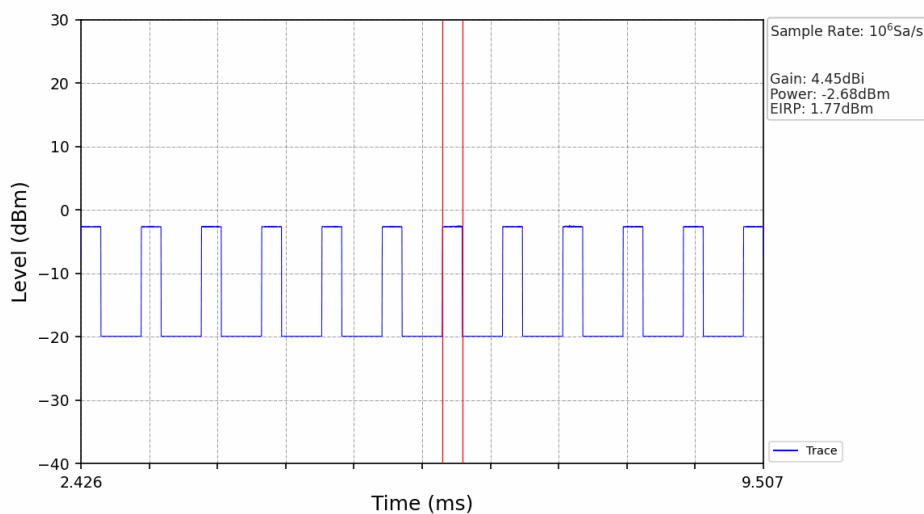


1M_2480MHz_Ant1_NTNV



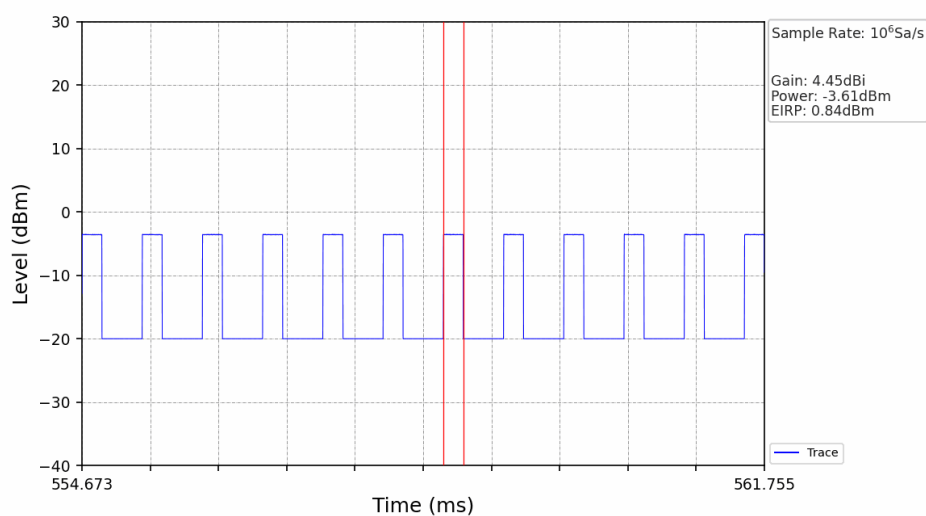
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.394	0.394	0.394	0.393	0.394	0.393	0.393	0.393	0.394	0.394	0.394	0.394
Power (dBm)	-4.28	-4.22	-4.18	-4.17	-4.19	-4.16	-4.14	-4.20	-4.18	-4.19	-4.18	-4.18
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2402MHz_Ant1_NTNV



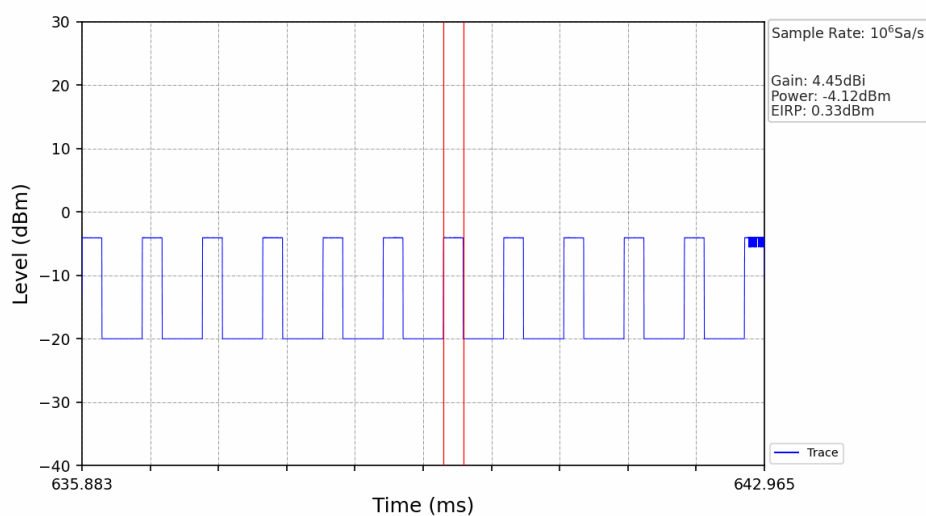
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.207	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208
Power (dBm)	-2.71	-2.70	-2.69	-2.70	-2.70	-2.70	-2.68	-2.70	-2.68	-2.70	-2.70	-2.70
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2440MHz_Ant1_NTNV



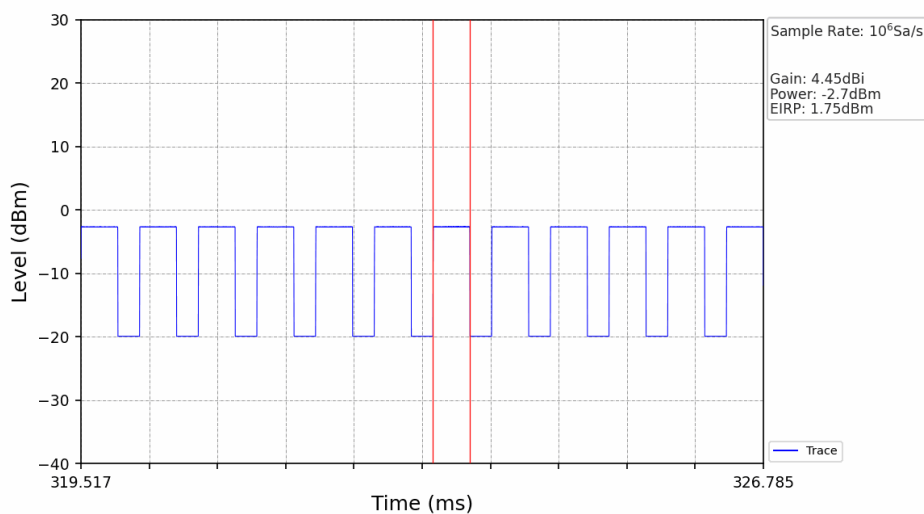
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.208	0.208	0.208	0.208	0.207	0.207	0.207	0.208	0.208	0.207	0.208
Power (dBm)	-3.64	-3.63	-3.63	-3.63	-3.63	-3.62	-3.61	-3.61	-3.63	-3.63	-3.62	-3.63
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2480MHz_Ant1_NTNV



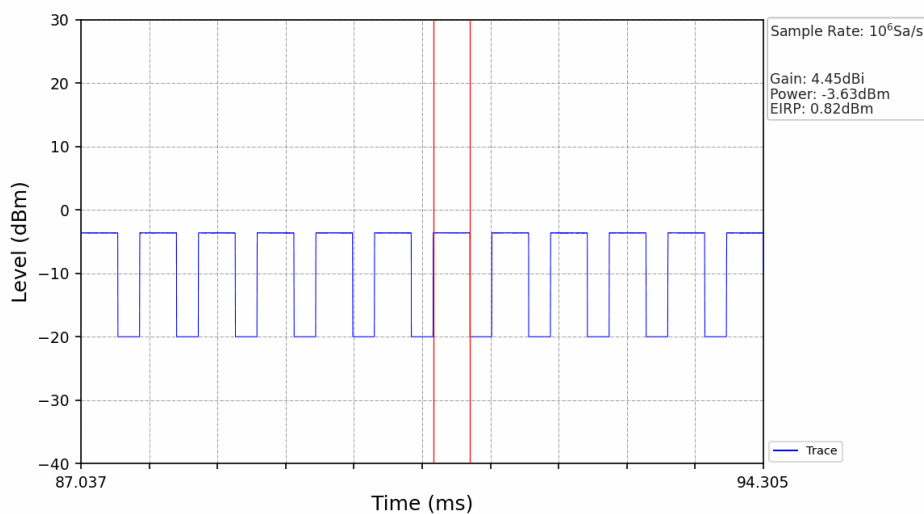
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.208	0.208	0.208	0.208	0.207	0.207	0.207	0.207	0.207	0.208	0.208
Power (dBm)	-4.15	-4.14	-4.13	-4.13	-4.14	-4.12	-4.12	-4.12	-4.12	-4.13	-4.14	-4.34
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

1M_2402MHz_Ant1_HTNV



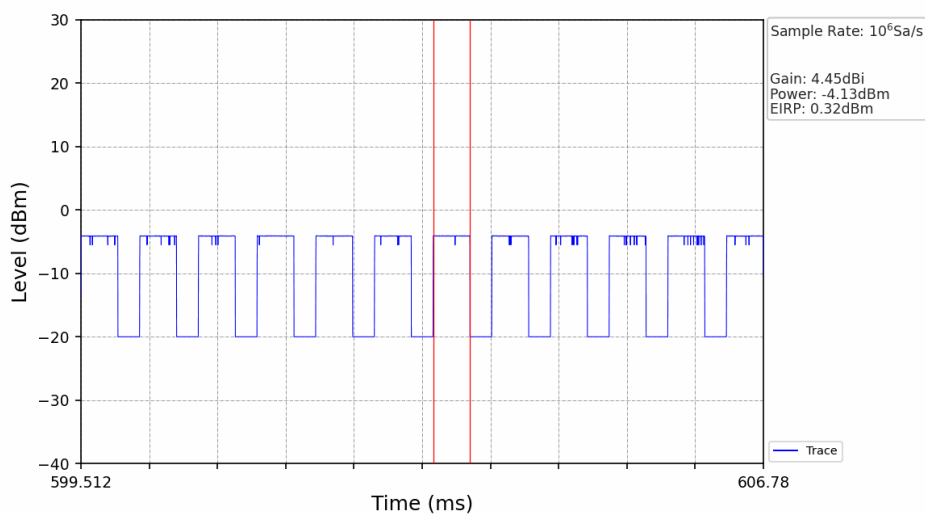
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.394	0.394	0.393	0.394	0.394	0.394	0.394	0.394	0.394	0.394	0.394	0.394
Power (dBm)	-2.70	-2.70	-2.70	-2.71	-2.70	-2.70	-2.70	-2.71	-2.71	-2.70	-2.70	-2.71
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

1M_2440MHz_Ant1_HTNV



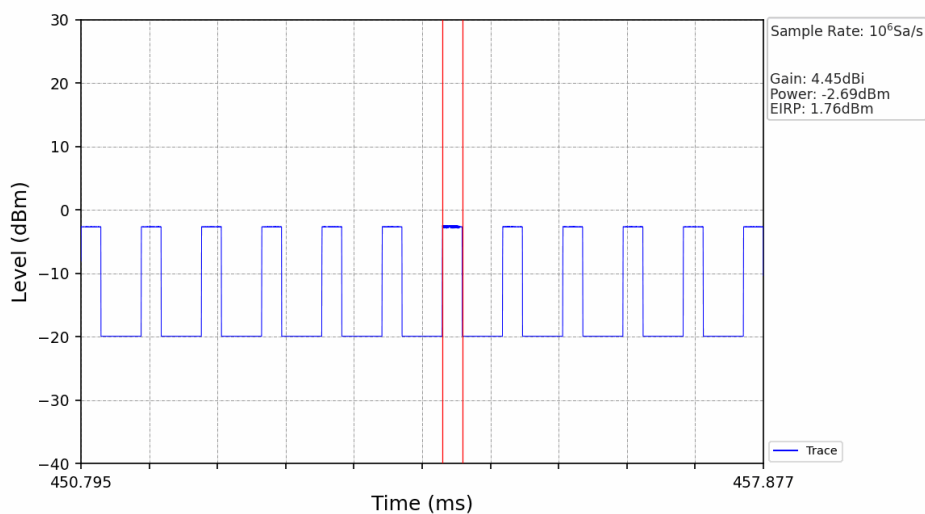
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.394	0.394	0.394	0.394	0.394	0.393	0.393	0.393	0.393	0.394	0.394	0.394
Power (dBm)	-3.65	-3.65	-3.65	-3.65	-3.65	-3.64	-3.63	-3.64	-3.64	-3.65	-3.65	-3.65
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

1M_2480MHz_Ant1_HTNV



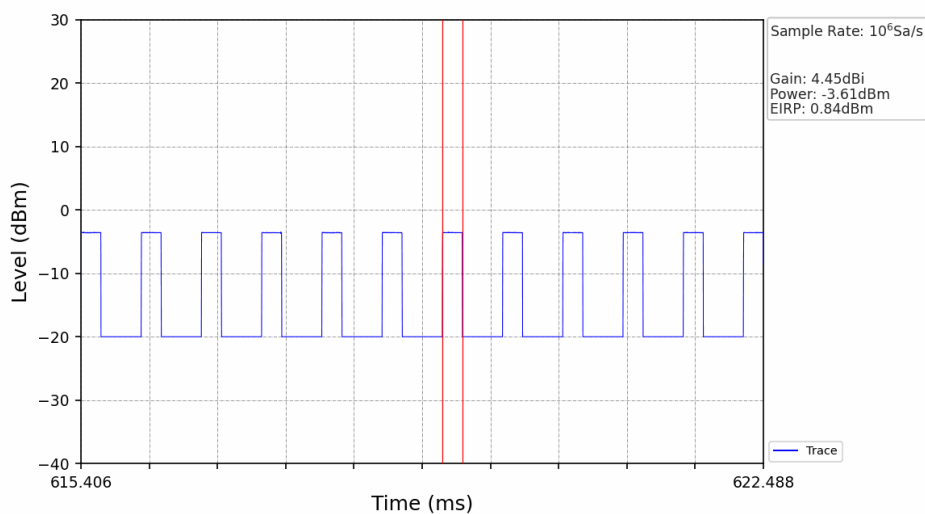
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.394	0.394	0.394	0.394	0.394	0.393	0.393	0.393	0.393	0.393	0.393	0.394
Power (dBm)	-4.16	-4.16	-4.15	-4.14	-4.14	-4.14	-4.13	-4.14	-4.15	-4.16	-4.17	-4.16
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2402MHz_Ant1_HTNV



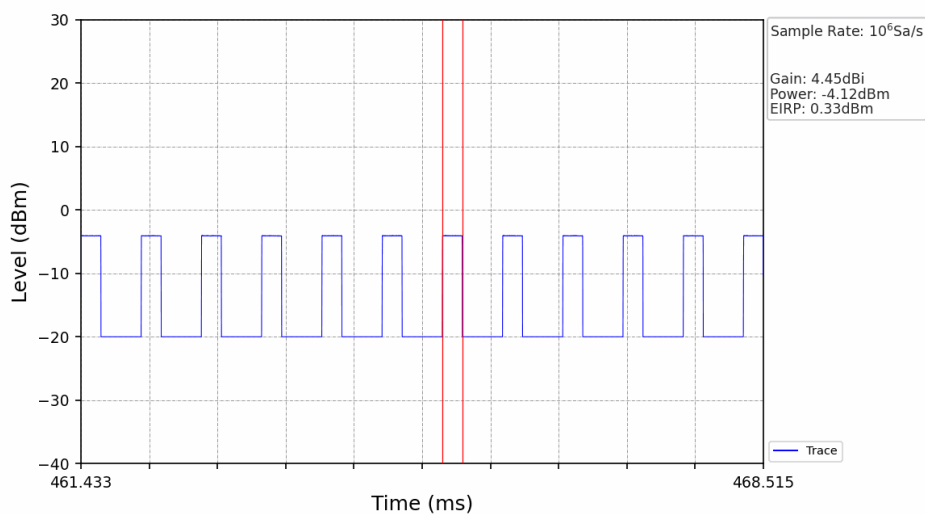
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208
Power (dBm)	-2.71	-2.71	-2.71	-2.71	-2.71	-2.71	-2.69	-2.70	-2.72	-2.71	-2.71	-2.71
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2440MHz_Ant1_HTNV



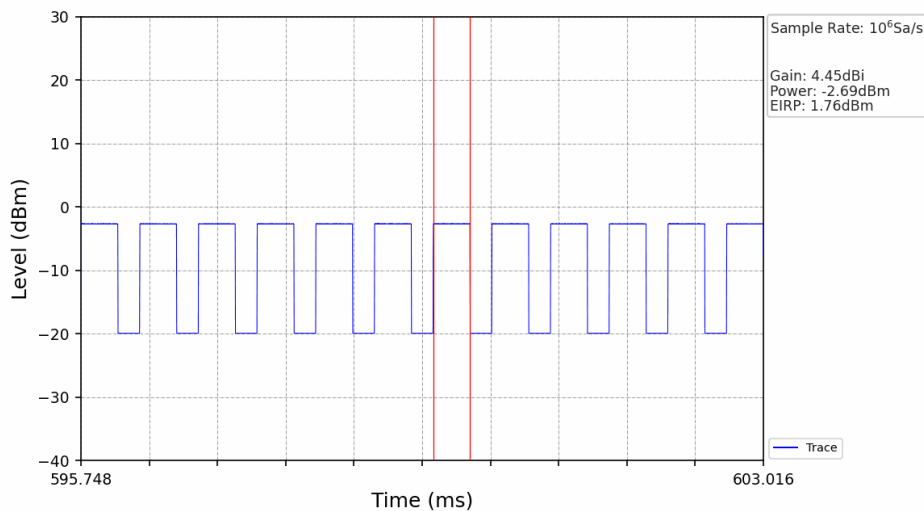
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.208	0.208	0.208	0.208	0.208	0.207	0.207	0.207	0.207	0.207	0.208
Power (dBm)	-3.64	-3.64	-3.64	-3.64	-3.64	-3.63	-3.61	-3.61	-3.61	-3.61	-3.61	-3.64
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2480MHz_Ant1_HTNV



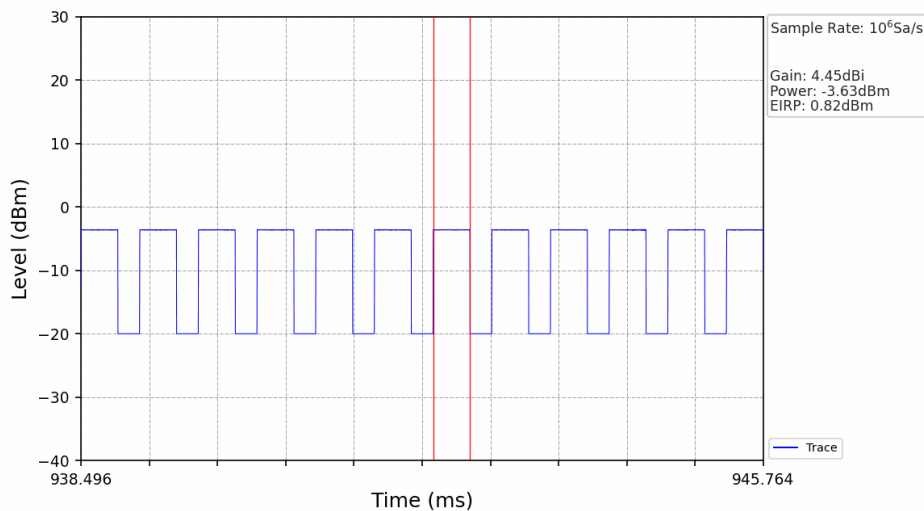
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.208	0.208	0.208	0.208	0.208	0.207	0.207	0.207	0.207	0.207	0.208
Power (dBm)	-4.14	-4.14	-4.14	-4.14	-4.14	-4.14	-4.12	-4.12	-4.12	-4.12	-4.13	-4.15
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

1M_2402MHz_Ant1_LTNV



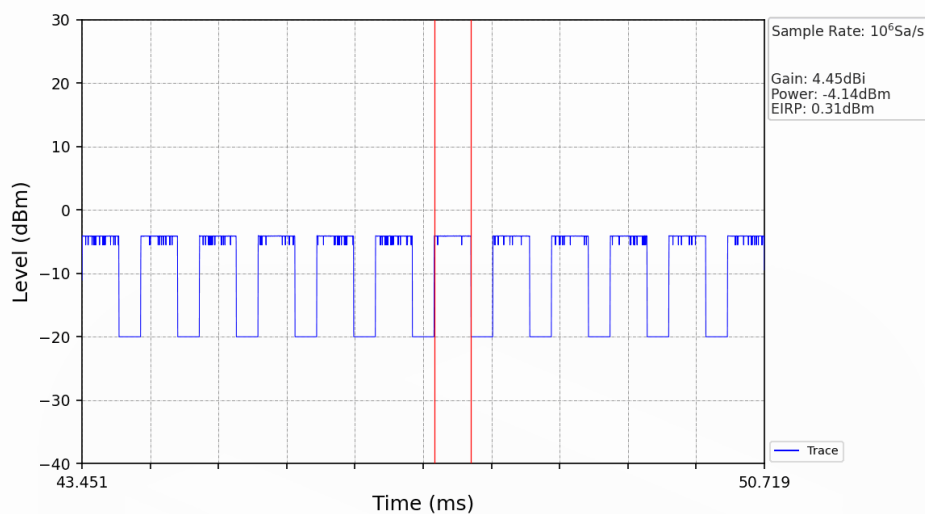
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.395	0.395	0.394	0.394	0.394	0.394	0.394	0.394	0.394	0.394	0.394	0.393
Power (dBm)	-2.71	-2.71	-2.70	-2.70	-2.70	-2.69	-2.69	-2.70	-2.70	-2.70	-2.70	-2.70
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

1M_2440MHz_Ant1_LTNV



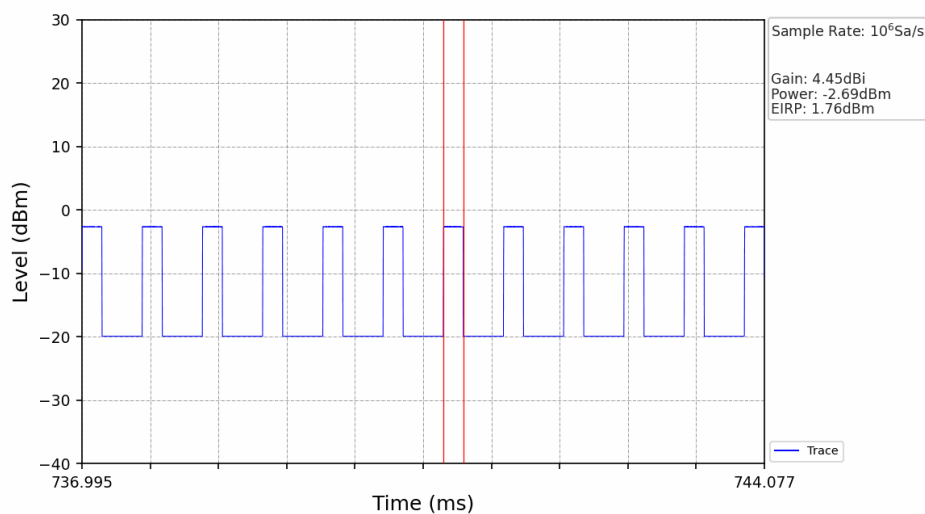
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.394	0.394	0.394	0.394	0.394	0.393	0.393	0.393	0.393	0.393	0.393	0.394
Power (dBm)	-3.64	-3.64	-3.64	-3.64	-3.64	-3.64	-3.63	-3.64	-3.63	-3.63	-3.64	-3.65
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

1M_2480MHz_Ant1_LTNV



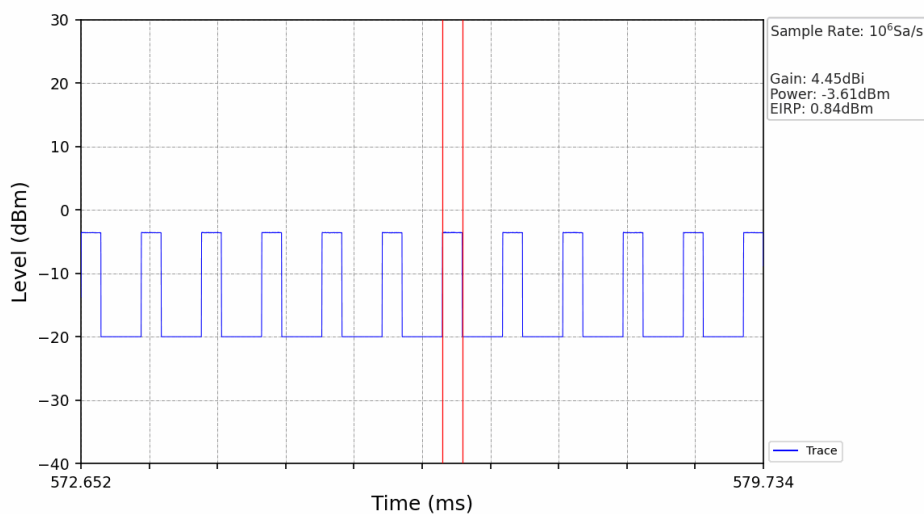
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.394	0.394	0.393	0.393	0.393	0.393	0.393	0.393	0.394	0.394	0.394	0.394
Power (dBm)	-4.21	-4.18	-4.20	-4.16	-4.19	-4.20	-4.14	-4.16	-4.17	-4.20	-4.16	-4.19
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2402MHz_Ant1_LTNV



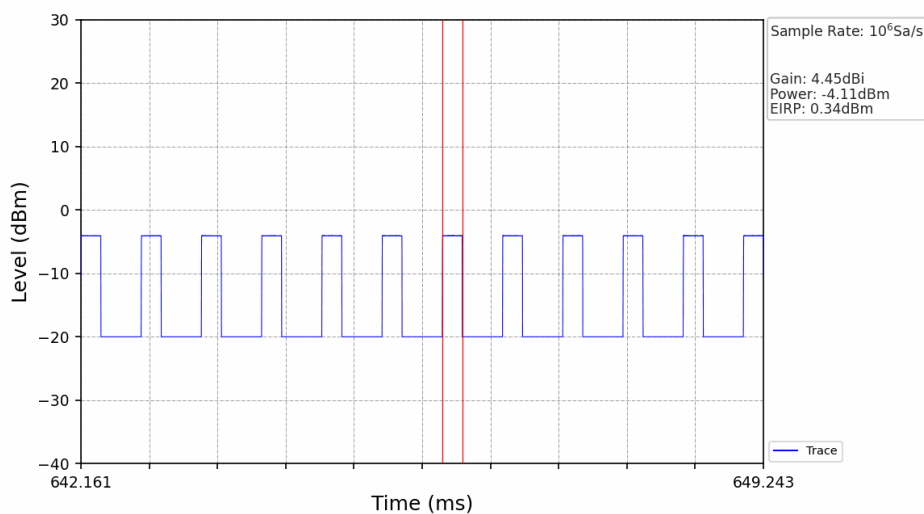
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.208	0.208	0.208	0.208	0.208	0.207	0.208	0.208	0.208	0.208	0.208
Power (dBm)	-2.70	-2.70	-2.70	-2.70	-2.70	-2.70	-2.69	-2.71	-2.71	-2.71	-2.71	-2.72
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2440MHz_Ant1_LTNV



Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.208	0.208	0.208	0.208	0.207	0.207	0.207	0.207	0.207	0.207	0.208
Power (dBm)	-3.64	-3.64	-3.64	-3.63	-3.64	-3.63	-3.61	-3.62	-3.61	-3.62	-3.63	-3.64
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2M_2480MHz_Ant1_LTNV



Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.208	0.208	0.208	0.208	0.208	0.207	0.207	0.207	0.207	0.207	0.208	0.208
Power (dBm)	-4.13	-4.14	-4.13	-4.13	-4.13	-4.11	-4.11	-4.11	-4.11	-4.12	-4.13	-4.13
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

2. Power Spectral Density

2.1 Test Result

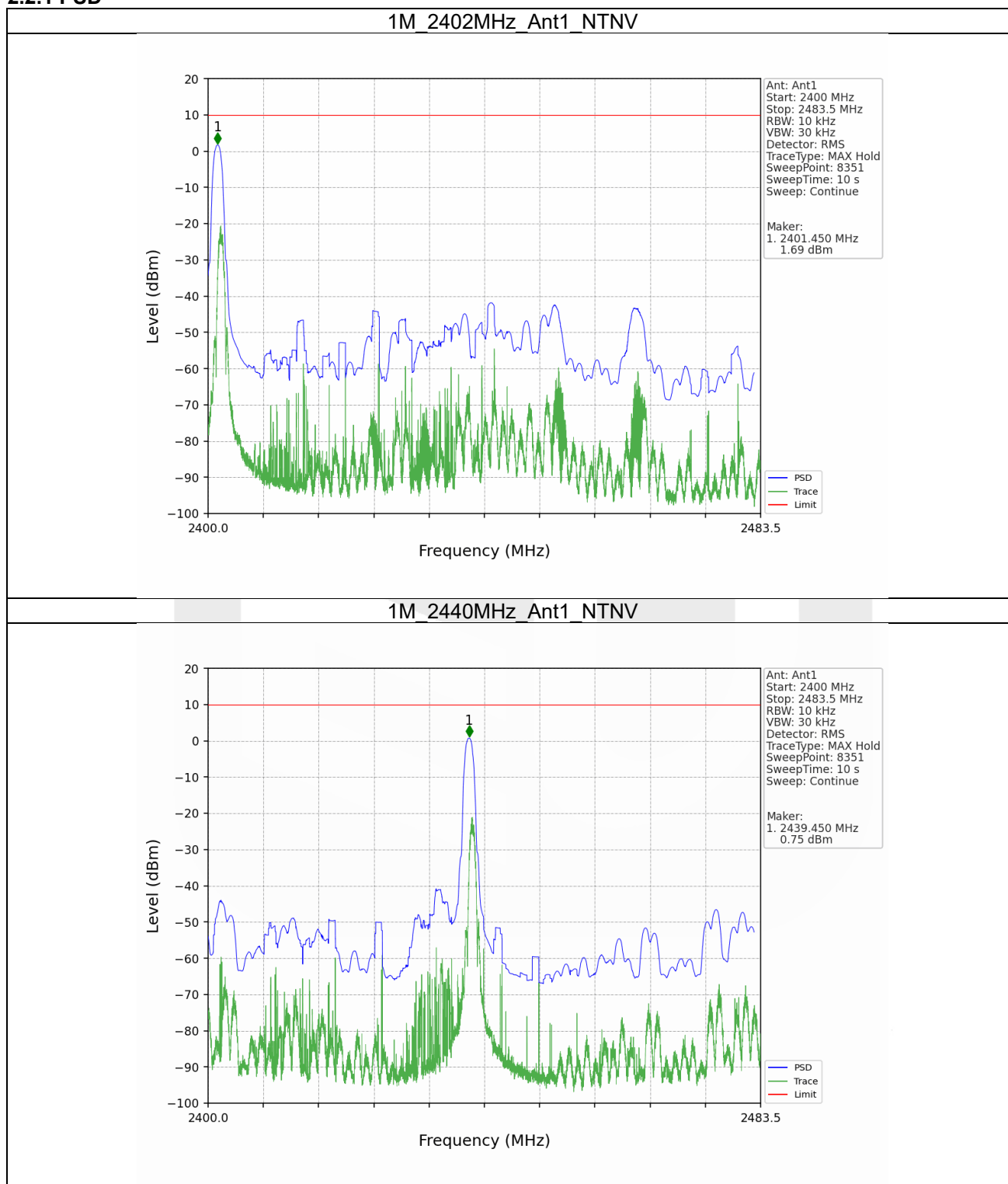
2.1.1 PSD

ENV	Mode	TX Type	Frequency (MHz)	ANT	E.I.R.PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NTNV	1M	SISO	2402	1	1.69	≤ 10	Pass
			2440	1	0.75	≤ 10	Pass
			2480	1	0.24	≤ 10	Pass
	2M	SISO	2402	1	0.71	≤ 10	Pass
			2440	1	-0.23	≤ 10	Pass
			2480	1	-0.75	≤ 10	Pass

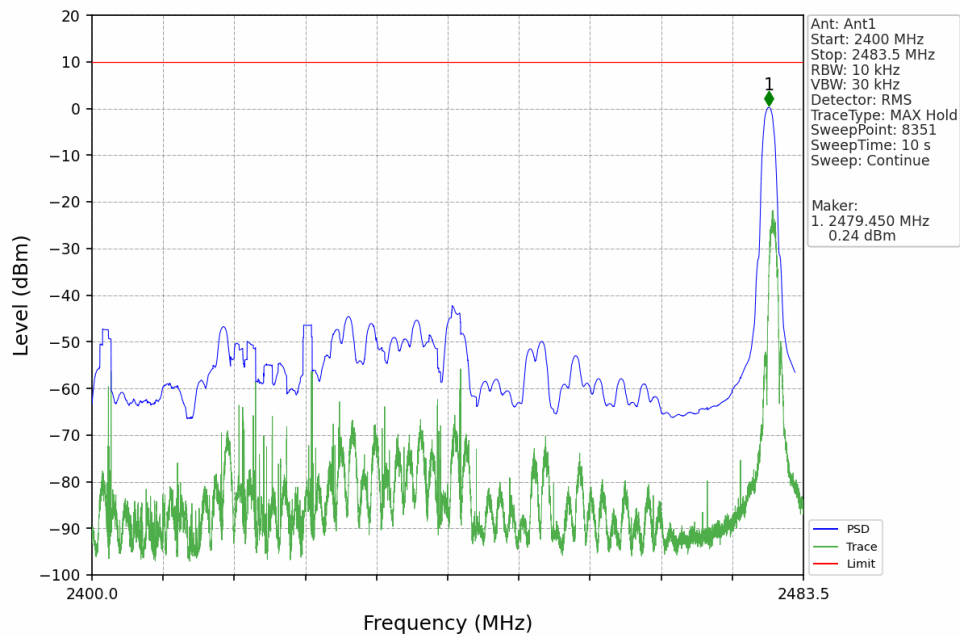


2.2 Test Graph

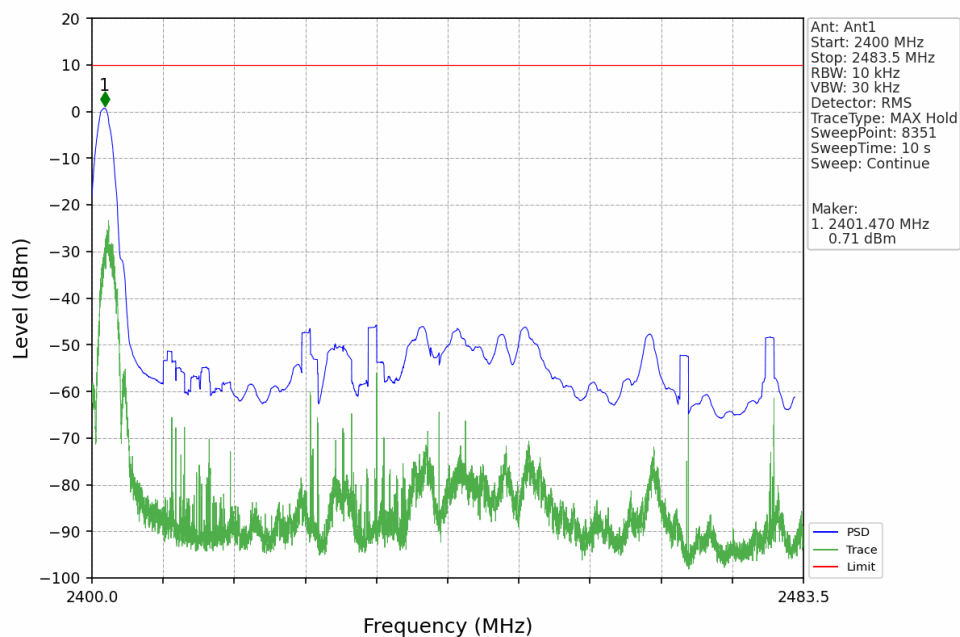
2.2.1 PSD



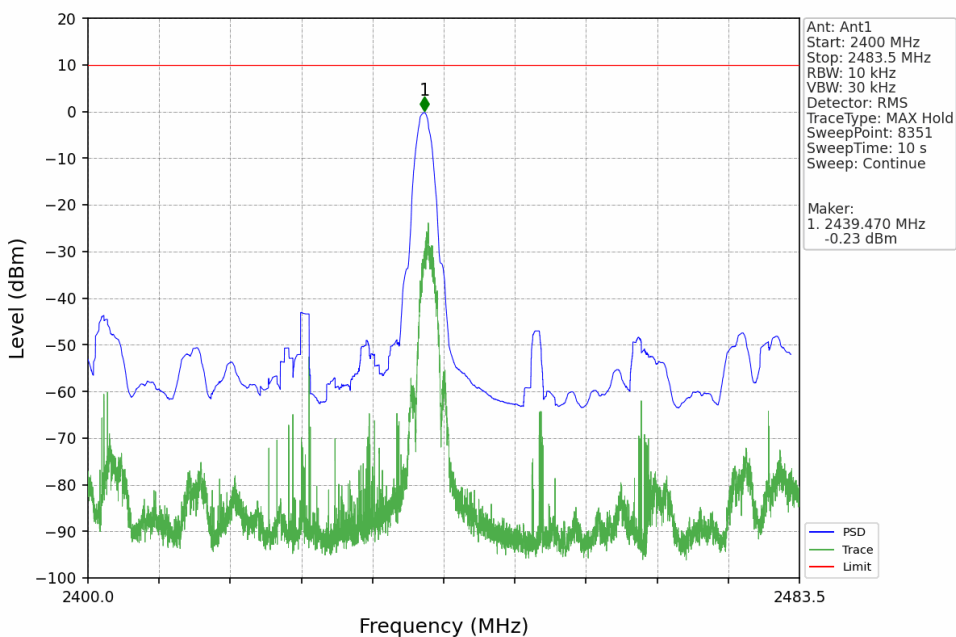
1M_2480MHz_Ant1_NTNV



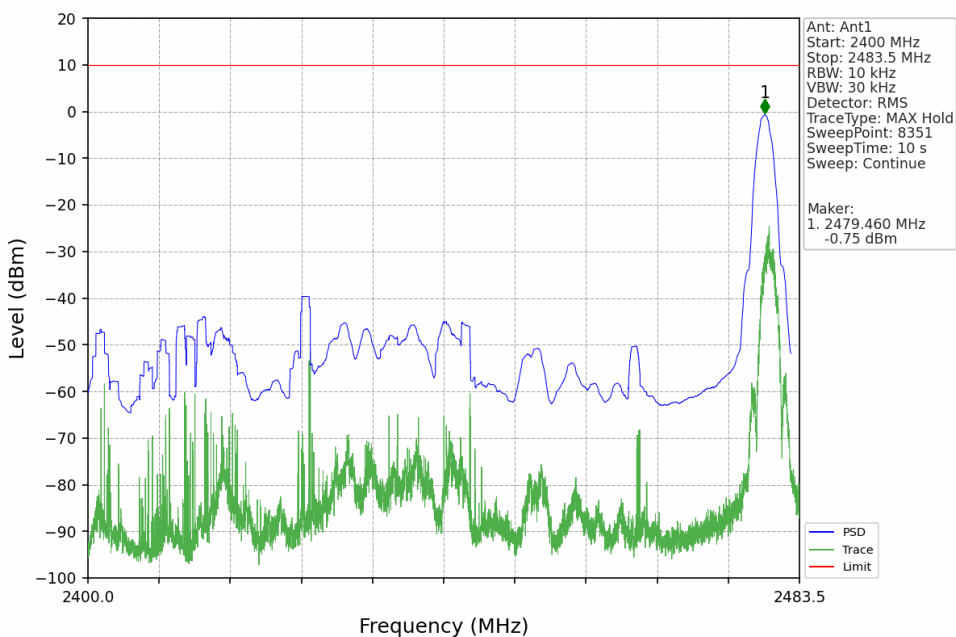
2M_2402MHz_Ant1_NTNV



2M_2440MHz_Ant1_NTNV



2M_2480MHz_Ant1_NTNV



3. Occupied Channel Bandwidth

3.1 Test Result

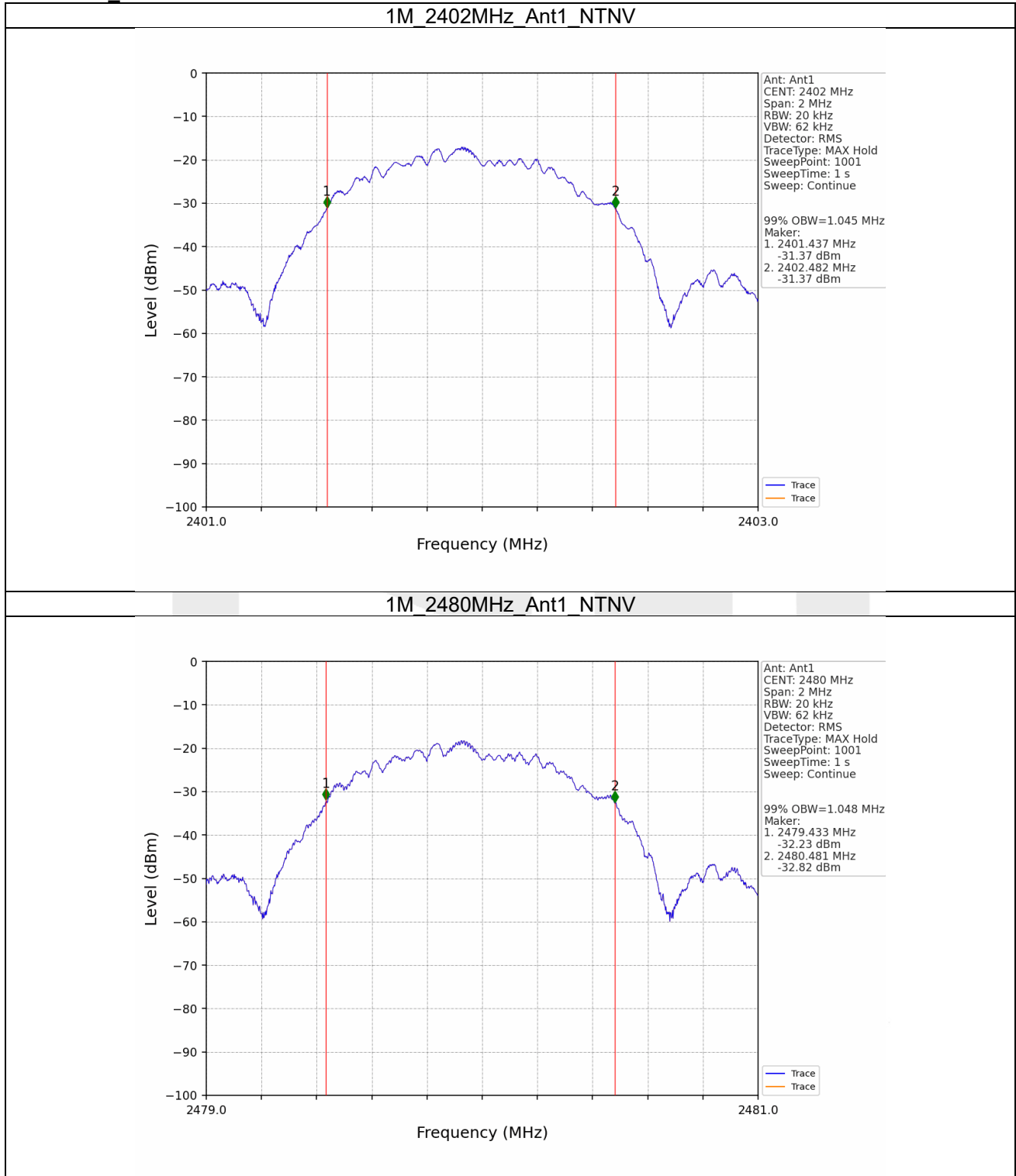
3.1.1 OBW_Ant1

Ant1								
ENV	Mode	TX Type	Frequency (MHz)	OBW (MHz)	Frequency Range (MHz)			Verdict
				Result	FL	FH	Limit	
NTNV	1M	SISO	2402	1.045	2401.437	/	≥ 2400	Pass
			2480	1.048	/	2480.481	≤ 2483.5	Pass
	2M	SISO	2402	2.055	2400.940	/	≥ 2400	Pass
			2480	2.060	/	2480.997	≤ 2483.5	Pass

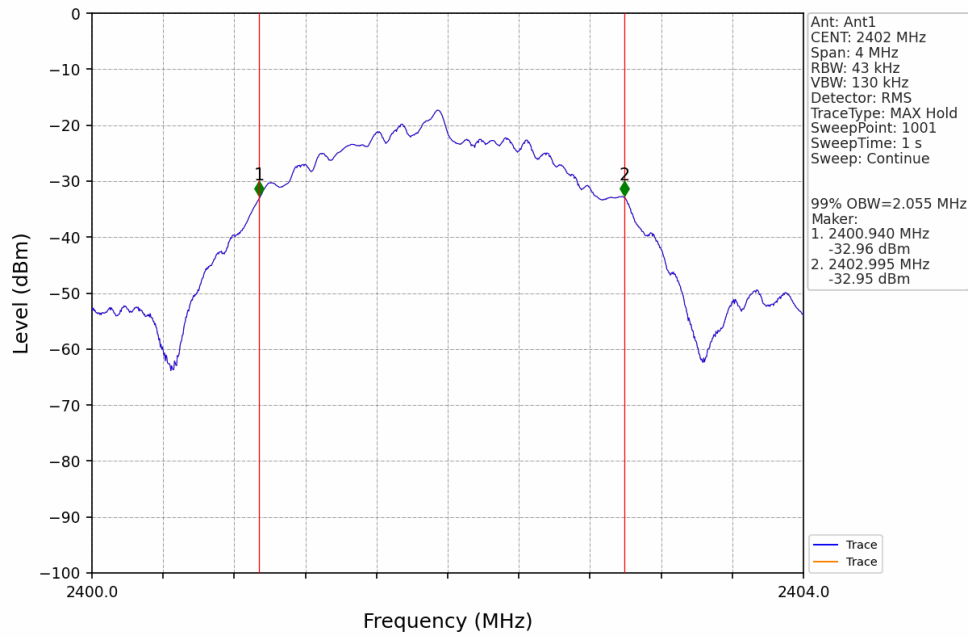


3.2 Test Graph

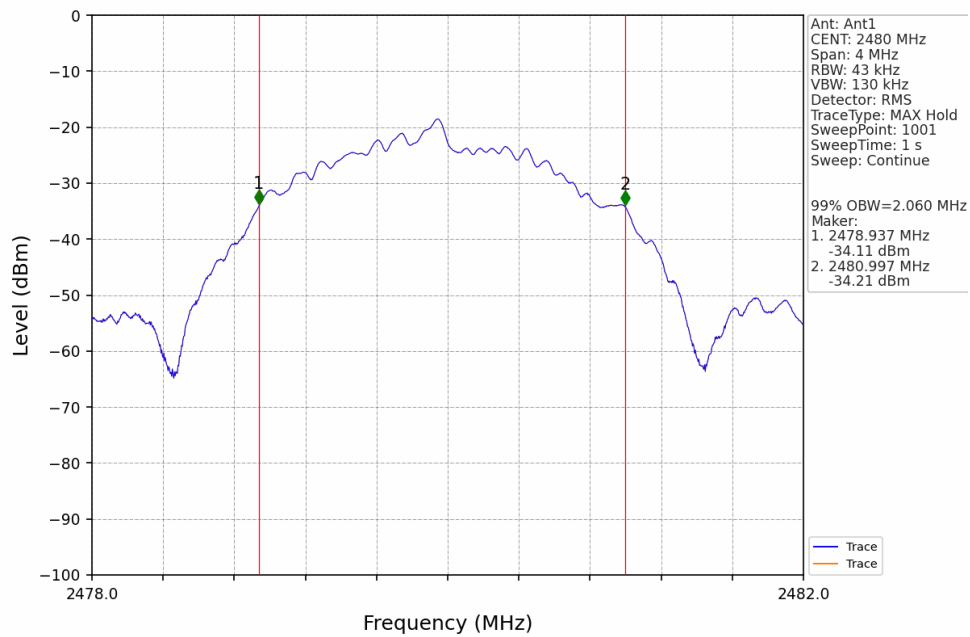
3.2.1 OBW_Ant1



2M_2402MHz_Ant1_NTNV



2M_2480MHz_Ant1_NTNV



4. Transmitter Unwanted Emissions In The Out-Of-Band Domain

4.1 Test Result

4.1.1 1M-Ant1_NTNV

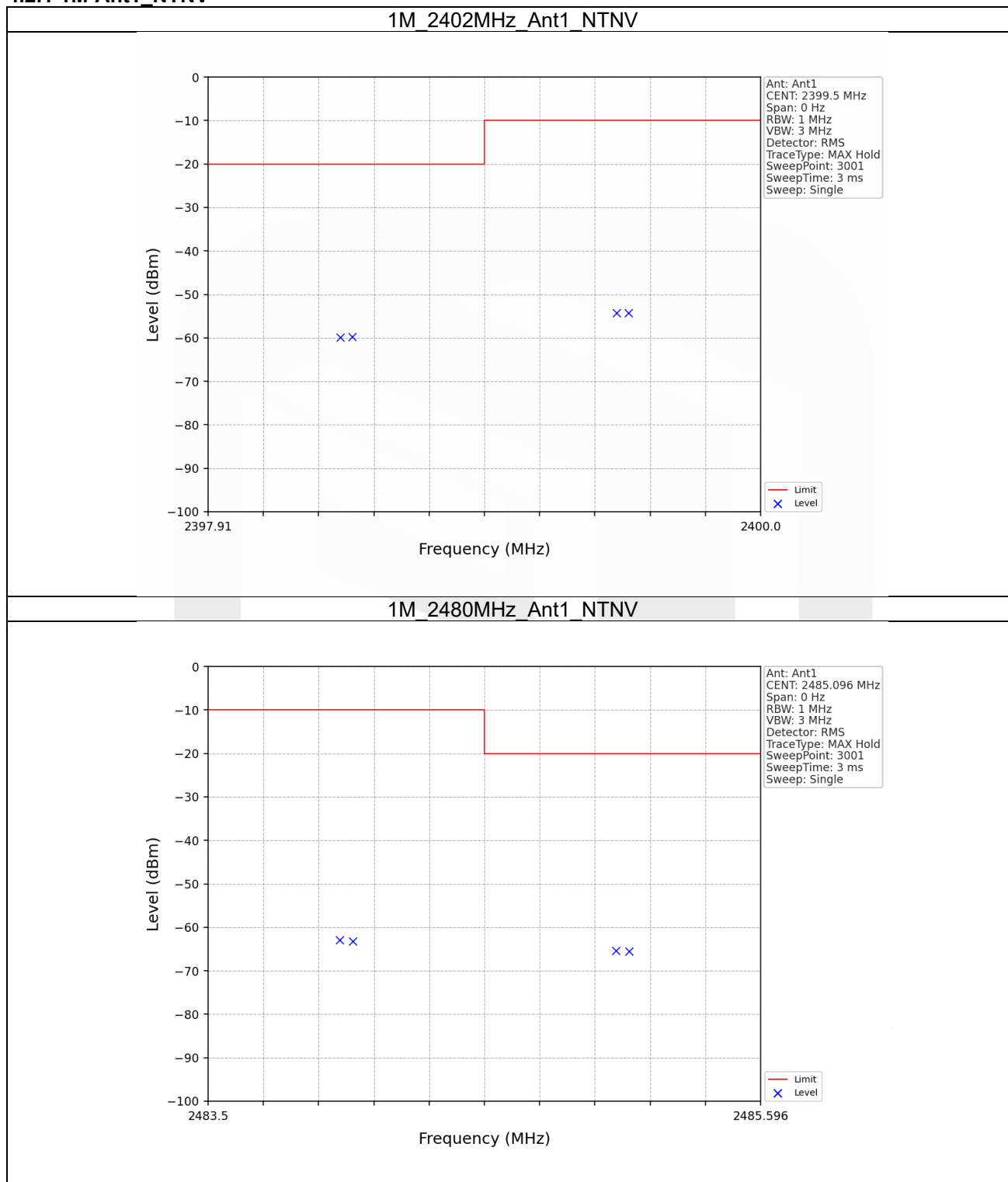
Ant1_NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
1M	SISO	2402	1	2398.410	-59.92	<=-20	Pass
				2398.455	-59.74	<=-20	Pass
				2399.455	-54.29	<=-10	Pass
				2399.500	-54.25	<=-10	Pass
		2480	1	2484.000	-62.91	<=-10	Pass
				2484.048	-63.14	<=-10	Pass
				2485.048	-65.31	<=-20	Pass
				2485.096	-65.48	<=-20	Pass

4.1.2 2M-Ant1_NTNV

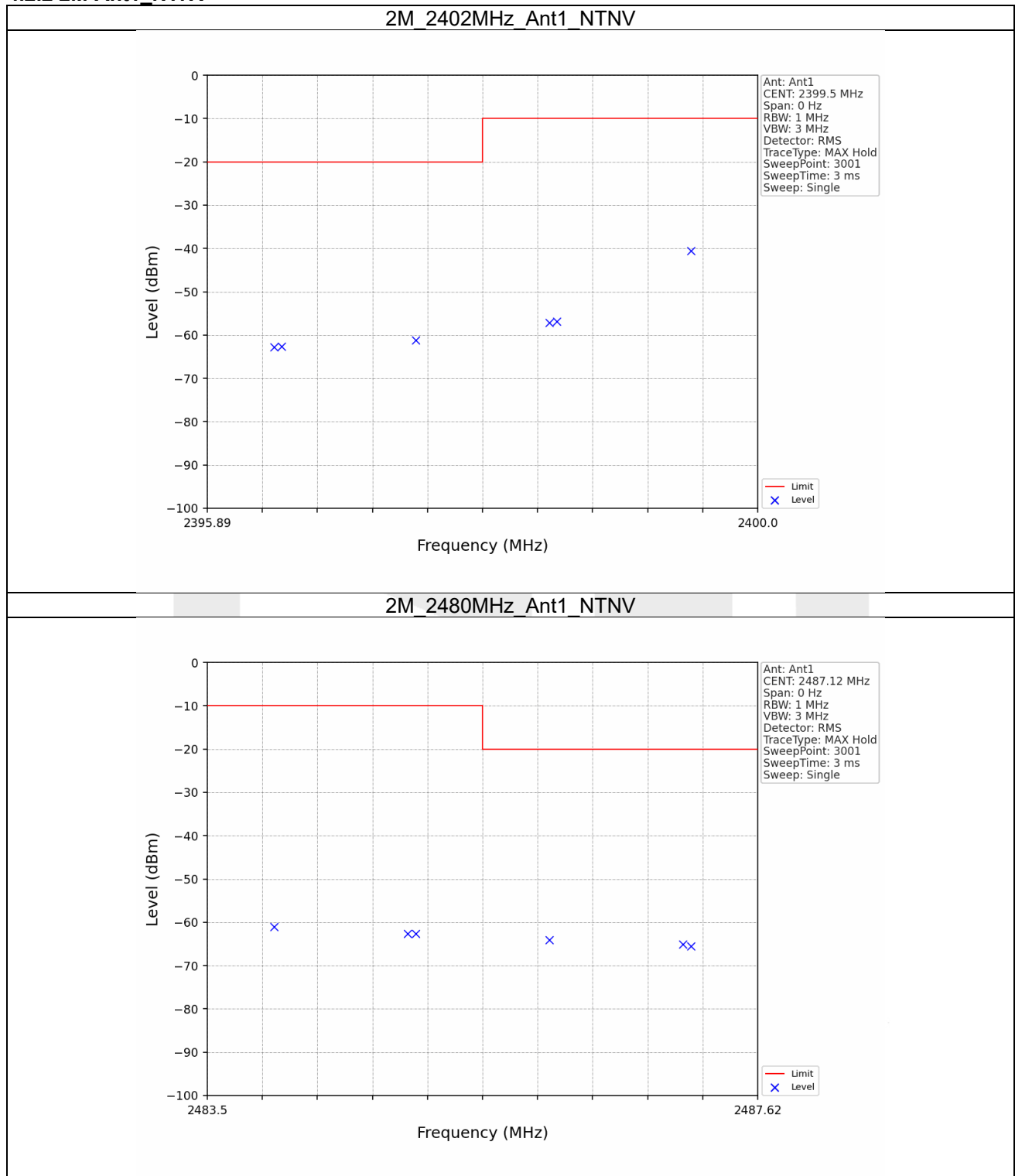
Ant1_NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
2M	SISO	2402	1	2396.390	-62.82	<=-20	Pass
				2396.445	-62.65	<=-20	Pass
				2397.445	-61.13	<=-20	Pass
				2398.445	-57.18	<=-10	Pass
				2398.500	-56.82	<=-10	Pass
				2399.500	-40.51	<=-10	Pass
		2480	1	2484.000	-60.99	<=-10	Pass
				2485.000	-62.69	<=-10	Pass
				2485.060	-62.69	<=-10	Pass
				2486.060	-64.14	<=-20	Pass
				2487.060	-65.05	<=-20	Pass
				2487.120	-65.50	<=-20	Pass

4.2 Test Graph

4.2.1 1M-Ant1_NTNV



4.2.2 2M-Ant1_NTNV



5. Transmitter Unwanted Emissions In The Spurious Domain

5.1 Test Result

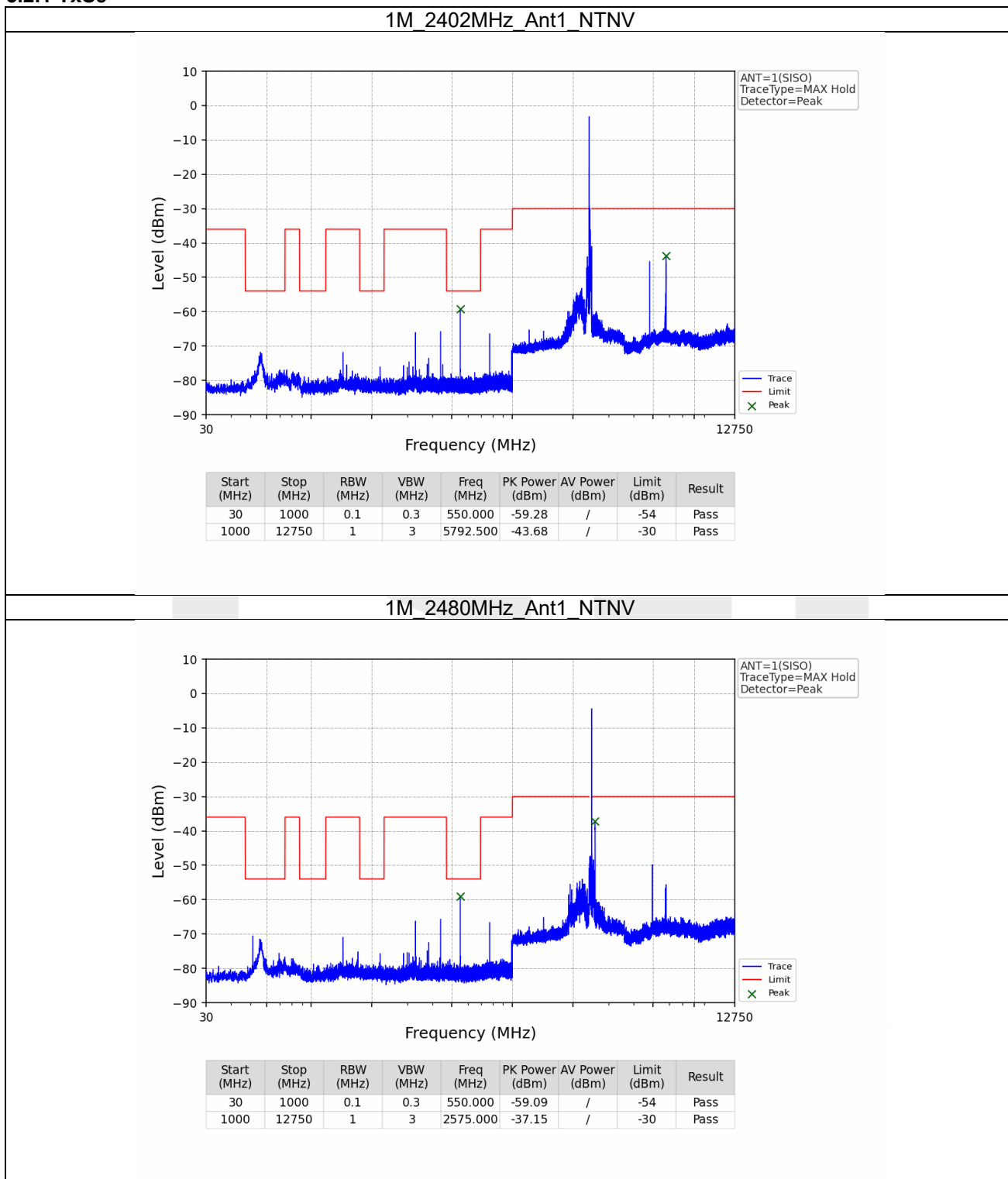
5.1.1 TxSe

ENV	Mode	TX Type	Frequency (MHz)	ANT	Test Result	Limit	Verdict
NTNV	1M	SISO	2402	1	Refer To Test Graph		Pass
			2480	1	Refer To Test Graph		Pass
	2M	SISO	2402	1	Refer To Test Graph		Pass
			2480	1	Refer To Test Graph		Pass

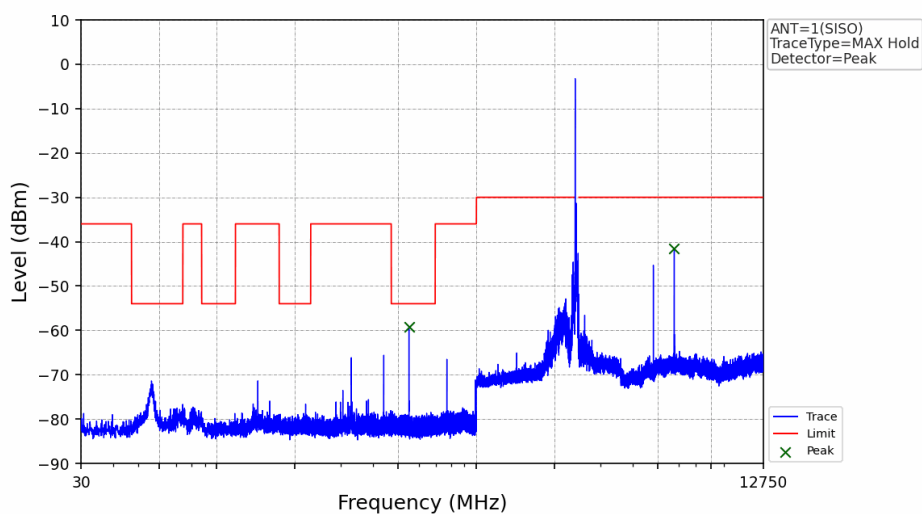


5.2 Test Graph

5.2.1 TxSe

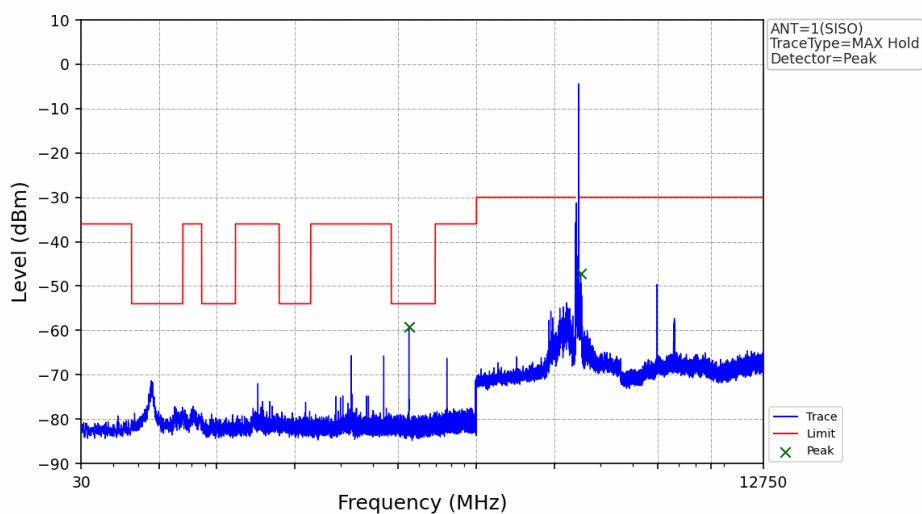


2M_2402MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-59.29	/	-54	Pass
1000	12750	1	3	5782.500	-41.55	/	-30	Pass

2M_2480MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-59.26	/	-54	Pass
1000	12750	1	3	2523.500	-47.24	/	-30	Pass

6. Receiver Spurious Emissions

6.1 Test Result

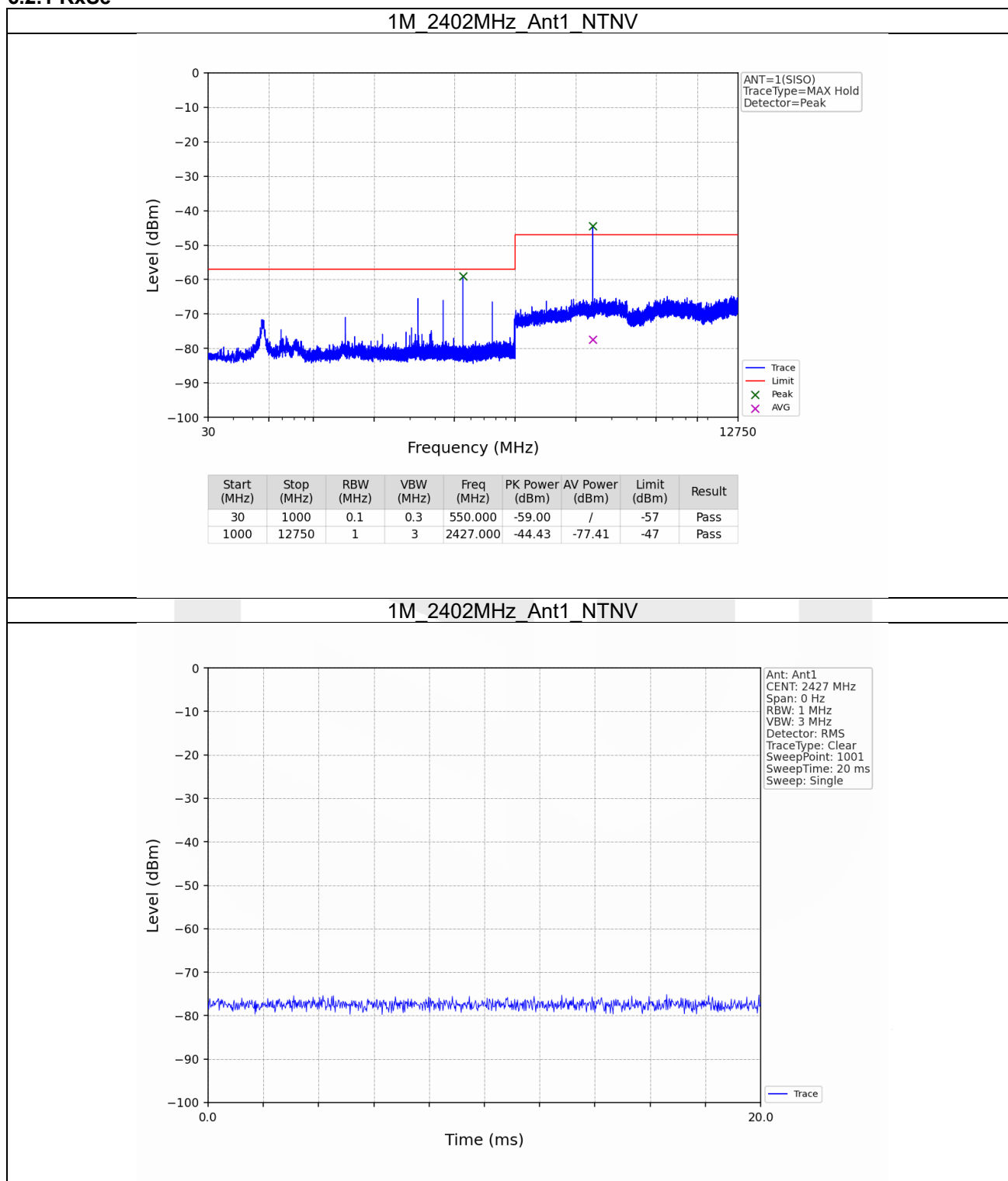
6.1.1 RxSe

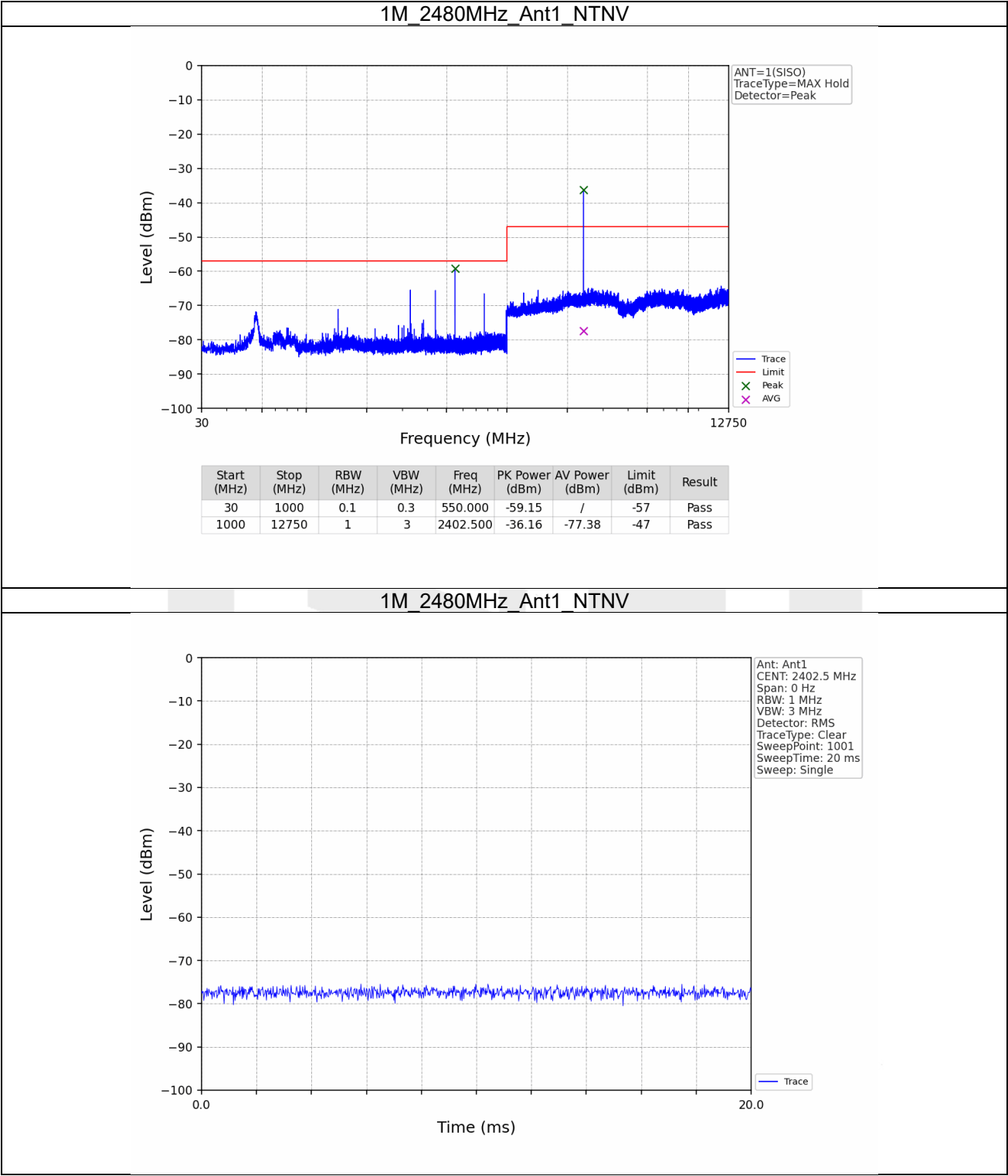
ENV	Mode	TX Type	Frequency (MHz)	ANT	Test Result	Limit	Verdict
NTNV	1M	SISO	2402	1	Refer To Test Graph		Pass
			2480	1	Refer To Test Graph		Pass
	2M	SISO	2402	1	Refer To Test Graph		Pass
			2480	1	Refer To Test Graph		Pass



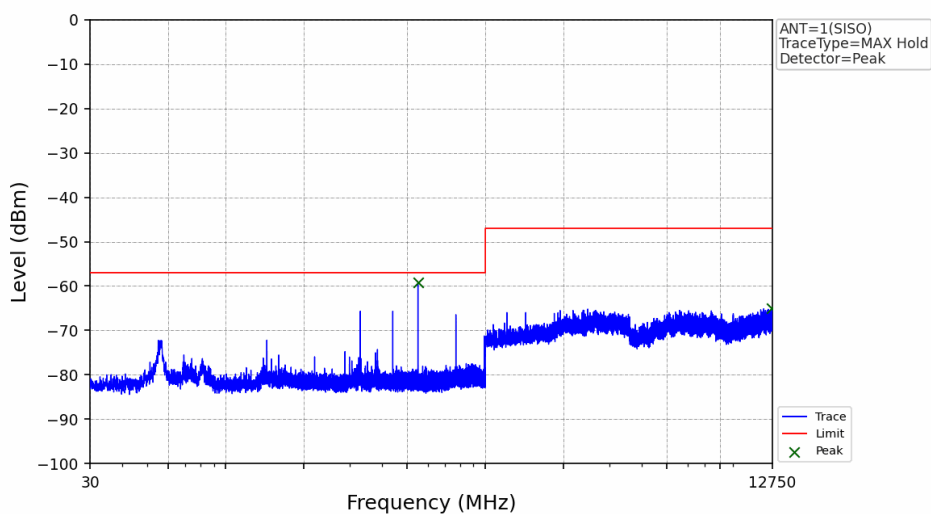
6.2 Test Graph

6.2.1 RxSe



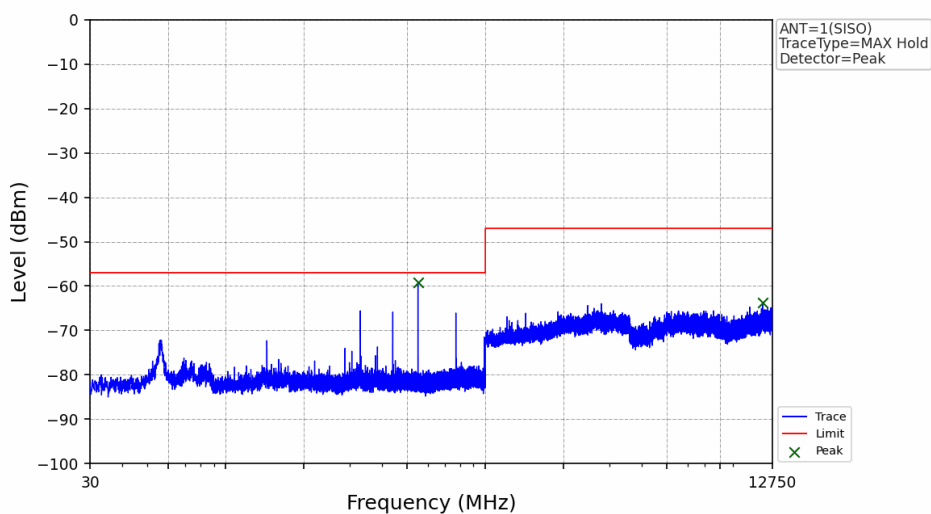


2M_2402MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-59.21	/	-57	Pass
1000	12750	1	3	12680.000	-64.99	/	-47	Pass

2M_2480MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-59.14	/	-57	Pass
1000	12750	1	3	11682.000	-63.79	/	-47	Pass

7. Receiver Blocking

Ant1									
ENV	Mode	TX Type	Frequency (MHz)	Wanted signal level (dBm)	Blocking Signal		PER (%)	Limit (%)	Verdict
					Frequency (MHz)	Power (dBm)			
NTNV	1M	SISO	2402	-64.36	2380	-29.55	0.10	<=10	Pass
					2504		0.09	<=10	Pass
					2300		0.07	<=10	Pass
					2584		0.08	<=10	Pass
			2480	-64.35	2380	-29.55	0.11	<=10	Pass
					2504		0.08	<=10	Pass
					2300		0.10	<=10	Pass
					2584		0.08	<=10	Pass

Note1: Receiver Category =2.

BLE 2:
1. RF Output Power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization
2.1 Test Result
2.1.1 Power

ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NTNV	1M	SISO	2402	1	2.67	-1.59	1.08	<=20	Pass
			2440	1	2.67	-1.66	1.01	<=20	Pass
			2480	1	2.67	-1.28	1.39	<=20	Pass
HTNV	1M	SISO	2402	1	2.67	-1.60	1.07	<=20	Pass
			2440	1	2.67	-1.66	1.01	<=20	Pass
			2480	1	2.67	-1.27	1.40	<=20	Pass
LTVN	1M	SISO	2402	1	2.67	-1.60	1.07	<=20	Pass
			2440	1	2.67	-1.67	1.00	<=20	Pass
			2480	1	2.67	-1.28	1.39	<=20	Pass

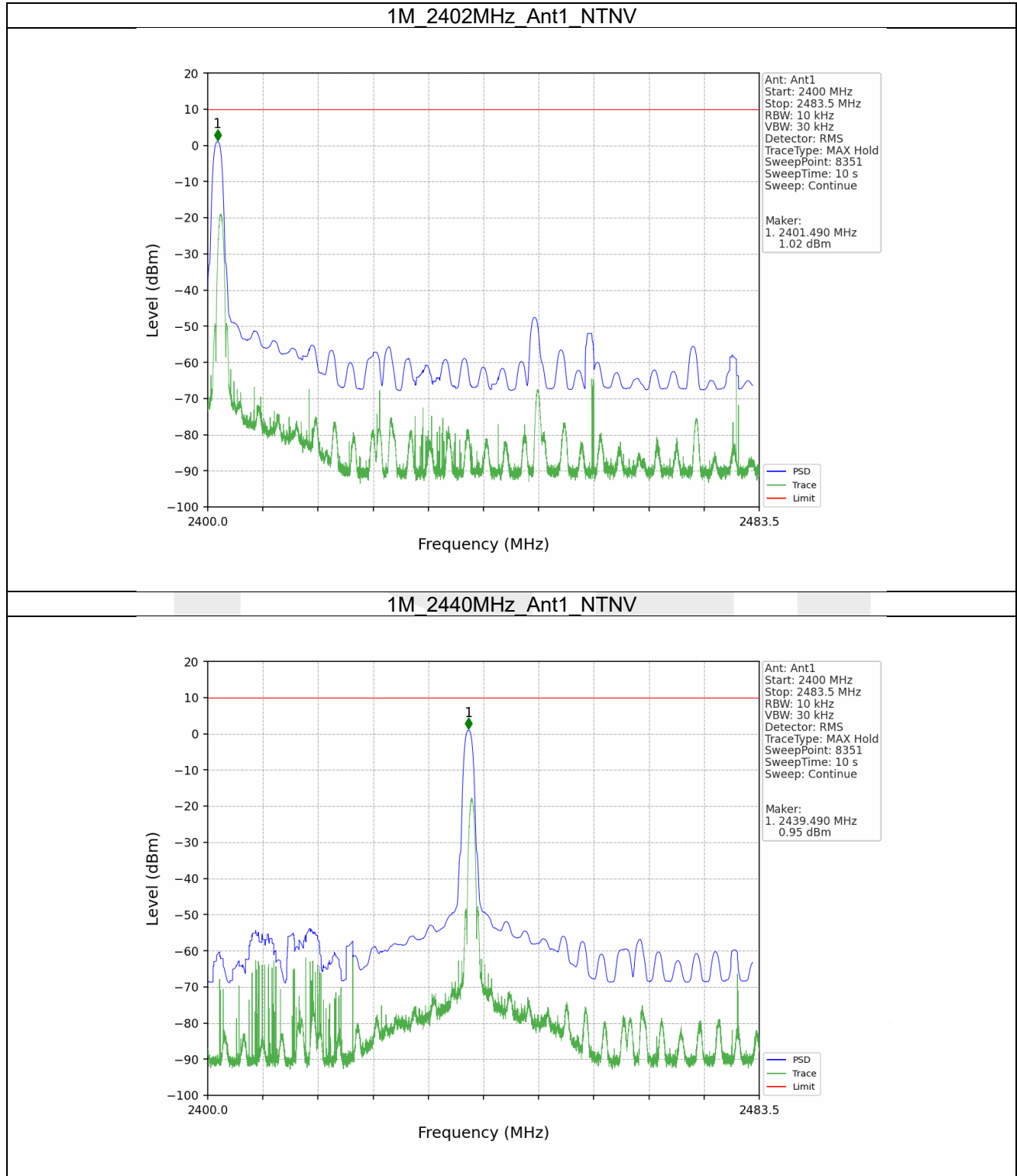
Note1: E.I.R.P = Measured Power + Antenna Gain

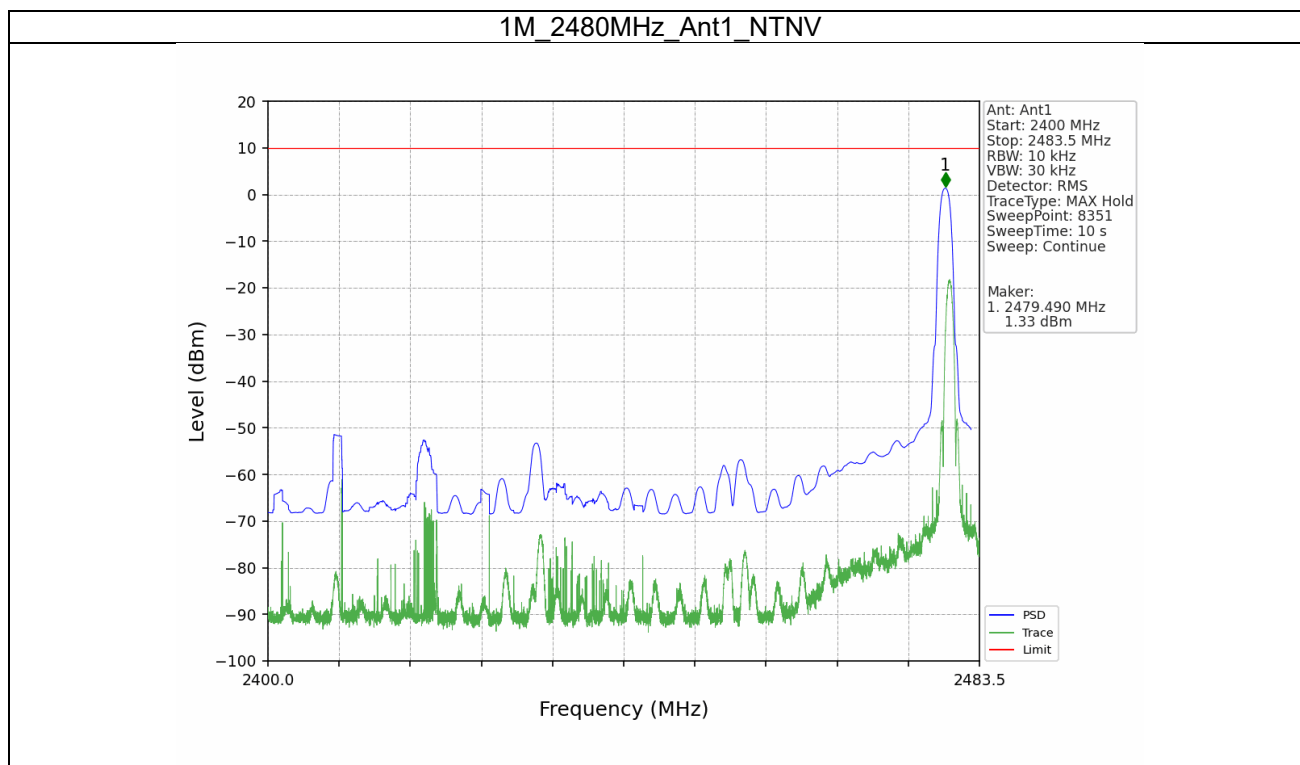
2. Power Spectral Density
2.1 Test Result
2.1.1 PSD

ENV	Mode	TX Type	Frequency (MHz)	ANT	E.I.R.PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NTNV	1M	SISO	2402	1	1.02	<=10	Pass
			2440	1	0.95	<=10	Pass
			2480	1	1.33	<=10	Pass

2.2 Test Graph

2.2.1 PSD





3. Occupied Channel Bandwidth

3.1 Test Result

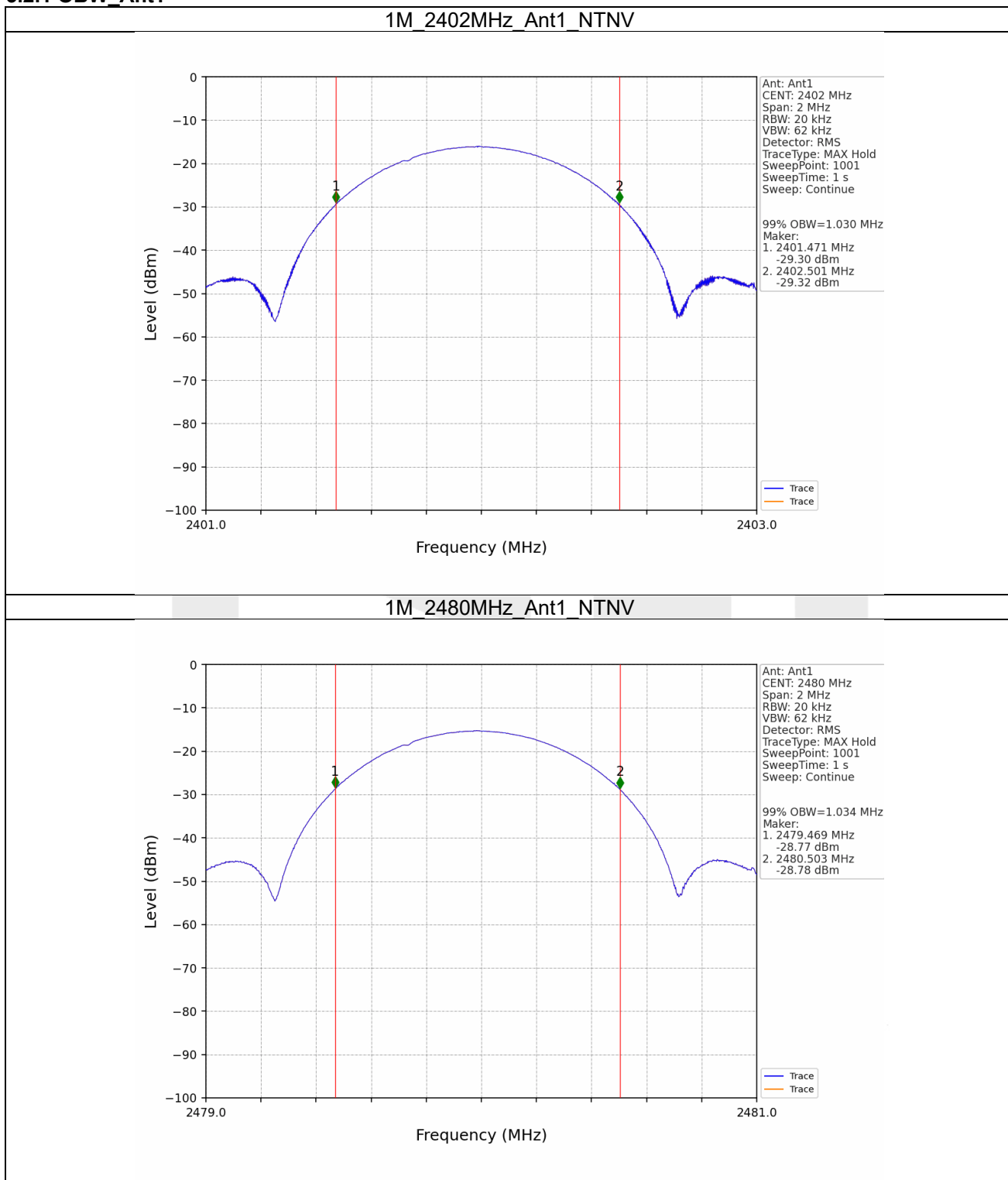
3.1.1 OBW_Ant1

Ant1								
ENV	Mode	TX Type	Frequency (MHz)	OBW (MHz)	Frequency Range (MHz)			Verdict
				Result	FL	FH	Limit	
NTNV	1M	SISO	2402	1.030	2401.471	/	>=2400	Pass
			2480	1.034	/	2480.503	<=2483.5	Pass



3.2 Test Graph

3.2.1 OBW_Ant1



4. Transmitter Unwanted Emissions In The Out-Of-Band Domain

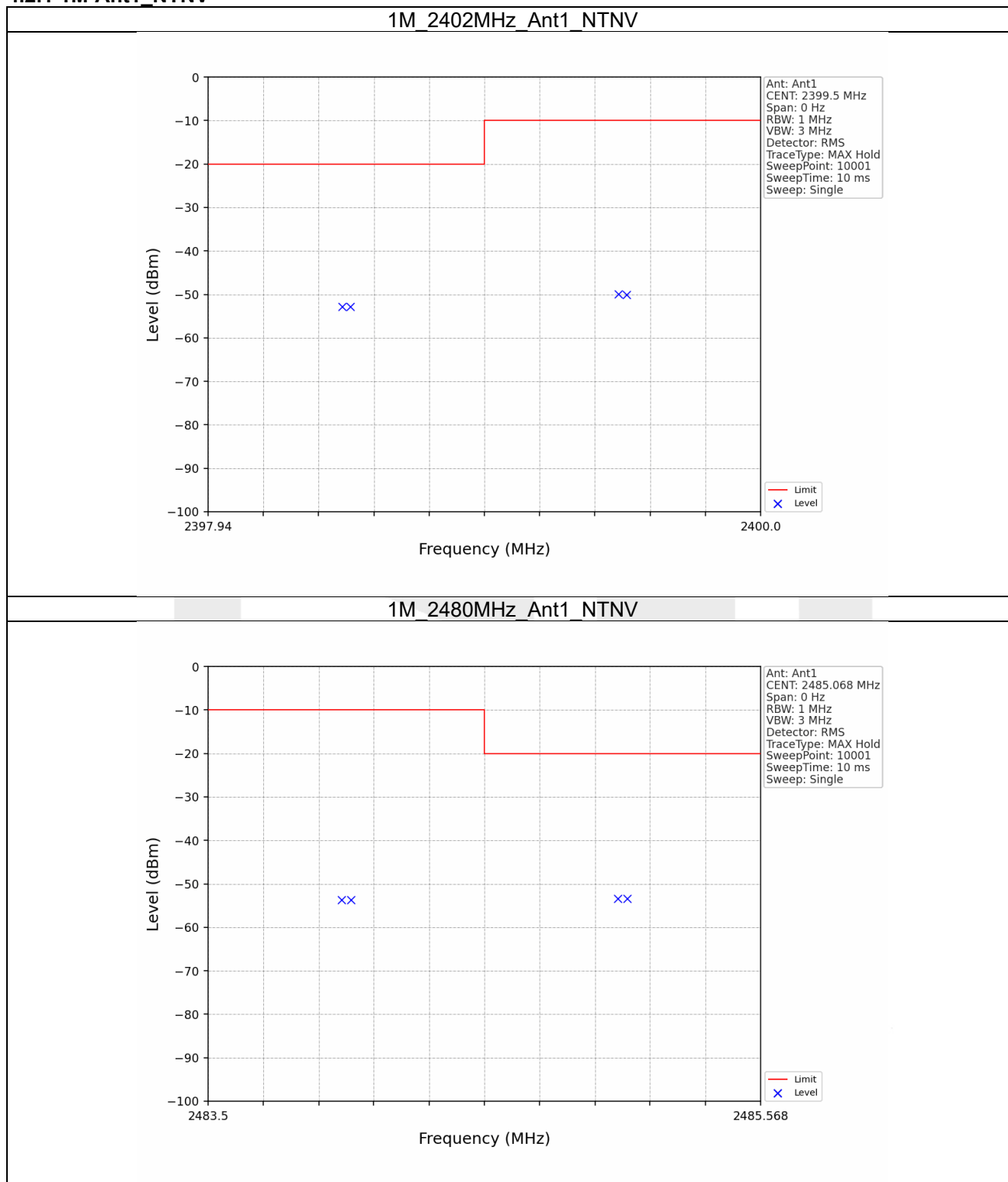
4.1 Test Result

4.1.1 1M-Ant1_NTNV

Ant1_NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
1M	SISO	2402	1	2398.440	-52.86	<=-20	Pass
				2398.470	-52.85	<=-20	Pass
				2399.470	-49.89	<=-10	Pass
				2399.500	-50.06	<=-10	Pass
		2480	1	2484.000	-53.70	<=-10	Pass
				2484.034	-53.68	<=-10	Pass
				2485.034	-53.46	<=-20	Pass
				2485.068	-53.37	<=-20	Pass

4.2 Test Graph

4.2.1 1M-Ant1_NTNV



5. Transmitter Unwanted Emissions In The Spurious Domain

5.1 Test Result

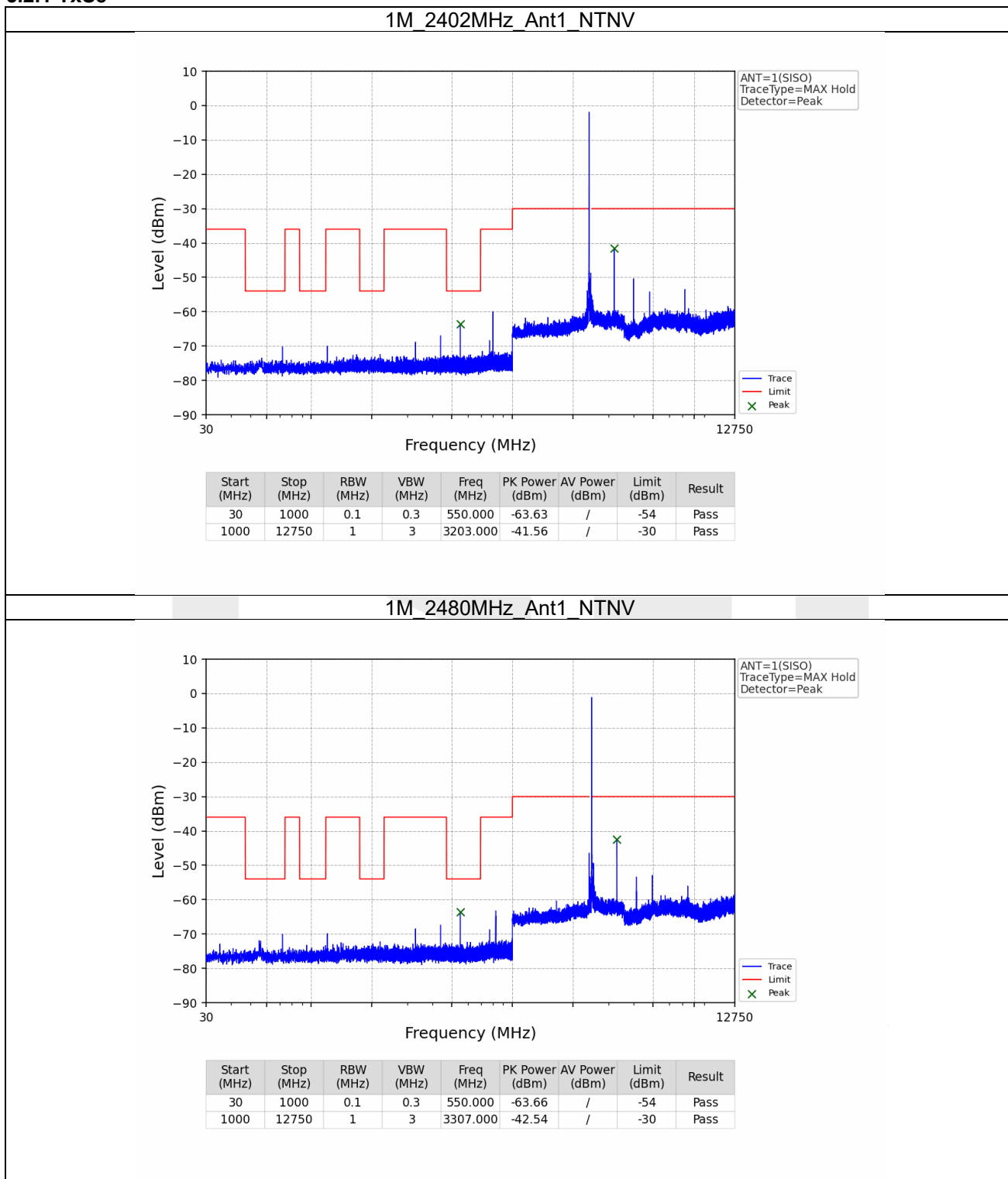
5.1.1 TxSe

ENV	Mode	TX Type	Frequency (MHz)	ANT	Test Result	Limit	Verdict
NTNV	1M	SISO	2402	1	Refer To Test Graph		Pass
			2480	1	Refer To Test Graph		Pass



5.2 Test Graph

5.2.1 TxSe



6. Receiver Spurious Emissions

6.1 Test Result

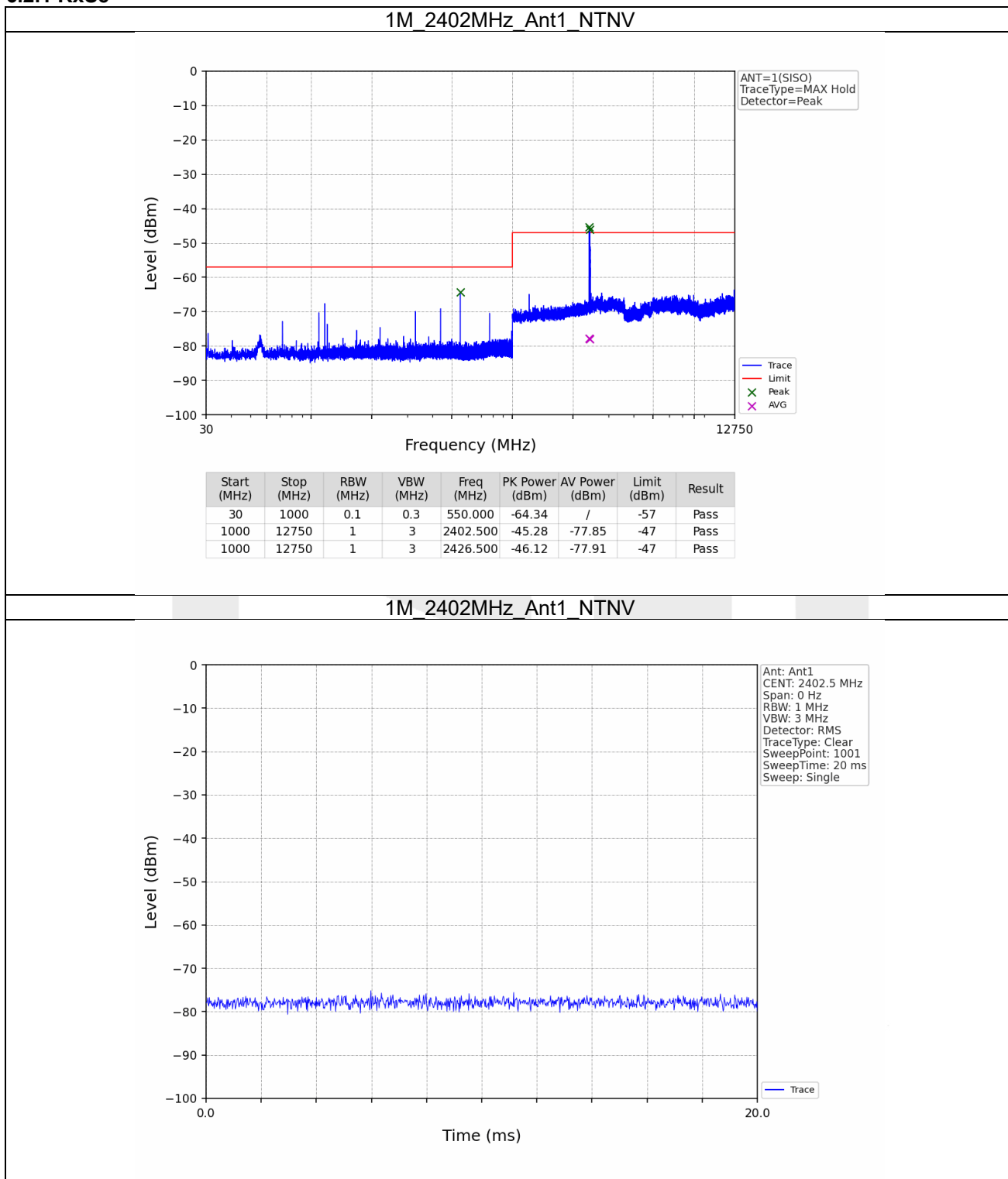
6.1.1 RxSe

ENV	Mode	TX Type	Frequency (MHz)	ANT	Test Result	Limit	Verdict
NTNV	1M	SISO	2402	1	Refer To Test Graph		Pass
			2480	1	Refer To Test Graph		Pass

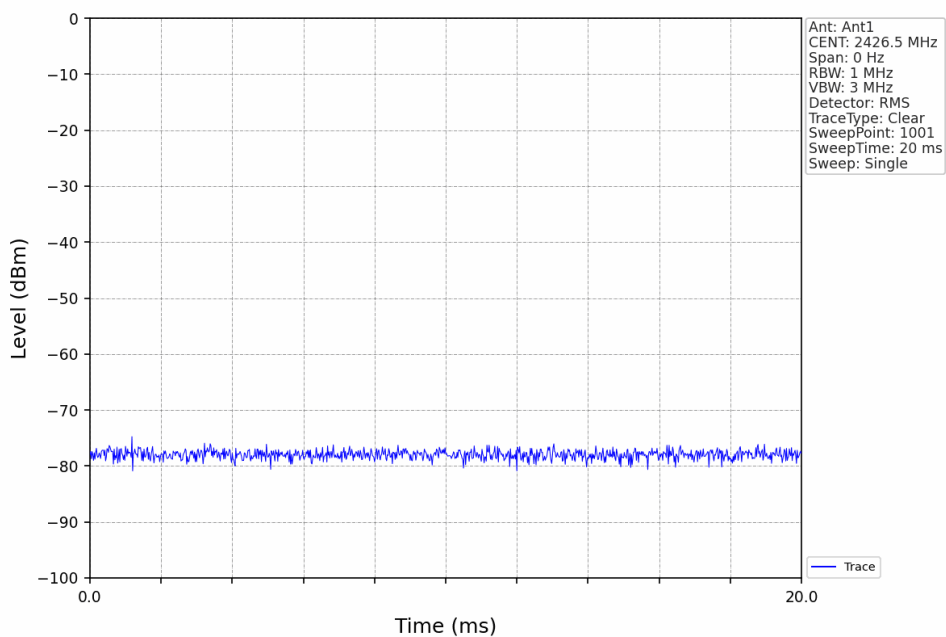


6.2 Test Graph

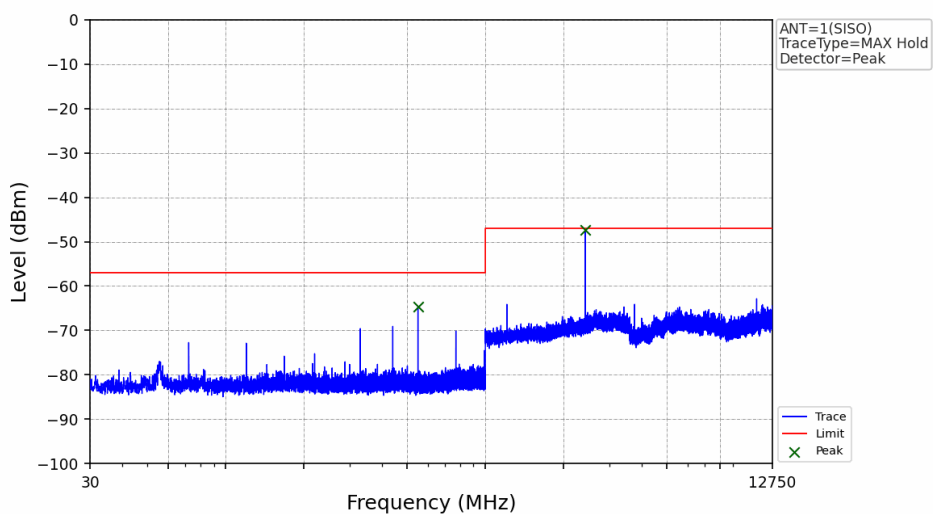
6.2.1 RxSe



1M_2402MHz_Ant1_NTNV



1M_2480MHz_Ant1_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-64.59	/	-57	Pass
1000	12750	1	3	2427.000	-47.30	/	-47	Pass

7. Receiver Blocking

Ant1									
ENV	Mode	TX Type	Frequency (MHz)	Wanted signal level (dBm)	Blocking Signal		PER (%)	Limit (%)	Verdict
					Frequency (MHz)	Power (dBm)			
NTNV	1M	SISO	2402	-66.20	2380	-31.33	0.10	<=10	Pass
					2504		0.10	<=10	Pass
					2300		0.09	<=10	Pass
					2584		0.08	<=10	Pass
			2480	-66.18	2380	-31.33	0.09	<=10	Pass
					2504		0.08	<=10	Pass
					2300		0.07	<=10	Pass
					2584		0.08	<=10	Pass

Note1: Receiver Category =2.

STATEMENT

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7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--- End of Report ---

TEST REPORT

Report No.: 8326EU010302W3

Applicant: Woan Technology (Shenzhen) Co., Ltd.

Address: Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang Sub-district,
Bao'an District, Shenzhen, Guangdong, P.R.China,
518100

Product Name: SwitchBot Hub 3

Model No.: W7202100 (refer to clause 2.4)

Trademark: SwitchBot

Test Standard(s): ETSI EN 300 328 V2.2.2 (2019-07)

Date of Receipt: Jan. 03, 2025

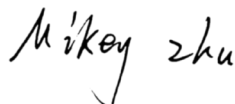
Test Date: Jan. 03, 2025 – Jan. 17, 2025

Date of Issue: Jan. 22, 2025

ISSUED BY:
SHENZHEN EU TESTING LABORATORY LIMITED



Prepared by:



Mikey Zhu/ Engineer

Reviewed and Approved by:



Sally Zhang/ Manager

Revision Record

Report Version	Issued Date	Description	Status
V0	Jan. 22, 2025	Original	Valid



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2 General Information

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description of E.U.T.

Product Name	SwitchBot Hub 3
Model No. Under Test	W7202100
List Model No.	W7202101, W7202102, W7202103, W7202104, W7202105
Description of Model differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in appearance and model name. (this information provided by the customer)
Rating(s)	Input: 5.0V---2.0A Output: 5V---0.5A, 2.5W (Adapter Input: 100-240V~, 50/60Hz, 0.35A Max; Output: 5.0V---2.0A 10.0W)
Adapter	Model: KA12C-0502000EU Input: 100-240V~, 50/60Hz, 0.35A Max Output: 5.0V---2.0A, 10.0W Manufacturer: SHENZHEN KEYU POWER SUPPLY TECHNOLOGY CO., LTD.
Test Sample No.	-1/2(Normal Sample), -2/2(Engineering Sample)
Hardware Version	N/A
Software Version	N/A
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.5 Technical Information of E.U.T.

Network and Wireless Connectivity	Bluetooth (BDR+EDR+BLE) WiFi 2.4G: 802.11b, 802.11g, 802.11n(HT20/40)
-----------------------------------	--

The requirement for the following technical information of the EUT was tested in this report:

Technology	WiFi 2.4G
Operation Mode	☒ b ☒ g ☒ n(HT20) ☒ n(HT40) ☐ ac(VHT20) ☐ ac(VHT40) ☐ ax(HEW20) ☐ ax(HEW40)
Operating Frequency	802.11b/g/n(HT20): 2412MHz to 2472MHz 802.11n(HT40): 2422MHz to 2462MHz
Number of Channels	802.11b/g/n(HT20): 13 Channels 802.11n(HT40): 9 Channels
Modulation Technology	DSSS, OFDM
Modulation Type	☒ 802.11b: DSSS (CCK, DQPSK, DBPSK) ☒ 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM) ☒ 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) ☐ 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) ☐ 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Antenna Type	FPC Antenna
Antenna Gain	3.14 dBi Max.
RF Output Power (EIRP)	16.08 dBm Max.
Receiver Category	1

All channels were listed on the following table:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
01	2412	05	2432	09	2452	13	3472
02	2417	06	2437	10	2457		
03	2422	07	2442	11	2462		
04	2427	08	2447	12	2467		

Modulation technology	Modulation Type	Transfer Rate (Mbps)(Single RF path)
DSSS (802.11b)	DBPSK	1
	DQPSK	2
	CCK	5.5/11
OFDM (802.11g)	BPSK	6/9
	QPSK	12/18
	16QAM	24/36
	64QAM	48/54
OFDM (802.11n-20 MHz)	BPSK	6.5/7.2
	QPSK	13/19.5/14.4/21.7
	16QAM	26/39/28.9/43.3
	64QAM	52/58.5/65/57.8/65/72.2
OFDM (802.11n-40 MHz)	BPSK	13.5/15
	QPSK	27/40.5/30/45
	16QAM	54/81/60/90
	64QAM	108/121.5/135/120/150

Note: Preliminary tests were performed in different data rate in above table to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	
RF output power	11b/11g/11n20/11n40	1/6/6.5/13.5Mbps	1/7/13	3/7/11
Power Spectral Density	11b/11g/11n20/11n40	1/6/6.5/13.5Mbps	1/7/13	3/7/11
Adaptivity (adaptive equipment using modulations other than FHSS)	11b/11g/11n20/11n40	1/6/6.5/13.5Mbps	1/13	3/11
Occupied Channel Bandwidth	11b/11g/11n20/11n40	1/6/6.5/13.5Mbps	1/13	3/11
Transmitter unwanted emissions in the out-of-band domain	11b/11g/11n20/11n40	1/6/6.5/13.5Mbps	1/13	3/11
Transmitter unwanted emissions in the spurious domain	11b/11g/11n20/11n40	1/6/6.5/13.5Mbps	1/13	3/11
Receiver spurious emissions	11b/11g/11n20/11n40	1/6/6.5/13.5Mbps	1/13	3/11
Receiver Blocking	11b	1 Mbps	1/13	

Mode	Channel	Channel Number	Frequency (MHz)
802.11b	HIGH/MIDDLE/LOW(H/M/L)	13/7/1	2472/2442/2412
802.11g	HIGH/MIDDLE/LOW(H/M/L)	13/7/1	2472/2442/2412
802.11n20	HIGH/MIDDLE/LOW(H/M/L)	13/7/1	2472/2442/2412
802.11n40	HIGH/MIDDLE/LOW(H/M/L)	11/7/3	2462/2442/2422

3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

No.	Identity	Document Title
1	ETSI EN 300 328 V2.2.2 (2019-07)	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

Remark:

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

3.2 Test Verdict

No.	Test Items	Clause No.	Verdict
Transmitter Items			
1	RF Output Power	4.3.2.2	PASS
2	Power Spectral Density	4.3.2.3	PASS
3	Duty Cycle, TX-Sequence, TX-gap	4.3.2.4	N/A
4	Medium Utilization (MU) factor	4.3.2.5	N/A
5	Adaptivity	4.3.2.6	PASS
6	Occupied Channel Bandwidth	4.3.2.7	PASS
7	Transmitter Unwanted Emissions in the Out-Of-Band Domain	4.3.2.8	PASS
8	Transmitter Unwanted Emissions in the Spurious Domain	4.3.2.9	PASS
Receiver Items			
10	Receiver spurious emissions	4.3.2.10	PASS
11	Receiver Blocking	4.3.2.11	PASS
12	Geo-location capability	4.3.2.12	N/A
Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.			

3.3 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China

4 Test Configuration

4.1 Test Environment

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	30% to 60%	
Atmospheric Pressure	86 kPa to 106 kPa	
Temperature	NT (Normal Temperature)	+15°C to +35°C
	Extreme Temperature	-10°C ~ 50°C Note ¹
Working Voltage of the EUT	NV (Normal Voltage)	230 VAC, 50Hz
	LV (Low Voltage)	207 VAC, 50Hz
	HV (High Voltage)	253 VAC, 50Hz
Note ¹ : The HT 50°C and LT -10°C was declared by manufacturer.		

4.2 Test Equipment

Radio Frequency (RF) Test					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2025/01/08	2026/01/07
Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	EE-007	2023/01/14	2026/01/13
Double Ridged Horn Antenna	A-INFOMW	LB-10180-NF	EE-008	2023/01/12	2026/01/11
Pre-amplifier	Agilent	8447D	EE-009	2025/01/08	2026/01/07
Pre-amplifier	Agilent	8449B	EE-010	2025/01/08	2026/01/07
MXA Signal Analyzer	Agilent	N9020A	EE-011	2025/01/08	2026/01/07
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2025/01/08	2026/01/07
Test Software	Farad	EZ-EMC	EE-015	N.C.R	N.C.R
MIMO Power Measurement Module	TSTPASS	TSPS 2023R	EE-016	2025/01/08	2026/01/07
RF Test Software	TSTPASS	TS32893 V2.0	EE-017	N.C.R	N.C.R
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	EE-402	2024/02/15	2025/02/14
MXG RF Analog Signal Generator	Agilent	N5181A	EE-406	2024/02/15	2025/02/14
Power Meter	Anritsu	ML2495A	EE-416	2024/02/15	2025/02/14
Constant Temperature Humidity Chamber	Guangxin	GXP-401	ES-002	2024/07/30	2025/07/29

4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Adapter	refer to clause 2.4	refer to clause 2.4	--

4.4 Test Mode

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

No.	Test Modes	Description
TM1	802.11b mode	Keep the EUT in 802.11b transmitting mode.
TM2	802.11g mode	Keep the EUT in 802.11g transmitting mode.
TM3	802.11n(HT20) mode	Keep the EUT in 802.11n(HT20) transmitting mode.
TM4	802.11n(HT40) mode	Keep the EUT in 802.11n(HT40) transmitting mode.

4.5 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

Test Item	Measurement Uncertainty
Conducted Emission	2.64 dB
Occupied Channel Bandwidth	2.8 %
RF output power, conducted	0.68 dB
Power Spectral Density, conducted	1.37 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.11 dB
Temperature	0.8°C
Humidity	4%

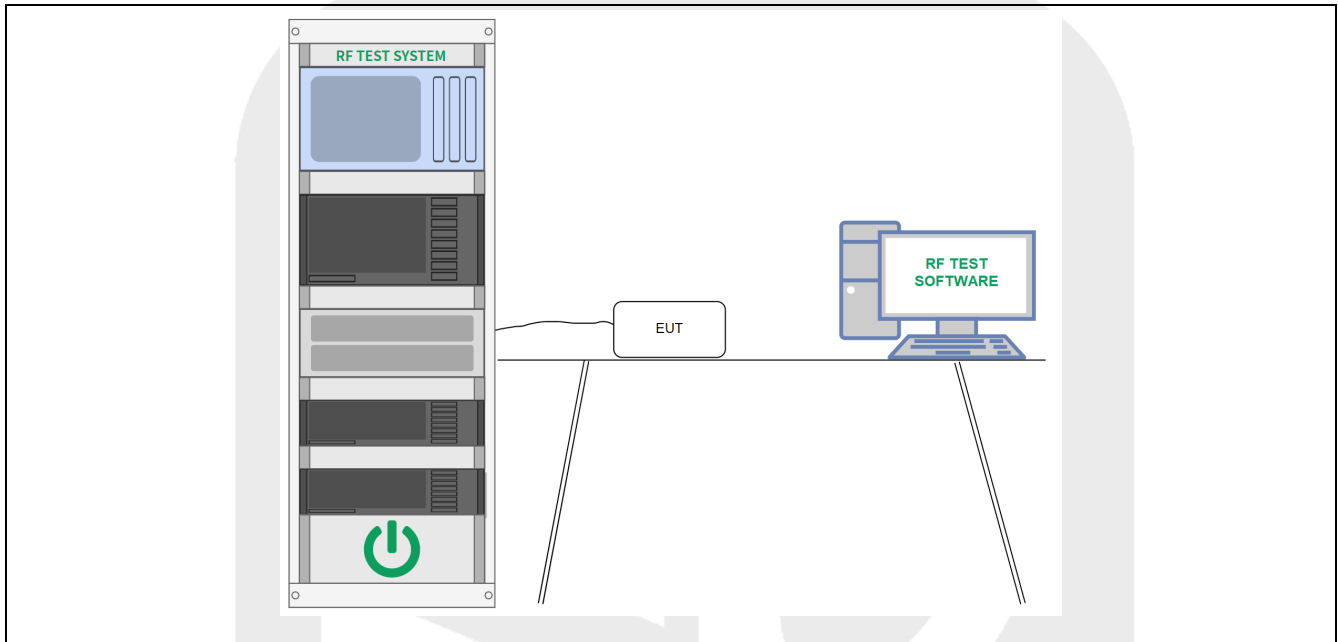
5 Test Items

5.1 RF Output Power

5.1.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.2.2
Test Requirement	The RF output power for non-FHSS equipment shall be equal to or less than 20 dBm.

5.1.2 Test Setup Diagram



5.1.3 Test Procedure

Refer to clause 5.4.2.2.1 of ETSI EN 300 328 V2.2.2:

1. Run a test program to control EUT transmitting at specific channel.
2. Connect the power sensor to the transmit port
3. Power Meter was setting as below:
Sample speed: 1 MS/s
Number of bursts: at least 10bursts
Detector: RMS
4. A power meter was used to read the response of the power sensor
5. Define Start time and Stop time of a burst by 30dB below the highest value of the stores samples.
6. Find the highest burst value
7. Record the power level
EIRP = antenna gain + power level of step 7.

5.1.4 Test Data

PASS.

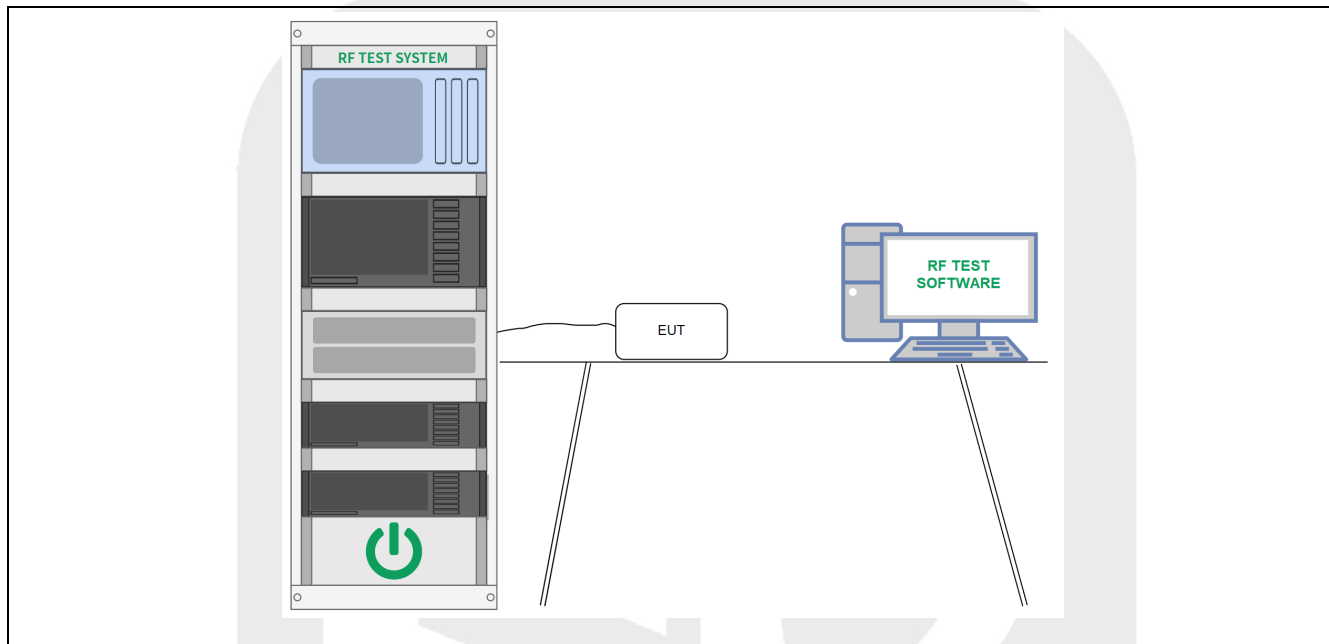
Please refer to Annex D for details.

5.2 Power Spectral Density

5.2.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.2.3
Test Requirement	The Power Spectral Density (PSD) is the mean equivalent isotropically radiated power (e.i.r.p.) spectral density in a 1 MHz bandwidth during a transmission burst. The maximum Power Spectral Density for non-FHSS equipment is 10 dBm per MHz.

5.2.2 Test Setup Diagram



5.2.3 Test Procedure

Refer to clause 5.4.3 of ETSI EN 300 328 V2.2.2:

The test procedure shall be as follows:

Connect the UUT to the spectrum analyser and use the following settings:

Start Frequency: 2 400 MHz

Stop Frequency: 2 483,5 MHz

Resolution BW: 10 kHz

Video BW: 30 kHz

Sweep Points: >8 350; for spectrum analysers not supporting this number of sweep points, the frequency band may be segmented.

Detector: RMS

Trace Mode: Max Hold

5.2.4 Test Data

PASS.

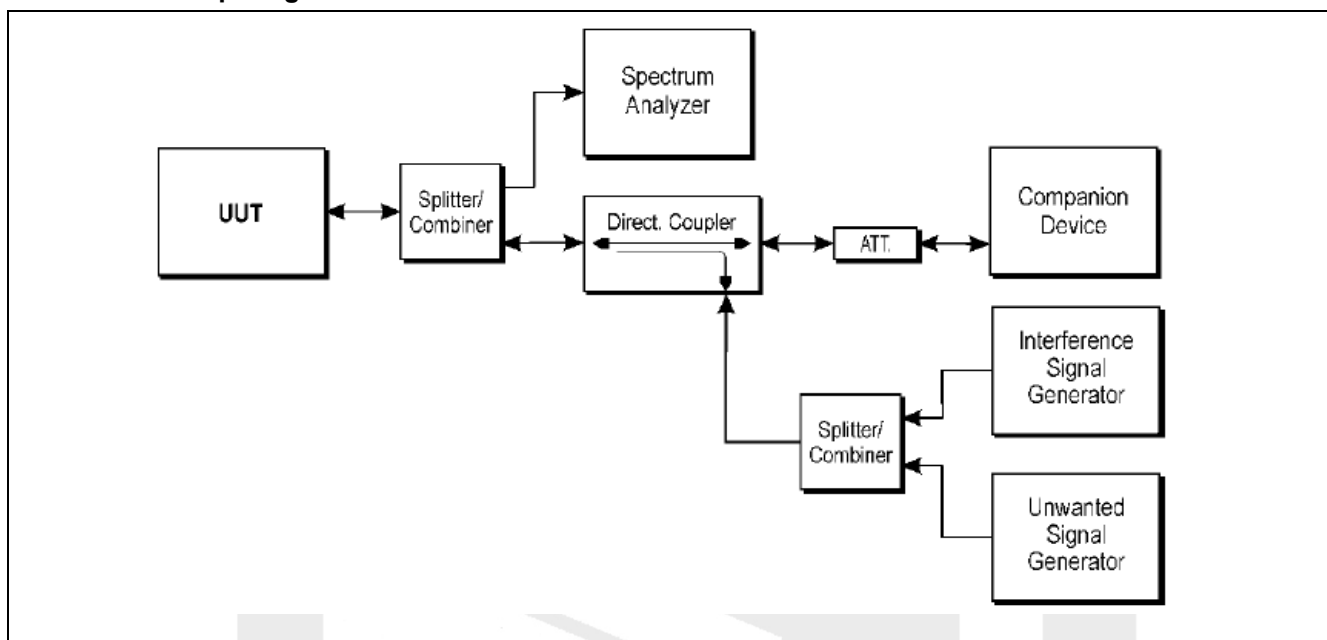
Please refer to Annex D for details.

5.3 Adaptivity

5.3.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.2.6
Test Requirement	These measurements shall only be performed at normal test conditions. When supported by the operating frequency range of the equipment, this test shall be performed on two operating (hopping) frequencies randomly selected from the operating frequencies used by the equipment. The first (lower) frequency shall be randomly selected within the range 2 400 MHz to 2 442 MHz while the second (higher) frequency shall be randomly selected within the range 2 442 MHz to 2 483,5 MHz. The equipment shall be in a normal operating (hopping) mode. For equipment which can operate in an adaptive and a non-adaptive mode, it shall be verified that prior to the test, the equipment is operating in the adaptive mode. The equipment shall be configured in a mode that results in the longest Channel Occupancy Time. Non-LBT based Detect and Avoid: 1 The frequency shall remain unavailable for a minimum time equal to 1 second after which the channel maybe considered again as an 'available' channel; 2 COT ≤ 40 ms; 3 Idle Period = 5% of COT; 4 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{\text{out}})$ (P_{out} in mW E.I.R.P) LBT based Detect and Avoid (Frame Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time ≤ 18 us; 2 CCA observation time declared by the supplier; 3 COT = 1~10 ms; 4 Idle Period $\geq 5\%$ of COT; 5 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{\text{out}})$ (P_{out} in mW E.I.R.P) LBT based Detect and Avoid (Load Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time ≥ 18 us; 2 CCA declared by the manufacturer; 3 Detection threshold level = $-70\text{dBm/MHz} + 10 \cdot \log(100\text{mW}/P_{\text{out}})$ (P_{out} in mW E.I.R.P) Short Control Signalling Transmissions: Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within any bservation period of 50ms.

5.3.2 Test Setup Diagram



5.3.3 Test Procedure

Refer to clause 5.4.6 of ETSI EN 300 328 V2.2.2 for details.

5.3.4 Test Data

PASS.

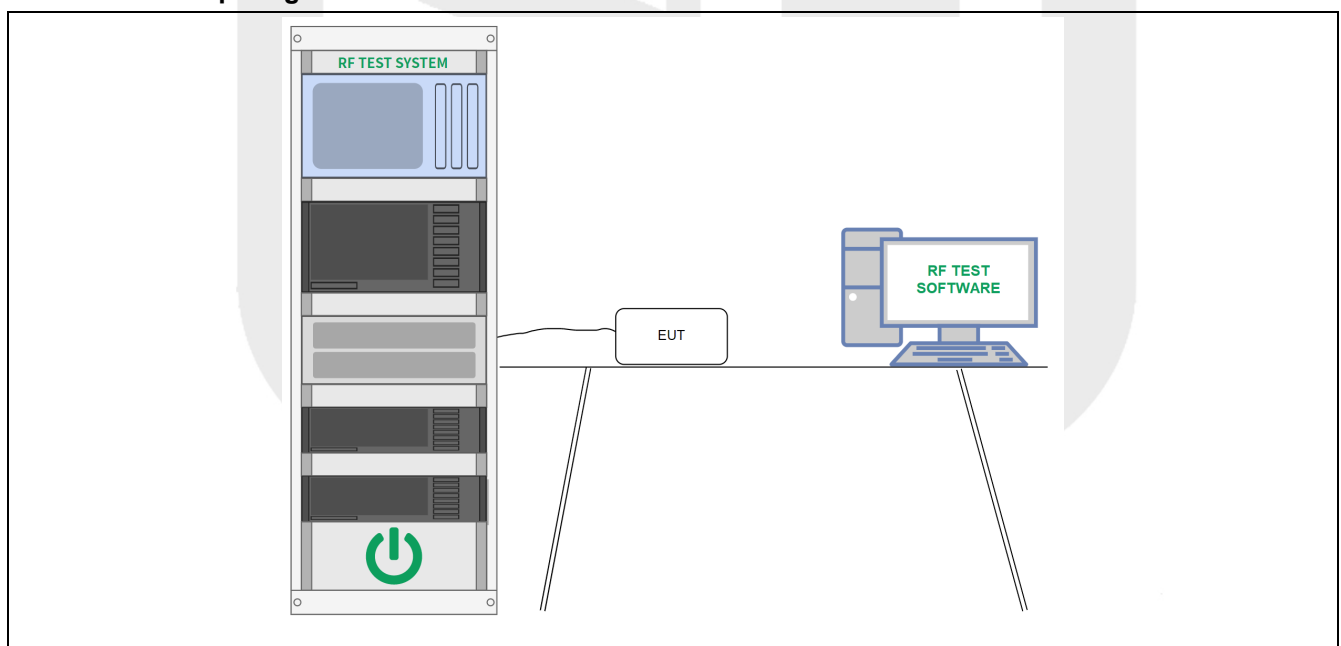
Please refer to Annex D for details.

5.4 Occupied Channel Bandwidth

5.4.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.2.7		
Test Requirement	The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal. The Occupied Channel Bandwidth shall be within the band given in table 1. In addition, for non-adaptive non-FHSS equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth shall be equal to or less than 20 MHz.		
	Condition		Limit
	All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz.
	Additional requirement	For non-adaptive using wide band modulations other than FHSS system and e.i.r.p > 10dBm	Less than 20MHz
		For non-adaptive Frequency Hoppingsystem and e.i.r.p > 10dBm.	Less than 5MHz

5.4.2 Test Setup Diagram



5.4.3 Test Procedure

Refer to clause 5.4.7 of ETSI EN 300 328 V2.2.2:

Connect the UUT to the spectrum analyser and use the following settings:

Centre Frequency: The centre frequency of the channel under test

Resolution BW: ~ 1 % of the span without going below 1 %

Video BW: 3×RBW

Frequency Span: 2 × Nominal Channel Bandwidth

Detector Mode: RMS

Trace Mode: Max Hold

Sweep time: 1 s

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

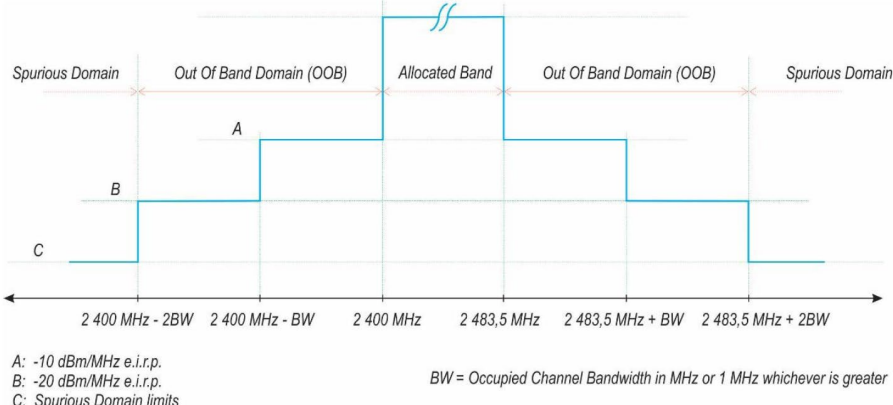
5.4.4 Test Data

PASS.

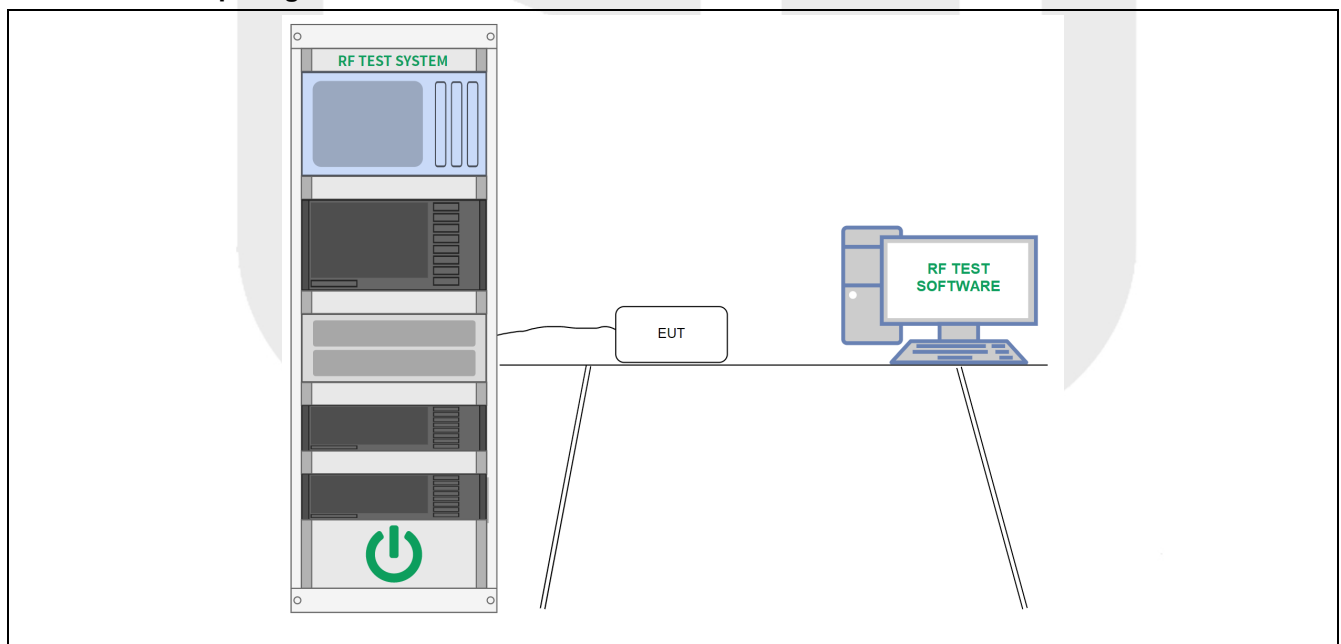
Please refer to Annex D for details.

5.5 Transmitter Unwanted Emissions in the out-of-band Domain

5.5.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.2.8
Test Requirement	Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the allocated band , but excluding unwanted emissions in the spurious domain. The transmitter unwanted emissions in the out-of-band domain shall not exceed the values provided by the mask in figure 3.  A: -10 dBm/MHz e.i.r.p. B: -20 dBm/MHz e.i.r.p. C: Spurious Domain limits BW = Occupied Channel Bandwidth in MHz or 1 MHz whichever is greater

5.5.2 Test Setup Diagram



5.5.3 Test Procedure

Refer to clause 5.4.8 of ETSI EN 300 328 V2.2.2:

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:
 - Measurement Mode: Time Domain Power
 - Centre Frequency: 2 484 MHz
 - Span: Zero Span
 - Resolution BW: 1 MHz
 - Filter mode: Channel filter
 - Video BW: 3 MHz
 - Detector Mode: RMS
 - Trace Mode: Max Hold
 - Sweep Mode: Single Sweep
 - Sweep Points: Sweep time [μs] / (1 μs) with a maximum of 30 000
 - Trigger Mode: Video
 - Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power.

Step 2 (segment 2 483,5 MHz to 2 483,5 MHz + BW):

- The measurement shall be performed and repeated while the trigger level is increased until no triggering takes place.
- For FHSS equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
 - Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
- Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
- Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3 (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW):

- Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

- Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2 BW to 2 400 MHz - BW):

- Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2 BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2 BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 6:

- In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain G in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
 - In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain G in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
- Comparison with the applicable limits shall be done using any of the options given below:
- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain Y in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.
 - Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by $10 \times \log_{10}(A_{ch})$ and the additional beamforming gain Y in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE: A_{ch} refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

5.5.4 Test Data

PASS.

Please refer to Annex D for details.

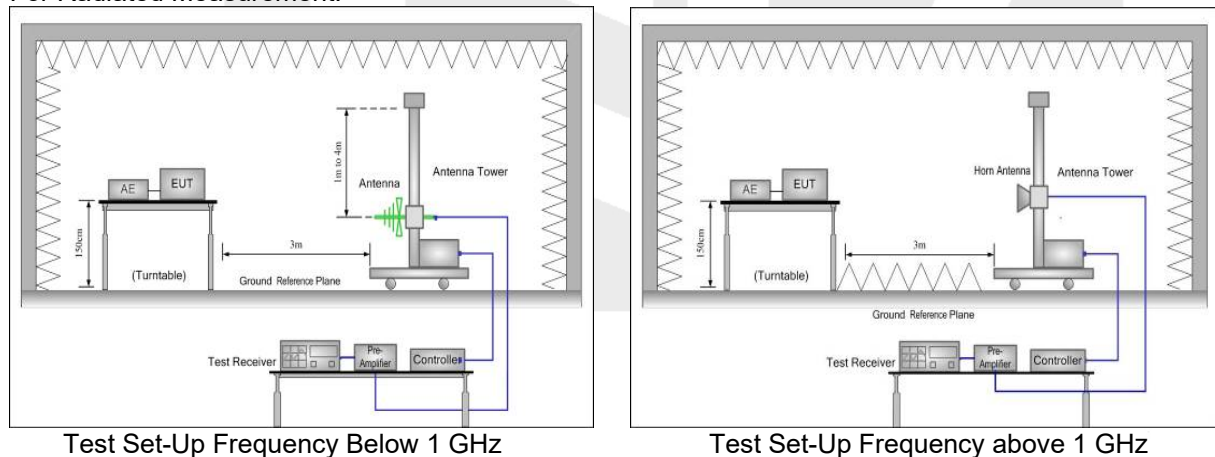
5.6 Transmitter Unwanted Emissions in the Spurious Domain

5.6.1 Test Requirement

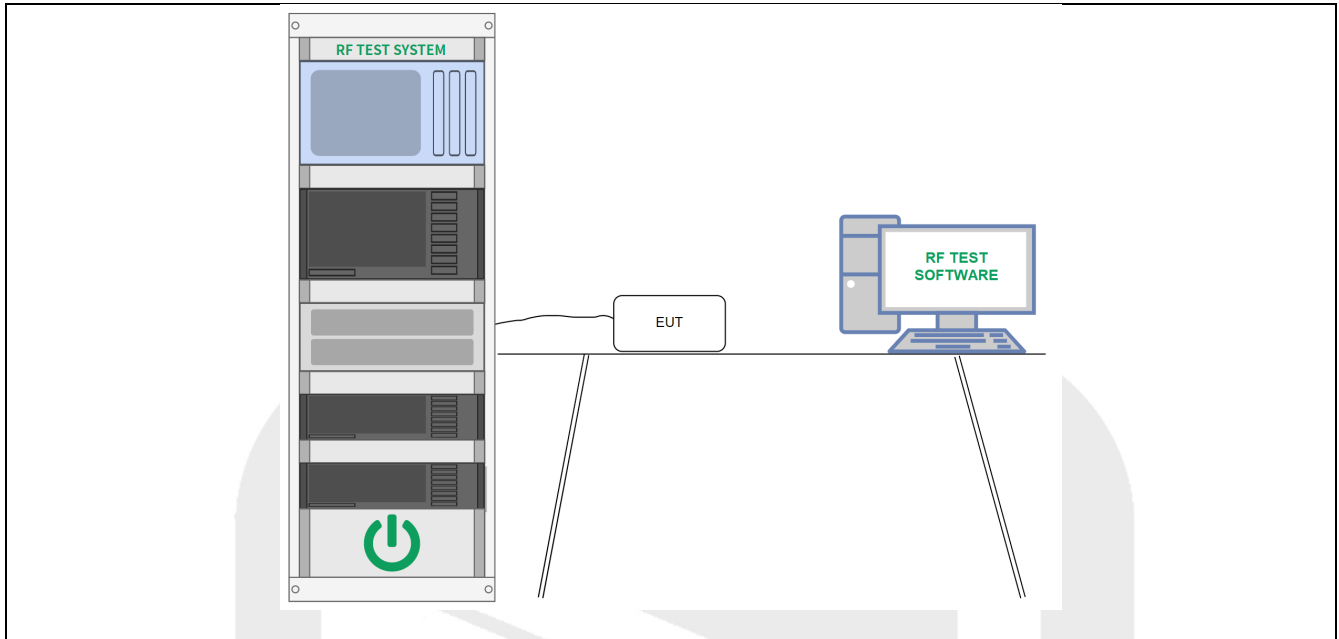
Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.2.9																																
Test Requirement	The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 12. In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.																																
	Table 12: Transmitter limits for spurious emissions <table><tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr><tr><td>30 MHz to 47 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>47 MHz to 74 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>74 MHz to 87,5 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>87,5 MHz to 118 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>118 MHz to 174 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>174 MHz to 230 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>230 MHz to 470 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>470 MHz to 694 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr><tr><td>694 MHz to 1 GHz</td><td>-36 dBm</td><td>100 kHz</td></tr><tr><td>1 GHz to 12,75 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr></table>	Frequency range	Maximum power	Bandwidth	30 MHz to 47 MHz	-36 dBm	100 kHz	47 MHz to 74 MHz	-54 dBm	100 kHz	74 MHz to 87,5 MHz	-36 dBm	100 kHz	87,5 MHz to 118 MHz	-54 dBm	100 kHz	118 MHz to 174 MHz	-36 dBm	100 kHz	174 MHz to 230 MHz	-54 dBm	100 kHz	230 MHz to 470 MHz	-36 dBm	100 kHz	470 MHz to 694 MHz	-54 dBm	100 kHz	694 MHz to 1 GHz	-36 dBm	100 kHz	1 GHz to 12,75 GHz	-30 dBm
Frequency range	Maximum power	Bandwidth																															
30 MHz to 47 MHz	-36 dBm	100 kHz																															
47 MHz to 74 MHz	-54 dBm	100 kHz																															
74 MHz to 87,5 MHz	-36 dBm	100 kHz																															
87,5 MHz to 118 MHz	-54 dBm	100 kHz																															
118 MHz to 174 MHz	-36 dBm	100 kHz																															
174 MHz to 230 MHz	-54 dBm	100 kHz																															
230 MHz to 470 MHz	-36 dBm	100 kHz																															
470 MHz to 694 MHz	-54 dBm	100 kHz																															
694 MHz to 1 GHz	-36 dBm	100 kHz																															
1 GHz to 12,75 GHz	-30 dBm	1 MHz																															

5.6.2 Test Setup Diagram

For Radiated Measurement:



For Conducted Measurement:



5.6.3 Test Procedure

Refer to clause 5.4.9 of ETSI EN 300 328 V2.2.2:

Step 1:

The sensitivity of the measurement set-up should be such that the noise floor is at least 12 dB below the limits given in table 4 or table 12.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 19\,400$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.

For FHSS equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

The above sweep time setting may result in long measuring times in case of FHSS equipment. To avoid such long measuring times, an FFT analyser may be used.

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 1 MHz

- Video bandwidth: 3 MHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 23\,500$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

Step 4:

- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach). The limits used to identify emissions during this pre-scan need to be reduced by $10 \times \log_{10}(\text{Ach})$.

5.6.4 Test Data**PASS.**

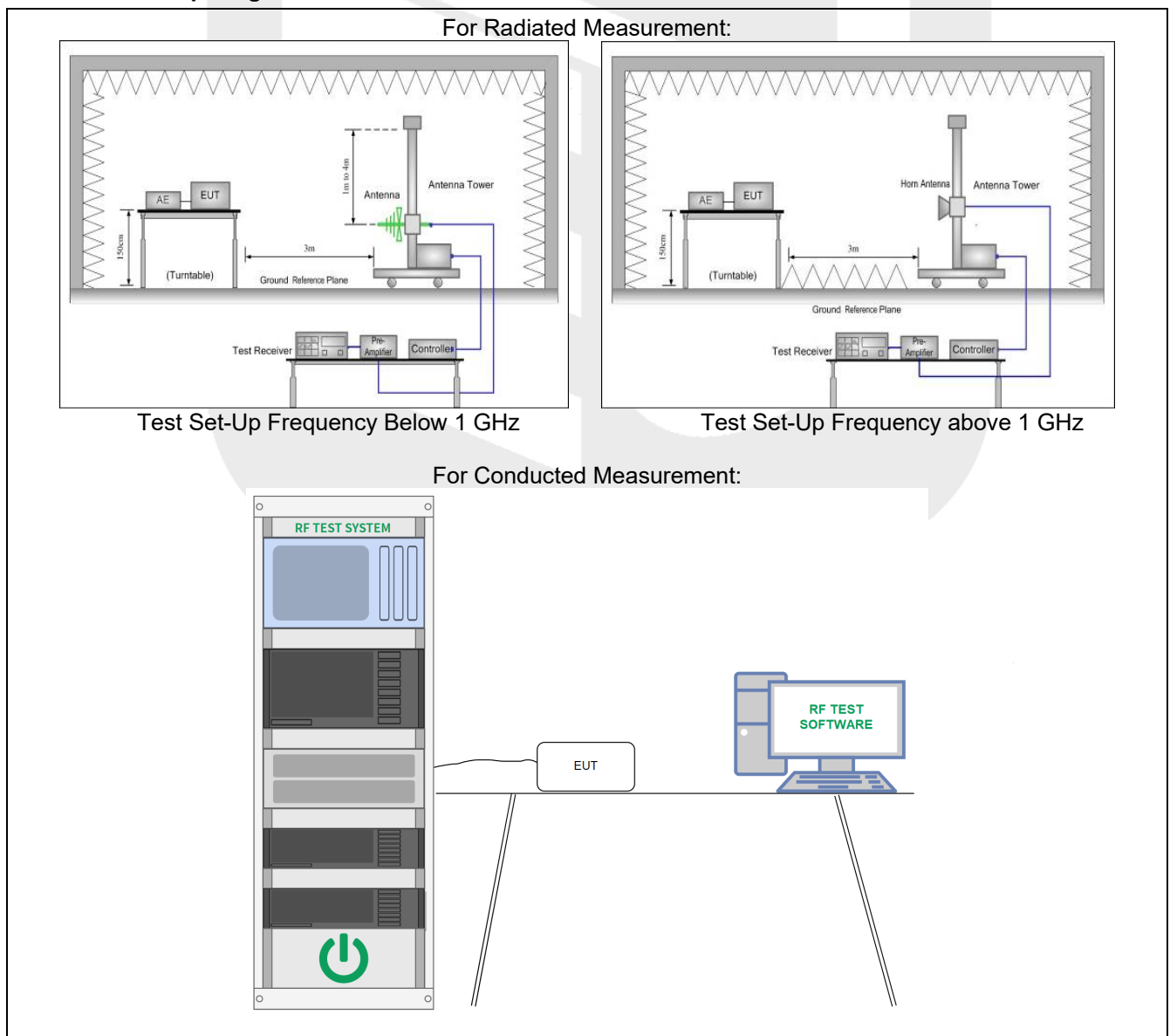
Please refer to Annex D for details.

5.7 Receiver Spurious Emissions

5.7.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.2.10									
Test Requirement	The spurious emissions of the receiver shall not exceed the values given in table 13. In case of non-FHSS equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or for emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz. Table 13: Spurious emission limits for receivers <table><tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr><tr><td>30 MHz to 1 GHz</td><td>-57 dBm</td><td>100 kHz</td></tr><tr><td>1 GHz to 12,75 GHz</td><td>-47 dBm</td><td>1 MHz</td></tr></table>	Frequency range	Maximum power	Bandwidth	30 MHz to 1 GHz	-57 dBm	100 kHz	1 GHz to 12,75 GHz	-47 dBm	1 MHz
Frequency range	Maximum power	Bandwidth								
30 MHz to 1 GHz	-57 dBm	100 kHz								
1 GHz to 12,75 GHz	-47 dBm	1 MHz								

5.7.2 Test Setup Diagram



5.7.3 Test Procedure

Refer to clause 5.4.10 of ETSI EN 300 328 V2.2.2.

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in table 5 or table 13.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 19\,400$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.

For FHSS equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

The above sweep time setting may result in long measuring times in case of FHSS equipment. To avoid such long measuring times, an FFT analyser may be used.

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 3 MHz
- Filter type: 3 dB (Gaussian)
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: $\geq 23\,500$; for spectrum analysers not supporting this high number of sweep points, the frequency band may be segmented.
- Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

Step 4:

- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach). The limits used to identify emissions during this pre-scan need to be reduced by $10 \times \log_{10}(\text{Ach})$.

5.7.4 Test Data

PASS.

Please refer to Annex D for details.

5.8 Receiver Blocking

5.8.1 Test Requirement

Test Standard	ETSI EN 300 328 V2.2.2 Clause 4.3.2.11										
Test Requirement	Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) at frequencies other than those of the operating band and spurious responses. For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %. For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment. While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16. Table 14: Receiver Blocking parameters for Receiver Category 1 equipment <table><tr><th>Wanted signal mean power from companion device (dBm) (see notes 1 and 4)</th><th>Blocking signal frequency (MHz)</th><th>Blocking signal power (dBm) (see note 4)</th><th>Type of blocking signal</th></tr><tr><td>(-133 dBm + 10 × log₁₀(OCBW)) or -68 dBm whichever is less (see note 2)</td><td>2 380 2 504</td><td rowspan="2">-34</td><td rowspan="2">CW</td></tr><tr><td>(-139 dBm + 10 × log₁₀(OCBW)) or -74 dBm whichever is less (see note 3)</td><td>2 300 2 330 2 360 2 524 2 584 2 674</td></tr></table> NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.	Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal	(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW	(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674
	Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal							
(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW								
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674										

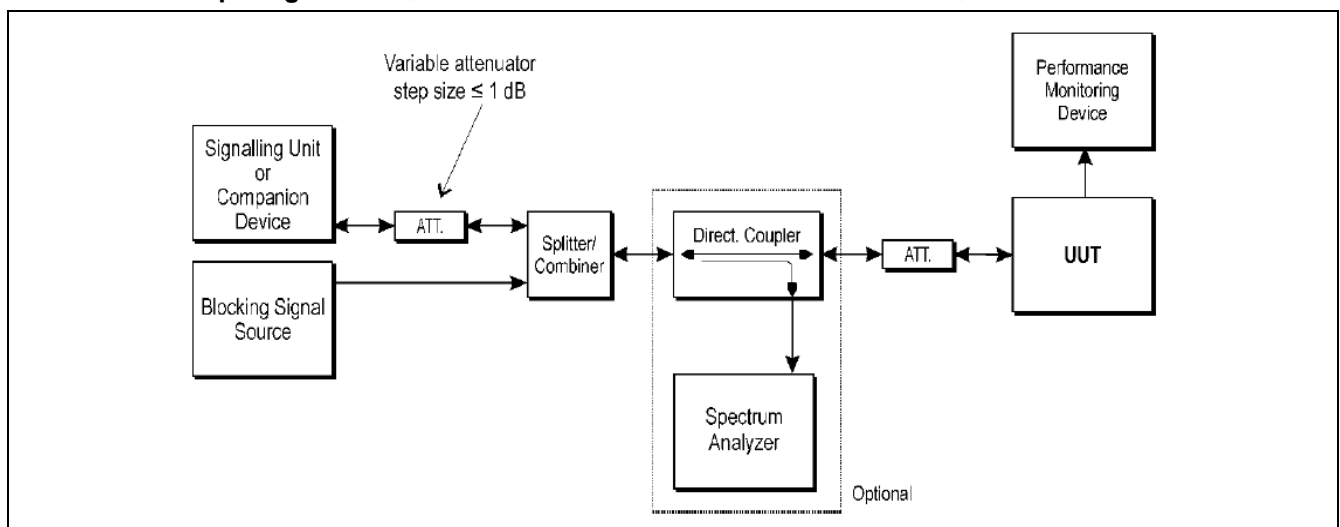
Table 15: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + $10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB}$) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 26 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Table 16: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + $10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB}$) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 30 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

5.8.2 Test Setup Diagram



5.8.3 Test Procedure

Refer to clause 5.4.11 of ETSI EN 300 328 V2.2.2:

Step 1:

- For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed.

Step 2:

- The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

- With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.
- Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.
- When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min} . This signal level (P_{min}) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

- The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6.

Step 5:

- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:
 - For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.
 - For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:
 - For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.
 - For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.
- If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.

- It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

Step 6:

- Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 7:

- For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed.

Step 8:

- It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

5.8.4 Test Data

PASS.

Please refer to Annex D for details.

ANNEX A TEST SETUP PHOTOS

PHOTO 1

Radiated Emission
Below 1GHz

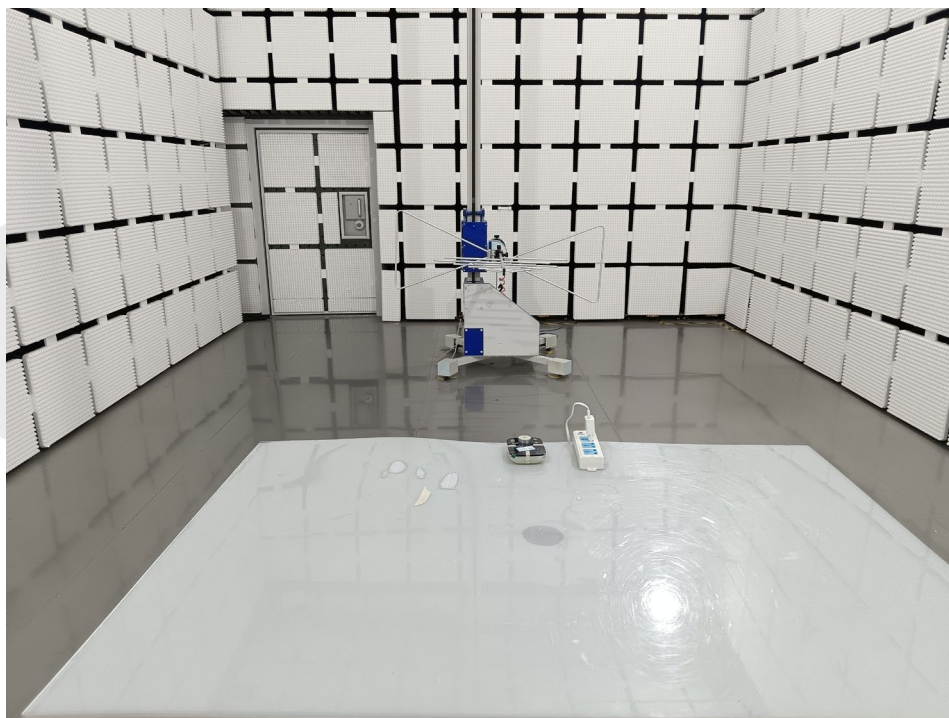
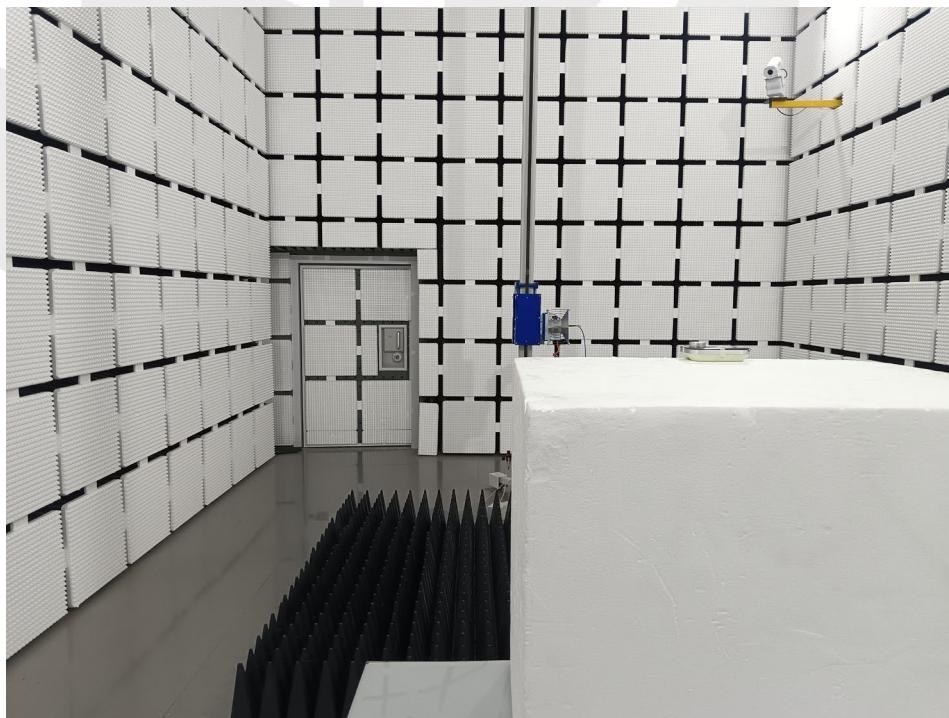


PHOTO 2

Radiated Emission
Above 1GHz



ANNEX B EXTERNAL PHOTOS

Please refer to the document “8326EU010302E.PDF”

ANNEX C INTERNAL PHOTOS

Please refer to the document “8326EU010302E.PDF”



ANNEX D TEST DATA**Test Summary**

Item	Result
Duty Cycle - SA	Pass
RF Output Power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization	Pass
Power Spectral Density	Pass
Occupied Channel Bandwidth	Pass
Transmitter Unwanted Emissions In The Out-Of-Band Domain	Pass
Transmitter Unwanted Emissions In The Spurious Domain	Pass
Receiver Spurious Emissions	Pass
Adaptivity (Channel Access Mechanism)	Pass
Receiver Blocking	Pass

1. Duty Cycle - SA

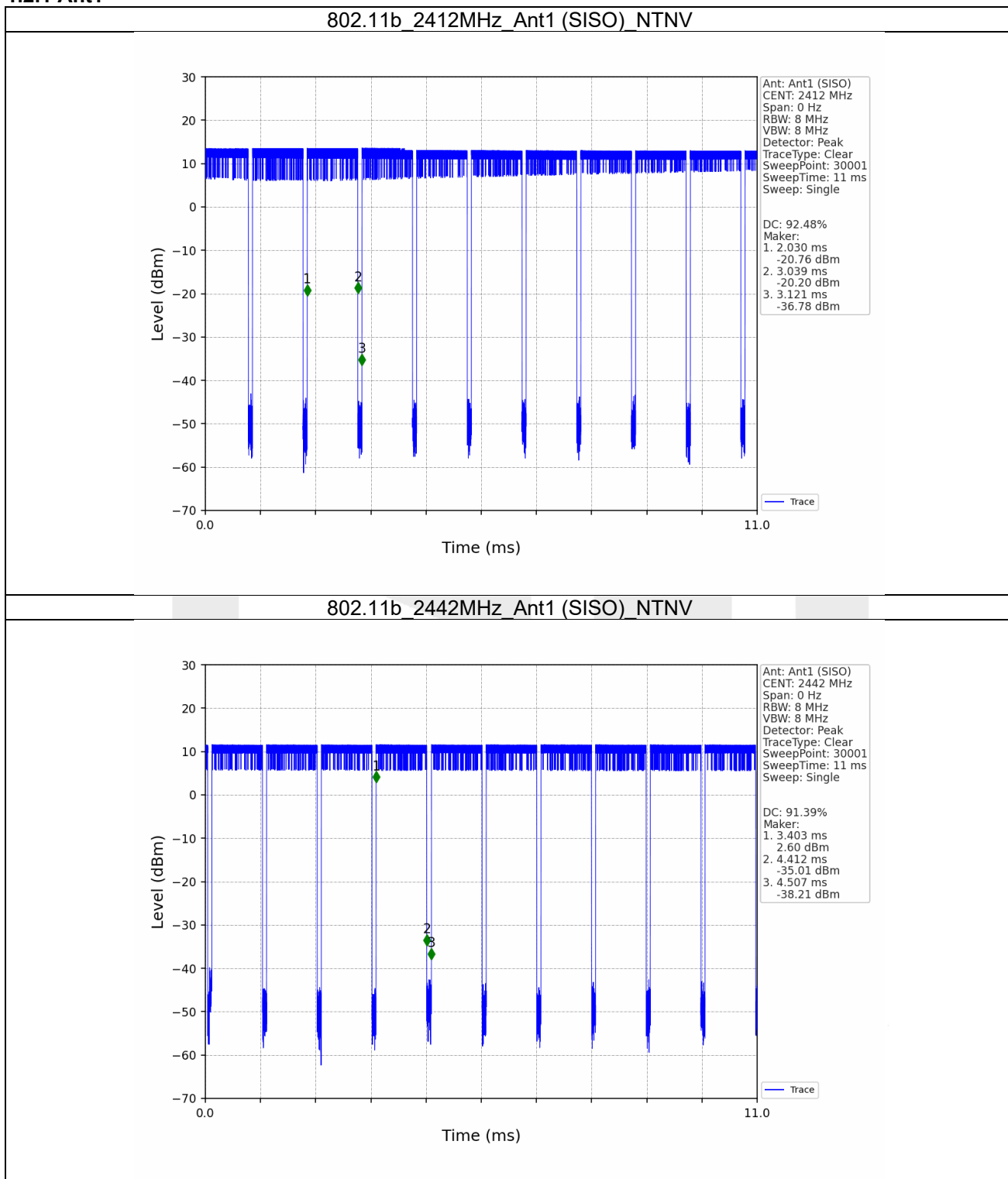
1.1 Test Result

1.1.1 Ant1

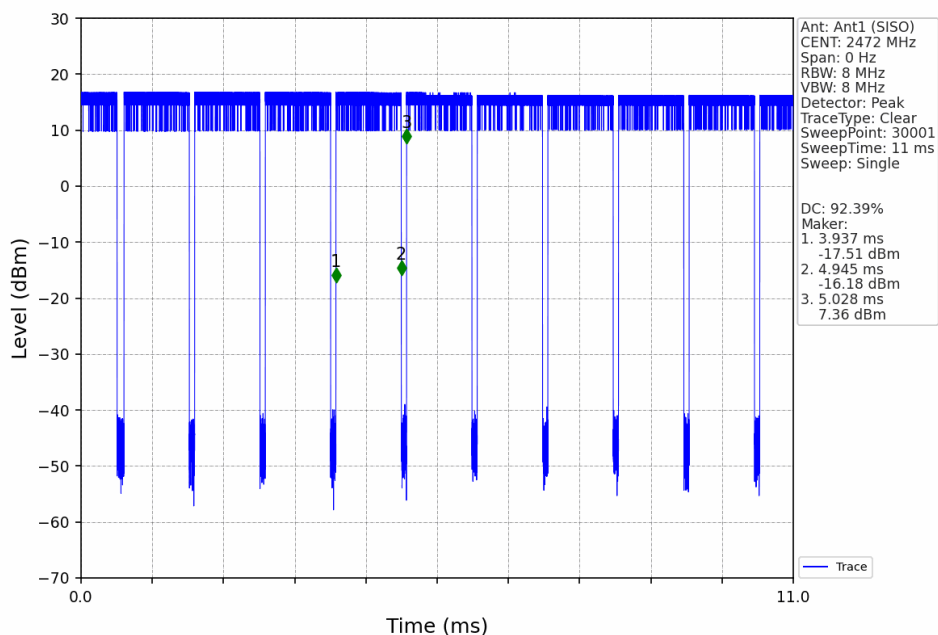
Ant1								
ENV	Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11b	SISO	2412	1.009	1.091	92.48	0.34	0.03
			2442	1.009	1.104	91.39	0.39	1.14
			2472	1.008	1.091	92.39	0.34	0.03
	802.11g	SISO	2412	0.616	0.651	94.62	0.24	0.04
			2442	0.617	0.651	94.78	0.23	0.04
			2472	0.617	0.651	94.78	0.23	0.04
	802.11n (HT20)	SISO	2412	0.613	0.678	90.41	0.44	4.34
			2442	0.613	0.647	94.74	0.23	0.00
			2472	0.613	0.647	94.74	0.23	0.04
	802.11n (HT40)	SISO	2422	0.613	0.647	94.74	0.23	0.03
			2442	0.613	0.742	82.61	0.83	12.13
			2462	0.614	0.647	94.90	0.23	0.00

1.2 Test Graph

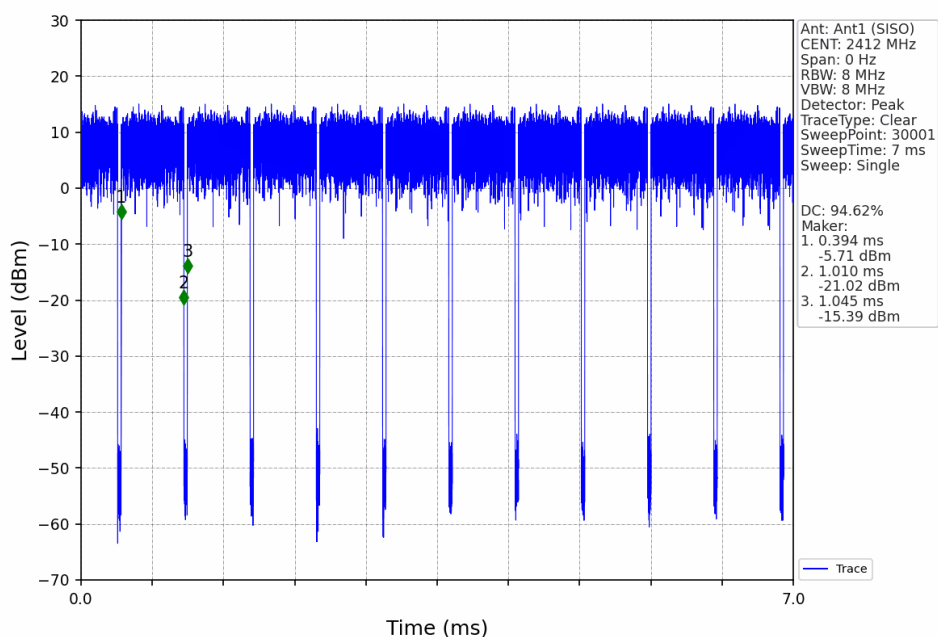
1.2.1 Ant1



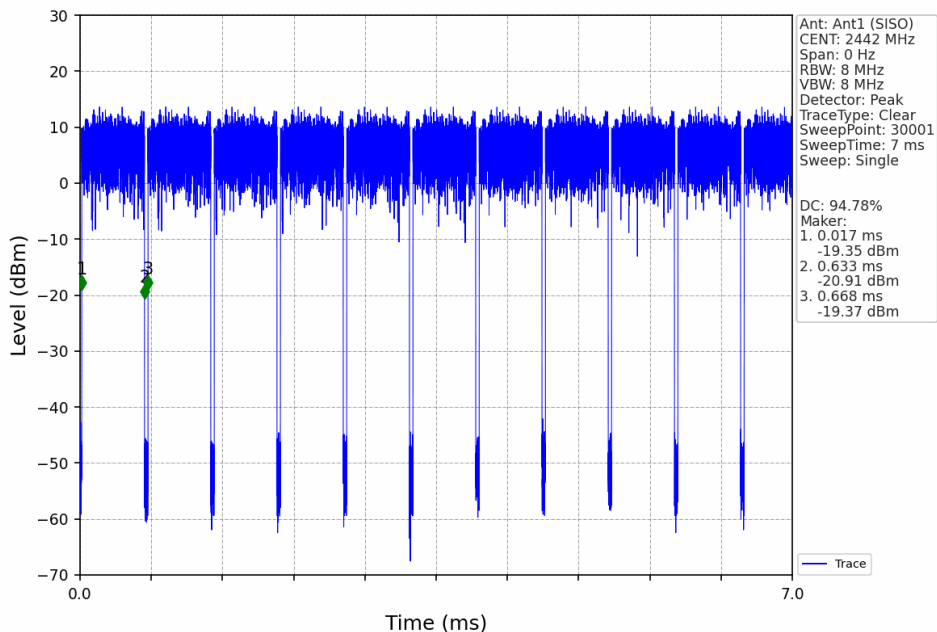
802.11b_2472MHz_Ant1 (SISO)_NTNV



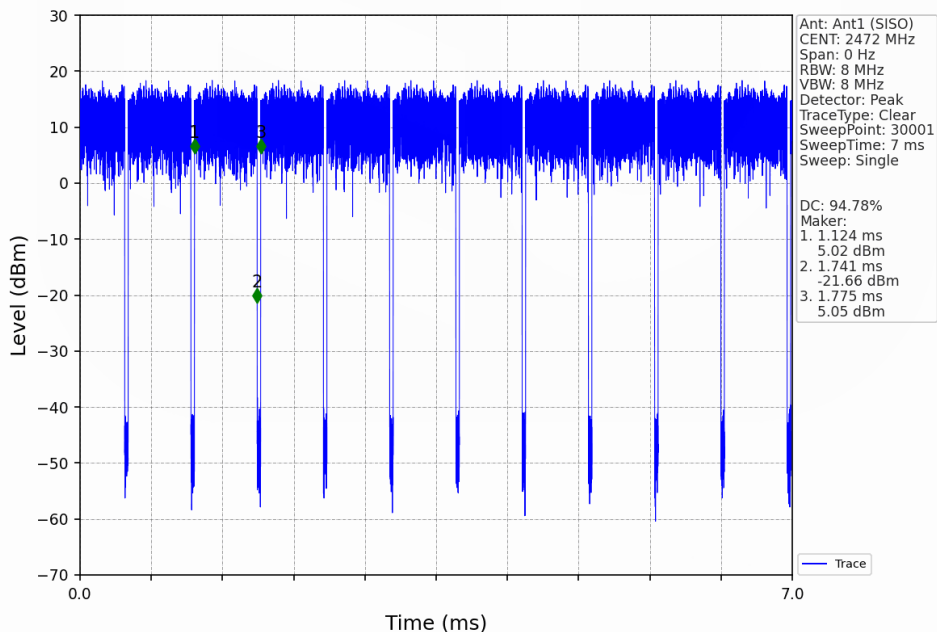
802.11g_2412MHz_Ant1 (SISO)_NTNV



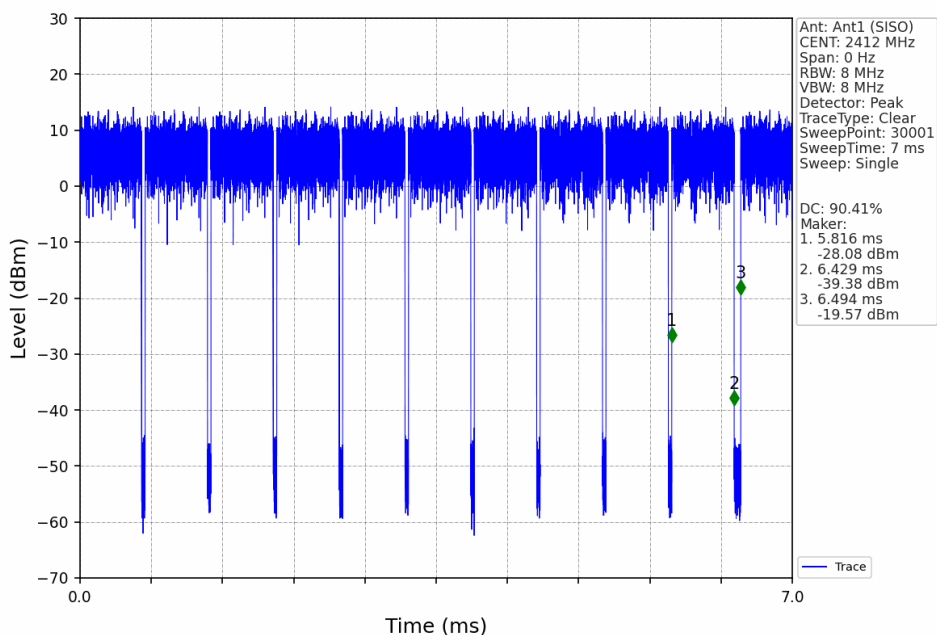
802.11g_2442MHz_Ant1 (SISO)_NTNV



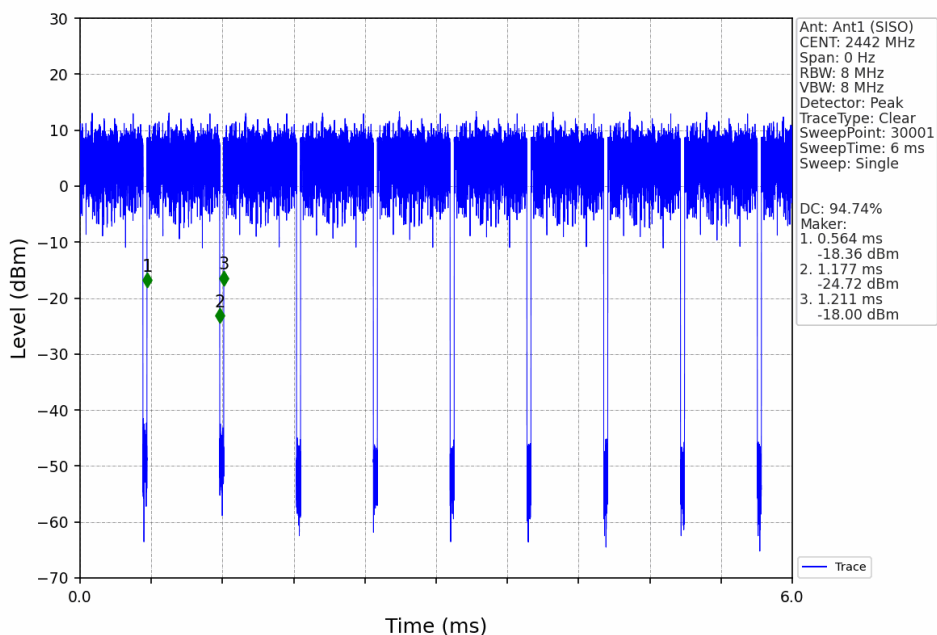
802.11g_2472MHz_Ant1 (SISO)_NTNV



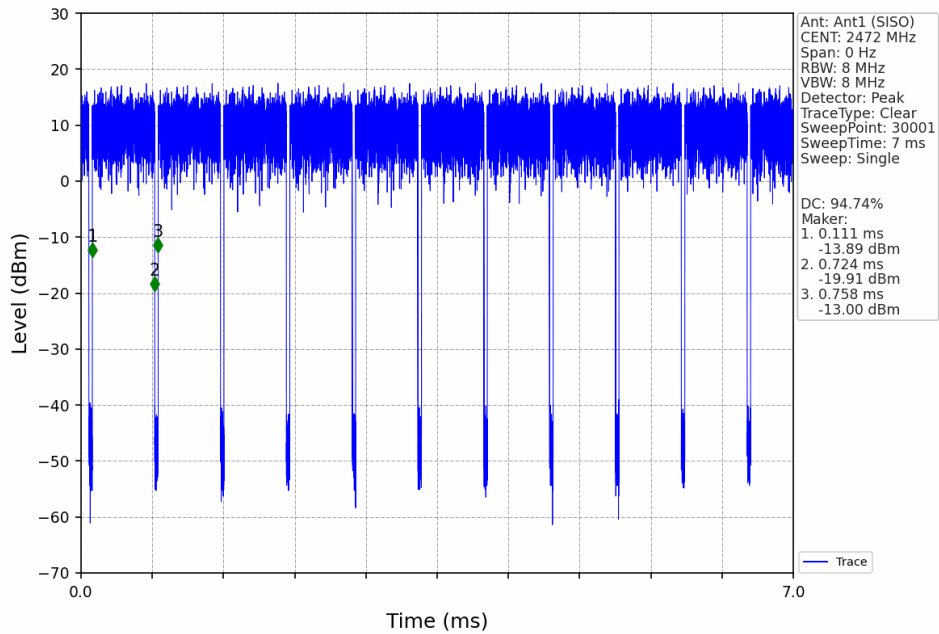
802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



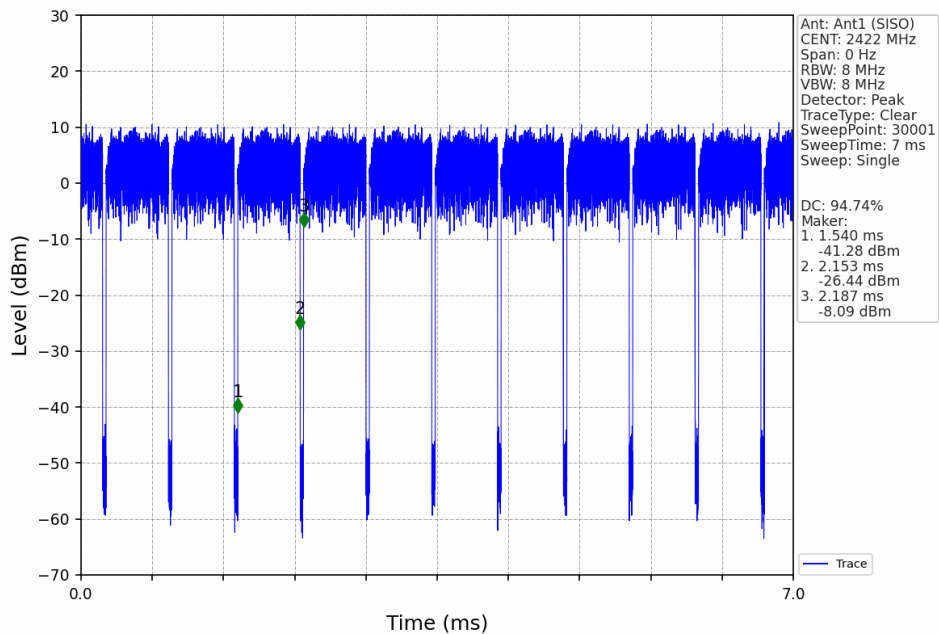
802.11n(HT20)_2442MHz_Ant1 (SISO)_NTNV



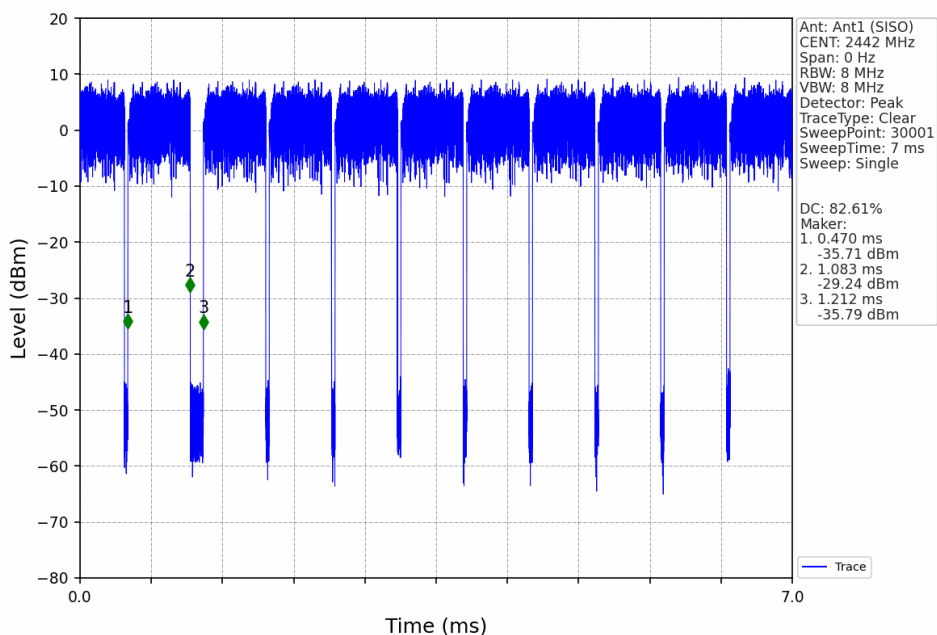
802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



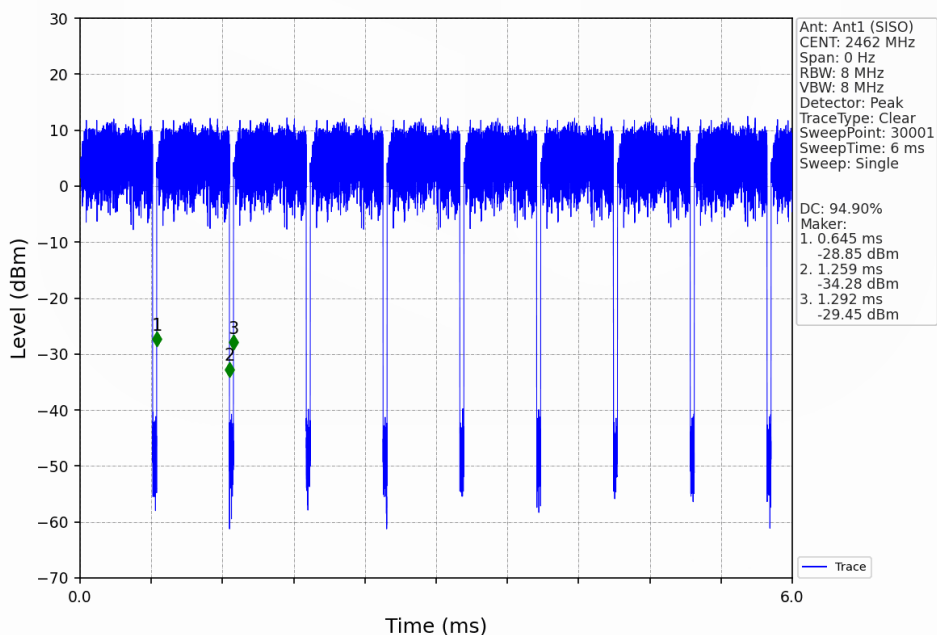
802.11n(HT40)_2422MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_2442MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_2462MHz_Ant1 (SISO)_NTNV



2. RF Output Power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization

2.1 Test Result

2.1.1 Power

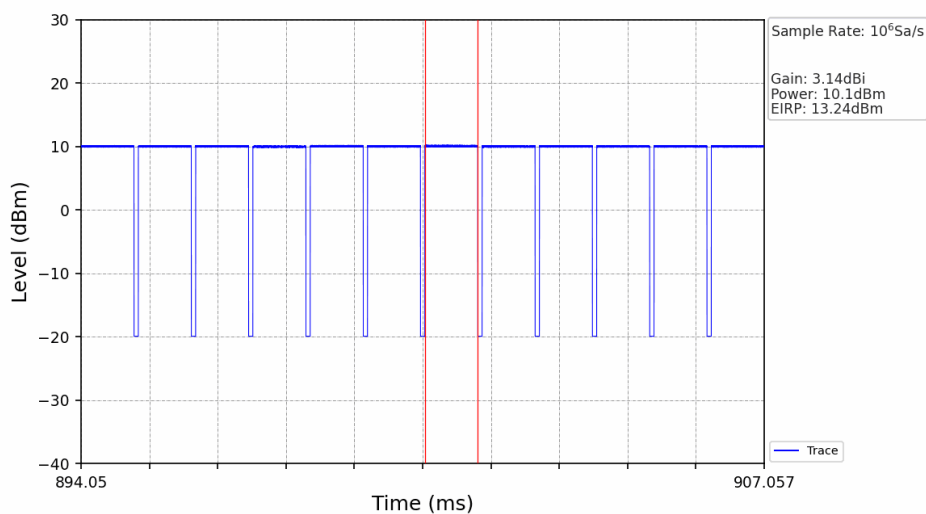
ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NTNV	802.11b	SISO	2412	1	3.14	10.10	13.24	<=20	Pass
			2442	1	3.14	9.32	12.46	<=20	Pass
			2472	1	3.14	12.92	16.06	<=20	Pass
	802.11g	SISO	2412	1	3.14	9.39	12.53	<=20	Pass
			2442	1	3.14	8.76	11.90	<=20	Pass
			2472	1	3.14	12.38	15.52	<=20	Pass
	802.11n (HT20)	SISO	2412	1	3.14	8.40	11.54	<=20	Pass
			2442	1	3.14	7.92	11.06	<=20	Pass
			2472	1	3.14	11.61	14.75	<=20	Pass
	802.11n (HT40)	SISO	2422	1	3.14	8.70	11.84	<=20	Pass
			2442	1	3.14	7.21	10.35	<=20	Pass
			2462	1	3.14	10.49	13.63	<=20	Pass
HTNV	802.11b	SISO	2412	1	3.14	10.06	13.20	<=20	Pass
			2442	1	3.14	9.31	12.45	<=20	Pass
			2472	1	3.14	12.94	16.08	<=20	Pass
	802.11g	SISO	2412	1	3.14	9.37	12.51	<=20	Pass
			2442	1	3.14	8.71	11.85	<=20	Pass
			2472	1	3.14	12.43	15.57	<=20	Pass
	802.11n (HT20)	SISO	2412	1	3.14	8.40	11.54	<=20	Pass
			2442	1	3.14	7.93	11.07	<=20	Pass
			2472	1	3.14	11.67	14.81	<=20	Pass
	802.11n (HT40)	SISO	2422	1	3.14	8.71	11.85	<=20	Pass
			2442	1	3.14	7.21	10.35	<=20	Pass
			2462	1	3.14	10.48	13.62	<=20	Pass
LTVN	802.11b	SISO	2412	1	3.14	10.01	13.15	<=20	Pass
			2442	1	3.14	9.31	12.45	<=20	Pass
			2472	1	3.14	12.93	16.07	<=20	Pass
	802.11g	SISO	2412	1	3.14	9.39	12.53	<=20	Pass
			2442	1	3.14	8.72	11.86	<=20	Pass
			2472	1	3.14	12.39	15.53	<=20	Pass
	802.11n (HT20)	SISO	2412	1	3.14	8.40	11.54	<=20	Pass
			2442	1	3.14	8.01	11.15	<=20	Pass
			2472	1	3.14	11.51	14.65	<=20	Pass
	802.11n (HT40)	SISO	2422	1	3.14	8.70	11.84	<=20	Pass
			2442	1	3.14	7.22	10.36	<=20	Pass
			2462	1	3.14	10.47	13.61	<=20	Pass

Note1: E.I.R.P = Measured Power + Antenna Gain

2.2 Test Graph

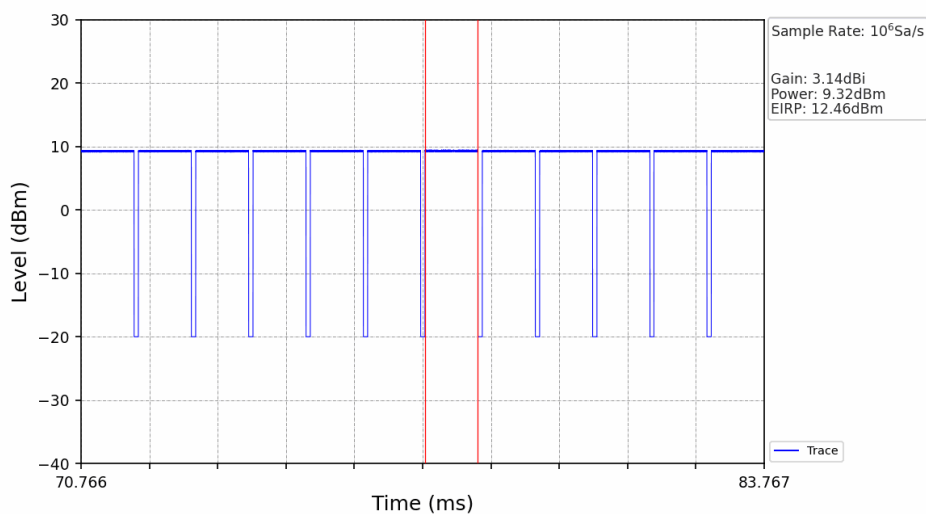
2.2.1 Power

802.11b_2412MHz_Ant1 (SISO)_NTNV



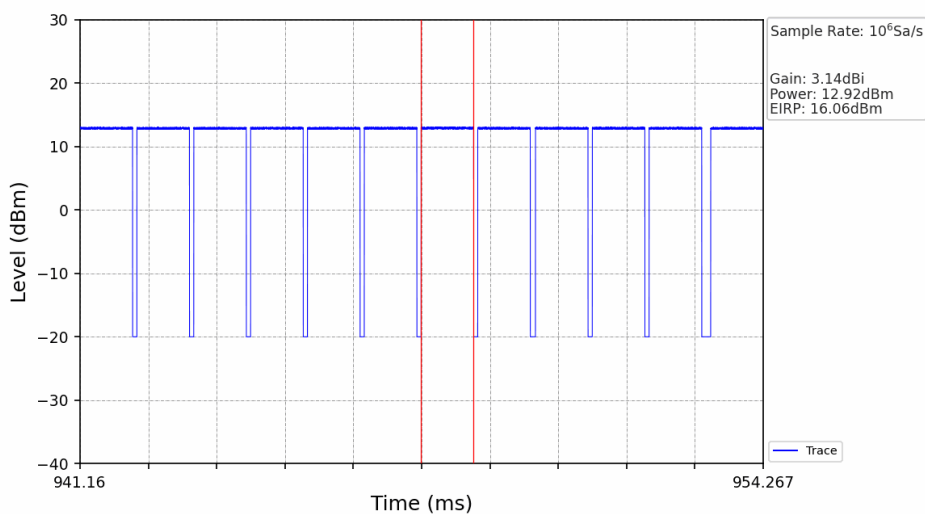
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.008	1.008	1.008	1.009	1.009	1.008	1.008	1.008	1.008	1.008	1.007	1.008
Power (dBm)	10.04	10.04	10.04	9.99	10.06	10.03	10.10	10.02	10.04	10.03	10.03	10.03
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11b_2442MHz_Ant1 (SISO)_NTNV



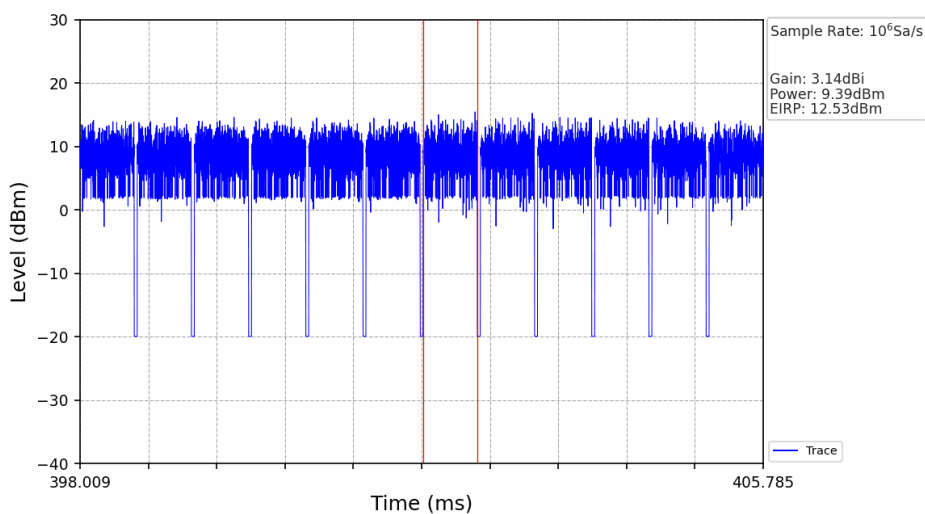
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.009	1.008	1.008	1.008	1.009	1.009	1.008	1.008	1.008	1.008	1.008	1.008
Power (dBm)	9.27	9.28	9.28	9.28	9.29	9.28	9.32	9.29	9.28	9.28	9.28	9.27
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11b_2472MHz_Ant1 (SISO)_NTNV



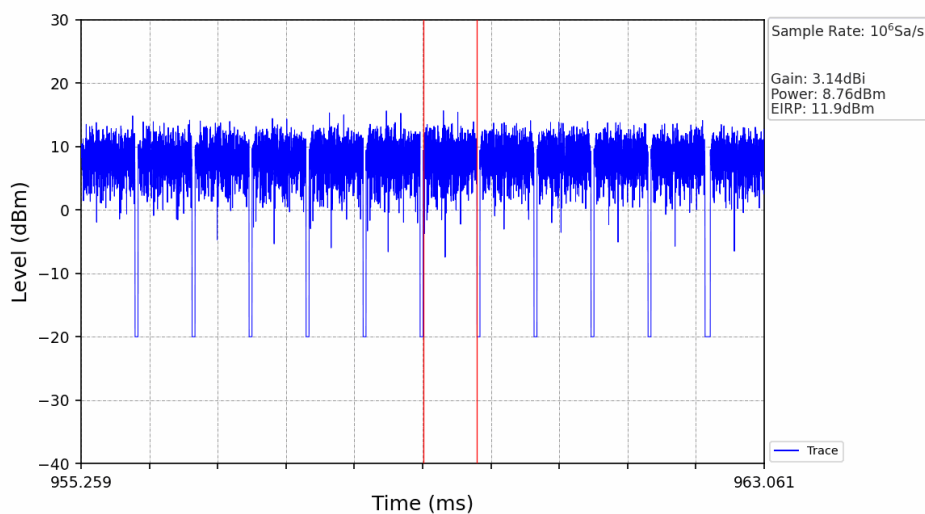
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.008	1.008	1.008	1.008	1.009	1.009	1.008	1.008	1.008	1.009	1.009	1.008
Power (dBm)	12.90	12.90	12.89	12.91	12.90	12.91	12.92	12.90	12.90	12.90	12.90	12.90
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2412MHz_Ant1 (SISO)_NTNV



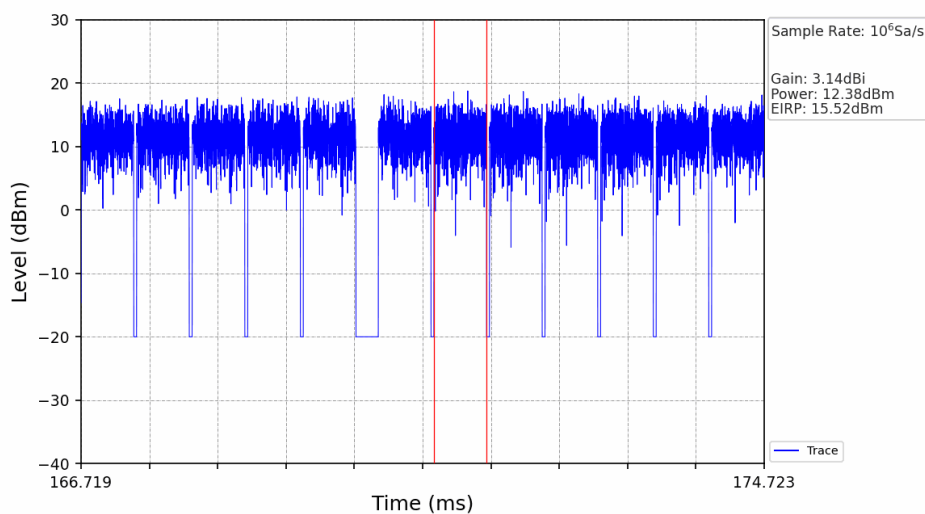
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.616	0.616	0.617	0.617	0.617	0.617	0.616	0.616	0.616	0.616	0.616	0.616
Power (dBm)	9.17	9.07	9.20	9.24	9.27	9.28	9.39	9.33	9.34	9.34	9.16	9.11
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2442MHz_Ant1 (SISO)_NTNV



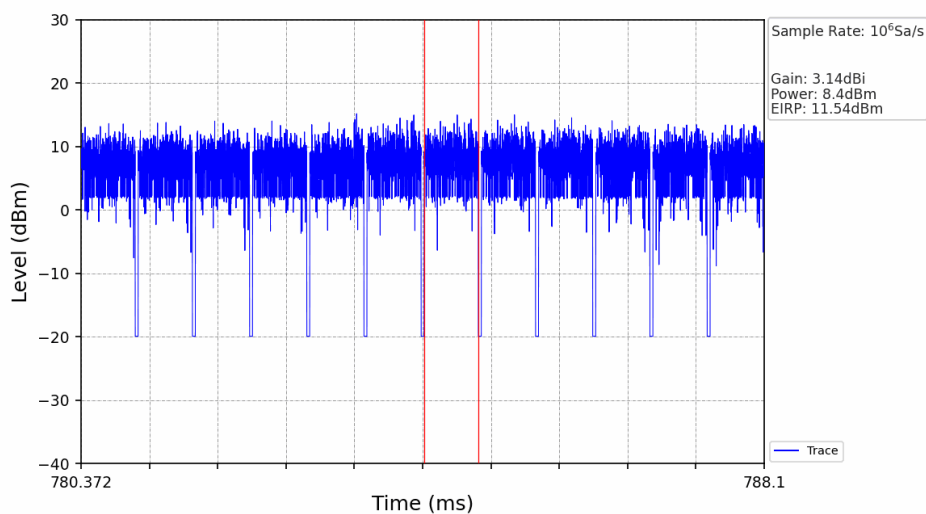
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.616	0.616	0.616	0.616	0.616	0.616	0.615	0.616	0.616	0.616	0.616	0.616
Power (dBm)	8.59	8.58	8.69	8.65	8.68	8.70	8.76	8.55	8.55	8.55	8.55	8.52
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2472MHz_Ant1 (SISO)_NTNV



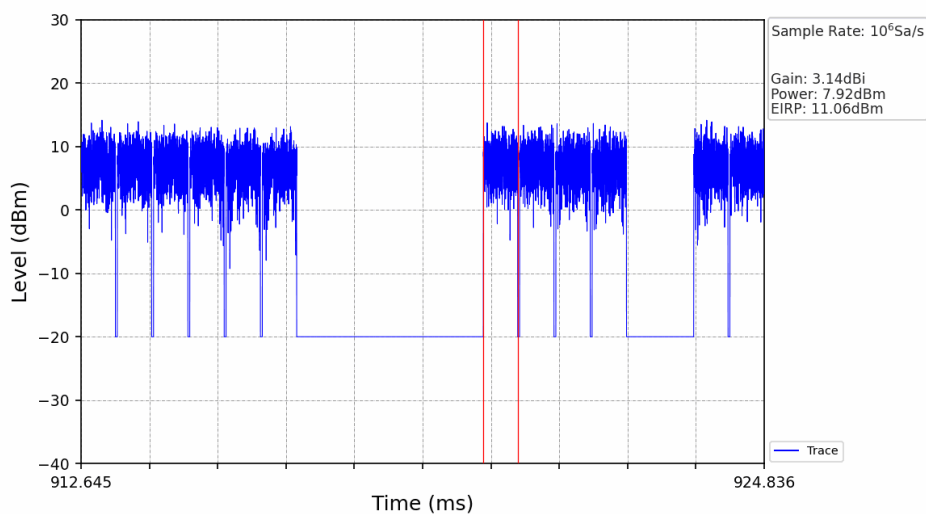
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.617	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.615	0.616
Power (dBm)	12.08	12.10	12.20	12.17	12.15	12.22	12.38	12.33	12.28	12.23	12.23	12.24
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



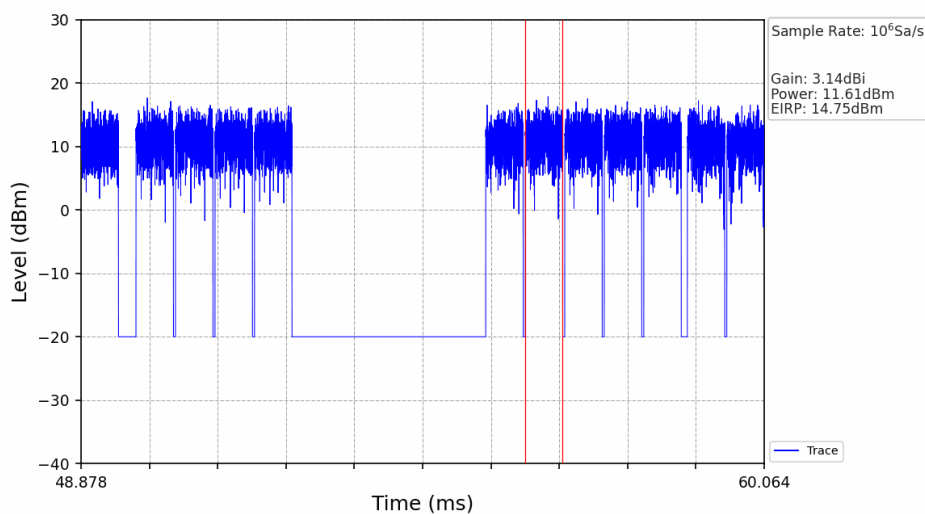
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.613	0.613	0.613	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612
Power (dBm)	7.92	7.87	7.87	7.88	8.01	8.39	8.40	8.38	8.34	8.16	8.03	8.03
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2442MHz_Ant1 (SISO)_NTNV



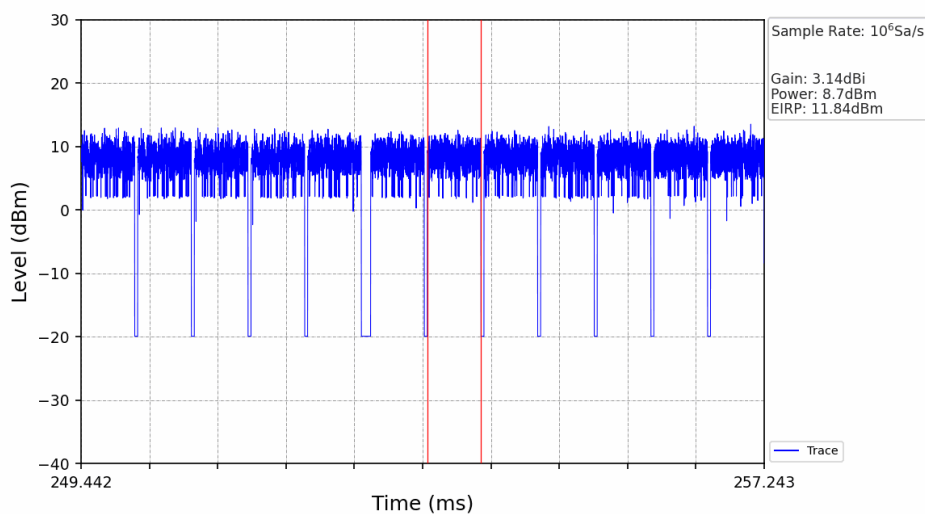
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.611	0.612
Power (dBm)	7.80	7.77	7.73	7.70	7.48	7.46	7.92	7.80	7.56	7.56	7.69	7.67
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



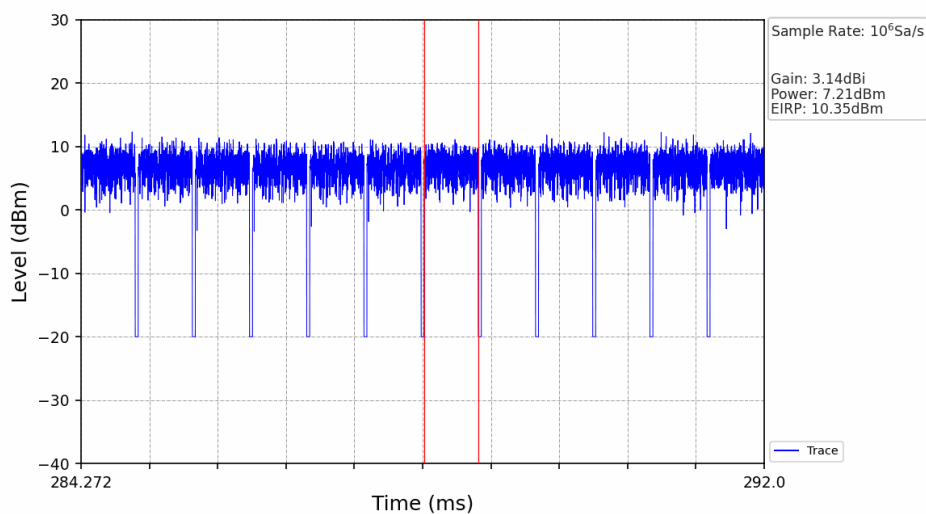
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.613	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612
Power (dBm)	11.15	11.29	11.35	11.32	11.28	11.38	11.61	11.53	11.49	11.45	11.34	11.20
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2422MHz_Ant1 (SISO)_NTNV



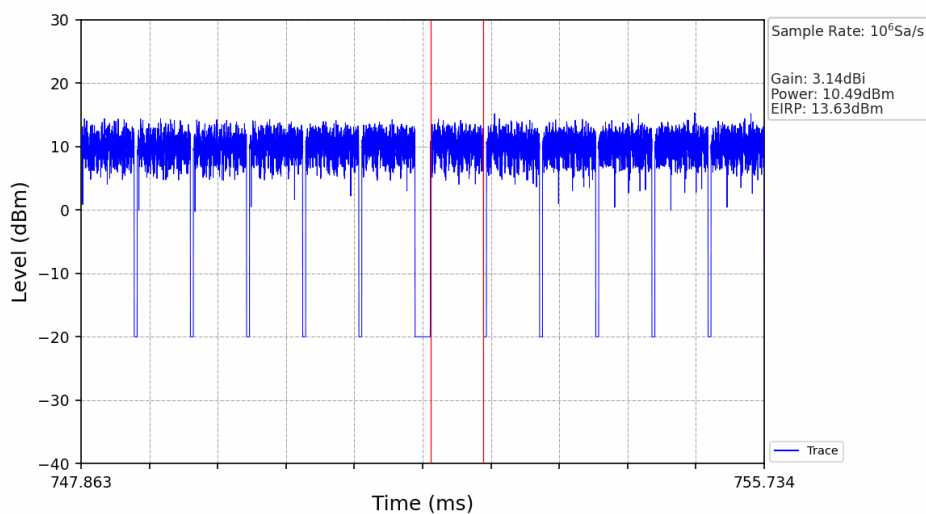
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.613	0.613	0.613
Power (dBm)	8.56	8.54	8.51	8.49	8.64	8.70	8.70	8.70	8.63	8.57	8.60	8.63
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2442MHz_Ant1 (SISO)_NTNV



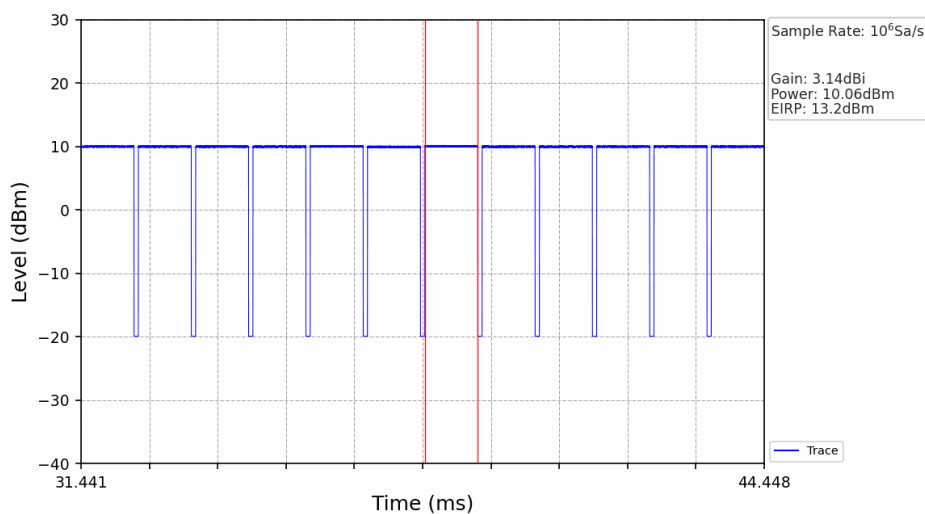
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.611	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.613
Power (dBm)	7.14	7.08	7.03	7.00	6.98	7.00	7.21	7.19	7.18	7.16	7.10	7.12
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2462MHz_Ant1 (SISO)_NTNV



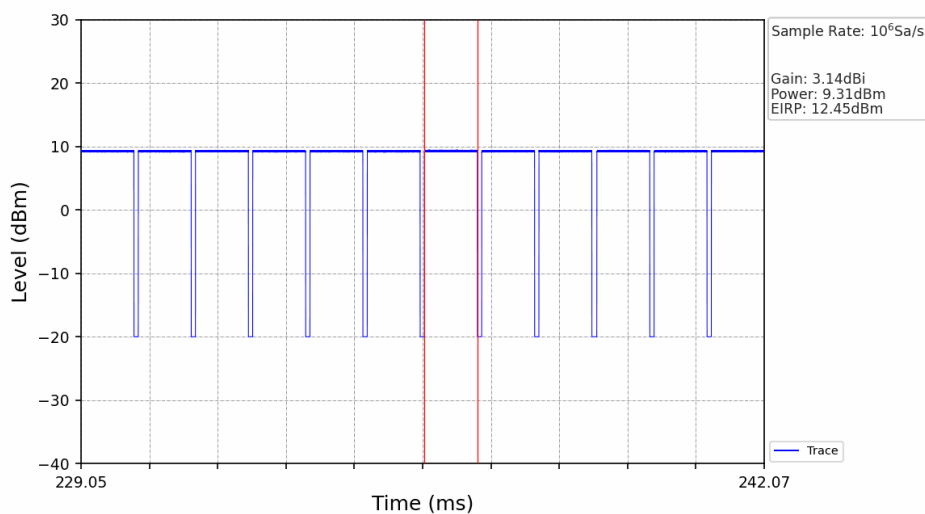
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.613	0.613	0.613	0.613
Power (dBm)	10.33	10.30	10.28	10.39	10.46	10.47	10.49	10.42	10.38	10.40	10.42	10.42
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11b_2412MHz_Ant1 (SISO)_HTNV



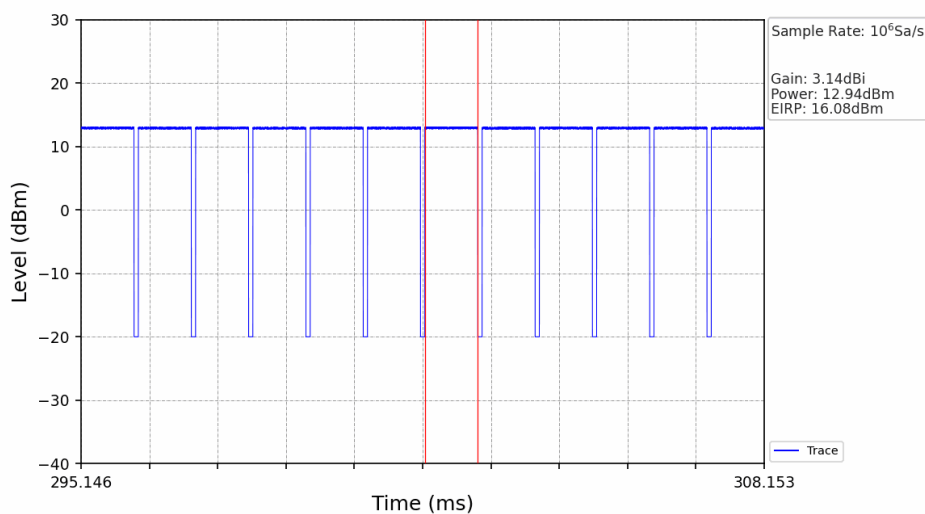
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.008	1.008	1.008	1.008	1.008	1.008	1.008	1.008	1.008	1.008	1.009	1.008
Power (dBm)	10.00	10.00	10.00	9.99	10.03	9.95	10.06	9.99	9.99	9.99	10.00	9.99
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11b_2442MHz_Ant1 (SISO)_HTNV



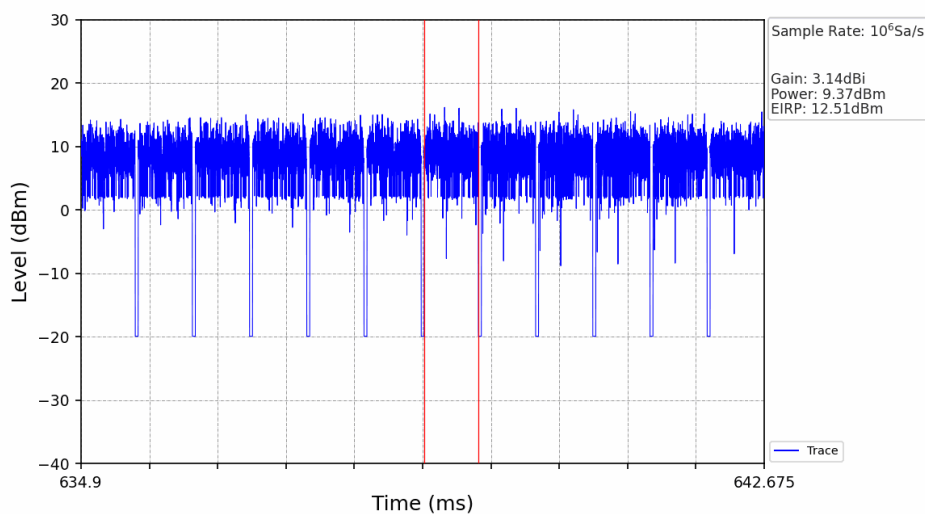
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.008	1.008	1.008	1.008	1.008	1.008	1.008	1.008	1.009	1.009	1.008	1.008
Power (dBm)	9.27	9.27	9.28	9.27	9.27	9.27	9.31	9.28	9.27	9.29	9.27	9.28
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11b_2472MHz_Ant1 (SISO)_HTNV



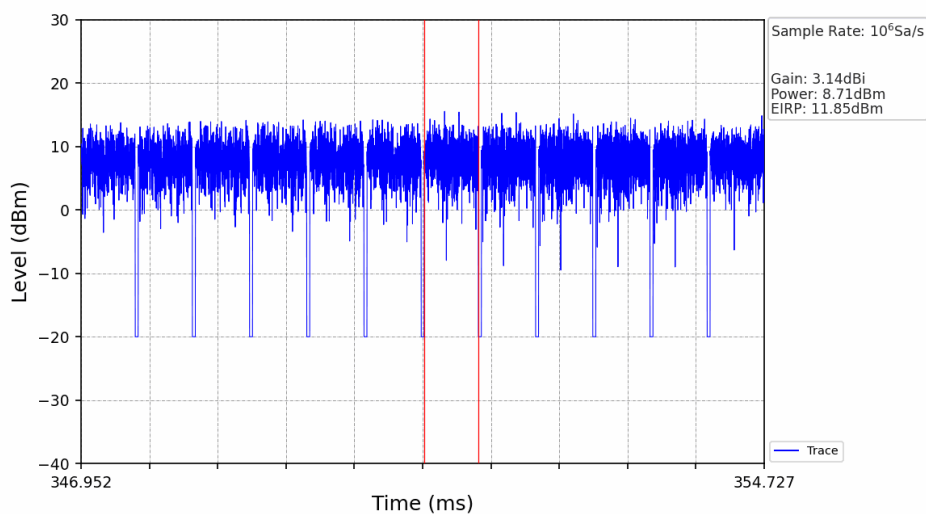
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.008	1.008	1.009	1.009	1.008	1.008	1.008	1.008	1.009	1.009	1.008	1.008
Power (dBm)	12.92	12.92	12.92	12.91	12.92	12.92	12.94	12.92	12.93	12.92	12.92	12.91
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2412MHz_Ant1 (SISO)_HTNV



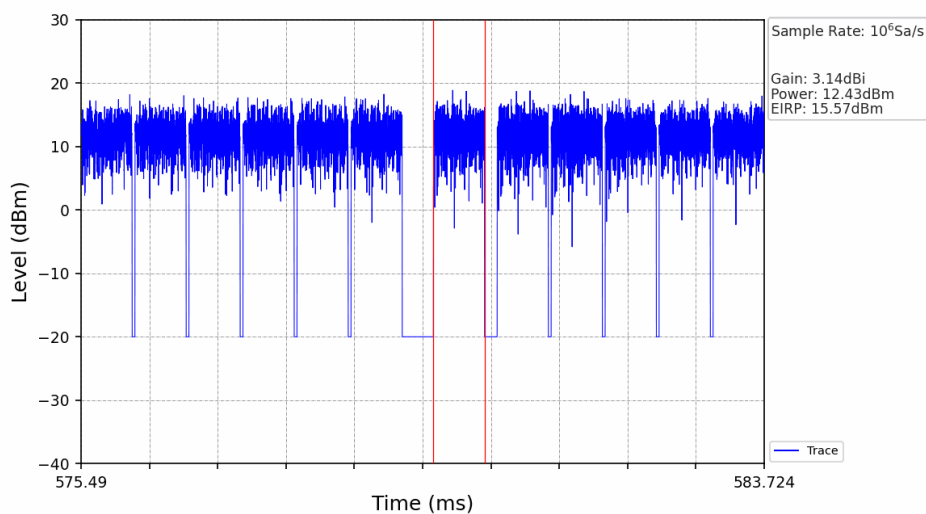
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.615	0.616
Power (dBm)	9.08	9.10	9.22	9.18	9.16	9.14	9.37	9.32	9.27	9.22	9.22	9.24
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2442MHz_Ant1 (SISO)_HTNV



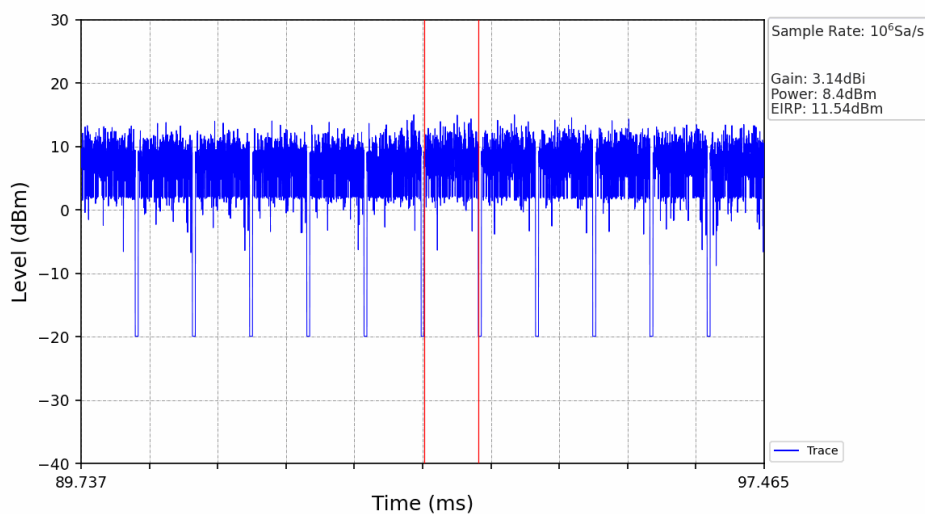
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.615	0.616
Power (dBm)	8.42	8.45	8.55	8.52	8.50	8.48	8.71	8.66	8.61	8.55	8.58	8.58
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2472MHz_Ant1 (SISO)_HTNV



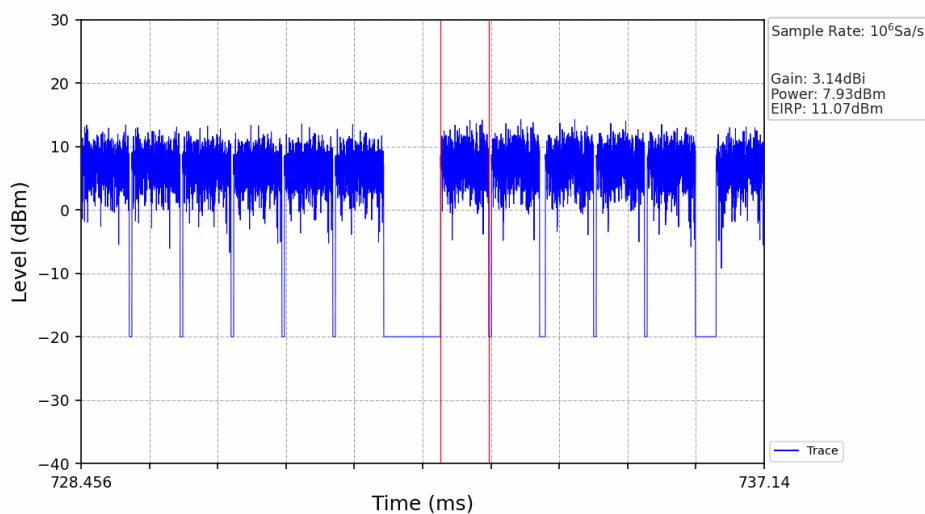
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.615	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616
Power (dBm)	12.23	12.22	12.23	12.21	12.18	12.30	12.43	12.41	12.34	12.22	12.20	12.22
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2412MHz_Ant1 (SISO)_HTNV



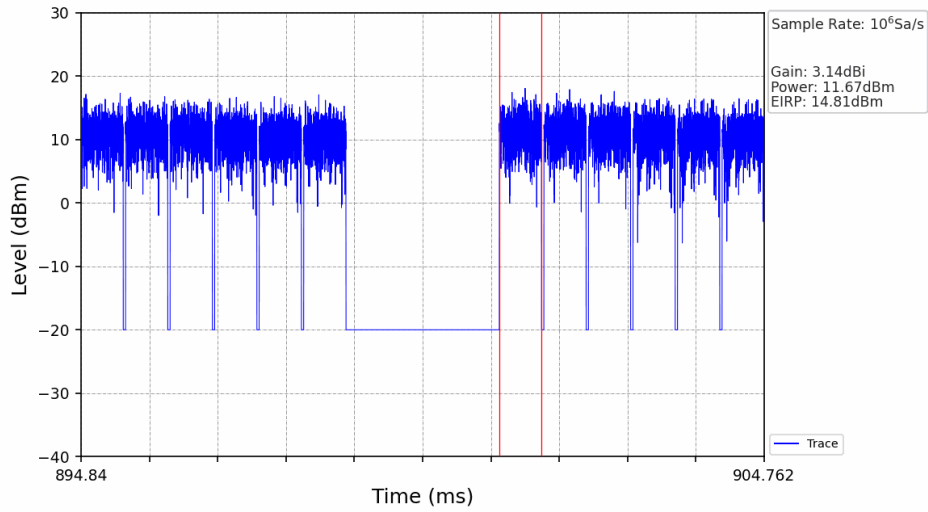
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.613	0.613	0.613	0.612	0.612	0.612	0.612	0.612	0.612	0.612
Power (dBm)	8.14	7.86	7.86	7.86	7.88	8.02	8.40	8.36	8.33	8.31	8.15	8.03
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2442MHz_Ant1 (SISO)_HTNV



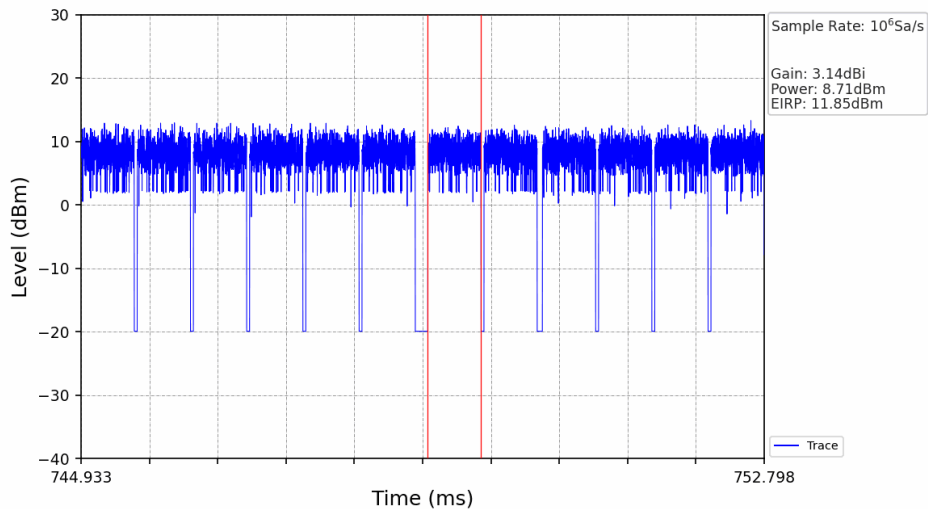
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.613	0.613	0.613	0.612	0.612	0.612	0.612	0.612	0.612
Power (dBm)	7.59	7.60	7.46	7.30	7.31	7.32	7.93	7.88	7.83	7.78	7.63	7.53
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2472MHz_Ant1 (SISO)_HTNV



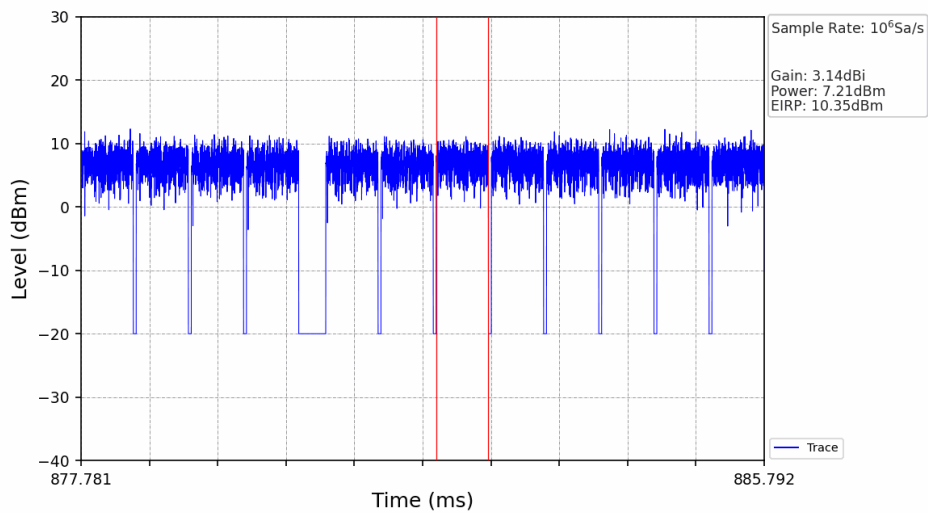
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.612	0.613	0.613	0.612	0.612	0.612	0.612	0.612	0.612
Power (dBm)	11.26	11.26	11.25	11.14	10.96	10.97	11.67	11.55	11.48	11.25	11.16	11.15
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2422MHz_Ant1 (SISO)_HTNV



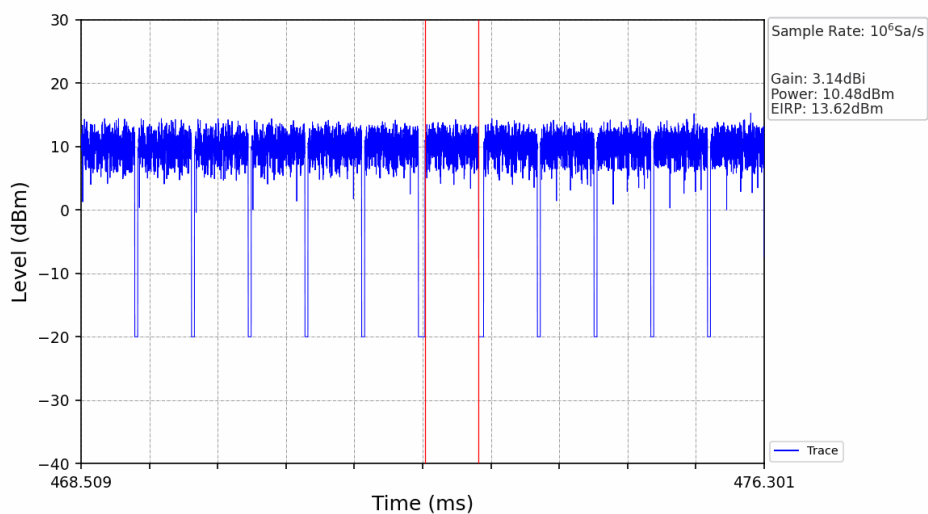
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.613	0.613	0.613	0.613
Power (dBm)	8.56	8.55	8.52	8.57	8.59	8.64	8.71	8.67	8.56	8.55	8.56	8.59
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2442MHz_Ant1 (SISO)_HTNV



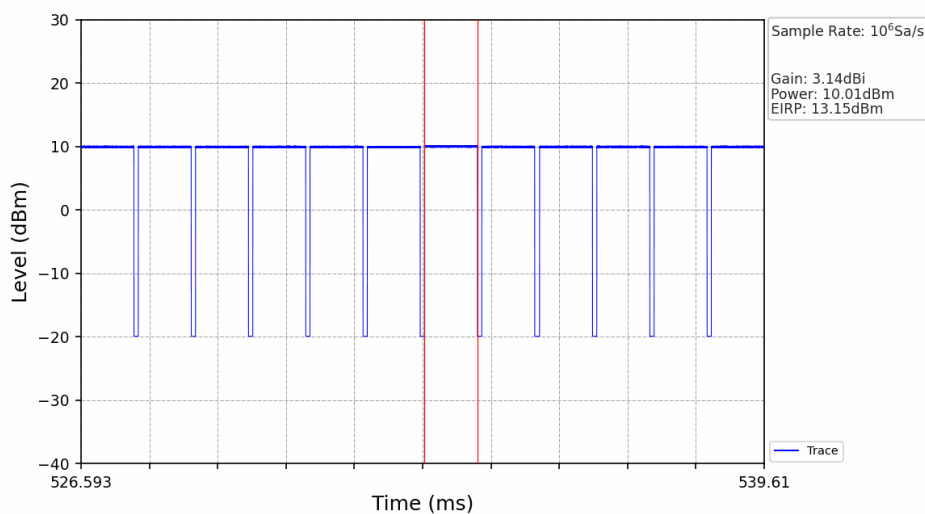
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.611	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.613
Power (dBm)	7.12	7.05	7.03	7.00	7.02	6.98	7.21	7.19	7.18	7.16	7.09	7.11
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2462MHz_Ant1 (SISO)_HTNV



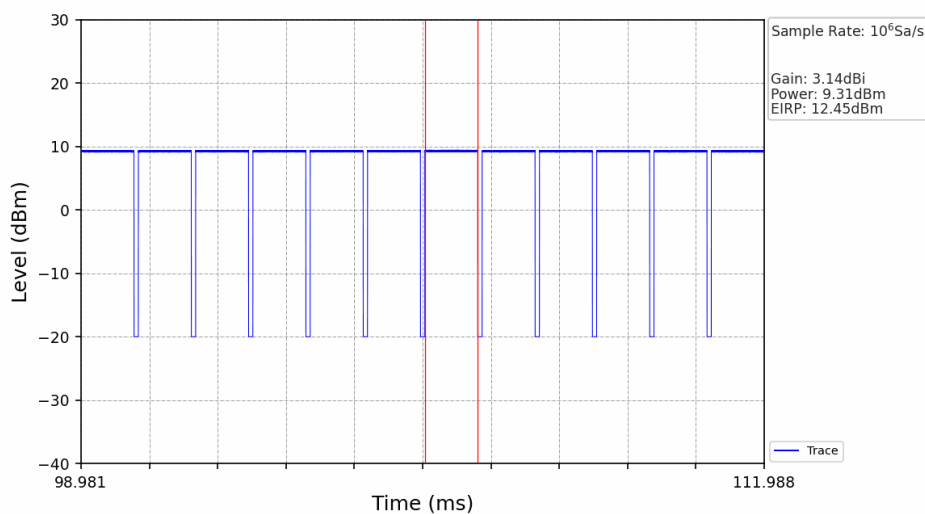
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.613	0.613	0.613	0.613
Power (dBm)	10.34	10.32	10.29	10.37	10.45	10.47	10.48	10.47	10.34	10.37	10.40	10.42
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11b_2412MHz_Ant1 (SISO)_LTV



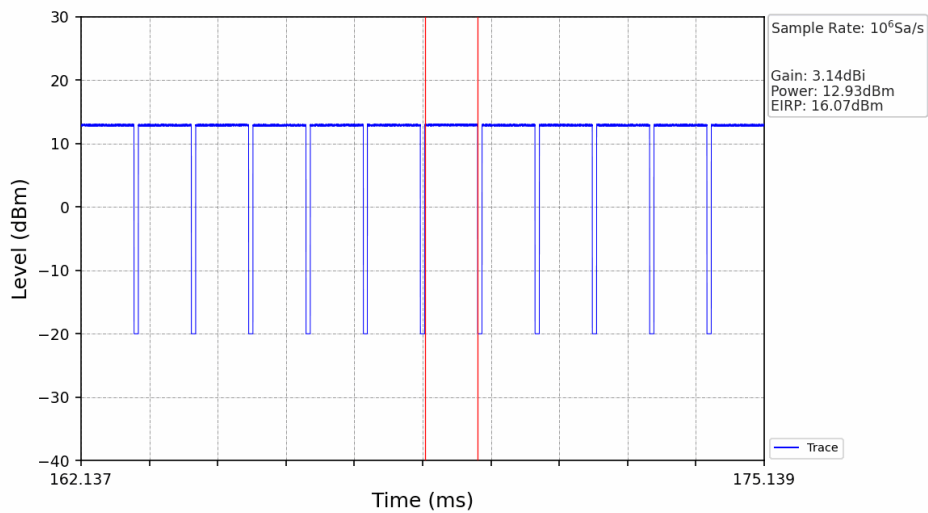
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.008	1.008	1.008	1.008	1.009	1.008	1.008	1.008	1.008	1.008	1.008	1.008
Power (dBm)	9.96	9.96	9.95	9.95	9.95	9.92	10.01	9.96	9.95	9.96	9.95	9.96
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11b_2442MHz_Ant1 (SISO)_LTV



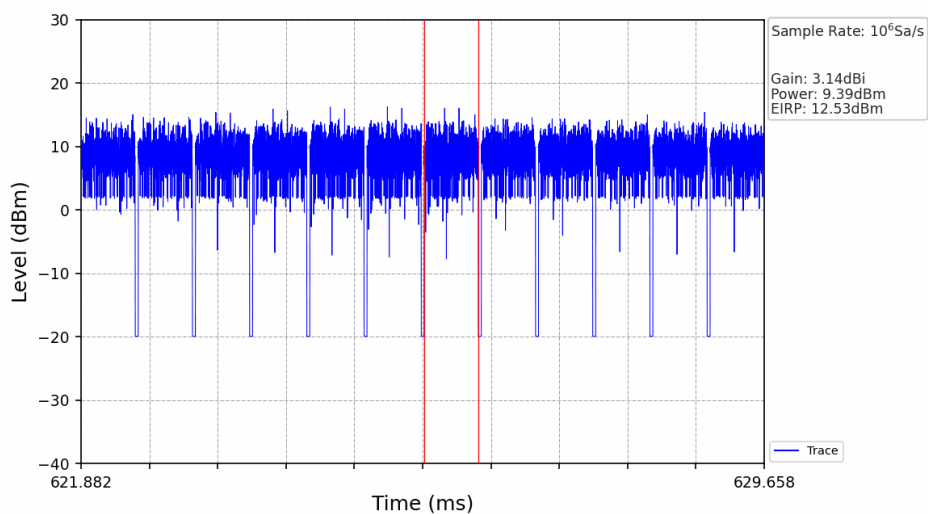
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.008	1.008	1.007	1.008	1.008	1.008	1.008	1.008	1.008	1.009	1.009	1.008
Power (dBm)	9.26	9.27	9.27	9.27	9.27	9.27	9.31	9.27	9.27	9.27	9.27	9.26
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11b_2472MHz_Ant1 (SISO)_LTV



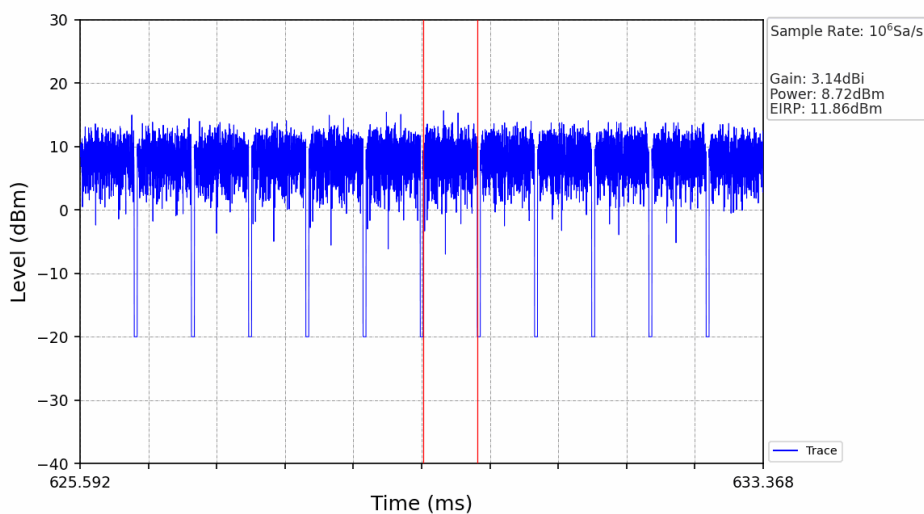
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	1.008	1.008	1.008	1.009	1.009	1.008	1.008	1.008	1.008	1.009	1.008	1.008
Power (dBm)	12.91	12.91	12.92	12.90	12.91	12.91	12.93	12.91	12.91	12.91	12.91	12.90
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2412MHz_Ant1 (SISO)_LTV



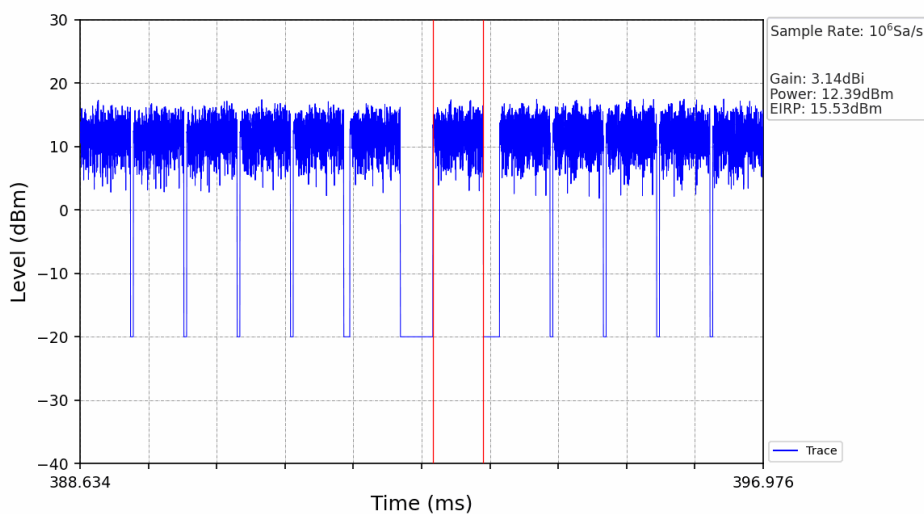
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.616	0.616	0.616	0.616	0.616	0.616	0.615	0.616	0.616	0.616	0.616	0.616
Power (dBm)	9.25	9.23	9.34	9.32	9.34	9.35	9.39	9.22	9.21	9.22	9.24	9.19
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2442MHz_Ant1 (SISO)_LTV



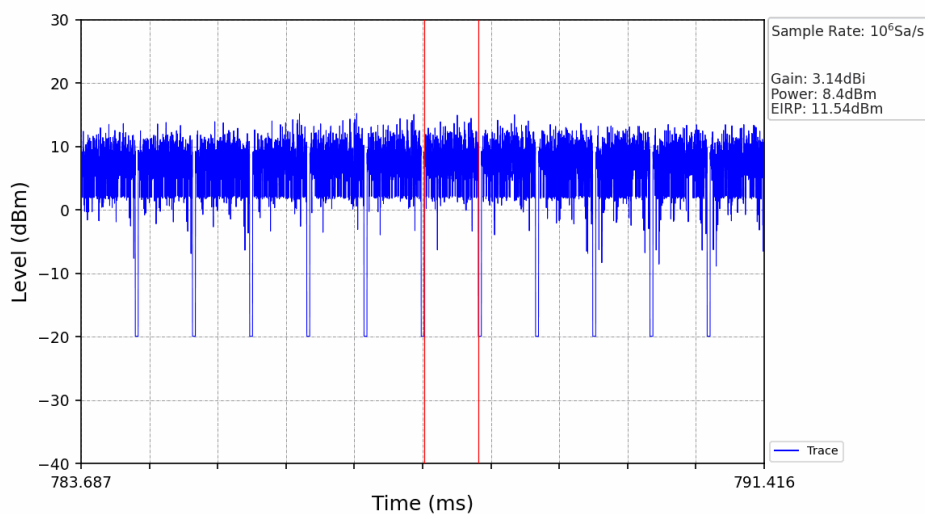
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.616	0.616	0.616	0.616	0.616	0.616	0.615	0.616	0.616	0.616	0.616	0.616
Power (dBm)	8.60	8.59	8.64	8.65	8.67	8.69	8.72	8.53	8.55	8.55	8.55	8.50
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11g_2472MHz_Ant1 (SISO)_LTV



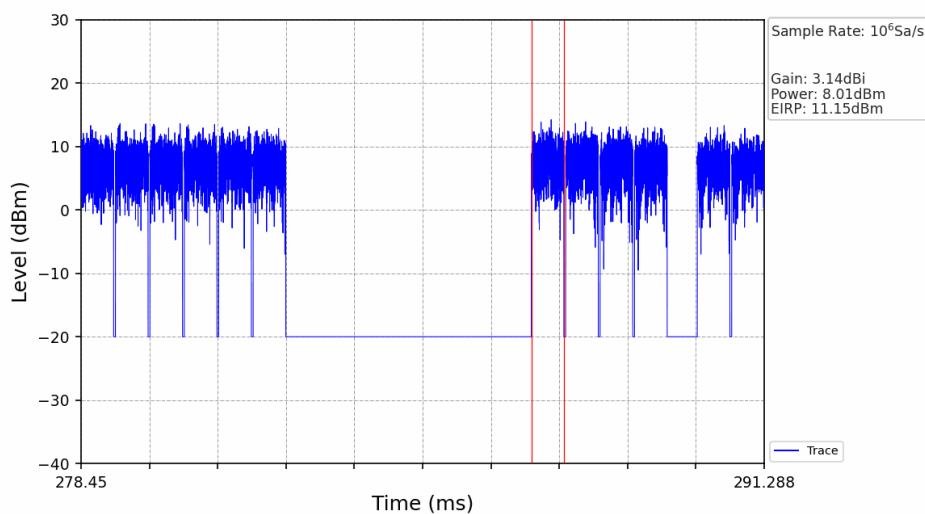
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.616	0.616	0.616	0.617	0.617	0.617	0.616	0.616	0.616	0.616	0.616	0.617
Power (dBm)	12.11	12.09	12.16	12.28	12.27	12.25	12.39	12.34	12.32	12.33	12.23	12.04
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2412MHz_Ant1 (SISO)_LTNV



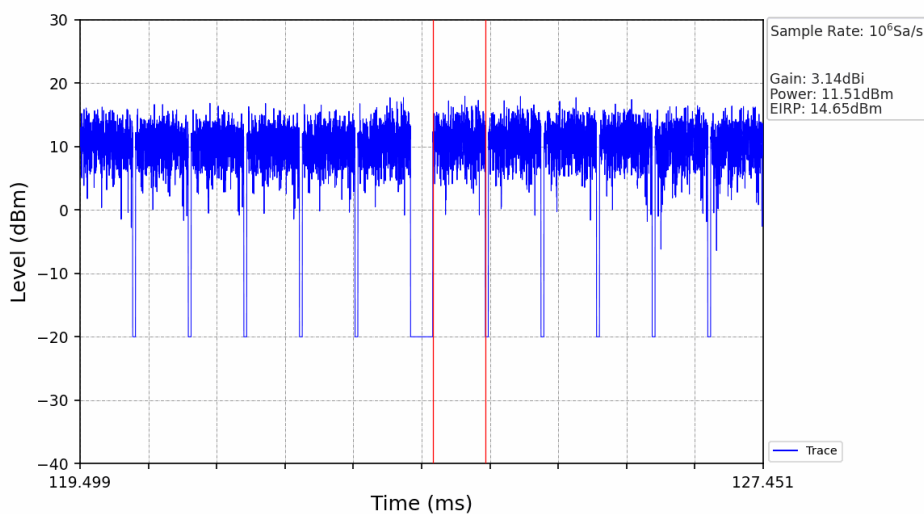
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.613	0.613	0.613	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612
Power (dBm)	7.86	7.86	7.85	8.08	8.37	8.39	8.40	8.38	8.12	8.03	8.03	8.02
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2442MHz_Ant1 (SISO)_LTNV



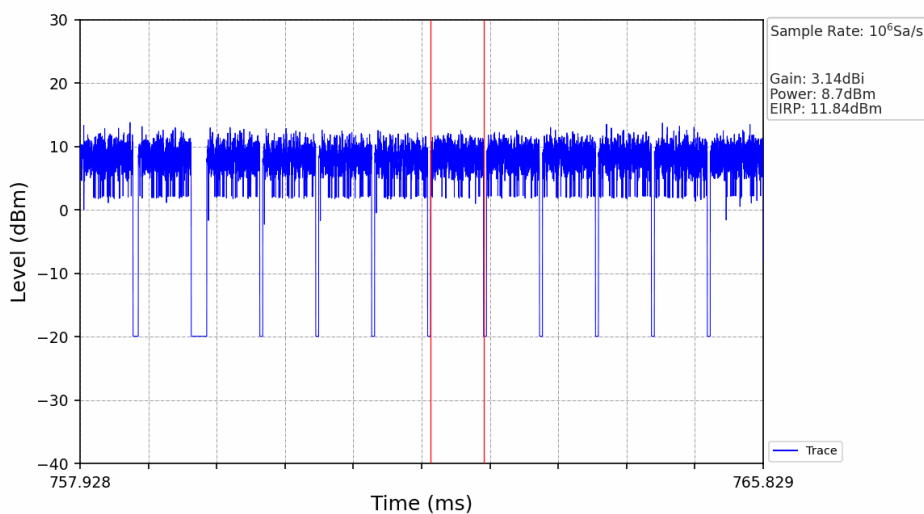
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.611
Power (dBm)	7.46	7.65	7.63	7.62	7.62	7.60	8.01	7.88	7.59	7.56	7.61	7.38
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT20)_2472MHz_Ant1 (SISO)_LTNV



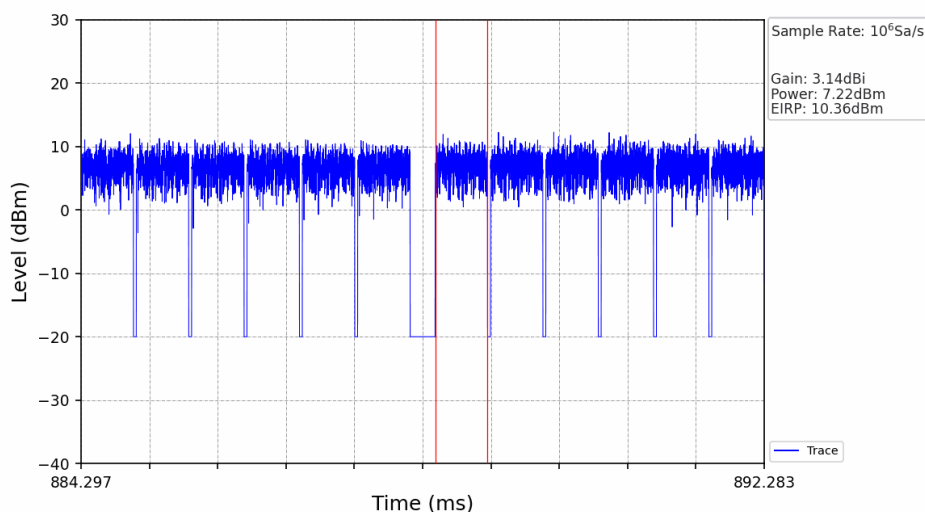
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.613	0.613	0.613	0.613	0.612	0.612	0.612	0.612	0.612	0.612	0.612
Power (dBm)	11.23	10.94	10.94	10.96	10.95	11.20	11.51	11.45	11.41	11.27	11.11	11.10
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2422MHz_Ant1 (SISO)_LTNV



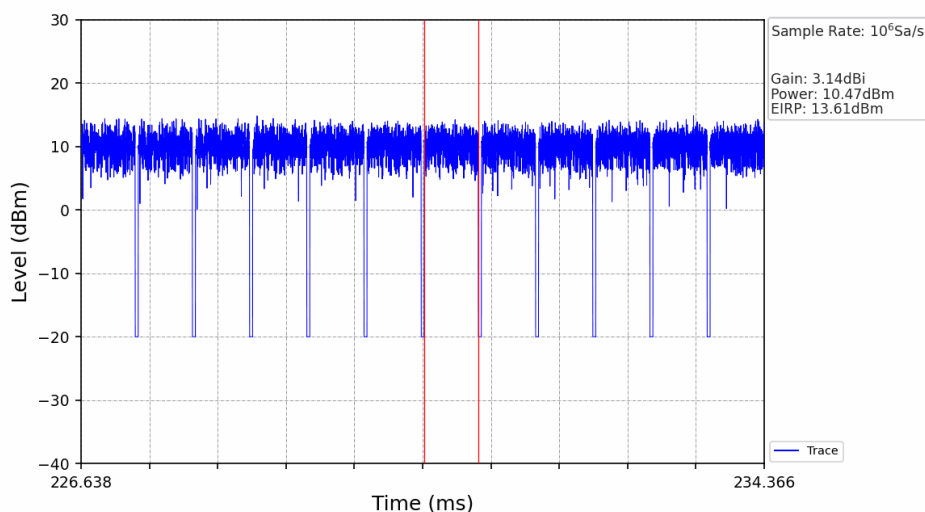
Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.611	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.613
Power (dBm)	8.64	8.53	8.57	8.51	8.50	8.48	8.70	8.69	8.66	8.64	8.61	8.61
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2442MHz_Ant1 (SISO)_LTNV



Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.612	0.613	0.613
Power (dBm)	7.07	7.00	6.97	6.96	6.94	7.01	7.22	7.17	7.15	7.16	7.13	7.13
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

802.11n(HT40)_2462MHz_Ant1 (SISO)_LTNV



Burst No.	1	2	3	4	5	6	7	8	9	10	11	12
Length (ms)	0.613	0.612	0.612	0.612	0.612	0.612	0.612	0.613	0.613	0.613	0.613	0.612
Power (dBm)	10.33	10.33	10.36	10.38	10.41	10.45	10.47	10.33	10.31	10.34	10.36	10.39
Remark	/	/	/	/	/	/	Max	/	/	/	/	/

3. Power Spectral Density

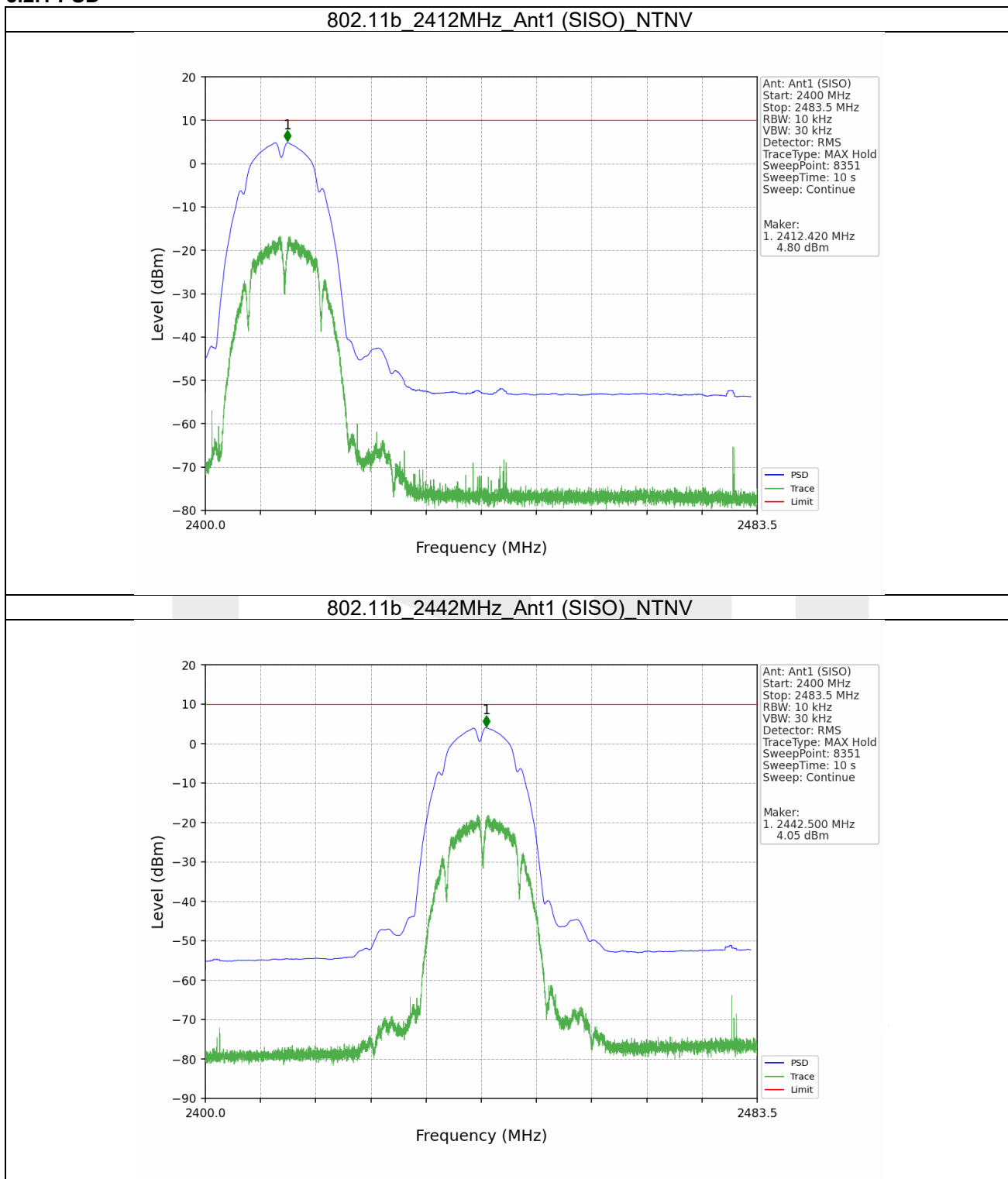
3.1 Test Result

3.1.1 PSD

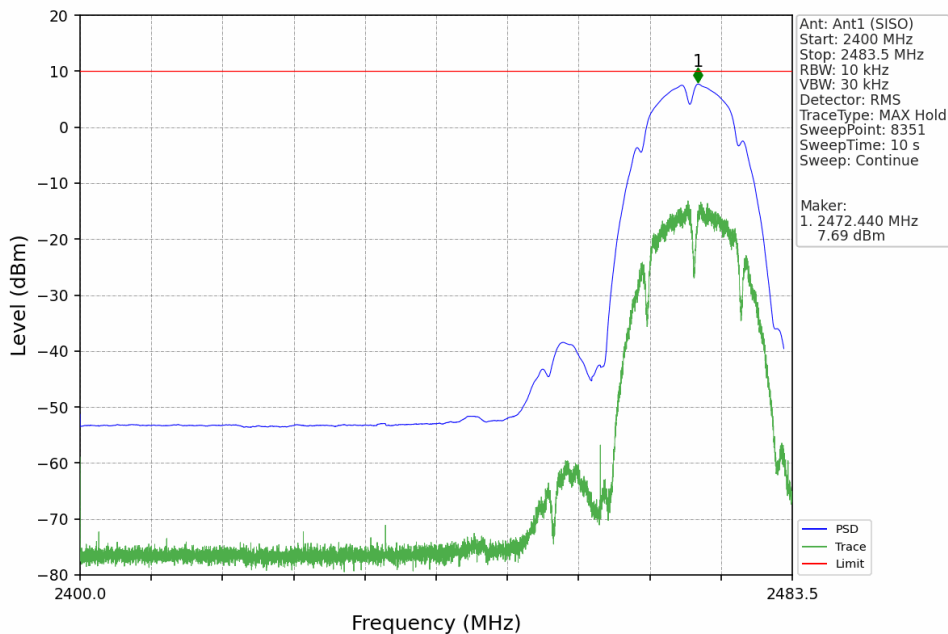
ENV	Mode	TX Type	Frequency (MHz)	ANT	E.I.R.PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NTNV	802.11b	SISO	2412	1	4.80	≤ 10	Pass
			2442	1	4.05	≤ 10	Pass
			2472	1	7.69	≤ 10	Pass
	802.11g	SISO	2412	1	1.08	≤ 10	Pass
			2442	1	0.51	≤ 10	Pass
			2472	1	4.21	≤ 10	Pass
	802.11n (HT20)	SISO	2412	1	0.01	≤ 10	Pass
			2442	1	-0.55	≤ 10	Pass
			2472	1	3.19	≤ 10	Pass
	802.11n (HT40)	SISO	2422	1	-2.76	≤ 10	Pass
			2442	1	-3.94	≤ 10	Pass
			2462	1	-0.44	≤ 10	Pass

3.2 Test Graph

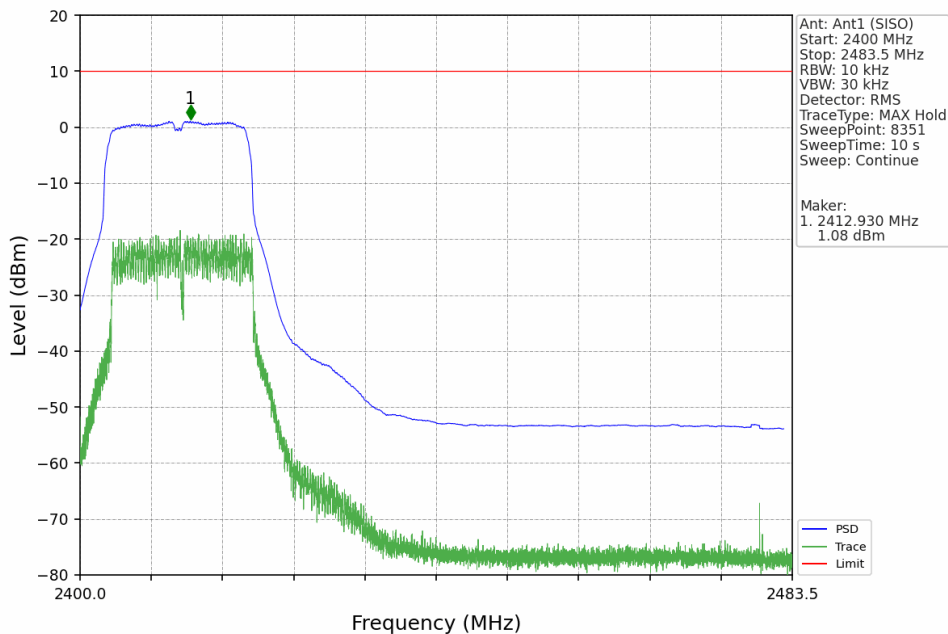
3.2.1 PSD



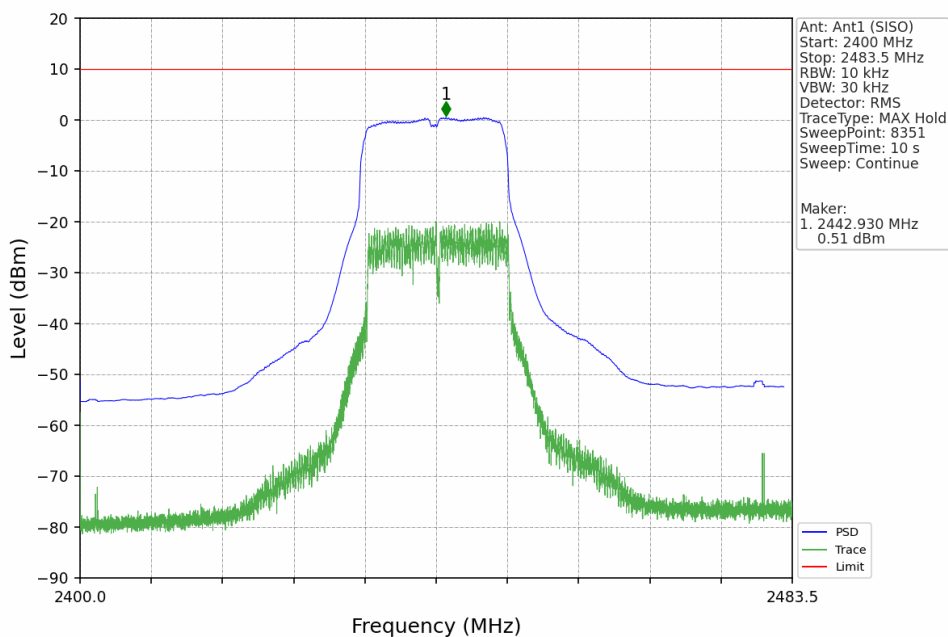
802.11b_2472MHz_Ant1 (SISO)_NTNV



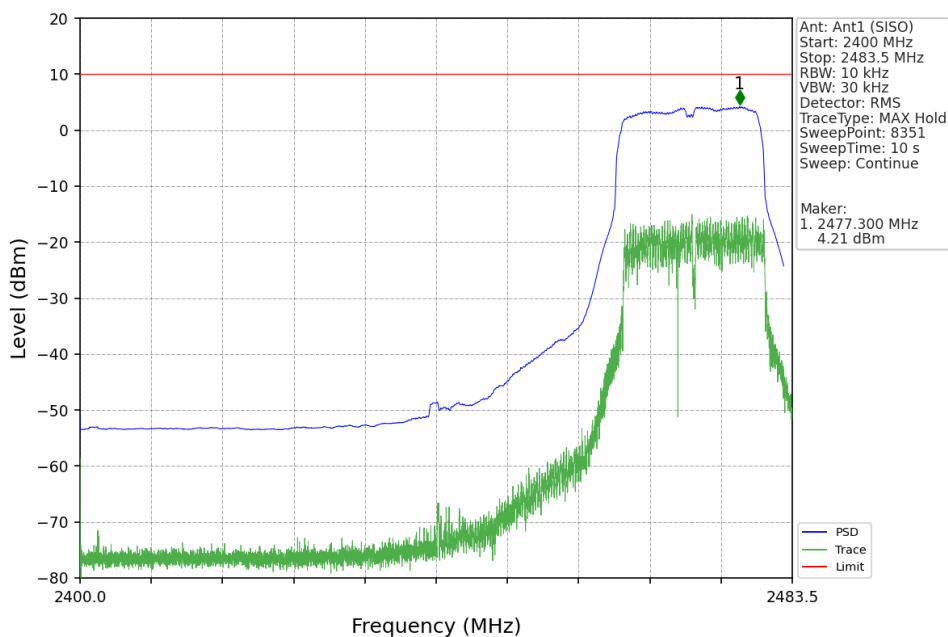
802.11g_2412MHz_Ant1 (SISO)_NTNV



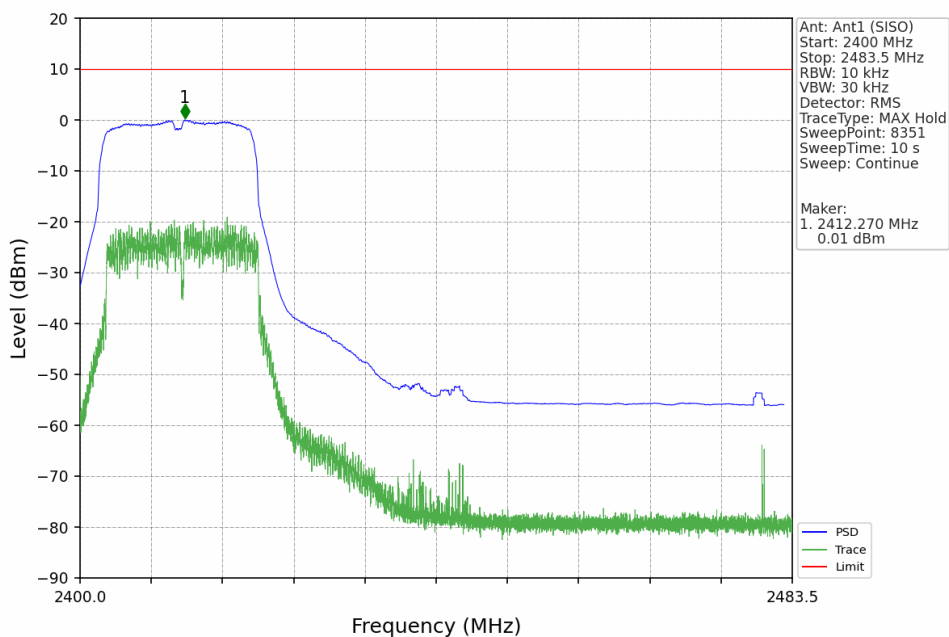
802.11g_2442MHz_Ant1 (SISO)_NTNV



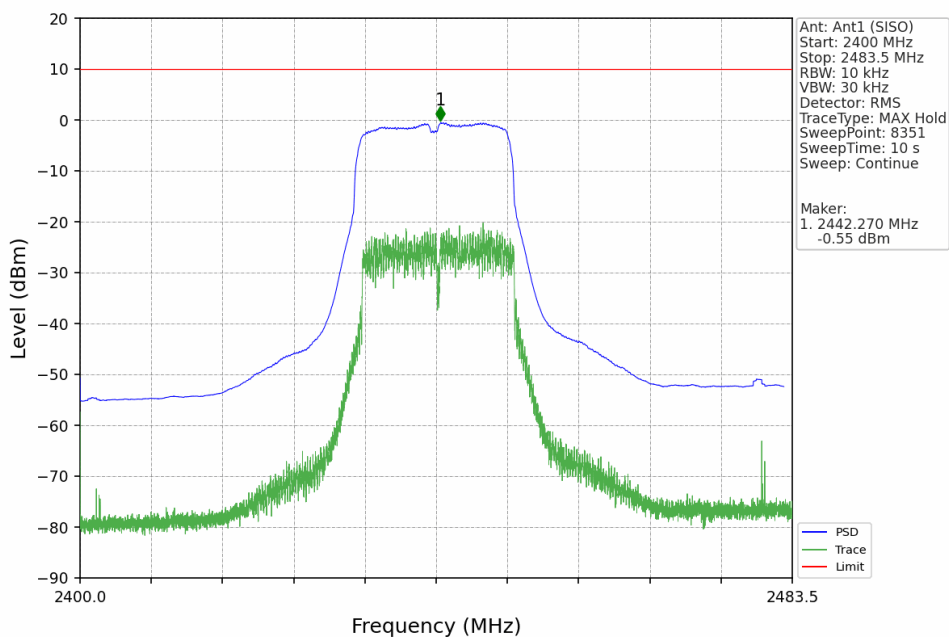
802.11g_2472MHz_Ant1 (SISO)_NTNV



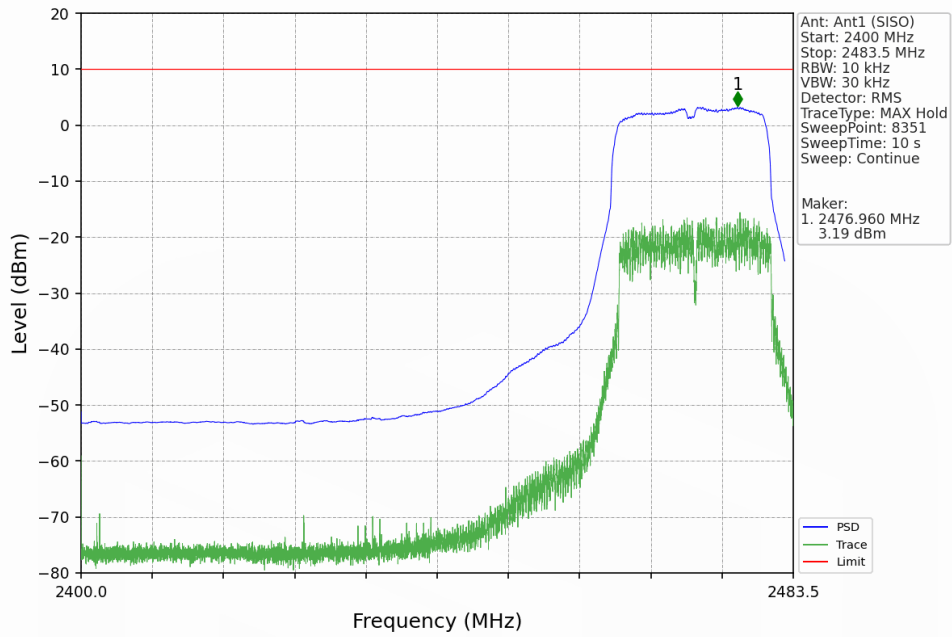
802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



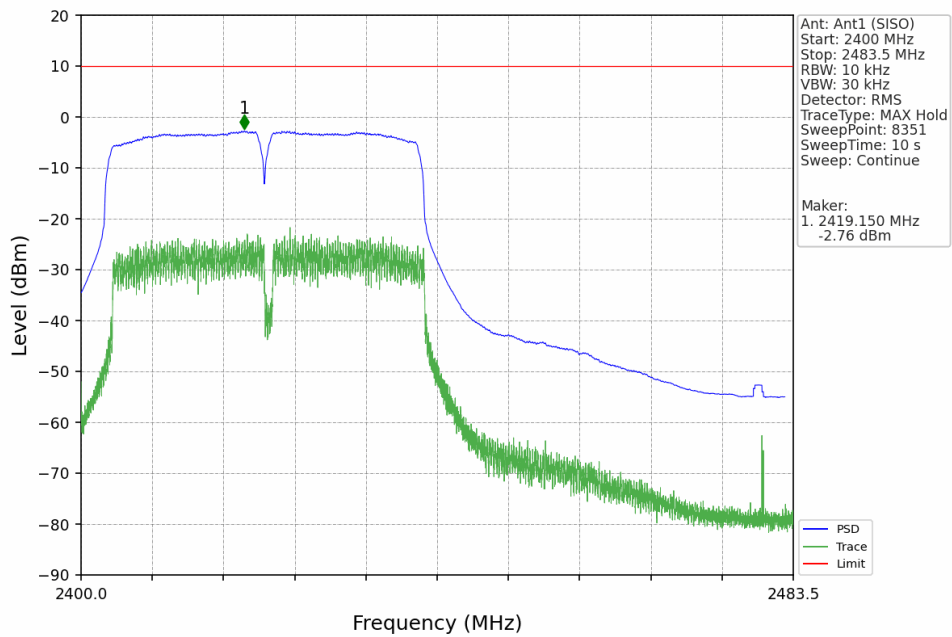
802.11n(HT20)_2442MHz_Ant1 (SISO)_NTNV



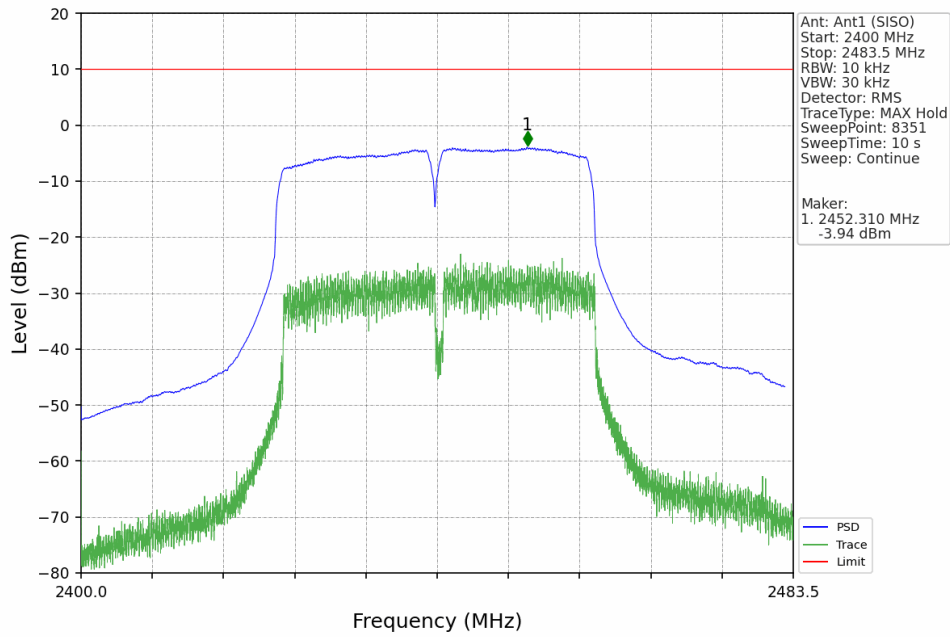
802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



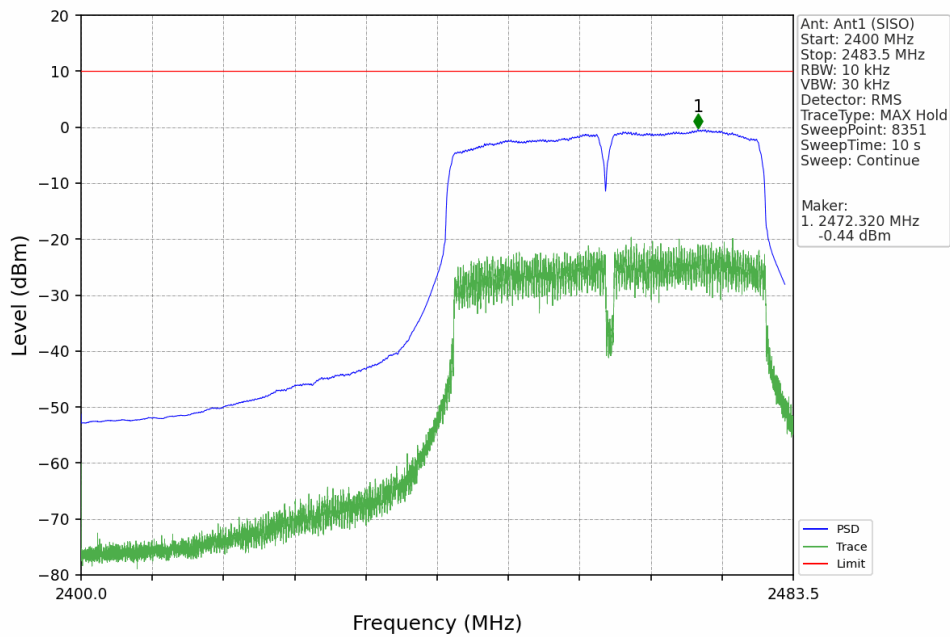
802.11n(HT40)_2422MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_2442MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_2462MHz_Ant1 (SISO)_NTNV



4. Occupied Channel Bandwidth

4.1 Test Result

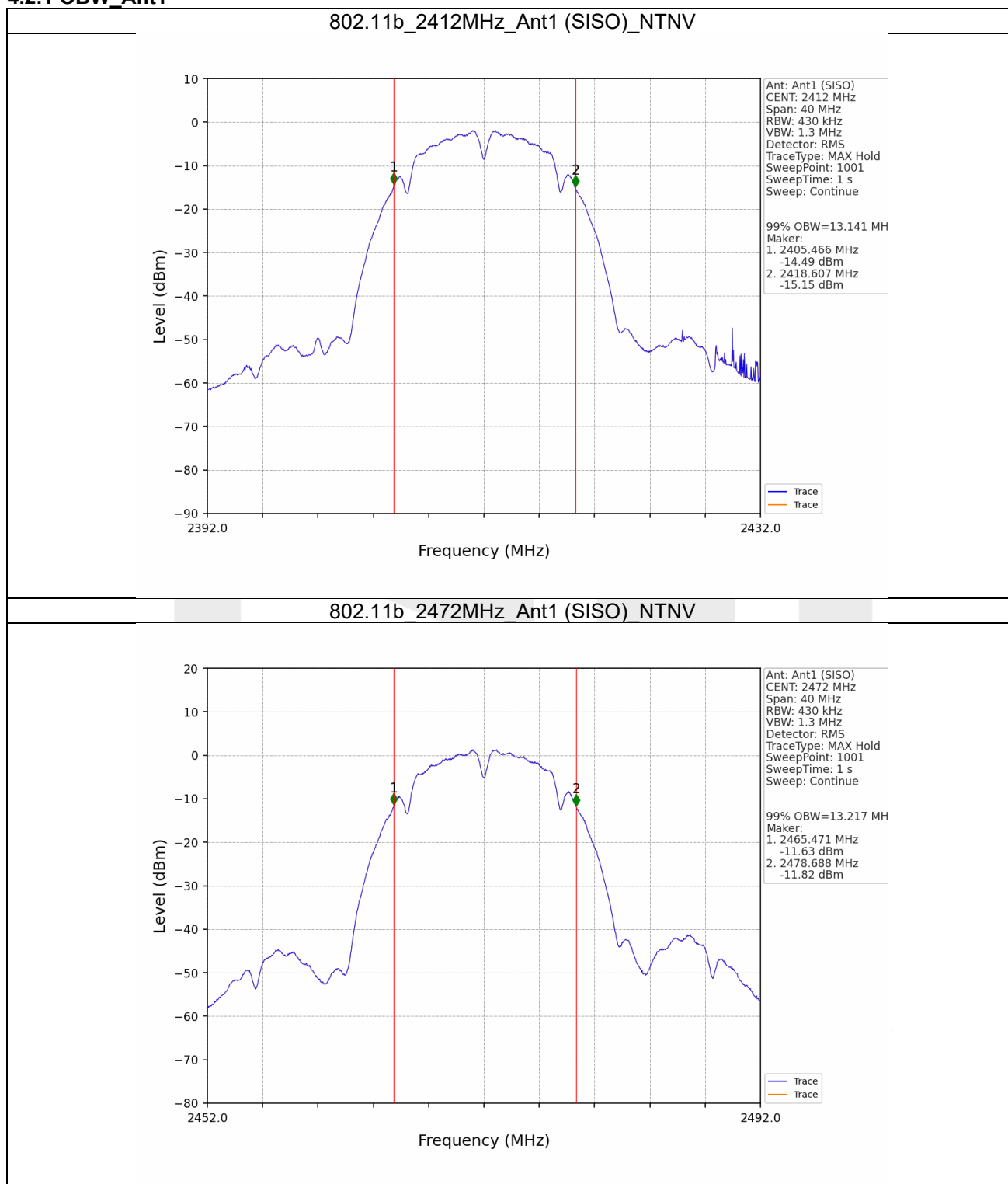
4.1.1 OBW_Ant1

Ant1								
ENV	Mode	TX Type	Frequency (MHz)	OBW (MHz)	Frequency Range (MHz)			Verdict
				Result	FL	FH	Limit	
NTNV	802.11b	SISO	2412	13.141	2405.466	/	≥ 2400	Pass
			2472	13.217	/	2478.688	≤ 2483.5	Pass
	802.11g	SISO	2412	16.568	2403.736	/	≥ 2400	Pass
			2472	16.576	/	2480.325	≤ 2483.5	Pass
	802.11n (HT20)	SISO	2412	17.767	2403.136	/	≥ 2400	Pass
			2472	17.775	/	2480.922	≤ 2483.5	Pass
	802.11n (HT40)	SISO	2422	36.196	2403.929	/	≥ 2400	Pass
			2462	36.213	/	2480.212	≤ 2483.5	Pass

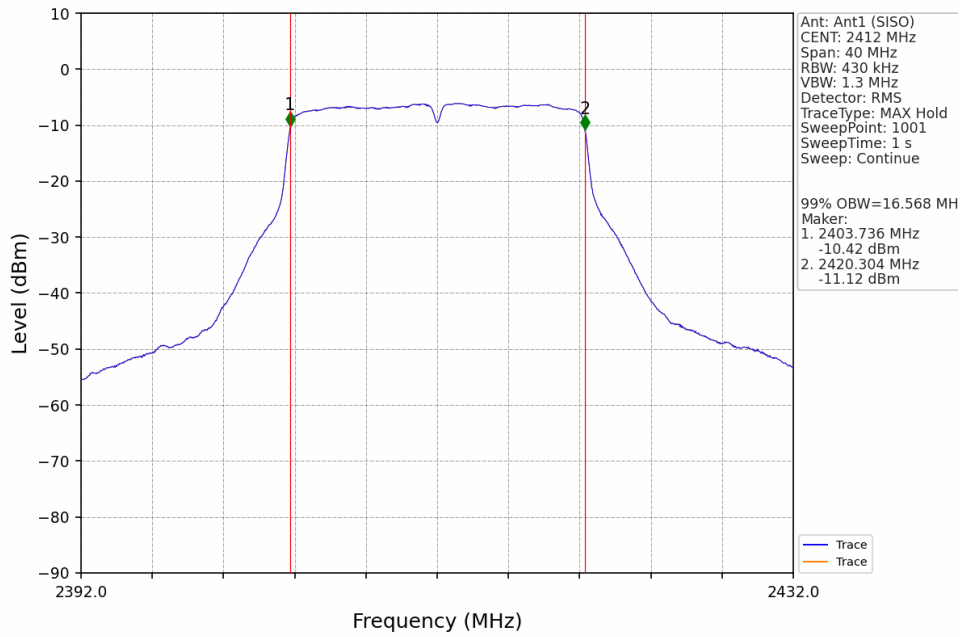


4.2 Test Graph

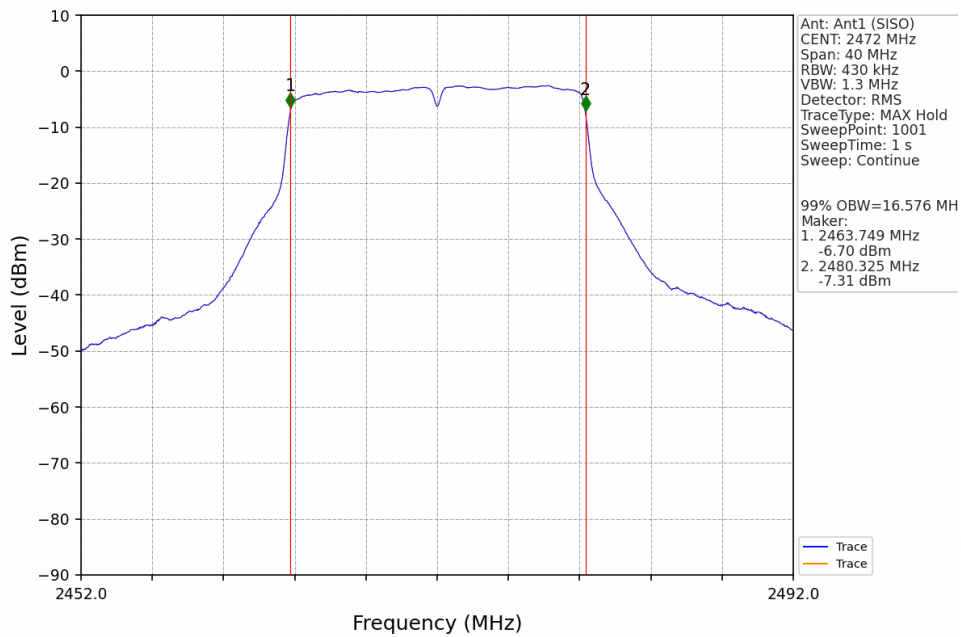
4.2.1 OBW_Ant1



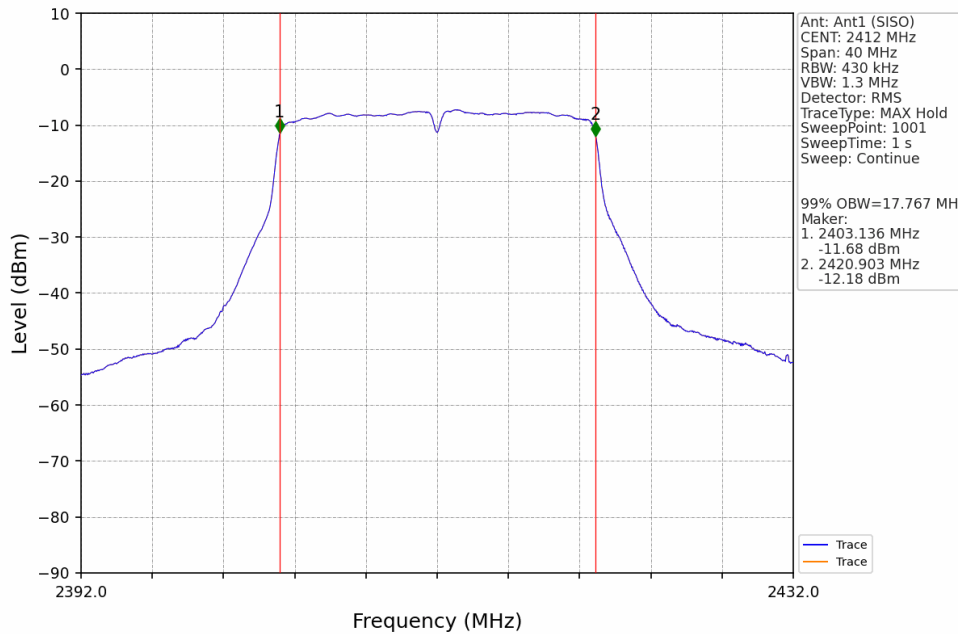
802.11g_2412MHz_Ant1 (SISO)_NTNV



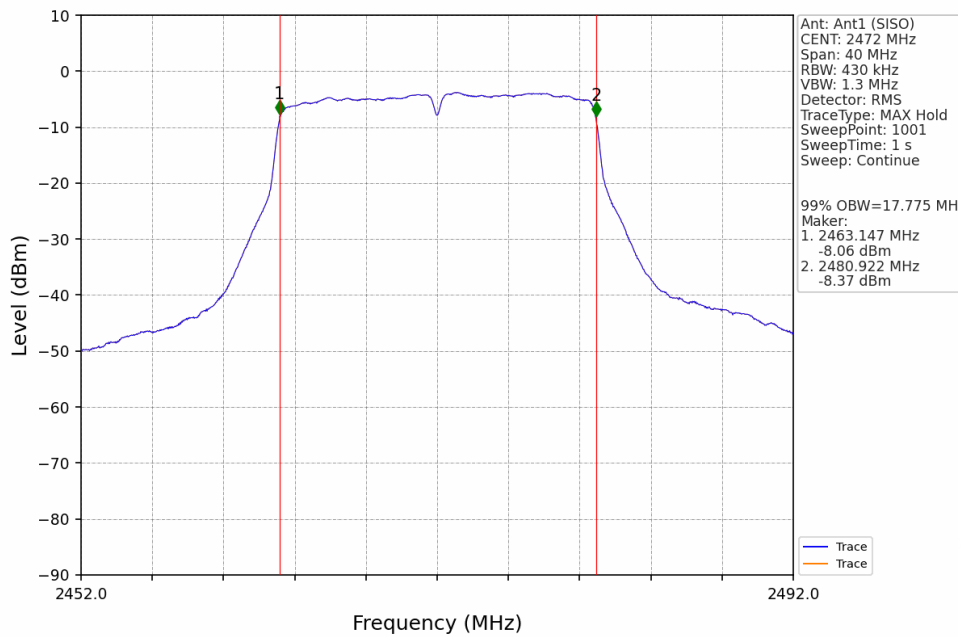
802.11g_2472MHz_Ant1 (SISO)_NTNV



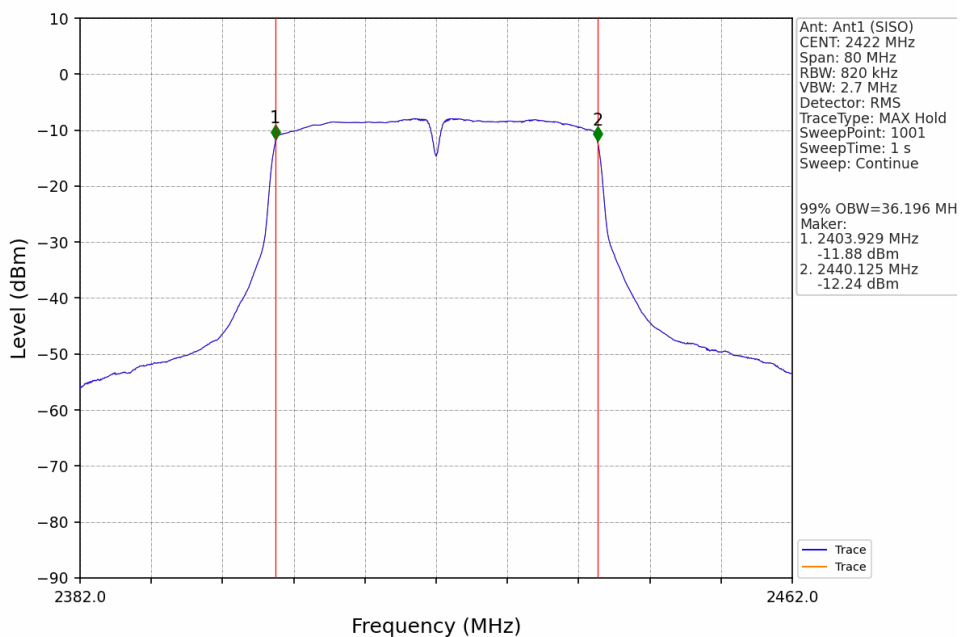
802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



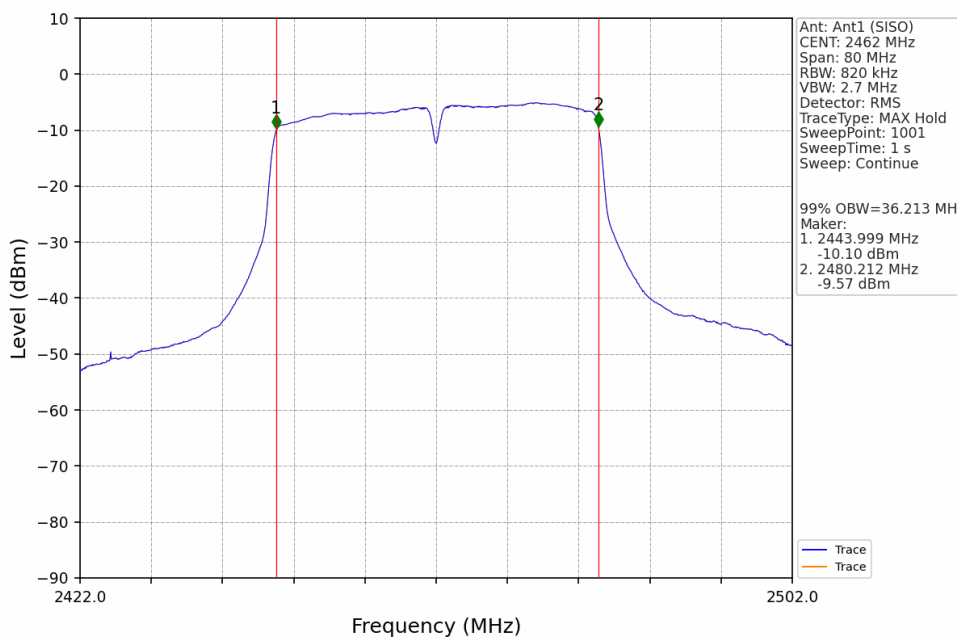
802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_2422MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_2462MHz_Ant1 (SISO)_NTNV



5. Transmitter Unwanted Emissions In The Out-Of-Band Domain

5.1 Test Result

5.1.1 802.11b-Ant1_NTNV

Ant1_NTNV							
Mode	Tx Type	Frequency (MHz)	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
802.11b	SISO	2412	1	2374.218	-56.49	<=-20	Pass
				2374.359	-56.45	<=-20	Pass
				2375.359	-56.51	<=-20	Pass
				2376.359	-56.32	<=-20	Pass
				2377.359	-56.32	<=-20	Pass
				2378.359	-56.31	<=-20	Pass
				2379.359	-56.27	<=-20	Pass
				2380.359	-56.15	<=-20	Pass
				2381.359	-56.11	<=-20	Pass
				2382.359	-56.02	<=-20	Pass
				2383.359	-55.96	<=-20	Pass
				2384.359	-55.98	<=-20	Pass
				2385.359	-55.89	<=-20	Pass
				2386.359	-55.76	<=-20	Pass
				2387.359	-55.54	<=-10	Pass
				2387.500	-55.64	<=-10	Pass
				2388.500	-55.64	<=-10	Pass
				2389.500	-55.50	<=-10	Pass
				2390.500	-55.41	<=-10	Pass
				2391.500	-55.10	<=-10	Pass
				2392.500	-54.49	<=-10	Pass
				2393.500	-52.90	<=-10	Pass
				2394.500	-50.78	<=-10	Pass
				2395.500	-50.40	<=-10	Pass
				2396.500	-47.12	<=-10	Pass
				2397.500	-44.77	<=-10	Pass
				2398.500	-46.46	<=-10	Pass
				2399.500	-46.49	<=-10	Pass
		2472	1	2484.000	-41.18	<=-10	Pass
				2485.000	-36.99	<=-10	Pass
				2486.000	-36.36	<=-10	Pass
				2487.000	-34.62	<=-10	Pass
				2488.000	-38.26	<=-10	Pass
				2489.000	-41.03	<=-10	Pass
				2490.000	-42.37	<=-10	Pass
				2491.000	-45.97	<=-10	Pass
				2492.000	-49.13	<=-10	Pass
				2493.000	-50.40	<=-10	Pass
				2494.000	-51.09	<=-10	Pass
				2495.000	-51.32	<=-10	Pass
				2496.000	-51.32	<=-10	Pass
				2496.217	-50.99	<=-10	Pass
				2497.217	-50.17	<=-20	Pass
				2498.217	-50.25	<=-20	Pass
				2499.217	-51.63	<=-20	Pass
				2500.217	-51.81	<=-20	Pass
				2501.217	-51.96	<=-20	Pass
				2502.217	-52.15	<=-20	Pass
				2503.217	-52.10	<=-20	Pass
				2504.217	-52.10	<=-20	Pass

				2505.217	-52.16	<=-20	Pass
				2506.217	-52.22	<=-20	Pass
				2507.217	-52.16	<=-20	Pass
				2508.217	-52.12	<=-20	Pass
				2509.217	-52.22	<=-20	Pass
				2509.434	-52.09	<=-20	Pass



5.1.2 802.11g-Ant1_NTNV

Ant1_NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
802.11g	SISO	2412	1	2367.364	-56.78	<=-20	Pass
				2367.932	-56.72	<=-20	Pass
				2368.932	-56.64	<=-20	Pass
				2369.932	-56.66	<=-20	Pass
				2370.932	-56.65	<=-20	Pass
				2371.932	-56.63	<=-20	Pass
				2372.932	-56.50	<=-20	Pass
				2373.932	-56.43	<=-20	Pass
				2374.932	-56.40	<=-20	Pass
				2375.932	-56.19	<=-20	Pass
				2376.932	-56.31	<=-20	Pass
				2377.932	-56.16	<=-20	Pass
				2378.932	-55.97	<=-20	Pass
				2379.932	-55.88	<=-20	Pass
				2380.932	-55.83	<=-20	Pass
				2381.932	-55.65	<=-20	Pass
				2382.932	-55.36	<=-20	Pass
				2383.932	-55.04	<=-10	Pass
				2384.500	-54.95	<=-10	Pass
				2385.500	-54.54	<=-10	Pass
				2386.500	-54.27	<=-10	Pass
				2387.500	-53.78	<=-10	Pass
				2388.500	-53.06	<=-10	Pass
				2389.500	-51.91	<=-10	Pass
				2390.500	-50.61	<=-10	Pass
				2391.500	-49.14	<=-10	Pass
				2392.500	-47.92	<=-10	Pass
				2393.500	-46.71	<=-10	Pass
				2394.500	-45.58	<=-10	Pass
				2395.500	-44.32	<=-10	Pass
				2396.500	-43.25	<=-10	Pass
				2397.500	-42.25	<=-10	Pass
				2398.500	-40.88	<=-10	Pass
				2399.500	-37.44	<=-10	Pass
		2472	1	2484.000	-29.31	<=-10	Pass
				2485.000	-31.40	<=-10	Pass
				2486.000	-32.81	<=-10	Pass
				2487.000	-34.06	<=-10	Pass
				2488.000	-35.02	<=-10	Pass
				2489.000	-35.75	<=-10	Pass
				2490.000	-36.72	<=-10	Pass
				2491.000	-37.97	<=-10	Pass
				2492.000	-39.43	<=-10	Pass
				2493.000	-40.96	<=-10	Pass
				2494.000	-43.02	<=-10	Pass
				2495.000	-44.69	<=-10	Pass
				2496.000	-45.90	<=-10	Pass
				2497.000	-46.83	<=-10	Pass
				2498.000	-49.34	<=-10	Pass
				2499.000	-48.51	<=-10	Pass
				2499.576	-48.34	<=-10	Pass
				2500.576	-48.90	<=-20	Pass

				2501.576	-49.34	<=-20	Pass
				2502.576	-49.86	<=-20	Pass
				2503.576	-50.08	<=-20	Pass
				2504.576	-50.50	<=-20	Pass
				2505.576	-51.04	<=-20	Pass
				2506.576	-50.94	<=-20	Pass
				2507.576	-51.28	<=-20	Pass
				2508.576	-51.27	<=-20	Pass
				2509.576	-51.64	<=-20	Pass
				2510.576	-51.64	<=-20	Pass
				2511.576	-51.72	<=-20	Pass
				2512.576	-51.86	<=-20	Pass
				2513.576	-52.13	<=-20	Pass
				2514.576	-51.94	<=-20	Pass
				2515.576	-51.87	<=-20	Pass
				2516.152	-51.99	<=-20	Pass

5.1.3 802.11n(HT20)-Ant1_NTNV

Ant1_NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
802.11n (HT20)	SISO	2412	1	2364.966	-57.98	<=-20	Pass
				2365.733	-57.86	<=-20	Pass
				2366.733	-57.90	<=-20	Pass
				2367.733	-58.04	<=-20	Pass
				2368.733	-57.94	<=-20	Pass
				2369.733	-57.92	<=-20	Pass
				2370.733	-57.76	<=-20	Pass
				2371.733	-57.86	<=-20	Pass
				2372.733	-57.73	<=-20	Pass
				2373.733	-57.79	<=-20	Pass
				2374.733	-57.77	<=-20	Pass
				2375.733	-57.65	<=-20	Pass
				2376.733	-57.60	<=-20	Pass
				2377.733	-57.57	<=-20	Pass
				2378.733	-57.34	<=-20	Pass
				2379.733	-57.32	<=-20	Pass
				2380.733	-57.20	<=-20	Pass
				2381.733	-56.84	<=-20	Pass
				2382.733	-56.85	<=-10	Pass
				2383.500	-56.71	<=-10	Pass
				2384.500	-56.60	<=-10	Pass
				2385.500	-56.32	<=-10	Pass
				2386.500	-55.54	<=-10	Pass
				2387.500	-54.83	<=-10	Pass
				2388.500	-53.53	<=-10	Pass
				2389.500	-51.80	<=-10	Pass
				2390.500	-50.04	<=-10	Pass
				2391.500	-48.72	<=-10	Pass
				2392.500	-47.57	<=-10	Pass
				2393.500	-46.39	<=-10	Pass
				2394.500	-45.17	<=-10	Pass
				2395.500	-44.45	<=-10	Pass
				2396.500	-43.80	<=-10	Pass
				2397.500	-42.52	<=-10	Pass
				2398.500	-40.65	<=-10	Pass
				2399.500	-38.56	<=-10	Pass
		2472	1	2484.000	-29.46	<=-10	Pass
				2485.000	-33.32	<=-10	Pass
				2486.000	-34.42	<=-10	Pass
				2487.000	-35.29	<=-10	Pass
				2488.000	-36.01	<=-10	Pass
				2489.000	-36.67	<=-10	Pass
				2490.000	-37.81	<=-10	Pass
				2491.000	-38.89	<=-10	Pass
				2492.000	-40.13	<=-10	Pass
				2493.000	-41.54	<=-10	Pass
				2494.000	-42.74	<=-10	Pass
				2495.000	-44.19	<=-10	Pass
				2496.000	-45.90	<=-10	Pass
				2497.000	-47.37	<=-10	Pass
				2498.000	-48.14	<=-10	Pass
				2499.000	-48.86	<=-10	Pass

			2500.000	-49.38	<=-10	Pass
			2500.775	-49.53	<=-10	Pass
			2501.775	-50.12	<=-20	Pass
			2502.775	-50.28	<=-20	Pass
			2503.775	-50.66	<=-20	Pass
			2504.775	-51.07	<=-20	Pass
			2505.775	-51.24	<=-20	Pass
			2506.775	-51.41	<=-20	Pass
			2507.775	-51.53	<=-20	Pass
			2508.775	-51.66	<=-20	Pass
			2509.775	-51.83	<=-20	Pass
			2510.775	-51.87	<=-20	Pass
			2511.775	-51.97	<=-20	Pass
			2512.775	-52.00	<=-20	Pass
			2513.775	-52.07	<=-20	Pass
			2514.775	-52.09	<=-20	Pass
			2515.775	-52.08	<=-20	Pass
			2516.775	-52.13	<=-20	Pass
			2517.775	-52.12	<=-20	Pass
			2518.550	-52.20	<=-20	Pass

5.1.4 802.11n(HT40)-Ant1_NTNV

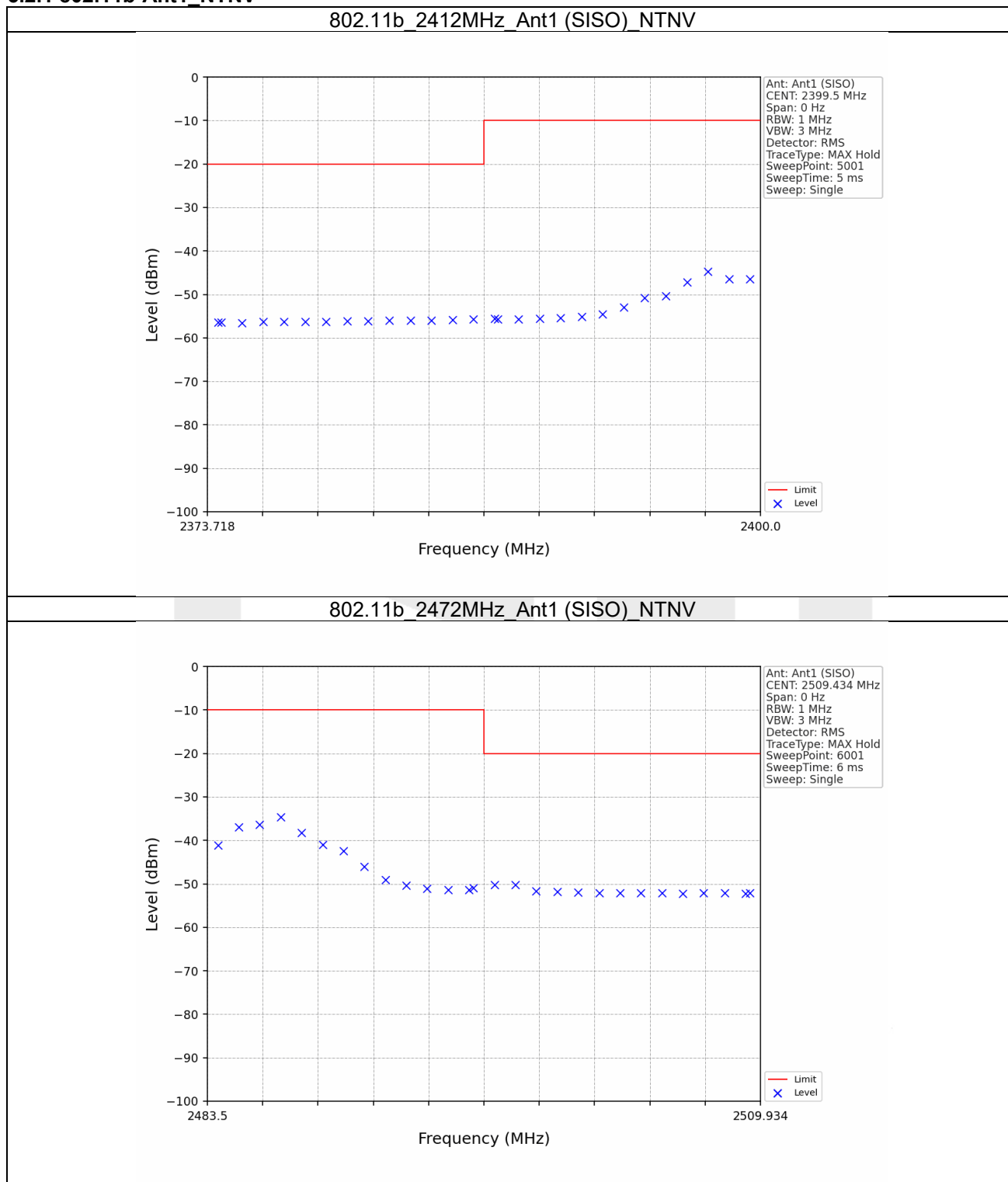
Ant1_NTNV							
Mode	TX Type	Frequency (MHz)	ANT	Test Freq. (MHz)	Result (dBm/MHz)	Limit (dBm/MHz)	Verdict
802.11n (HT40)	SISO	2422	1	2328.108	-58.71	<=-20	Pass
				2328.304	-58.70	<=-20	Pass
				2329.304	-58.61	<=-20	Pass
				2330.304	-58.72	<=-20	Pass
				2331.304	-58.54	<=-20	Pass
				2332.304	-58.59	<=-20	Pass
				2333.304	-58.62	<=-20	Pass
				2334.304	-58.61	<=-20	Pass
				2335.304	-58.51	<=-20	Pass
				2336.304	-58.62	<=-20	Pass
				2337.304	-58.53	<=-20	Pass
				2338.304	-58.52	<=-20	Pass
				2339.304	-58.52	<=-20	Pass
				2340.304	-58.54	<=-20	Pass
				2341.304	-58.52	<=-20	Pass
				2342.304	-58.60	<=-20	Pass
				2343.304	-58.42	<=-20	Pass
				2344.304	-58.39	<=-20	Pass
				2345.304	-58.44	<=-20	Pass
				2346.304	-58.41	<=-20	Pass
				2347.304	-58.50	<=-20	Pass
				2348.304	-58.33	<=-20	Pass
				2349.304	-58.35	<=-20	Pass
				2350.304	-58.33	<=-20	Pass
				2351.304	-58.27	<=-20	Pass
				2352.304	-58.24	<=-20	Pass
				2353.304	-58.30	<=-20	Pass
				2354.304	-58.36	<=-20	Pass
				2355.304	-58.12	<=-20	Pass
				2356.304	-58.19	<=-20	Pass
				2357.304	-58.12	<=-20	Pass
				2358.304	-57.98	<=-20	Pass
				2359.304	-58.07	<=-20	Pass
				2360.304	-58.08	<=-20	Pass
				2361.304	-58.00	<=-20	Pass
				2362.304	-57.79	<=-20	Pass
				2363.304	-57.85	<=-20	Pass
				2364.304	-57.84	<=-10	Pass
				2364.500	-57.75	<=-10	Pass
				2365.500	-57.76	<=-10	Pass
				2366.500	-57.66	<=-10	Pass
				2367.500	-57.57	<=-10	Pass
				2368.500	-57.58	<=-10	Pass
				2369.500	-57.41	<=-10	Pass
				2370.500	-57.33	<=-10	Pass
				2371.500	-57.02	<=-10	Pass
				2372.500	-56.80	<=-10	Pass
				2373.500	-56.43	<=-10	Pass
				2374.500	-55.92	<=-10	Pass
				2375.500	-55.60	<=-10	Pass
				2376.500	-55.16	<=-10	Pass
				2377.500	-54.56	<=-10	Pass

				2378.500	-54.02	<=-10	Pass
				2379.500	-53.49	<=-10	Pass
				2380.500	-52.96	<=-10	Pass
				2381.500	-52.39	<=-10	Pass
				2382.500	-51.49	<=-10	Pass
				2383.500	-50.93	<=-10	Pass
				2384.500	-50.46	<=-10	Pass
				2385.500	-49.72	<=-10	Pass
				2386.500	-49.61	<=-10	Pass
				2387.500	-49.43	<=-10	Pass
				2388.500	-48.54	<=-10	Pass
				2389.500	-48.11	<=-10	Pass
				2390.500	-47.68	<=-10	Pass
				2391.500	-47.50	<=-10	Pass
				2392.500	-46.96	<=-10	Pass
				2393.500	-46.52	<=-10	Pass
				2394.500	-45.92	<=-10	Pass
				2395.500	-45.28	<=-10	Pass
				2396.500	-44.40	<=-10	Pass
				2397.500	-43.69	<=-10	Pass
				2398.500	-40.70	<=-10	Pass
				2399.500	-38.42	<=-10	Pass
		2462	1	2484.000	-32.46	<=-10	Pass
				2485.000	-34.10	<=-10	Pass
				2486.000	-35.80	<=-10	Pass
				2487.000	-36.91	<=-10	Pass
				2488.000	-38.24	<=-10	Pass
				2489.000	-38.89	<=-10	Pass
				2490.000	-39.29	<=-10	Pass
				2491.000	-39.26	<=-10	Pass
				2492.000	-39.94	<=-10	Pass
				2493.000	-40.24	<=-10	Pass
				2494.000	-40.61	<=-10	Pass
				2495.000	-40.87	<=-10	Pass
				2496.000	-41.36	<=-10	Pass
				2497.000	-41.53	<=-10	Pass
				2498.000	-41.89	<=-10	Pass
				2499.000	-42.51	<=-10	Pass
				2500.000	-42.90	<=-10	Pass
				2501.000	-43.88	<=-10	Pass
				2502.000	-44.69	<=-10	Pass
				2503.000	-45.16	<=-10	Pass
				2504.000	-45.72	<=-10	Pass
				2505.000	-46.26	<=-10	Pass
				2506.000	-46.43	<=-10	Pass
				2507.000	-47.15	<=-10	Pass
				2508.000	-47.67	<=-10	Pass
				2509.000	-48.18	<=-10	Pass
				2510.000	-48.83	<=-10	Pass
				2511.000	-49.44	<=-10	Pass
				2512.000	-49.84	<=-10	Pass
				2513.000	-50.26	<=-10	Pass
				2514.000	-50.42	<=-10	Pass
				2515.000	-50.76	<=-10	Pass
				2516.000	-50.99	<=-10	Pass
				2517.000	-51.11	<=-10	Pass

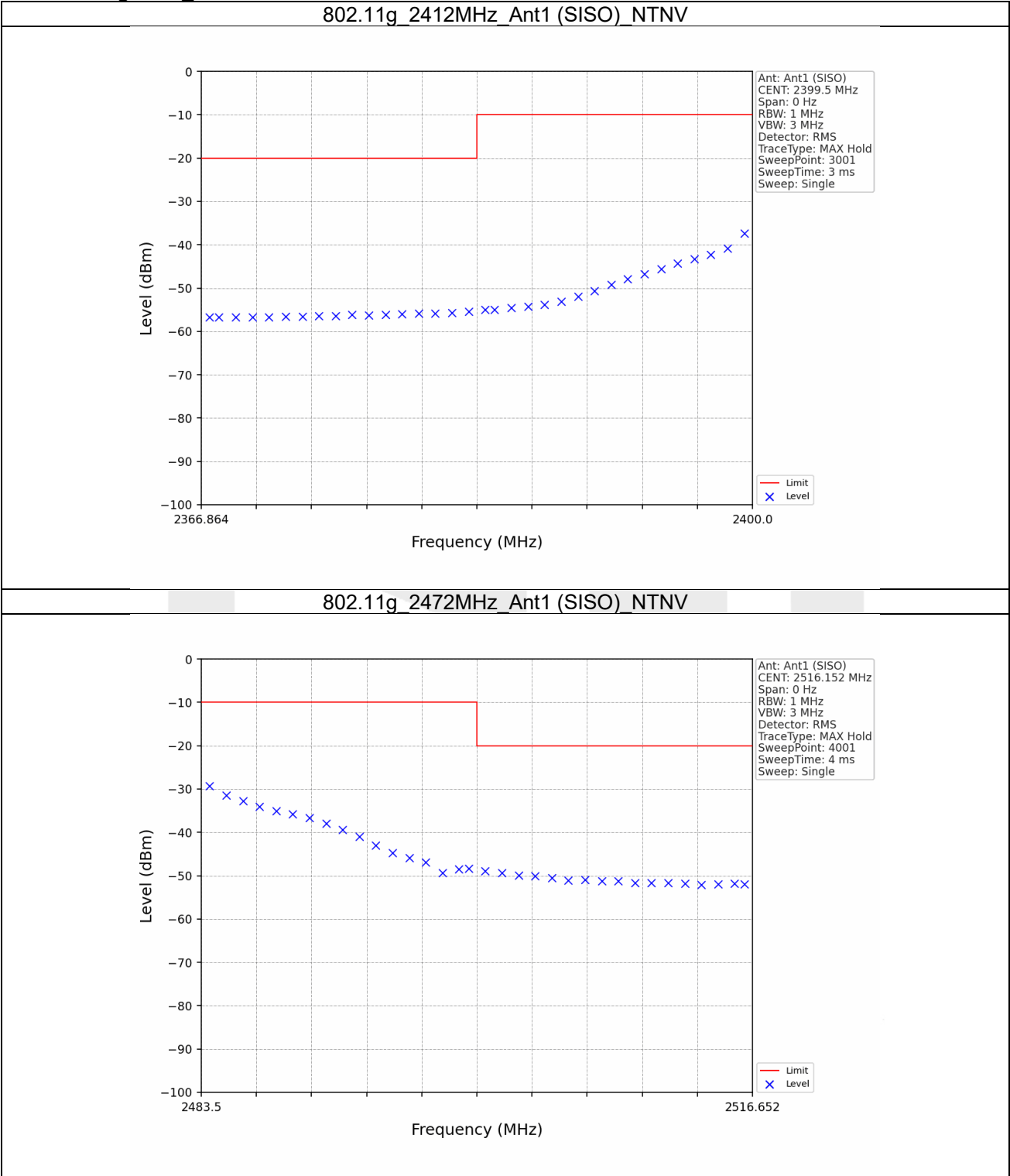
				2518.000	-51.17	<=-10	Pass
				2519.000	-51.34	<=-10	Pass
				2519.213	-51.19	<=-10	Pass
				2520.213	-51.53	<=-20	Pass
				2521.213	-51.41	<=-20	Pass
				2522.213	-51.53	<=-20	Pass
				2523.213	-51.78	<=-20	Pass
				2524.213	-51.81	<=-20	Pass
				2525.213	-51.84	<=-20	Pass
				2526.213	-51.97	<=-20	Pass
				2527.213	-51.99	<=-20	Pass
				2528.213	-51.99	<=-20	Pass
				2529.213	-51.98	<=-20	Pass
				2530.213	-52.05	<=-20	Pass
				2531.213	-52.11	<=-20	Pass
				2532.213	-52.17	<=-20	Pass
				2533.213	-52.25	<=-20	Pass
				2534.213	-52.27	<=-20	Pass
				2535.213	-52.19	<=-20	Pass
				2536.213	-52.21	<=-20	Pass
				2537.213	-52.36	<=-20	Pass
				2538.213	-52.34	<=-20	Pass
				2539.213	-52.22	<=-20	Pass
				2540.213	-52.31	<=-20	Pass
				2541.213	-52.21	<=-20	Pass
				2542.213	-52.36	<=-20	Pass
				2543.213	-52.18	<=-20	Pass
				2544.213	-52.21	<=-20	Pass
				2545.213	-52.32	<=-20	Pass
				2546.213	-52.39	<=-20	Pass
				2547.213	-52.45	<=-20	Pass
				2548.213	-52.35	<=-20	Pass
				2549.213	-52.30	<=-20	Pass
				2550.213	-52.40	<=-20	Pass
				2551.213	-52.34	<=-20	Pass
				2552.213	-52.37	<=-20	Pass
				2553.213	-52.26	<=-20	Pass
				2554.213	-52.52	<=-20	Pass
				2555.213	-52.33	<=-20	Pass
				2555.426	-52.44	<=-20	Pass

5.2 Test Graph

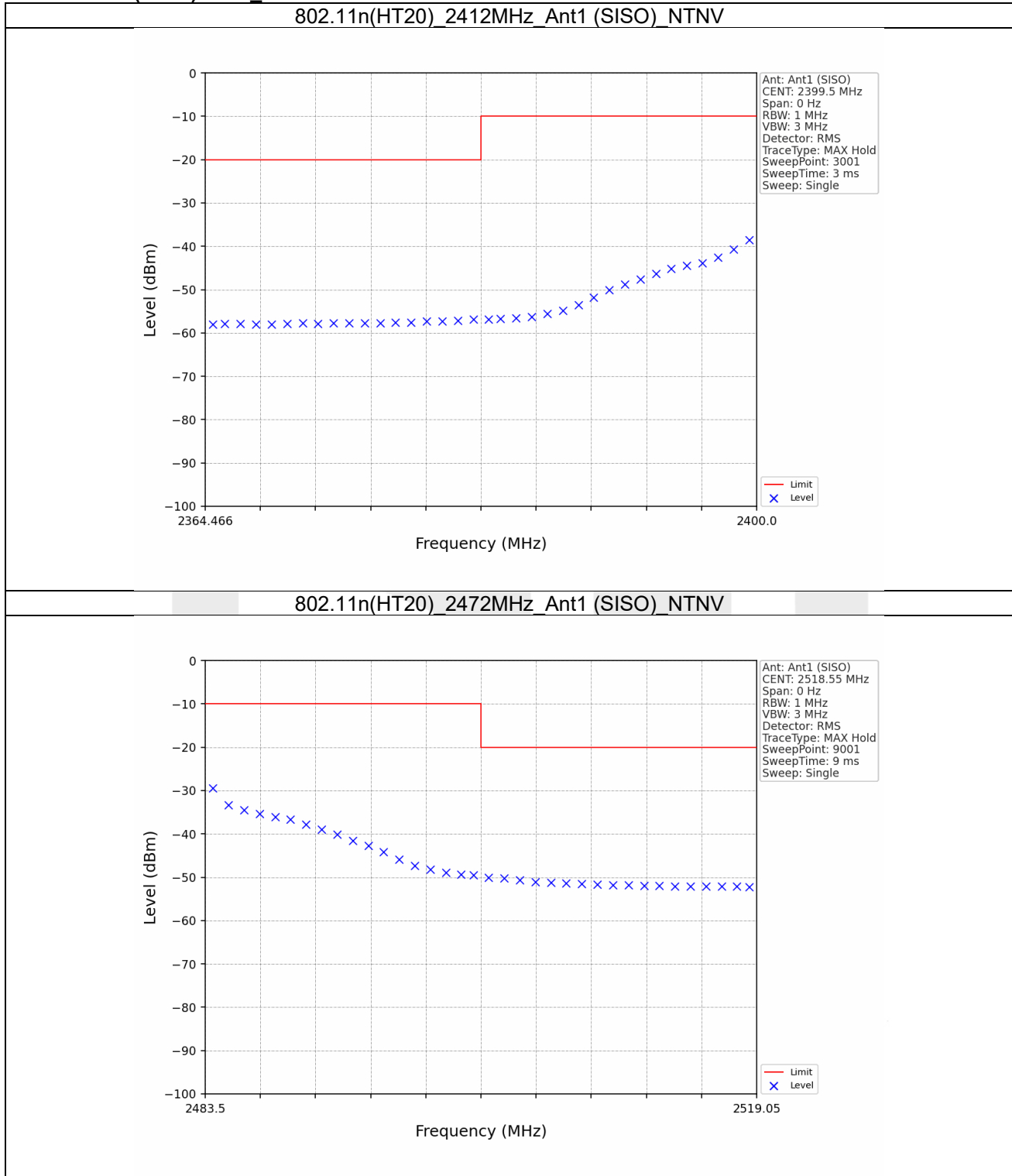
5.2.1 802.11b-Ant1_NTNV



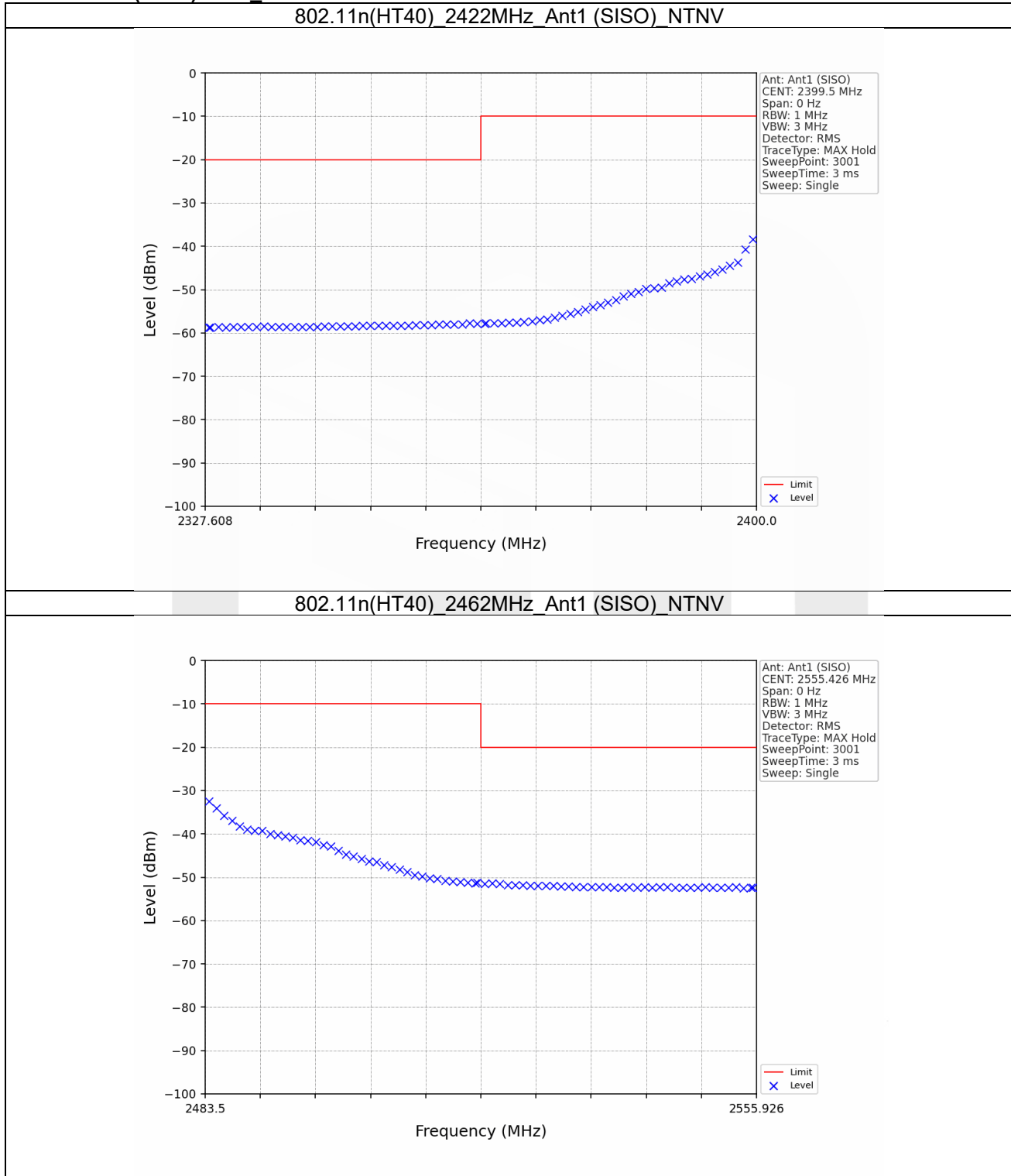
5.2.2 802.11g-Ant1_NTNV



5.2.3 802.11n(HT20)-Ant1_NTNV



5.2.4 802.11n(HT40)-Ant1_NTNV



6. Transmitter Unwanted Emissions In The Spurious Domain

6.1 Test Result

6.1.1 TxSe

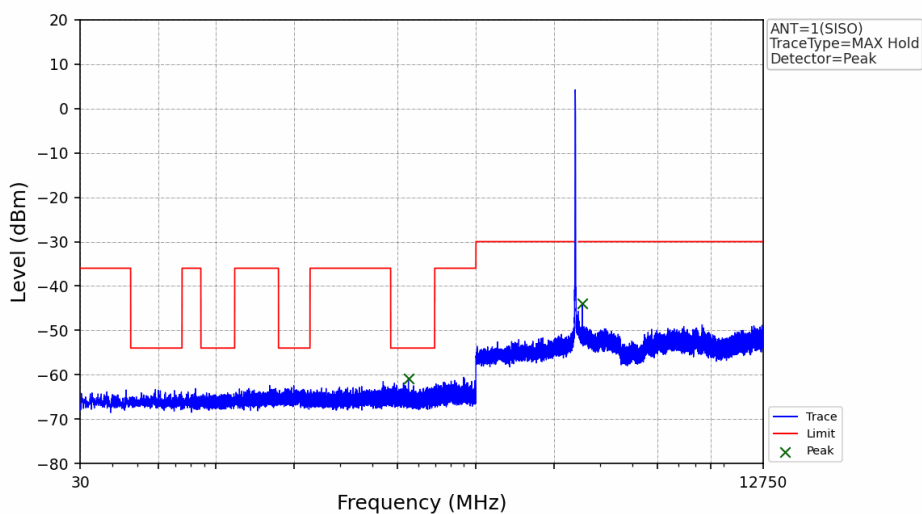
ENV	Mode	TX Type	Frequency (MHz)	ANT	Test Result	Limit	Verdict
NTNV	802.11b	SISO	2412	1	Refer To Test Graph		Pass
			2472	1	Refer To Test Graph		Pass
	802.11g	SISO	2412	1	Refer To Test Graph		Pass
			2472	1	Refer To Test Graph		Pass
	802.11n (HT20)	SISO	2412	1	Refer To Test Graph		Pass
			2472	1	Refer To Test Graph		Pass
	802.11n (HT40)	SISO	2422	1	Refer To Test Graph		Pass
			2462	1	Refer To Test Graph		Pass



6.2 Test Graph

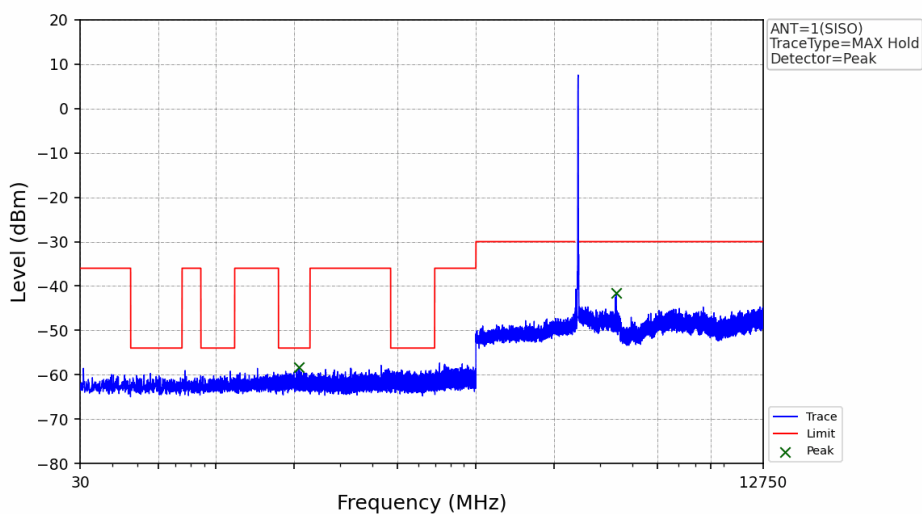
6.2.1 TxSe

802.11b_2412MHz_Ant1 (SISO)_NTNV



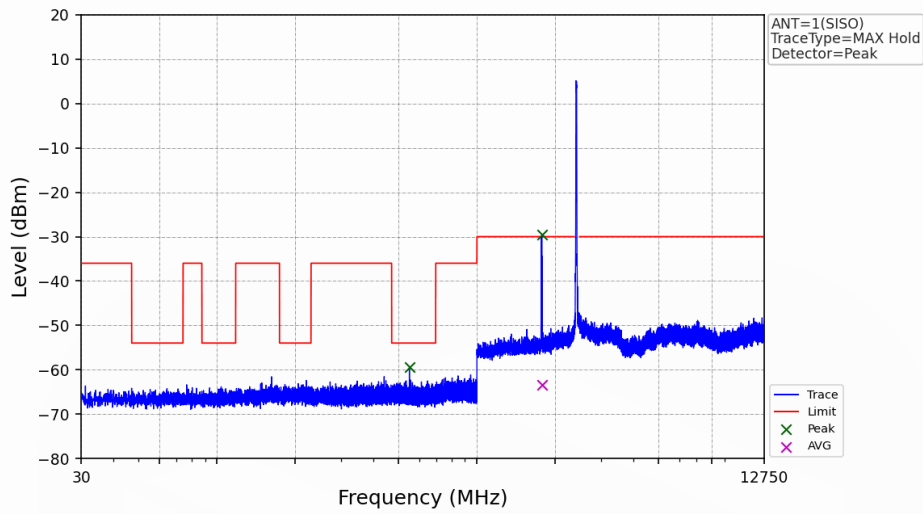
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-60.80	/	-54	Pass
1000	12750	1	3	2569.500	-43.93	/	-30	Pass

802.11b_2472MHz_Ant1 (SISO)_NTNV



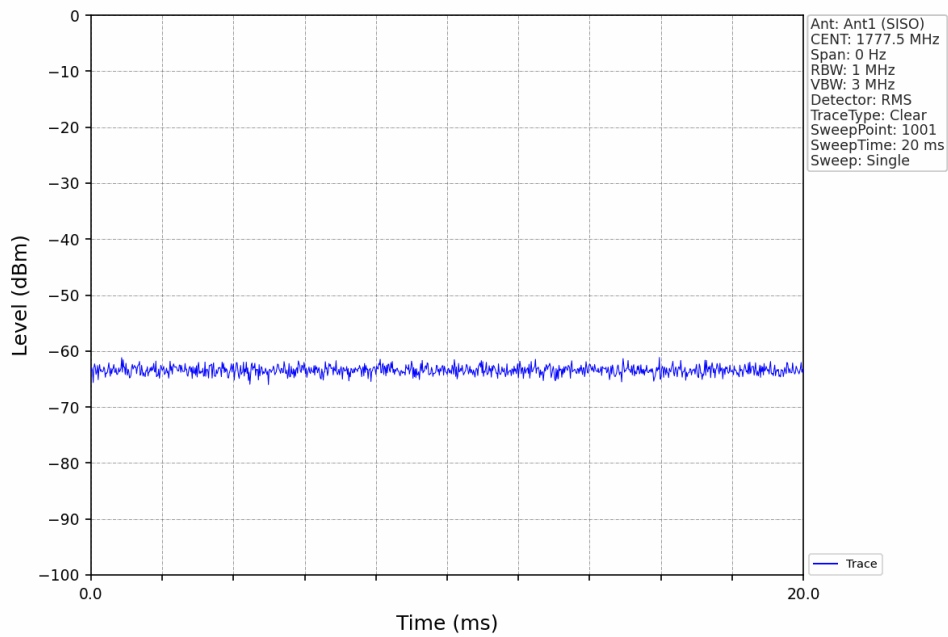
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	208.750	-58.37	/	-54	Pass
1000	12750	1	3	3462.500	-41.50	/	-30	Pass

802.11g_2412MHz_Ant1 (SISO)_NTNV

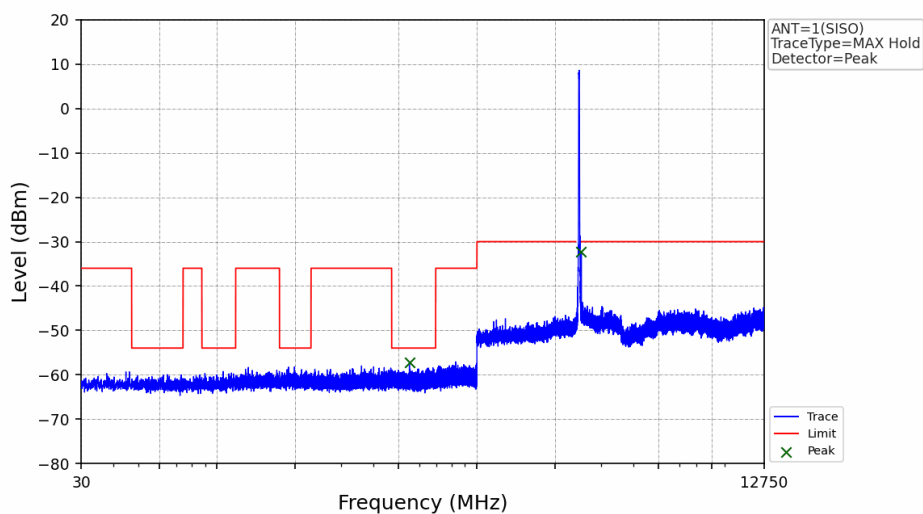


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.050	-59.43	/	-54	Pass
1000	12750	1	3	1777.500	-29.56	-63.36	-30	Pass

802.11g_2412MHz_Ant1 (SISO)_NTNV

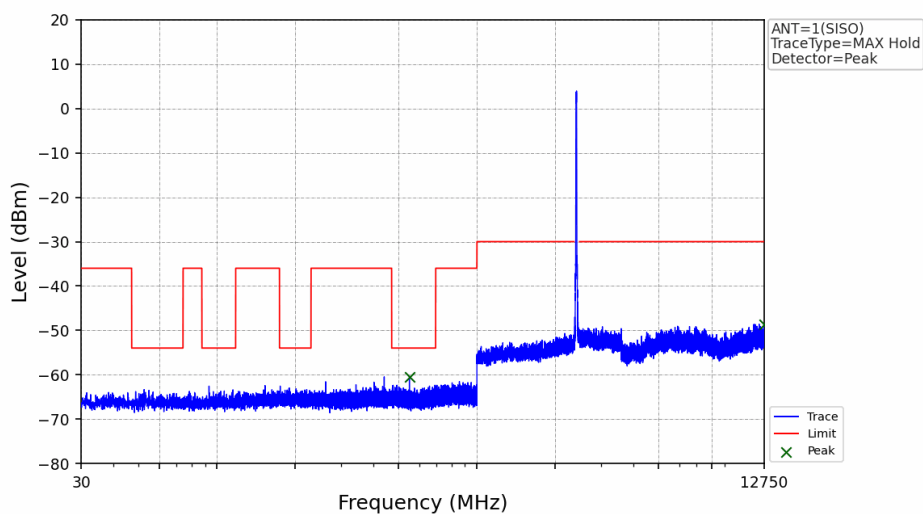


802.11g_2472MHz_Ant1 (SISO)_NTNV



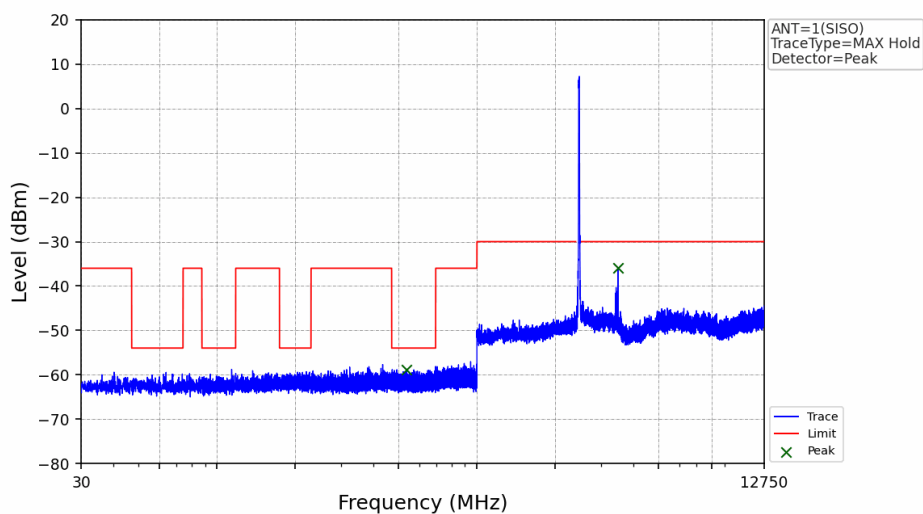
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.050	-57.16	/	-54	Pass
1000	12750	1	3	2522.000	-32.30	/	-30	Pass

802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



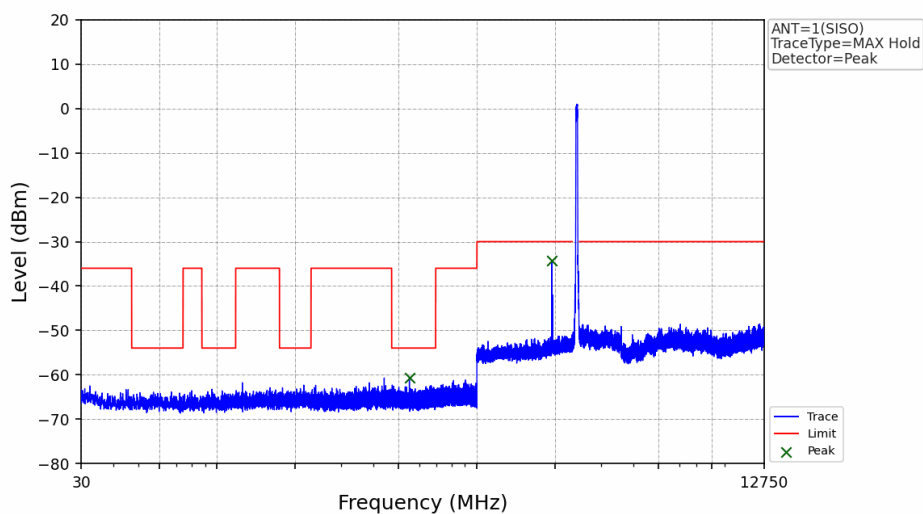
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-60.45	/	-54	Pass
1000	12750	1	3	12712.500	-48.60	/	-30	Pass

802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



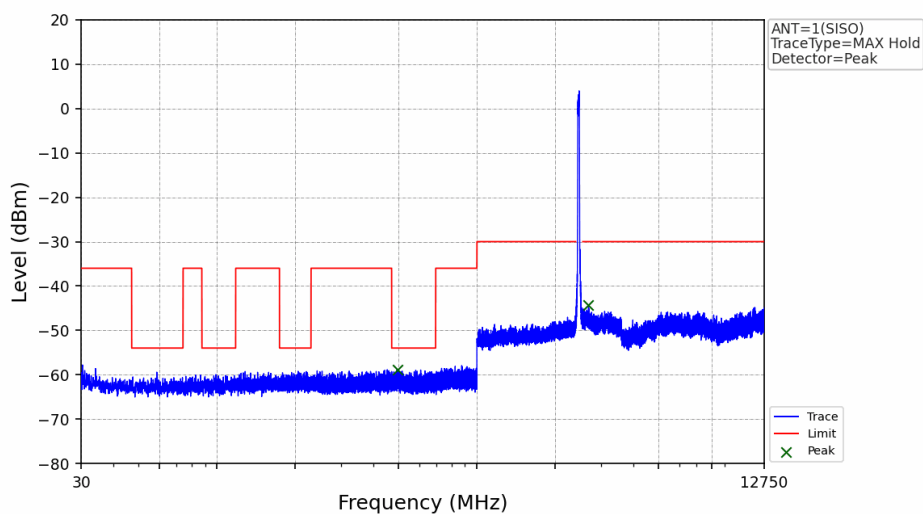
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	536.350	-58.79	/	-54	Pass
1000	12750	1	3	3486.500	-35.91	/	-30	Pass

802.11n(HT40)_2422MHz_Ant1 (SISO)_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	550.000	-60.65	/	-54	Pass
1000	12750	1	3	1941.500	-34.22	/	-30	Pass

802.11n(HT40)_2462MHz_Ant1 (SISO)_NTNV



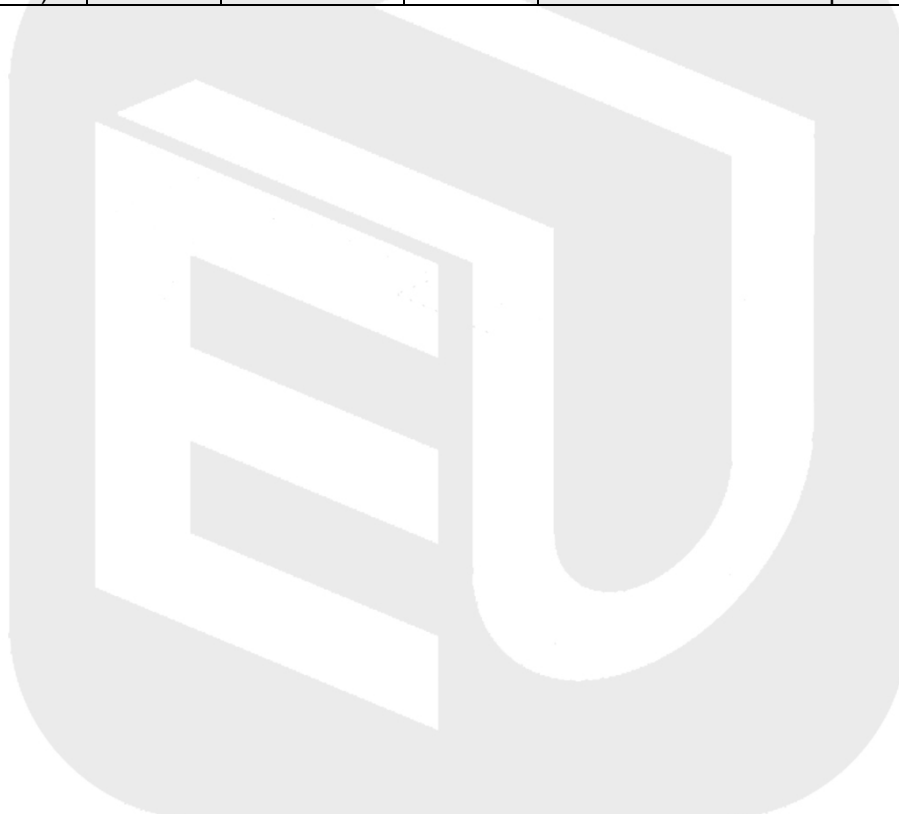
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	493.800	-58.83	/	-54	Pass
1000	12750	1	3	2690.000	-44.31	/	-30	Pass

7. Receiver Spurious Emissions

7.1 Test Result

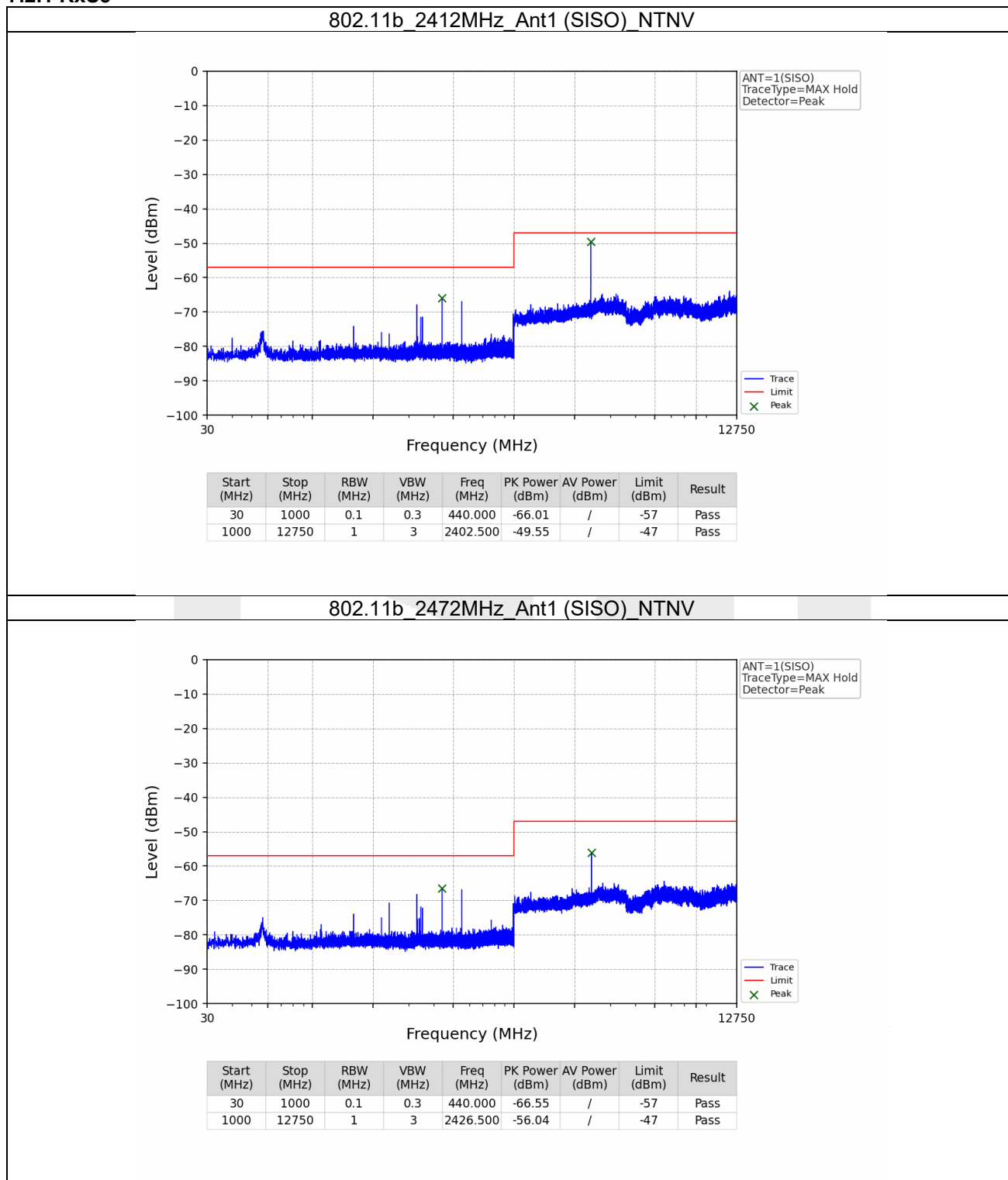
7.1.1 RxSe

ENV	Mode	TX Type	Frequency (MHz)	ANT	Test Result	Limit	Verdict
NTNV	802.11b	SISO	2412	1	Refer To Test Graph		Pass
			2472	1	Refer To Test Graph		Pass
	802.11g	SISO	2412	1	Refer To Test Graph		Pass
			2472	1	Refer To Test Graph		Pass
	802.11n (HT20)	SISO	2412	1	Refer To Test Graph		Pass
			2472	1	Refer To Test Graph		Pass
	802.11n (HT40)	SISO	2422	1	Refer To Test Graph		Pass
			2462	1	Refer To Test Graph		Pass

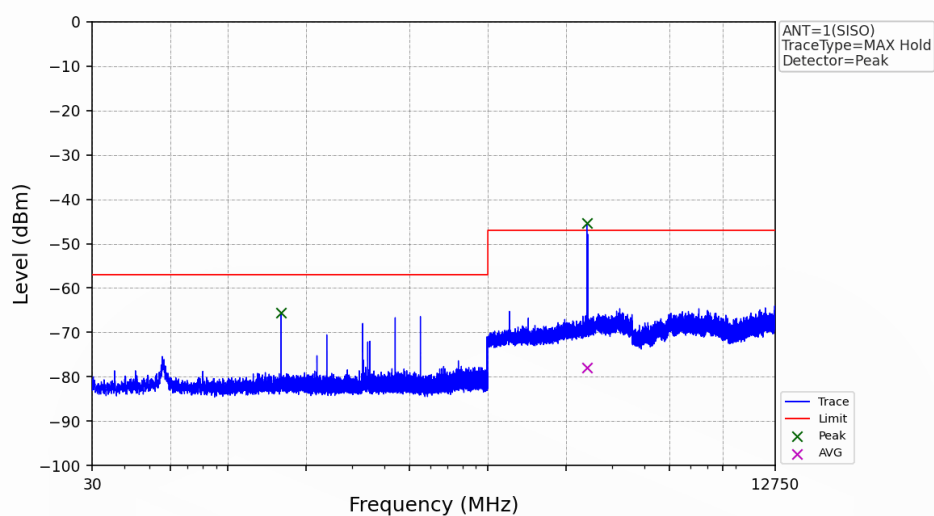


7.2 Test Graph

7.2.1 RxSe

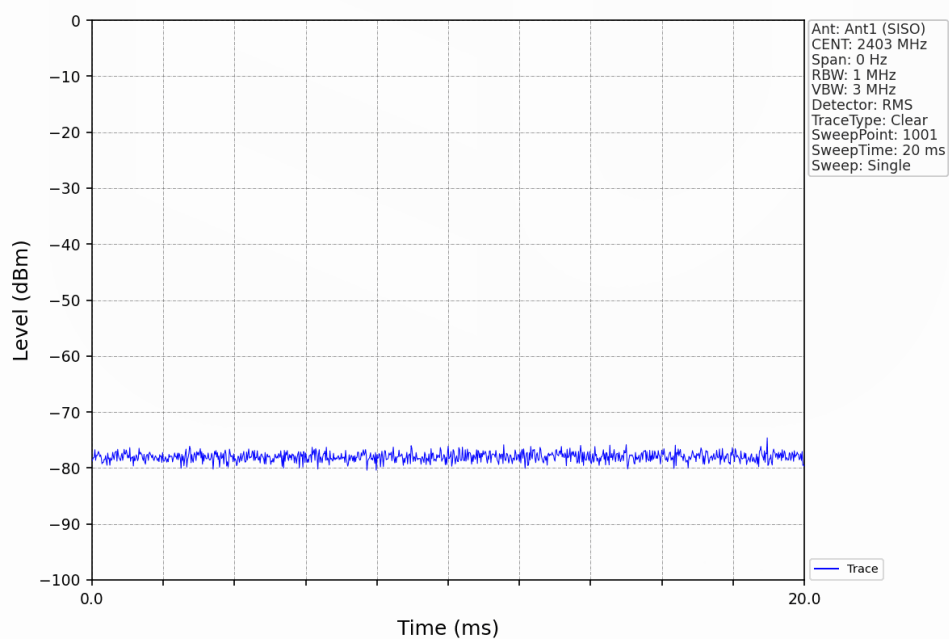


802.11g_2412MHz_Ant1 (SISO)_NTNV

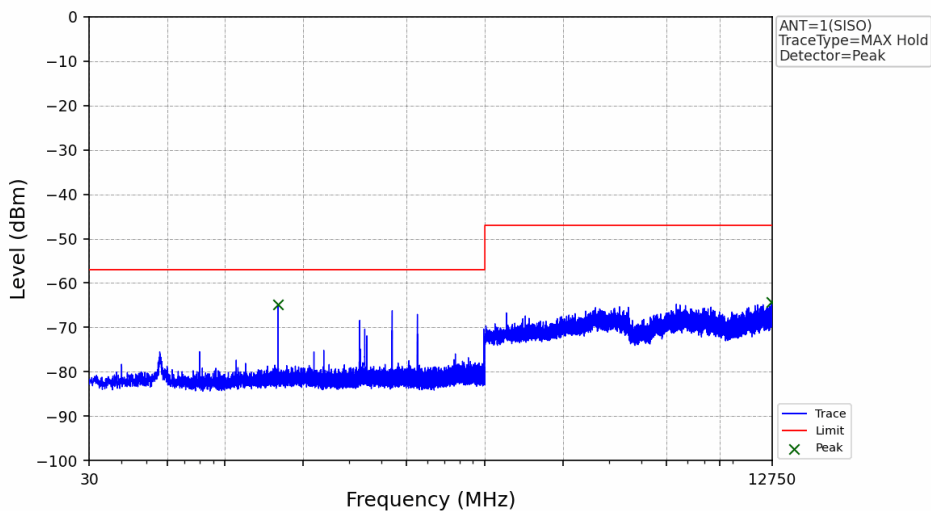


Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	160.000	-65.61	/	-57	Pass
1000	12750	1	3	2403.000	-45.26	-77.93	-47	Pass

802.11g_2412MHz_Ant1 (SISO)_NTNV

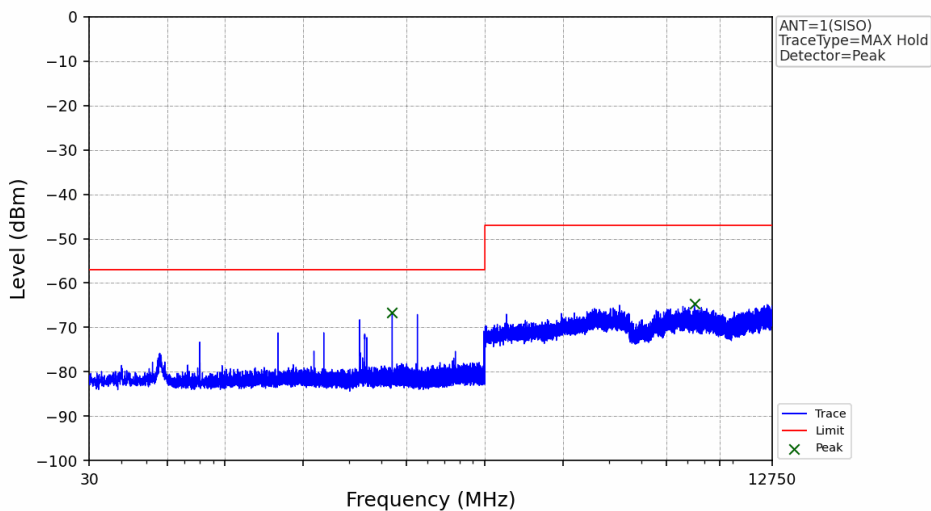


802.11g_2472MHz_Ant1 (SISO)_NTNV



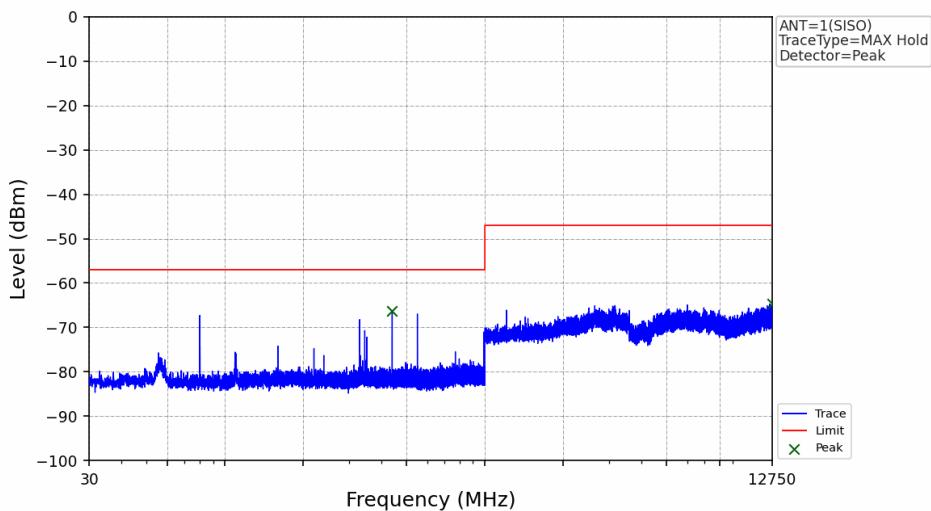
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	160.000	-64.94	/	-57	Pass
1000	12750	1	3	12625.500	-64.36	/	-47	Pass

802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



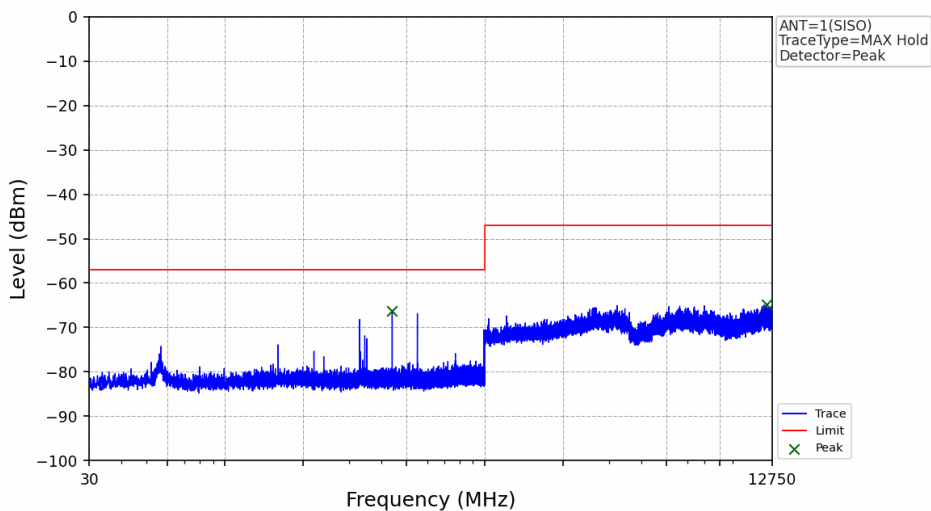
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	440.000	-66.61	/	-57	Pass
1000	12750	1	3	6398.500	-64.60	/	-47	Pass

802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



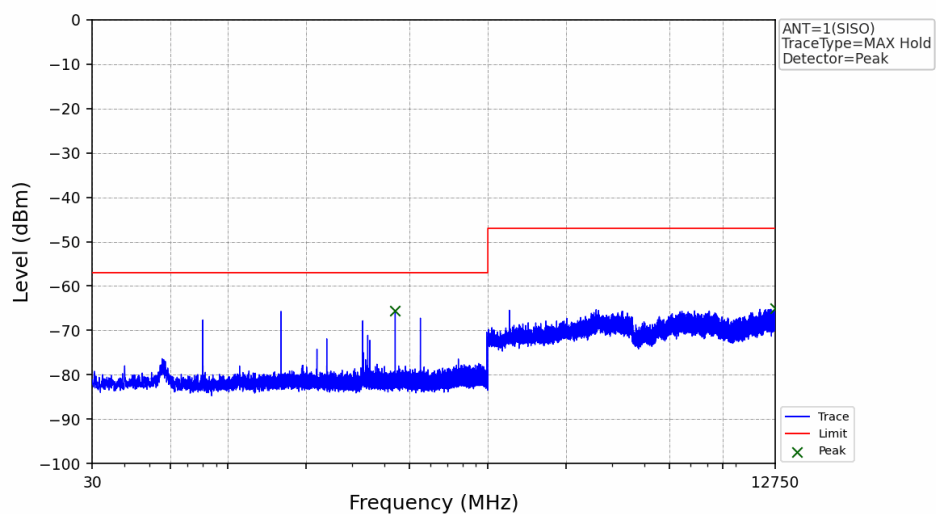
Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	440.000	-66.34	/	-57	Pass
1000	12750	1	3	12720.000	-64.60	/	-47	Pass

802.11n(HT40)_2422MHz_Ant1 (SISO)_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	440.000	-66.25	/	-57	Pass
1000	12750	1	3	12105.500	-64.86	/	-47	Pass

802.11n(HT40)_2462MHz_Ant1 (SISO)_NTNV



Start (MHz)	Stop (MHz)	RBW (MHz)	VBW (MHz)	Freq (MHz)	PK Power (dBm)	AV Power (dBm)	Limit (dBm)	Result
30	1000	0.1	0.3	440.000	-65.64	/	-57	Pass
1000	12750	1	3	12729.000	-64.95	/	-47	Pass

8. Adaptivity (Channel Access Mechanism)

8.1. Test Result (worst case: 802.11b modulation)

ENV	Mode	TX Type	Frequency (MHz)	ANT	Interference Signal			Max. Short Control Signal		Verdict
					Type	Add Time (s)	Level (dBm/MHz)	Duty Cycle (%)	Limit (%)	
NTNV	802.11b	SISO	2412	1	AWGN	1.55	-61.54	0	<=10	Pass
					AWGN+CW	61.55		0	<=10	Pass
			2472	1	AWGN	1.85	-60.94	0	<=10	Pass
					AWGN+CW	61.85		0	<=10	Pass



9. Receiver Blocking (worst case: 802.11b modulation)

Ant1									
ENV	Mode	TX Type	Frequency (MHz)	Wanted signal level (dBm)	Blocking Signal		PER (%)	Limit (%)	Verdict
					Frequency (MHz)	Power (dBm)			
NTNV	802.11b	SISO	2412	-70.86	2300	-30.86	1.44	<=10	Pass
					2330	-30.86	1.25	<=10	Pass
					2360	-30.86	1.13	<=10	Pass
				-64.86	2380	-30.86	1.53	<=10	Pass
					2504	-30.86	1.22	<=10	Pass
					2524	-30.86	1.13	<=10	Pass
				-70.86	2584	-30.86	1.30	<=10	Pass
					2674	-30.86	1.23	<=10	Pass
			2472	-70.86	2300	-30.86	1.03	<=10	Pass
					2330	-30.86	1.30	<=10	Pass
					2360	-30.86	1.18	<=10	Pass
				-64.86	2380	-30.86	1.18	<=10	Pass
					2504	-30.86	1.39	<=10	Pass
					2524	-30.86	1.36	<=10	Pass
				-70.86	2584	-30.86	1.01	<=10	Pass
					2674	-30.86	1.55	<=10	Pass

Note1: Receiver Category =1.

STATEMENT

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--- End of Report ---



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CERTIFICATE

Certificate of Conformity

Directive 2014/53/EU

On The Radio Equipment Directive

Certificate No. : C8326EU010302W
Applicant : Woan Technology (Shenzhen) Co., Ltd.
Address : Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road,
Mabu Community, Xixiang Sub-district, Bao'an District,
Shenzhen, Guangdong, P.R.China, 518100
Manufacturer : Same as above
Address : Same as above
Product : SwitchBot Hub 3
Model No. : W7202100, W7202101, W7202102, W7202103, W7202104,
W7202105
Trade Mark : SwitchBot
Rating : Input: 5.0V---2.0A
Output: 5V---0.5A, 2.5W
(Adapter Input: 100-240V~, 50/60Hz, 0.35A Max; Output: 5.0V---
2.0A 10.0W)

The radio equipment meets the following essential requirements		Complied
Article 3(1)(a) ■ Safety	IEC 62368-1: 2018 EN IEC 62368-1:2020+A11:2020	Yes
Article 3(1)(a) ■ Health	EN 50665: 2017 EN IEC 62311: 2020	Yes
Article 3(1)(b) ■ EMC	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.3.1 (2024-09) EN 55032:2015+A1:2020, EN 55035:2017+A11:2020	Yes
Article 3(2) ■ Radio	ETSI EN 300 328 V2.2.2(2019-07)	Yes

Note: The attached Annex forms part of this certificate which consists of 2 pages.

Date: 2025-01-22



Signature: Sally Zhang
Manager: Sally Zhang



The CE Marking may only be used if all relevant and effective EU Directives are complied with

SHENZHEN EU TESTING LABORATORY LIMITED

Email: service@eu-test.com

Tel: (86)-755-2357-9714

www.eu-test.com





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CERTIFICATE

Annex of
RED Certificate
Certificate No.: C8326EU010302W

Product Specifications	
Frequency Range:	Bluetooth (BDR&EDR, BLE): 2402 - 2480 MHz 2.4G WiFi (20MHz/40MHz): 2412 - 2472 MHz
RF Output Power (EIRP):	Bluetooth (BDR&EDR): 1.08 dBm EIRP Bluetooth (BLE 1): 1.77 dBm EIRP Bluetooth (BLE 2): 1.40 dBm EIRP 2.4G WiFi: 16.08 dBm EIRP

Technical Documentation Identification

Test Report	
Article 3(1)(a) ■ Safety	8326EU010302S
Article 3(1)(a) ■ Health	8326EU010302H
Article 3(1)(b) ■ EMC	8326EU010302E
Article 3(2) ■ Radio	8326EU010302W1 8326EU010302W2 8326EU010302W3

Notes:

1. The certificate of conformity is based on an evaluation of a sample of the above-mentioned product. Technical report and documentation are at the applicant's disposal. This is to certify that the tested sample is in compliance with the requirements of article 3 of the Radio Equipment Directive 2014/53/EU. The certificate does not imply assessment of the production and does not permit the use of Lab's logo. The applicant of the certificate is authorized to use this certificate in connection with EU declaration of conformity to article 18 of the Directive.
2. The manufacturer shall affix the CE marking to each item of radio equipment that is in conformity with the certificate and satisfies the applicable requirement of the Directive.
3. The manufacturer shall draw up a written EU declaration of conformity for each radio equipment type and keep it at the disposal of the national authorities for 10 years after the radio equipment has been placed on the market. The EU declaration of conformity shall identify the radio equipment type for which it has been drawn up. A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.

SHENZHEN EU TESTING LABORATORY LIMITED

Email: service@eu-test.com

Tel: (86)-755-2357-9714

www.eu-test.com



TEST REPORT

Report No.: 8326EU010302E

Applicant: Woan Technology (Shenzhen) Co., Ltd.

Address: Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang Sub-district,
Bao'an District, Shenzhen, Guangdong, P.R.China,
518100

Product Name: SwitchBot Hub 3

Model No.: W7202100 (refer to clause 2.4)

Trademark: SwitchBot

Test Standard(s): ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.3.1 (2024-09)
EN 55032:2015+A1:2020
EN 55035:2017+A11:2020

Date of Receipt: Jan. 03, 2025

Test Date: Jan. 03, 2025 – Jan. 17, 2025

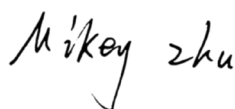
Date of Issue: Jan. 22, 2025

ISSUED BY:

SHENZHEN EU TESTING LABORATORY LIMITED



Prepared by:



Mikey Zhu/ Engineer

Reviewed and Approved by:



Sally Zhang/ Manager

Revision Record

Report Version	Issued Date	Description	Status
V0	Jan. 22, 2025	Original	Valid



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2 General Information

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description of E.U.T.

Product Name	SwitchBot Hub 3
Model No. Under Test	W7202100
List Model No.	W7202101, W7202102, W7202103, W7202104, W7202105
Description of Model differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in appearance and model name. (this information provided by the customer)
Rating(s)	Input: 5.0V --- 2.0A Output: 5V --- 0.5A, 2.5W (Adapter Input: 100-240V~, 50/60Hz, 0.35A Max; Output: 5.0V --- 2.0A 10.0W)
Adapter	Model: KA12C-0502000EU Input: 100-240V~, 50/60Hz, 0.35A Max Output: 5.0V --- 2.0A, 10.0W Manufacturer: SHENZHEN KEYU POWER SUPPLY TECHNOLOGY CO., LTD.
Test Sample No.	-1/2(Normal Sample), -2/2(Engineering Sample)
Hardware Version	N/A
Software Version	N/A
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.5 Technical Information of E.U.T.

Network and Wireless Connectivity	Bluetooth (BDR+EDR+BLE) WiFi 2.4G: 802.11b, 802.11g, 802.11n(HT20/40)
Classification of equipment	Class B

3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

No.	Identity	Document Title
1	ETSI EN 301 489-1 V2.2.3 (2019-11)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility
3	ETSI EN 301 489-17 V3.3.1 (2024-09)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband and Wideband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility
4	EN 55032:2015+A1:2020	Electromagnetic compatibility of multimedia equipment —Emission Requirements
5	EN 55035:2017+A11:2020	Electromagnetic compatibility of multimedia equipment —Immunity Requirements

Remark:

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

3.2 Test Verdict

Emission			
Test Items	Standard	Basic Standard	Results
Conducted Emission (Power Line)	ETSI EN 301 489-1 V2.2.3 Clause 8.3 & 8.4	EN 55032	PASS
Radiated Emission	ETSI EN 301 489-1 V2.2.3 Clause 8.2	EN 55032	PASS
Harmonic Current Emission	ETSI EN 301 489-1 V2.2.3 Clause 8.5	EN IEC 61000-3-2	N/A
Voltage Fluctuations&Flicker	ETSI EN 301 489-1 V2.2.3 Clause 8.6	EN 61000-3-3	PASS
Immunity			
Test Items	Standard	Basic Standard	Results
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.3 Clause 9.3	EN 61000-4-2	PASS
RF Electromagnetic Field☆	ETSI EN 301 489-1 V2.2.3 Clause 9.2	EN 61000-4-3	PASS
Fast transients, common mode	ETSI EN 301 489-1 V2.2.3 Clause 9.4	EN 61000-4-4	PASS
Surges	ETSI EN 301 489-1 V2.2.3 Clause 9.8	EN 61000-4-5	PASS
Radio frequency, common mode ☆	ETSI EN 301 489-1 V2.2.3 Clause 9.5	EN 61000-4-6	PASS
Volt. Interruptions Volt. Dips	ETSI EN 301 489-1 V2.2.3 Clause 9.7	EN 61000-4-11	PASS
Transients and surges in the vehicular environment	ETSI EN 301 489-1 V2.2.3 Clause 9.6	ISO 7637-2	N/A
Note: (1) "N/A" denotes test is not applicable in this Test Report. (2) The test item marked with "☆" is subcontracted to Shenzhen PSI Testing Co., Ltd., which has gained the customer's approval.			

3.3 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China

4 Test Configuration

4.1 Test Environment

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	30% to 60%	
Atmospheric Pressure	86 kPa to 106 kPa	
Temperature	NT (Normal Temperature)	+15°C to +35°C
Working Voltage of the EUT	NV (Normal Voltage)	AC 230V/50Hz for adapter

4.2 Test Equipment

Conducted Emission at AC power line					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	EE-004	2025/01/08	2026/01/07
EMI Test Receiver	Rohde & Schwarz	ESCI	EE-005	2025/01/08	2026/01/07
Test Software	Farad	EZ-EMC	EE-014	N.C.R	N.C.R

Radiated Emission Test					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2025/01/08	2026/01/07
Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	EE-007	2023/01/14	2026/01/13
Double Ridged Horn Antenna	A-INFOMW	LB-10180-NF	EE-008	2023/01/12	2026/01/11
Pre-amplifier	Agilent	8447D	EE-009	2025/01/08	2026/01/07
Pre-amplifier	Agilent	8449B	EE-010	2025/01/08	2026/01/07
MXA Signal Analyzer	Agilent	N9020A	EE-011	2025/01/08	2026/01/07
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2025/01/08	2026/01/07
Test Software	Farad	EZ-EMC	EE-015	N.C.R	N.C.R

Flicker Test					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
Harmonic and Flicker Analyzer	CI	PACS-1	EE-020	2024/10/29	2025/10/28
Programmable AC Power Source	CI	3001 ix	EE-021	2024/10/29	2025/10/28

Electrostatic Discharge Test					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
ESD Simulators	NoiseKen	ESS-B3011	EE-013	2025/01/08	2026/01/07

EFT, Surge and Dips Test					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
Integrated Immunity Simulator	TESEQ	NSG3040	EE-019	2024/10/29	2025/10/28

4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Adapter	refer to clause 2.4	refer to clause 2.4	--

4.4 Test Mode

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

No.	Test Modes	Description
TM1	BT Mode	Keep the EUT in BT connection Mode.
TM2	BLE Mode	Keep the EUT in BLE connection Mode.
TM3	2.4G WiFi Mode	Keep the EUT in 2.4G WiFi connection Mode.
TM4	Standby Mode	Keep the EUT in Standby Mode.

4.5 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

Test Item	Measurement Uncertainty
Radiated Emission (30MHz- 1GHz)	Ur = 2.70 dB (Horizontal)
	Ur = 2.70 dB (Vertical)
Radiated Emission (1GHz- 18GHz)	Ur = 3.50 dB (Horizontal)
	Ur = 3.50 dB (Vertical)
Radiated Emission (18GHz- 40GHz)	Ur = 5.15 dB (Horizontal)
	Ur = 5.24 dB (Vertical)
Conducted Emission	Uc = 2.50 dB

5 Emission Test

5.1 Conducted Emission at AC Power Line

5.1.1 Test Requirement

Test Standard	ETSI EN 301 489-1 Clause 8.3 & 8.4
Basic Standard	EN 55032

☐ Limits for conducted emission at the AC mains power ports of Class A equipment

Test Limit	Frequency (MHz)	At mains terminals (dB μ V)	
		Quasi-peak Level	Average Level
	0.15 ~ 0.50	79.0	66.0
	0.50 ~ 30.00	73.0	60.0

Remark: (1) The lower limit shall apply at the transition frequencies.

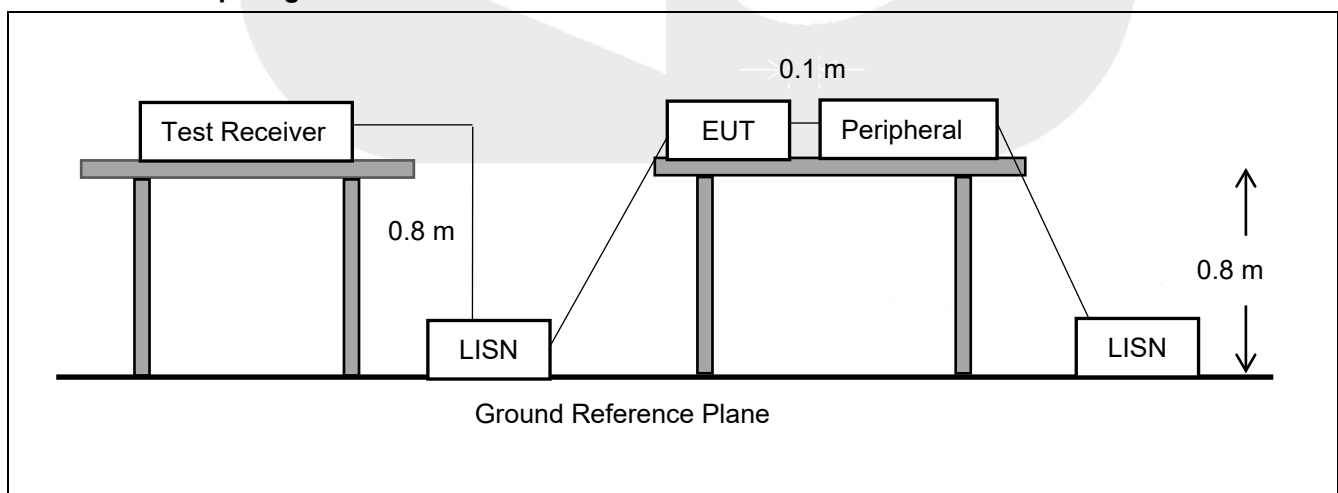
☒ Limits for conducted emission at the AC mains power ports of Class B equipment

Test Limit	Frequency (MHz)	At mains terminals (dB μ V)	
		Quasi-peak Level	Average Level
	0.15 ~ 0.50	66.0 ~ 56.0*	59.0 ~ 46.0*
	0.50 ~ 5.00	56.0	46.0
	5.00 ~ 30.00	60.0	50.0

Remark: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

5.1.2 Test Setup Diagram



5.1.3 Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipment. Both sides of AC line are investigated to find out the maximum conducted emission according to the test standard regulations during conducted emission measurement.

The bandwidth of the field strength meter (R&S Test Receiver ESCI) is set at 9kHz in 150kHz~30MHz.

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

Refer to recorded points and plots below.

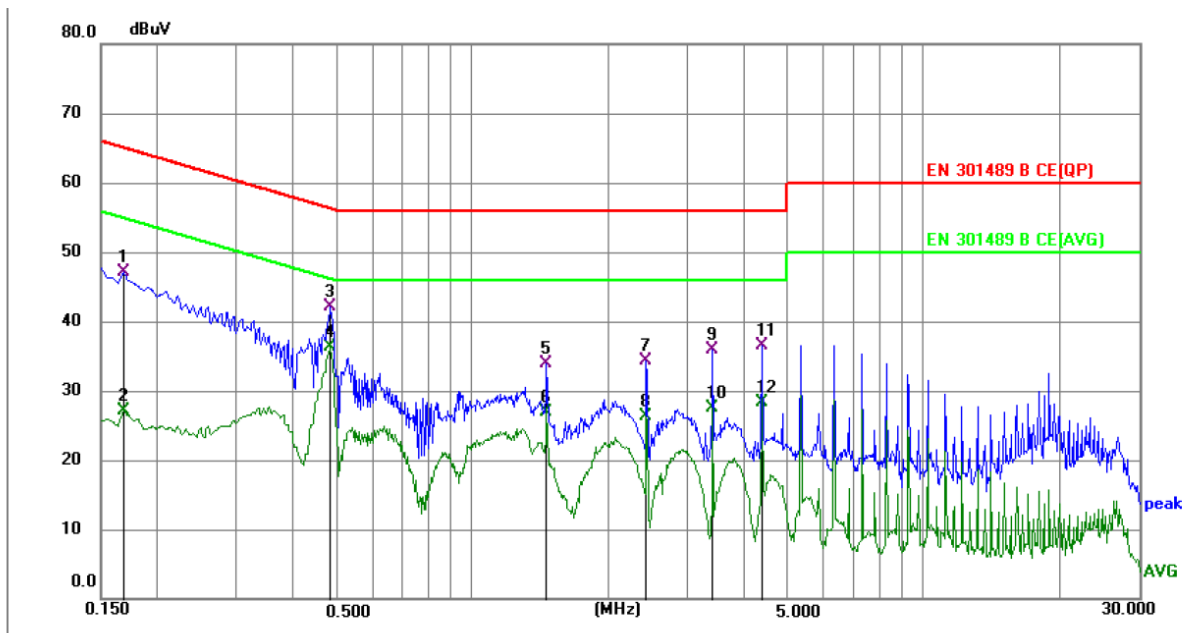
5.1.4 Test Data

PASS.

Only the worst case data was showed in the report, please to see the following pages.

Conducted Emission Test Data

Test Site: Shielded Room #1
Test Mode: TM4
Comments: Live Line



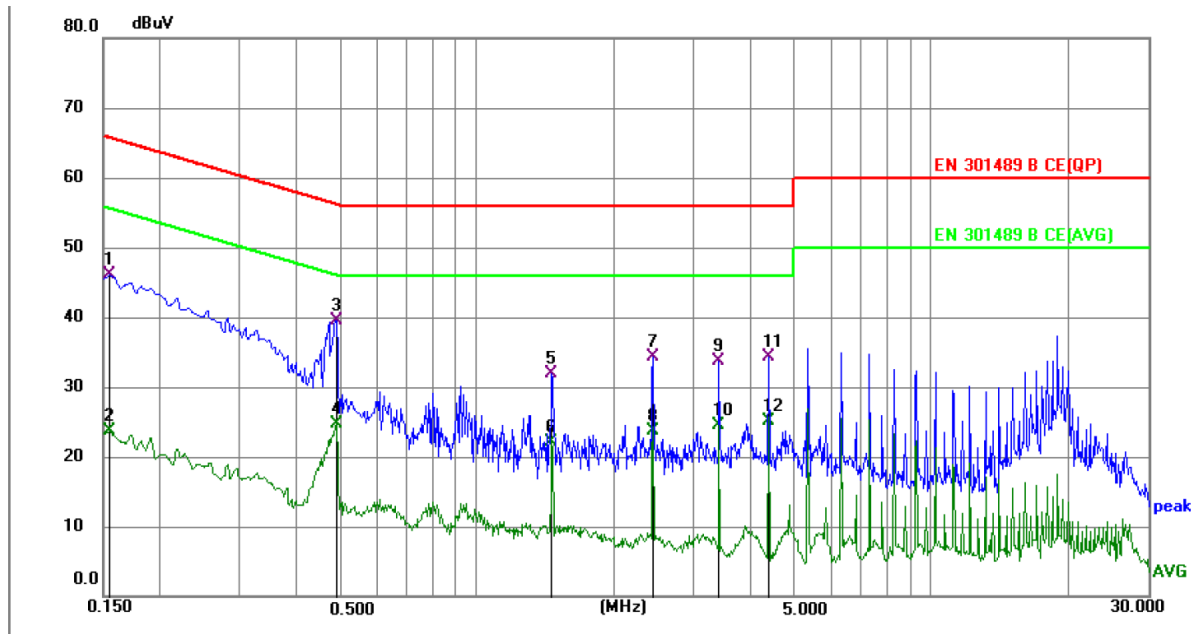
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1680	37.10	9.96	47.06	65.06	-18.00	QP	P	
2	0.1680	17.06	9.96	27.02	55.06	-28.04	AVG	P	
3	0.4830	32.15	10.04	42.19	56.29	-14.10	QP	P	
4 *	0.4830	26.26	10.04	36.30	46.29	-9.99	AVG	P	
5	1.4595	23.88	10.03	33.91	56.00	-22.09	QP	P	
6	1.4595	16.83	10.03	26.86	46.00	-19.14	AVG	P	
7	2.4315	24.29	10.04	34.33	56.00	-21.67	QP	P	
8	2.4315	16.23	10.04	26.27	46.00	-19.73	AVG	P	
9	3.4080	25.85	10.05	35.90	56.00	-20.10	QP	P	
10	3.4080	17.38	10.05	27.43	46.00	-18.57	AVG	P	
11	4.3800	26.38	10.04	36.42	56.00	-19.58	QP	P	
12	4.3800	18.32	10.04	28.36	46.00	-17.64	AVG	P	

Note: Level = Reading + Factor

Margin = Level - Limit

Conducted Emission Test Data

Test Site: Shielded Room #1
 Test Mode: TM4
 Comments: Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1545	36.08	9.98	46.06	65.75	-19.69	QP	P	
2	0.1545	13.67	9.98	23.65	55.75	-32.10	AVG	P	
3 *	0.4875	29.51	10.07	39.58	56.21	-16.63	QP	P	
4	0.4875	14.65	10.07	24.72	46.21	-21.49	AVG	P	
5	1.4595	21.86	10.06	31.92	56.00	-24.08	QP	P	
6	1.4595	12.07	10.06	22.13	46.00	-23.87	AVG	P	
7	2.4360	24.21	10.06	34.27	56.00	-21.73	QP	P	
8	2.4360	13.56	10.06	23.62	46.00	-22.38	AVG	P	
9	3.4080	23.63	10.04	33.67	56.00	-22.33	QP	P	
10	3.4080	14.48	10.04	24.52	46.00	-21.48	AVG	P	
11	4.3845	24.24	10.05	34.29	56.00	-21.71	QP	P	
12	4.3845	15.06	10.05	25.11	46.00	-20.89	AVG	P	

Note: Level = Reading + Factor

Margin = Level - Limit

5.2 Radiated Emission

5.2.1 Test Requirement

Test Standard	ETSI EN 301 489-1 Clause 8.2
Basic Standard	EN 55032

☐ **Limit for radiated emissions at frequencies up to 1 GHz for class A equipment**

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)
30 ~ 230	3	50
230 ~ 1000	3	57

Remark: The lower limit shall apply at the transition frequencies.

☐ **Limit for radiated emissions at frequencies above 1 GHz for class A equipment**

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)	
		Peak	Average
1000 ~ 3000	3	76	56
3000 ~ 6000	3	80	60

Remark: The lower limit shall apply at the transition frequencies.

☒ **Limit for radiated emissions at frequencies up to 1 GHz for class B equipment**

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Remark: The lower limit shall apply at the transition frequencies.

☒ **Limit for radiated emissions at frequencies above 1 GHz for class B equipment**

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)	
		Peak	Average
1000 ~ 3000	3	70	50
3000 ~ 6000	3	74	54

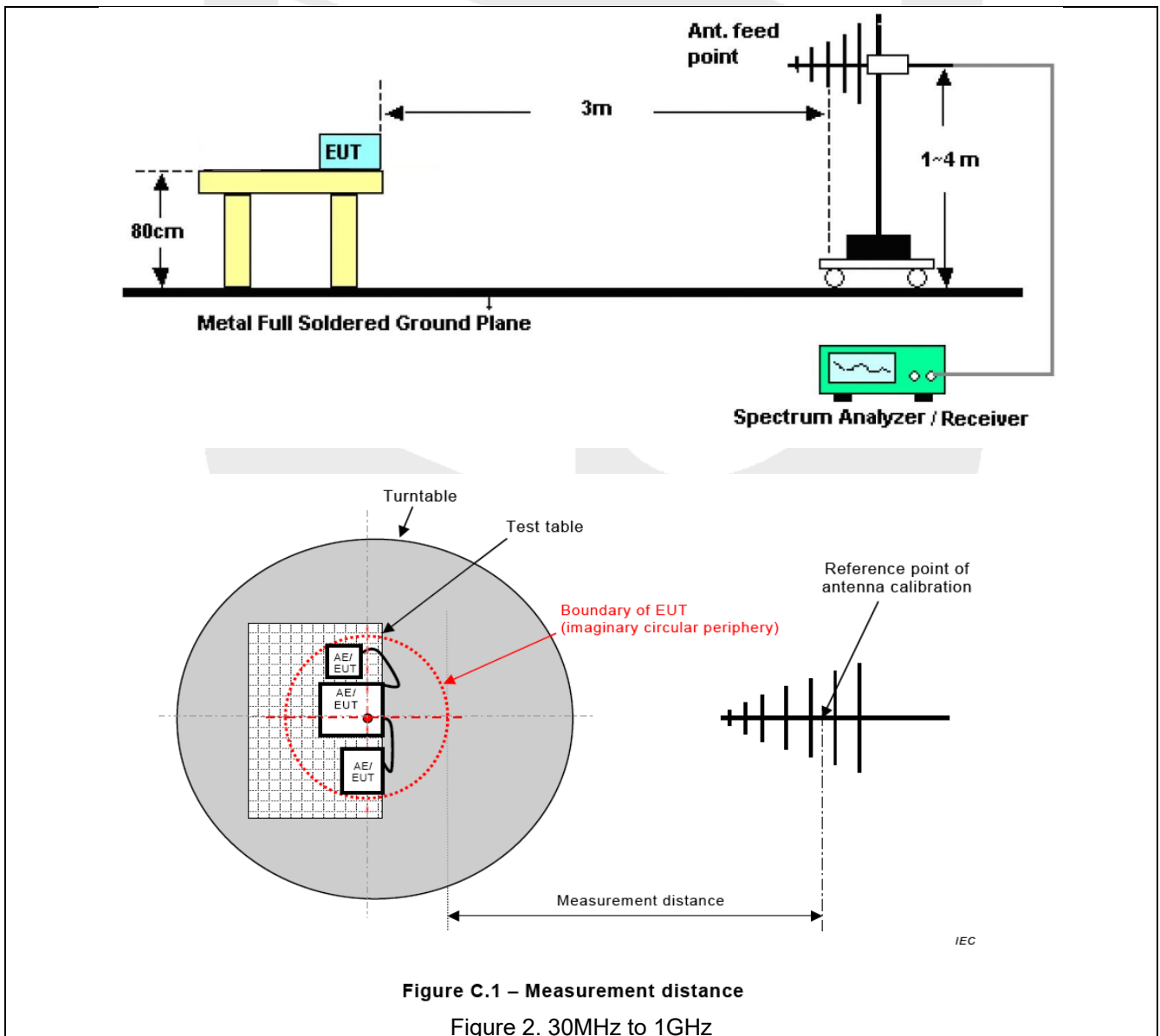
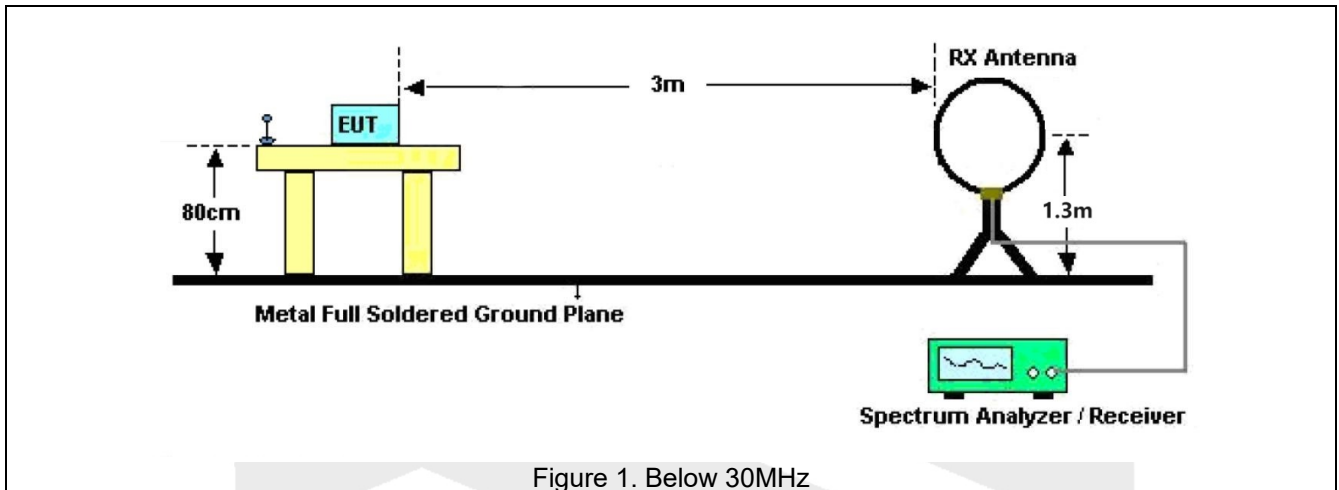
Remark: The lower limit shall apply at the transition frequencies.

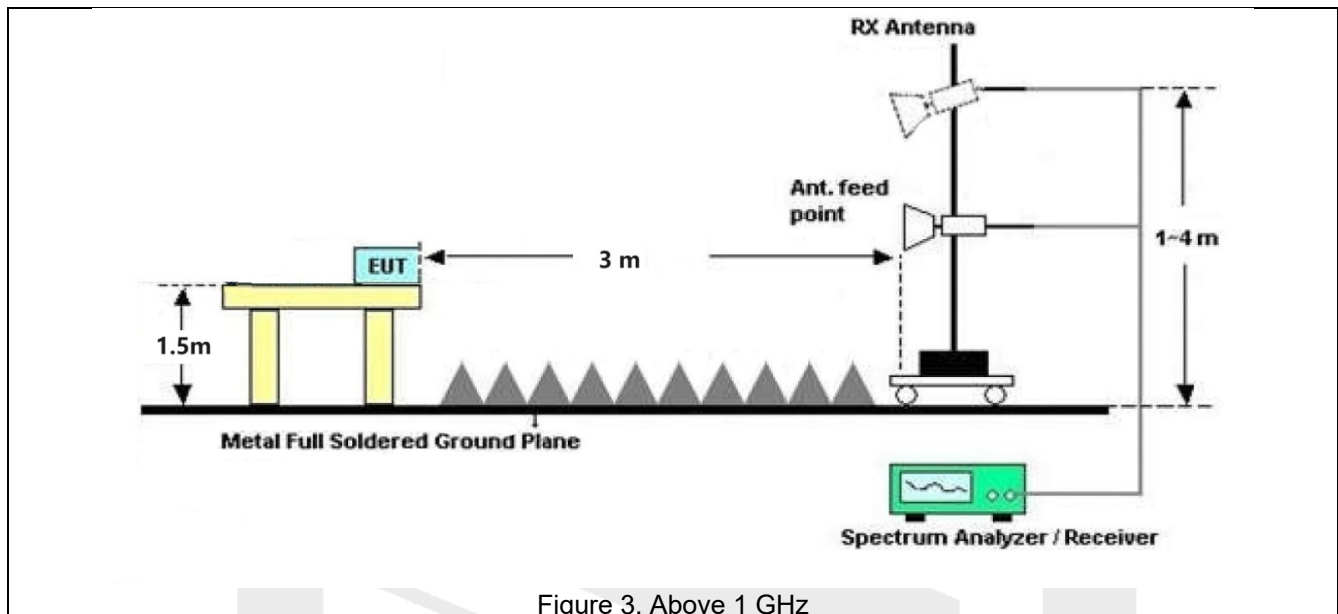
☐ **Radiated emission test limit for FM receivers**

Frequency (MHz)	Distance (Meters)	Limit (dB μ V/m)	
		Fundamental	Harmonics
30 ~ 230	3	60	52
230 ~ 300	3	60	52
300 ~ 1000	3	60	56

Remark: The lower limit shall apply at the transition frequency.

5.2.2 Test Setup Diagram





5.2.3 Test Procedure

The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter test site. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the 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 re-measured.

The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak/Average detection at frequency above 1GHz.

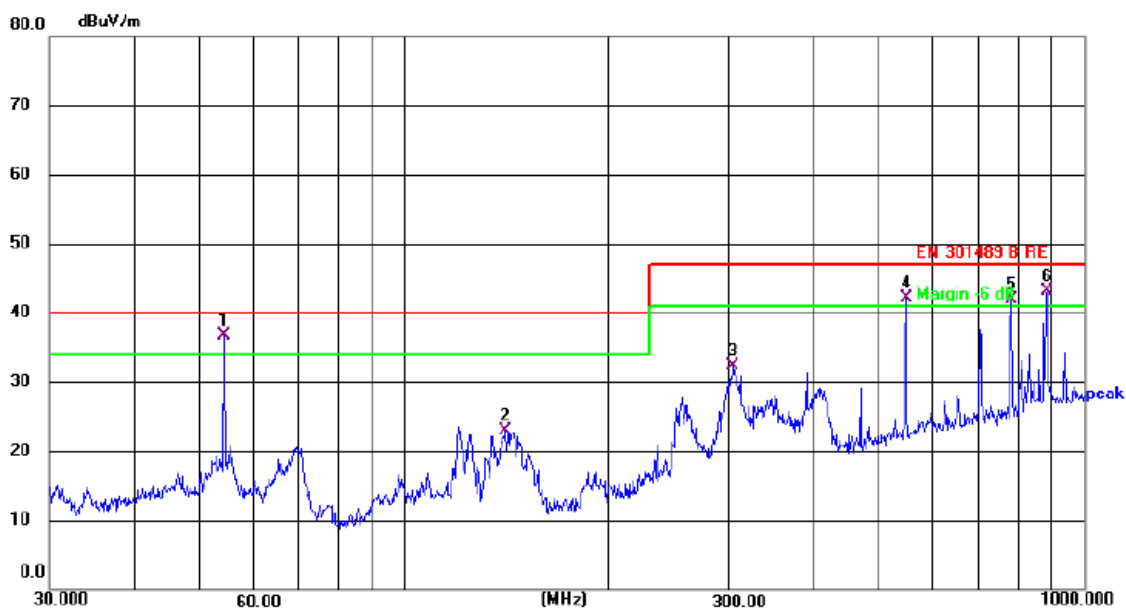
5.2.4 Test Data

PASS.

Only the worst case data was showed in the report, please to see the following pages.

Radiated Emission Test Data (30-1000MHz)

Test item:	966 Chamber #1	Polarization:	Horizontal
Distance:	3m	Test Mode:	TM3



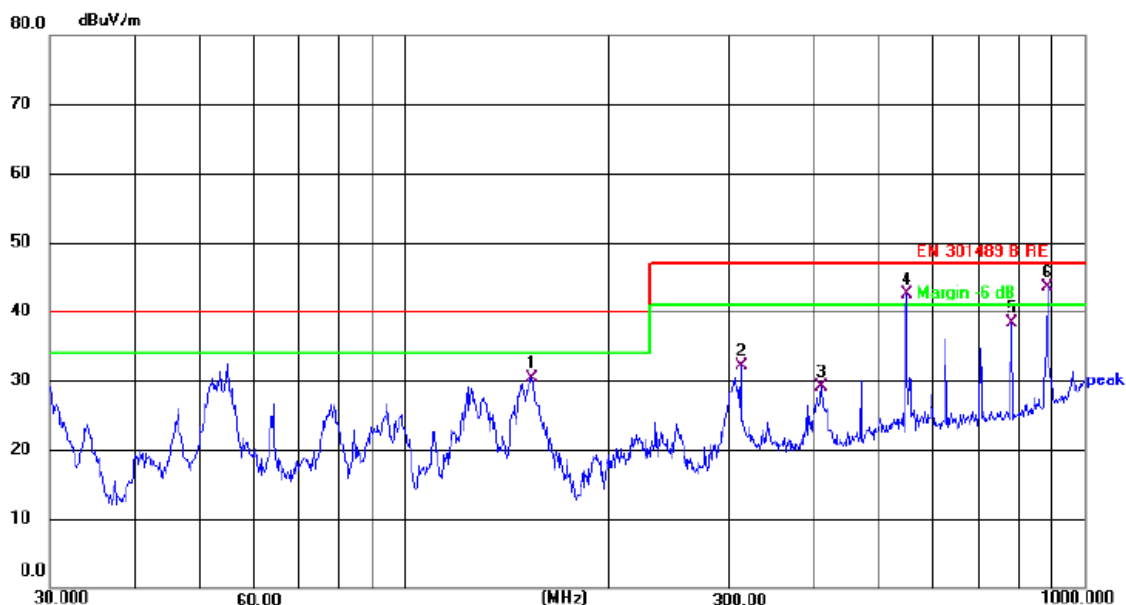
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	54.0711	51.23	-14.45	36.78	40.00	-3.22	QP	P	
2	140.8351	41.11	-18.15	22.96	40.00	-17.04	QP	P	
3	304.6099	44.29	-11.89	32.40	47.00	-14.60	QP	P	
4 !	547.0977	49.59	-7.44	42.15	47.00	-4.85	QP	P	
5 !	782.3453	46.06	-4.21	41.85	47.00	-5.15	QP	P	
6 !	881.4067	45.46	-2.44	43.02	47.00	-3.98	QP	P	

Note: Level = Reading + Factor

Margin = Level - Limit

Radiated Emission Test Data (30-1000MHz)

Test item:	966 Chamber #1	Polarization:	Vertical
Distance:	3m	Test Mode:	TM3



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	153.7385	48.82	-18.42	30.40	40.00	-9.60	QP	P	
2	312.1794	43.73	-11.70	32.03	47.00	-14.97	QP	P	
3	410.3824	38.91	-9.75	29.16	47.00	-17.84	QP	P	
4 !	547.0976	49.87	-7.34	42.53	47.00	-4.47	QP	P	
5	782.3453	42.44	-4.18	38.26	47.00	-8.74	QP	P	
6 *	881.4067	46.12	-2.66	43.46	47.00	-3.54	QP	P	

Note: Level = Reading + Factor

Margin = Level - Limit

Radiated Emission Test Data (1GHz-6GHz)

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Detector
1630.67	53.35	-2.98	50.37	70.00	-19.63	H	PEAK
1870.66	46.05	-2.44	43.61	70.00	-26.39	H	PEAK
2154.42	50.59	-3.81	46.78	70.00	-23.22	H	PEAK
4051.18	52.25	-5.16	47.09	74.00	-26.91	H	PEAK
4485.66	52.00	-4.77	47.23	74.00	-26.77	H	PEAK
5168.65	60.62	-5.46	55.16	74.00	-18.84	H	PEAK
1630.61	40.58	-2.98	37.60	50.00	-12.40	H	AVG
1871.19	33.18	-2.44	30.74	50.00	-19.26	H	AVG
2150.69	40.44	-3.81	36.63	50.00	-13.37	H	AVG
4059.21	39.18	-5.16	34.02	54.00	-19.98	H	AVG
4482.58	48.65	-4.77	43.88	54.00	-10.12	H	AVG
5170.60	41.08	-5.46	35.62	54.00	-18.38	H	AVG
1331.84	51.85	-2.80	49.05	70.00	-20.95	V	PEAK
2073.53	52.27	-2.96	49.31	70.00	-20.69	V	PEAK
2079.18	43.89	-4.40	39.49	70.00	-30.51	V	PEAK
3952.70	49.53	-5.26	44.27	74.00	-29.73	V	PEAK
4583.27	48.66	-5.36	43.30	74.00	-30.70	V	PEAK
4971.65	54.52	-5.34	49.18	74.00	-24.82	V	PEAK
1331.18	38.33	-2.80	35.53	50.00	-14.47	V	AVG
2078.79	39.42	-2.96	36.46	50.00	-13.54	V	AVG
2086.39	42.59	-4.40	38.19	50.00	-11.81	V	AVG
3956.66	42.05	-5.26	36.79	54.00	-17.21	V	AVG
4583.73	37.79	-5.36	32.43	54.00	-21.57	V	AVG
4973.06	43.13	-5.34	37.79	54.00	-16.21	V	AVG

Remark:

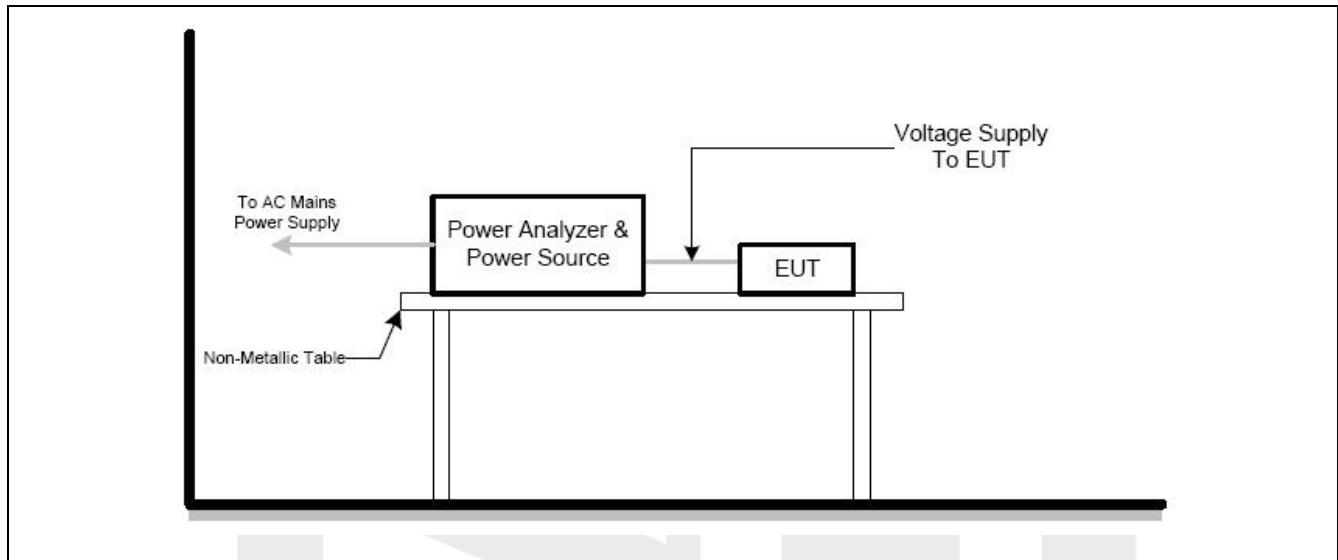
1. Level = Reading + Factor, Margin= Level – Limit.

5.3 Harmonic Current Emissions

5.3.1 Test Requirement

Test Standard	ETSI EN 301 489-1 V2.2.3 Clause 8.5
Basic Standard	EN 61000-3-2

5.3.2 Test Setup Diagram



5.3.3 Test Procedure

- 1) The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.
- 2) The classification of EUT is classified as follows:
Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
Class B: Portable tools; Arc welding equipment which is not professional equipment.
Class C: Lighting equipment.
Class D: Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television.
- 3) The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

5.3.4 Test Data

Not Applicable.

EUT power is less than 75W, so this test report is not applicable.

5.4 Voltage Fluctuations and Flicker

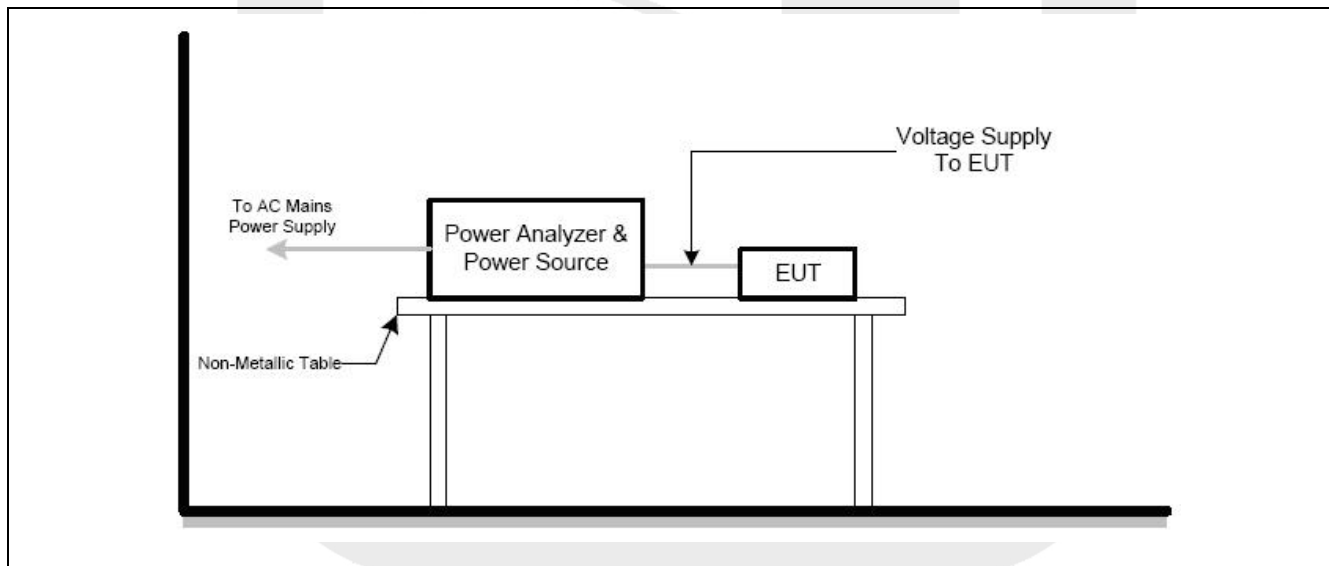
5.4.1 Test Requirement

Test Standard	ETSI EN 301 489-1 V2.2.3 Clause 8.6
Basic Standard	EN 61000-3-3

Voltage Fluctuation and Flicker Test Limit

Test Items	Limits
Pst	1.0
Plt	0.65
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

5.4.2 Test Setup Diagram



5.4.3 Test Procedure

- 1) Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of EN/IEC 61000-3-3 depend on which standard adopted for compliance measurement.
- 2) All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

5.4.4 Test Data

PASS.

Please refer to the following results.

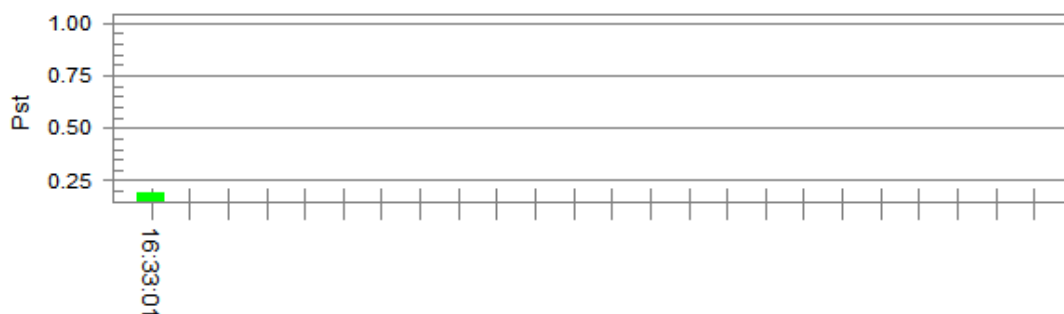
Flicker Test Report EN/IEC 61000-3-3

Test Result: Pass

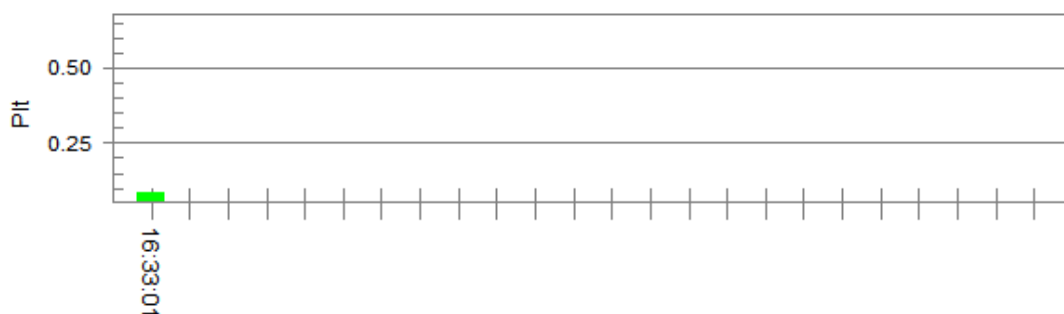
Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 230.65
T-max (mS): 0
Highest dc (%): 0.00
Highest dmax (%): 0.00
Highest Pst (10 min. period): 0.188
Highest Plt (2 hr. period): 0.082

Test limit (mS):	500.0	Pass
Test limit (%):	3.30	Pass
Test limit (%):	4.00	Pass
Test limit:	1.000	Pass
Test limit:	0.650	Pass

6 Immunity Test

✧ Performance Criteria (ETSI EN 301489-1)

General Performance Criteria

Performance criteria for continuous phenomena

During the test, the equipment shall:

- continue to operate as intended;
- not unintentionally transmit;
- not unintentionally change its operating state;
- not unintentionally change critical stored data.

Performance criteria for transient phenomena

For all ports and transient phenomena with the exception described below, the following applies:

- The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Note: For a 70 % residual voltage dip and voltage interruption tests in the case where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up) , above Performance criteria for transient phenomena is not applicable. The following criteria are used to replace it:

- volatile user data may have been lost and if applicable the communication link need not to be maintained and lost functions should be recoverable by user or operator.
- no unintentional responses shall occur at the end of the test, when the voltage is restored to nominal.
- in the event of loss of function(s) or in the event of loss of user stored data, this fact shall be recorded.

◇ **Performance Criteria (ETSI EN 301489-17)**

General Performance Criteria

Type	During test	After test
Criterion A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
Criterion B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
Criterion C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data

NOTE: For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

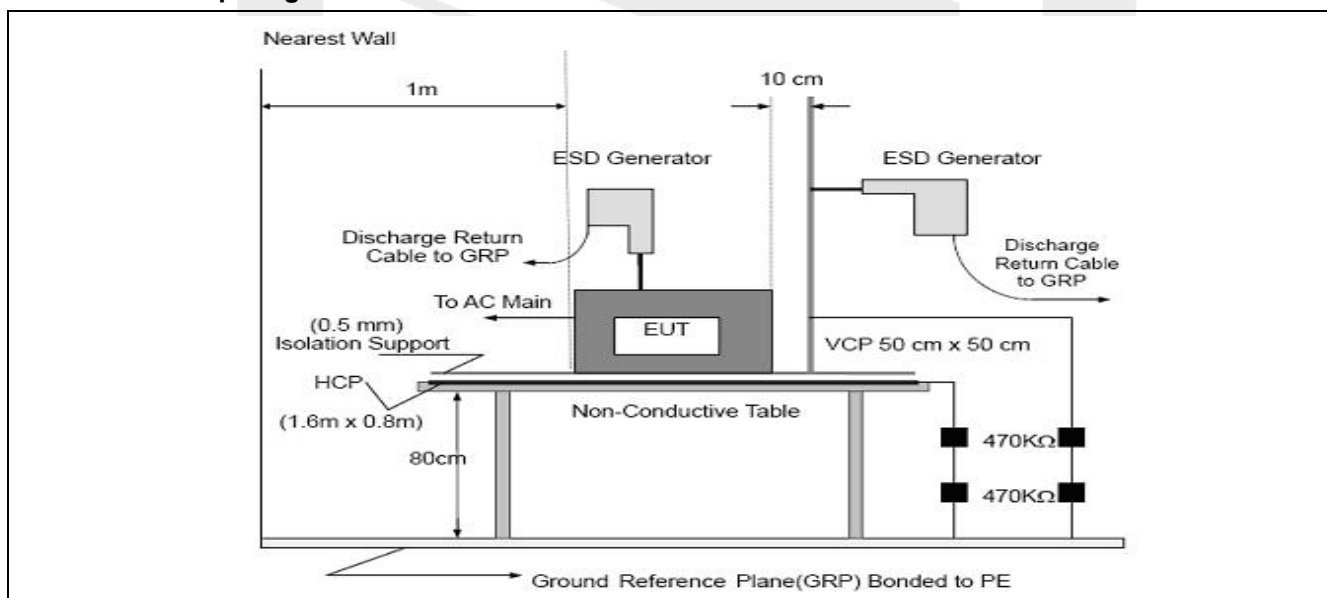
Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

6.1 Electrostatic Discharge Immunity Test

6.1.1 Test Requirement

Test Standard	ETSI EN 301 489-1 Clause 9.3
Basic Standard	EN 61000-4-2
Discharge Impedance	330 ohm / 150 pF
Discharge Voltage	Air Discharge: 2kV/4kV/8kV Contact Discharge: 2kV/4kV/6kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total
Discharge Mode	Single Discharge
Discharge Period	1 second minimum

6.1.2 Test Setup Diagram



6.1.3 Test Procedure

TABLE-TOP EQUIPMENT:

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940kohm total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT:

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

Contact discharge was applied to conductive surfaces and coupling planes of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

6.1.4 Test Data

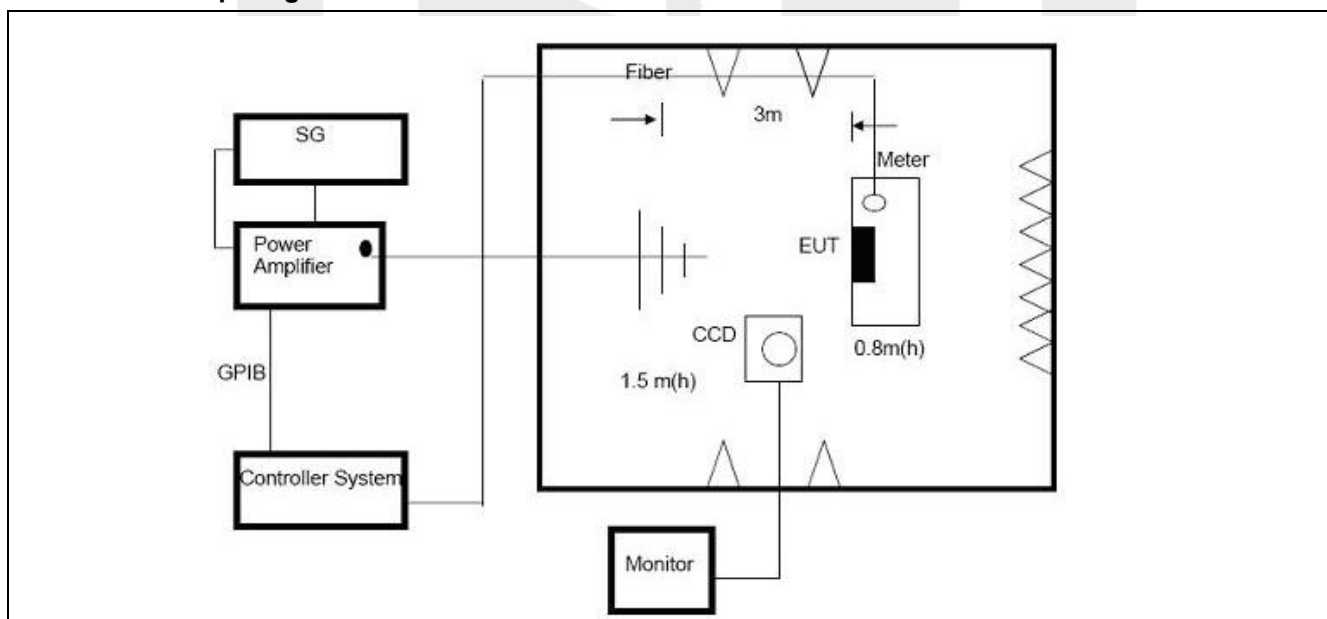
Electrostatic Discharge Test Results		
Test Mode	All Modes	
Test Voltage	Coupling	Verdict
±4kV	Contact Discharge	Pass
±2KV, ±4kV, ±8kV	Air Discharge	Pass
±4kV	Indirect Discharge HCP	Pass
±4kV	Indirect Discharge VCP	Pass
Remark: The performance complies with Performance criteria for Transient phenomena.		

6.2 RF Field Strength Susceptibility Test

6.2.1 Test Requirement

Test Standard	ETSI EN 301 489-1 Clause 9.3
Basic Standard	EN 61000-4-3
Frequency Range	80MHz to 6000MHz
Field Strength	3 V/m
Modulation	1kHz Sine Wave, 80%, AM Modulation
Frequency Step	1 % of preceding frequency value
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.5 m
Dwell Time	at least 0.5s
Spot frequencies: 1800 MHz, 2600 MHz, 3500 MHz and 5000 MHz; Additional spot frequencies: 80 MHz, 120 MHz, 160 MHz, 230 MHz, 434 MHz, 460 MHz, 600 MHz, 863 MHz and 900 MHz.	

6.2.2 Test Setup Diagram



6.2.3 Test Procedure

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber. The testing distance from antenna to the EUT was 3 meters.

- 1) The field strength level was 3V/m.
- 2) The frequency range is swept from 80 MHz to 1000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave.
- 3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0.5s.
- 4) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

6.2.4 Test Data

Radiated, RF Electromagnetic Fields Test Results				
Test Mode	All Modes			
Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Verdict
80 ~ 6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	Pass
			Rear	Pass
			Left	Pass
			Right	Pass
Remark: 1) The performance complies with Performance criteria for Continuous phenomena. 2) This test item is subcontracted to Shenzhen PSI Testing Co., Ltd. 3) During the test, the PER of Bluetooth is less than 10%.				

6.3.4 Test Data

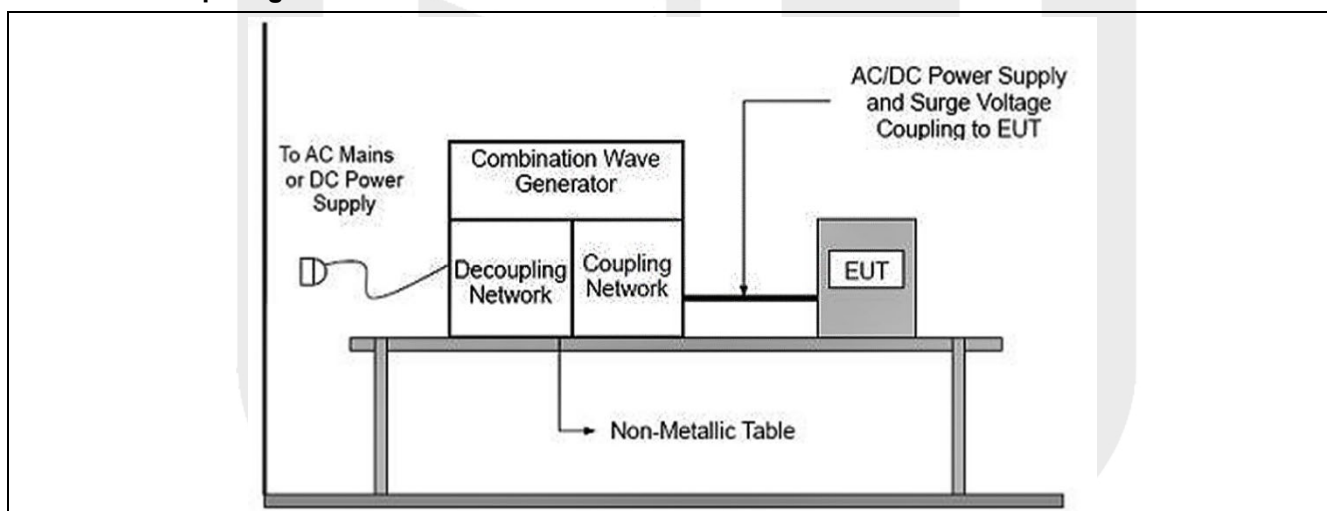
FAST TRANSIENTS, COMMON MODE Test Results									
Test Mode	All Modes								
Coupling Line	Test level (kV)								Verdict
	0.5		1		2		4		
	+	-	+	-	+	-	+	-	
AC Line	P	P	P	P					Pass
Remark: The performance complies with Performance criteria for Transient phenomena.									

6.4 Surges Test

6.4.1 Test Requirement

Test Standard	ETSI EN 301 489-1 V2.2.3 Clause 9.8
Basic Standard	EN 61000-4-5
Wave-Shape	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage	Line to Line: 1 kV; Line to ground: 2kV
Generator Source	2 ohm between networks
Impedance	12 ohm between network and ground
Polarity	Positive/Negative
Phase Angle	0°/90°/180°/270°
Pulse Repetition Rate	1 time / min. (maximum)
Number of Tests	5 positive and 5 negative at selected points

6.4.2 Test Setup Diagram



6.4.3 Test Procedure

- 1) For EUT power supply:
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter). For double-insulated products without PE or external earth connections, the test shall be done in a similar way as for grounded products but without adding any additional external grounded connections. If there are no other possible connections to earth, line-to-ground tests may be omitted.
- 2) For Unshielded unsymmetrical interconnection lines:
The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length.
- 3) Unshielded symmetrical interconnections communication lines:

The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length.

4) For Shielded lines:

Direct application,

The EUT is isolated from ground and the surge is applied to its metallic enclosure; the termination (or auxiliary equipment) at the port(s) under test is grounded. This test applies to equipment with single or multiple shielded cables.

Rules for application of the surge to shielded lines:

i) Shields grounded at both ends

> The surge injection on the shield.

ii) Shields grounded at one end

> If in the installation the shield is connected only at the auxiliary equipment, test shall be done in that configuration but with the generator still connected to the EUT side. If cable lengths allow, the cables shall be on insulated supports 0.1 m above the ground plane or cable tray.

For products which do not have metallic enclosures, the surge is applied directly to the shielded cable.

- Alternative coupling method for testing single cables in a multi-shield configuration, Surges are applied in close proximity to the interconnection cable under test by a wire. The length of the cable between the port(s) under test and the device attached to the other end of the cable shall be the lesser of the maximum length permitted by the EUT's specification, or 20 m. Where the length exceeds 1 m, excess lengths of cables shall be bundled at the approximate centre of the cables with the bundles 30 cm to 40 cm in length.

6.4.4 Test Data

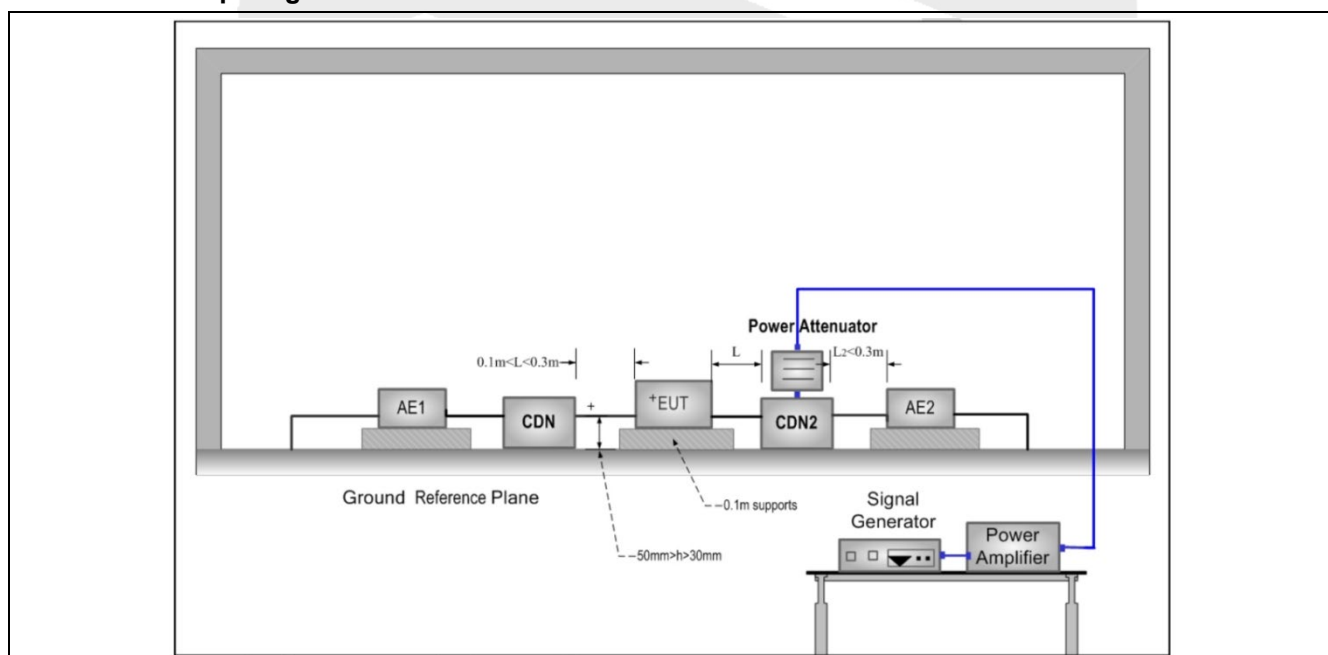
Surges Test Results											
Test Mode			All Modes								
Coupling Line			Test level (kV)								Verdict
			0.5		1		2		4		
			+	-	+	-	+	-	+	-	
AC line	L-N	0°	P	P	P	P					Pass
		90°	P	P	P	P					
		180°	P	P	P	P					
		270°	P	P	P	P					
Remark: The performance complies with Performance criteria for Transient phenomena.											

6.5 Radio Frequency, Common Mode Test

6.5.1 Test Requirement

Test Standard	ETSI EN 301 489-1 V2.2.3 Clause 9.5
Basic Standard	EN 61000-4-6
Frequency Range	0.15 MHz - 80 MHz
Field Strength	3 Vr.m.s.
Modulation	1kHz Sine Wave, 80%, AM Modulation
Frequency Ste:	1 % of fundamental
Dwell Time	at least 3 seconds

6.5.2 Test Setup Diagram



6.5.3 Test Procedure

- 1) The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.
- 2) The coupling and decoupling devices were required, they were located between 0.1 m and 0.3 m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.
- 3) Each AE, used with clamp injection, shall be placed on an insulating support 0.1 m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0.3 m from the AE. The cable(s) between the AE and the decoupling network (s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane.
- 4) The frequency range was swept from 150 kHz to 230 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave, pausing to

adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size do not exceed 1% of the preceding frequency.

6.5.4 Test Data

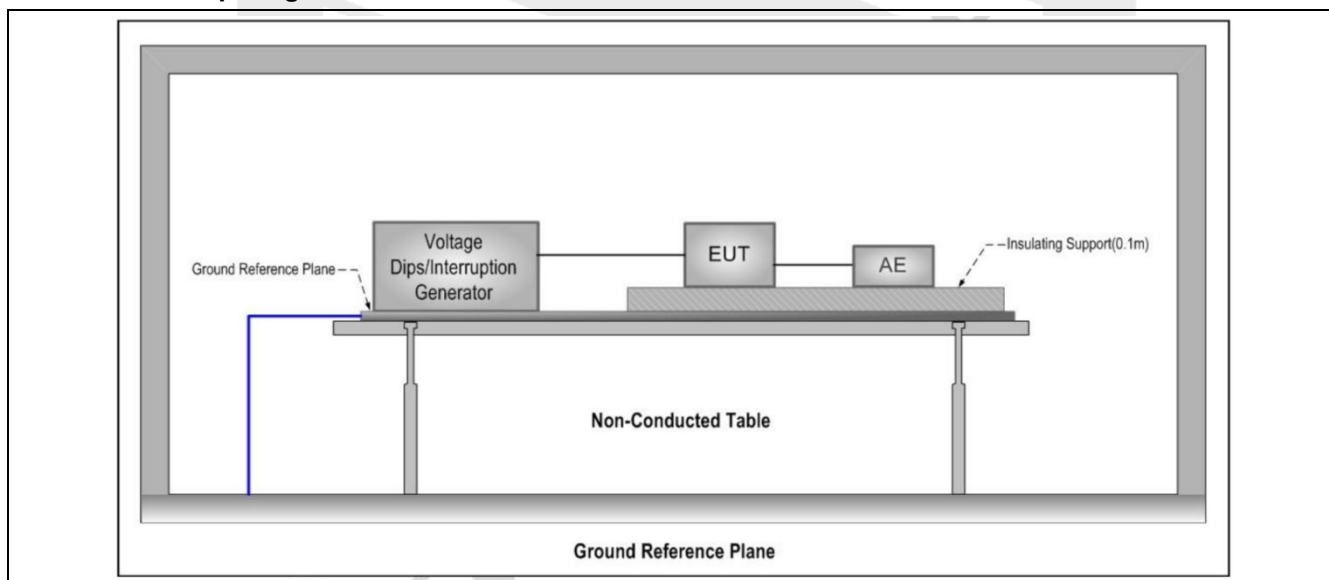
RADIO FREQUENCY, COMMON MODE Test Results			
Test Mode	All Modes		
Frequency Range (MHz)	Injected Port	Level (V)	Verdict
0.15 ~ 80	☒ AC ☐ DC ☐ Signal	☐ 1V ☒ 3V ☐ __V	Pass
Remark: 1) The performance complies with Performance criteria for Continuous phenomena. 2) This test item is subcontracted to Shenzhen PSI Testing Co., Ltd. 3) During the test, the PER of Bluetooth is less than 10%.			

6.6 Voltage Dips and Interruptions

6.6.1 Test Requirement

Test Standard	ETSI EN 301 489-1 V2.2.3 Clause 9.7
Basic Standard	EN 61000-4-11
Voltage Dips	0% reduction, 0.5 Cycle 0% reduction, 1.0 Cycle 70% reduction, 25 Cycles
Voltage Interruptions	0% reduction, 250 Cycles
Interval between Event	Minimum 10 seconds
Phase Angle	0°/180°
Test Cycle	3 times

6.6.2 Test Setup Diagram



6.6.3 Test Procedure

- 1) The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.1m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.8m high wooden support above the GRP.
2. The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.
3. The EUT was tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.
4. For EUT with more than one power cord, each power cord was tested individually.

6.6.4 Test Data

Voltage Dips and Interruptions Test Results	
Test Mode	All Modes

Voltage Dips	Durations		Event interval (sec)	Total events (time)	Verdict
Voltage residual (%)	(period)	(ms)	10	3	
0	0.5	10	10	3	Pass
0	1	20	10	3	Pass
70	25	500	10	3	Pass
Remark: The performance complies with Performance criteria for Transient phenomena.					

Voltage Interruptions	Durations		Event interval (sec)	Total events (time)	Verdict
Voltage residual (%)	(period)	(ms)	10	3	
0	250	5000	10	3	Pass
Remark: The performance complies with Performance criteria for Transient phenomena.					

ANNEX A TEST SETUP PHOTOS

PHOTO 1

Conducted Emission
Test

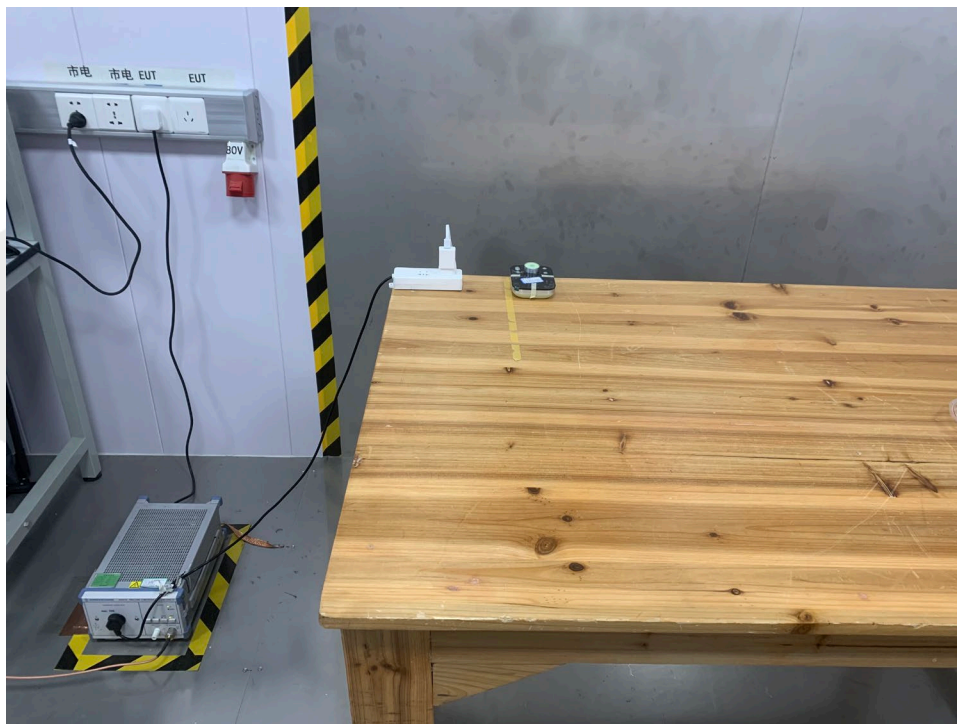


PHOTO 2

Radiated Emission
Test

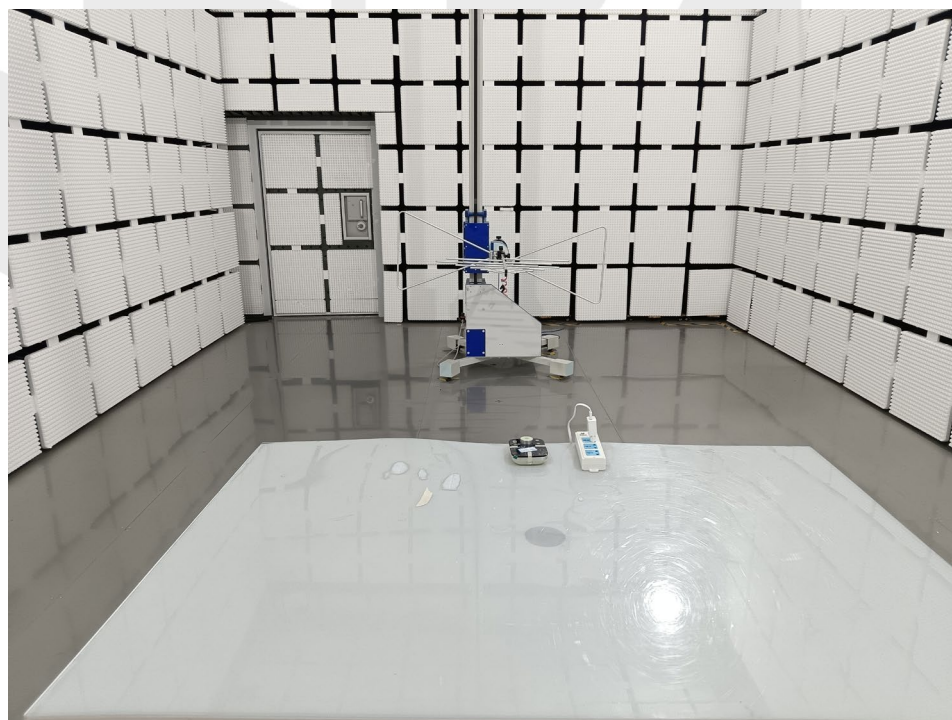


PHOTO 3

Electrostatic
Discharge Immunity
Test

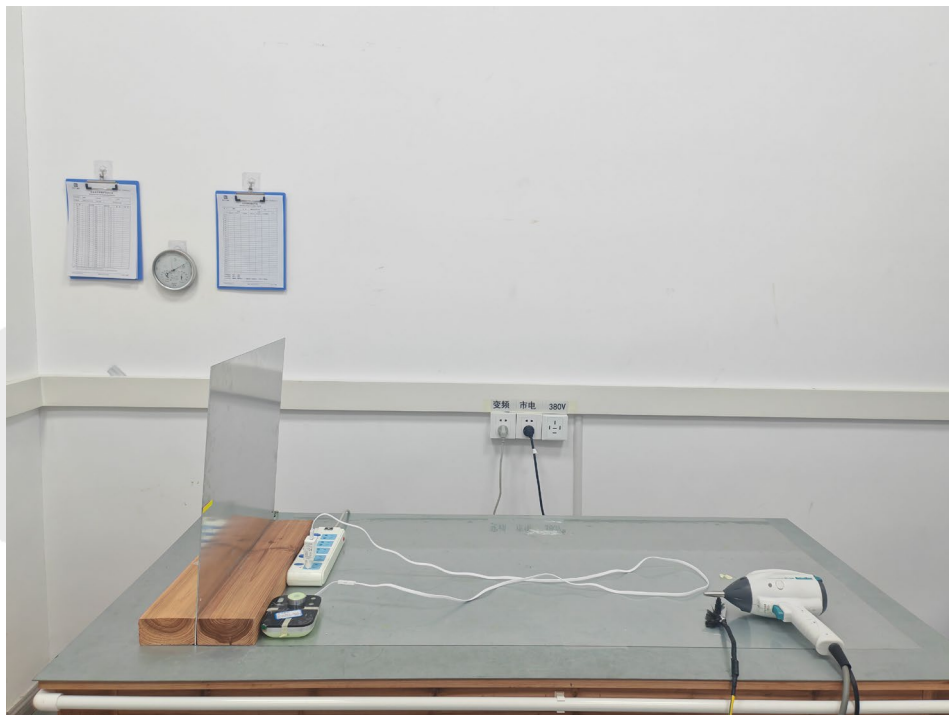


PHOTO 4

EFT, Surge and Dips
Test

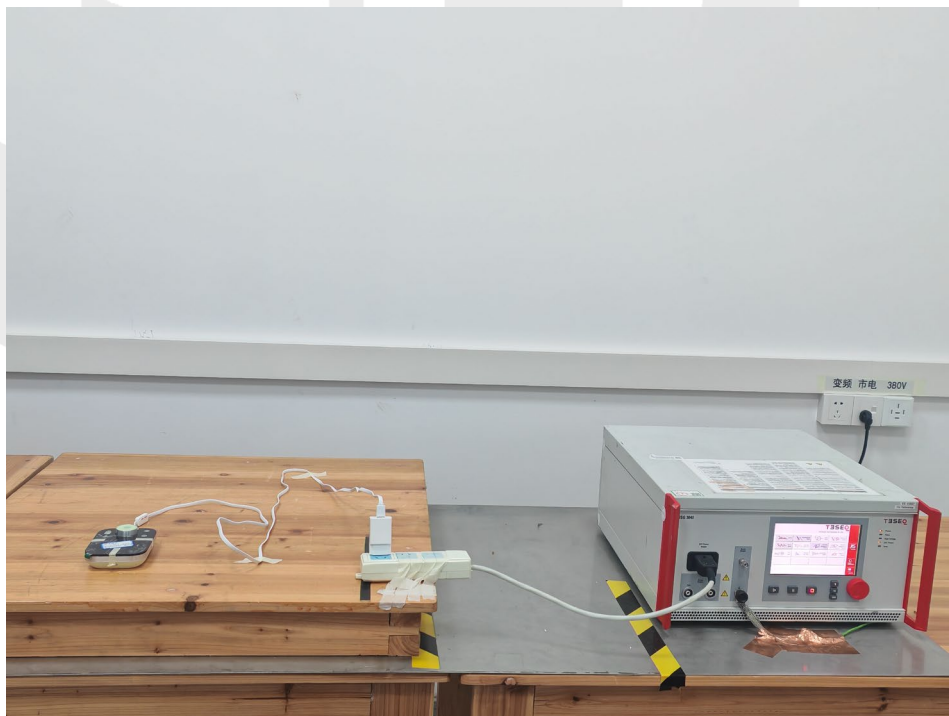


PHOTO 5

Flicker Test



ANNEX B EXTERNAL PHOTOS



PHOTO 3



PHOTO 4

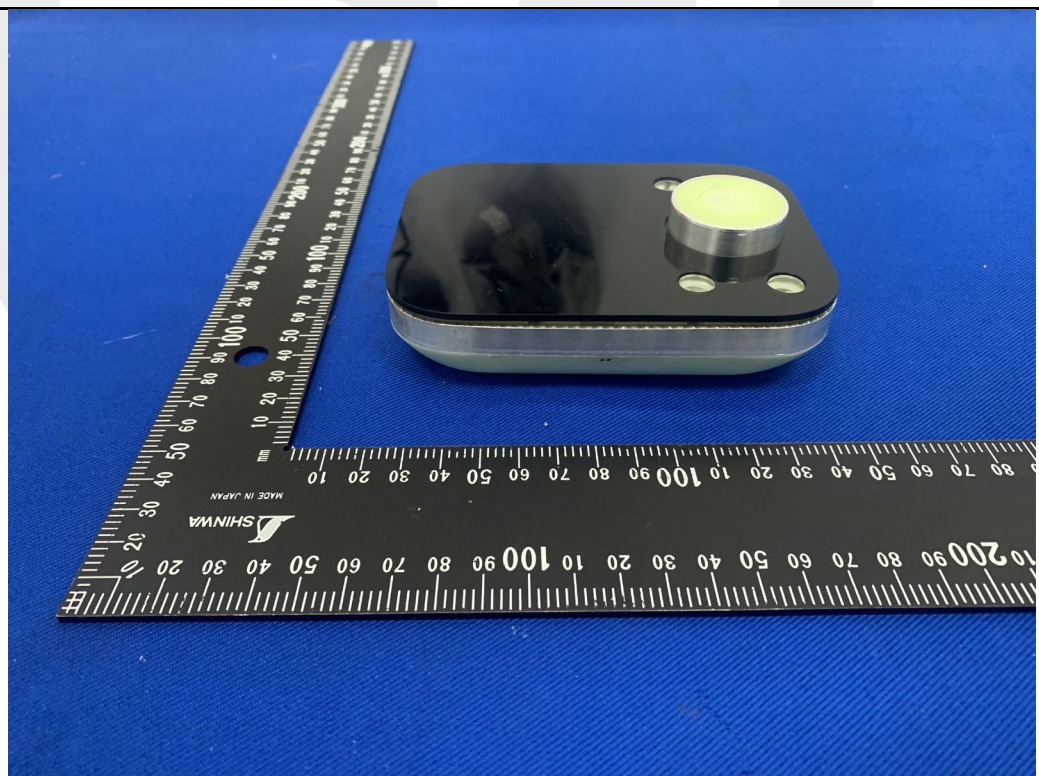


PHOTO 5



PHOTO 6

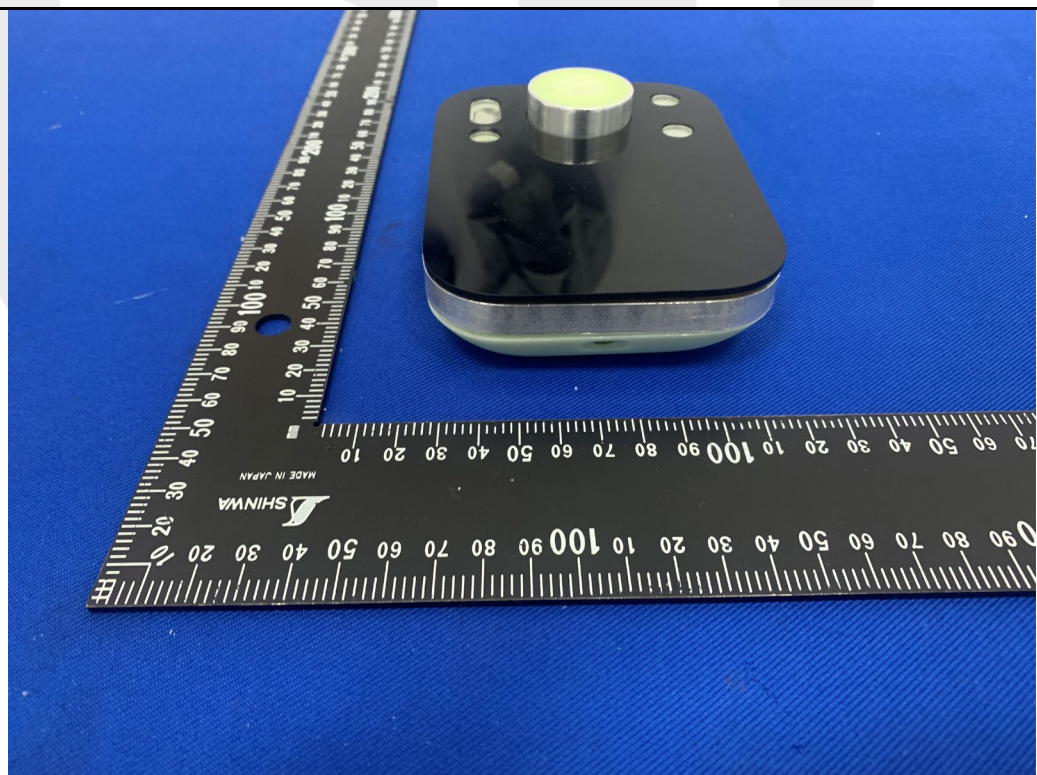


PHOTO 7

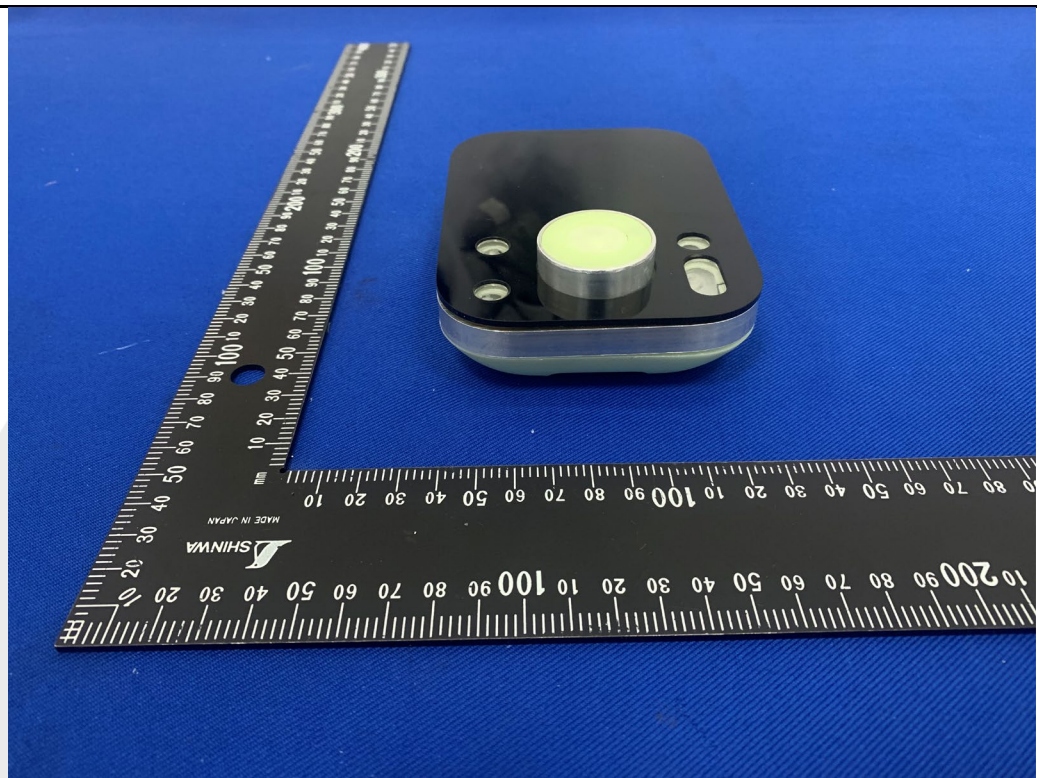


PHOTO 8



PHOTO 9



ANNEX C INTERNAL PHOTOS

PHOTO 1

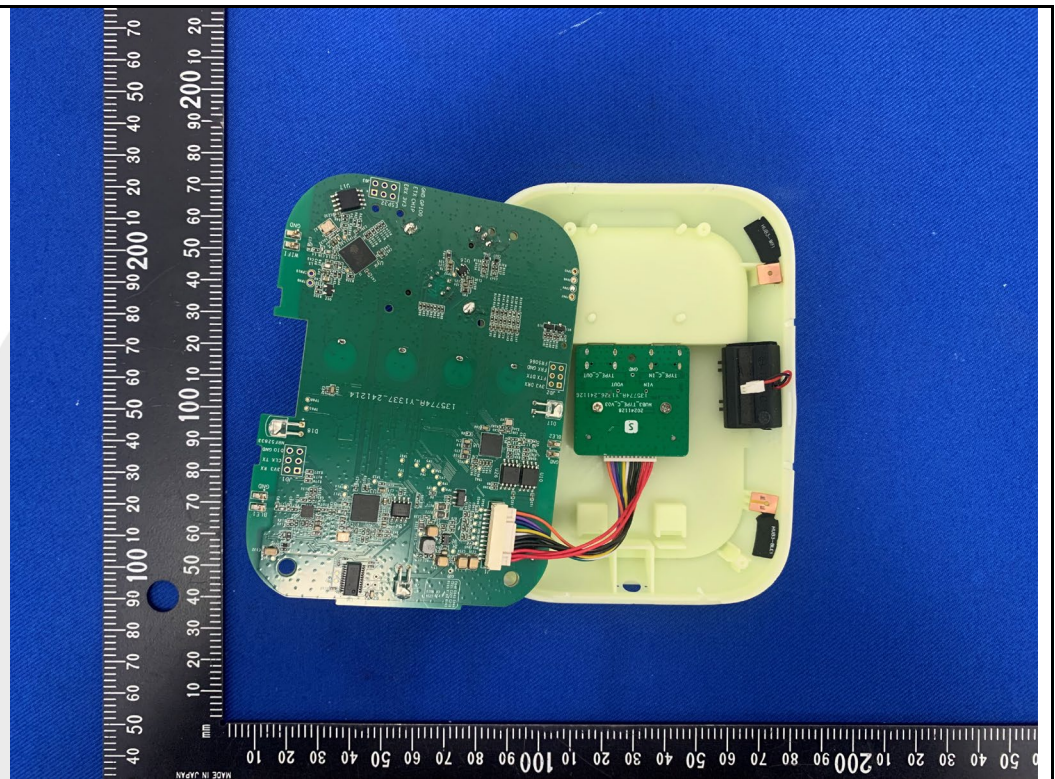


PHOTO 2

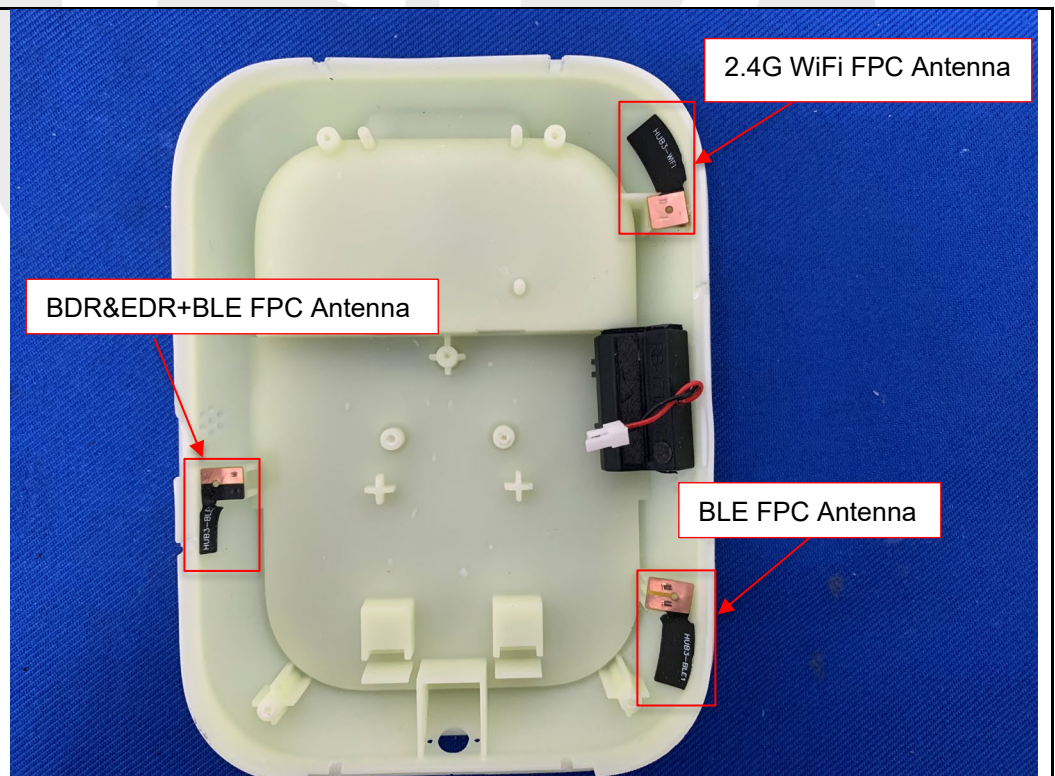


PHOTO 3

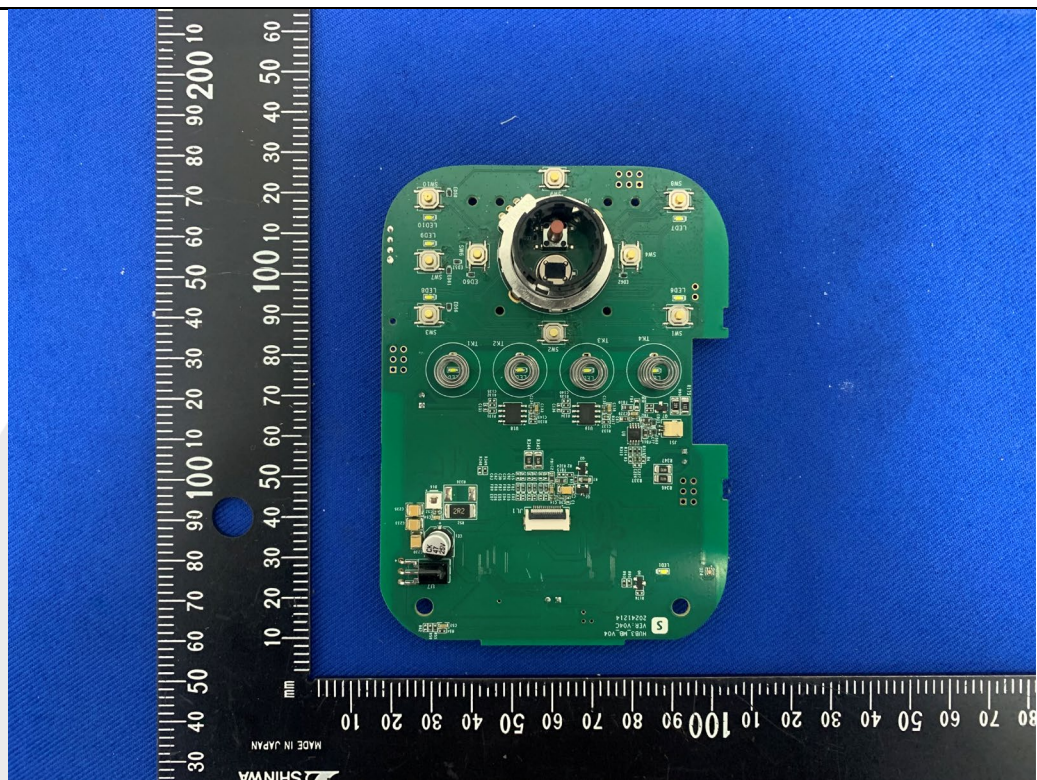
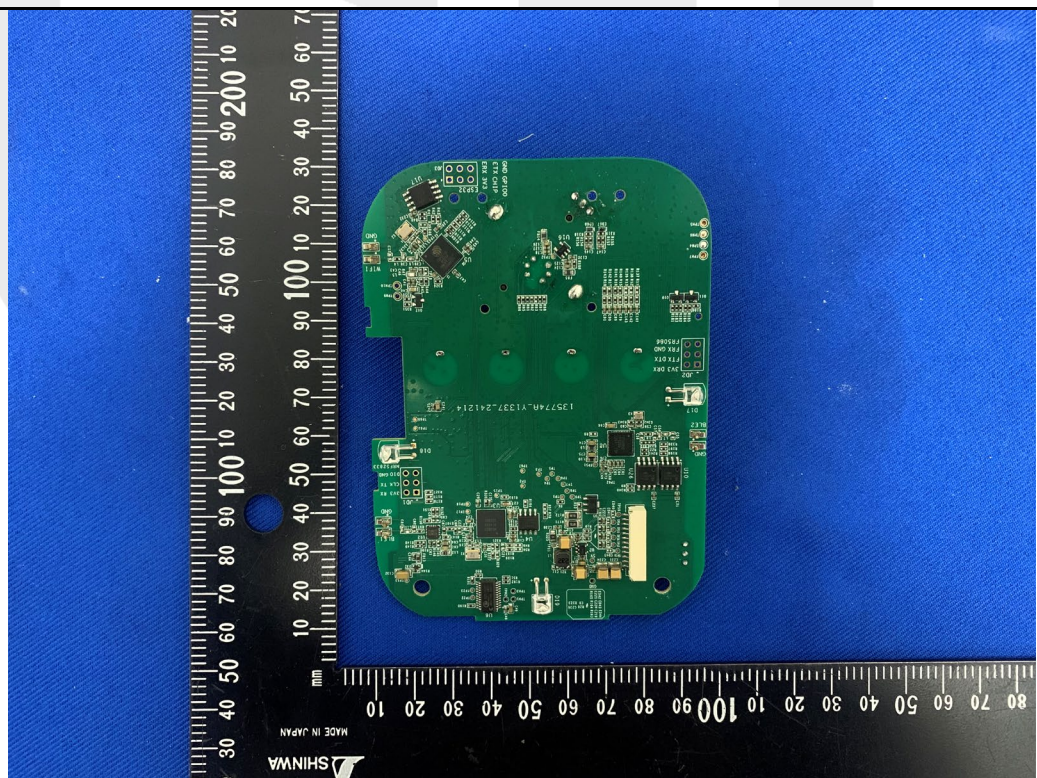
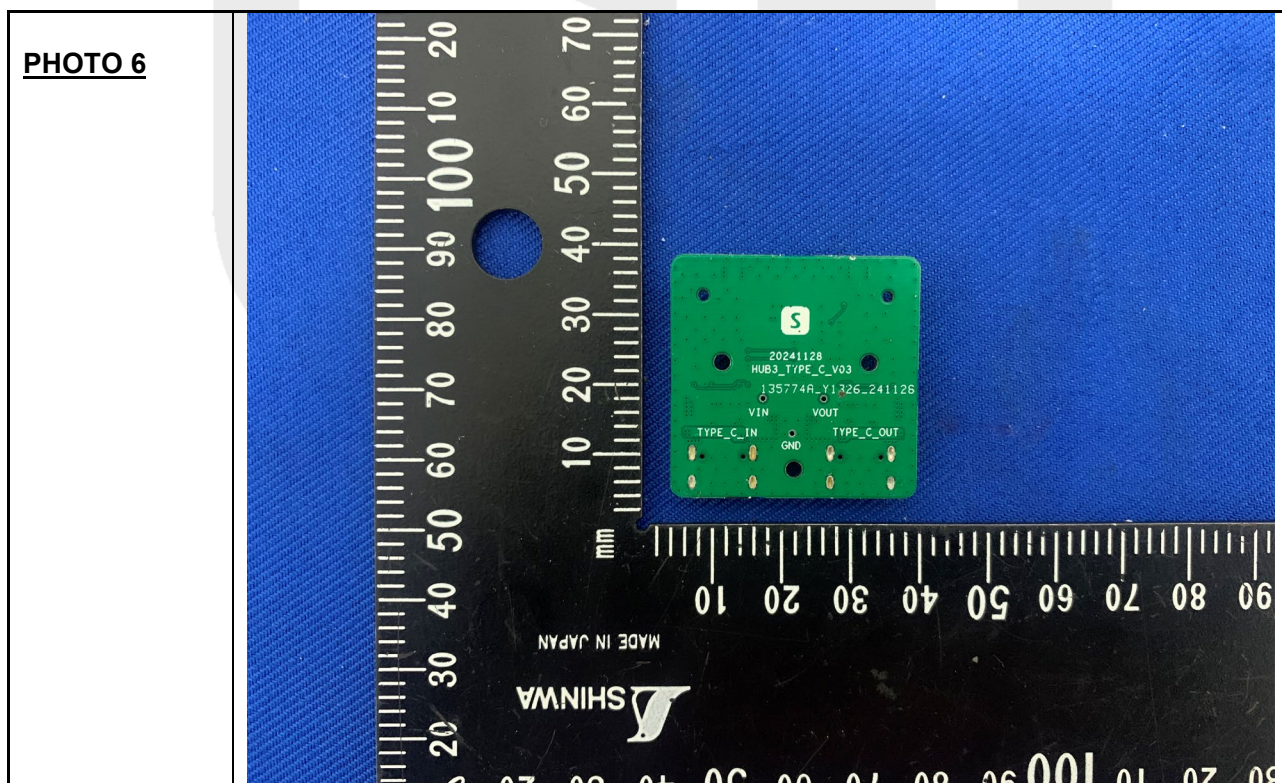
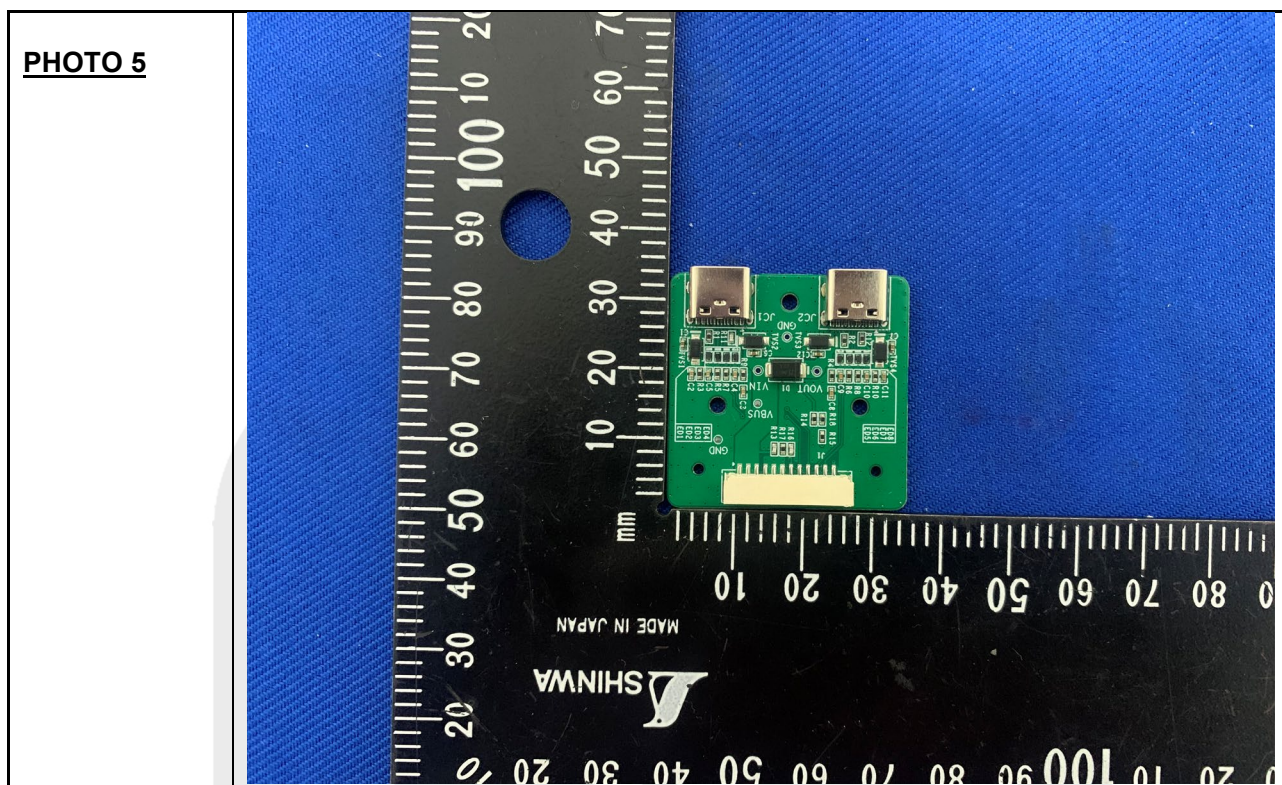
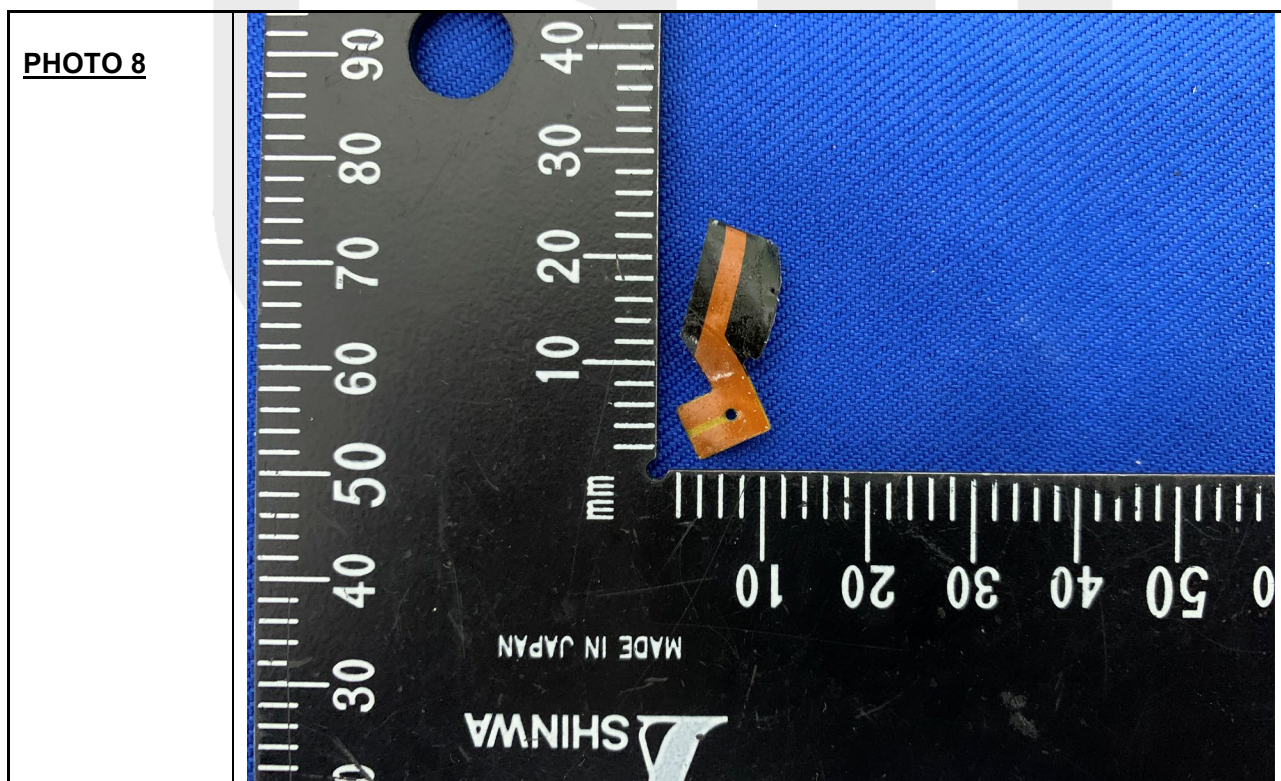
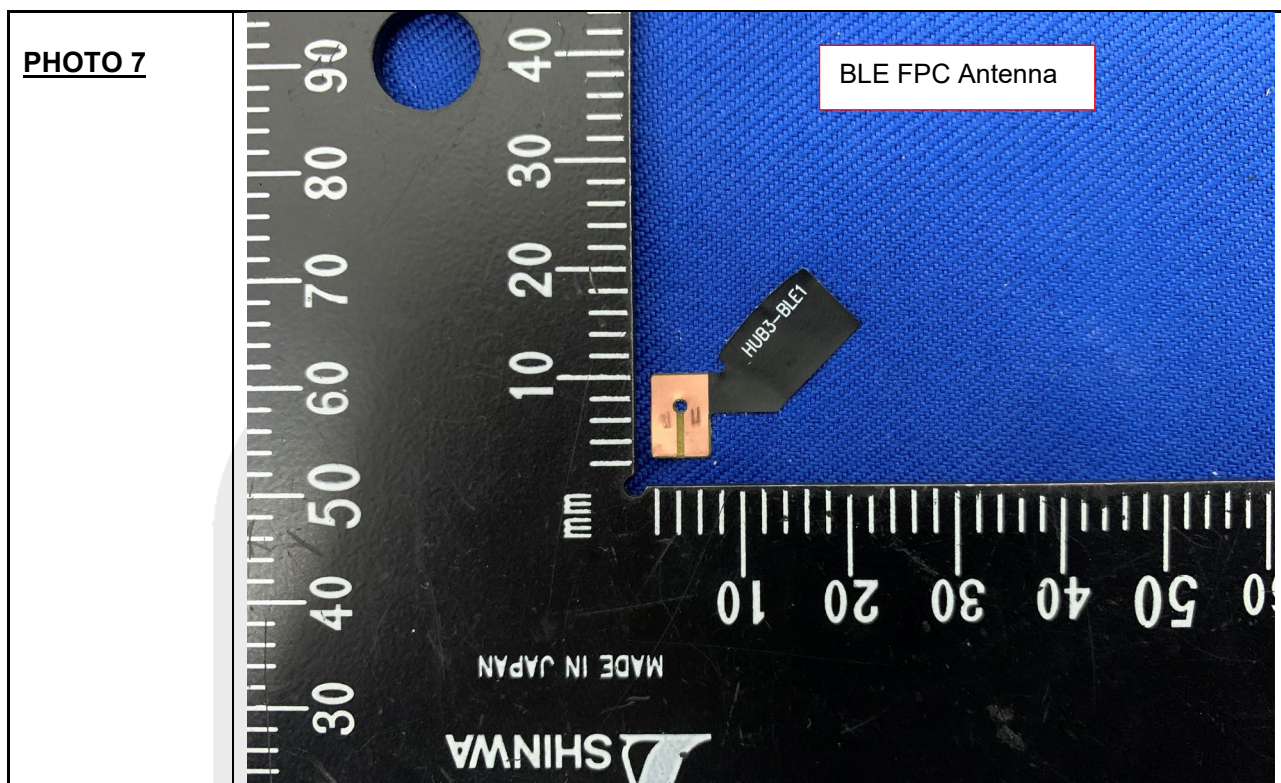
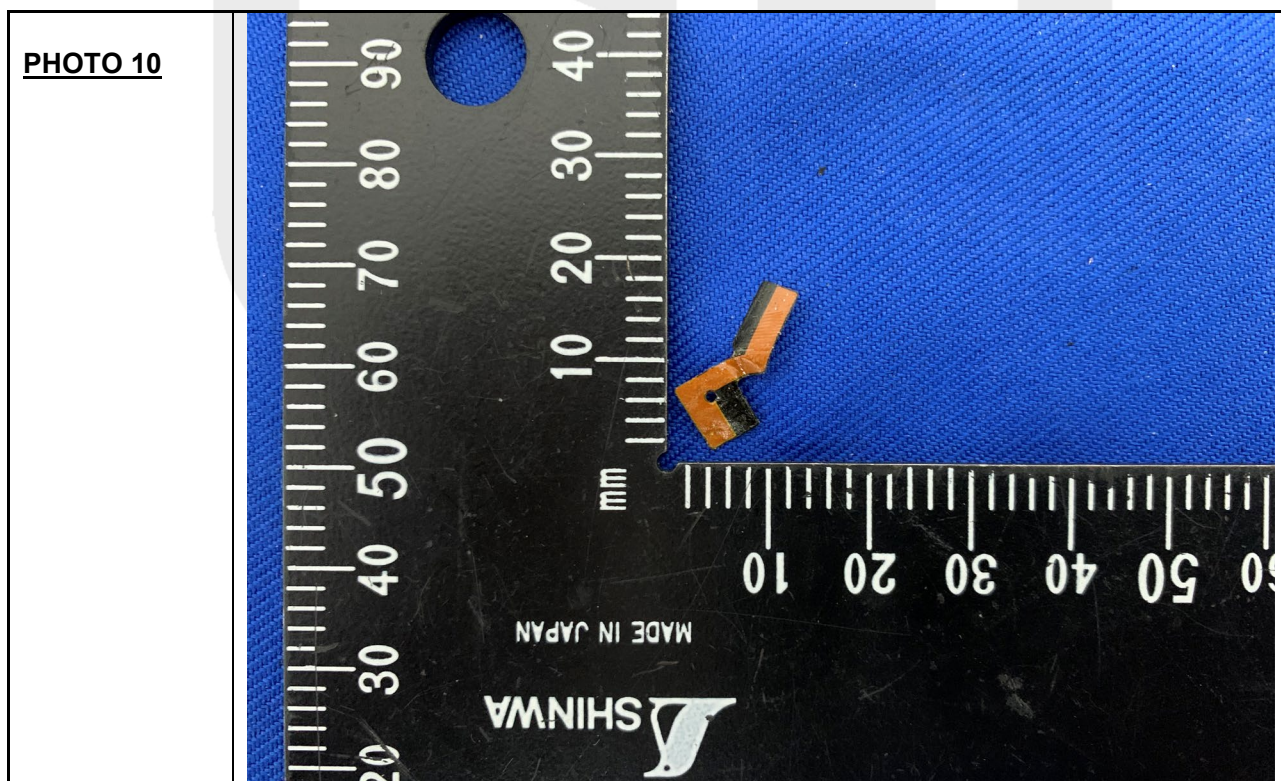
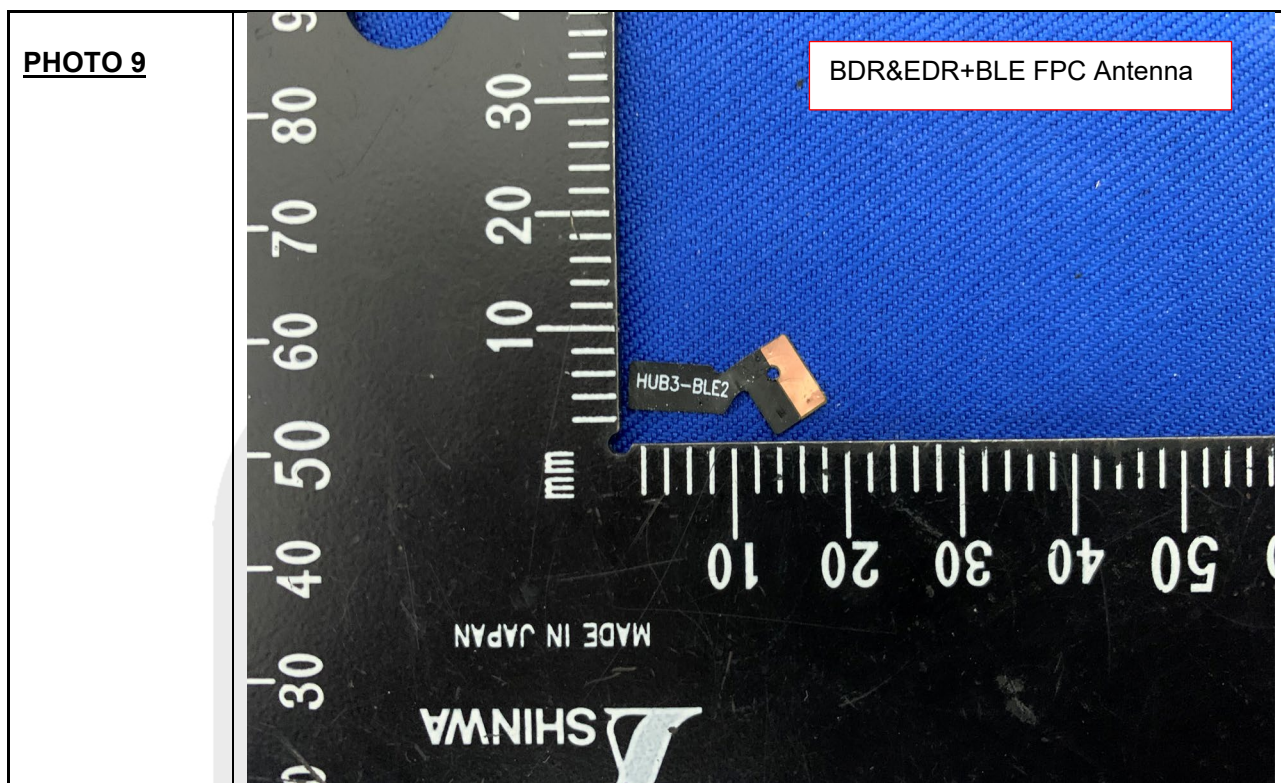


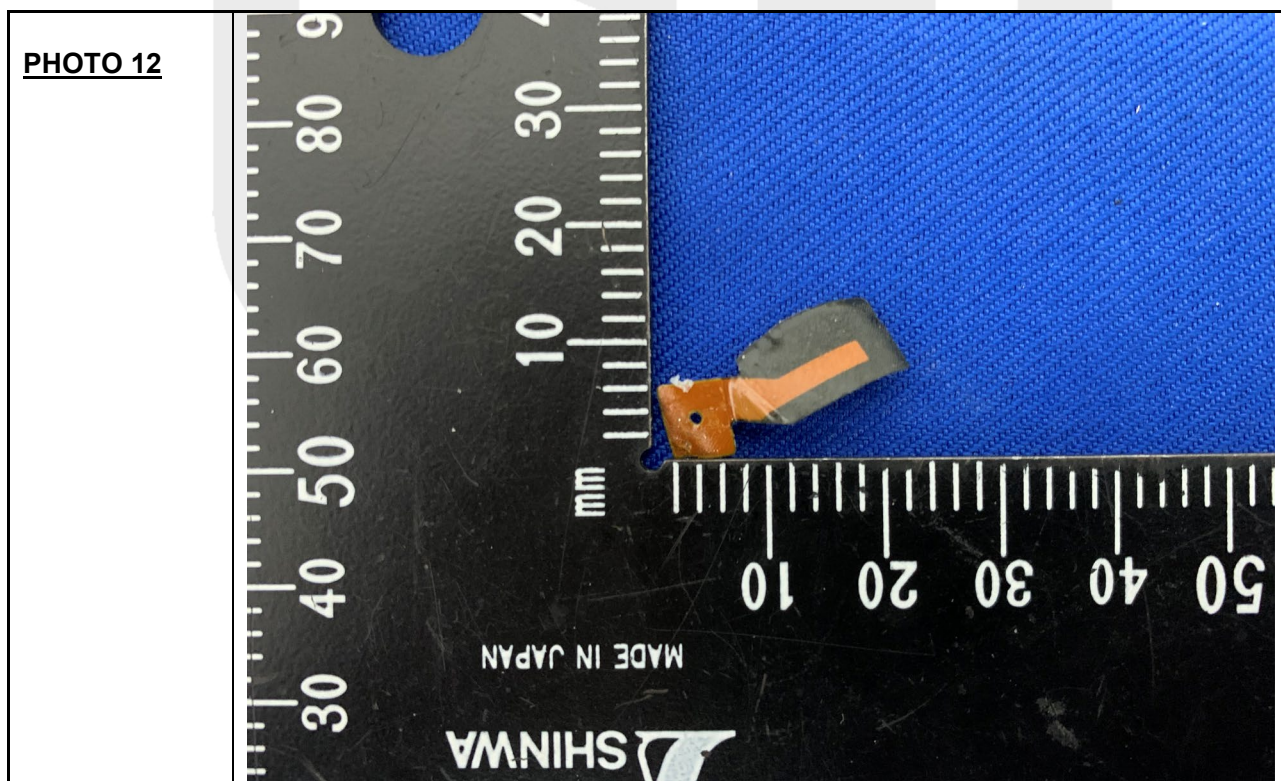
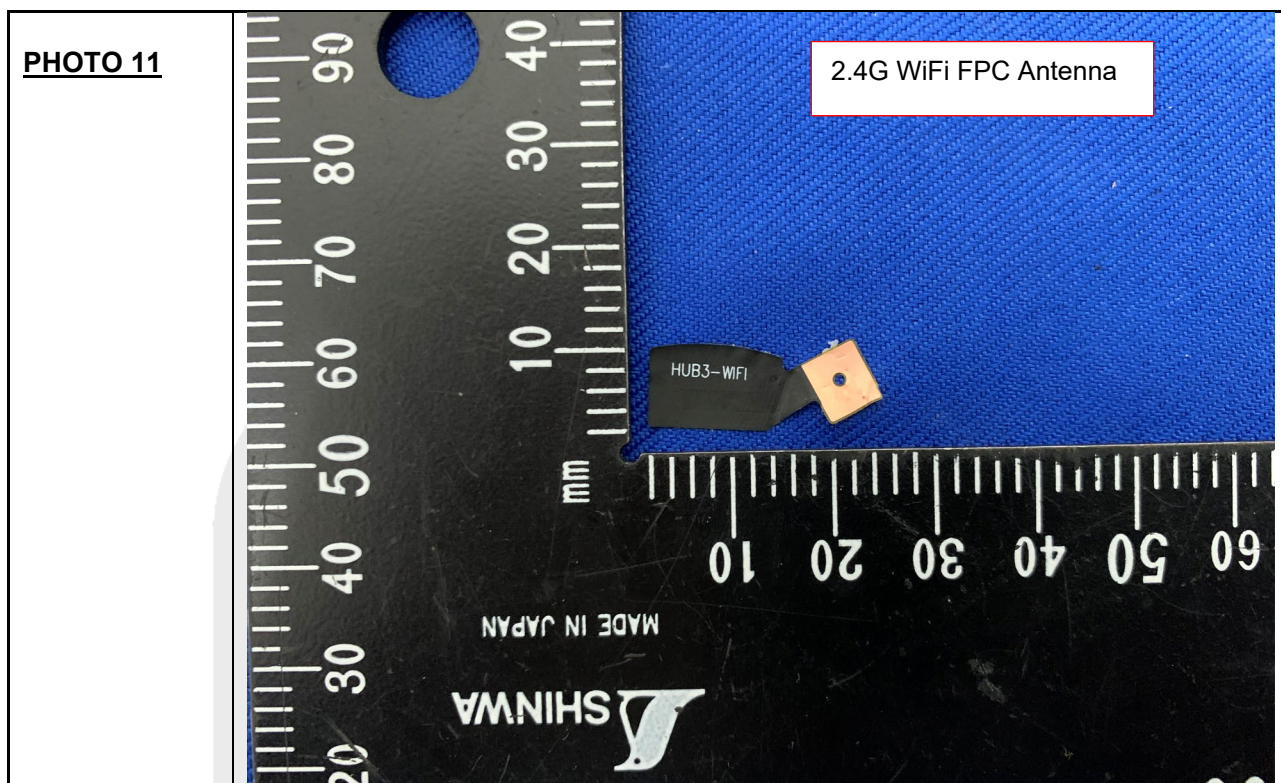
PHOTO 4









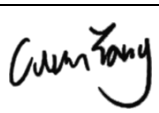


STATEMENT

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--- End of Report ---

TEST REPORT EN IEC 62368-1:2020+A11:2020 Audio/video, information and communication technology equipment Part 1: Safety requirements	
Report Number.....	8326EU010302S
Date of issue	2025-01-22
Total number of pages	74 pages
Name of Testing Laboratory preparing the Report	SHENZHEN EU TESTING LABORATORY LIMITED
Applicant's name	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R. China, 518100
Test specification: Standard IEC 62368-1: 2018 EN IEC 62368-1:2020+A11:2020 Test procedure..... Type Tested Non-standard test method..... N/A	
General disclaimer: The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing SHENZHEN EU TESTING LABORATORY LIMITED. The authenticity of this Test Report and its contents can be verified by SHENZHEN EU TESTING LABORATORY LIMITED, responsible for this Test Report.	

Testing procedure and testing location:		
☒ Testing Laboratory:	SHENZHEN EU TESTING LABORATORY LIMITED	
Testing location/ address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China	
Tested by (name + signature)	Cuvin Yang	
Approved by (name+ signature).....	Mike Sun	

Test item description	SwitchBot Hub 3
Trade Mark.....	SwitchBot
Manufacturer	Woan Technology (Shenzhen) Co., Ltd. Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R. China, 518100
Model/Type reference.....	W7202100, W7202101, W7202102, W7202103, W7202104, W7202105
Ratings.....	Input: 5V $\overline{=}$ 2A Output: 5V $\overline{=}$ 0.5A

Summary of testing:
Tests performed (name of test and test clause):

The submitted samples were found to comply with the requirements of:

Electrical safety

-- EN IEC 62368-1:2020+A11:2020

Testing location:

SHENZHEN EU TESTING LABORATORY LIMITED

101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China

Summary of compliance with National Differences (List of countries addressed):

EU Group Differences, EU Special National Conditions,

For National Differences see end of this test report.

See attachment 1 for National Differences.

☒ **The product fulfils the requirements of EN IEC 62368-1:2020+A11:2020.**

Copy of marking plate:

SwitchBot Hub 3 SwitchBot ハブ3 Model/型番: W7202100 Input/入力: 5V $\overline{=}$ 2A

Output/出力: 5V $\overline{=}$ 500mA FCC ID: 2AKXB-W7202100 Made in China

Designed by SwitchBot XXXX



Test item particulars:		
Product group	☒ end product ☐ built-in component	
Classification of use by	☒ Ordinary person ☐ Children likely present ☐ Instructed person ☐ Skilled person	
Supply connection	☐ AC mains ☐ DC mains ☒ not mains connected: ☒ ES1 ☐ ES2 ☐ ES3	
Supply tolerance	☐ +10%/-10% ☐ +20%/-15% ☐ + %/ - % ☒ None	
Supply connection – type	☐ Pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ Pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: Not directly connected to mains	
Considered current rating of protective device	☐ A; Location: ☐ building ☐ equipment ☒ N/A (Not directly connected to mains)	
Equipment mobility	☒ movable ☐ hand-held ☒ transportable ☐ direct plug-in ☐ stationary ☐ for building-in ☐ wall/ceiling-mounted ☐ SRME/rack-mounted ☐ other:	
Overvoltage category (OVC)	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other: --(Not directly connected to mains)	
Class of equipment	☐ Class I ☐ Class II ☒ Class III ☐ Not classified	
Special installation location	☒ N/A ☐ restricted access area ☐ outdoor location	
Pollution degree (PD)	☐ PD 1 ☒ PD 2 ☐ PD 3	
Manufacturer's specified T_{ma}	40°C	
IP protection class	☒ IPX0 ☐ IP____	
Power systems	☐ TN ☐ TT ☐ IT - V _{L-L} ☒ not AC mains	
Altitude during operation (m)	☒ 2000 m or less ☐ m	
Altitude of test laboratory (m)	☒ 2000 m or less ☐ 5000 m	
Mass of equipment (kg)	0.190kg	

Possible test case verdicts: - test case does not apply to the test object.....: N/A - test object does meet the requirement.....: P (Pass) - test object does not meet the requirement.....: F (Fail)	
Testing: Date of receipt of test item: 2025-01- 03 Date (s) of performance of tests: 2025-01- 03 to 2025-01-14	
General remarks: "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☐ comma / ☒ point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 62368-1:	
The application for obtaining a CB Test Certificate include more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.	☐ Yes ☒ Not applicable
Name and address of factory (ies)	Woan Technology (Shenzhen) Co., Ltd. Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R. China, 518100
General product information and other remarks: 1. The SwitchBot Hub 3 is considered as a transportable, it belongs Class III equipment. 2. The product was submitted and tested for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 40°C.	
Model Differences The different models of this product vary solely in model designation and exterior design; the internal circuitry, PCB layout, and circuit principles are identical across all models.	
Additional application considerations – (Considerations used to test a component or sub-assembly) – N/A	

OVERVIEW OF ENERGY SOURCES AND SAFEGUARDS				
Clause	Possible Hazard			
5	Electrically-caused injury			
Class and Energy Source (e.g. ES3: Primary circuit)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
ES1: All Internal circuits	Ordinary	N/A	N/A	N/A
6	Electrically-caused fire			
Class and Energy Source (e.g. PS2: 100 Watt circuit)	Material part (e.g. Printed board)	Safeguards		
		B	S	R
PS3: All Internal circuits	Enclosure, PCB	No parts exceeding 90% of its spontaneous Ignition temperature	Min. V-1 PCB used	HB Fire enclosure
7	Injury caused by hazardous substances			
Class and Energy Source (e.g. Ozone)	Body Part (e.g., Skilled)	Safeguards		
		B	S	R
N/A	N/A	N/A	N/A	N/A
8	Mechanically-caused injury			
Class and Energy Source (e.g. MS3: Plastic fan blades)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
MS1: Edges and corners	Ordinary	N/A	N/A	N/A
MS1: Equipment mass	Ordinary	N/A	N/A	N/A
9	Thermal burn			
Class and Energy Source (e.g. TS1: Keyboard caps)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
TS1: External enclosure	Ordinary	N/A	N/A	N/A
10	Radiation			
Class and Energy Source (e.g. RS1: PMP sound output)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
RS1: LEDs indicating light only	Ordinary	N/A	N/A	N/A
Supplementary Information: “B” – Basic Safeguard; “S” – Supplementary Safeguard; “R” – Reinforced Safeguard				

ENERGY SOURCE DIAGRAM
Optional. Manufacturers are to provide the energy sources diagram identify declared energy sources and identifying the demarcations are between power sources. Recommend diagram be provided included in

power supply and multipart systems.

Insert diagram below. Example diagram designs are; Block diagrams; image(s) with layered data; mechanical drawings

☐ ES

☐ PS

☐ MS

☐ TS

☐ RS



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Clause	Requirement + Test	Result - Remark	Verdict
4	GENERAL REQUIREMENTS		P
4.1.1	Acceptance of materials, components and subassemblies	See appended table 4.1.2	P
4.1.2	Use of components	Components which are certified to IEC and/or national standards are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment. See also Annex G	P
4.1.3	Equipment design and construction	No accessible part which could cause injury.	P
4.1.4	Specified ambient temperature for outdoor use (°C):		N/A
4.1.5	Constructions and components not specifically covered		N/A
4.1.8	Liquids and liquid filled components (LFC)		N/A
4.1.15	Markings and instructions	(See Annex F)	P
4.4.3	Safeguard robustness		P
4.4.3.1	General		P
4.4.3.2	Steady force tests	(See annex T.4)	P
4.4.3.3	Drop tests	(See annex T.7)	P
4.4.3.4	Impact tests		N/A
4.4.3.5	Internal accessible safeguard tests		N/A
4.4.3.6	Glass impact tests		N/A
4.4.3.7	Glass fixation tests		N/A
	Glass impact test (1J)		N/A
	Push/pull test (10 N)		N/A
4.4.3.8	Thermoplastic material tests		N/A
4.4.3.9	Air comprising a safeguard		N/A
4.4.3.10	Accessibility, glass, safeguard effectiveness		N/A
4.4.4	Displacement of a safeguard by an insulating liquid		N/A
4.4.5	Safety interlocks		N/A
4.5	Explosion		N/A
4.5.1	General		N/A
4.5.2	No explosion during normal/abnormal operating condition		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	No harm by explosion during single fault conditions		N/A
4.6	Fixing of conductors		N/A
	Fix conductors not to defeat a safeguard		N/A
	Compliance is checked by test		N/A
4.7	Equipment for direct insertion into mains socket-outlets		N/A
4.7.2	Mains plug part complies with relevant standard ...	No such apparatus	N/A
4.7.3	Torque (Nm)		N/A
4.8	Equipment containing coin/button cell batteries		N/A
4.8.1	General		N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery compartment door/cover construction		N/A
	Open torque test		N/A
4.8.4.2	Stress relief test		N/A
4.8.4.3	Battery replacement test		N/A
4.8.4.4	Drop test		N/A
4.8.4.5	Impact test		N/A
4.8.4.6	Crush test		N/A
4.8.5	Compliance		N/A
	30N force test with test probe		N/A
	20N force test with test hook		N/A
4.9	Likelihood of fire or shock due to entry of conductive object		N/A
4.10	Component requirements		N/A
4.10.1	Disconnect Device		N/A
4.10.2	Switches and relays		N/A

5	ELECTRICALLY-CAUSED INJURY		P
5.2	Classification and limits of electrical energy sources		P
5.2.2	ES1, ES2 and ES3 limits	Max. 5VDC power supply	P
5.2.2.2	Steady-state voltage and current limits	(See appended table 5.2)	P
5.2.2.3	Capacitance limits	No Capacitance limits introduced	N/A
5.2.2.4	Single pulse limits	No single pulse introduced	N/A
5.2.2.5	Limits for repetitive pulses	No repetitive pulses introduced	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.2.6	Ringling signals	No means for connection to telephone network and no ringing signal generated	N/A
5.2.2.7	Audio signals		N/A
5.3	Protection against electrical energy sources		N/A
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	Only ES1 circuit can be accessed	N/A
5.3.1 a)	Accessible ES1/ES2 derived from ES2/ES3 circuits		N/A
5.3.1 b)	Skilled persons not unintentional contact ES3 bare conductors		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
	Accessibility to outdoor equipment bare parts		N/A
5.3.2.2	Contact requirements		N/A
	Test with test probe from Annex V		-
5.3.2.2 a)	Air gap – electric strength test potential (V)..... :		N/A
5.3.2.2 b)	Air gap – distance (mm) :		N/A
5.3.2.3	Compliance		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	Insulation materials and requirements		P
5.4.1.2	Properties of insulating material		P
5.4.1.3	Material is non-hygroscopic	No such material used.	N/A
5.4.1.4	Maximum operating temperature for insulating materials :	See table 5.4.1.4	P
5.4.1.5	Pollution degrees..... :	2	P
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling test		N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage..... :		N/A
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat test :		N/A
5.4.1.10.3	Ball pressure test..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.2	Clearances		N/A
5.4.2.1	General requirements		N/A
	Clearances in circuits connected to AC Mains, Alternative method		N/A
5.4.2.2	Procedure 1 for determining clearance		N/A
	Temporary overvoltage		—
5.4.2.3	Procedure 2 for determining clearance		N/A
5.4.2.3.2.2	a.c. mains transient voltage		—
5.4.2.3.2.3	d.c. mains transient voltage		—
5.4.2.3.2.4	External circuit transient voltage		—
5.4.2.3.2.5	Transient voltage determined by measurement		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test		N/A
5.4.2.5	Multiplication factors for clearances and test voltages		N/A
5.4.2.6	Clearance measurement		N/A
5.4.3	Creepage distances		N/A
5.4.3.1	General		N/A
5.4.3.3	Material group		—
5.4.3.4	Creepage distances measurement		N/A
5.4.4	Solid insulation		N/A
5.4.4.1	General requirements		N/A
5.4.4.2	Minimum distance through insulation		N/A
5.4.4.3	Insulating compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Insulating compound forming cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs)		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
	Number of layers (pcs)		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material		N/A
5.4.4.6.5	Mandrel test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz, E_P , K_R , d , V_{PW} (V)		N/A
	Alternative by electric strength test, tested voltage (V), K_R		N/A
5.4.5	Antenna terminal insulation		N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
5.4.5.3	Insulation resistance ($M\Omega$)		N/A
	Electric strength test		N/A
5.4.6	Insulation of internal wire as part of supplementary safeguard	Class III equipment	N/A
5.4.7	Tests for semiconductor components and for cemented joints	Class III equipment	N/A
5.4.8	Humidity conditioning	Class III equipment	N/A
	Relative humidity (%), temperature ($^{\circ}C$), duration (h)		—
5.4.9	Electric strength test	Class III equipment	N/A
5.4.9.1	Test procedure for type test of solid insulation		N/A
5.4.9.2	Test procedure for routine test		N/A
5.4.10	Safeguards against transient voltages from external circuits		N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test		N/A
5.4.10.2.3	Steady-state test		N/A
5.4.10.3	Verification for insulation breakdown for impulse test		N/A
5.4.11	Separation between external circuits and earth		N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	SPDs bridge separation between external circuit and earth		N/A
	Rated operating voltage U_{op} (V)		—
	Nominal voltage U_{peak} (V)		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Max increase due to variation ΔU_{sp}		—
	Max increase due to ageing ΔU_{sa}		—
5.4.11.3	Test method and compliance		N/A
5.4.12	Insulating liquid		N/A
5.4.12.1	General requirements		N/A
5.4.12.2	Electric strength of an insulating liquid		N/A
5.4.12.3	Compatibility of an insulating liquid		N/A
5.4.12.4	Container for insulating liquid		N/A
5.5	Components as safeguards		N/A
5.5.1	General	Class III equipment	N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector		N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers		N/A
5.5.5	Relays		N/A
5.5.6	Resistors		N/A
5.5.7	SPDs		N/A
5.5.8	Insulation between the mains and an external circuit consisting of a coaxial cable		N/A
5.5.9	Safeguards for socket-outlets in outdoor equipment		N/A
	RCD rated residual operating current (mA)		—
5.6	Protective conductor	Class III equipment	N/A
5.6.2	Requirement for protective conductors		N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm ²)		—
	Protective earthing conductor serving as a reinforced safeguard		N/A
	Protective earthing conductor serving as a double safeguard		N/A
5.6.4	Requirements for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Protective bonding conductor size (mm ²).		—
5.6.4.2	Protective current rating (A)		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Terminal size for connecting protective earthing conductors (mm)		N/A
	Terminal size for connecting protective bonding conductors (mm).....		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective bonding system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method		N/A
5.6.6.3	Resistance (Ω) or voltage drop		N/A
5.6.7	Reliable connection of a protective earthing conductor		N/A
5.6.8	Functional earthing		N/A
	Conductor size (mm ²)		N/A
	Class II with functional earthing marking		N/A
	Appliance inlet cl & cr (mm)		N/A
5.7	Prospective touch voltage, touch current and protective conductor current		N/A
5.7.2	Measuring devices and networks		N/A
5.7.2.1	Measurement of touch current	Only ES1 circuits.	N/A
5.7.2.2	Measurement of voltage		N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A
5.7.4	Unearthed accessible parts		N/A
5.7.5	Earthed accessible conductive parts		N/A
5.7.6	Requirements when touch current exceeds ES2 limits		N/A
	Protective conductor current (mA)		N/A
	Instructional Safeguard		N/A
5.7.7	Prospective touch voltage and touch current associated with external circuits		N/A
5.7.7.1	Touch current from coaxial cables		N/A
5.7.7.2	Prospective touch voltage and touch current associated with paired conductor cables		N/A
5.7.8	Summation of touch currents from external circuits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	a) Equipment connected to earthed external circuits, current (mA)		N/A
	b) Equipment connected to unearthed external circuits, current (mA)		N/A
5.8	Backfeed safeguard in battery backed up supplies		N/A
	Mains terminal ES		N/A
	Air gap (mm)		N/A

6	ELECTRICALLY- CAUSED FIRE		P
6.2	Classification of PS and PIS		P
6.2.2	Power source circuit classifications	(See appended table 6.2.2)	P
6.2.3	Classification of potential ignition sources		P
6.2.3.1	Arcing PIS		N/A
6.2.3.2	Resistive PIS	(See appended table 6.2.3.2)	N/A
6.3	Safeguards against fire under normal operating and abnormal operating conditions		P
6.3.1	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials	(See appended table B.1.5 and B.3)	P
	Combustible materials outside fire enclosure		N/A
6.4	Safeguards against fire under single fault conditions		P
6.4.1	Safeguard method		P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		N/A
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	Supplementary safeguards		N/A
6.4.3.2	Single Fault Conditions		N/A
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits		P
6.4.5	Control of fire spread in PS2 circuits		N/A
6.4.5.2	Supplementary safeguards		N/A
6.4.6	Control of fire spread in PS3 circuits		P
6.4.7	Separation of combustible materials from a PIS		N/A
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers		P

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Clause	Requirement + Test	Result - Remark	Verdict

6.4.8.2	Fire enclosure and fire barrier material properties		P
6.4.8.2.1	Requirements for a fire barrier	No such barrier used.	N/A
6.4.8.2.2	Requirements for a fire enclosure	HB fire enclosure used	P
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier		N/A
6.4.8.3.1	Fire enclosure and fire barrier openings	No openings on the fire enclosure.	N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top openings and properties		N/A
	Openings dimensions (mm)		N/A
6.4.8.3.4	Bottom openings and properties		N/A
	Openings dimensions (mm)		N/A
	Flammability tests for the bottom of a fire enclosure		N/A
	Instructional Safeguard		N/A
6.4.8.3.5	Side openings and properties		N/A
	Openings dimensions (mm)		N/A
6.4.8.3.6	Integrity of a fire enclosure, condition met: a), b) or c)		N/A
6.4.8.4	Separation of a PIS from a fire enclosure and a fire barrier distance (mm) or flammability rating	HB fire enclosure used	P
6.4.9	Flammability of insulating liquid		N/A
6.5	Internal and external wiring		N/A
6.5.1	General requirements		N/A
6.5.2	Requirements for interconnection to building wiring		N/A
6.5.3	Internal wiring size (mm ²) for socket-outlets		N/A
6.6	Safeguards against fire due to the connection to additional equipment		P

7	INJURY CAUSED BY HAZARDOUS SUBSTANCES		P
7.2	Reduction of exposure to hazardous substances		P
7.3	Ozone exposure		N/A
7.4	Use of personal safeguards or personal protective equipment (PPE)		N/A
	Personal safeguards and instructions		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010)		—
7.6	Batteries and their protection circuits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

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8	MECHANICALLY-CAUSED INJURY		P
8.2	Mechanical energy source classifications		P
8.3	Safeguards against mechanical energy sources		N/A
8.4	Safeguards against parts with sharp edges and corners		N/A
8.4.1	Safeguards	MS1 classification	N/A
	Instructional Safeguard		N/A
8.4.2	Sharp edges or corners		N/A
8.5	Safeguards against moving parts		N/A
8.5.1	Fingers, jewellery, clothing, hair, etc., contact with MS2 or MS3 parts		N/A
	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
	Moving MS3 parts only accessible to skilled person		N/A
8.5.2	Instructional safeguard		N/A
8.5.4	Special categories of equipment containing moving parts		N/A
8.5.4.1	General		N/A
8.5.4.2	Equipment containing work cells with MS3 parts		N/A
8.5.4.2.1	Protection of persons in the work cell		N/A
8.5.4.2.2	Access protection override		N/A
8.5.4.2.2.1	Override system		N/A
8.5.4.2.2.2	Visual indicator		N/A
8.5.4.2.3	Emergency stop system		N/A
	Maximum stopping distance from the point of activation (m)		N/A
	Space between end point and nearest fixed mechanical part (mm)		N/A
8.5.4.2.4	Endurance requirements		N/A
	Mechanical system subjected to 100 000 cycles of operation		N/A
	- Mechanical function check and visual inspection		N/A
	- Cable assembly		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.5.4.3	Equipment having electromechanical device for destruction of media		N/A
8.5.4.3.1	Equipment safeguards		N/A
8.5.4.3.2	Instructional safeguards against moving parts.....:		N/A
8.5.4.3.3	Disconnection from the supply		N/A
8.5.4.3.4	Cut type and test force (N).....:		N/A
8.5.4.3.5	Compliance		N/A
8.5.5	High pressure lamps		N/A
	Explosion test		N/A
8.5.5.3	Glass particles dimensions (mm)		N/A
8.6	Stability of equipment		N/A
8.6.1	General	MS1	N/A
	Instructional safeguard.....:	Not required	N/A
8.6.2	Static stability		N/A
8.6.2.2	Static stability test.....:		N/A
8.6.2.3	Downward force test		N/A
8.6.3	Relocation stability		N/A
	Wheels diameter (mm).....:		—
	Tilt test		N/A
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test		N/A
8.7	Equipment mounted to wall, ceiling or other structure		N/A
8.7.1	Mount means type.....:		N/A
8.7.2	Test methods		N/A
	Test 1, additional downwards force (N).....:		N/A
	Test 2, number of attachment points and test force (N)		N/A
	Test 3 Nominal diameter (mm) and applied torque (Nm)		N/A
8.8	Handles strength		N/A
8.8.1	General		N/A
8.8.2	Handle strength test		N/A
	Number of handles.....:		—
	Force applied (N).....:		—

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Clause	Requirement + Test		Verdict
8.9	Wheels or casters attachment requirements		N/A
8.9.2	Pull test		N/A
8.10	Carts, stands and similar carriers		N/A
8.10.1	General		N/A
8.10.2	Marking and instructions		N/A
8.10.3	Cart, stand or carrier loading test		N/A
	Loading force applied (N).....		N/A
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Force applied (N).....		—
8.10.6	Thermoplastic temperature stability		N/A
8.11	Mounting means for slide-rail mounted equipment (SRME)		N/A
8.11.1	General		N/A
8.11.2	Requirements for slide rails		N/A
	Instructional Safeguard		N/A
8.11.3	Mechanical strength test		N/A
8.11.3.1	Downward force test, force (N) applied		N/A
8.11.3.2	Lateral push force test		N/A
8.11.3.3	Integrity of slide rail end stops		N/A
8.11.4	Compliance		N/A
8.12	Telescoping or rod antennas		N/A
	Button/ball diameter (mm).....		—

9	THERMAL BURN INJURY		P
9.2	Thermal energy source classifications		P
9.3	Touch temperature limits		P
9.3.1	Touch temperatures of accessible parts :	(See appended table 5.4.1.4, 9.3, B.1.5, B.2.6)	P
9.3.2	Test method and compliance		P
9.4	Safeguards against thermal energy sources		N/A
9.5	Requirements for safeguards		N/A
9.5.1	Equipment safeguard		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.5.2	Instructional safeguard :		N/A
9.6	Requirements for wireless power transmitters		N/A
9.6.1	General		N/A
9.6.2	Specification of the foreign objects		N/A
9.6.3	Test method and compliance :		N/A

10	RADIATION		P
10.2	Radiation energy source classification		P
10.2.1	General classification	RS1	P
	Lasers		—
	Lamps and lamp systems		—
	Image projectors		—
	X-Ray		—
	Personal music player		—
10.3	Safeguards against laser radiation		N/A
	The standard(s) equipment containing laser(s) comply		N/A
10.4	Safeguards against optical radiation from lamps and lamp systems (including LED types)		N/A
10.4.1	General requirements		N/A
	Instructional safeguard provided for accessible radiation level needs to exceed		N/A
	Risk group marking and location		N/A
	Information for safe operation and installation		N/A
10.4.2	Requirements for enclosures		N/A
	UV radiation exposure		N/A
10.4.3	Instructional safeguard		N/A
10.5	Safeguards against X-radiation		N/A
10.5.1	Requirements		N/A
	Instructional safeguard for skilled persons		—
10.5.3	Maximum radiation (pA/kg)		—
10.6	Safeguards against acoustic energy sources		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output $L_{Aeq,T}$, dB(A)		N/A
	Unweighted RMS output voltage (mV)		N/A
	Digital output signal (dBFS)		N/A
10.6.3	Requirements for dose-based systems		N/A
10.6.3.1	General requirements		N/A
10.6.3.2	Dose-based warning and automatic decrease		N/A
10.6.3.3	Exposure-based warning and requirements		N/A
	30 s integrated exposure level (MEL30)		N/A
	Warning for MEL ≥ 100 dB(A).....		N/A
10.6.4	Measurement methods		N/A
10.6.5	Protection of persons		N/A
	Instructional safeguards		N/A
10.6.6	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.6.1	Corded listening devices with analogue input		N/A
	Listening device input voltage (mV).....		N/A
10.6.6.2	Corded listening devices with digital input		N/A
	Max. acoustic output $L_{Aeq,T}$, dB(A)		N/A
10.6.6.3	Cordless listening devices		N/A
	Max. acoustic output $L_{Aeq,T}$, dB(A)		N/A

B	NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS		P
B.1	General		P
B.1.5	Temperature measurement conditions	(See appended table B.1.5)	P
B.2	Normal operating conditions		P
B.2.1	General requirements	(See Test Item Particulars and appended test tables)	P
	Audio Amplifiers and equipment with audio amplifiers		N/A
B.2.3	Supply voltage and tolerances		N/A
B.2.5	Input test	(See appended table B.2.5)	P
B.3	Simulated abnormal operating conditions		P

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Clause	Requirement + Test	Result - Remark	Verdict
B.3.1	General		N/A
B.3.2	Covering of ventilation openings		N/A
	Instructional safeguard		N/A
B.3.3	DC mains polarity test		N/A
B.3.4	Setting of voltage selector		N/A
B.3.5	Maximum load at output terminals		N/A
B.3.6	Reverse battery polarity		N/A
B.3.7	Audio amplifier abnormal operating conditions		N/A
B.3.8	Safeguards functional during and after abnormal operating conditions.....		N/A
B.4	Simulated single fault conditions		P
B.4.1	General		P
B.4.2	Temperature controlling device		N/A
B.4.3	Blocked motor test		N/A
B.4.4	Functional insulation		P
B.4.4.1	Short circuit of clearances for functional insulation		P
B.4.4.2	Short circuit of creepage distances for functional insulation		P
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A
B.4.5	Short-circuit and interruption of electrodes in tubes and semiconductors		P
B.4.6	Short circuit or disconnection of passive components		P
B.4.7	Continuous operation of components		N/A
B.4.8	Compliance during and after single fault conditions.....	(See appended table B.4)	P
B.4.9	Battery charging and discharging under single fault conditions		N/A
C	UV RADIATION		N/A
C.1	Protection of materials in equipment from UV radiation		N/A
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
C.2	UV light conditioning test		N/A
C.2.1	Test apparatus.....		N/A
C.2.2	Mounting of test samples		N/A

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Clause	Requirement + Test		Verdict
C.2.3	Carbon-arc light-exposure test		N/A
C.2.4	Xenon-arc light-exposure test		N/A
D	TEST GENERATORS		N/A
D.1	Impulse test generators		N/A
D.2	Antenna interface test generator		N/A
D.3	Electronic pulse generator		N/A
E	TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS		N/A
E.1	Electrical energy source classification for audio signals		N/A
	Maximum non-clipped output power (W)	—	—
	Rated load impedance (Ω)	—	—
	Open-circuit output voltage (V)	—	—
	Instructional safeguard	—	—
E.2	Audio amplifier normal operating conditions		N/A
	Audio signal source type	N/A	N/A
	Audio output power (W)	N/A	N/A
	Audio output voltage (V)	N/A	N/A
	Rated load impedance (Ω)	N/A	N/A
	Requirements for temperature measurement	N/A	N/A
E.3	Audio amplifier abnormal operating conditions		N/A
F	EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS		P
F.1	General		P
	Language	English	—
F.2	Letter symbols and graphical symbols		P
F.2.1	Letter symbols according to IEC60027-1		P
F.2.2	Graphic symbols according to IEC, ISO or manufacturer specific		P
F.3	Equipment markings		P
F.3.1	Equipment marking locations		P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification	(See copy of marking plate)	P
F.3.2.2	Model identification	(See copy of marking plate)	P
F.3.3	Equipment rating markings		P
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains		P

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Clause	Requirement + Test	Result - Remark	Verdict
F.3.3.3	Nature of the supply voltage		P
F.3.3.4	Rated voltage.....		P
F.3.3.5	Rated frequency		N/A
F.3.3.6	Rated current or rated power.....		P
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device		N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings		N/A
F.3.5.2	Switch position identification marking		N/A
F.3.5.3	Replacement fuse identification and rating markings		N/A
	Instructional safeguards for neutral fuse		N/A
F.3.5.4	Replacement battery identification marking		N/A
F.3.5.5	Neutral conductor terminal		N/A
F.3.5.6	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal		N/A
F.3.6.1.2	Protective bonding conductor terminals		N/A
F.3.6.2	Equipment class marking		N/A
F.3.6.3	Functional earthing terminal marking		N/A
F.3.7	Equipment IP rating marking		N/A
F.3.8	External power supply output marking		P
F.3.9	Durability, legibility and permanence of marking		P
F.3.10	Test for permanence of markings	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15 sec. And then again for 15 sec, with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking on the label did not fade. There was no curling and lifting of the label edge. After each test, the marking remained legible.	P

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Clause	Requirement + Test		Verdict
F.4	Instructions		P
	a) Information prior to installation and initial use		P
	b) Equipment for use in locations where children not likely to be present		N/A
	c) Instructions for installation and interconnection		P
	d) Equipment intended for use only in restricted access area		N/A
	e) Equipment intended to be fastened in place		N/A
	f) Instructions for audio equipment terminals		N/A
	g) Protective earthing used as a safeguard		N/A
	h) Protective conductor current exceeding ES2 limits		N/A
	i) Graphic symbols used on equipment		P
	j) Permanently connected equipment not provided with all-pole mains switch		N/A
	k) Replaceable components or modules providing safeguard function		N/A
	l) Equipment containing insulating liquid		N/A
	m) Installation instructions for outdoor equipment		N/A
F.5	Instructional safeguards		P
G	COMPONENTS		P
G.1	Switches		N/A
G.1.1	General	No such component	N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.1.3	Test method and compliance		N/A
G.2	Relays		N/A
G.2.1	Requirements	No such component	N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supplying power to other equipment		N/A
G.2.4	Test method and compliance		N/A
G.3	Protective devices		N/A
G.3.1	Thermal cut-offs	No such component	N/A
	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Test method and compliance		N/A
G.3.2	Thermal links		N/A
G.3.2.1	a) Thermal links tested separately according to IEC 60691 with specifics		N/A
	b) Thermal links tested as part of the equipment		N/A
G.3.2.2	Test method and compliance		N/A
G.3.3	PTC thermistors	No such component	N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.4		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions		N/A
G.4	Connectors		N/A
G.4.1	Spacings	No such component	N/A
G.4.2	Mains connector configuration		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
G.5	Wound components		N/A
G.5.1	Wire insulation in wound components	No such component	N/A
G.5.1.2	Protection against mechanical stress		N/A
G.5.2	Endurance test		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Test time (days per cycle)		—
	Test temperature (°C)		—
G.5.2.3	Wound components supplied from the mains		N/A
G.5.2.4	No insulation breakdown		N/A
G.5.3	Transformers	No such component	N/A
G.5.3.1	Compliance method		N/A
	Position		N/A
	Method of protection		N/A
G.5.3.2	Insulation		N/A
	Protection from displacement of windings		—

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Clause	Requirement + Test	Result - Remark	Verdict
G.5.3.3	Transformer overload tests		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding temperatures		N/A
G.5.3.3.3	Winding temperatures – alternative test method		N/A
G.5.3.4	Transformers using FIW		N/A
G.5.3.4.1	General		N/A
	FIW wire nominal diameter		—
G.5.3.4.2	Transformers with basic insulation only		N/A
G.5.3.4.3	Transformers with double insulation or reinforced insulation.....		N/A
G.5.3.4.4	Transformers with FIW wound on metal or ferrite core		N/A
G.5.3.4.5	Thermal cycling test and compliance		N/A
G.5.3.4.6	Partial discharge test		N/A
G.5.3.4.7	Routine test		N/A
G.5.4	Motors		N/A
G.5.4.1	General requirements		N/A
G.5.4.2	Motor overload test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4.2	Locked-rotor overload test		N/A
	Test duration (days)		—
G.5.4.5	Running overload test for DC motors		N/A
G.5.4.5.2	Tested in the unit		N/A
G.5.4.5.3	Alternative method		N/A
G.5.4.6	Locked-rotor overload test for DC motors		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature		N/A
G.5.4.6.3	Alternative method		N/A
G.5.4.7	Motors with capacitors		N/A
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage		—
G.6	Wire Insulation		N/A
G.6.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.6.2	Enamelled winding wire insulation		N/A
G.7	Mains supply cords		N/A
G.7.1	General requirements	No such mains supply cords	N/A
	Type		—
G.7.2	Cross sectional area (mm ² or AWG)		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N)		N/A
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)		N/A
G.7.3.2.4	Strain relief and cord anchorage material		N/A
G.7.4	Cord Entry		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Test method and compliance		N/A
	Overall diameter or minor overall dimension, <i>D</i> (mm)		—
	Radius of curvature after test (mm)		—
G.7.6	Supply wiring space		N/A
G.7.6.1	General requirements		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Requirements		N/A
G.7.6.2.2	Test with 8 mm strand		N/A
G.8	Varistors		N/A
G.8.1	General requirements	No such component	N/A
G.8.2	Safeguards against fire		N/A
G.8.2.1	General		N/A
G.8.2.2	Varistor overload test		N/A
G.8.2.3	Temporary overvoltage test		N/A
G.9	Integrated circuit (IC) current limiters		N/A
G.9.1	Requirements	No such component	N/A
	IC limiter output current (max. 5A)		—

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Clause	Requirement + Test		Verdict
	Manufacturers' defined drift		—
G.9.2	Test Program		N/A
G.9.3	Compliance		N/A
G.10	Resistors		N/A
G.10.1	General	No such component	N/A
G.10.2	Conditioning		N/A
G.10.3	Resistor test		N/A
G.10.4	Voltage surge test		N/A
G.10.5	Impulse test		N/A
G.10.6	Overload test		N/A
G.11	Capacitors and RC units		N/A
G.11.1	General requirements	No such component	N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	Optocouplers		N/A
	Optocouplers comply with IEC 60747-5-5 with specifics	No such component	N/A
	Type test voltage $V_{ini,a}$		—
	Routine test voltage, $V_{ini,b}$		—
G.13	Printed boards		P
G.13.1	General requirements		P
G.13.2	Uncoated printed boards		P
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation		N/A
	Number of insulation layers (pcs)		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2	Test method and compliance		N/A
G.14	Coating on components terminals		N/A
G.14.1	Requirements		N/A
G.15	Pressurized liquid filled components		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.15.1	Requirements		N/A
G.15.2	Test methods and compliance		N/A
G.15.2.1	Hydrostatic pressure test		N/A
G.15.2.2	Creep resistance test		N/A
G.15.2.3	Tubing and fittings compatibility test		N/A
G.15.2.4	Vibration test		N/A
G.15.2.5	Thermal cycling test		N/A
G.15.2.6	Force test		N/A
G.15.3	Compliance		N/A
G.16	IC including capacitor discharge function (ICX)		N/A
G.16.1	Condition for fault tested is not required		N/A
	ICX with associated circuitry tested in equipment		N/A
	ICX tested separately		N/A
G.16.2	Tests		N/A
	Smallest capacitance and smallest resistance specified by ICX manufacturer for impulse test		—
	Mains voltage that impulses to be superimposed on		—
	Largest capacitance and smallest resistance for ICX tested by itself for 10000 cycles test.....		—
G.16.3	Capacitor discharge test.....		N/A
H	CRITERIA FOR TELEPHONE RINGING SIGNALS		N/A
H.1	General		N/A
H.2	Method A		N/A
H.3	Method B		N/A
H.3.1	Ringing signal		N/A
H.3.1.1	Frequency (Hz)		—
H.3.1.2	Voltage (V)		—
H.3.1.3	Cadence; time (s) and voltage (V)		—
H.3.1.4	Single fault current (mA):.....		—
H.3.2	Tripping device and monitoring voltage		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V).....		N/A

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Clause	Requirement + Test		Verdict
J	INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION		N/A
J.1	General		N/A
	Winding wire insulation		—
	Solid round winding wire, diameter (mm)		N/A
	Solid square and rectangular (flatwise bending) winding wire, cross-sectional area (mm ²)		N/A
J.2/J.3	Tests and Manufacturing	(See separate test report)	—
K	SAFETY INTERLOCKS		N/A
K.1	General requirements		N/A
	Instructional safeguard		N/A
K.2	Components of safety interlock safeguard mechanism		N/A
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
K.5.1	Under single fault condition		N/A
K.6	Mechanically operated safety interlocks		N/A
K.6.1	Endurance requirement		N/A
K.6.2	Test method and compliance		N/A
K.7	Interlock circuit isolation		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements		N/A
	In circuit connected to mains, separation distance for contact gaps (mm)		N/A
	In circuit isolated from mains, separation distance for contact gaps (mm)		N/A
	Electric strength test before and after the test of K.7.2		N/A
K.7.2	Overload test, Current (A)		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test		N/A
L	DISCONNECT DEVICES		N/A
L.1	General requirements	Not connected to Mains supply	N/A
L.2	Permanently connected equipment		N/A
L.3	Parts that remain energized		N/A
L.4	Single-phase equipment		N/A
L.5	Three-phase equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
L.6	Switches as disconnect devices		N/A
L.7	Plugs as disconnect devices		N/A
L.8	Multiple power sources		N/A
	Instructional safeguard		N/A
M	EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS		N/A
M.1	General requirements		N/A
M.2	Safety of batteries and their cells		N/A
M.2.1	Batteries and their cells comply with relevant IEC standards		N/A
M.3	Protection circuits for batteries provided within the equipment		N/A
M.3.1	Requirements		N/A
M.3.2	Test method		N/A
	Overcharging of a rechargeable battery		N/A
	Excessive discharging		N/A
	Unintentional charging of a non-rechargeable battery		N/A
	Reverse charging of a rechargeable battery		N/A
M.3.3	Compliance		N/A
M.4	Additional safeguards for equipment containing a portable secondary lithium battery		N/A
M.4.1	General		N/A
M.4.2	Charging safeguards		N/A
M.4.2.1	Requirements		N/A
M.4.2.2	Compliance		N/A
M.4.3	Fire enclosure		N/A
M.4.4	Drop test of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation and procedure for the drop test		N/A
M.4.4.3	Drop, Voltage on reference and dropped batteries (V); voltage difference during 24 h period (%):		N/A
M.4.4.4	Check of the charge/discharge function		N/A
M.4.4.5	Charge / discharge cycle test		N/A
M.4.4.6	Compliance		N/A
M.5	Risk of burn due to short-circuit during carrying		N/A
M.5.1	Requirement		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.5.2	Test method and compliance		N/A
M.6	Safeguards against short-circuits		N/A
M.6.1	External and internal faults		N/A
M.6.2	Compliance		N/A
M.7	Risk of explosion from lead acid and NiCd batteries		N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
	Calculated hydrogen generation rate		N/A
M.7.2	Test method and compliance		N/A
	Minimum air flow rate, Q (m ³ /h)		N/A
M.7.3	Ventilation tests		N/A
M.7.3.1	General		N/A
M.7.3.2	Ventilation test – alternative 1		N/A
	Hydrogen gas concentration (%)		N/A
M.7.3.3	Ventilation test – alternative 2		N/A
	Obtained hydrogen generation rate		N/A
M.7.3.4	Ventilation test – alternative 3		N/A
	Hydrogen gas concentration (%)		N/A
M.7.4	Marking		N/A
M.8	Protection against internal ignition from external spark sources of batteries with aqueous electrolyte		N/A
M.8.1	General		N/A
M.8.2	Test method		N/A
M.8.2.1	General		N/A
M.8.2.2	Estimation of hypothetical volume V_z (m ³ /s)		—
M.8.2.3	Correction factors		—
M.8.2.4	Calculation of distance d (mm)		—
M.9	Preventing electrolyte spillage		N/A
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	Instructions to prevent reasonably foreseeable misuse		N/A
	Instructional safeguard		N/A
N	ELECTROCHEMICAL POTENTIALS		N/A
	Material(s) used		—

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Clause	Requirement + Test	Result - Remark	Verdict
O	MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES		N/A
	Value of X (mm)..... :		—
P	SAFEGUARDS AGAINST CONDUCTIVE OBJECTS		N/A
P.1	General		N/A
P.2	Safeguards against entry or consequences of entry of a foreign object		N/A
P.2.1	General		N/A
P.2.2	Safeguards against entry of a foreign object		N/A
	Location and Dimensions (mm) :		—
P.2.3	Safeguards against the consequences of entry of a foreign object		N/A
P.2.3.1	Safeguard requirements		N/A
	The ES3 and PS3 keep-out volume in Figure P.3 not applicable to transportable equipment		N/A
	Transportable equipment with metalized plastic parts..... :		N/A
P.2.3.2	Consequence of entry test..... :		N/A
P.3	Safeguards against spillage of internal liquids		N/A
P.3.1	General		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Compliance		N/A
P.4	Metallized coatings and adhesives securing parts		N/A
P.4.1	General		N/A
P.4.2	Tests		N/A
	Conditioning, T _c (°C) :		—
	Duration (weeks)..... :		—
Q	CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING		N/A
Q.1	Limited power sources		N/A
Q.1.1	Requirements		N/A
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Regulating network limited output		N/A
	d) Overcurrent protective device limited output		N/A
	e) IC current limiter complying with G.9		N/A
Q.1.2	Test method and compliance :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Current rating of overcurrent protective device (A)		N/A
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A)		N/A
	Current limiting method		—
R	LIMITED SHORT CIRCUIT TEST		N/A
R.1	General		N/A
R.2	Test setup		N/A
	Overcurrent protective device for test.....		—
R.3	Test method		N/A
	Cord/cable used for test		—
R.4	Compliance		N/A
S	TESTS FOR RESISTANCE TO HEAT AND FIRE		N/A
S.1	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W		N/A
	Samples, material		—
	Wall thickness (mm)		—
	Conditioning (°C)		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	Flammability test for fire enclosure and fire barrier integrity		N/A
	Samples, material		—
	Wall thickness (mm)		—
	Conditioning (°C)		—
S.3	Flammability test for the bottom of a fire enclosure		N/A
S.3.1	Mounting of samples		N/A
S.3.2	Test method and compliance		N/A
	Mounting of samples		—
	Wall thickness (mm)		—
S.4	Flammability classification of materials		N/A

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Clause	Requirement + Test		Verdict
S.5	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power exceeding 4 000 W		N/A
	Samples, material		—
	Wall thickness (mm)		—
	Conditioning (°C)		—
T	MECHANICAL STRENGTH TESTS		P
T.1	General		P
T.2	Steady force test, 10 N		N/A
T.3	Steady force test, 30 N		N/A
T.4	Steady force test, 100 N	(See appended table T.4)	P
T.5	Steady force test, 250 N		N/A
T.6	Enclosure impact test		N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test	(See appended table T.7)	P
T.8	Stress relief test.....	(See appended table T.8)	P
T.9	Glass Impact Test		N/A
T.10	Glass fragmentation test		N/A
	Number of particles counted		N/A
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm)		N/A
U	MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION		N/A
U.1	General		N/A
	Instructional safeguard :		N/A
U.2	Test method and compliance for non-intrinsically protected CRTs		N/A
U.3	Protective screen		N/A
V	DETERMINATION OF ACCESSIBLE PARTS		P
V.1	Accessible parts of equipment		P
V.1.1	General		P
V.1.2	Surfaces and openings tested with jointed test probes		N/A
V.1.3	Openings tested with straight unjointed test probes		N/A
V.1.4	Plugs, jacks, connectors tested with blunt probe		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
V.1.5	Slot openings tested with wedge probe		N/A
V.1.6	Terminals tested with rigid test wire		N/A
V.2	Accessible part criterion		P
X	ALTERNATIVE METHOD FOR DETERMINING CLEARANCES FOR INSULATION IN CIRCUITS CONNECTED TO AN AC MAINS NOT EXCEEDING 420 V PEAK (300 V RMS)		N/A
	Clearance		N/A
Y	CONSTRUCTION REQUIREMENTS FOR OUTDOOR ENCLOSURES		N/A
Y.1	General		N/A
Y.2	Resistance to UV radiation		N/A
Y.3	Resistance to corrosion		N/A
Y.3	Resistance to corrosion		N/A
Y.3.1	Metallic parts of outdoor enclosures are resistant to effects of water-borne contaminants by		N/A
Y.3.2	Test apparatus		N/A
Y.3.3	Water – saturated sulphur dioxide atmosphere		N/A
Y.3.4	Test procedure		N/A
Y.3.5	Compliance		N/A
Y.4	Gaskets		N/A
Y.4.1	General		N/A
Y.4.2	Gasket tests		N/A
Y.4.3	Tensile strength and elongation tests		N/A
	Alternative test methods		N/A
Y.4.4	Compression test		N/A
Y.4.5	Oil resistance		N/A
Y.4.6	Securing means		N/A
Y.5	Protection of equipment within an outdoor enclosure		N/A
Y.5.1	General		N/A
Y.5.2	Protection from moisture		N/A
	Relevant tests of IEC 60529 or Y.5.3		N/A
Y.5.3	Water spray test		N/A
Y.5.4	Protection from plants and vermin		N/A
Y.5.5	Protection from excessive dust		N/A
Y.5.5.1	General		N/A
Y.5.5.2	IP5X equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Y.5.5.3	IP6X equipment		N/A
Y.6	Mechanical strength of enclosures		N/A
Y.6.1	General		N/A
Y.6.2	Impact test		N/A



IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.1.2	TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾	
PCB	Shenzhen keshijia Electronics Co., Ltd	KSJ-A01	Min thk:1.0mm Flame class:130°C V-0	UL 796	UL E464917	
Alternative	Shenzhen keshijia Electronics Co., Ltd	KSJ-A02(ASP1)	Min thk:1.0mm Flame class:130°C V-0	UL 796	UL	
Plastic enclosure	SILVER AGE ENGINEERING PLASTICS (DONGGUAN) CO LTD	ABS313	Min thk:1.6mm Flame class:HB	UL 94	UL E225348	
Alternative	Alternative	Alternative	Min thk:1.6mm Flame class:HB	UL 94	UL	
Adapter	SHENZHEN KEYU POWERSUPPLY TECHNOLOGY CO., LTD	KA12C-0502000EU	Input: 100-240V~50/60Hz 0.35A Max Output:5V --- 2A	IEC 62368-1:2018	Test report no.: 652101902704	

5.2	TABLE: Classification of electrical energy sources						P
Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters				ES Class
			U (V)	I (mA)	Type ¹⁾	Additional Info ²⁾	
5VDC	All circuits	Normal	5VDC	--	SS	--	ES1
		Abnormal	--	--	--	--	
		Single fault: SC/OC	--	--	--	--	
Supplementary information:							
1) Type: Steady state (SS), Capacitance (CP), Single pulse (SP), Repetitive pulses (RP), etc.							
2) Additional Info: Frequency, Pulse duration, Pulse off time, Capacitance value, etc.							

5.4.1.8	TABLE: Working voltage measurement				N/A
Location	RMS voltage (V)	Peak voltage (V)	Frequency (Hz)	Comments	
--	--	--	--	--	
--	--	--	--	--	

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics			N/A
Method :			—	
Object/ Part No./Material	Manufacturer/trademark	Thickness (mm)	T softening (°C)	
--	--	--	--	
--	--	--	--	

Supplementary information:

5.4.1.10.3	TABLE: Ball pressure test of thermoplastics				N/A
Allowed impression diameter (mm)..... :			≤ 2 mm	—	
Object/Part No./Material	Manufacturer/trademark	Thickness (mm)	Test temperature (°C)	Impression diameter (mm)	
--	--	--	--	--	
--	--	--	--	--	

Supplementary information:

5.4.2, 5.4.3	TABLE: Minimum Clearances/Creepage distance							N/A
Clearance (cl) and creepage distance (cr) at/of/between:	U _p (V)	U _{rms} (V)	Freq ¹⁾ (Hz)	Required cl (mm)	cl (mm)	E.S. ²⁾ (V)	Required cr (mm)	cr (mm)
--	--	--	--	--	--	--	--	--

Supplementary information:

1) Only for frequency above 30 kHz

2) Complete Electric Strength voltage (E.S. (V) when 5.4.2.4 applied)

5.4.4.2	TABLE: Minimum distance through insulation				N/A
Distance through insulation (DTI) at/of	Peak voltage (V)	Insulation	Required DTI (mm)	Measured DTI (mm)	
--	--	--	--	--	

Supplementary information:

5.4.4.9	TABLE: Solid insulation at frequencies >30 kHz						N/A
Insulation material	E _P	Frequency (kHz)	K _R	Thickness d (mm)	Insulation	V _{PW} (Vpk)	
--	--	--	--	--	--	--	

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

5.4.9	TABLE: Electric strength tests			N/A
Test voltage applied between:		Voltage shape (Surge, Impulse, AC, DC, etc.)	Test voltage (V)	Breakdown Yes / No
--		--	--	--
--		--	--	--
Supplementary information:				

5.5.2.2	TABLE: Stored discharge on capacitors					N/A
Location	Supply voltage (V)	Operating and fault condition ¹⁾	Switch position	Measured voltage (Vpk)	ES Class	
--	--	--	--	--	--	--
Supplementary information:						
X-capacitors installed for testing:						
☐ bleeding resistor rating:						
☐ ICX:						
1) Normal operating condition (e.g., normal operation, or open fuse), SC= short circuit, OC= open circuit						

5.6.6	TABLE: Resistance of protective conductors and terminations					N/A
Location	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)		
--	--	--	--	--	--	--
Supplementary information:						

5.7.4	TABLE: Unearthed accessible parts					N/A
Location	Operating and fault conditions	Supply Voltage (V)	Parameters			ES class
			Voltage (V _{rms} or V _{pk})	Current (A _{rms} or A _{pk})	Freq. (Hz)	
--	--	--	--	--	--	--
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit						

5.7.5	TABLE: Earthed accessible conductive part					N/A
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Clause	Requirement + Test	Result - Remark	Verdict

Supply voltage (V)			—
Phase(s)	☐ Single Phase; ☐ Three Phase: ☐ Delta ☐ Wye		
Power Distribution System	☐ TN ☐ TT ☐ IT		
Location	Fault Condition No in IEC 60990 clause 6.2.2	Touch current (mA)	Comment
--	--	--	--
Supplementary Information:			

5.8	TABLE: Backfeed safeguard in battery backed up supplies					N/A
Location	Supply voltage (V)	Operating and fault condition	Time (s)	Open-circuit voltage (V)	Touch current (A)	ES Class
--	--	--	--	--	--	--
Supplementary information: Abbreviation: SC= short circuit, OC= open circuit						

6.2.2	TABLE: Power source circuit classifications					P
Location	Operating and fault condition	Voltage (V)	Current (A)	Max. Power ¹⁾ (W)	Time (S)	PS class
Input	Normal	--	--	--	--	PS3 (declare)
Usb-C output	Normal	3.508	2	7.012	3	PS1
	Abnormal	--	--	--	--	
	SC D1	--	--	--	--	
Supplementary information: Abbreviation: SC= short circuit; OC= open circuit 1) Measured after 3 s for PS1 and measured after 5 s for PS2 and PS3.						

6.2.3.1	TABLE: Determination of Arcing PIS				N/A
Location		Open circuit voltage after 3 s (Vpk)	Measured r.m.s current (A)	Calculated value	Arcing PIS? Yes / No
--		--	--	--	--
Supplementary information:					

6.2.3.2	TABLE: Determination of resistive PIS			N/A
Location	Operating and fault condition	Dissipate power (W)	Arcing PIS? Yes / No	
--	--	--	--	

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

Abbreviation: SC= short circuit; OC= open circuit

8.5.5	TABLE: High pressure lamp				N/A
Lamp manufacturer	Lamp type	Explosion method	Longest axis of glass particle (mm)	Particle found beyond 1 m Yes / No	
--	--	--	--	--	
Supplementary information:					

9.6	TABLE: Temperature measurements for wireless power transmitters							N/A
Supply voltage (V)		--						—
Max. transmit power of transmitter (W)		--						—
Foreign objects	w/o receiver and direct contact		with receiver and direct contact		with receiver and at distance of 2 mm		with receiver and at distance of 5 mm	
	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
Supplementary information:								

5.4.1.4, 6.3.2, 9.0, B.2.6	TABLE: Temperature measurements			P
	Supply voltage (V)	5V		—
	Ambient T _{min} (°C)	--		—
	Ambient T _{max} (°C)	--		—
	T _{ma} (°C)	40.0		—
Maximum measured temperature T of part/at:		T (°C)		Allowed T _{max} (°C)
Pcb near type-c port		49.4		130
Pcb near U3		48.3		130
Pcb near U4		49.2		130
Pcb near U6		48.0		130
Pcb near U9		50.3		130
Pcb near U10		49.1		130

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Clause	Requirement + Test	Result - Remark	Verdict

Pcb near U18	49.6	130					
CE1 Body	48.4	110					
Plastic inside	46.0	--					
Ambient	40.0	--					
Below points are tested based on ambient at 25°C							
Plastic outside	28.8	77					
Button	28.8	77					
Ambient	25.0	--					
Supplementary information: * Temperature limit for TS1 of accessible enclosure according to Table 38.							
Note 1: The apparatus was submitted and evaluated for maximum manufacturer's recommended ambient (T _{ma}) of 40°C.							
Note 2: The temperatures were measured under the worse case normal mode defined in clause B.2.1.							
Note 3: Temperature limits are calculated as follows:							
Winding components providing safety isolation:							
Class B → T _{max} = 120 – 10 = 110 °C							
Temperature T of winding:	t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class
--	--	--	--	--	--	--	--

B.2.5		TABLE: Input test							P
U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status	
5V	--	0.15	2	0.75	--	--	--	Normal Condition	
Supplementary information:									

B.3, B.4		TABLE: Abnormal operating and fault condition tests					P
Ambient temperature T _{amb} (°C)..... :					25°C unless otherwise specified		—
Power source for EUT: Manufacturer, model/type, output rating . :					--		—
Component No.	Condition	Supply voltage (V)	Test time	Fuse no.	Fuse current (A)	Observation	
Usb-C Output	Overload	5VDC	3Hour 21mins	--	--	Ambient temperature: 25°C Plastic inside near type-c output port: 29.8 °C PCB near U6: 33.4°C PCB near U9: 37.6°C PCB near CE1: 34.5°C	

IEC 62368-1						
Clause	Requirement + Test			Result - Remark		Verdict
						Unit normal work, no hazards.
U1 pin 1-8	SC	5VDC	10 Min	--	--	Unit shut down, recoverable after fault removed, no hazards.
U9 pin 1-6	SC	5VDC	10 Min	--	--	Unit shut down, recoverable after fault removed, no hazards.
Q4 pin 1-3	SC	5VDC	10 Min	--	--	Unit shut down, recoverable after fault removed, no hazards.
Supplementary information: S-C=Short circuit						

M.3	TABLE: Protection circuits for batteries provided within the equipment						N/A
Is it possible to install the battery in a reverse polarity position?.....:					No possible		—
Equipment Specification	Charging						
	Voltage (V)				Current (A)		
Manufacturer/type	Battery specification						
	Non-rechargeable batteries			Rechargeable batteries			
	Discharging current (A)	Unintentional charging current (A)	Charging		Discharging current (A)	Reverse charging current (A)	
			Voltage (V)	Current (A)			
Note: The tests of M.3.2 are applicable only when above appropriate data is not available.							
Specified battery temperature (°C)							--
Component No.	Fault condition	Charge/discharge mode	Test time	Temp. (°C)	Current (A)	Voltage (V)	Observation
Supplementary information:							
Abbreviation: SC= short circuit; OC= open circuit NL= no chemical leakage; NS= no spillage of liquid; NE= no explosion; NF= no emission of flame or expulsion of molten metal.							

M.4.2	TABLE: Charging safeguards for equipment containing a secondary lithium battery	N/A
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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Maximum specified charging voltage (V)		—
Maximum specified charging current (A)		—
Highest specified charging temperature (°C)		----
Lowest specified charging temperature (°C)		---

Battery manufacturer/type	Operating and fault condition	Measurement			Observation
		Charging voltage (V)	Charging current (A)	Temp. (°C)	

Supplementary information:
Abbreviation: SC= short circuit; OC= open circuit; MSCV= maximum specified charging voltage; MSCC= maximum specified charging current; HSCT= highest specified charging temperature; LSCT= lowest specified charging temperature

Q.1	TABLE: Circuits intended for interconnection with building wiring (LPS)						P
Output Circuit	Condition	U _{oc} (V)	Time (s)	I _{sc} (A)		S (VA)	
				Meas.	Limit	Meas.	Limit
USB-C	Normal	4.801	60	2.0	8	7.012	100
Supplementary Information:							

T.2, T.3, T.4, T.5	TABLE: Steady force test						P
Part/Location	Material	Thickness (mm)	Probe	Force (N)	Test Duration (s)	Observation	
External enclosure	*)	*)	--	100	5	No class 3 energy sources become accessible to an ordinary person or to an instructed person	
Supplementary information: *) See table 4.1.2							

T.6, T.9	TABLE: Impact test				N/A
Location/part	Material	Thickness (mm)	Height (mm)	Observation	
--	--	--	--	--	
Supplementary information:					

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

T.7	TABLE: Drop test			P
Location/part	Material	Thickness (mm)	Height (mm)	Observation
Complete equipment	*)	*)	1000	No class 3 energy sources become accessible to an ordinary person or to an instructed person
Supplementary information: *) See table 4.1.2				

T.8	TABLE: Stress relief test					P
Location/Part	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation	
Complete equipment	*)	*)	70	7	No class 3 energy sources become accessible to an ordinary person or to an instructed person	
Supplementary information: *) See table 4.1.2						

X	TABLE: Alternative method for determining minimum clearances distances			N/A
Clearance distanced between:	Peak of working voltage (V)	Required cl (mm)	Measured cl (mm)	
--	--	--	--	
Supplementary information:				

IEC62368_1C- ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT IEC 62368-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES (AUDIO/VIDEO, INFORMATION AND COMMUNICATION TECHNOLOGY EQUIPMENT - PART 1: SAFETY REQUIREMENTS)			
Differences according to: EN IEC 62368-1:2020+A11:2020			
Attachment Form No.: EU_GD_IEC62368_1C			
Attachment Originator: UL(Demko)			
Master Attachment: 2022-02-04			
Copyright © 2020 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			
	CENELEC COMMON MODIFICATIONS (EN)		Verdict
	Clause numbers in the cells that are shaded light grey are clause references in EN IEC 62368-1:2020+A11:2020. All other clause numbers in that column, except for those in the paragraph below, refers to IEC 62368-1:2018. Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2018 are prefixed "Z".		P
	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords		N/A
1	Modification to Clause 3 .		P
3.3.19	Sound exposure Replace 3.3.19 of IEC 62368-1 with the following definitions:		P
3.3.19.1	momentary exposure level, MEL metric for estimating 1 s sound exposure level from the HD 483-1 S2 test signal applied to both channels, based on EN 50332-1:2013, 4.2. Note 1 to entry: MEL is measured as A-weighted levels in dB. Note 2 to entry: See B.3 of EN 50332-3:2017 for additional information.		N/A

IEC62368_1C- ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
3.3.19.3	sound exposure, E A-weighted sound pressure (p) squared and integrated over a stated period of time, T Note 1 to entry: The SI unit is Pa² s. $E = \int_0^T p(t)^2 dt$		N/A
3.3.19.4	sound exposure level, SEL logarithmic measure of sound exposure relative to a reference value, E_0, typically the 1 kHz threshold of hearing in humans. Note 1 to entry: SEL is measured as A-weighted levels in dB. $SEL = 10 \lg \left(\frac{E}{E_0} \right) \text{ dB}$ Note 2 to entry: See B.4 of EN 50332-3:2017 for additional information.		N/A
3.3.19.5	digital signal level relative to full scale, dBFS levels reported in dBFS are always r.m.s. Full scale level, 0 dBFS, is the level of a dc-free 997-Hz sine wave whose undithered positive peak value is positive digital full scale, leaving the code corresponding to negative digital full scale unused Note 1 to entry: It is invalid to use dBFS for non-r.m.s. levels. Because the definition of full scale is based on a sine wave, the level of signals with a crest factor lower than that of a sine wave may exceed 0 dBFS. In particular, square wave signals may reach +3,01 dBFS.		N/A
2	Modification to Clause 10		N/A
10.6	Safeguards against acoustic energy sources Replace 10.6 of IEC 62368-1 with the following:		N/A
10.6.1.1	Introduction Safeguard requirements for protection against long-term exposure to excessive sound pressure levels from personal music players closely coupled to the ear are specified below. Requirements for earphones and headphones intended for use with personal music players are also covered. A personal music player is a portable equipment intended for use by an ordinary person, that: – is designed to allow the user to listen to audio or		N/A

IEC62368_1C- ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	audiovisual content / material; and – uses a listening device, such as headphones or earphones that can be worn in or on or around the ears; and – has a player that can be body worn (of a size suitable to be carried in a clothing pocket) and is intended for the user to walk around with while in continuous use (for example, on a street, in a subway, at an airport, etc.). EXAMPLES Portable CD players, MP3 audio players, mobile phones with MP3 type features, PDAs or similar equipment. Personal music players shall comply with the requirements of either 10.6.2 or 10.6.3. NOTE 1 Protection against acoustic energy sources from telecom applications is referenced to ITU-T P.360. NOTE 2 It is the intention of the Committee to allow the alternative methods for now, but to only use the dose measurement method as given in 10.6.5 in future. Therefore, manufacturers are encouraged to implement 10.6.5 as soon as possible. Listening devices sold separately shall comply with the requirements of 10.6.6. These requirements are valid for music or video mode only. The requirements do not apply to: – professional equipment; NOTE 3 Professional equipment is equipment sold through special sales channels. All products sold through normal electronics stores are considered not to be professional equipment. – hearing aid equipment and other devices for assistive listening; – the following type of analogue personal music players: • long distance radio receiver (for example, a multiband radio receiver or world band radio receiver, an AM radio receiver), and • cassette player/recorder; NOTE 4 This exemption has been allowed because this technology is falling out of use and it is expected that within a few years it will no longer exist. This exemption will not be extended to other technologies. – a player while connected to an external amplifier that does not allow the user to walk around while in use. For equipment that is clearly designed or intended primarily for use by children, the limits of the relevant toy standards may apply.		

IEC62368_1C- ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	The relevant requirements are given in EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		
10.6.1.2	Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body mounted devices, attention is drawn to EN 50360 and EN 50566.		N/A
10.6.2	Classification of devices without the capacity to estimate sound dose		N/A
10.6.2.1	General This standard is transitioning from short-term based (30 s) requirements to long-term based (40 hour) requirements. These clauses remain in effect only for devices that do not comply with sound dose estimation as stipulated in EN 50332-3. For classifying the acoustic output $L_{Aeq,T}$, measurements are based on the A-weighted equivalent sound pressure level over a 30 s period. For music where the average sound pressure (long term $L_{Aeq,T}$) measured over the duration of the song is lower than the average produced by the programme simulation noise, measurements may be done over the duration of the complete song. In this case, T becomes the duration of the song. NOTE Classical music, acoustic music and broadcast typically has an average sound pressure (long term $L_{Aeq,T}$) which is much lower than the average programme simulation noise. Therefore, if the player is capable to analyse the content and compare it with the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song does not exceed the required limit. For example, if the player is set with the programme simulation noise to 85 dB, but the average music level of the song is only 65 dB, there is no need to give a warning or ask an acknowledgement as long as the average sound level of the song is not above the basic limit of 85 dB.		N/A
10.6.2.2	RS1 limits (to be superseded, see 10.6.3.2) RS1 is a class 1 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary		N/A

IEC62368_1C- ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 85 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 27 mV (analogue interface) or -25 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1. – The RS1 limits will be updated for all devices as per 10.6.3.2.		
10.6.2.3	RS2 limits (to be superseded, see 10.6.3.3) RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or when the combination of player and listening device is known by other means such as setting or automatic 130 detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 100 dB(A) when playing the fixed “programme simulation noise” as described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 150 mV (analogue interface) or -10 dBFS (digital interface) when playing the fixed “programme simulation noise” as described in EN 50332-1.		N/A
10.6.2.4	RS3 limits RS3 is a class 3 acoustic energy source that exceeds RS2 limits.		N/A
10.6.3	Classification of devices (new)		N/A
10.6.3.1	General Previous limits (10.6.2) created abundant false negative and false positive PMP sound level warnings. New limits, compliant with The Commission Decision of 23 June 2009, are given below.		N/A
10.6.3.2	RS1 limits (new) RS1 is a class 1 acoustic energy source that does not exceed the following:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 80 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1.		
10.6.3.3	RS2 limits (new) RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the weekly sound exposure level, as described in EN 50332-3, shall be ≤ 80 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output level, integrated over one week, as described in EN50332-3, shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1.		N/A
10.6.4	Requirements for maximum sound exposure		N/A
10.6.4.1	Measurement methods All volume controls shall be turned to maximum during tests. Measurements shall be made in accordance with EN 50332-1 or EN 50332-2 as applicable.		N/A
10.6.4.2	Protection of persons Except as given below, protection requirements for parts accessible to ordinary persons, instructed persons and skilled persons are given in 4.3. NOTE 1 Volume control is not considered a safeguard.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Between RS2 and an ordinary person, the basic safeguard may be replaced by an instructional safeguard in accordance with Clause F.5, except that the instructional safeguard shall be placed on the equipment, or on the packaging, or in the instruction manual. Alternatively, the instructional safeguard may be given through the equipment display during use. The elements of the instructional safeguard shall be as follows:  – element 1a: the symbol , IEC 60417-6044 (2011-01) – element 2: “High sound pressure” or equivalent wording – element 3: “Hearing damage risk” or equivalent wording – element 4: “Do not listen at high volume levels for long periods.” or equivalent wording An equipment safeguard shall prevent exposure of an ordinary person to an RS2 source without intentional physical action from the ordinary person and shall automatically return to an output level not exceeding what is specified for an RS1 source when the power is switched off. The equipment shall provide a means to actively inform the user of the increased sound level when the equipment is operated with an output exceeding RS1. Any means used shall be acknowledged by the user before activating a mode of operation which allows for an output exceeding RS1. The acknowledgement does not need to be repeated more than once every 20 h of cumulative listening time. NOTE 2 Examples of means include visual or audible signals. Action from the user is always needed. NOTE 3 The 20 h listening time is the accumulative listening time, independent of how often and how long the personal music player has been switched off. A skilled person shall not be unintentionally exposed to RS3.		
10.6.5	Requirements for dose-based systems		N/A
10.6.5.1	General requirements		N/A
	Personal music players shall give the warnings as provided below when tested according to EN		

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Clause	Requirement + Test	Result - Remark	Verdict
	50332-3, using the limits from this clause. The manufacturer may offer optional settings to allow the users to modify when and how they wish to receive the notifications and warnings to promote a better user experience without defeating the safeguards. This allows the users to be informed in a method that best meets their physical capabilities and device usage needs. If such optional settings are offered, an administrator (for example, parental restrictions, business/educational administrators, etc.) shall be able to lock any optional settings into a specific configuration. The personal music player shall be supplied with easy to understand explanation to the user of the dose management system, the risks involved, and how to use the system safely. The user shall be made aware that other sources may significantly contribute to their sound exposure, for example work, transportation, concerts, clubs, cinema, car races, etc.		
10.6.5.2	Dose-based warning and requirements When a dose of 100 % <i>CSD</i> is reached, and at least at every 100 % further increase of <i>CSD</i>, the device shall warn the user and require an acknowledgement. In case the user does not acknowledge, the output level shall automatically decrease to compliance with class RS1. The warning shall at least clearly indicate that listening above 100 % <i>CSD</i> leads to the risk of hearing damage or loss.		N/A
10.6.5.3	Exposure-based requirements With only dose-based requirements, cause and effect could be far separated in time, defying the purpose of educating users about safe listening practice. In addition to dose-based requirements, a PMP shall therefore also put a limit to the short-term sound level a user can listen at. The exposure-based limiter (EL) shall automatically reduce the sound level not to exceed 100 dB(A) or 150 mV integrated over the past 180 s, based on methodology defined in EN 50332-3. The EL settling time (time from starting level reduction to reaching target output) shall be 10 s or faster. Test of EL functionality is conducted according to EN 50332-3, using the limits from this clause. For		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	equipment provided as a package (player with its listening device), the level integrated over 180 s shall be 100 dB or lower. For equipment provided with a standardized connector, the unweighted level integrated over 180 s shall be no more than 150 mV for an analogue interface and no more than -10 dBFS for a digital interface. NOTE In case the source is known not to be music (or test signal), the EL may be disabled.		
10.6.6	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.6.1	Corded listening devices with analogue input With 94 dB L_{Aeq} acoustic pressure output of the listening device, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the input voltage of the listening device when playing the fixed "programme simulation noise" as described in EN 50332-1 shall be ≥ 75 mV. NOTE The values of 94 dB and 75 mV correspond with 85 dB and 27 mV or 100 dB and 150 mV.		N/A
10.6.6.2	Corded listening devices with digital input With any playing device playing the fixed "programme simulation noise" described in EN 50332-1, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.		N/A
10.6.6.3	Cordless listening devices In cordless mode, – with any playing and transmitting device playing the fixed programme simulation noise described in EN 50332-1; and – respecting the cordless transmission standards, where an air interface standard exists that specifies the equivalent acoustic level; and – with volume and sound settings in the receiving device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output for the above mentioned programme simulation noise, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB		N/A

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Clause	Requirement + Test				Result - Remark		Verdict
	with an input signal of -10 dBFS.						
10.6.6.4	Measurement method <i>Measurements shall be made in accordance with EN 50332-2 as applicable.</i>						N/A
3	Modification to the whole document						N/A
	Delete all the “country” notes in the reference document according to the following list:						N/A
	0.2.1	Note 1 and 2	1	Note 4 and 5	3.3.8.1	Note 2	
	3.3.8.3	Note 1	4.1.15	Note	4.7.3	Note 1 and 2	
	5.2.2.2	Note	5.4.2.3.2.2 Table 12	Note c	5.4.2.3.2.4	Note 1 and 3	
	5.4.2.3.2.4 Table 13	Note 2	5.4.2.5	Note 2	5.4.5.1	Note	
	5.4.10.2.1	Note	5.4.10.2.2	Note	5.4.10.2.3	Note	
	5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3 and 4	
	5.6.8	Note 2	5.7.6	Note	5.7.7.1	Note 1 and Note 2	
	8.5.4.2.3	Note	10.2.1 Table 39	Note 3 and 4 and 5	10.5.3	Note 2	
	10.6.4	Note 3	F.3.3.6	Note 3	Y.4.1	Note	
	Y.4.5	Note					
4	Modification to Clause 1						N/A
1	Add the following note: <i>NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.</i>						N/A
5	Modification to 4.Z1						N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.21	Add the following new subclause after 4.9: To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. mains, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for pluggable equipment type B or permanently connected equipment, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for pluggable equipment type A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		N/A
6	Modification to 5.4.2.3.2.4		N/A
5.4.2.3.2.4	Add the following to the end of this subclause: The requirement for interconnection with external circuit is in addition given in EN 50491-3:2009.		N/A
7	Modification to 10.2.1		N/A
10.2.1	Add the following to ^{c)} and ^{d)} in table 39: For additional requirements, see 10.5.1.		N/A
8	Modification to 10.5.1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.5.1	Add the following after the first paragraph: For RS 1 compliance is checked by measurement under the following conditions: In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or pre-sets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made. NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm², at any point 10 cm from the outer surface of the apparatus. Moreover, the measurement shall be made under fault conditions causing an increase of the high voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made. For RS1, the dose-rate shall not exceed 1 μSv/h taking account of the background level. NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		N/A
9	Modification to G.7.1		N/A
G.7.1	Add the following note: NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A
10	Modification to Bibliography		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Add the following notes for the standards indicated: IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1. IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		N/A
11	ADDITION OF ANNEXES		N/A
ZB	ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)		N/A
4.1.15	Denmark, Finland, Norway and Sweden To the end of the subclause the following is added: Class I pluggable equipment type A intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment shall be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In Denmark : "Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord." In Finland : "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In Norway : "Apparatet må tilkoples jordet stikkontakt" In Sweden : "Apparaten skall anslutas till jordat uttag"		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	United Kingdom To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex		N/A
5.2.2.2	Denmark After the 2nd paragraph add the following: A warning (marking safeguard) for high touch current is required if the touch current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.4.11.1 and Annex G	Finland and Sweden To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5 kV.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: - the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; - the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		
5.5.2.1	Norway After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
5.5.6	Finland, Norway and Sweden To the end of the subclause the following is added: Resistors used as basic safeguard or bridging basic insulation in class I pluggable equipment type A shall comply with G.10.1 and the test of G.10.2.		N/A
5.6.1	Denmark Add to the end of the subclause Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment. <i>Justification:</i> In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.4.2.1	Ireland and United Kingdom After the indent for pluggable equipment type A , the following is added: – the protective current rating is taken to be 13 A, this being the largest rating of fuse used in the mains plug.		N/A
5.6.4.2.1	France After the indent for pluggable equipment type A , the following is added: – in certain cases, the protective current rating of the circuit supplied from the mains is taken as 20 A instead of 16 A.		N/A
5.6.5.1	To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm ² to 1,5 mm ² in cross-sectional area.		N/A
5.6.8	Norway To the end of the subclause the following is added: Equipment connected with an earthed mains plug is classified as class I equipment . See the Norway marking requirement in 4.1.15. The symbol IEC 60417-6092, as specified in F.3.6.2, is accepted.		N/A
5.7.6	Denmark To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the protective conductor current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.7.6.2	Denmark To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .		N/A
5.7.7.1	Norway and Sweden To the end of the subclause the following is added: The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system.		N/A

IEC62368_1C- ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)” NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet.” Translation to Swedish: ”Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.		
8.5.4.2.3	United Kingdom Add the following after the 2nd dash bullet in 3rd paragraph: An emergency stop system complying with the requirements of IEC 60204-1 and ISO 13850 is required where there is a risk of personal injury.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
B.3.1 and B.4	Ireland and United Kingdom The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of direct plug-in equipment, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the direct plug-in equipment, until the requirements of Annexes B.3.1 and B.4 are met		N/A
G.4.2	Denmark To the end of the subclause the following is added: Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a polyphase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a <i>Justification:</i> Heavy Current Regulations, Section 6c		N/A

IEC62368_1C- ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
G.4.2	United Kingdom To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N/A
G.7.1	United Kingdom To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a 'standard plug' in accordance with the Plugs and Sockets etc. (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations. NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		N/A
G.7.1	Ireland To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, "13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard		N/A
G.7.2	Ireland and United Kingdom To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm² is allowed for equipment which is rated over 10 A and up to and including 13 A.		N/A
ZC	ANNEX ZC, NATIONAL DEVIATIONS (EN)		N/A

IEC62368_1C- ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
10.5.2	Germany The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization is required, or application of type approval (Bauartzulassung) and marking. <i>Justification:</i> German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. NOTE Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int+49-531-592-6320, Internet: http://www.ptb.de		N/A
ZD	IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS (EN)		N/A

Type of flexible cord	Code designations	
	IEC	CENELEC
PVC insulated cords		
Flat twin tinsel cord	60227 IEC 41	H03VH-Y
Light polyvinyl chloride sheathed flexible cord	60227 IEC 52	H03VV-F H03VVH2-F
Ordinary polyvinyl chloride sheathed flexible cord	60227 IEC 53	H05VV-F H05VVH2-F
Rubber insulated cords		
Braided cord	60245 IEC 51	H03RT-F
Ordinary tough rubber sheathed flexible cord	60245 IEC 53	H05RR-F
Ordinary polychloroprene sheathed flexible cord	60245 IEC 57	H05RN-F
Heavy polychloroprene sheathed flexible cord	60245 IEC 66	H07RN-F
Cords having high flexibility		
Rubber insulated and sheathed cord	60245 IEC 86	H03RR-H
Rubber insulated, crosslinked PVC sheathed cord	60245 IEC 87	H03RV4-H
Crosslinked PVC insulated and sheathed cord	60245 IEC 88	H03V4V4-H
Cords insulated and sheathed with halogen-free thermoplastic compounds		
Light halogen-free thermoplastic insulated and sheathed flexible cords		H03Z1Z1-F H03Z1Z1H2-F
Ordinary halogen-free thermoplastic insulated and sheathed flexible cords		H05Z1Z1-F H05Z1Z1H2-F

Attachment 1: Photos

Photo 1



Photo 2



Photo 3

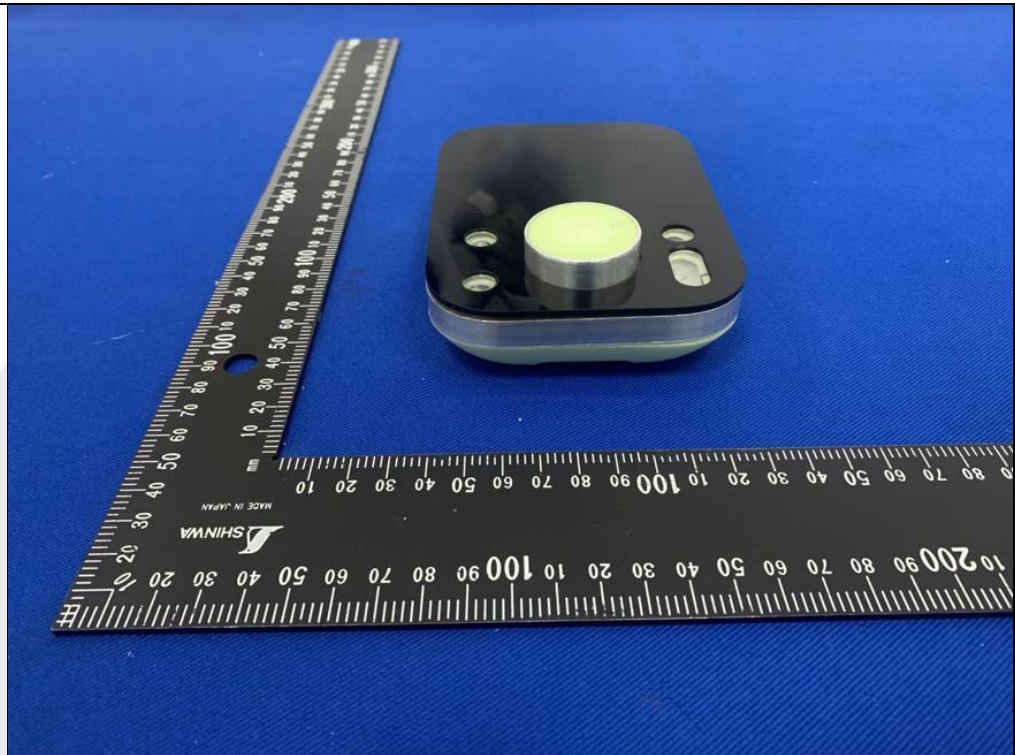


Photo 4



Photo 5



Photo 6

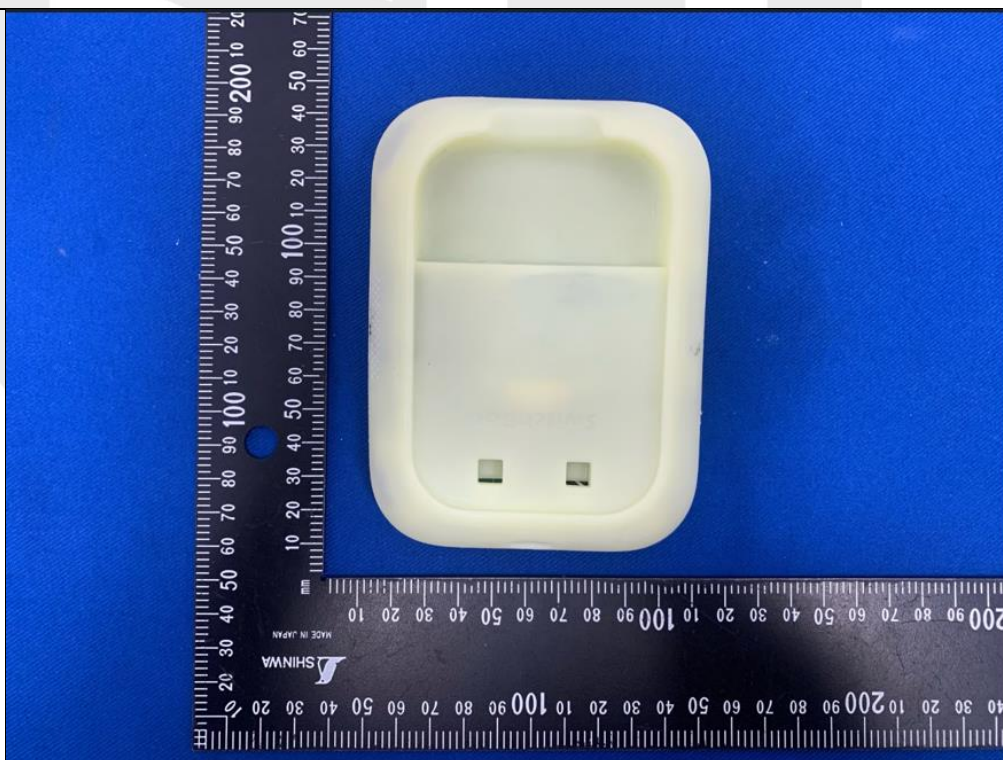


Photo 7



Photo 8

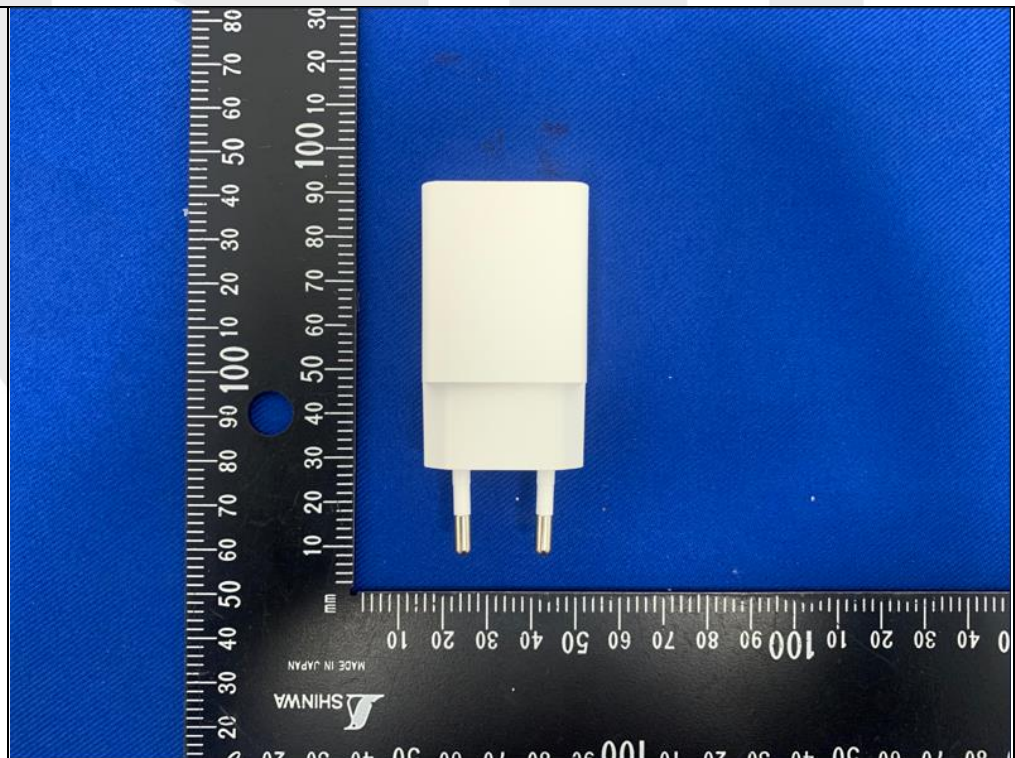


Photo 9

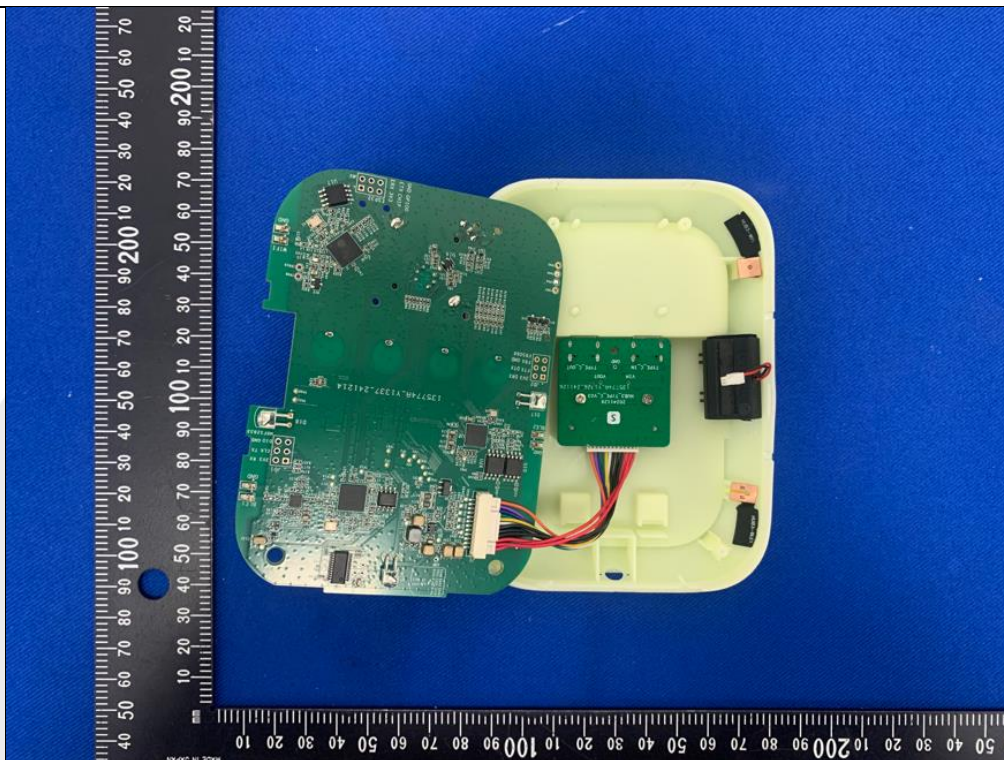


Photo 10

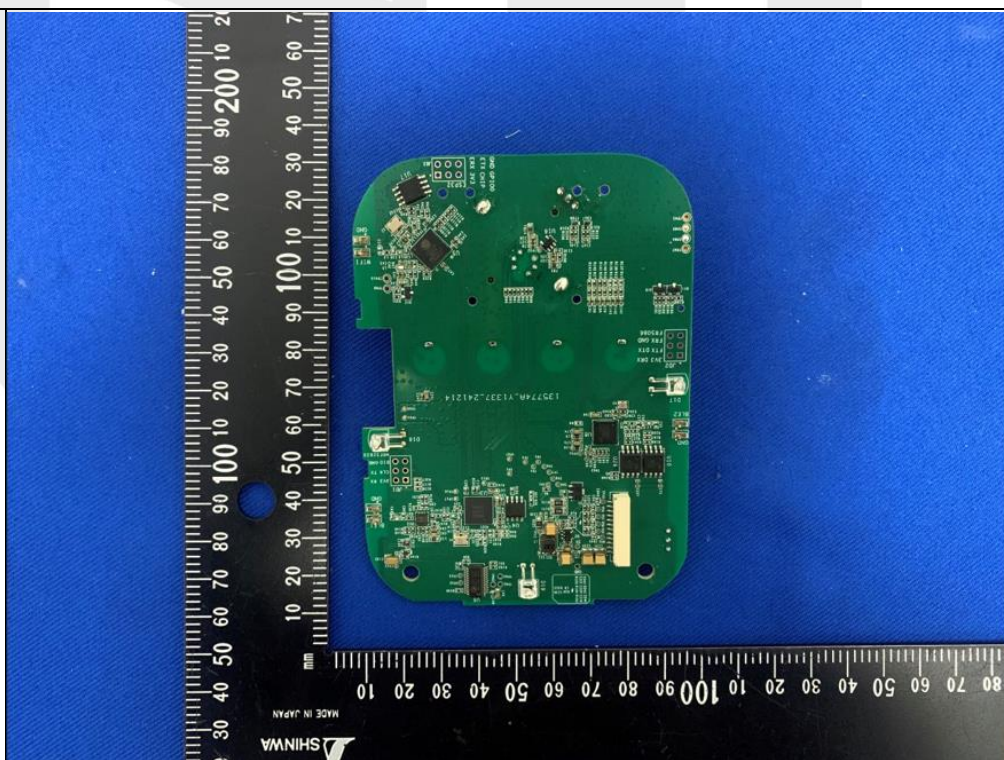


Photo 11

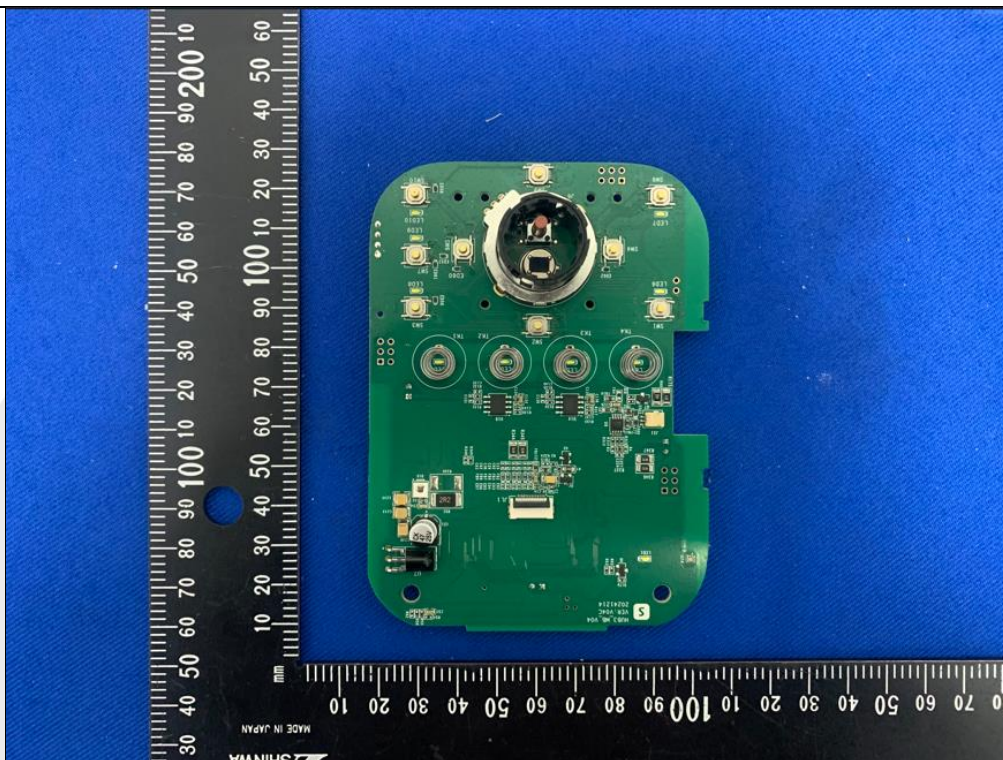
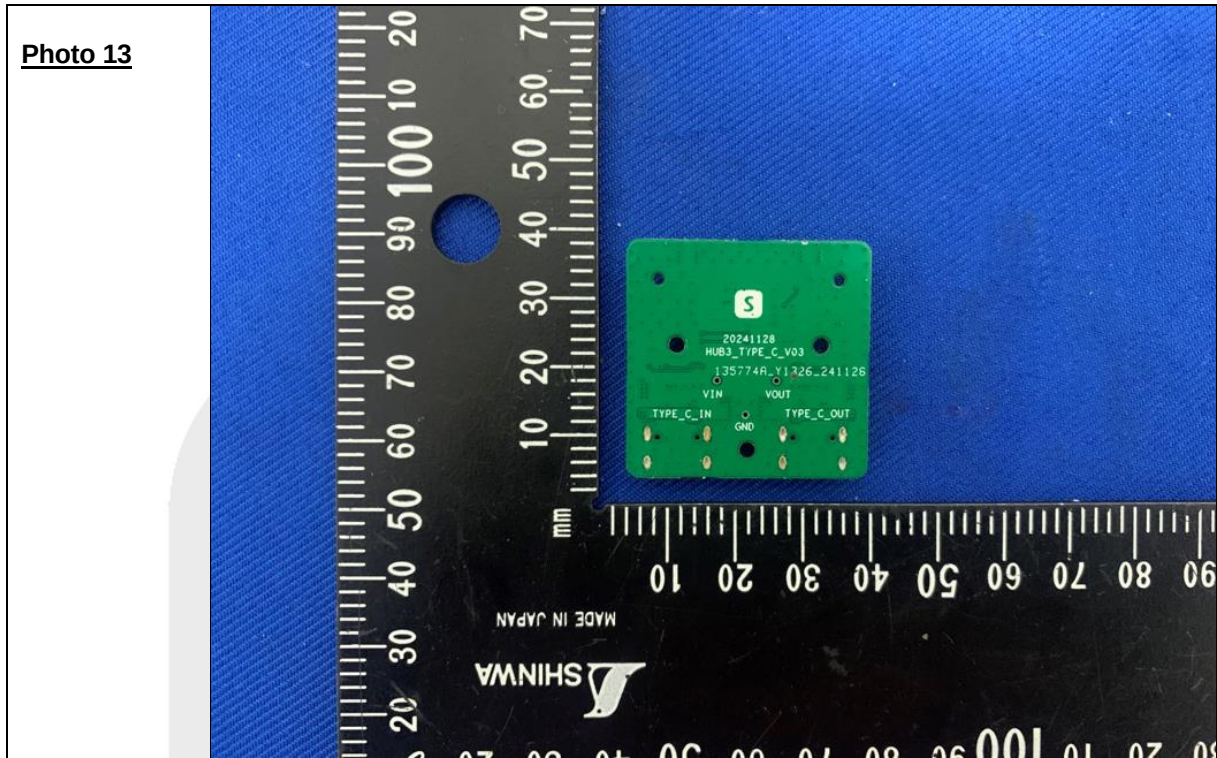


Photo 12



Photo 13



End of report