

FCC Part 15.247

TEST REPORT

For

Technology Solutions (UK) Ltd

Suite A, Loughborough Technology Centre, Epinal Way, Loughborough, Leicestershire,
LE11 3GE, United Kingdom

FCC ID: S6J3417

Report Type:
Original Report

Product Type:
RAIN RFID Module

Report Producer : Lynette Wen

Report Number : RXZ230928138RF02

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Revision History

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1. General Information

1.1. Product Description for Equipment under Test (EUT)

Applicant	Technology Solutions (UK) Ltd
	Suite A, Loughborough Technology Centre, Epinal Way, Loughborough, Leicestershire, LE11 3GE, United Kingdom
Manufacturer	Technology Solutions (UK) Ltd
	Suite A, Loughborough Technology Centre, Epinal Way, Loughborough, Leicestershire, LE11 3GE, United Kingdom
Brand(Trade) Name	TSL
Product (Equipment)	RAIN RFID Module
Main Model Name	3417
Series Model Name	N/A
Frequency Range	902.75 ~ 927.25 MHz
Peak Conducted Output Power	DSB-ASK Mode: 29.93 dBm PR-ASK Mode: 29.99 dBm
Modulation Technique	DSB-ASK PR-ASK
Power Operation (Voltage Range)	☐ AC 120V/60Hz ☐ Adapter: ☐ By AC Power Cord ☐ PoE
	☒ DC Type ☐ Battery ☒ Power Supply DC 5-15 V ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System
Received Date	2023/10/24
Date of Test	2023/11/09 ~ 2023/12/26

*All measurement and test data in this report was gathered from production sample serial number: RXZ230928138-1-2 (Assigned by BACL, New Taipei Laboratory).

1.2. Objective

This report is prepared on behalf of *Technology Solutions (UK) Ltd* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules.

1.3. Related Submittal(s)/Grant(s)

N/A.

1.4. Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
FCC 558074 D01 15.247 Meas Guidance v05r02.

1.5. Statement

Decision Rule: No, (The test results do not include MU judgment)

It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6. Measurement Uncertainty

Parameter		Uncertainty
AC Mains		±2.53 dB
RF output power, conducted		±3.74 dB
Power Spectral Density, conducted		±0.62 dB
Occupied Bandwidth		±0.09 %
Unwanted Emissions, conducted		±1.13 dB
Emissions, radiated	9 kHz~30MHz	±3.54 dB
	30 MHz~1GHz	±4.99 dB
	1 GHz~18 GHz	±7.56 dB
	18 GHz~40 GHz	±5.06 dB
Temperature		±0.79 °C
Humidity		±0.44 %

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty

1.7. Environmental Conditions

Test Site	Test Date	Temperature (°C)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2023/11/22	22.7	65	1010	Jing
Radiation Spurious Emissions	2023/11/09~2023/12/26	18.3~23.7	60~68	1010	Aaron
Conducted Spurious Emissions	2023/11/13	23.3	56	1010	Jing
20 dB Emission Bandwidth	2023/11/13	23.3	56	1010	Jing
Channel Separation Test	2023/11/13	23.3	56	1010	Jing
Time of Occupancy	2023/11/13	23.3	56	1010	Jing
Quantity of hopping channel	2023/11/13	23.3	56	1010	Jing
Maximum Output Power	2023/11/13	23.3	56	1010	Jing
100 kHz Bandwidth of Frequency Band Edge	2023/11/13~2023/12/8	23.3~25.3	56~57	1010	Jing

1.8. Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) to collect test data is located on

☒ 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

2. System Test Configuration

2.1. Description of Test Configuration

For RFID mode, 50 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.75	26	915.25
2	903.25	27	915.75
3	903.75	28	916.25
4	904.25	29	916.75
5	904.75	30	917.25
6	905.25	31	917.75
7	905.75	32	918.25
8	906.25	33	918.75
9	906.75	34	919.25
10	907.25	35	919.75
11	907.75	36	920.25
12	908.25	37	920.75
13	908.75	38	921.25
14	909.25	39	921.75
15	909.75	40	922.25
16	910.25	41	922.75
17	910.75	42	923.25
18	911.25	43	923.75
19	911.75	44	924.25
20	912.25	45	924.75
21	912.75	46	925.25
22	913.25	47	925.75
23	913.75	48	926.25
24	914.25	49	926.75
25	914.75	50	927.25

Were tested with channel 1, 26 and 50.

The system was configured for testing in engineering mode, which was provided by manufacturer. This device does not support MIMO mode.

2.2. Equipment Modifications

No modification was made to the EUT.

2.3. EUT Exercise Software

The test software was used “STORM RF Test USB App V1.3.0”

Mode	Frequency (MHz)	Power Level Setting			
		Antenna Port 1	Antenna Port 2	Antenna Port 3	Antenna Port 4
DSB-ASK	902.75	2800	2800	2800	2800
	915.25	2800	2800	2800	2800
	927.25	2800	2800	2800	2800
PR-ASK	902.75	2800	2800	2800	2800
	915.25	2800	2800	2800	2800
	927.25	2800	2800	2800	2800

This device does not support MIMO mode.

2.4. Test Mode

Full System (model: 3417) for all test item.

2.5. Support Equipment List and Details

Description	Manufacturer	Model Number
Adapter	TT Electronics	ATS065T-P150
Tablet	Amazon	R2SP8T
Developer Board	TSL	3117B V0.4
Termination	Woken	WTER-18S

2.6. External Cable List and Details

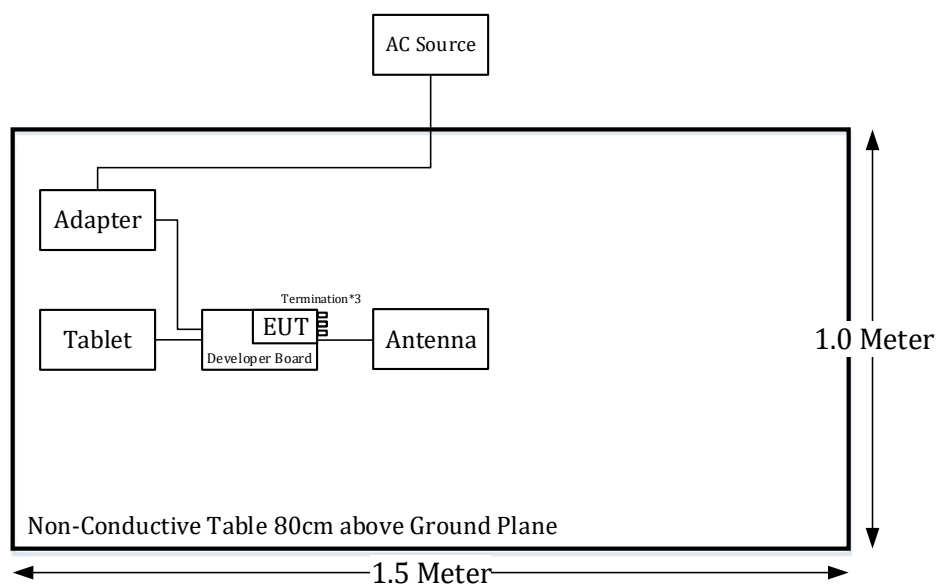
Description	Manufacturer	Model Number
Type-C Cable	PRO-SIGNAL	USB3C-901

2.7. Block Diagram of Test Setup

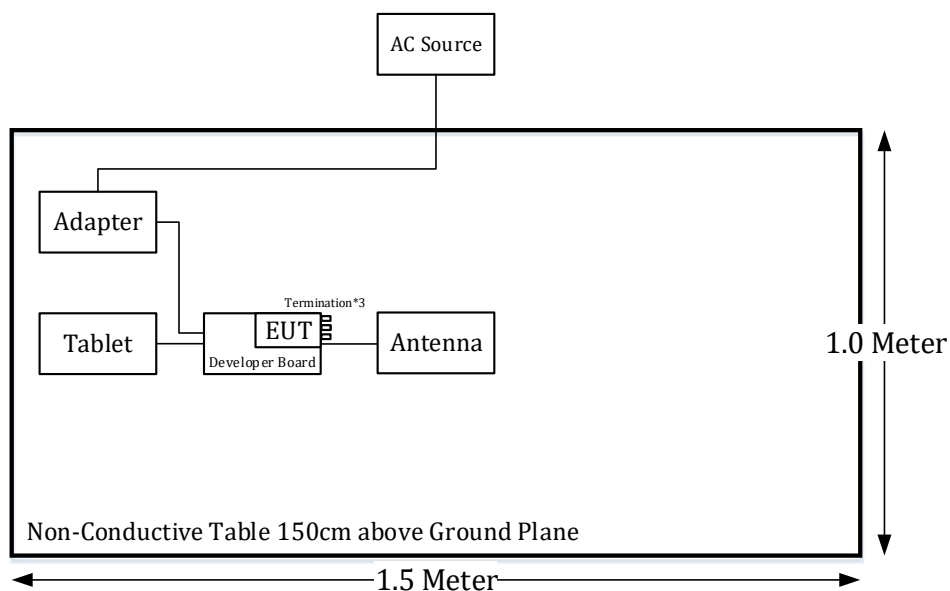
See test photographs attached in annex setup photos for the actual connections between EUT and support equipment.

Radiation:

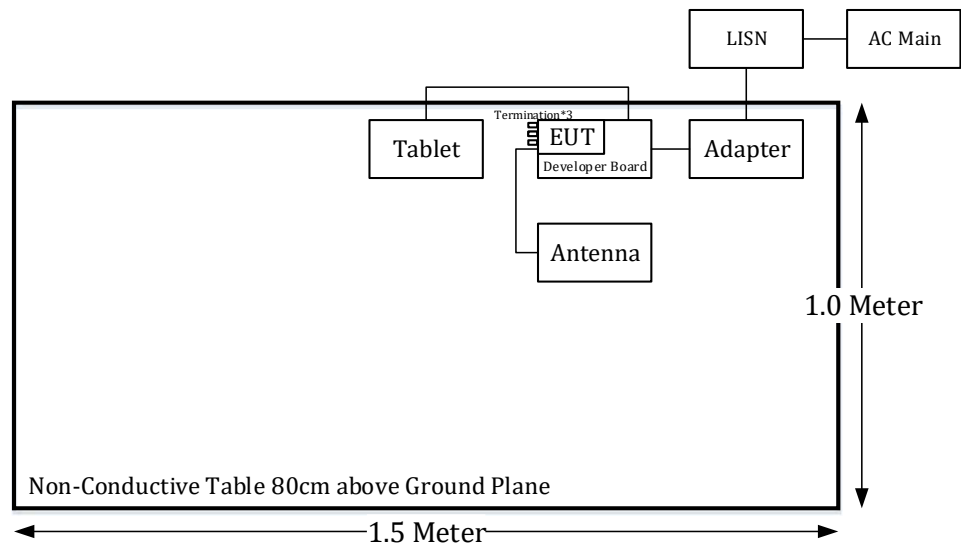
Below 1GHz:



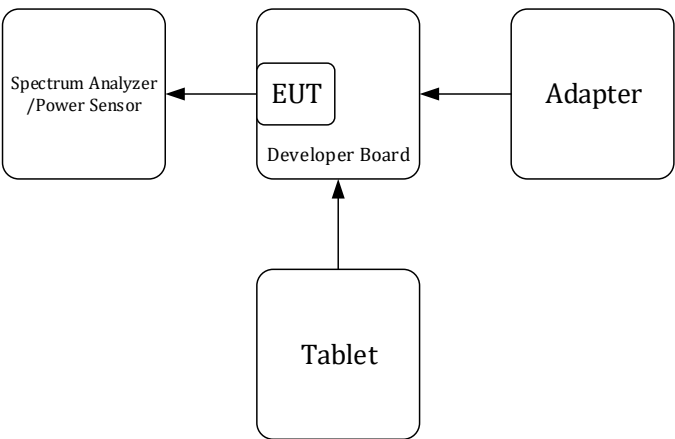
Above 1GHz:



Conduction:



Conducted:



3. Summary of Test Results

FCC Rules	Description of Test	Results
§15.247(i), §1.1307(b)(3)(i)	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(1)	20 dB Emission Bandwidth	Compliance
§15.247 (a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(i)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(i)	Quantity of hopping channel Test	Compliance
§15.247(b)(2)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance

4. Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101612	2023/2/2	2024/2/1
EMI Test Receiver	Rohde & Schwarz	ESW8	100947	2023/5/22	2024/5/20
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2023/5/18	2024/5/16
RF Cable	EMEC	EM-CB5D	1	2023/6/6	2024/6/4
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiation 3M Room (966-A)					
Active Loop Antenna	ETS-Lindgren	6502	35796	2023/3/27	2024/3/25
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/1554 2_01	2023/2/2	2024/2/1
Horn Antenna	EMCO	SAS-571	1020	2023/5/18	2024/5/16
Preamplifier	Sonoma	310N	130602	2023/6/16	2024/6/14
Preamplifier	Channel	ERA-100M-18G-01D1748	EC2300051	2023/04/01	2024/03/30
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2023/2/1	2024/1/31
EMI Test Receiver	Rohde & Schwarz	ESR3	102099	2023/6/16	2024/6/14
Band-reject filter (902-928MHz)	MICRO-TRONICS	BRC50722	G014	2023/10/2	2024/9/30
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2023/1/24	2024/1/23
Coaxial Cable	COMMATE	PEWC	8Dr	2022/12/24	2023/12/23
				2023/12/23	2024/12/22
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2023/1/24	2024/1/23
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2022/12/24	2023/12/23
				2023/12/23	2024/12/22
Cable	EMC	EMC105-SM-SM-10000	201003	2023/1/24	2024/1/23
Software	AUDIX	E3	18621a	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2023/2/10	2024/2/9
Cable	UTIFLEX	UFA210A	9435	2023/10/2	2024/9/30
Power Sensor	Boonton	RTP5006	11037	2023/5/23	2024/5/21
Attenuator	MCL	BW-S20W5+	1430	2023/6/6	2024/6/4

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements

5. FCC §15.247(i), §1.1307(b)(3)(i) - RF Exposure

5.1. Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$
1.34-30	$3,450 R^2/f^2$
30-300	$3.83 R^2$
300-1,500	$0.0128 R^2 f$
1,500-100,000	$19.2 R^2$

5.2. RF Exposure Evaluation Result

Project info

RFID

Band	Freq (MHz)	Tune-up Power (dBm)	Ant Gain + Cable Loss (dBi)	Distances (mm)	Tune-up Power (mW)	ERP (dBm)	ERP (mW)
DSB-ASK	902.75	30	-0.3	200	1000.00	27.55	568.85
PR-ASK	902.75	30	-0.3	200	1000.00	27.55	568.85

Cable loss is 0.3 dB

§ 1.1307(b)(3)(i)(A) and (C) method is not applicable.

§ 1.1307(b)(3)(i)(B)

Band	Freq (MHz)	Pth (mW)	X	ERP 20cm (mW)	Result Option B
DSB-ASK	902.75	1841.61	1.465	1841.61	exempt
PR-ASK	902.75	1841.61	1.465	1841.61	exempt

The available maximum time-averaged power or effective radiated power (ERP), whichever is greater

This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive).

Result: The device compliant the SAR-Based Exemption at 20cm distances.

6. FCC §15.203 – Antenna Requirements

6.1. Applicable Standard

According to § 15.203,

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

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi.

6.2. Antenna Information

Manufacturer	Model	Type	Antenna Gain	Cable Loss
TSL	ANT016015	Panel Antenna	0 dBi	0.3 dB

The antenna is connected to the EUT using a unique type of connector.

Result: Compliance

7. FCC §15.207(a) – AC Line Conducted Emissions

7.1. Applicable Standard

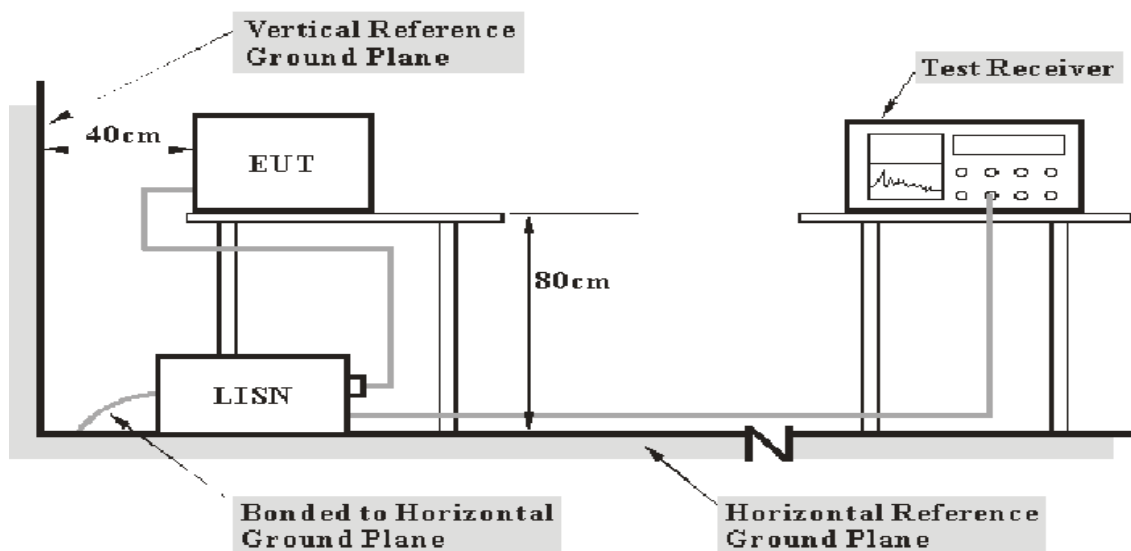
According to §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 ^{Note 1}	56 to 46 ^{Note 1}
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

7.2. EUT Setup



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

7.3. EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	IF B/W
150kHz – 30MHz	9kHz

7.4. Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

7.5. Corrected Factor & Margin Calculation

The factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “Over Limit” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for Over Limit calculation is as follows:

$$\text{Over Limit} = \text{Result} - \text{Limit Line}$$

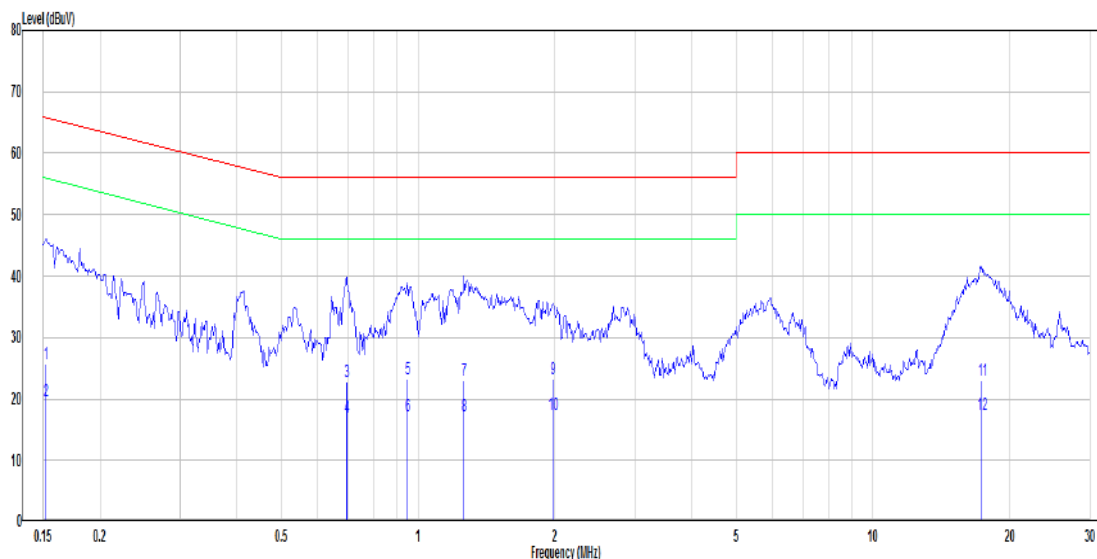
7.6. Test Results

Test Mode: Transmitting

DSB-ASK

(Worst case is Antenna Port 1, low channel)

Main: AC120 V, 60 Hz, Line



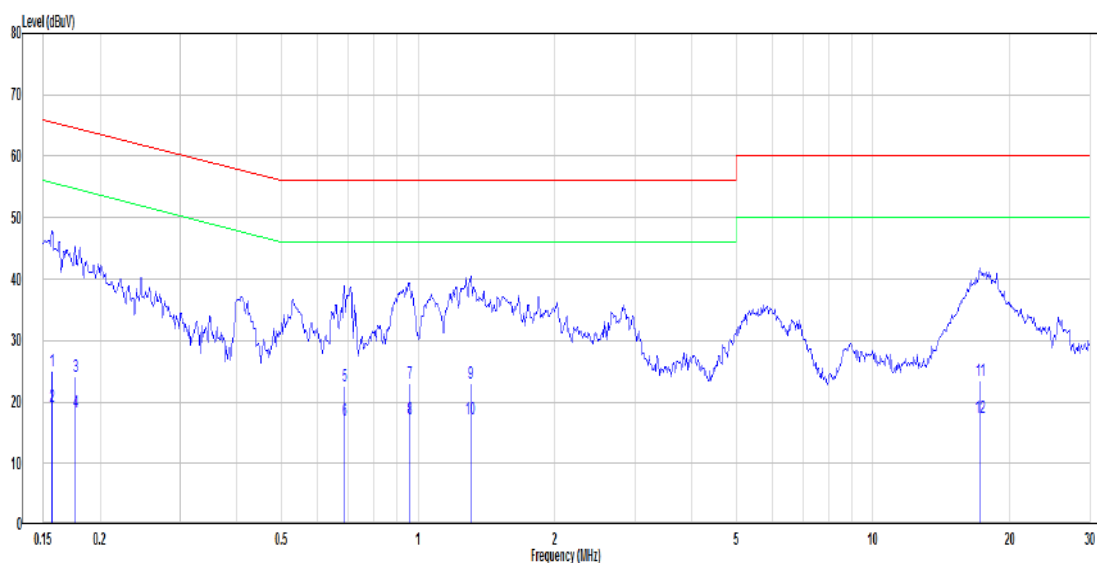
No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.152	6.23	19.50	25.73	65.87	-40.14	QP	Line
2	0.152	0.26	19.50	19.76	55.87	-36.11	Average	Line
3	0.697	3.02	19.72	22.74	56.00	-33.26	QP	Line
4	0.697	-2.82	19.72	16.90	46.00	-29.10	Average	Line
5	0.948	3.29	19.84	23.13	56.00	-32.87	QP	Line
6	0.948	-2.57	19.84	17.27	46.00	-28.73	Average	Line
7	1.262	3.00	19.92	22.92	56.00	-33.08	QP	Line
8	1.262	-2.70	19.92	17.22	46.00	-28.78	Average	Line
9	1.980	3.10	20.07	23.17	56.00	-32.83	QP	Line
10	1.980	-2.67	20.07	17.40	46.00	-28.60	Average	Line
11	17.383	2.74	20.37	23.11	60.00	-36.89	QP	Line
12	17.383	-2.99	20.37	17.38	50.00	-32.62	Average	Line

Note:

Result = Reading + Factor

Over Limit = Result – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Main: AC120 V, 60 Hz, Neutral

No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark	Phase
	(MHz)	dBuV	Factor(dB)	dBuV	dBuV	(dB)		
1	0.156	5.53	19.50	25.03	65.65	-40.62	QP	Neutral
2	0.156	-0.32	19.50	19.18	55.65	-36.47	Average	Neutral
3	0.177	4.70	19.50	24.20	64.64	-40.44	QP	Neutral
4	0.177	-1.14	19.50	18.36	54.64	-36.28	Average	Neutral
5	0.690	2.96	19.72	22.68	56.00	-33.32	QP	Neutral
6	0.690	-2.82	19.72	16.90	46.00	-29.10	Average	Neutral
7	0.958	3.19	19.85	23.04	56.00	-32.96	QP	Neutral
8	0.958	-2.60	19.85	17.25	46.00	-28.75	Average	Neutral
9	1.303	3.07	19.93	23.00	56.00	-33.00	QP	Neutral
10	1.303	-2.67	19.93	17.26	46.00	-28.74	Average	Neutral
11	17.199	2.97	20.42	23.39	60.00	-36.61	QP	Neutral
12	17.199	-2.94	20.42	17.48	50.00	-32.52	Average	Neutral

Note:

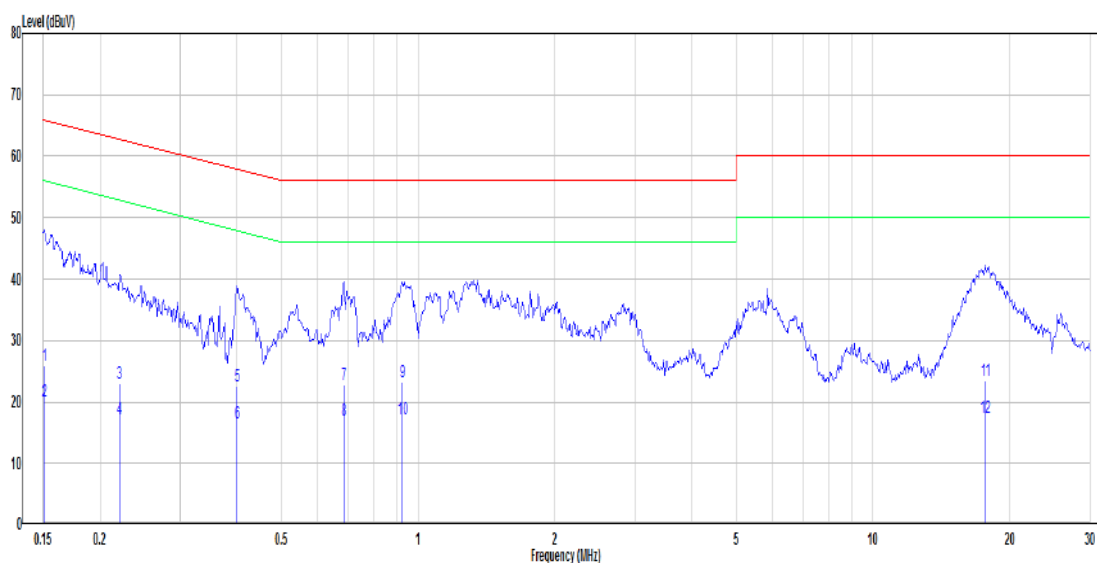
Result = Reading + Factor

Over Limit = Result – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

PR-ASK

(Worst case is Antenna Port 1, low channel)

Main: AC120 V, 60 Hz, Line

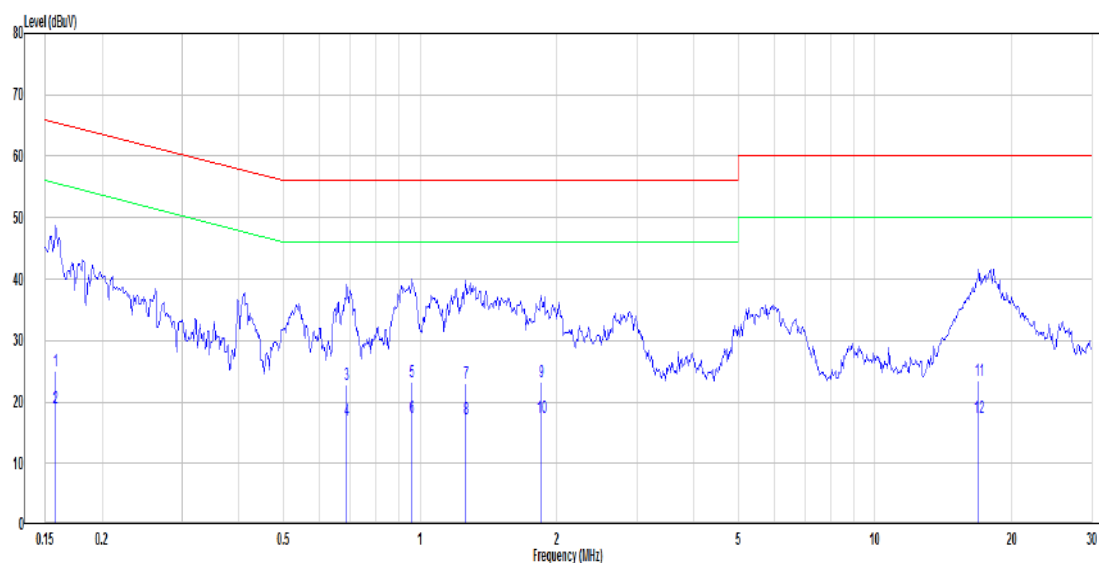
No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark	Phase
	(MHz)	dBuV	Factor(dB)	dBuV	dBuV	(dB)		
1	0.151	6.49	19.50	25.99	65.96	-39.97	QP	Line
2	0.151	0.66	19.50	20.16	55.96	-35.80	Average	Line
3	0.221	3.51	19.50	23.01	62.79	-39.78	QP	Line
4	0.221	-2.33	19.50	17.17	52.79	-35.62	Average	Line
5	0.400	2.91	19.58	22.49	57.86	-35.37	QP	Line
6	0.400	-3.00	19.58	16.58	47.86	-31.28	Average	Line
7	0.686	3.09	19.71	22.80	56.00	-33.20	QP	Line
8	0.686	-2.82	19.71	16.89	46.00	-29.11	Average	Line
9	0.923	3.30	19.83	23.13	56.00	-32.87	QP	Line
10	0.923	-2.61	19.83	17.22	46.00	-28.78	Average	Line
11	17.661	2.99	20.38	23.37	60.00	-36.63	QP	Line
12	17.661	-2.90	20.38	17.48	50.00	-32.52	Average	Line

Note:

Result = Reading + Factor

Over Limit = Result – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Main: AC120 V, 60 Hz, Neutral

No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark	Phase
	(MHz)	dBuV	Factor(dB)	dBuV	dBuV	(dB)		
1	0.158	5.52	19.50	25.02	65.56	-40.54	QP	Neutral
2	0.158	-0.50	19.50	19.00	55.56	-36.56	Average	Neutral
3	0.690	3.09	19.72	22.81	56.00	-33.19	QP	Neutral
4	0.690	-2.79	19.72	16.93	46.00	-29.07	Average	Neutral
5	0.958	3.30	19.85	23.15	56.00	-32.85	QP	Neutral
6	0.958	-2.49	19.85	17.36	46.00	-28.64	Average	Neutral
7	1.262	3.18	19.92	23.10	56.00	-32.90	QP	Neutral
8	1.262	-2.74	19.92	17.18	46.00	-28.82	Average	Neutral
9	1.848	3.11	20.04	23.15	56.00	-32.85	QP	Neutral
10	1.848	-2.71	20.04	17.33	46.00	-28.67	Average	Neutral
11	16.928	2.98	20.40	23.38	60.00	-36.62	QP	Neutral
12	16.928	-2.94	20.40	17.46	50.00	-32.54	Average	Neutral

Note:

Result = Reading + Factor

Over Limit = Result – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

8. FCC §15.209, §15.205 , §15.247(d) – Spurious Emissions

8.1. Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	608 – 614	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	960 – 1240	5. 35 – 5. 46
2.1735 – 2.1905	16.80425 – 16.80475	1300 – 1427	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1435 – 1626.5	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1645.5 – 1646.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1660 – 1710	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1718.8 – 1722.2	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	2200 – 2300	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2310 – 2390	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2483.5 – 2500	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2690 – 2900	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	3260 – 3267	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3.332 – 3.339	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3 3458 – 3 358	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3.600 – 4.400	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4		Above 38.6
13.36 – 13.41	399.9 – 410		

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

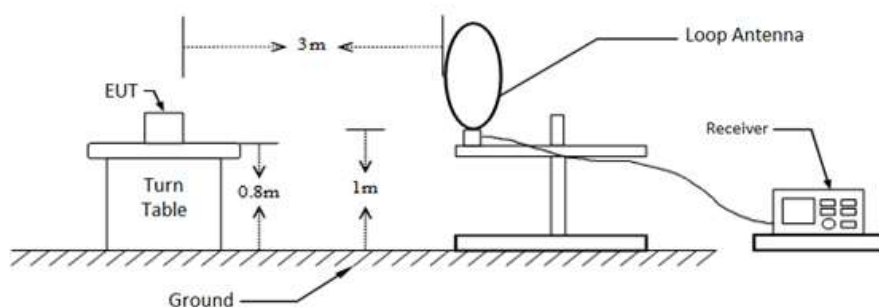
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains

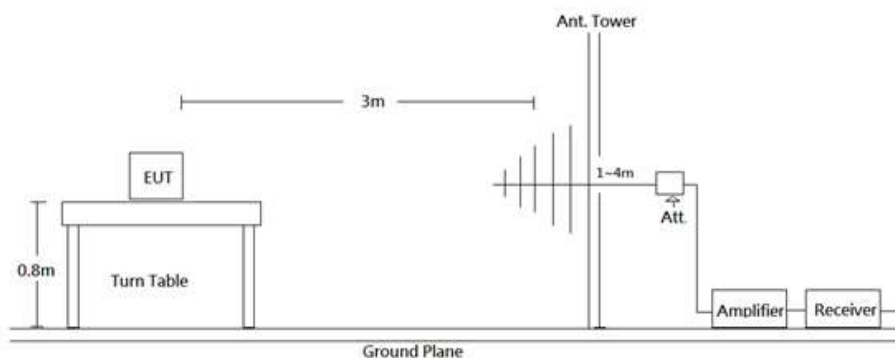
the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

8.2. EUT Setup

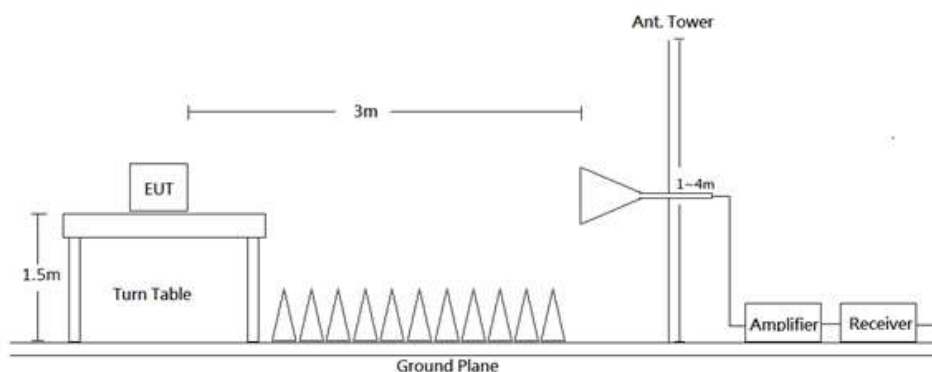
9 kHz - 30 MHz:



30 MHz - 1 GHz:



Above 1 GHz:



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

8.3. EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 10 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Measurement method
9 -150 kHz	300 Hz	1 kHz	Ave
150 kHz-30 MHz	10 kHz	30 kHz	QP
30-1000 MHz	100 kHz	300 kHz	QP
Above 1 GHz	1 MHz	3 MHz	PK
	1 MHz	10 Hz	Ave

8.4. Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

8.5. Corrected Factor & Margin Calculation

The Correct Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Level} - \text{Limit}$$

8.6. Test Results

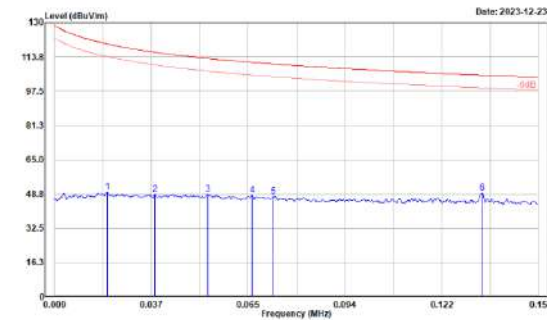
Test Mode: Transmitting

(Pre-scan with three EUT orthogonal axis, and worse case as X axis.)

9kHz-30MHz: (Worst case is PR-ASK mode, Antenna Port 1)

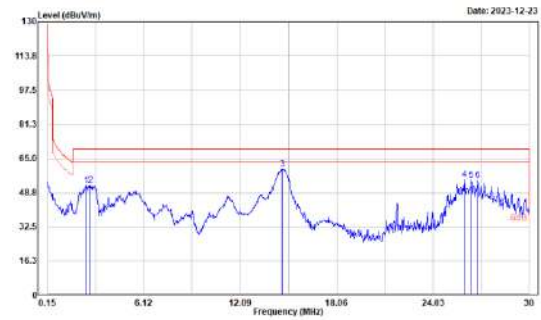
(Pre-scan with three Antenna orthogonal axis, and worse case as parallel.)

Low Channel / 9kHz-150kHz



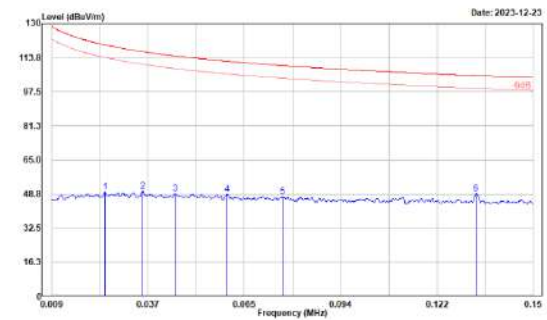
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
0.024	35.17	14.39	49.56	119.87	-70.31	100	83	Average
0.038	35.81	12.89	48.70	115.93	-67.23	100	360	Average
0.054	36.41	12.24	48.65	113.03	-64.38	100	184	Average
0.067	36.63	11.54	48.17	111.14	-62.97	100	208	Average
0.073	36.24	11.47	47.71	110.37	-62.66	100	355	Average
0.134	37.90	11.39	49.29	105.09	-55.80	100	351	Average

Low Channel / 150kHz-30MHz



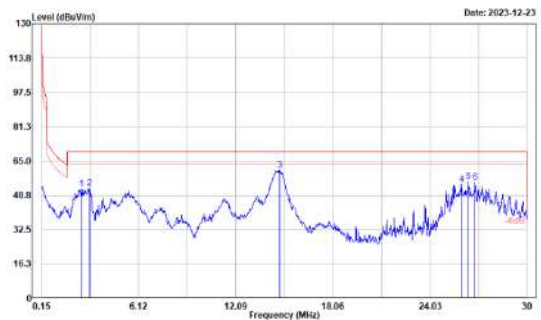
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2.538	41.44	10.59	52.03	69.54	-17.51	100	21	QP
2.887	41.68	10.52	52.20	69.54	-17.34	100	184	QP
14.687	40.38	11.51	59.89	69.54	-9.65	100	315	QP
25.970	43.10	11.71	54.81	69.54	-14.73	100	128	QP
26.388	43.04	11.72	54.76	69.54	-14.78	100	88	QP
26.806	42.84	11.72	54.56	69.54	-14.98	100	307	QP

Middle Channel / 9kHz-150kHz



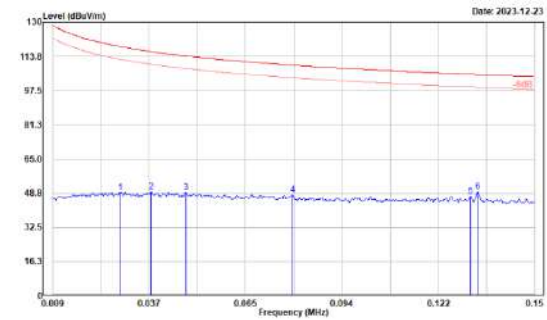
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
0.025	35.23	14.35	49.58	119.77	-70.19	100	27	Average
0.036	36.82	13.16	49.98	116.56	-66.58	100	354	Average
0.045	36.19	12.66	48.85	114.52	-65.67	100	39	Average
0.050	36.93	11.59	48.52	112.00	-63.48	100	0	Average
0.077	36.34	11.39	47.73	109.53	-62.20	100	0	Average
0.133	37.68	11.39	49.07	105.11	-56.04	100	0	Average

Middle Channel / 150kHz-30MHz



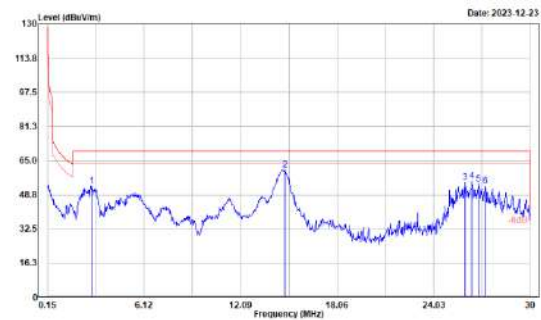
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2.596	41.33	10.57	51.90	69.54	-17.64	100	0	QP
3.075	41.59	10.47	52.06	69.54	-17.48	100	293	QP
14.777	49.05	11.51	60.56	69.54	-8.98	100	33	QP
25.970	42.35	11.71	54.06	69.54	-15.48	100	313	QP
26.388	43.55	11.72	55.27	69.54	-14.27	100	173	QP
26.806	43.68	11.72	54.80	69.54	-14.74	100	143	QP

High Channel / 9kHz-150kHz



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
0.029	35.22	13.86	49.08	118.43	-69.35	100	211	Average
0.038	36.31	12.93	49.24	116.03	-66.79	100	15	Average
0.048	36.42	12.63	49.05	113.99	-64.94	100	56	Average
0.079	36.58	11.34	47.92	109.64	-61.72	100	7	Average
0.131	35.74	11.38	47.12	105.24	-58.12	100	360	Average
0.133	38.01	11.39	49.40	105.10	-55.70	100	355	Average

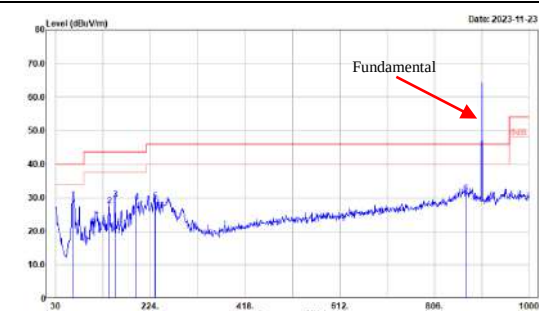
High Channel / 150kHz-30MHz



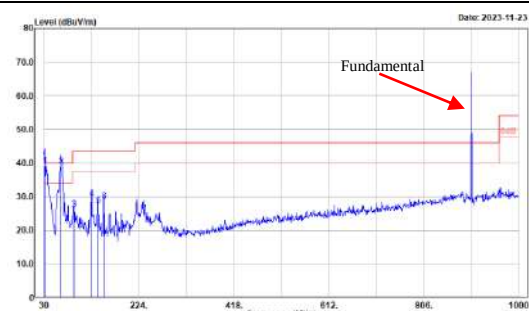
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2.837	42.40	10.51	52.91	69.54	-16.63	100	59	QP
14.836	49.20	11.51	60.71	69.54	-8.83	100	135	QP
25.970	43.00	11.71	54.71	69.54	-14.83	100	64	QP
26.388	43.54	11.72	55.26	69.54	-14.28	100	99	QP
26.806	42.11	11.72	53.83	69.54	-15.71	100	322	QP
27.224	41.18	11.74	52.92	69.54	-16.62	100	59	QP

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

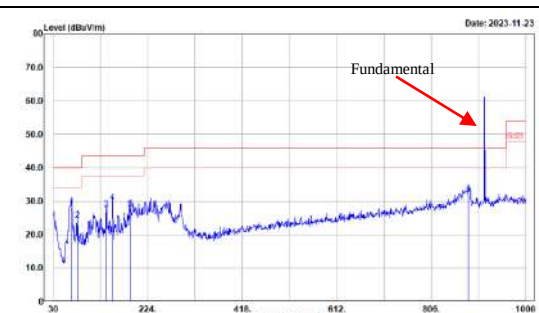
30MHz-1GHz: (Worst case is PR-ASK mode, Antenna Port 1)

Low Channel Horizontal

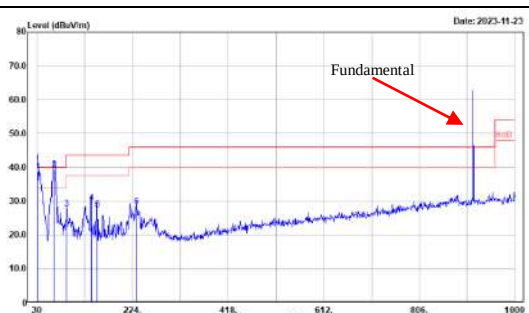
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
65.890	45.37	-16.19	29.18	40.00	-10.82	100	0	QP
139.610	37.55	-10.10	27.45	43.50	-16.05	100	93	QP
152.220	40.06	-10.49	29.57	43.50	-13.93	100	112	QP
194.900	39.73	-11.07	28.66	43.50	-14.84	100	109	QP
233.700	40.38	-11.64	28.74	46.00	-17.26	100	228	QP
870.020	29.92	1.31	31.23	46.00	-14.77	100	360	QP

Low Channel Vertical

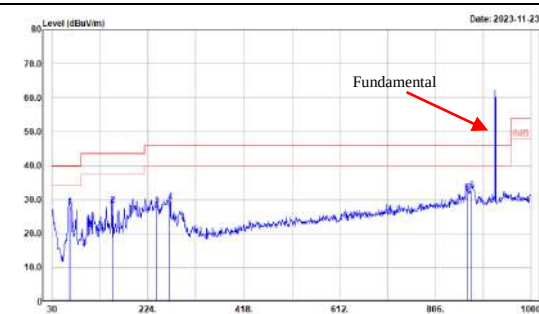
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
30.970	43.06	-3.87	39.19	40.00	-0.81	100	151	QP
63.950	54.95	-16.83	38.12	40.00	-1.88	100	30	QP
91.110	41.83	-15.49	26.34	43.50	-17.16	100	123	QP
127.000	39.12	-9.57	29.55	43.50	-13.95	100	92	QP
139.610	37.50	-10.10	27.40	43.50	-16.10	100	92	QP
152.220	39.14	-10.49	28.65	43.50	-14.85	100	147	QP

Middle Channel Horizontal

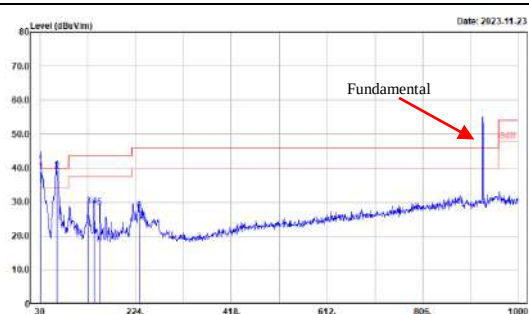
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
66.860	43.99	-15.84	28.15	40.00	-11.85	100	340	QP
78.500	40.18	-15.94	24.24	40.00	-15.76	100	107	QP
138.640	37.54	-10.04	27.50	43.50	-16.00	100	96	QP
151.250	40.01	-10.40	29.61	43.50	-13.89	100	107	QP
188.110	39.87	-12.06	27.81	43.50	-15.69	100	200	QP
882.630	30.55	1.55	32.10	46.00	-13.90	100	0	QP

Middle Channel Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
30.970	42.55	-3.87	38.68	40.00	-1.32	100	294	QP
63.950	55.37	-16.03	39.34	40.00	-0.66	100	21	QP
90.140	43.32	-15.61	27.71	43.50	-15.79	100	116	QP
139.610	39.65	-10.10	29.55	43.50	-13.95	100	114	QP
152.220	38.01	-10.49	27.52	43.50	-15.98	100	138	QP
231.760	40.15	-11.72	28.43	46.00	-17.57	100	317	QP

High Channel Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
65.890	44.15	-16.19	27.96	40.00	-12.04	100	360	QP
152.220	38.97	-10.49	28.48	43.50	-15.02	100	108	QP
241.460	39.49	-11.26	28.23	46.00	-17.77	100	223	QP
258.620	38.86	-9.66	29.20	46.00	-16.80	100	93	QP
870.020	30.68	1.31	31.99	46.00	-14.01	100	12	QP
879.720	31.38	1.42	32.80	46.00	-13.20	100	0	QP

High Channel Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
30.970	42.82	-3.87	38.95	40.00	-1.05	100	140	QP
63.950	55.25	-16.03	39.22	40.00	-0.78	100	9	QP
127.970	38.31	-9.57	28.74	43.50	-14.76	100	82	QP
139.610	38.80	-10.10	28.70	43.50	-14.74	100	112	QP
151.250	38.80	-10.40	28.40	43.50	-15.01	100	140	QP
231.760	39.24	-11.72	27.52	46.00	-18.48	100	181	QP

Level = Reading + Factor.

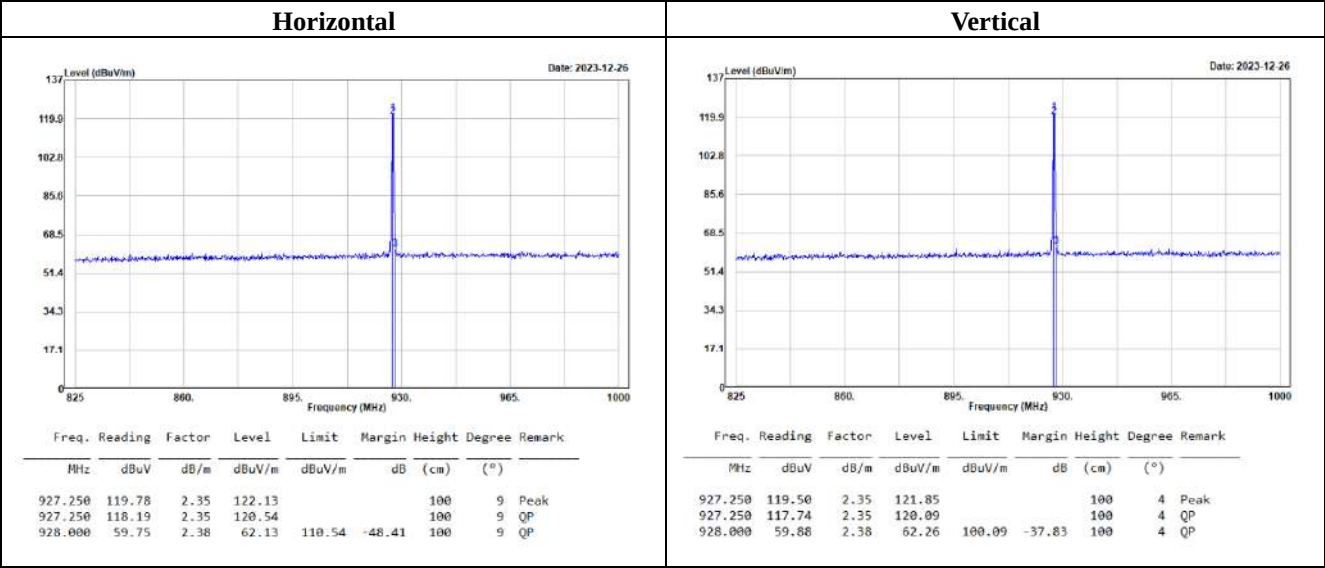
Margin = Level - Limit.

Factor = Antenna Factor + Cable Loss - Amplifier Gain.

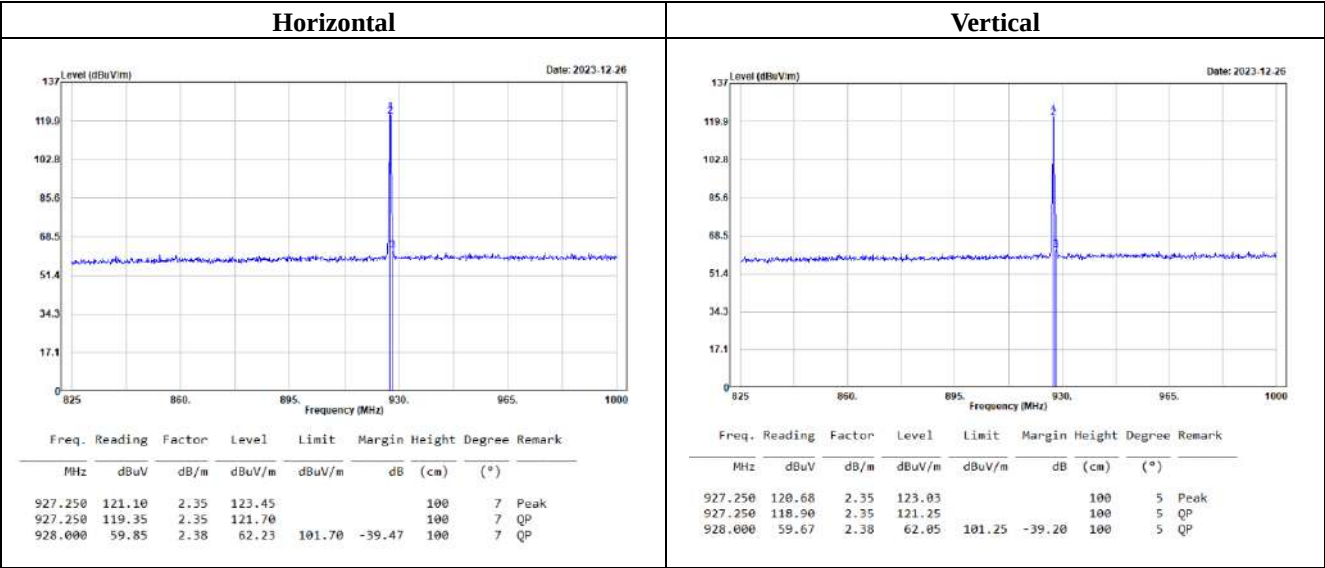
Band-Edge

(Worst case is DSB-ASK mode high channel)

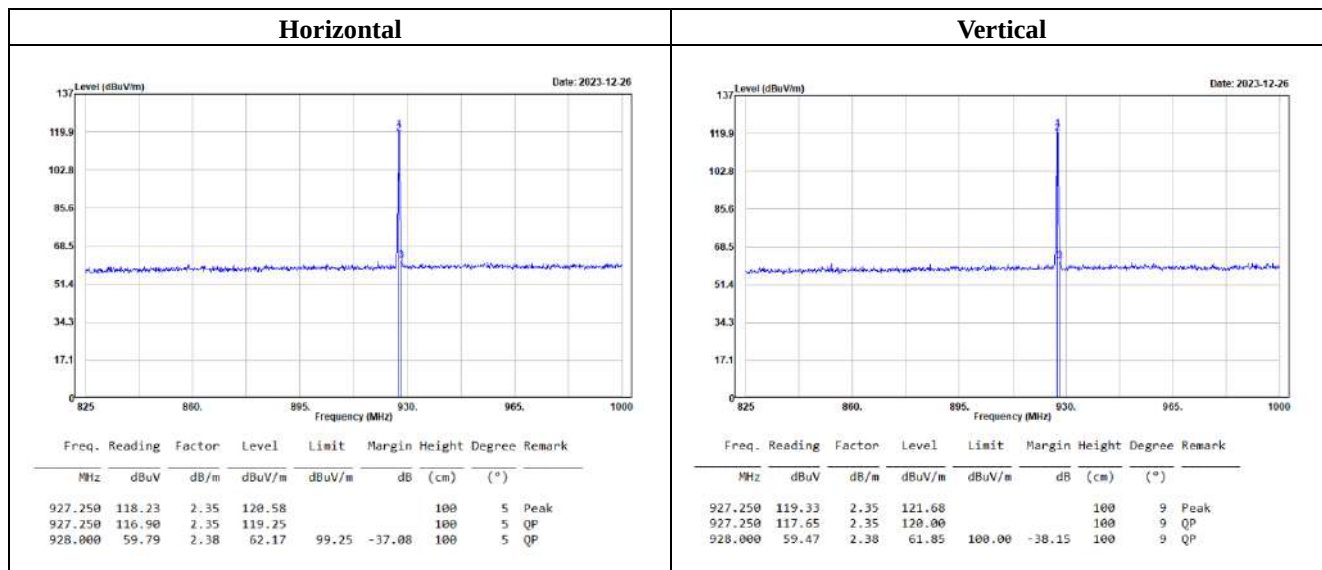
Antenna Port 1



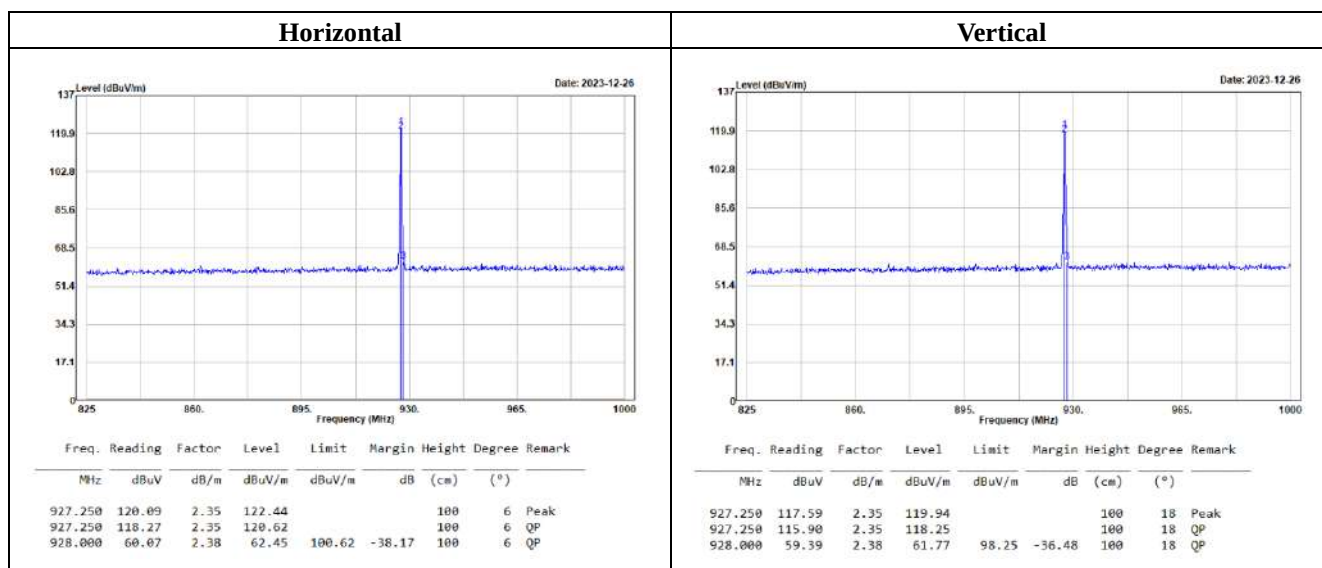
Antenna Port 2



Antenna Port 3



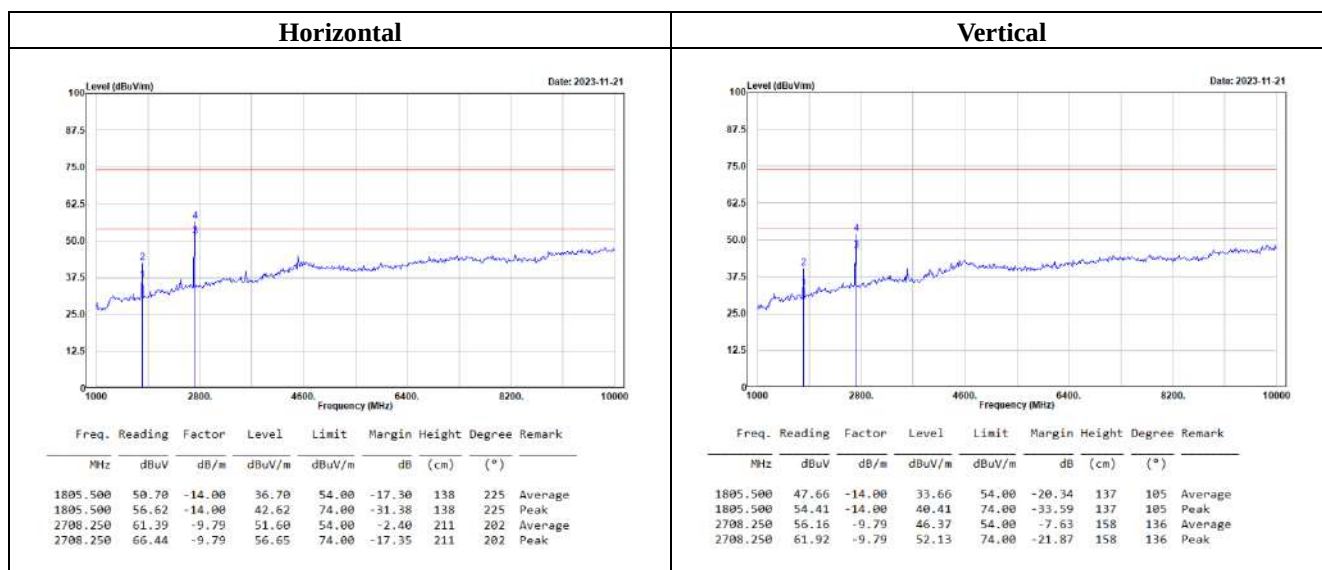
Antenna Port 4



1GHz-10GHz:

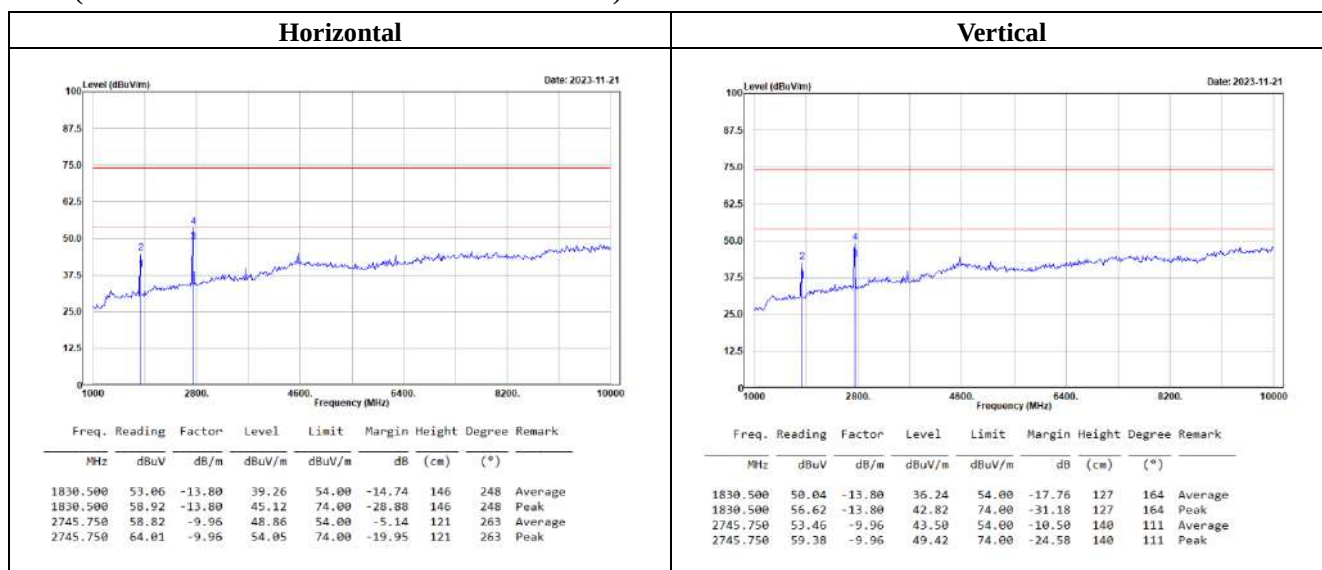
(Worst case is PR-ASK mode low channel)

Antenna Port 1



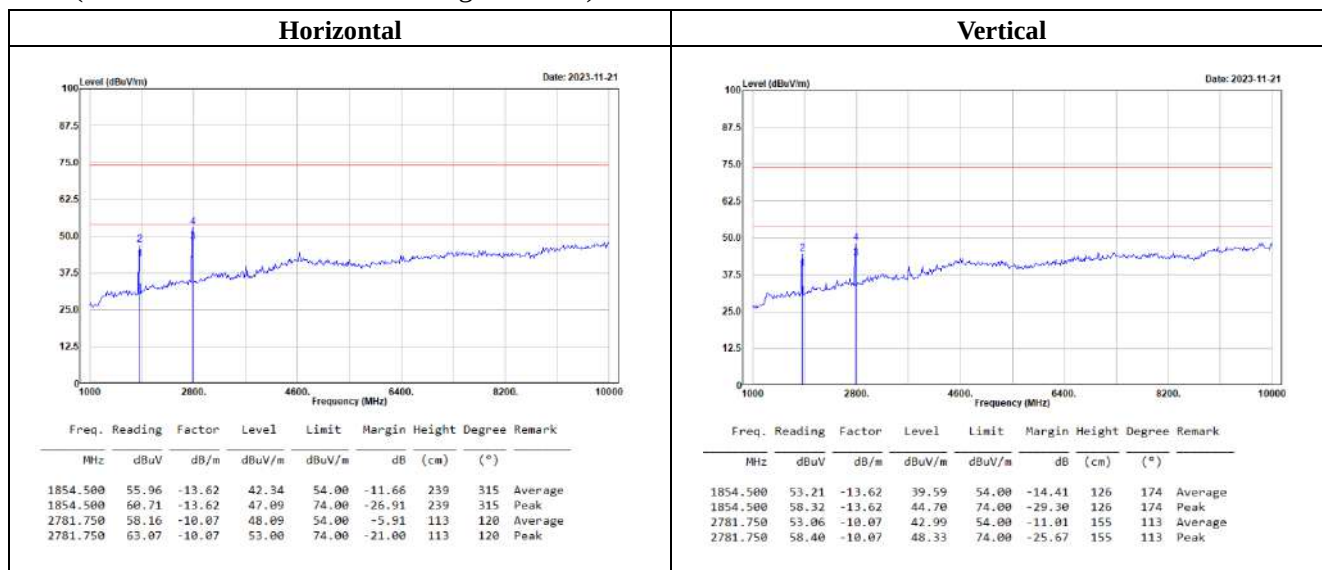
Antenna Port 2

(Worst case is PR-ASK mode Middle channel)



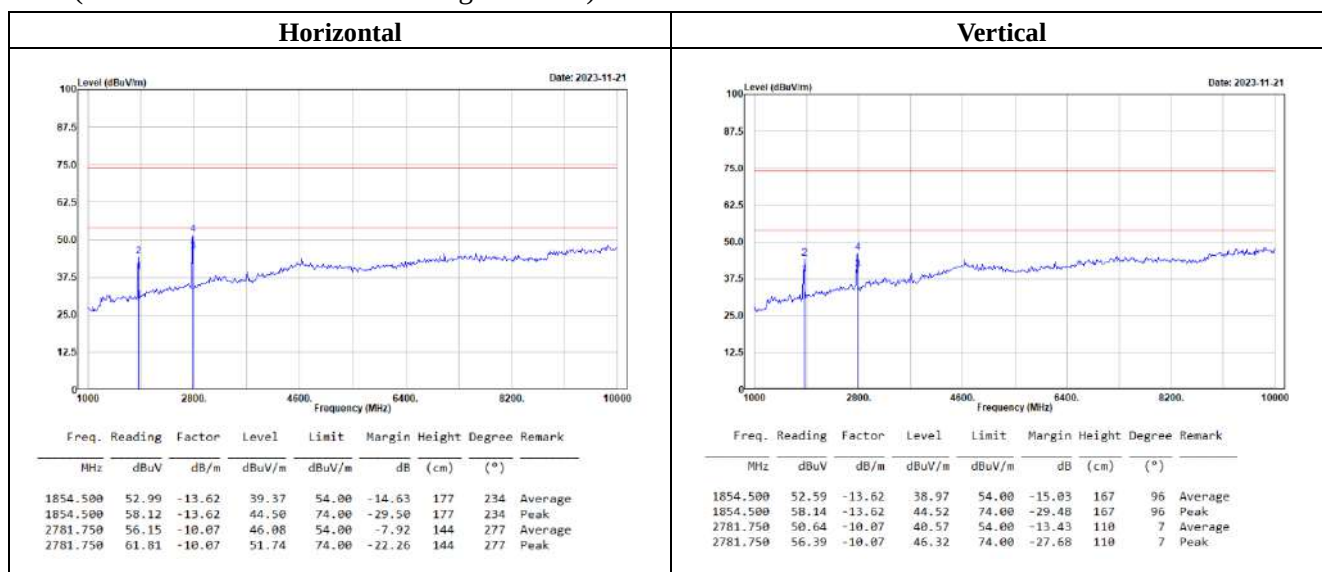
Antenna Port 3

(Worst case is PR-ASK mode High channel)



Antenna Port 4

(Worst case is PR-ASK mode High channel)



Above 1GHz

DSB-ASK Mode: Antenna Port 1

Low channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
902.000	59.90	1.90	61.80	102.80	-41.00	100	321	QP	
902.750	122.88	1.90	124.78			100	321	Peak	
902.750	120.90	1.90	122.80			100	321	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1805.500	46.96	-14.00	32.96	54.00	-21.04	141	183	Average	
1805.500	56.76	-14.00	42.76	74.00	-31.24	141	183	Peak	
2708.250	55.52	-9.79	45.73	54.00	-8.27	214	198	Average	
2708.250	65.84	-9.79	56.05	74.00	-17.95	214	198	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1805.500	45.68	-14.00	31.68	54.00	-22.32	152	67	Average	
1805.500	56.11	-14.00	42.11	74.00	-31.89	152	67	Peak	
2708.250	50.28	-9.79	40.49	54.00	-13.51	124	134	Average	
2708.250	60.54	-9.79	50.75	74.00	-23.25	124	134	Peak	

Middle channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
915.250	120.59	1.98	122.57			100	341	Peak	
915.250	118.73	1.98	120.71			100	341	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1830.500	47.34	-13.80	33.54	54.00	-20.46	179	147	Average	
1830.500	57.96	-13.80	44.16	74.00	-29.84	179	147	Peak	
2745.750	51.29	-9.96	41.33	54.00	-12.67	187	190	Average	
2745.750	62.06	-9.96	52.10	74.00	-21.90	187	190	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1830.500	45.67	-13.80	31.87	54.00	-22.13	140	119	Average	
1830.500	56.08	-13.80	42.28	74.00	-31.72	140	119	Peak	
2745.750	48.13	-9.96	38.17	54.00	-15.83	167	127	Average	
2745.750	57.74	-9.96	47.78	74.00	-26.22	167	127	Peak	

High channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
927.250	119.78	2.35	122.13			100	9	Peak	
927.250	118.19	2.35	120.54			100	9	QP	
928.000	59.75	2.38	62.13	110.54	-48.41	100	9	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1854.500	50.95	-13.62	37.33	54.00	-16.67	182	224	Average	
1854.500	61.33	-13.62	47.71	74.00	-26.29	182	224	Peak	
2781.750	51.31	-10.07	41.24	54.00	-12.76	176	189	Average	
2781.750	61.44	-10.07	51.37	74.00	-22.63	176	189	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1854.500	50.53	-13.62	36.91	54.00	-17.09	144	108	Average	
1854.500	60.37	-13.62	46.75	74.00	-27.25	144	108	Peak	
2781.750	49.08	-10.07	39.01	54.00	-14.99	155	138	Average	
2781.750	59.08	-10.07	49.01	74.00	-24.99	155	138	Peak	

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

DSB-ASK Mode: Antenna Port 2

Low channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
902.000		59.12	1.90	61.02	99.48	-38.46	100	308	QP	902.000		59.47	1.90	61.37	100.74	-39.37	100	330	QP
902.750		119.23	1.90	121.13			100	308	Peak	902.750		120.34	1.90	122.24			100	330	Peak
902.750		117.58	1.90	119.48			100	308	QP	902.750		118.84	1.90	120.74			100	330	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1805.500		47.57	-14.00	33.57	54.00	-20.43	136	265	Average	1805.500		47.55	-14.00	33.55	54.00	-20.45	146	64	Average
1805.500		58.28	-14.00	44.28	74.00	-29.72	136	265	Peak	1805.500		58.44	-14.00	44.44	74.00	-29.56	146	64	Peak
2708.250		52.70	-9.79	42.91	54.00	-11.09	213	200	Average	2708.250		48.51	-9.79	38.72	54.00	-15.28	148	126	Average
2708.250		63.79	-9.79	54.00	74.00	-20.00	213	200	Peak	2708.250		58.05	-9.79	48.26	74.00	-25.74	148	126	Peak
Middle channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
915.250		122.40	1.99	124.39			100	328	Peak	915.250		121.74	1.98	123.72			100	342	Peak
915.250		120.69	1.99	122.68			100	328	QP	915.250		119.90	1.98	121.88			100	342	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1830.500		50.87	-13.80	37.07	54.00	-16.93	134	340	Average	1830.500		43.94	-13.80	30.14	54.00	-23.86	151	136	Average
1830.500		60.06	-13.80	47.06	74.00	-26.94	134	340	Peak	1830.500		53.82	-13.80	40.02	74.00	-33.98	151	136	Peak
2745.750		50.12	-9.96	40.16	54.00	-13.84	133	200	Average	2745.750		45.94	-9.96	35.98	54.00	-18.02	115	132	Average
2745.750		60.83	-9.96	50.87	74.00	-23.13	133	200	Peak	2745.750		58.19	-9.96	48.23	74.00	-25.77	115	132	Peak
High channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
927.250		121.10	2.35	123.45			100	7	Peak	927.250		120.68	2.35	123.03			100	5	Peak
927.250		119.35	2.35	121.70			100	7	QP	927.250		118.90	2.35	121.25			100	5	QP
928.000		59.85	2.38	62.23	101.70	-39.47	100	7	QP	928.000		59.67	2.38	62.05	101.25	-39.20	100	5	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1854.500		52.75	-13.62	39.13	54.00	-14.87	146	115	Average	1854.500		50.11	-13.62	36.49	54.00	-17.51	148	104	Average
1854.500		62.80	-13.62	49.18	74.00	-24.82	146	115	Peak	1854.500		60.27	-13.62	46.65	74.00	-27.35	148	104	Peak
2781.750		49.55	-10.07	39.48	54.00	-14.52	121	250	Average	2781.750		45.89	-10.07	35.82	54.00	-18.18	193	125	Average
2781.750		59.50	-10.07	49.43	74.00	-24.57	121	250	Peak	2781.750		55.12	-10.07	45.05	74.00	-28.95	193	125	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

DSB-ASK Mode: Antenna Port 3

Low channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
902.000	59.69	1.90	61.59	100.74	-39.15	100	317	QP	
902.750	120.27	1.90	122.17			100	317	Peak	
902.750	118.84	1.90	120.74			100	317	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1805.500	47.46	-14.00	33.46	54.00	-20.54	105	300	Average	
1805.500	58.21	-14.00	44.21	74.00	-29.79	105	300	Peak	
2708.250	53.45	-9.79	43.66	54.00	-10.34	211	200	Average	
2708.250	63.40	-9.79	53.61	74.00	-20.39	211	200	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
902.000	59.75	1.90	61.65	101.77	-40.12	100	309	QP	
902.750	121.45	1.90	123.35			100	309	Peak	
902.750	119.87	1.90	121.77			100	309	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1805.500	45.48	-14.00	31.48	54.00	-22.52	121	305	Average	
1805.500	55.67	-14.00	41.67	74.00	-32.33	121	305	Peak	
2708.250	46.96	-9.79	37.17	54.00	-16.83	152	105	Average	
2708.250	56.63	-9.79	46.84	74.00	-27.16	152	105	Peak	
Middle channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
915.250	120.43	1.98	122.41			100	347	Peak	
915.250	118.70	1.98	120.68			100	347	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1830.500	50.31	-13.00	36.51	54.00	-17.49	171	334	Average	
1830.500	60.46	-13.00	46.66	74.00	-27.34	171	334	Peak	
2745.750	50.97	-9.96	41.01	54.00	-12.99	199	236	Average	
2745.750	61.14	-9.96	51.18	74.00	-22.82	199	236	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
915.250	121.08	1.98	123.06			100	360	Peak	
915.250	119.24	1.98	121.22			100	360	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1830.500	45.18	-13.00	31.38	54.00	-22.62	188	200	Average	
1830.500	54.97	-13.00	41.17	74.00	-32.83	188	200	Peak	
2745.750	48.07	-9.96	38.11	54.00	-15.89	135	137	Average	
2745.750	58.78	-9.96	48.82	74.00	-25.18	135	137	Peak	
High channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
927.250	118.23	2.35	120.58			100	5	Peak	
927.250	116.90	2.35	119.25			100	5	QP	
928.000	59.79	2.38	62.17	99.25	-37.08	100	5	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1854.500	52.24	-13.62	38.62	54.00	-15.38	152	110	Average	
1854.500	62.14	-13.62	48.52	74.00	-25.48	152	110	Peak	
2781.750	50.36	-10.07	40.29	54.00	-13.71	151	250	Average	
2781.750	60.33	-10.07	50.26	74.00	-23.74	151	250	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
927.250	119.33	2.35	121.68			100	9	Peak	
927.250	117.65	2.35	120.00			100	9	QP	
928.000	59.47	2.38	61.85	100.00	-38.15	100	9	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1854.500	49.47	-13.62	35.85	54.00	-18.15	148	108	Average	
1854.500	59.12	-13.62	45.50	74.00	-28.50	148	108	Peak	
2781.750	47.15	-10.07	37.08	54.00	-16.92	126	97	Average	
2781.750	56.82	-10.07	46.75	74.00	-27.25	126	97	Peak	

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

DSB-ASK Mode: Antenna Port 4

Low channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
902.000	59.32	1.90	61.22	101.47	-40.25	100	322	QP	
902.750	121.24	1.90	123.14			100	322	Peak	
902.750	119.57	1.90	121.47			100	322	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1805.500	46.61	-14.00	32.61	54.00	-21.39	180	32	Average	
1805.500	57.33	-14.00	43.33	74.00	-30.67	180	32	Peak	
2708.250	54.27	-9.79	44.48	54.00	-9.52	103	240	Average	
2708.250	64.26	-9.79	54.47	74.00	-19.53	103	240	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
902.000	59.64	1.90	61.54	100.53	-38.99	100	301	QP	
902.750	120.24	1.90	122.14			100	301	Peak	
902.750	118.63	1.90	120.53			100	301	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1805.500	45.65	-14.00	31.65	54.00	-22.35	138	103	Average	
1805.500	55.69	-14.00	41.69	74.00	-32.31	138	103	Peak	
2708.250	49.92	-9.79	40.13	54.00	-13.87	168	189	Average	
2708.250	59.05	-9.79	49.26	74.00	-24.74	168	189	Peak	

Middle channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
915.250	121.55	1.98	123.53			100	354	Peak	
915.250	119.69	1.98	121.67			100	354	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1830.500	46.33	-13.80	32.53	54.00	-21.47	186	142	Average	
1830.500	56.64	-13.80	42.84	74.00	-31.16	186	142	Peak	
2745.750	52.13	-9.96	42.17	54.00	-11.83	128	235	Average	
2745.750	61.99	-9.96	52.03	74.00	-21.97	128	235	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
915.250	121.09	1.98	123.07			100	321	Peak	
915.250	119.43	1.98	121.41			100	321	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1830.500	46.29	-13.80	32.49	54.00	-21.51	110	160	Average	
1830.500	56.56	-13.80	42.76	74.00	-31.24	110	160	Peak	
2745.750	47.94	-9.96	37.98	54.00	-16.02	167	164	Average	
2745.750	58.68	-9.96	48.72	74.00	-25.28	167	164	Peak	

High channel									
Horizontal					Vertical				
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
927.250	120.09	2.35	122.44			100	6	Peak	
927.250	118.27	2.35	120.62			100	6	QP	
928.000	60.07	2.38	62.45	100.62	-38.17	100	6	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1854.500	48.64	-13.62	35.02	54.00	-18.98	173	231	Average	
1854.500	58.33	-13.62	44.71	74.00	-29.29	173	231	Peak	
2781.750	50.89	-10.07	40.82	54.00	-13.18	159	239	Average	
2781.750	60.23	-10.07	50.16	74.00	-23.84	159	239	Peak	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
927.250	117.59	2.35	119.94			100	18	Peak	
927.250	115.90	2.35	118.25			100	18	QP	
928.000	59.39	2.38	61.77	98.25	-36.48	100	18	QP	
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		
1854.500	48.84	-13.62	35.22	54.00	-18.78	126	156	Average	
1854.500	58.01	-13.62	44.39	74.00	-29.61	126	156	Peak	
2781.750	46.89	-10.07	36.82	54.00	-17.18	167	180	Average	
2781.750	56.01	-10.07	46.74	74.00	-27.26	167	180	Peak	

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

PR-ASK Mode: Antenna Port 1

Low channel																	
Horizontal									Vertical								
Freq. Reading Factor Level Limit Margin Height Degree Remark									Freq. Reading Factor Level Limit Margin Height Degree Remark								
MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)									MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)								
902.000 59.86 1.90 61.76 102.24 -40.48 100 314 QP									902.000 59.97 1.90 61.87 102.85 -40.98 100 315 QP								
902.750 121.60 1.90 123.50 100 314 Peak									902.750 122.27 1.90 124.17 100 315 Peak								
902.750 120.34 1.90 122.24 100 314 QP									902.750 120.95 1.90 122.85 100 315 QP								
Freq. Reading Factor Level Limit Margin Height Degree Remark									Freq. Reading Factor Level Limit Margin Height Degree Remark								
MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)									MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)								
1805.500 50.70 -14.00 36.70 54.00 -17.30 138 225 Average									1805.500 47.66 -14.00 33.66 54.00 -20.34 137 105 Average								
1805.500 56.62 -14.00 42.62 74.00 -31.38 138 225 Peak									1805.500 54.41 -14.00 40.41 74.00 -33.59 137 105 Peak								
2708.250 61.39 -9.79 51.60 54.00 -2.40 211 202 Average									2708.250 56.16 -9.79 46.37 54.00 -7.63 158 136 Average								
2708.250 66.44 -9.79 56.65 74.00 -17.35 211 202 Peak									2708.250 61.92 -9.79 52.13 74.00 -21.87 158 136 Peak								
Middle channel																	
Horizontal									Vertical								
Freq. Reading Factor Level Limit Margin Height Degree Remark									Freq. Reading Factor Level Limit Margin Height Degree Remark								
MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)									MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)								
915.250 120.08 1.98 122.06 100 314 Peak									915.250 120.27 1.98 122.25 100 352 Peak								
915.250 118.86 1.98 120.84 100 314 QP									915.250 118.90 1.98 120.88 100 352 QP								
Freq. Reading Factor Level Limit Margin Height Degree Remark									Freq. Reading Factor Level Limit Margin Height Degree Remark								
MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)									MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)								
1830.500 51.46 -13.80 37.66 54.00 -16.34 185 131 Average									1830.500 47.15 -13.80 33.35 54.00 -20.65 108 163 Average								
1830.500 58.35 -13.80 44.55 74.00 -29.45 185 131 Peak									1830.500 54.88 -13.80 41.08 74.00 -32.92 108 163 Peak								
2745.750 57.34 -9.96 47.38 54.00 -6.62 121 247 Average									2745.750 53.81 -9.96 43.85 54.00 -10.15 118 124 Average								
2745.750 62.44 -9.96 52.48 74.00 -21.52 121 247 Peak									2745.750 59.78 -9.96 49.82 74.00 -24.18 118 124 Peak								
High channel																	
Horizontal									Vertical								
Freq. Reading Factor Level Limit Margin Height Degree Remark									Freq. Reading Factor Level Limit Margin Height Degree Remark								
MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)									MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)								
927.250 121.23 2.35 123.58 100 16 Peak									927.250 119.93 2.35 122.28 100 348 Peak								
927.250 120.19 2.35 122.54 100 16 QP									927.250 118.79 2.35 121.14 100 348 QP								
928.000 59.63 2.38 62.01 102.54 -40.53 100 16 QP									928.000 59.74 2.38 62.12 101.14 -39.02 100 348 QP								
Freq. Reading Factor Level Limit Margin Height Degree Remark									Freq. Reading Factor Level Limit Margin Height Degree Remark								
MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)									MHz dBuV dB/m dBuV/m dBuV/m dB (cm) (°)								
1854.500 55.25 -13.62 41.63 54.00 -12.37 127 134 Average									1854.500 51.76 -13.62 38.14 54.00 -15.86 161 161 Average								
1854.500 60.53 -13.62 46.91 74.00 -27.09 127 134 Peak									1854.500 57.71 -13.62 44.09 74.00 -29.91 161 161 Peak								
2781.750 57.29 -10.07 47.22 54.00 -6.78 160 211 Average									2781.750 52.06 -10.07 42.79 54.00 -11.21 107 149 Average								
2781.750 62.65 -10.07 52.58 74.00 -21.42 160 211 Peak									2781.750 58.70 -10.07 48.63 74.00 -25.37 107 149 Peak								

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

PR-ASK Mode: Antenna Port 2

Low channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
902.000		59.89	1.90	61.79	102.78	-40.99	100	315	QP	902.000		59.48	1.90	61.38	101.24	-39.86	100	302	QP
902.750		122.02	1.90	123.92			100	315	Peak	902.750		120.73	1.90	122.63			100	302	Peak
902.750		120.88	1.90	122.78			100	315	QP	902.750		119.34	1.90	121.24			100	302	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1805.500		50.93	-14.00	36.93	54.00	-17.07	125	336	Average	1805.500		48.28	-14.00	34.28	54.00	-19.72	147	24	Average
1805.500		57.33	-14.00	43.33	74.00	-30.67	125	336	Peak	1805.500		55.56	-14.00	41.56	74.00	-32.44	147	24	Peak
2708.250		58.58	-9.79	48.79	54.00	-5.21	114	215	Average	2708.250		53.40	-9.79	43.61	54.00	-10.39	119	109	Average
2708.250		64.78	-9.79	54.99	74.00	-19.01	114	215	Peak	2708.250		59.49	-9.79	49.70	74.00	-24.30	119	109	Peak

Middle channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
915.250		121.19	1.99	123.18			100	308	Peak	915.250		120.51	1.98	122.49			100	342	Peak
915.250		119.91	1.99	121.90			100	308	QP	915.250		119.19	1.98	121.17			100	342	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1830.500		53.06	-13.80	39.26	54.00	-14.74	146	248	Average	1830.500		50.04	-13.80	36.24	54.00	-17.76	127	164	Average
1830.500		58.92	-13.80	45.12	74.00	-28.88	146	248	Peak	1830.500		56.62	-13.80	42.82	74.00	-31.18	127	164	Peak
2745.750		58.82	-9.96	48.86	54.00	-5.14	121	263	Average	2745.750		53.46	-9.96	43.50	54.00	-10.50	140	111	Average
2745.750		64.01	-9.96	54.05	74.00	-19.95	121	263	Peak	2745.750		59.38	-9.96	49.42	74.00	-24.58	140	111	Peak

High channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
927.250		120.66	2.35	123.01			100	4	Peak	927.250		119.39	2.35	121.74			100	325	Peak
927.250		119.52	2.35	121.87			100	4	QP	927.250		118.23	2.35	120.58			100	325	QP
928.000		59.62	2.38	62.00	101.87	-39.87	100	4	QP	928.000		59.28	2.38	61.66	100.58	-38.92	100	325	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1854.500		56.93	-13.62	43.31	54.00	-10.69	243	245	Average	1854.500		57.25	-13.62	43.63	54.00	-10.37	243	100	Average
1854.500		61.97	-13.62	48.35	74.00	-25.65	243	245	Peak	1854.500		61.87	-13.62	48.25	74.00	-25.75	243	100	Peak
2781.750		60.31	-10.07	50.24	54.00	-3.76	114	122	Average	2781.750		54.23	-10.07	44.16	54.00	-9.84	124	104	Average
2781.750		65.16	-10.07	55.09	74.00	-18.91	114	122	Peak	2781.750		59.15	-10.07	49.08	74.00	-24.92	124	104	Peak

Level = Reading + Factor.

Margin = Level - Limit.

Factor = Antenna Factor + Cable Loss - Amplifier Gain.

PR-ASK Mode: Antenna Port 3

Low channel																	
Horizontal									Vertical								
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
902.000	59.64	1.90	61.54	99.57	-38.03	100	306	QP	902.000	59.87	1.90	61.77	102.36	-40.59	100	309	QP
902.750	119.84	1.90	121.74			100	306	Peak	902.750	121.81	1.90	123.71			100	309	Peak
902.750	117.67	1.90	119.57			100	306	QP	902.750	120.46	1.90	122.36			100	309	QP
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1805.500	52.22	-14.00	38.22	54.00	-15.78	108	331	Average	1805.500	50.47	-14.00	36.47	54.00	-17.53	222	61	Average
1805.500	58.47	-14.00	44.47	74.00	-29.53	108	331	Peak	1805.500	57.22	-14.00	43.22	74.00	-30.78	222	61	Peak
2708.250	57.70	-9.79	47.91	54.00	-6.09	112	255	Average	2708.250	50.45	-9.79	40.66	54.00	-13.34	152	105	Average
2708.250	63.47	-9.79	53.68	74.00	-20.32	112	255	Peak	2708.250	56.79	-9.79	47.00	74.00	-27.00	152	105	Peak

Middle channel																	
Horizontal									Vertical								
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
915.250	122.15	1.99	124.14			100	325	Peak	915.250	121.55	1.98	123.53			100	315	Peak
915.250	121.07	1.99	123.06			100	325	QP	915.250	120.53	1.98	122.51			100	315	QP
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1830.500	52.05	-13.80	38.25	54.00	-15.75	138	321	Average	1830.500	49.70	-13.80	35.90	54.00	-18.10	105	169	Average
1830.500	58.32	-13.80	44.52	74.00	-29.48	138	321	Peak	1830.500	56.61	-13.80	42.81	74.00	-31.19	105	169	Peak
2745.750	57.04	-9.96	47.08	54.00	-6.92	147	258	Average	2745.750	52.01	-9.96	42.05	54.00	-11.95	137	172	Average
2745.750	62.61	-9.96	52.65	74.00	-21.35	147	258	Peak	2745.750	58.78	-9.96	48.82	74.00	-25.18	137	172	Peak

High channel																	
Horizontal									Vertical								
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
927.250	120.53	2.35	122.88			100	8	Peak	927.250	119.29	2.35	121.64			100	359	Peak
927.250	119.42	2.35	121.77			100	8	QP	927.250	118.09	2.35	120.44			100	359	QP
928.000	59.69	2.38	62.07	101.77	-39.70	100	8	QP	928.000	59.37	2.38	61.75	100.44	-38.69	100	359	QP
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1854.500	55.96	-13.62	42.34	54.00	-11.66	239	315	Average	1854.500	53.21	-13.62	39.59	54.00	-14.41	126	174	Average
1854.500	60.71	-13.62	47.09	74.00	-26.91	239	315	Peak	1854.500	58.32	-13.62	44.70	74.00	-29.30	126	174	Peak
2781.750	58.16	-10.07	48.09	54.00	-5.91	113	120	Average	2781.750	53.06	-10.07	42.99	54.00	-11.01	155	113	Average
2781.750	63.07	-10.07	53.00	74.00	-21.00	113	120	Peak	2781.750	58.40	-10.07	48.33	74.00	-25.67	155	113	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

PR-ASK Mode: Antenna Port 4

Low channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
902.000		59.78	1.90	61.68	102.81	-41.13	100	316	QP	902.000		59.62	1.90	61.52	102.51	-40.99	100	311	QP
902.750		122.11	1.90	124.01			100	316	Peak	902.750		121.68	1.90	123.58			100	311	Peak
902.750		120.91	1.90	122.81			100	316	QP	902.750		120.61	1.90	122.51			100	311	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1805.500		51.23	-14.00	37.23	54.00	-16.77	141	111	Average	1805.500		51.41	-14.00	37.41	54.00	-16.59	188	47	Average
1805.500		59.11	-14.00	45.11	74.00	-28.89	141	111	Peak	1805.500		58.22	-14.00	44.22	74.00	-29.78	188	47	Peak
2708.250		54.05	-9.79	44.26	54.00	-9.74	115	255	Average	2708.250		46.83	-9.79	37.04	54.00	-16.96	244	343	Average
2708.250		61.51	-9.79	51.72	74.00	-22.28	115	255	Peak	2708.250		54.83	-9.79	45.04	74.00	-28.96	244	343	Peak

Middle channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
915.250		119.30	1.98	121.28			100	332	Peak	915.250		119.57	1.98	121.55			100	340	Peak
915.250		118.20	1.98	120.18			100	332	QP	915.250		118.33	1.98	120.31			100	340	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1830.500		49.07	-13.00	35.27	54.00	-18.73	112	236	Average	1830.500		51.99	-13.00	38.19	54.00	-15.81	208	100	Average
1830.500		56.68	-13.00	42.88	74.00	-31.12	112	238	Peak	1830.500		58.90	-13.00	45.10	74.00	-28.90	208	100	Peak
2745.750		54.79	-9.96	44.83	54.00	-9.17	108	238	Average	2745.750		48.49	-9.96	38.53	54.00	-15.47	194	175	Average
2745.750		61.05	-9.96	51.09	74.00	-22.91	108	238	Peak	2745.750		56.04	-9.96	46.08	74.00	-27.92	194	175	Peak

High channel																			
Horizontal									Vertical										
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
927.250		121.39	2.35	123.74			100	11	Peak	927.250		119.36	2.35	121.71			100	343	Peak
927.250		120.15	2.35	122.50			100	11	QP	927.250		118.25	2.35	120.60			100	343	QP
928.000		59.74	2.38	62.12	102.50	-40.38	100	11	QP	928.000		59.63	2.38	62.01	100.60	-38.59	100	343	QP
Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark	Freq.		Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)		MHz		dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
1854.500		52.99	-13.62	39.37	54.00	-14.63	177	234	Average	1854.500		52.59	-13.62	38.97	54.00	-15.03	167	96	Average
1854.500		58.12	-13.62	44.50	74.00	-29.50	177	234	Peak	1854.500		58.14	-13.62	44.52	74.00	-29.48	167	96	Peak
2781.750		56.15	-10.07	46.08	54.00	-7.92	144	277	Average	2781.750		50.64	-10.07	40.57	54.00	-13.43	110	7	Average
2781.750		61.81	-10.07	51.74	74.00	-22.26	144	277	Peak	2781.750		56.39	-10.07	46.32	74.00	-27.68	110	7	Peak

Level = Reading + Factor.

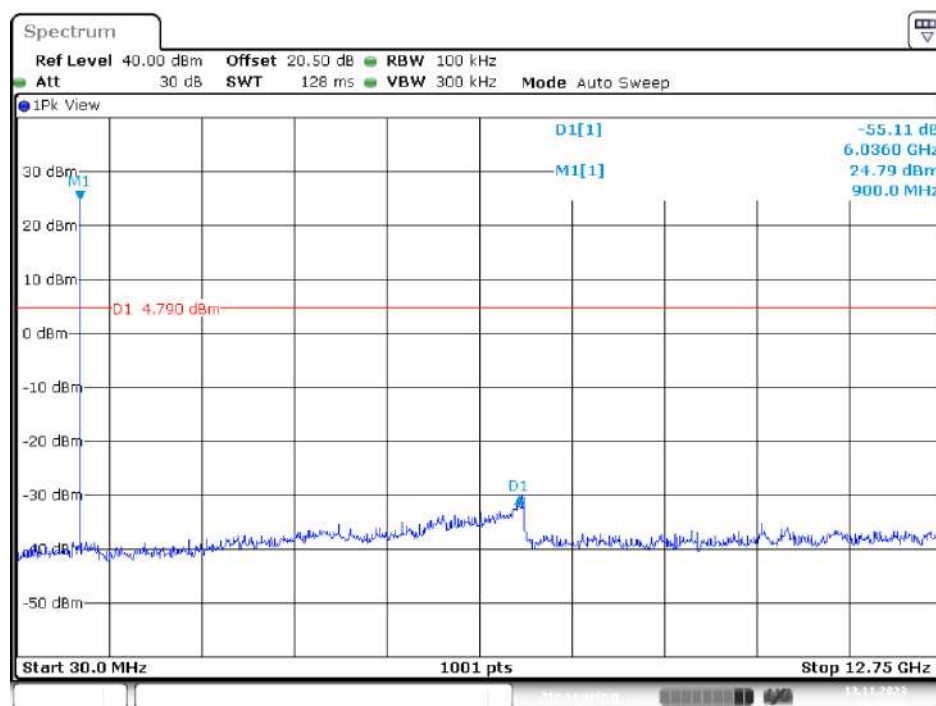
Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

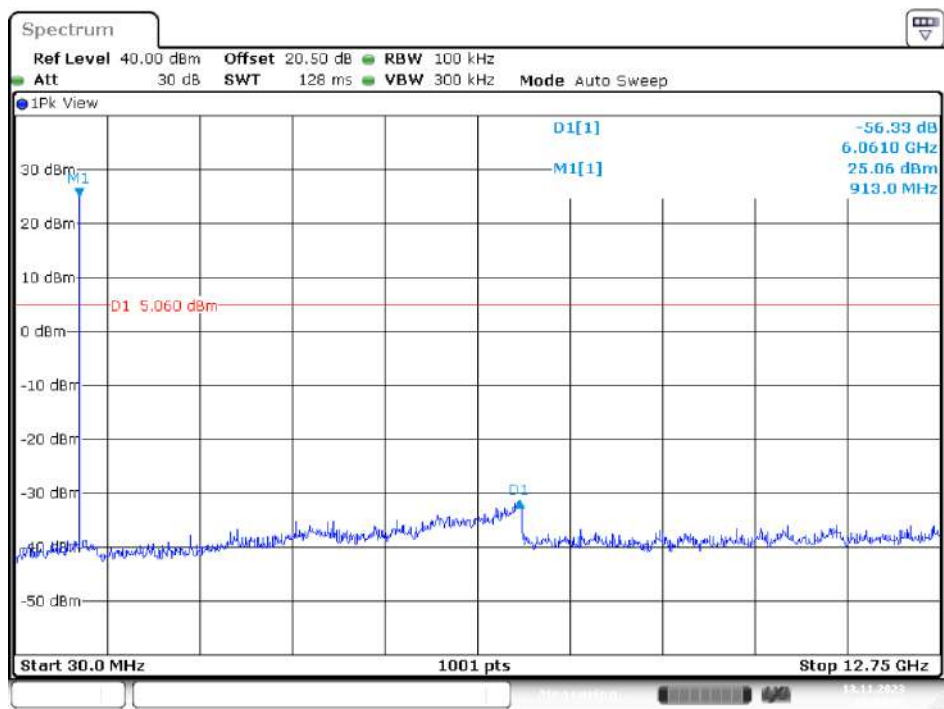
Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)				Delta Peak to Band Emission (dBc)	Result
		Antenna Port 1	Antenna Port 2	Antenna Port 3	Antenna Port 4		
DSB-ASK							
Low	902.75	55.11	55.10	56.78	55.46	≥ 20	Pass
Mid	915.25	56.33	56.98	58.18	55.87	≥ 20	Pass
High	927.25	55.86	56.59	55.23	58.90	≥ 20	Pass
PR-ASK							
Low	902.75	57.94	58.69	57.96	58.18	≥ 20	Pass
Mid	915.25	57.28	58.15	58.57	57.51	≥ 20	Pass
High	927.25	58.28	59.06	57.09	57.06	≥ 20	Pass

**DSB-ASK Mode Antenna Port 1
Low Channel**

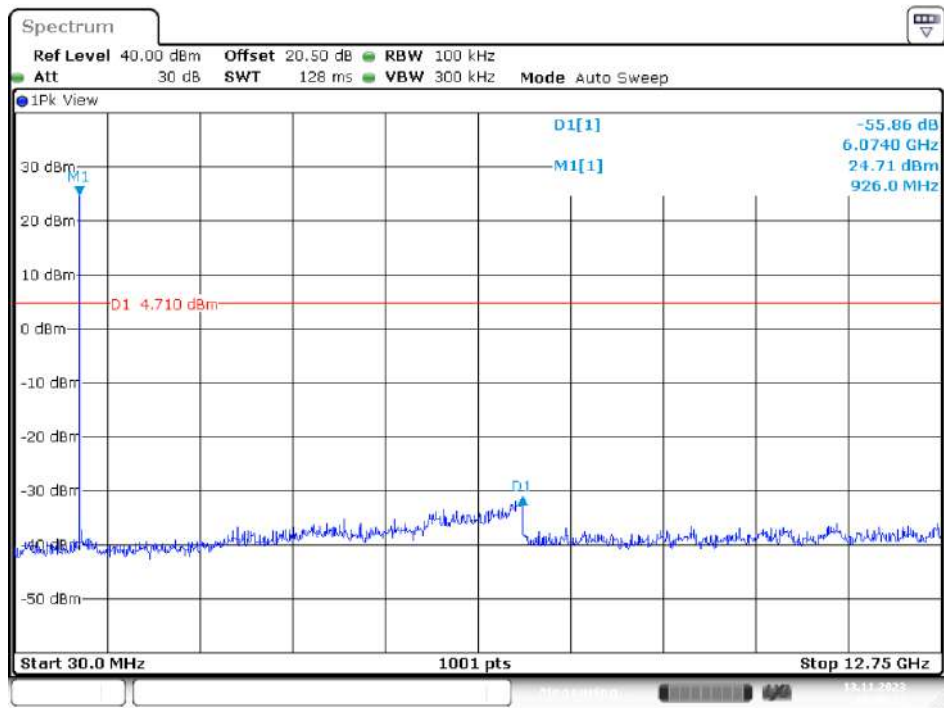


Middle Channel



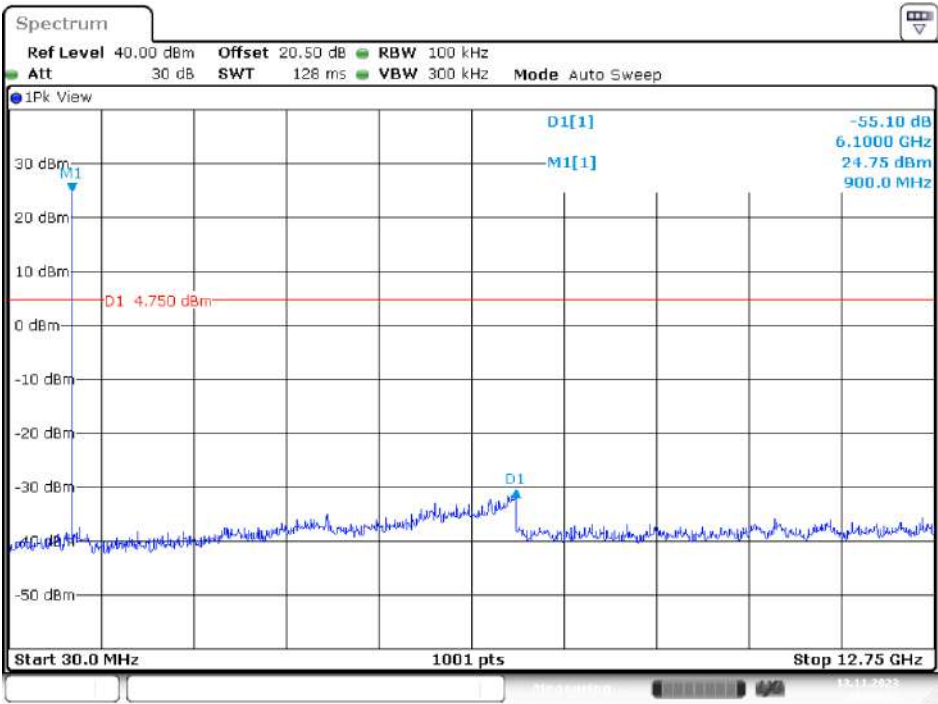
Date: 13.NOV.2023 16:44:52

High Channel



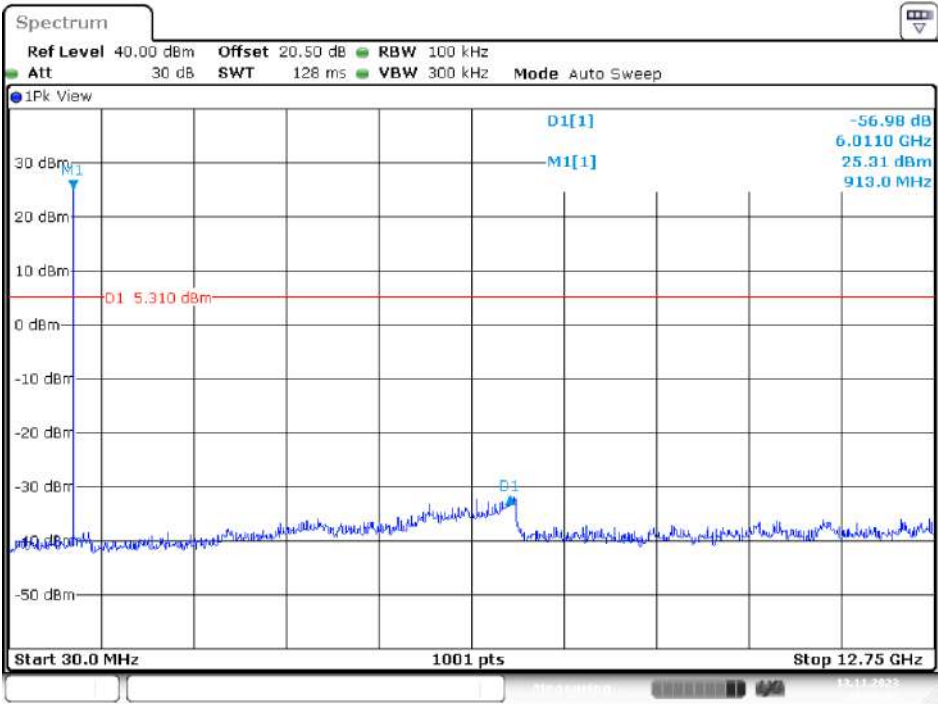
Date: 13.NOV.2023 16:46:12

DSB-ASK Mode Antenna Port 2
Low Channel



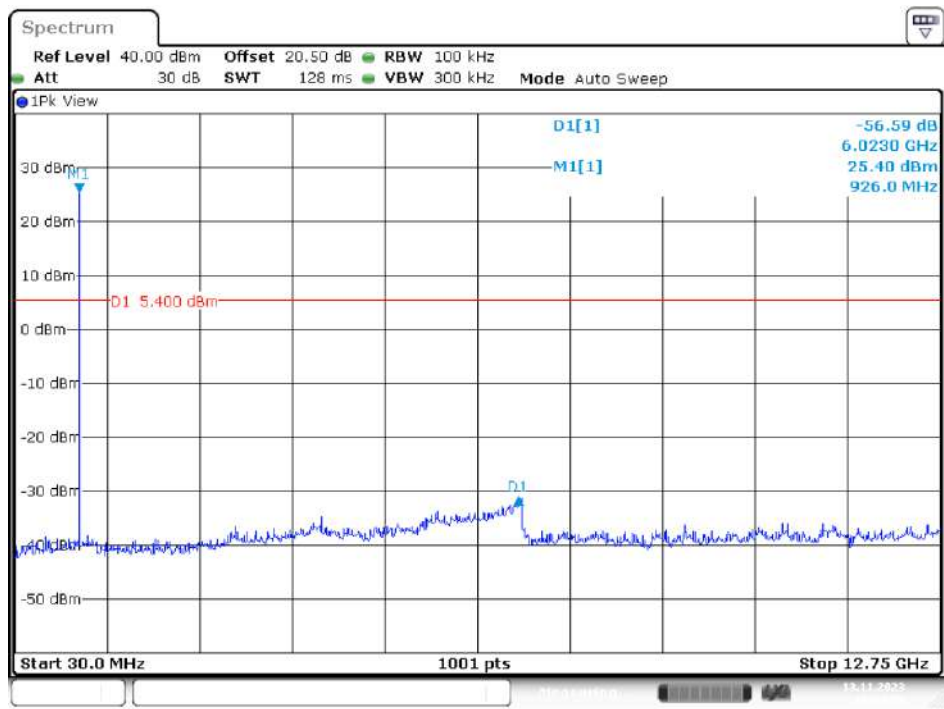
Date: 13.NOV.2023 16:57:24

Middle Channel



Date: 13.NOV.2023 16:56:15

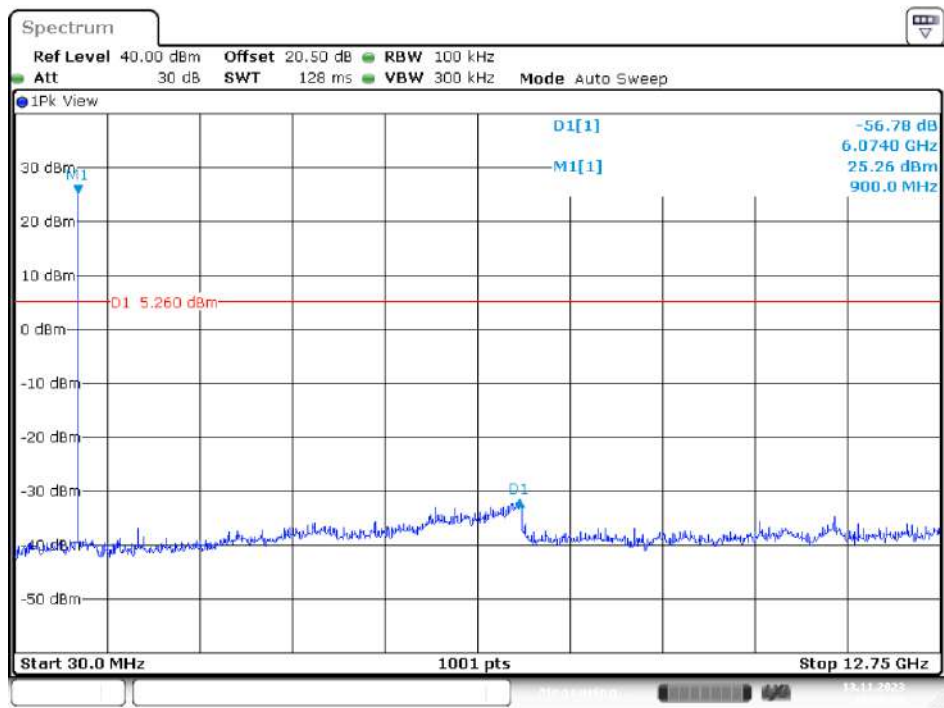
High Channel



Date: 13.NOV.2023 16:54:59

DSB-ASK Mode Antenna Port 3

Low Channel



Date: 13.NOV.2023 16:58:59

Spectrum

Ref Level 40.00 dBm Offset 20.50 dB RBW 100 kHz
 Att 30 dB SWT 128 ms VBW 300 kHz Mode Auto Sweep

1Pk View

30 dBm
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm

D1[1] ~58.18 dB
 6.0870 GHz
 27.21 dBm
 913.0 MHz

M1[1]

D1 7.210 dBm

D1

Start 30.0 MHz 1001 pts Stop 12.75 GHz

Date: 13.NOV.2023 17:00:10

Spectrum

Ref Level 40.00 dBm Offset 20.50 dB RBW 100 kHz
 Att 30 dB SWT 128 ms VBW 300 kHz Mode Auto Sweep

1Pk View

30 dBm
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm

D1[1] -55.23 dB
 6.0490 GHz
 25.21 dBm
 926.0 MHz

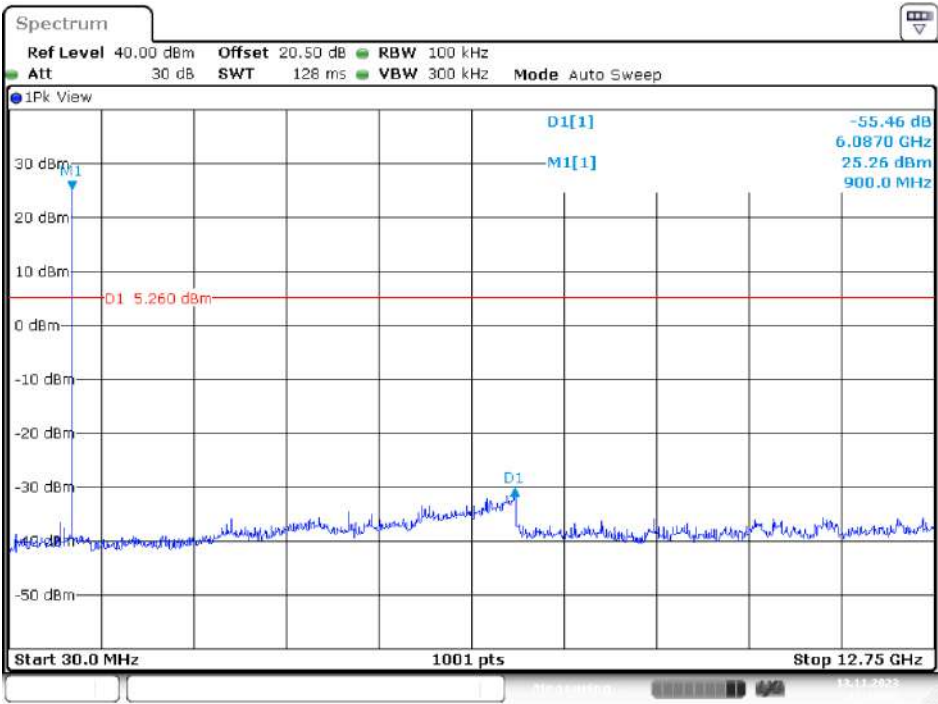
M1[1]

D1 5.210 dBm

Start 30.0 MHz 1001 pts Stop 12.75 GHz

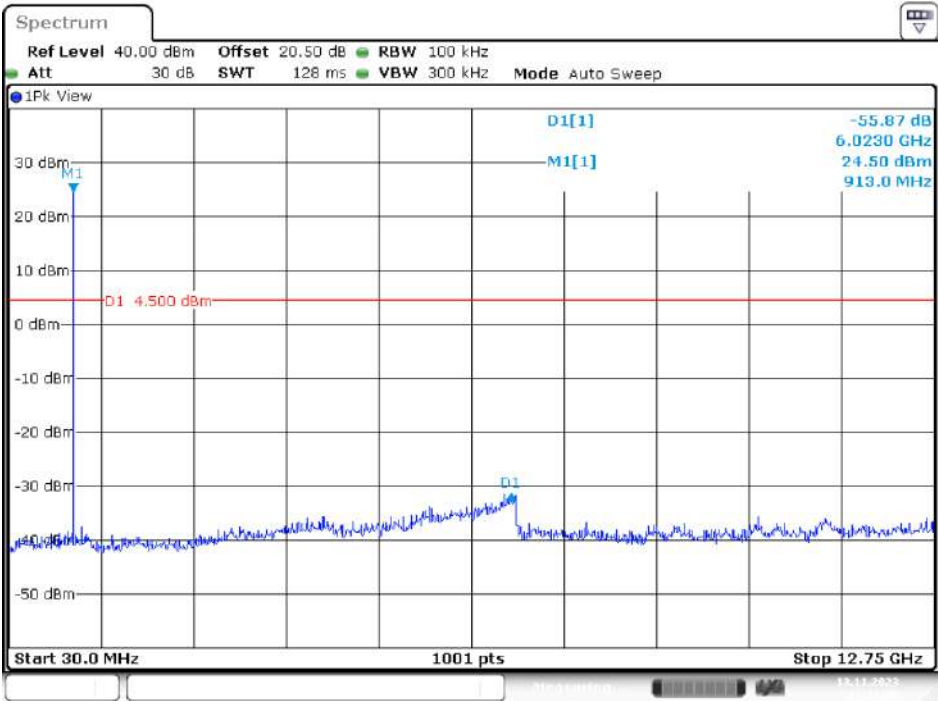
Date: 13.NOV.2023 17:01:16

DSB-ASK Mode Antenna Port 4
Low Channel



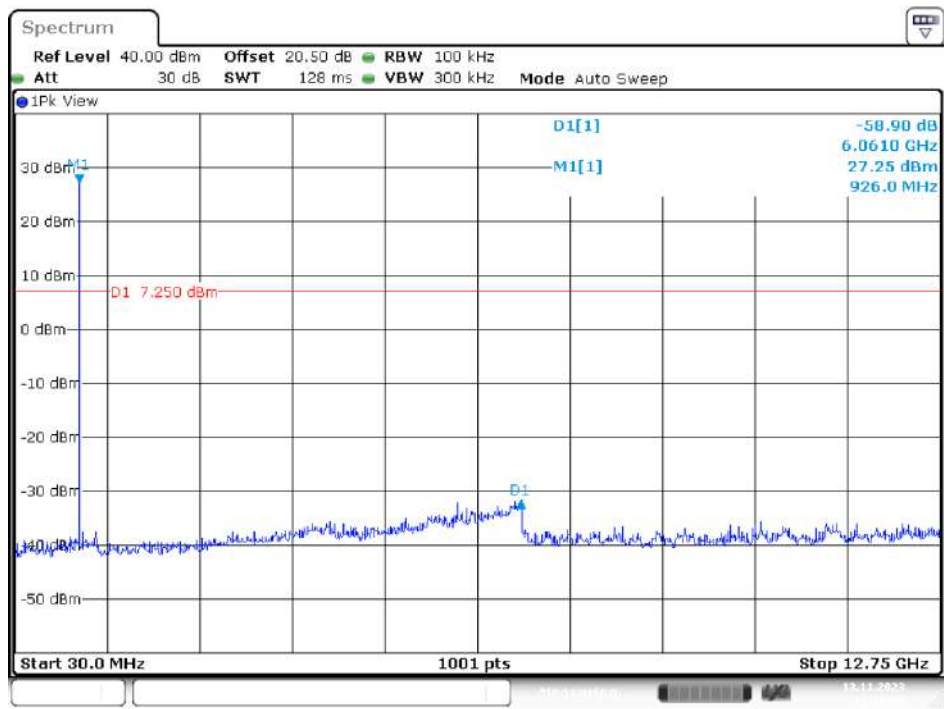
Date: 13.NOV.2023 17:12:52

Middle Channel



Date: 13.NOV.2023 17:11:36

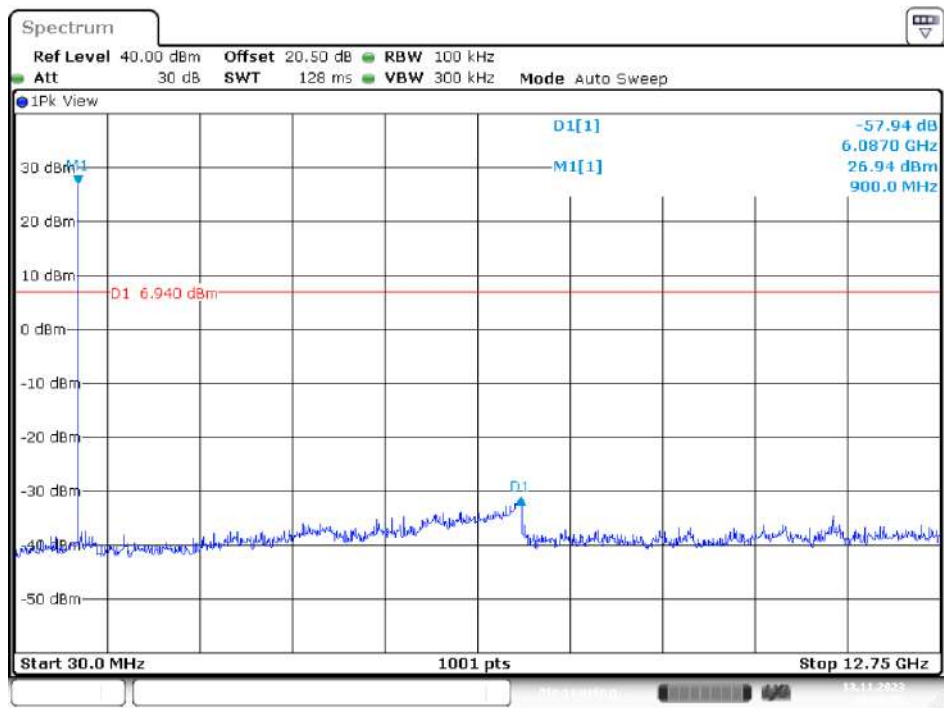
High Channel



Date: 13.NOV.2023 17:10:30

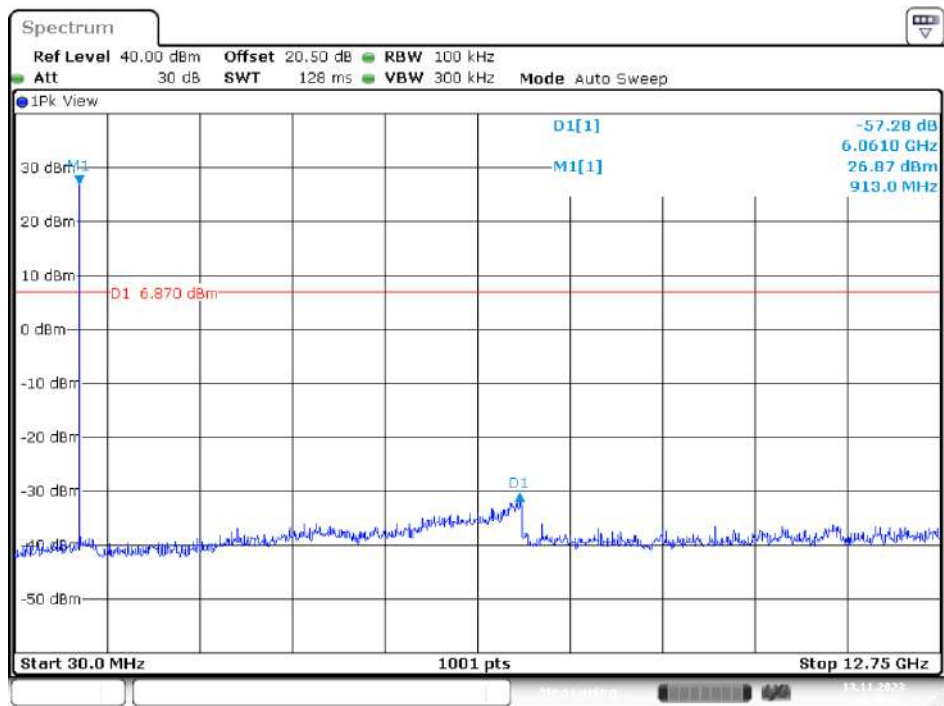
PR-ASK Mode Antenna Port 1

Low Channel



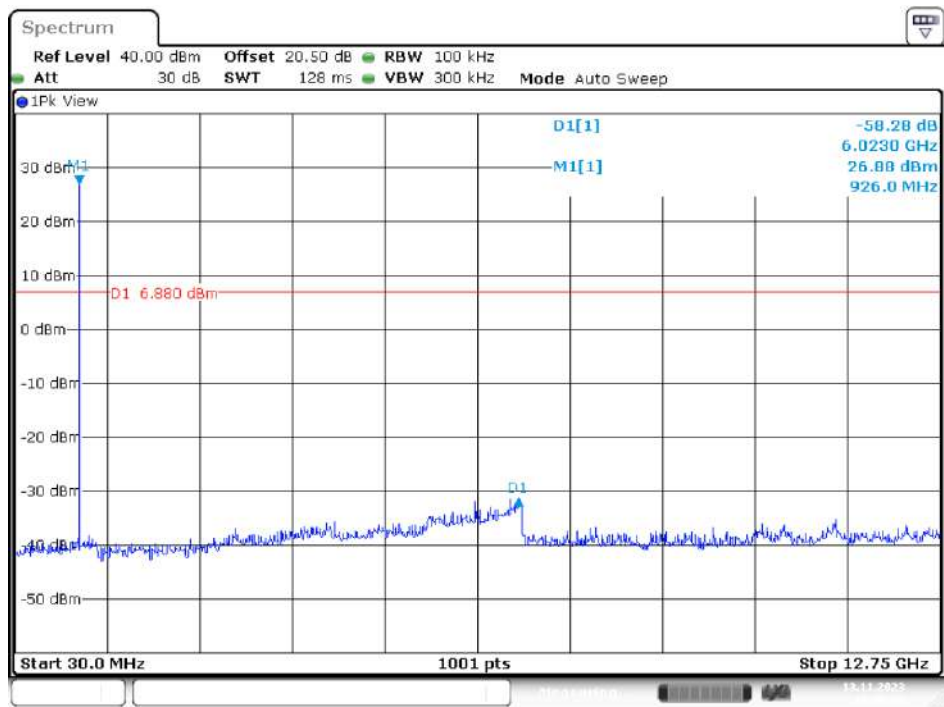
Date: 13.NOV.2023 16:50:26

Middle Channel



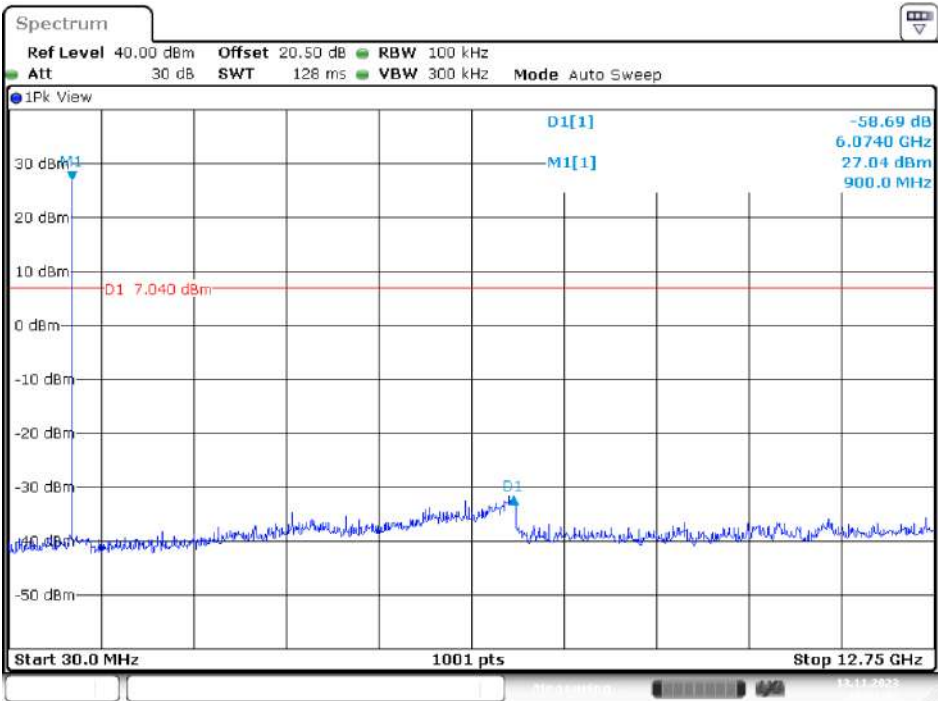
Date: 13.NOV.2023 16:49:22

High Channel



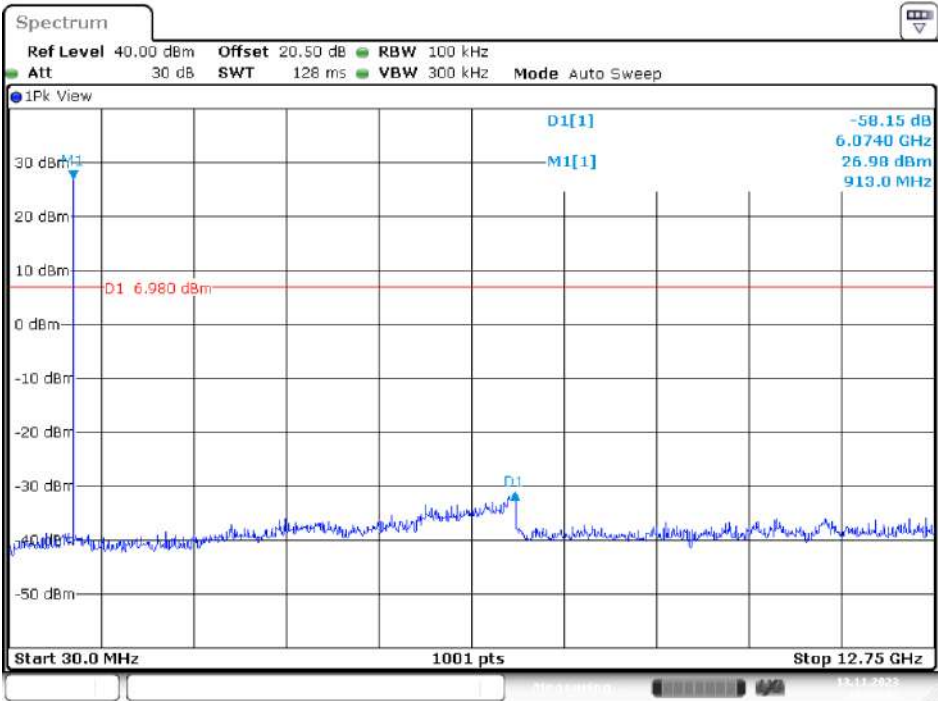
Date: 13.NOV.2023 16:48:26

PR-ASK Mode Antenna Port 2
Low Channel



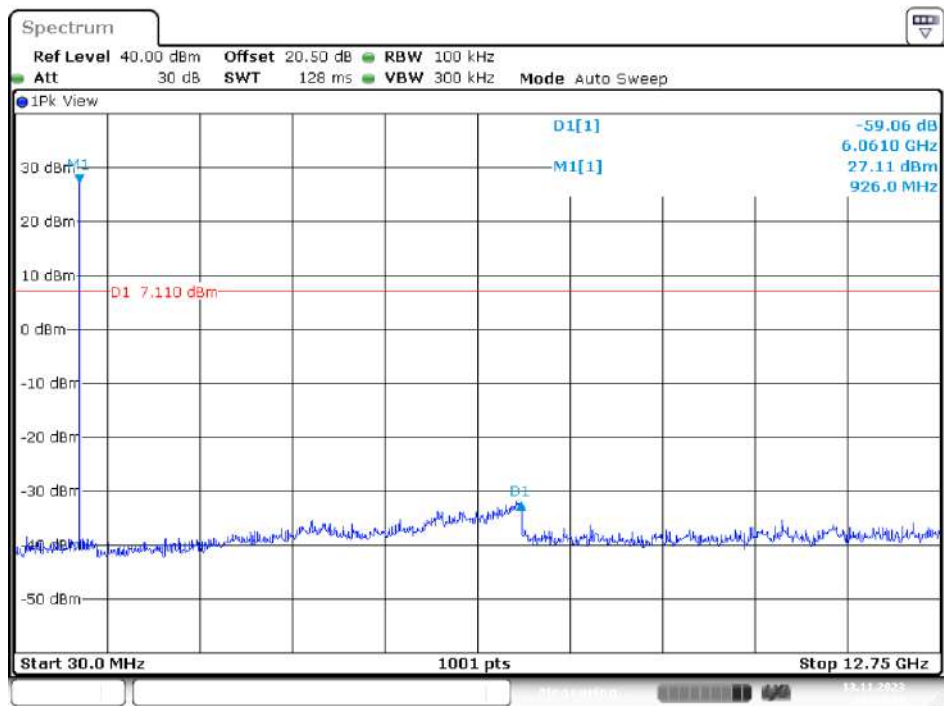
Date: 13.NOV.2023 16:51:43

Middle Channel



Date: 13.NOV.2023 16:53:06

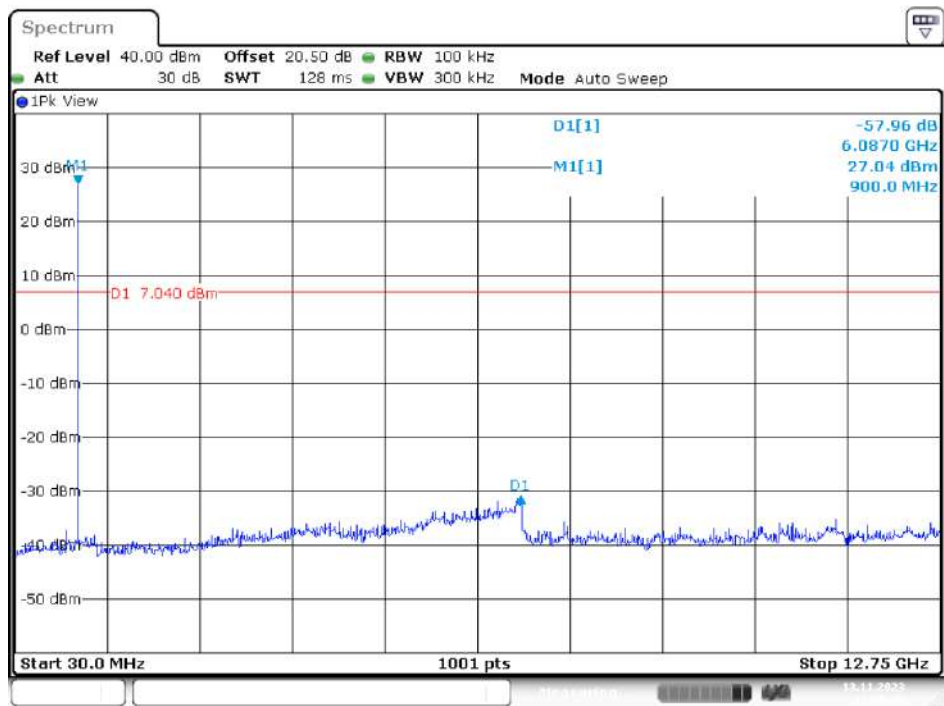
High Channel



Date: 13.NOV.2023 16:54:04

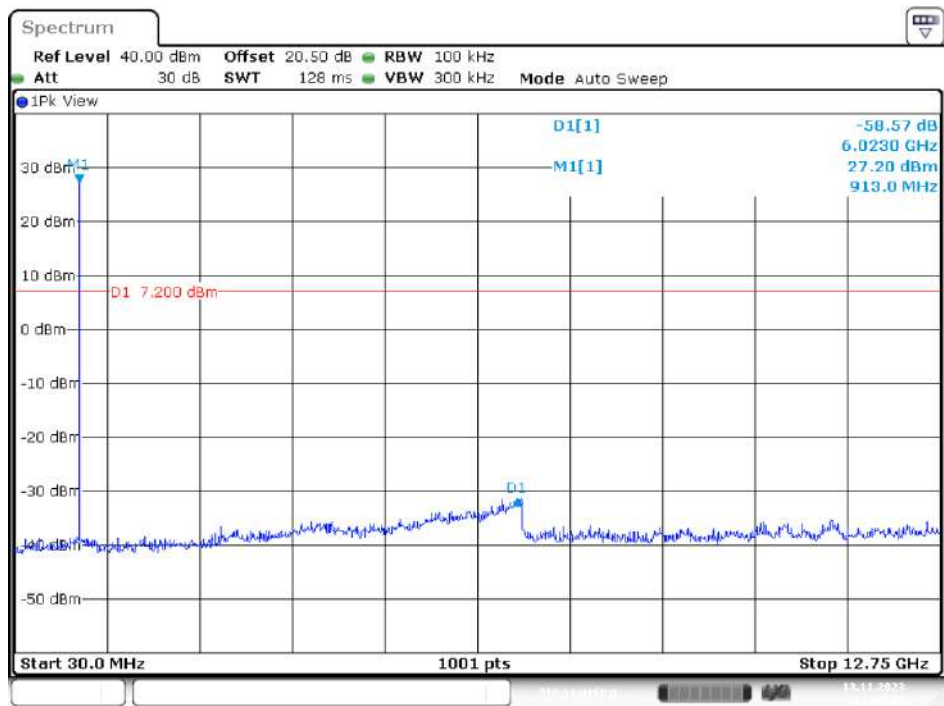
PR-ASK Mode Antenna Port 3

Low Channel



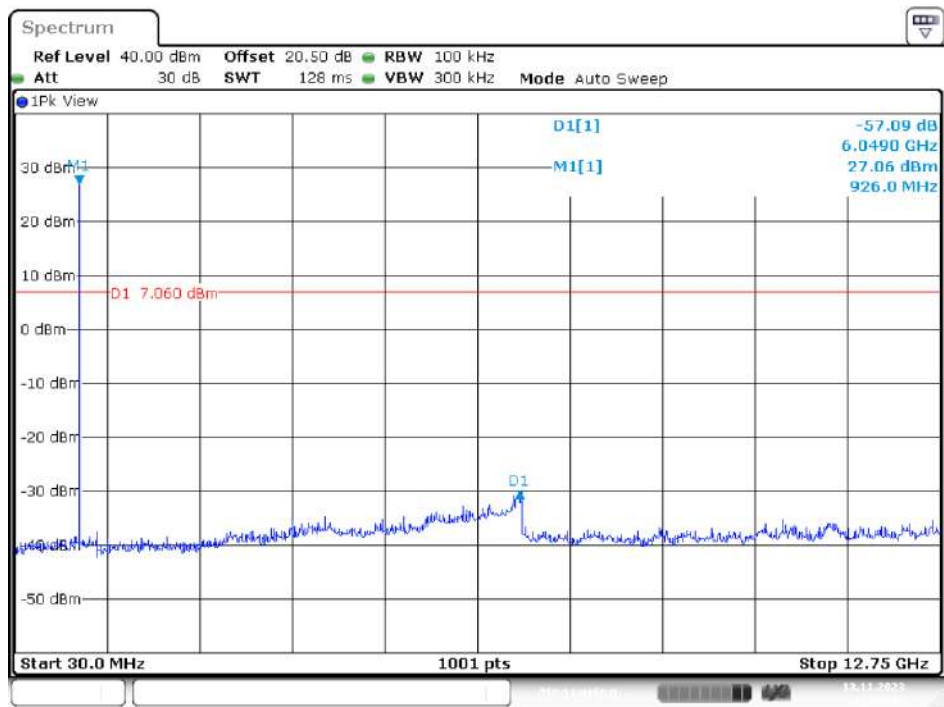
Date: 13.NOV.2023 17:05:36

Middle Channel



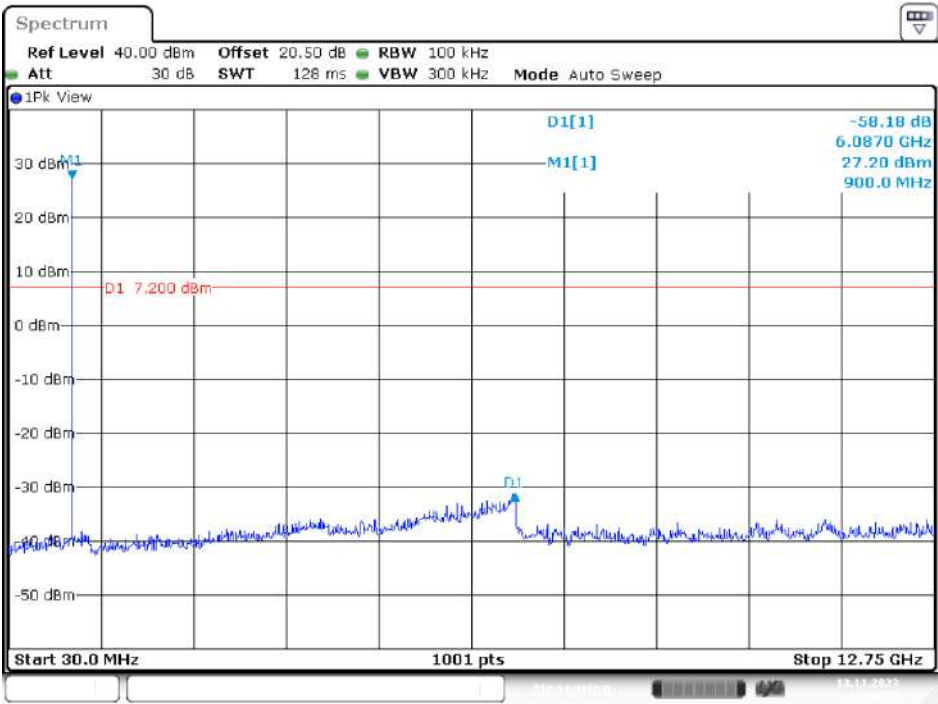
Date: 13.NOV.2023 17:04:03

High Channel



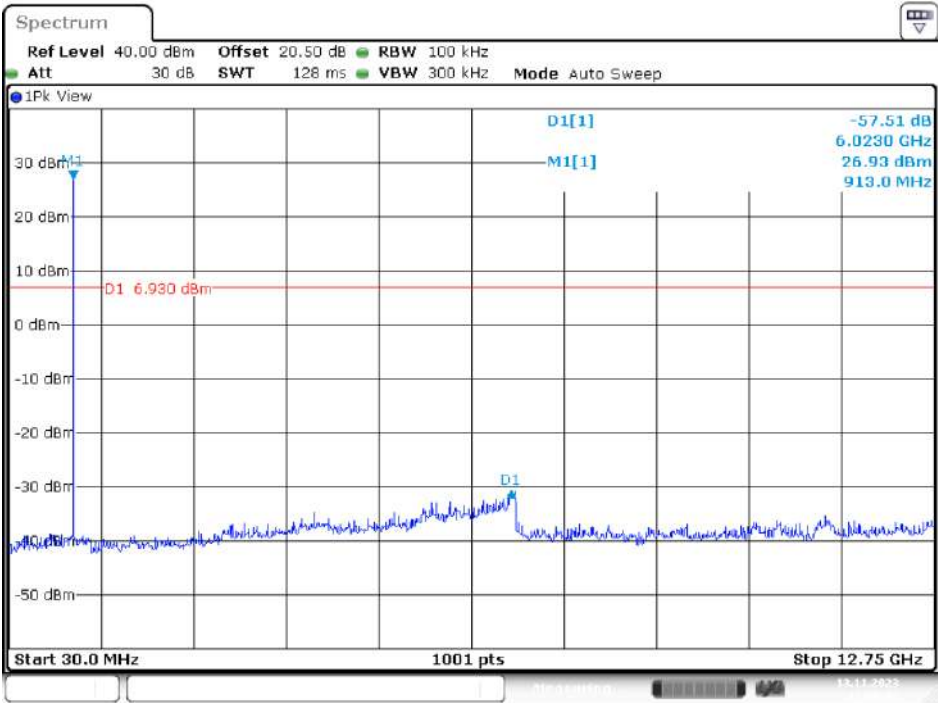
Date: 13.NOV.2023 17:02:34

PR-ASK Mode Antenna Port 4
Low Channel



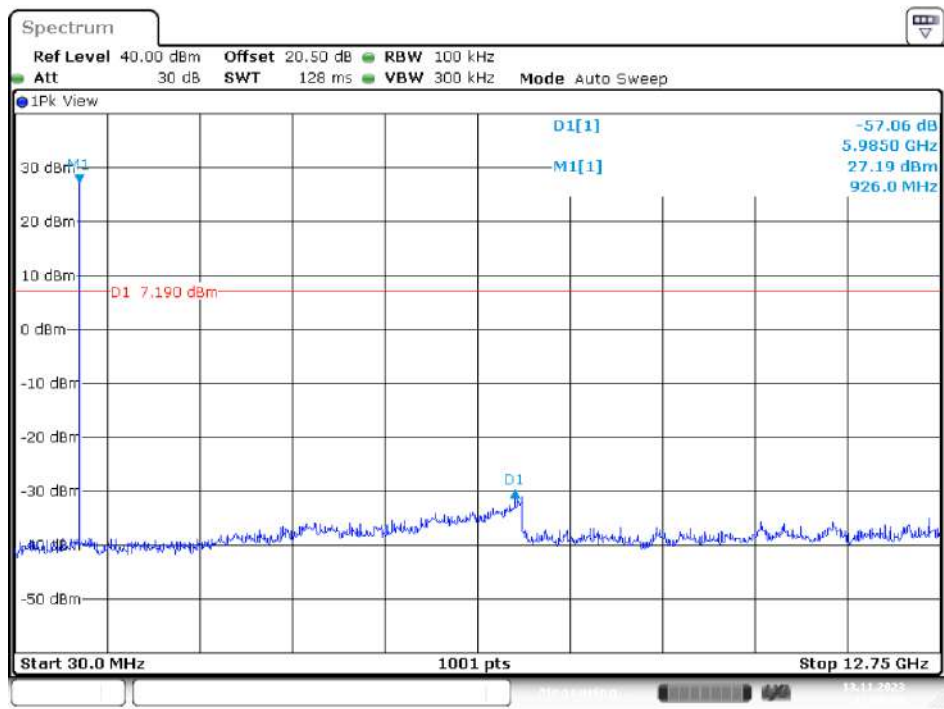
Date: 13.NOV.2023 17:06:56

Middle Channel



Date: 13.NOV.2023 17:08:06

High Channel



9. FCC §15.247(a)(1) – 20 dB Emission Bandwidth

9.1. Applicable Standard

According to FCC §15.247(a) (1) the maximum 20 dB bandwidth of the hopping channel shall be presented.

9.2. Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

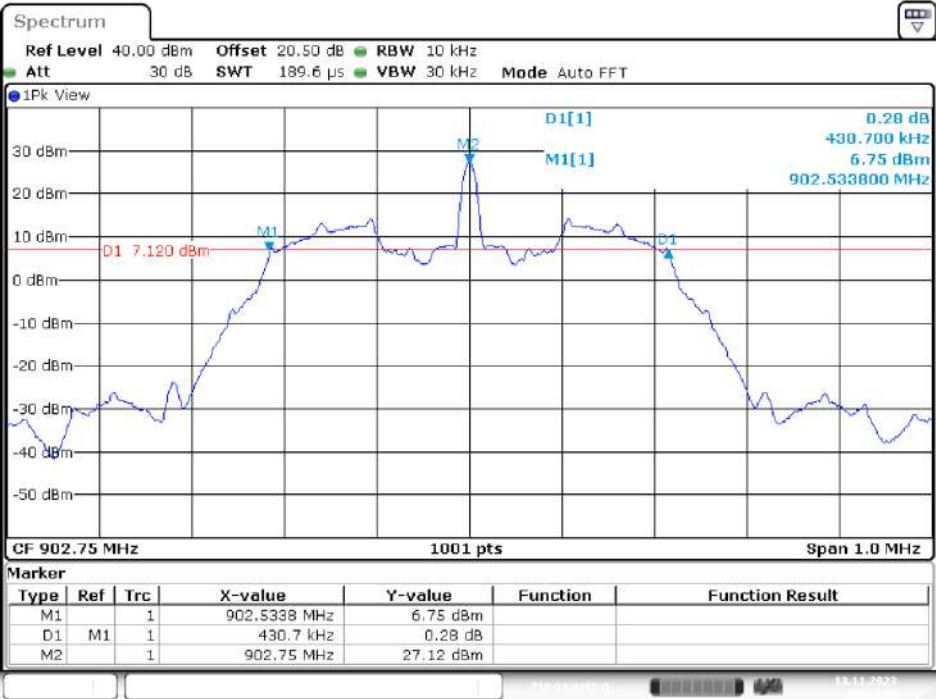
- (1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- (2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- (3) Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- (4) Repeat above procedures until all frequencies measured were complete.

9.3. Test Results

Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)				Limit (kHz)	Result
		Antenna Port 1	Antenna Port 2	Antenna Port 3	Antenna Port 4		
DSB-ASK							
Low	902.75	430.70	428.60	430.60	429.60	<500	Pass
Mid	915.25	429.60	431.60	429.60	430.60	<500	Pass
High	927.25	368.60	353.60	353.60	369.60	<500	Pass
PR-ASK							
Low	902.75	210.80	210.80	210.80	210.80	<500	Pass
Mid	915.25	210.80	210.80	210.80	210.80	<500	Pass
High	927.25	205.80	203.80	203.80	205.80	<500	Pass

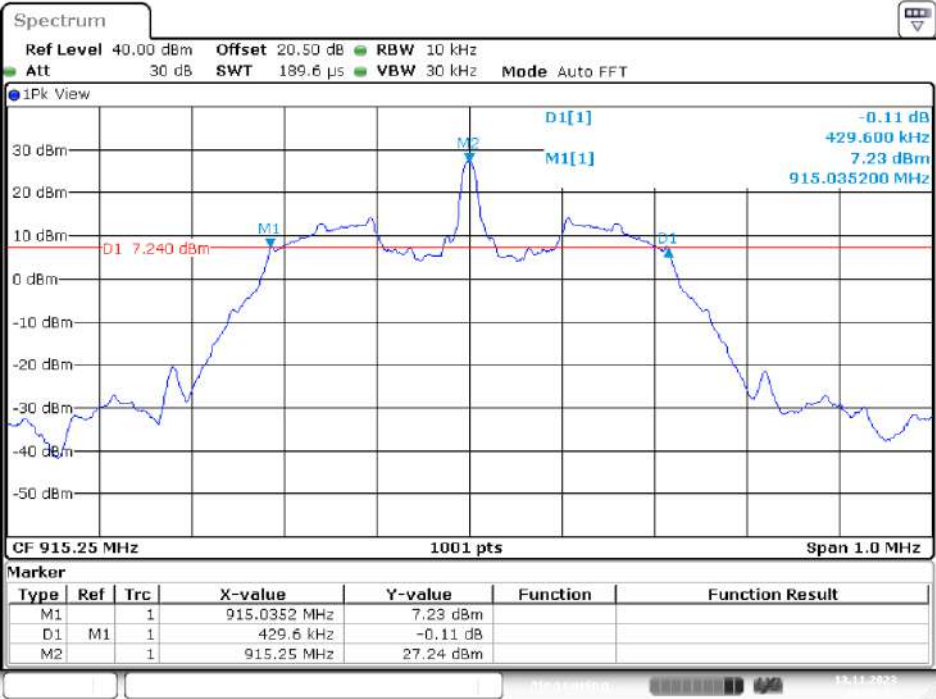
Please refer to the following plots

DSB-ASK Mode Antenna Port 1
Low Channel



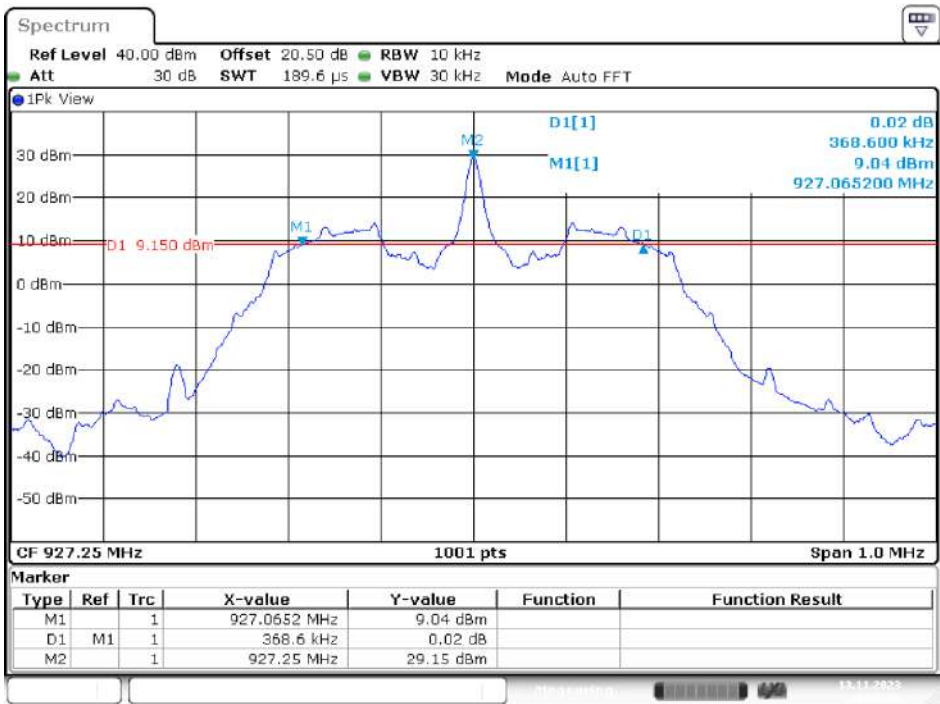
Date: 13.NOV.2023 14:24:39

Middle Channel



Date: 13.NOV.2023 14:26:23

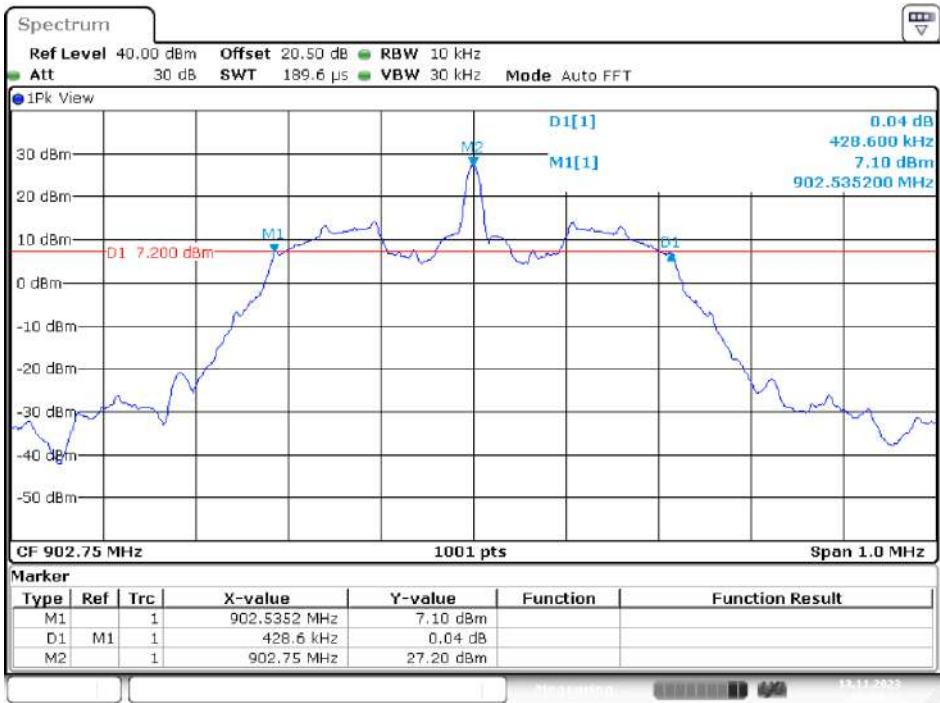
High Channel



Date: 13.NOV.2023 14:28:18

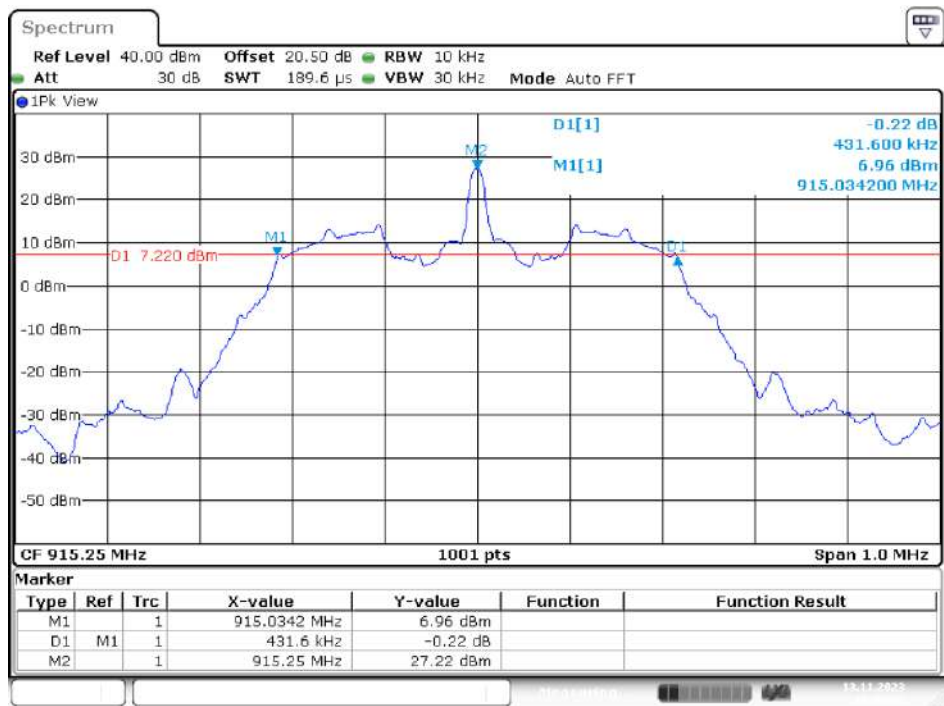
DSB-ASK Mode Antenna Port 2

Low Channel



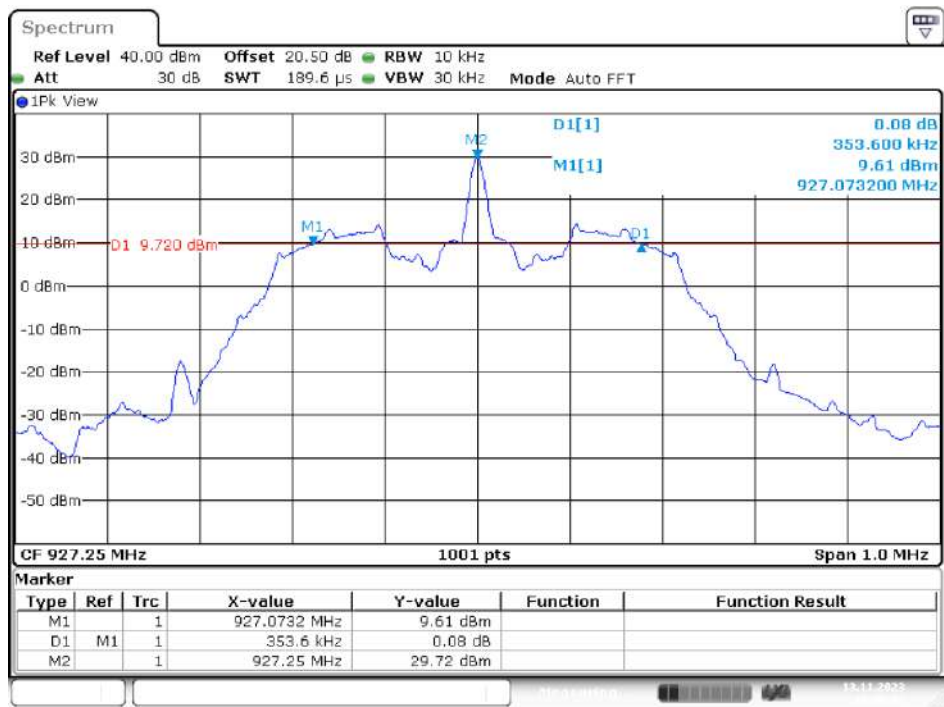
Date: 13.NOV.2023 14:44:12

Middle Channel



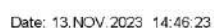
Date: 13.NOV.2023 14:42:36

High Channel



Date: 13.NOV.2023 14:40:42

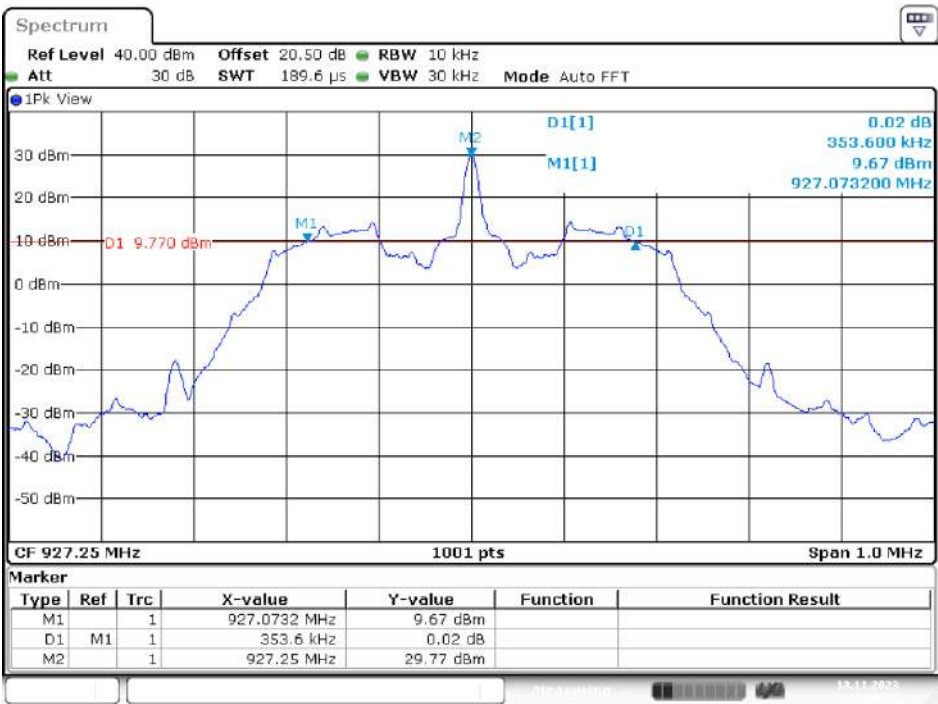
Low Channel



Middle Channel



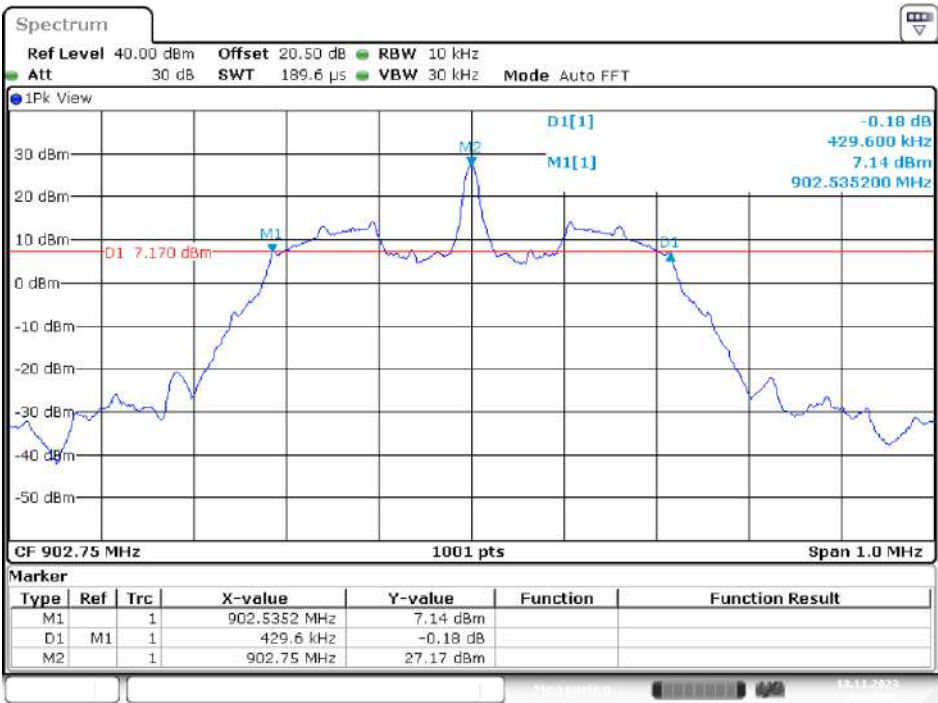
High Channel



Date: 13.NOV.2023 14:50:43

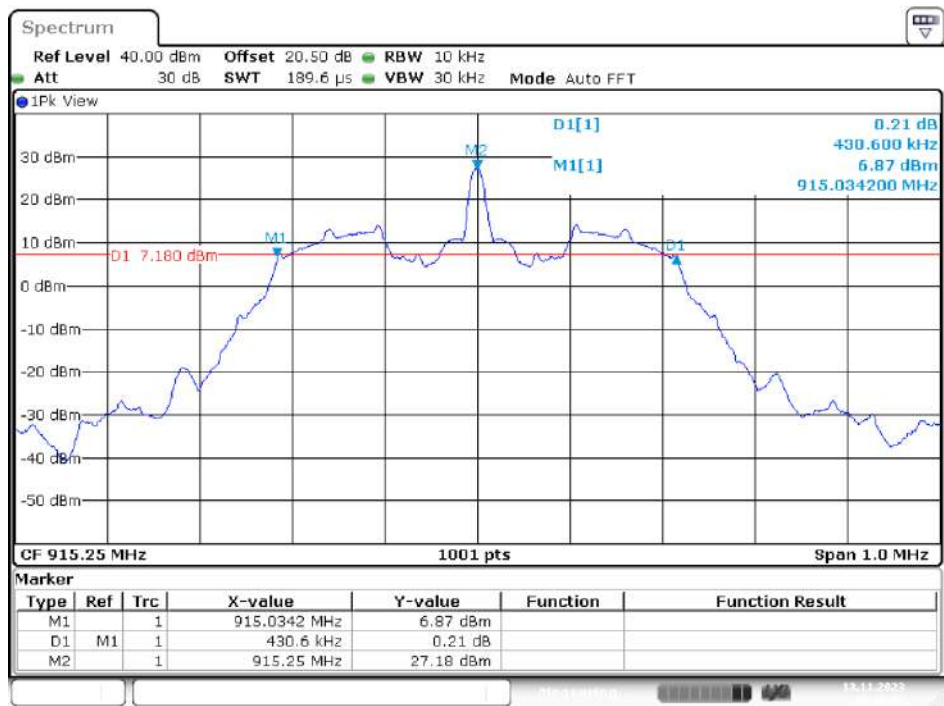
DSB-ASK Mode Antenna Port 4

Low Channel



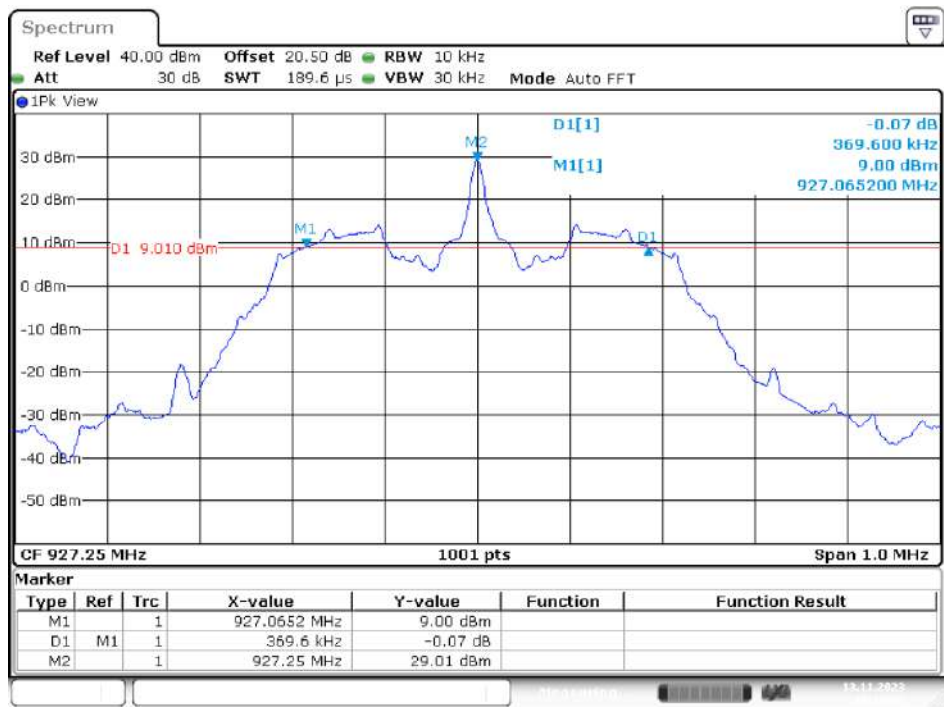
Date: 13.NOV.2023 15:20:37

Middle Channel



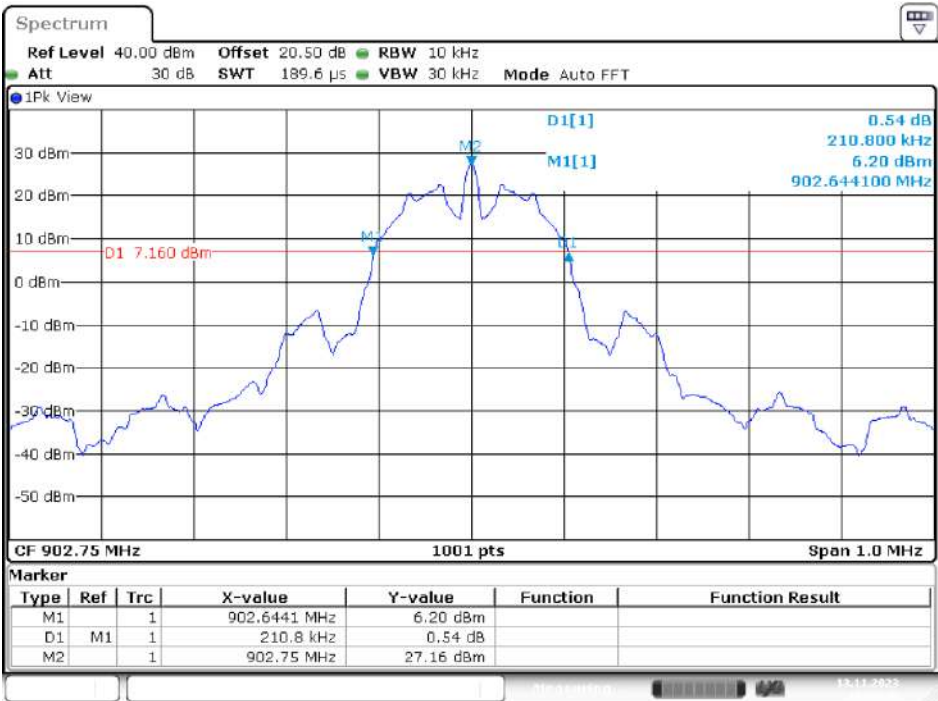
Date: 13.NOV.2023 15:19:06

High Channel



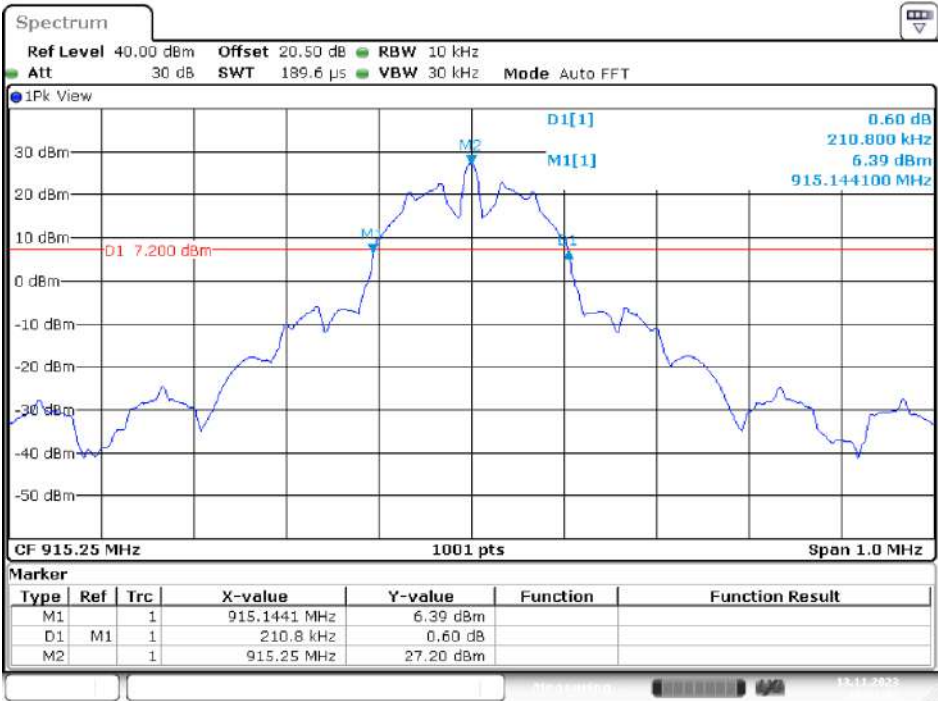
Date: 13.NOV.2023 15:17:22

PR-ASK Mode Antenna Port 1
Low Channel



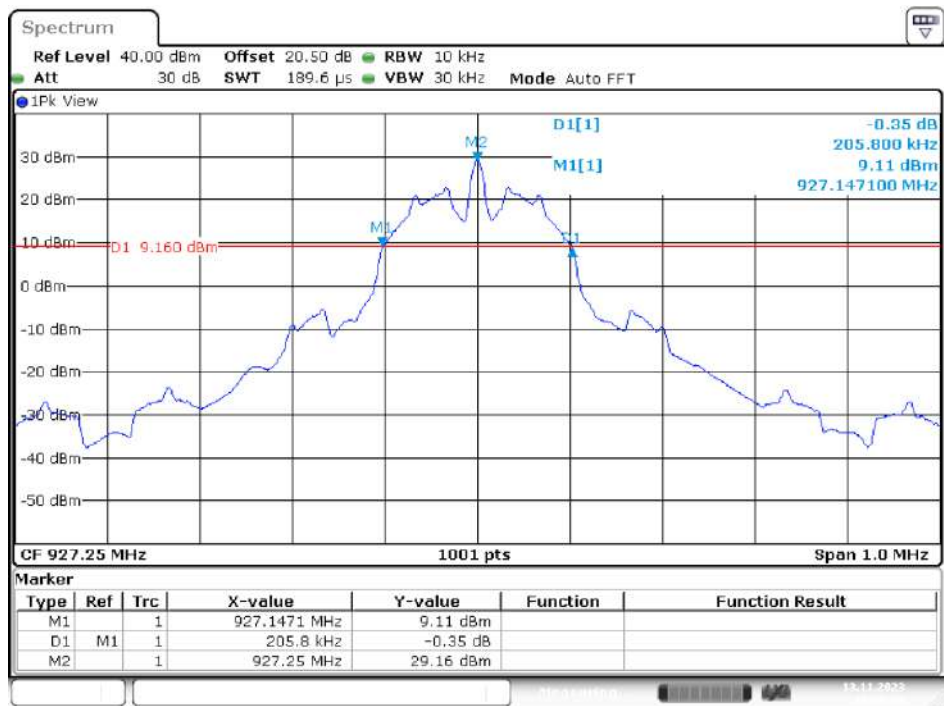
Date: 13.NOV.2023 14:33:36

Middle Channel



Date: 13.NOV.2023 14:31:38

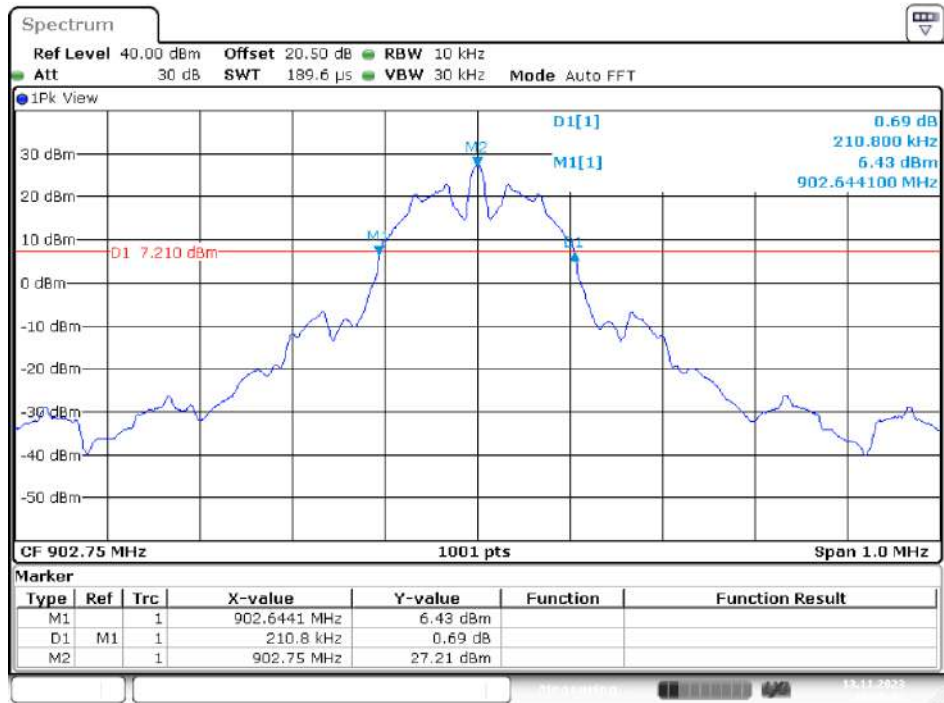
High Channel



Date: 13.NOV.2023 14:29:50

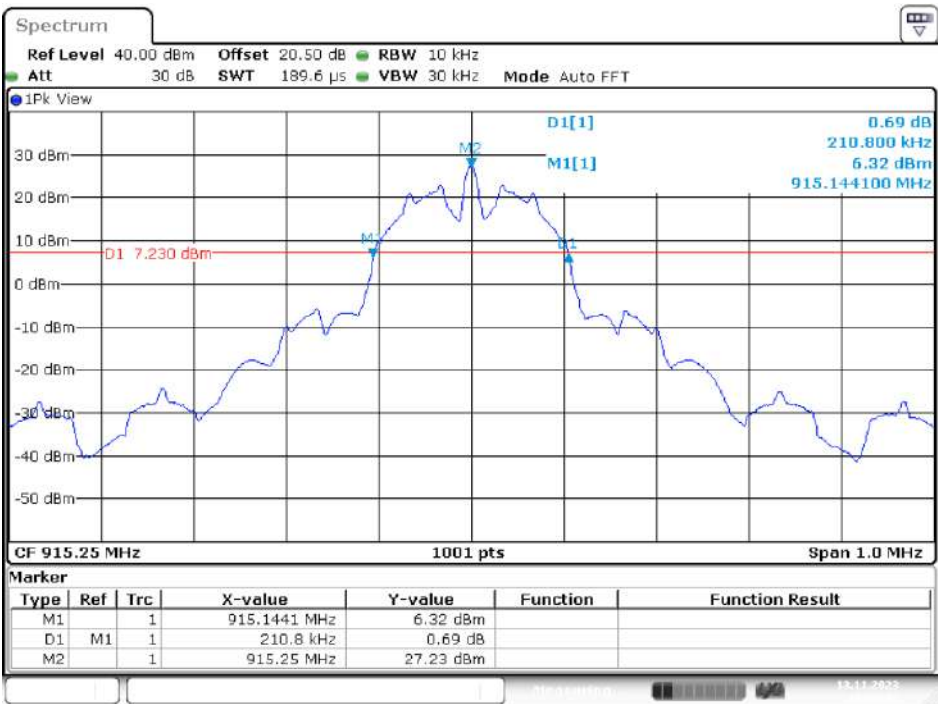
PR-ASK Mode Antenna Port 2

Low Channel



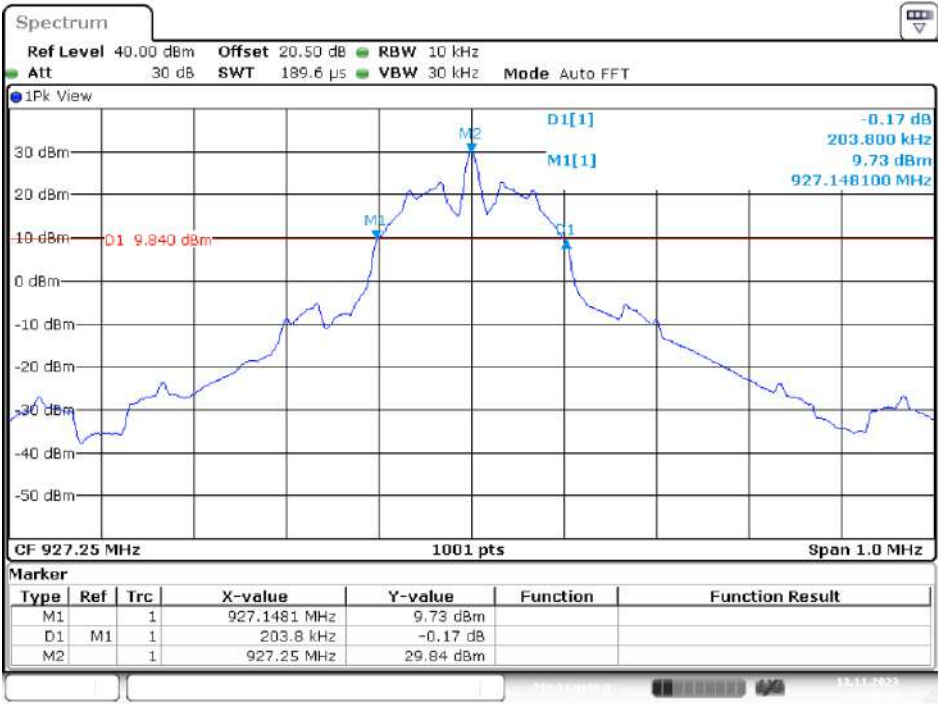
Date: 13.NOV.2023 14:35:15

Middle Channel



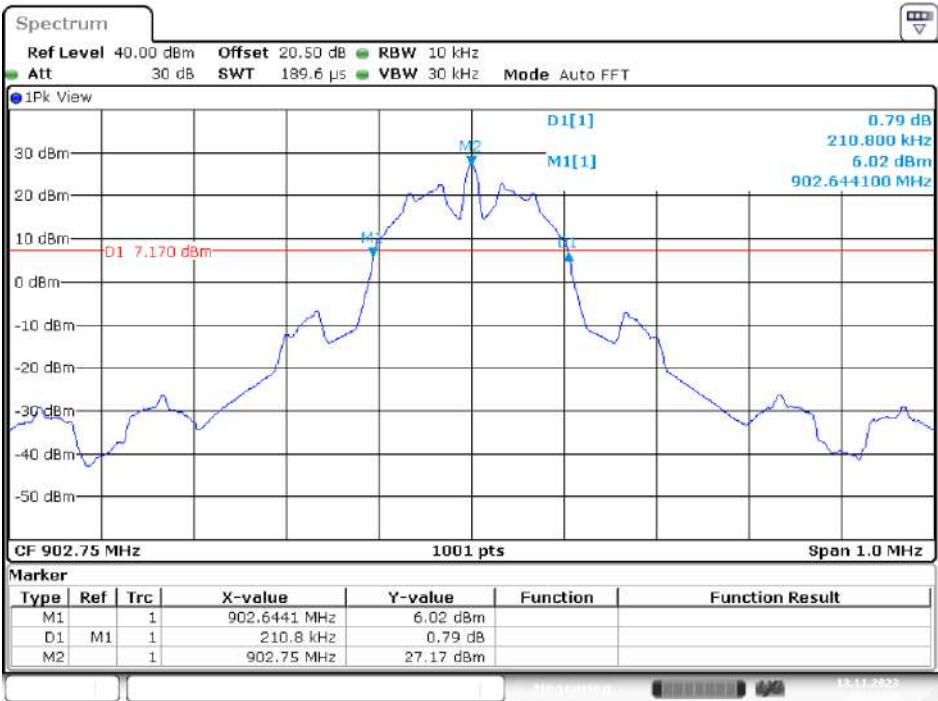
Date: 13.NOV.2023 14:37:03

High Channel



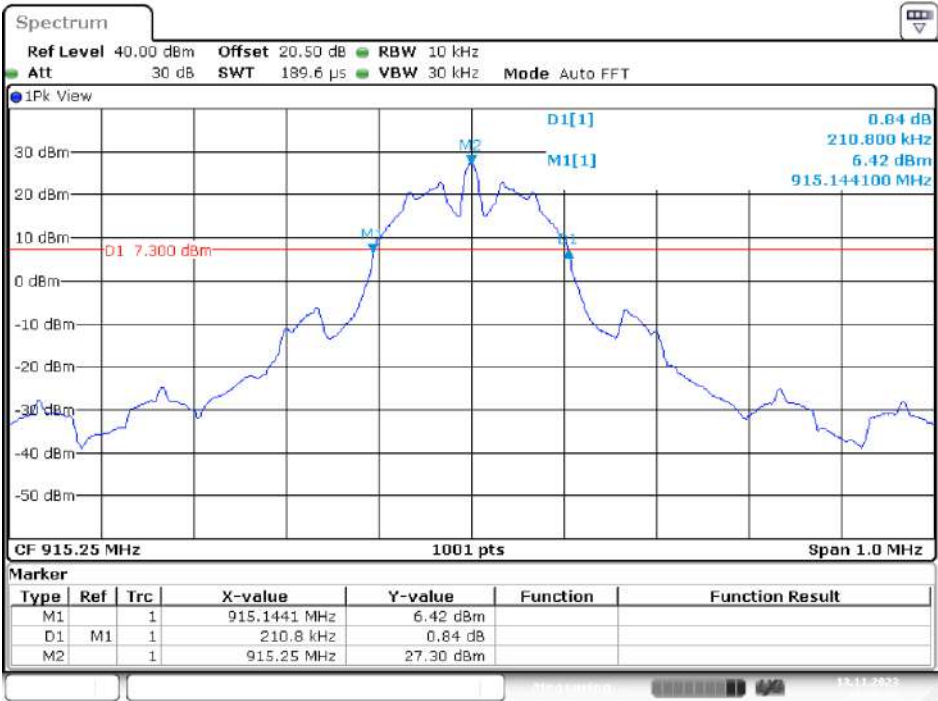
Date: 13.NOV.2023 14:39:00

PR-ASK Mode Antenna Port 3
Low Channel



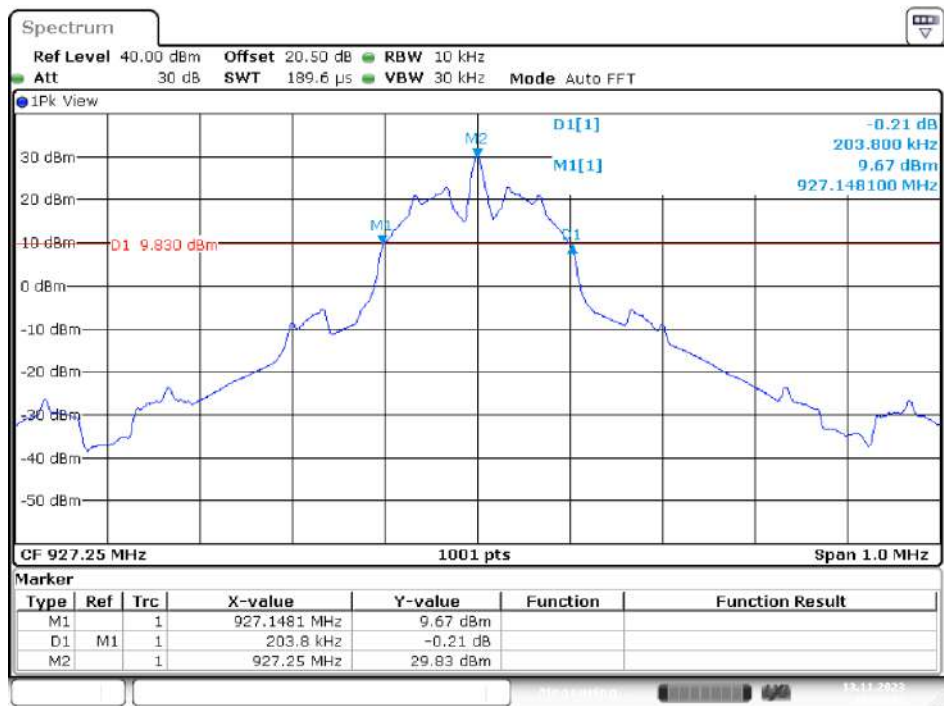
Date: 13.NOV.2023 15:11:18

Middle Channel



Date: 13.NOV.2023 15:09:52

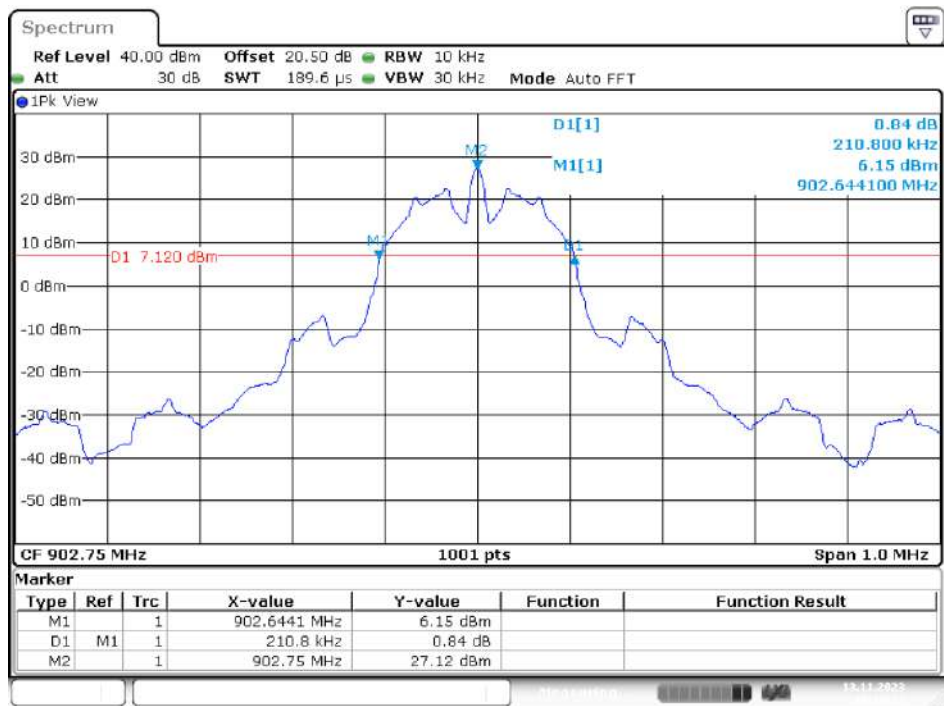
High Channel



Date: 13.NOV.2023 14:52:34

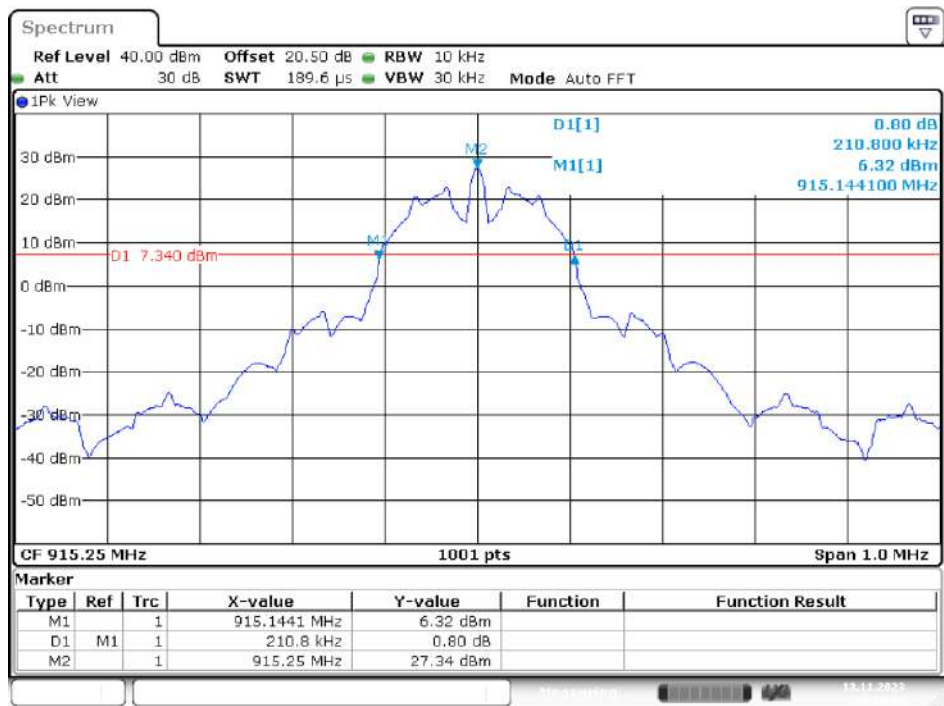
PR-ASK Mode Antenna Port 4

Low Channel



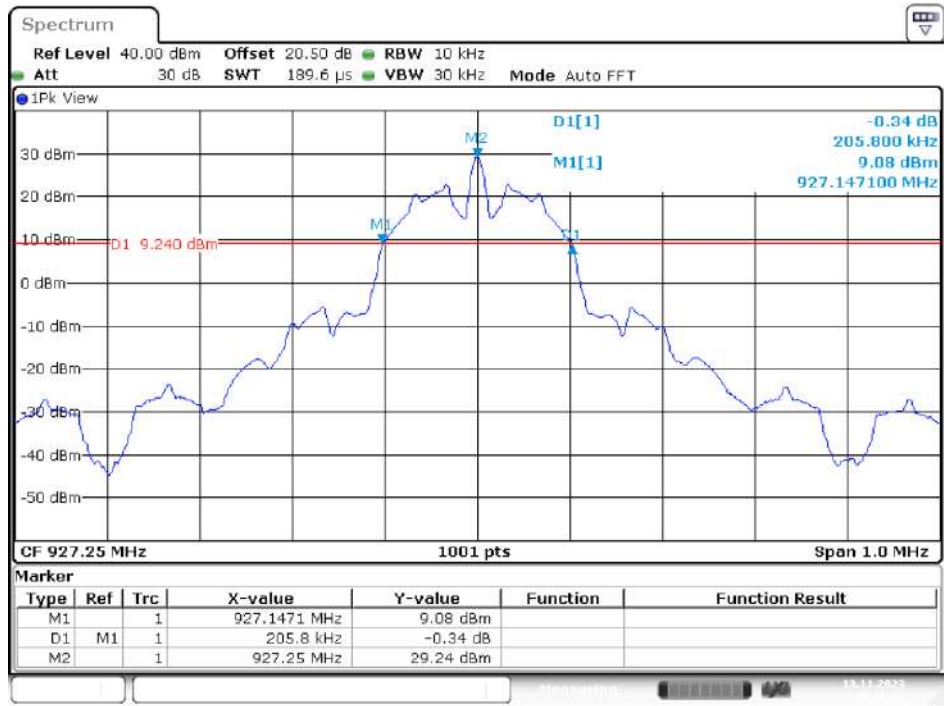
Date: 13.NOV.2023 15:13:11

Middle Channel



Date: 13.NOV.2023 15:14:34

High Channel



Date: 13.NOV.2023 15:16:11

10. FCC §15.247(a)(1) – Channel Separation Test

10.1. Applicable Standard

According to FCC §15.247(a) (1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

10.2. Test Procedure

According to ANSI C63.10-2013 Section 7.8.2

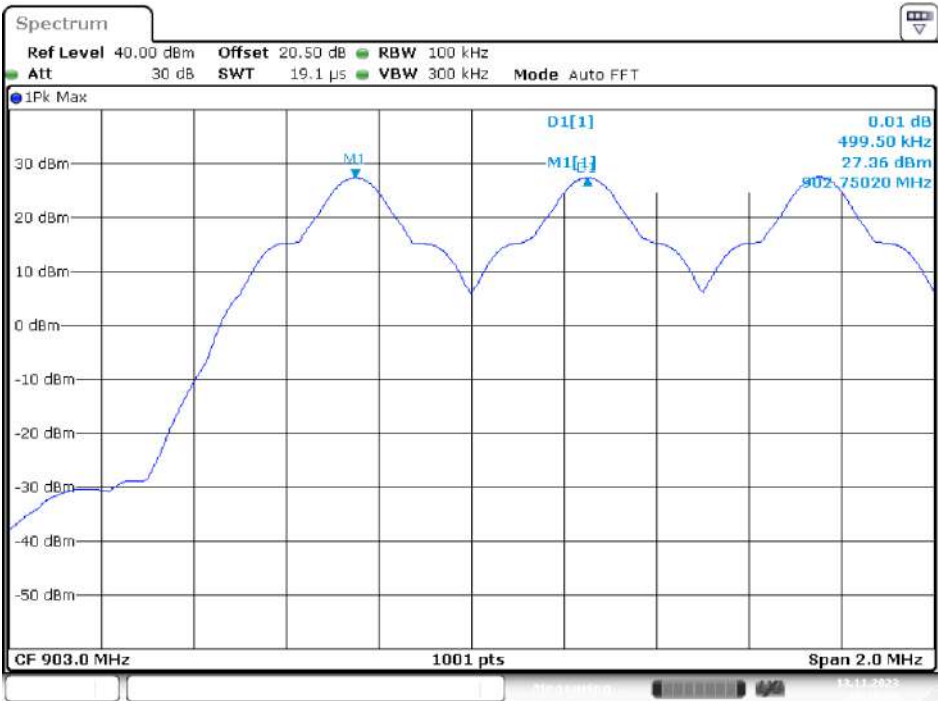
1. Set the EUT in transmitting mode, max hold the channel.
2. Set the adjacent channel of the EUT and max hold another trace.
3. Measure the channel separation.

10.3. Test Results

Channel	Frequency (MHz)	Channel Separation (kHz)				20 dB bandwidth (kHz)	Channel Separation Limit	Result
		Antenna Port 1	Antenna Port 2	Antenna Port 3	Antenna Port 4			
DSB-ASK								
Low	902.75	499.50	499.50	499.50	499.50	430.70	25 kHz or the 20 dB bandwidth, whichever is greater	Pass
Mid	915.25	499.50	499.50	499.50	499.50	431.60		Pass
High	927.25	499.50	499.50	499.50	499.50	369.60		Pass
PR-ASK								
Low	902.75	499.50	499.50	499.50	499.50	210.80	25 kHz or the 20 dB bandwidth, whichever is greater	Pass
Mid	915.25	499.50	499.50	499.50	499.50	210.80		Pass
High	927.25	499.50	499.50	499.50	499.50	205.80		Pass

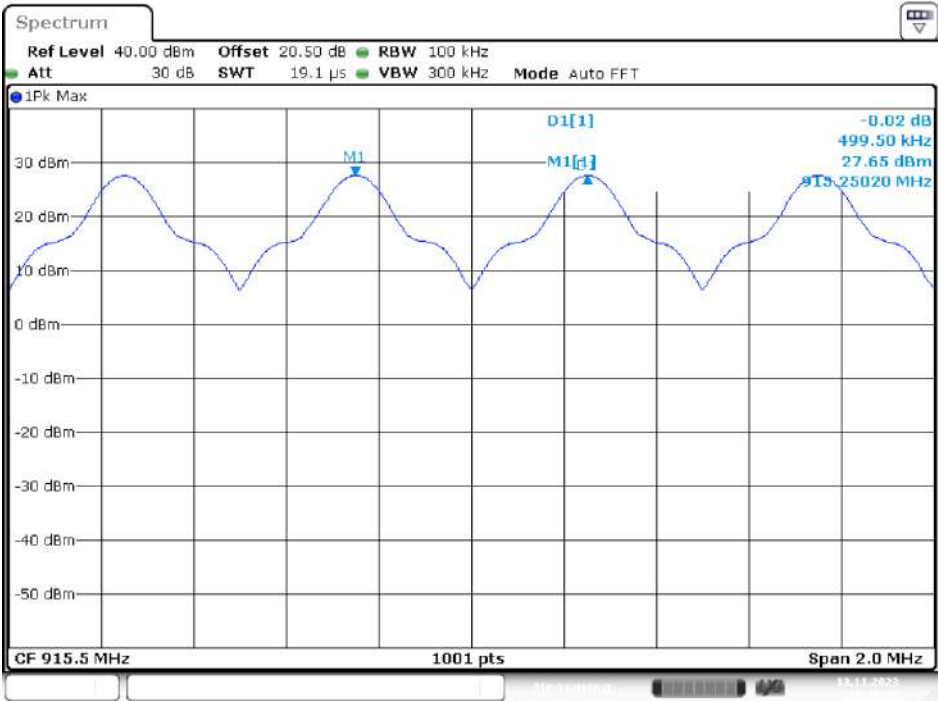
Please refer to the following plots.

DSB-ASK Mode Antenna Port 1
Low Channel



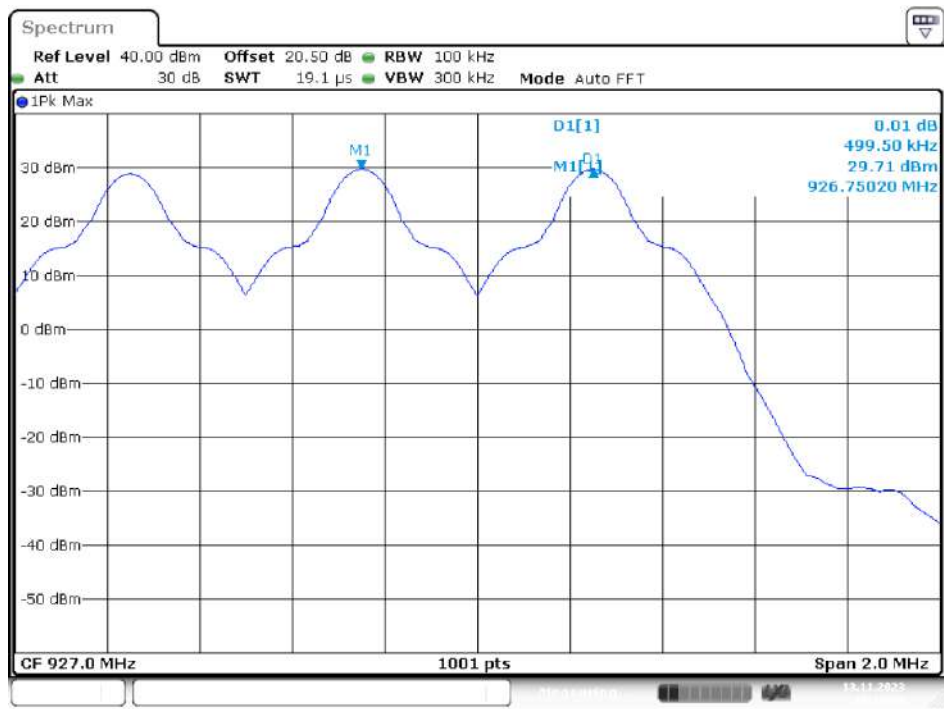
Date: 13.NOV.2023 16:16:00

Middle Channel



Date: 13.NOV.2023 16:16:48

High Channel



Date: 13,NOV,2023 16:17:19

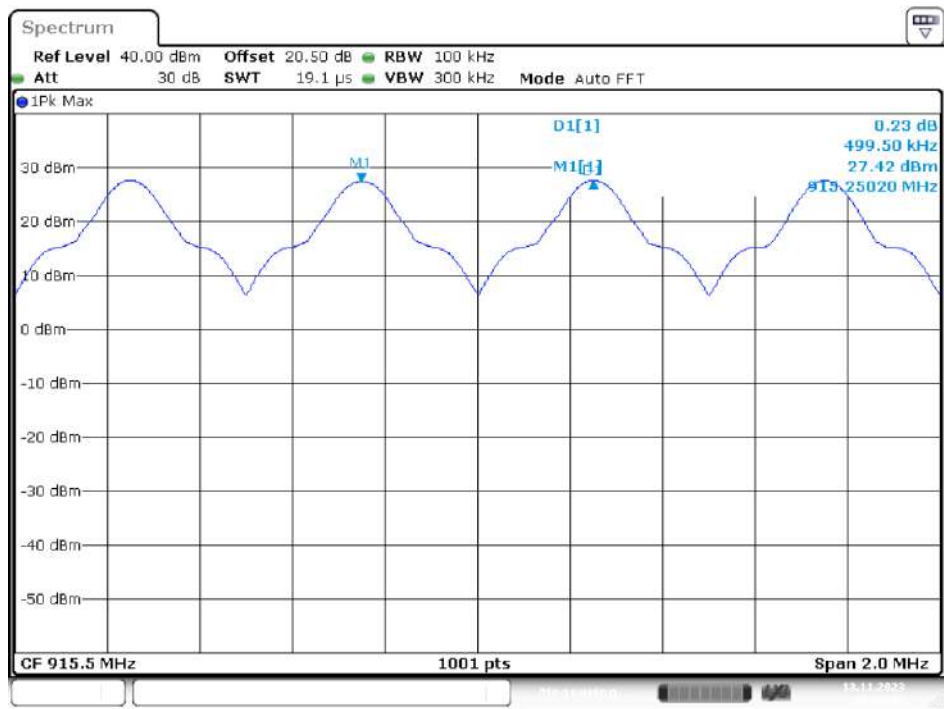
DSB-ASK Mode Antenna Port 2

Low Channel



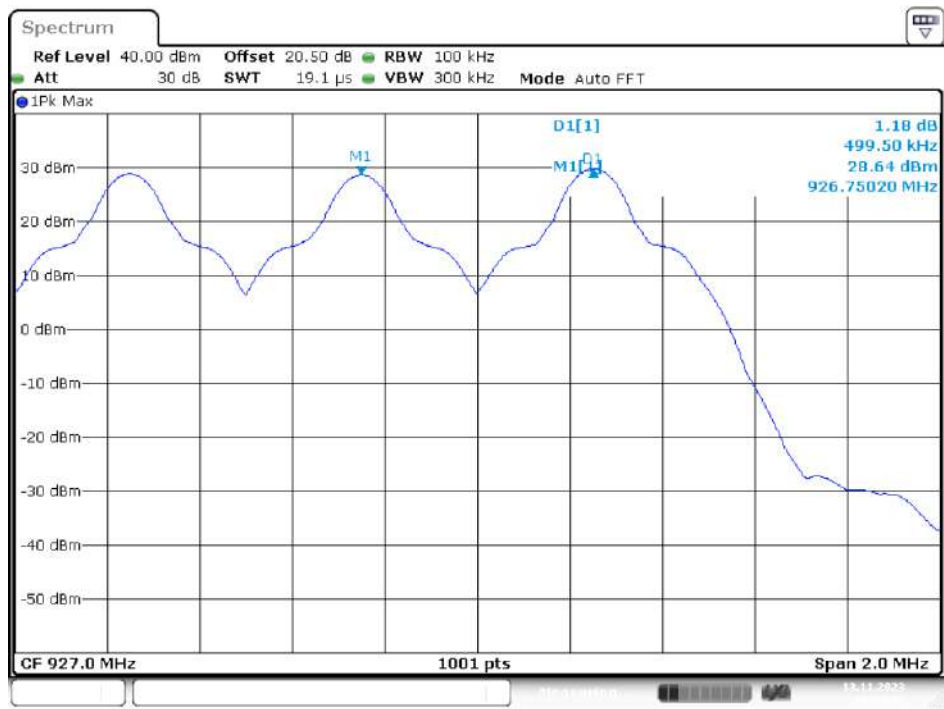
Date: 13,NOV,2023 16:24:13

Middle Channel



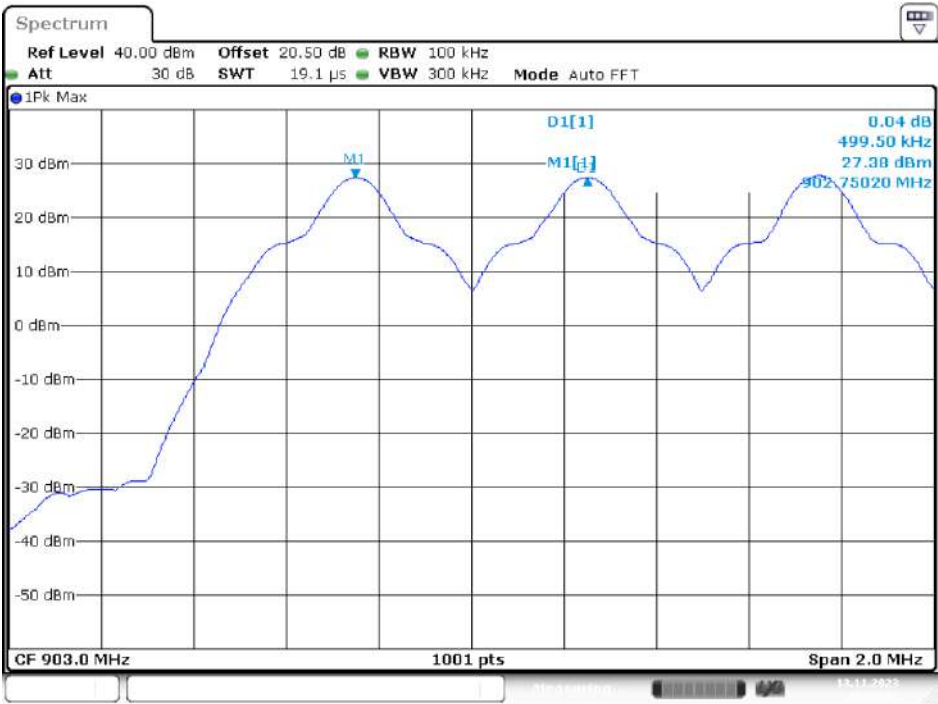
Date: 13,NOV.2023 16:23:43

High Channel



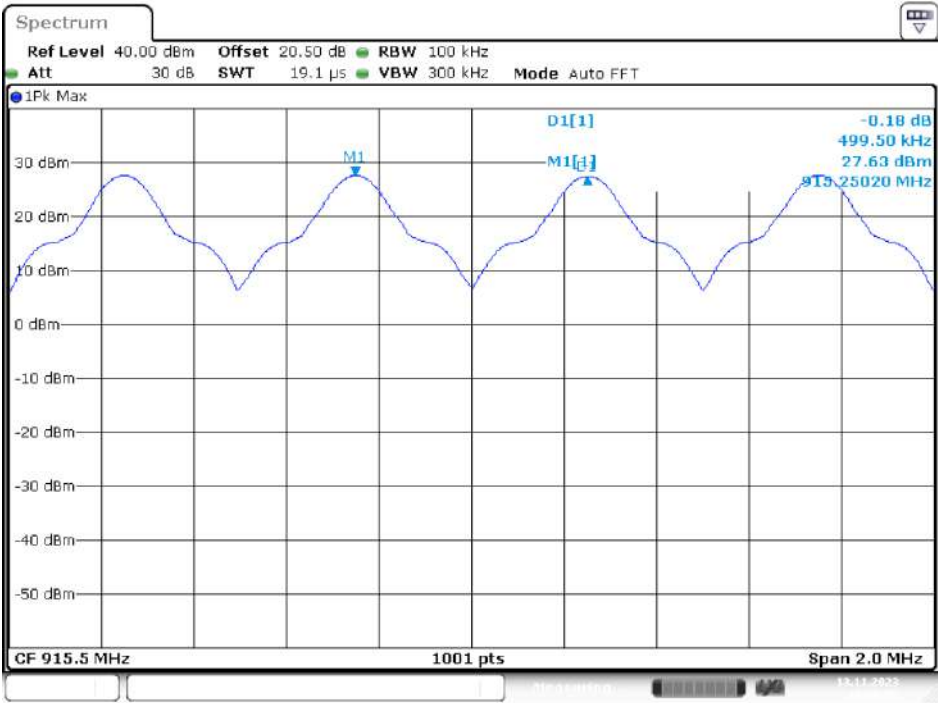
Date: 13,NOV.2023 16:24:42

DSB-ASK Mode Antenna Port 3
Low Channel



Date: 13.NOV.2023 16:27:04

Middle Channel



Date: 13.NOV.2023 16:26:25

High Channel



Date: 13.NOV.2023 16:25:47

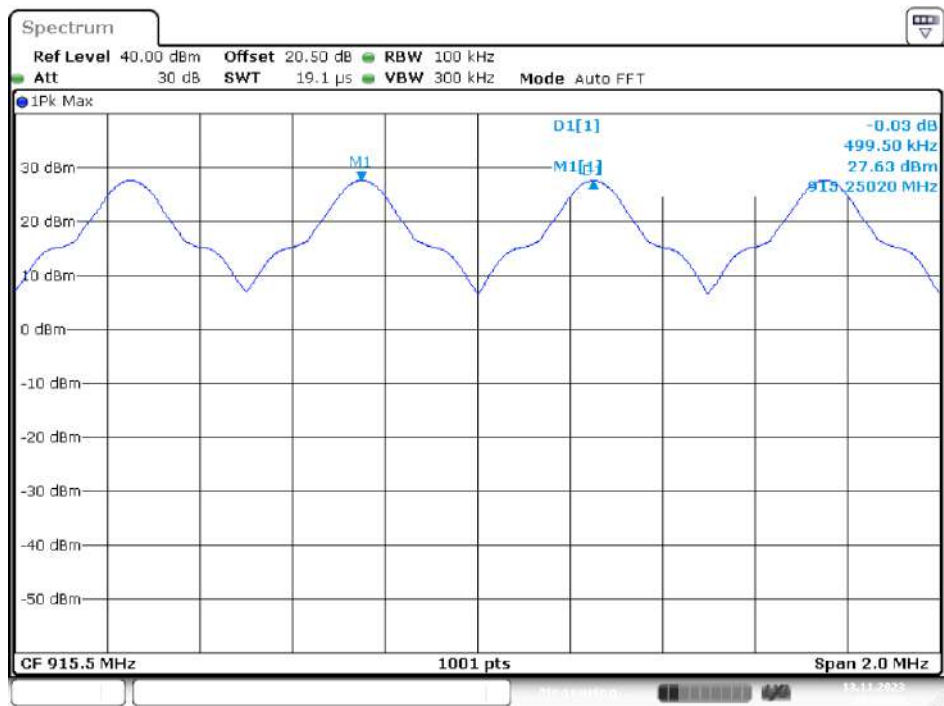
DSB-ASK Mode Antenna Port 4

Low Channel



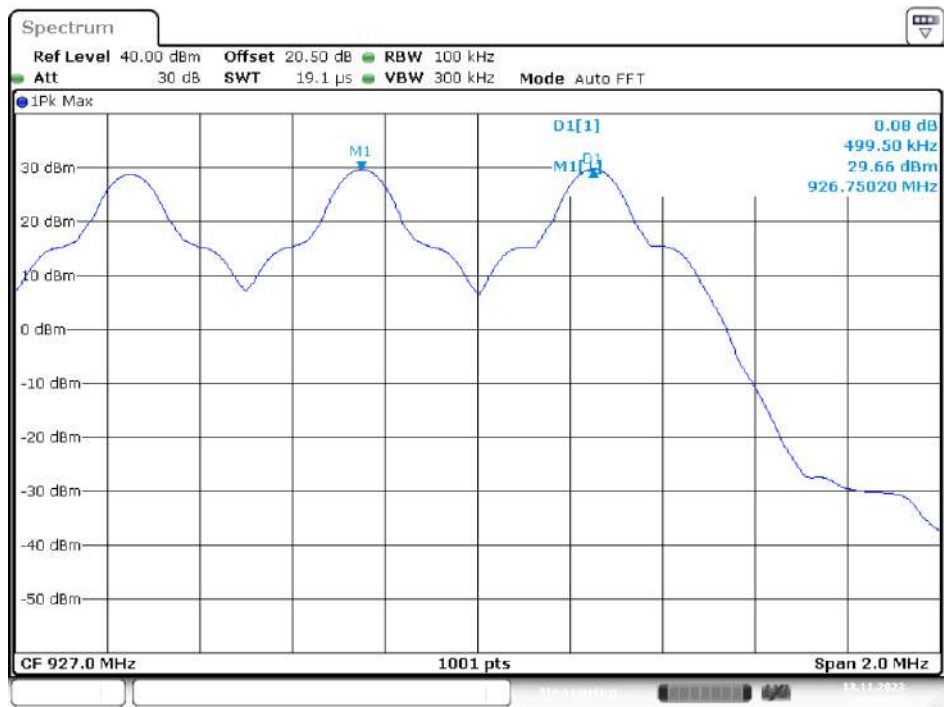
Date: 13.NOV.2023 16:32:00

Middle Channel



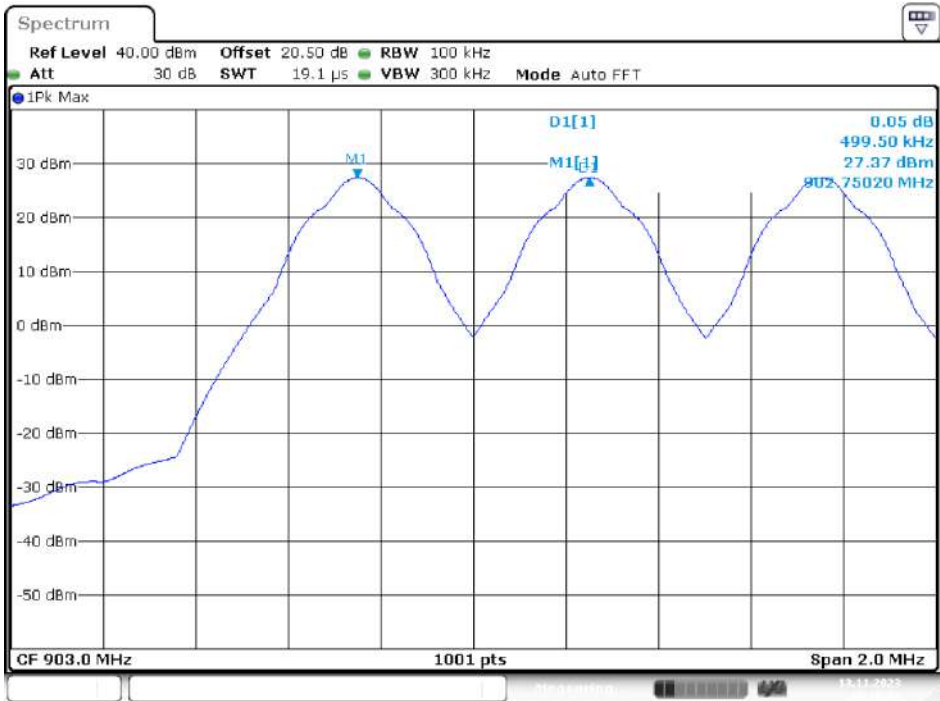
Date: 13.NOV.2023 16:33:10

High Channel

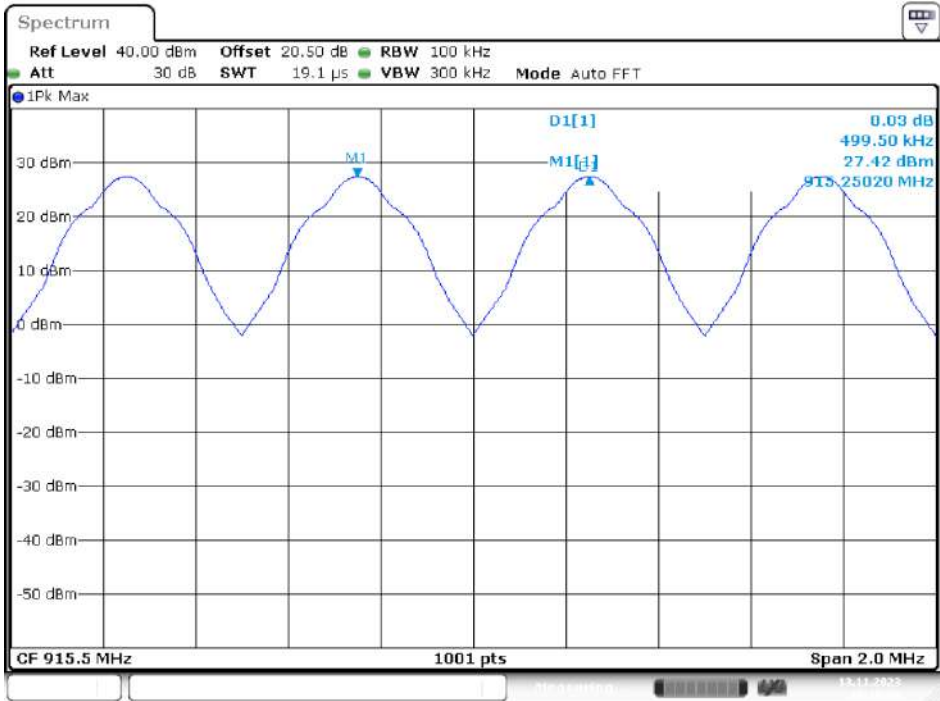


Date: 13.NOV.2023 16:33:54

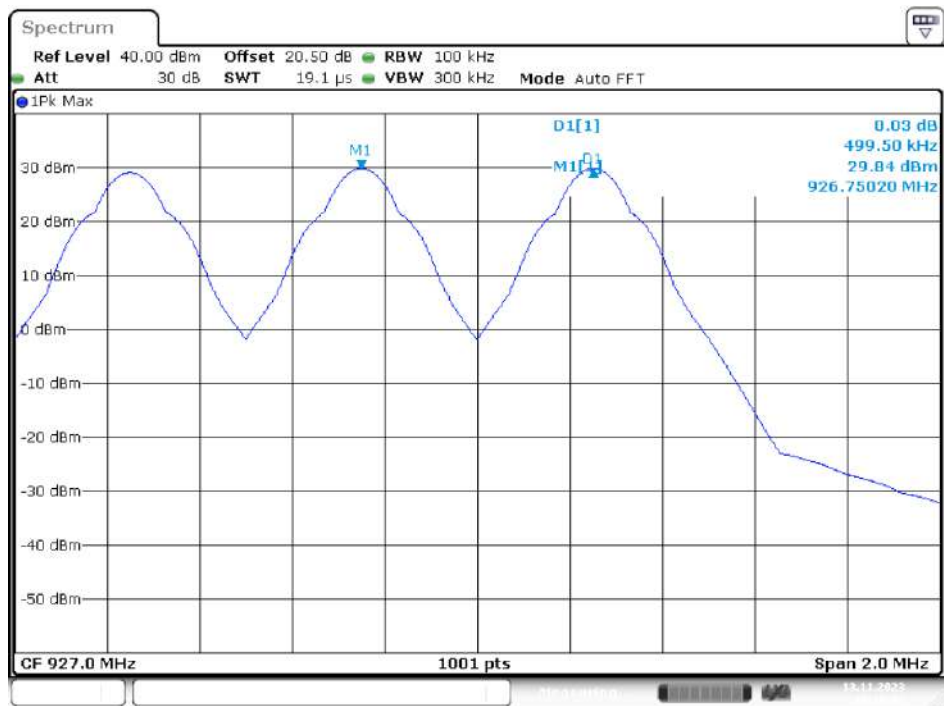
PR-ASK Mode Antenna Port 1
Low Channel



Middle Channel



High Channel



Date: 13.NOV.2023 16:18:03

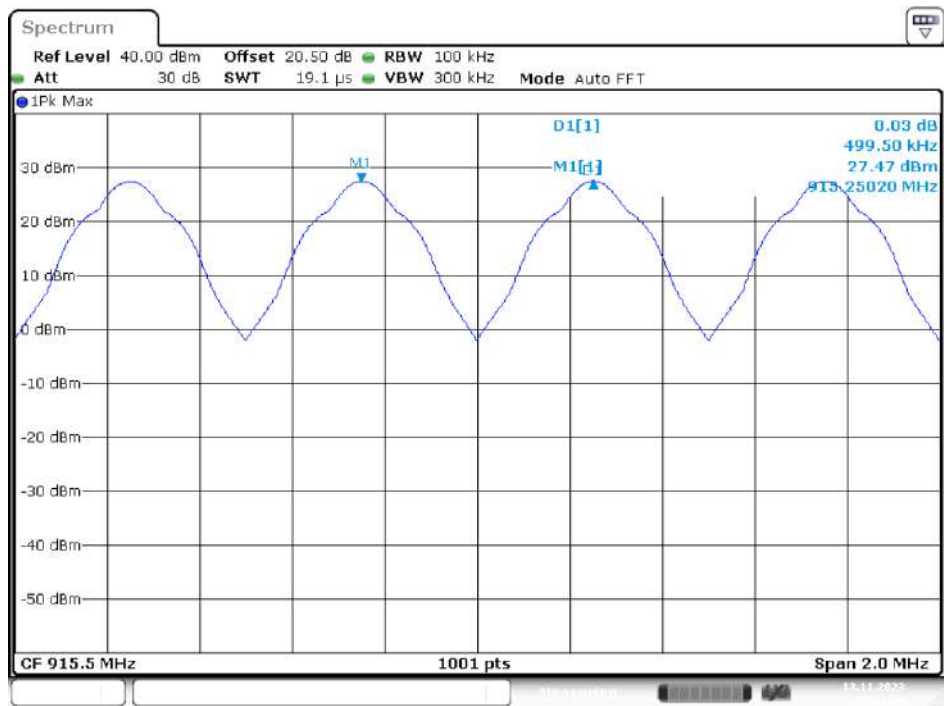
PR-ASK Mode Antenna Port 2

Low Channel



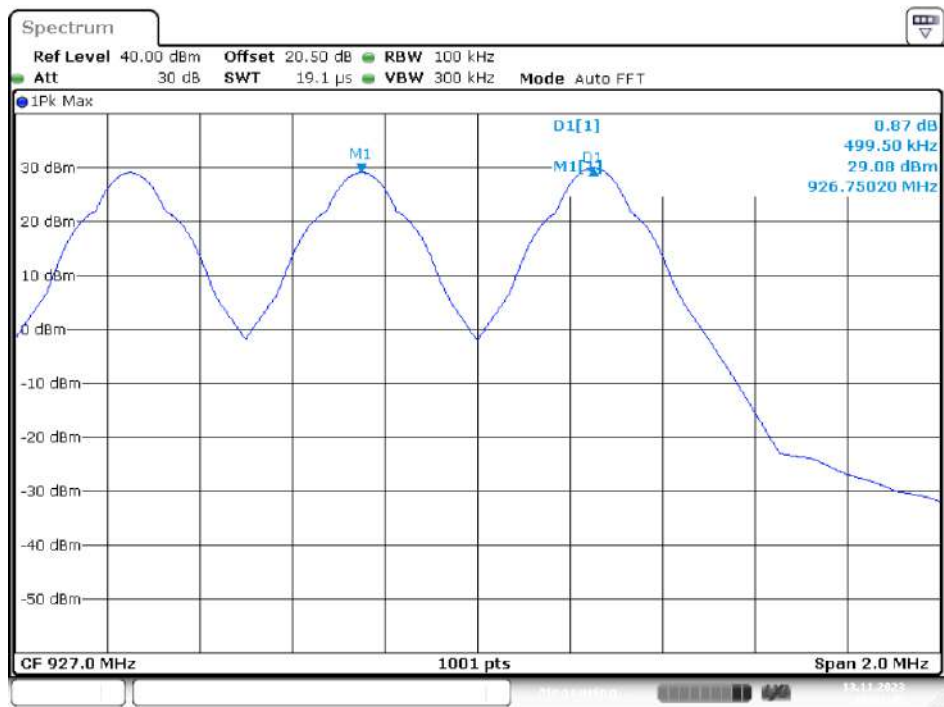
Date: 13.NOV.2023 16:20:22

Middle Channel



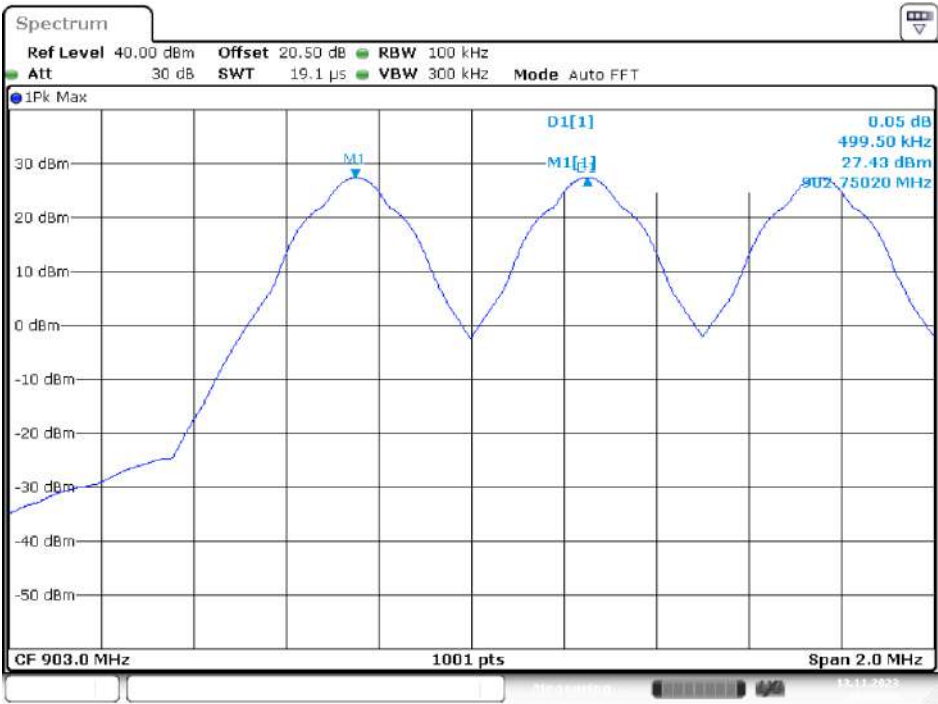
Date: 13.NOV.2023 16:21:08

High Channel

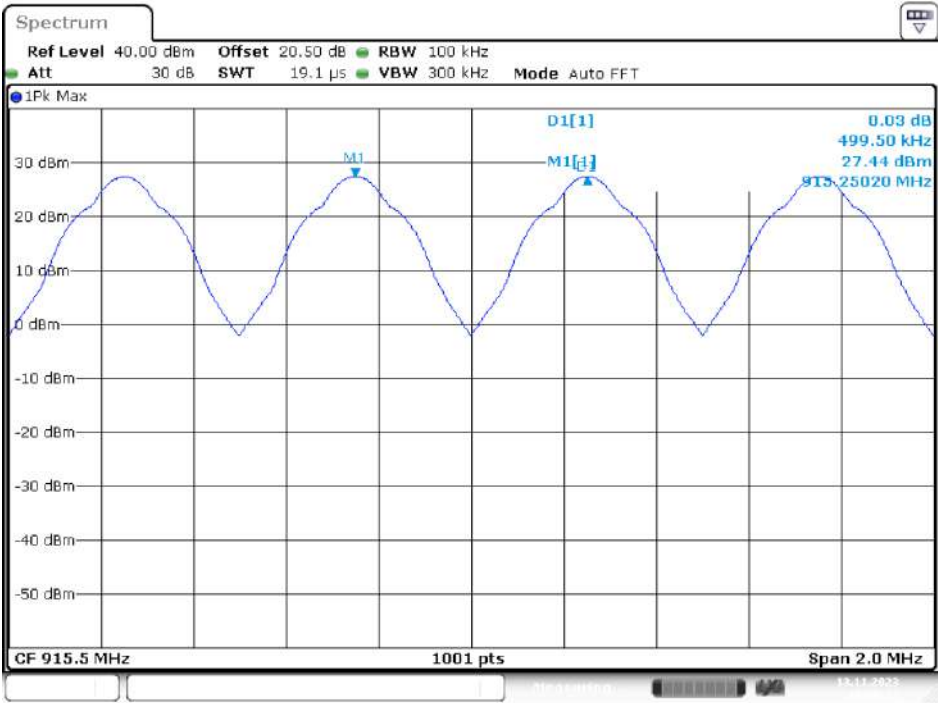


Date: 13.NOV.2023 16:21:45

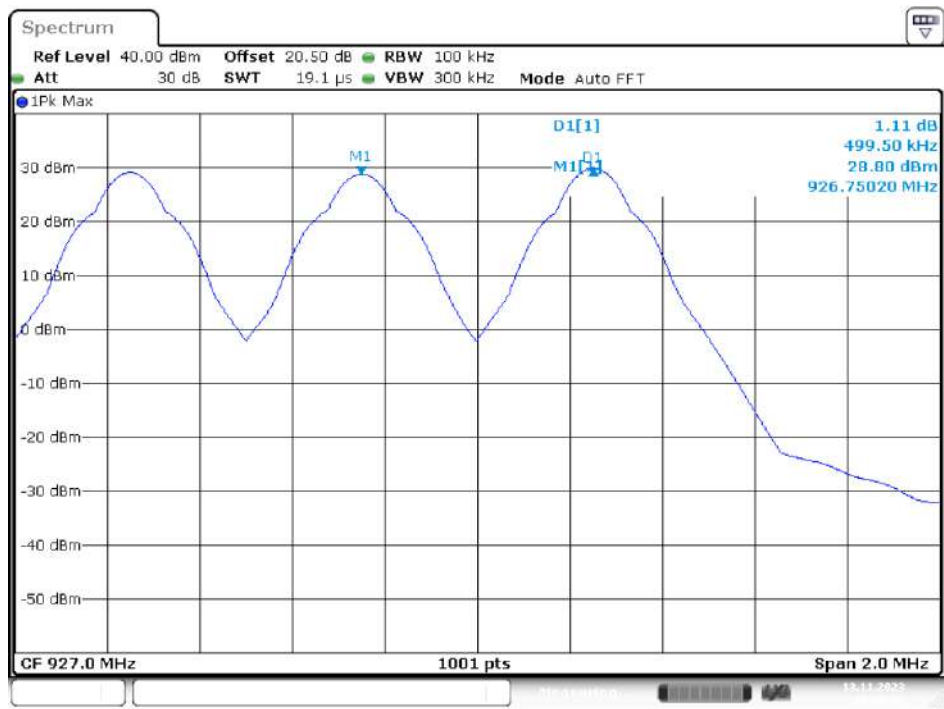
PR-ASK Mode Antenna Port 3
Low Channel



Middle Channel



High Channel



Date: 13.NOV.2023 16:28:52

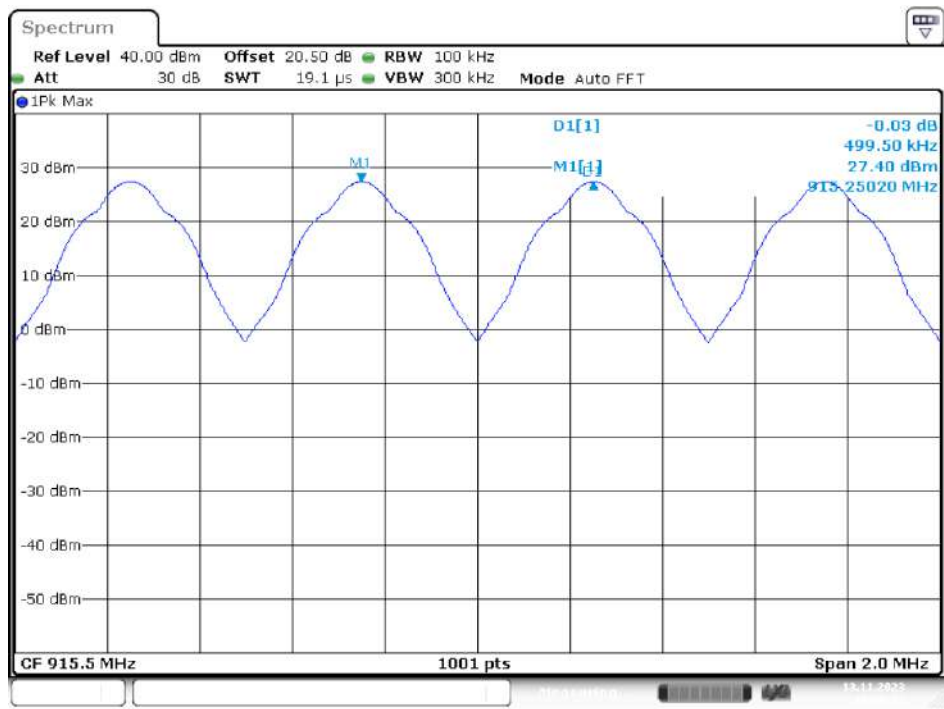
PR-ASK Mode Antenna Port 4

Low Channel



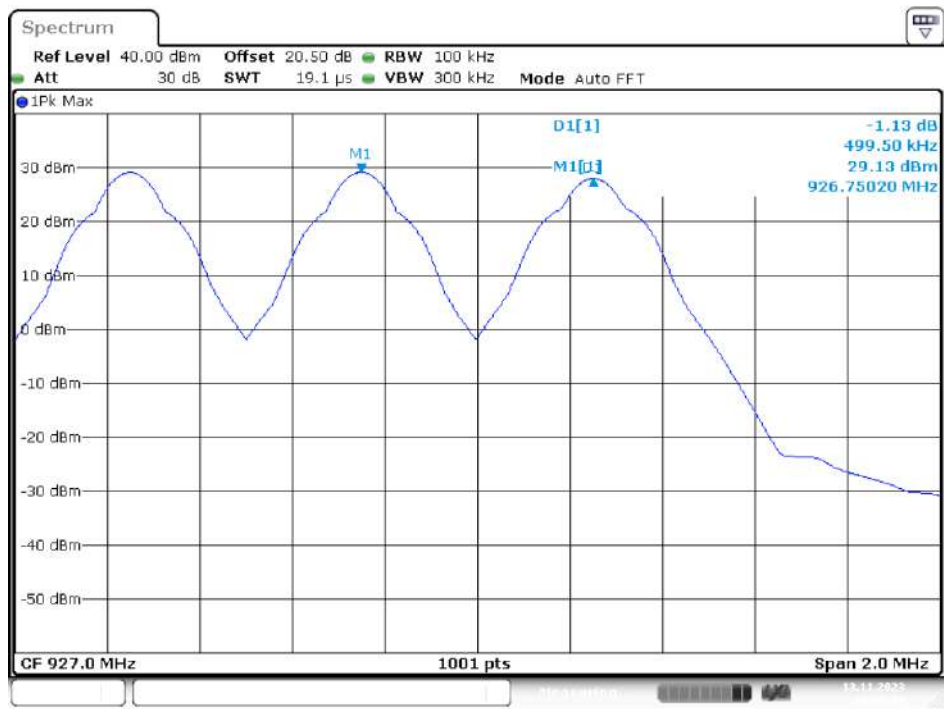
Date: 13.NOV.2023 16:31:02

Middle Channel



Date: 13,NOV.2023 16:30:23

High Channel



Date: 13,NOV.2023 16:29:44

11. FCC§15.247(a)(1)(i) –Time of Occupancy (Dwell Time)

11.1. Applicable Standard

According to FCC §15.247(a) (1) (i).

For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

11.2. Test Procedure

According to ANSI C63.10-2013 Section 7.8.4

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel.

RBW $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel.

Sweep = as necessary to capture the entire dwell time per hopping channel.

Detector function = peak.

Trace = max hold.

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements.

Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) x (period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.

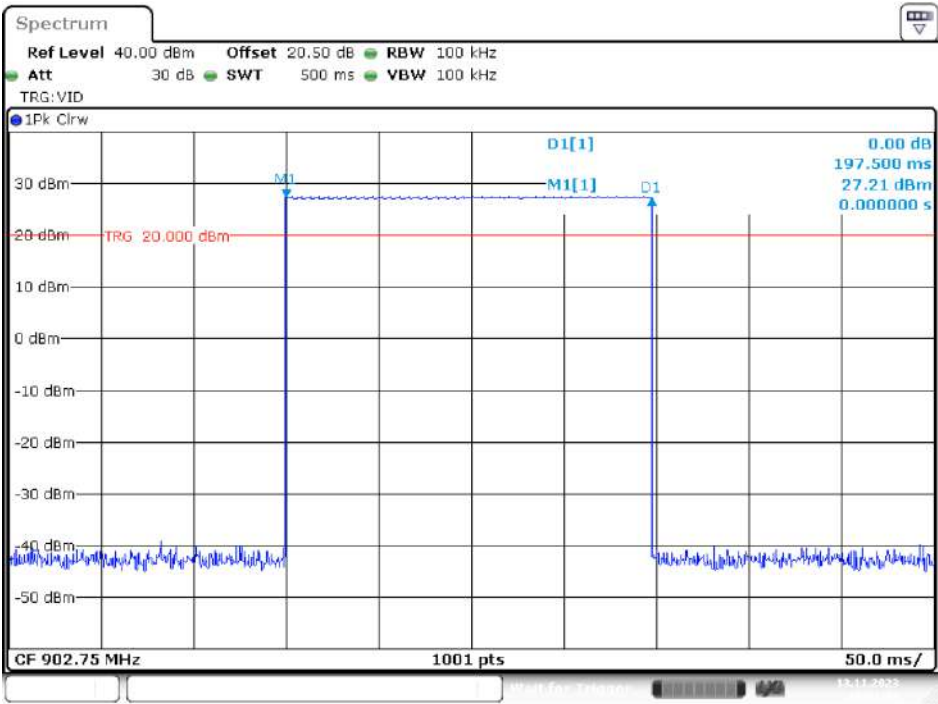
11.3. Test Results

Antenna Port	Pulse Time (ms)	Hopping Number	Period Time (s)	Total of Dwell (ms)	Limit (ms)	Result
Test mode: DSB-ASK mode / 902.75~927.25MHz						
1	197.50	1	10	197.50	<400	PASS
2	197.50	1	10	197.50	<400	PASS
3	197.50	1	10	197.50	<400	PASS
4	197.50	1	10	197.50	<400	PASS
Test mode: PR-ASK mode / 902.75~927.25MHz						
1	197.50	2	20	395	<400	PASS
2	197.50	2	20	395	<400	PASS
3	197.50	2	20	395	<400	PASS
4	197.50	2	20	395	<400	PASS

Note: Total of Dwell=Pulse Time * Hopping Number.

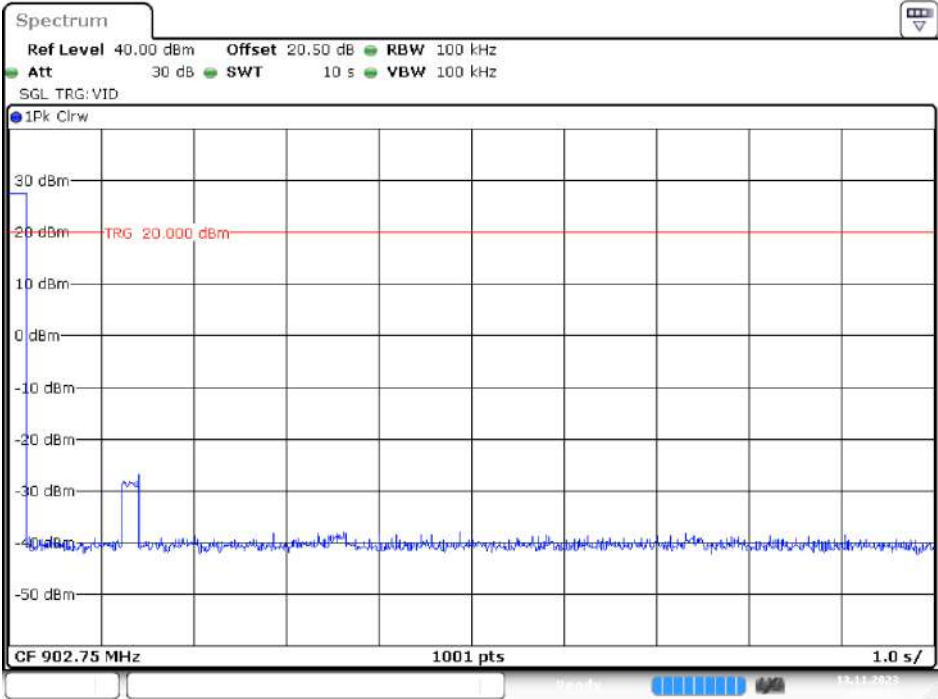
Please refer to the following plots.

DSB-ASK Mode Antenna Port 1
Pulse Width



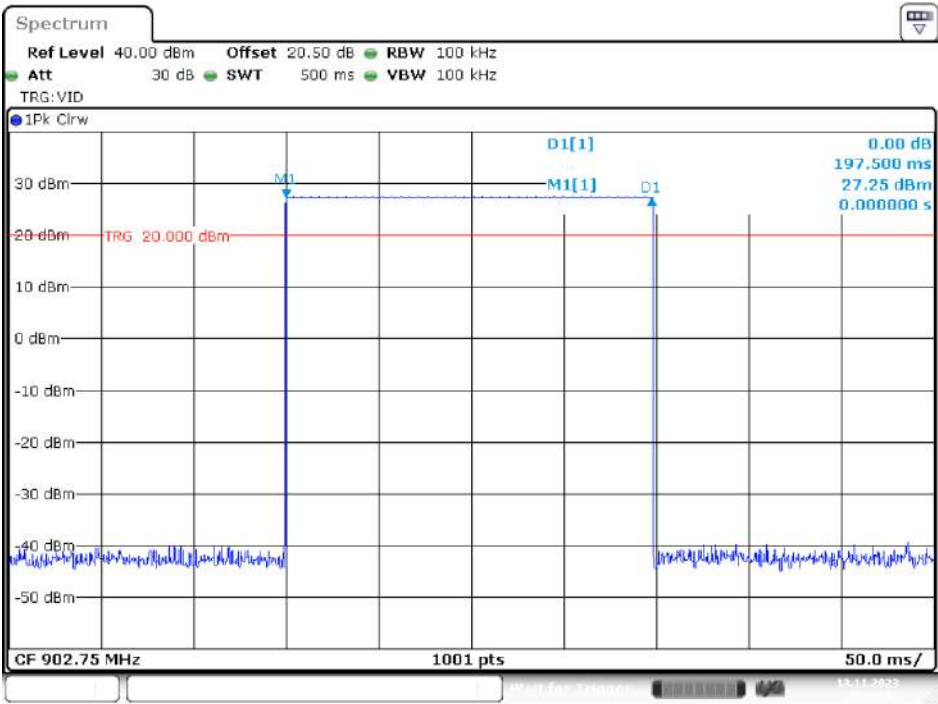
Date: 13.NOV.2023 16:01:34

Hopping Number



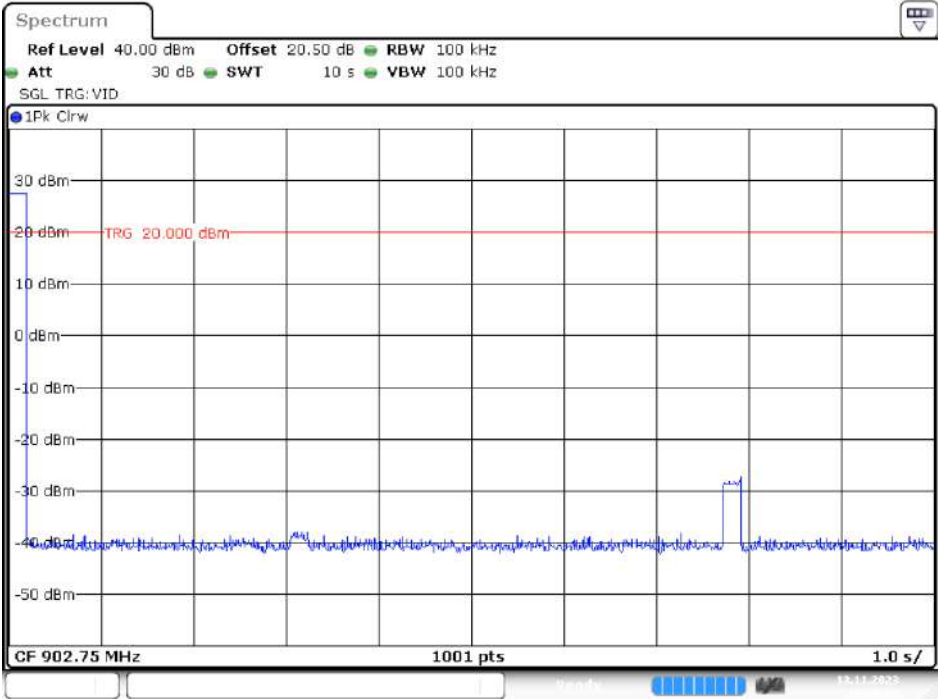
Date: 13.NOV.2023 16:03:23

DSB-ASK Mode Antenna Port 2
Pulse Width



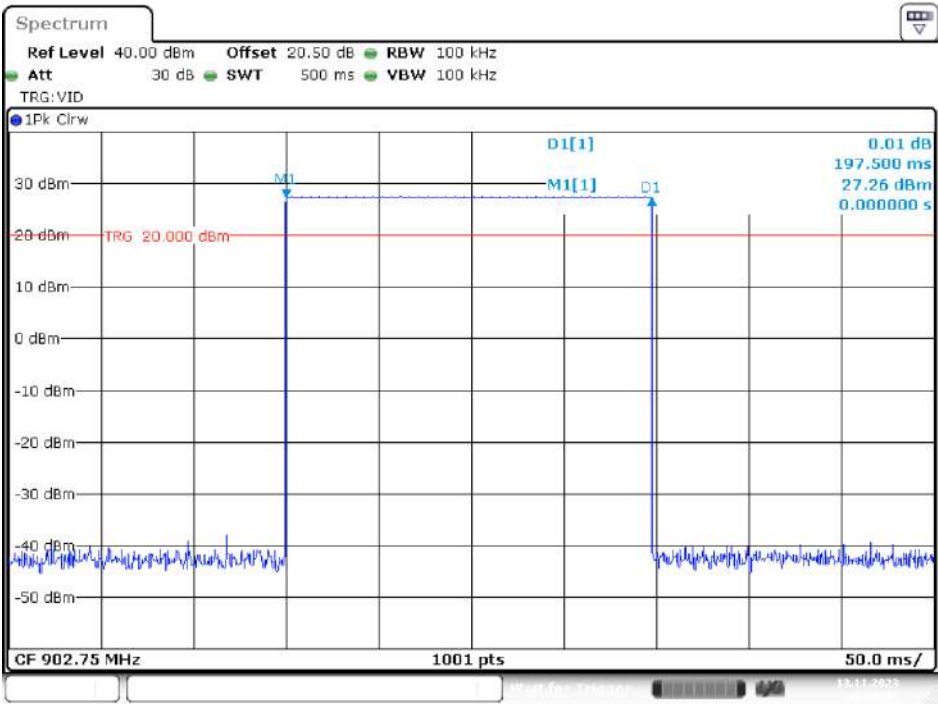
Date: 13.NOV.2023 16:07:07

Hopping Number



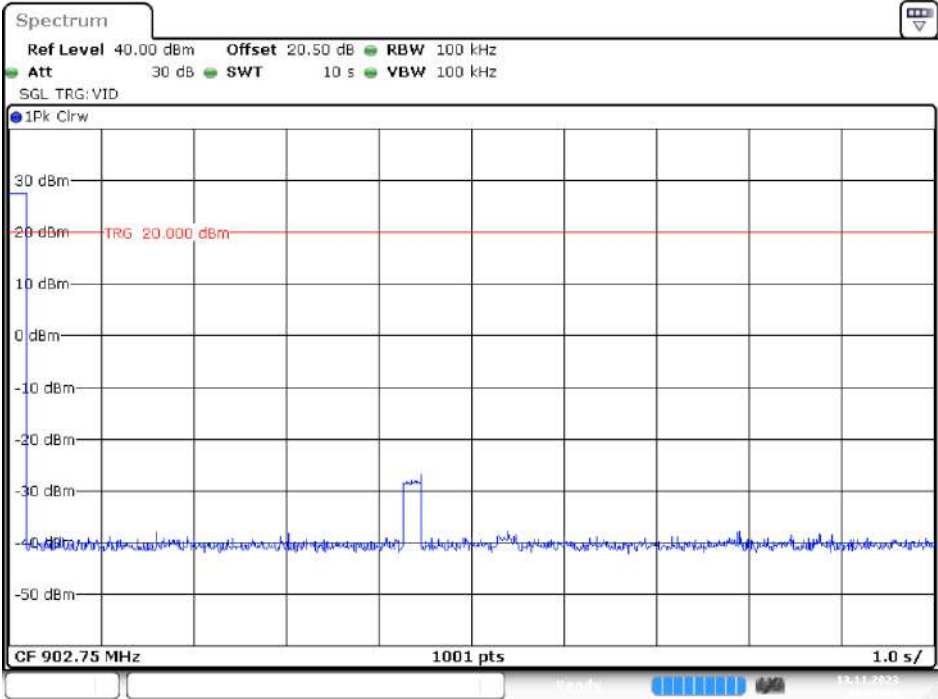
Date: 13.NOV.2023 16:08:08

DSB-ASK Mode Antenna Port 3
Pulse Width



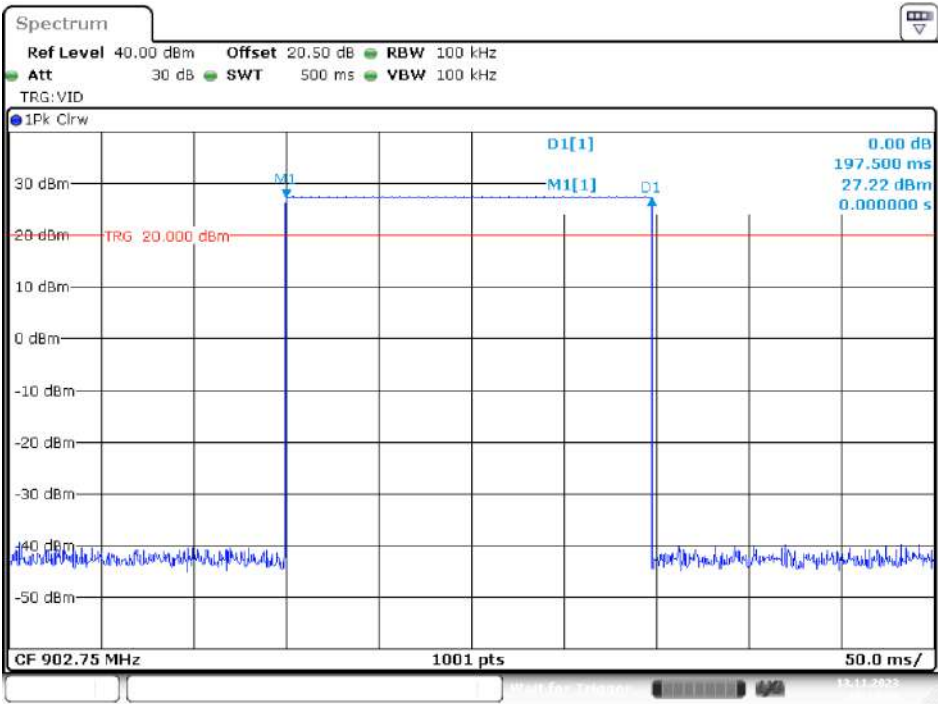
Date: 13.NOV.2023 16:09:57

Hopping Number



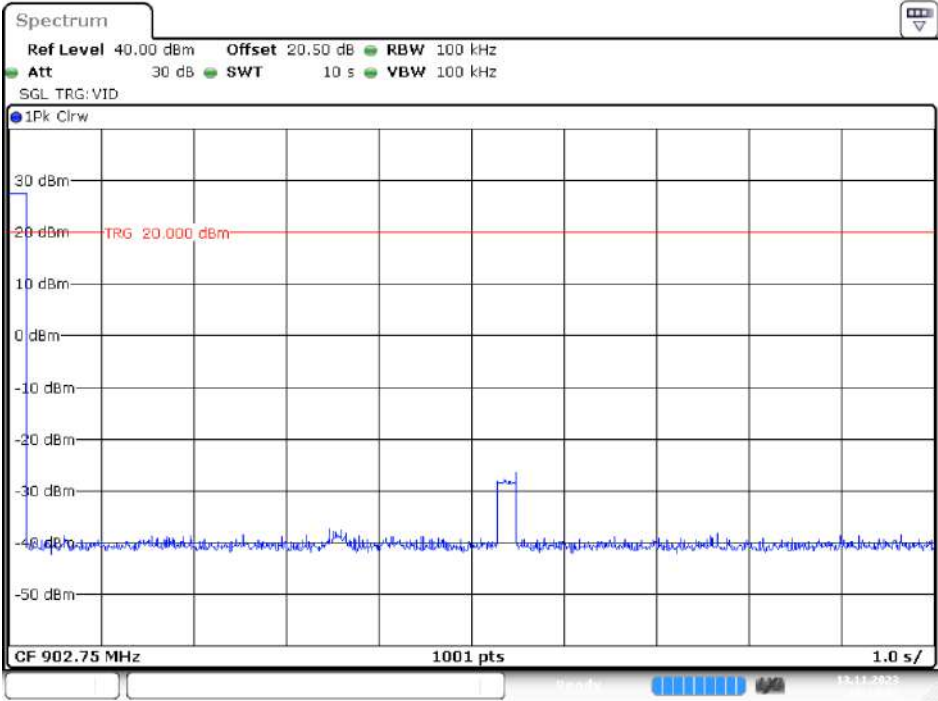
Date: 13.NOV.2023 16:09:34

DSB-ASK Mode Antenna Port 4
Pulse Width



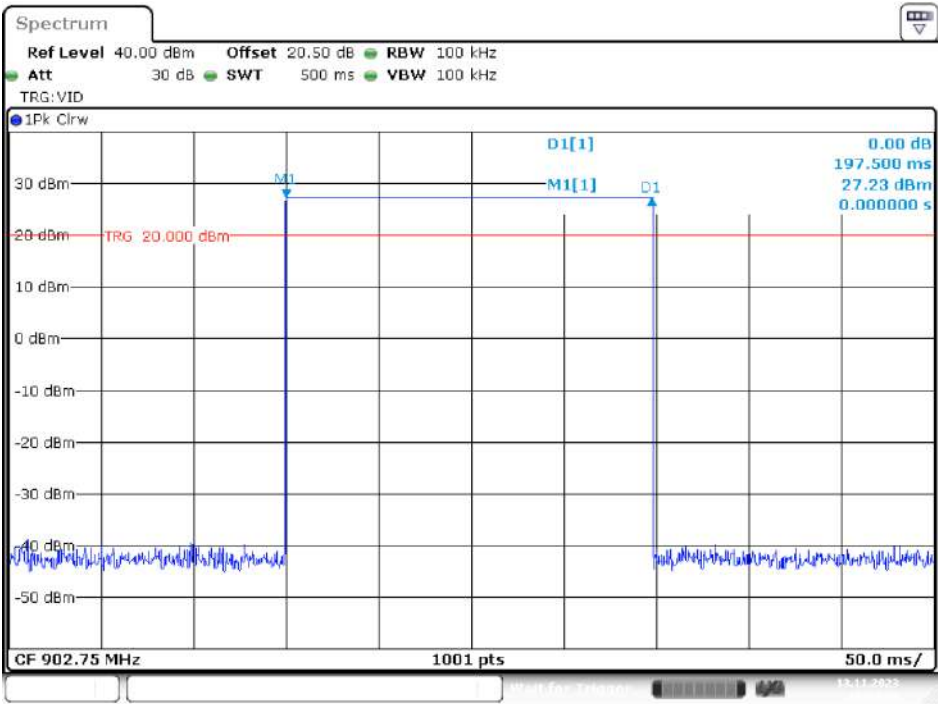
Date: 13.NOV.2023 16:14:01

Hopping Number

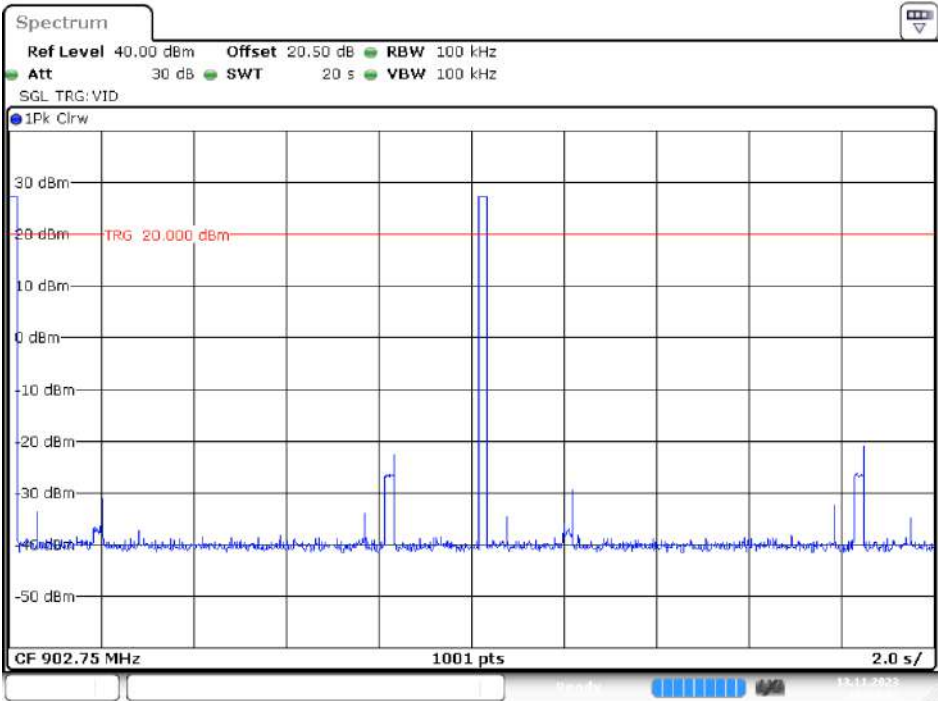


Date: 13.NOV.2023 16:14:42

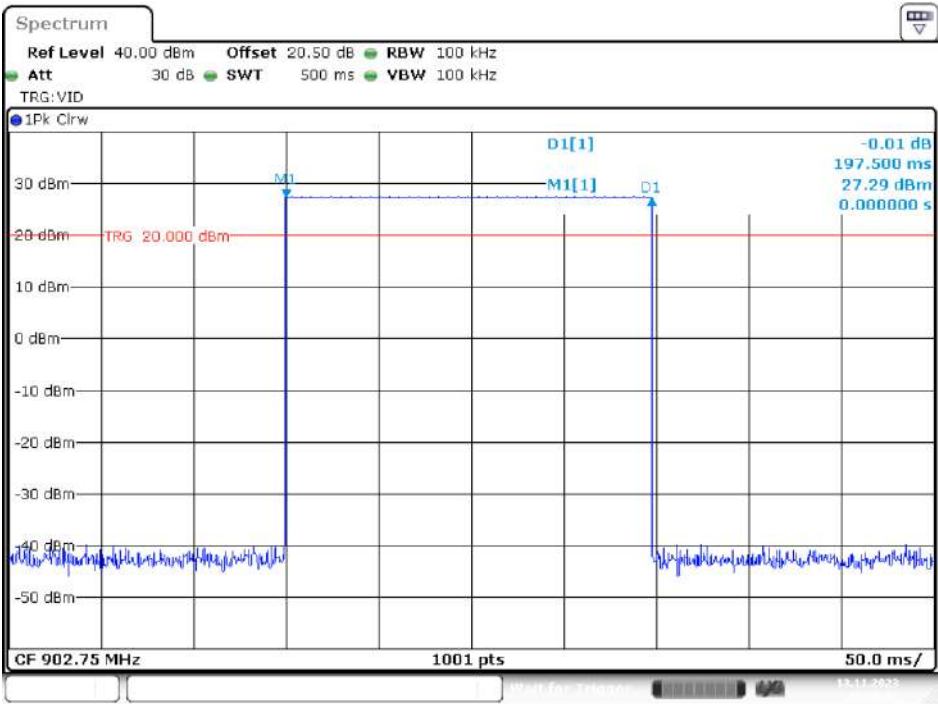
PR-ASK Mode Antenna Port 1
Pulse Width



Hopping Number

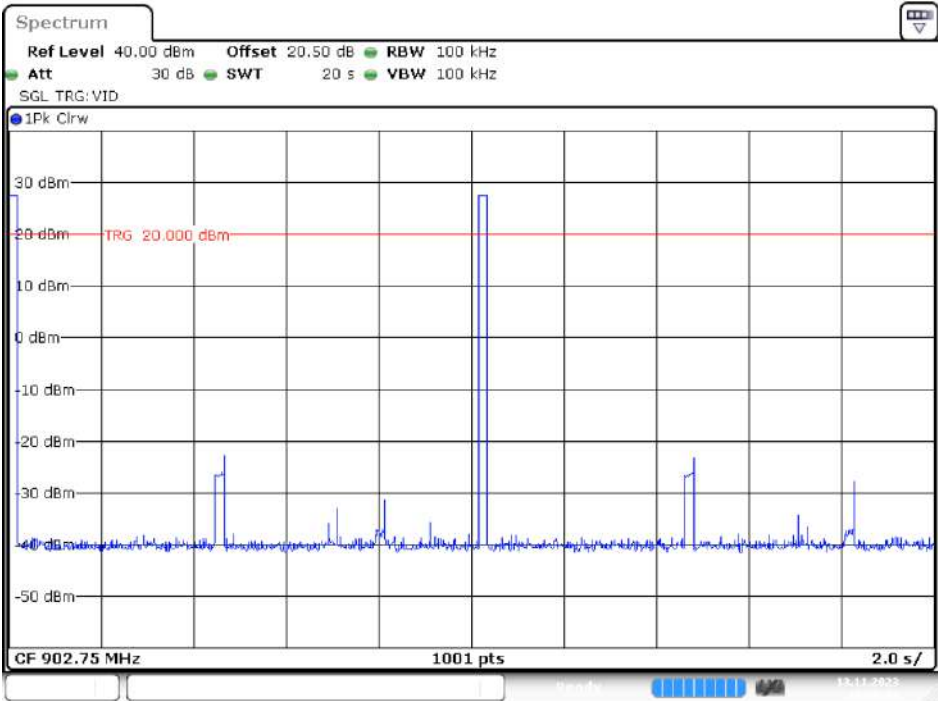


PR-ASK Mode Antenna Port 2
Pulse Width



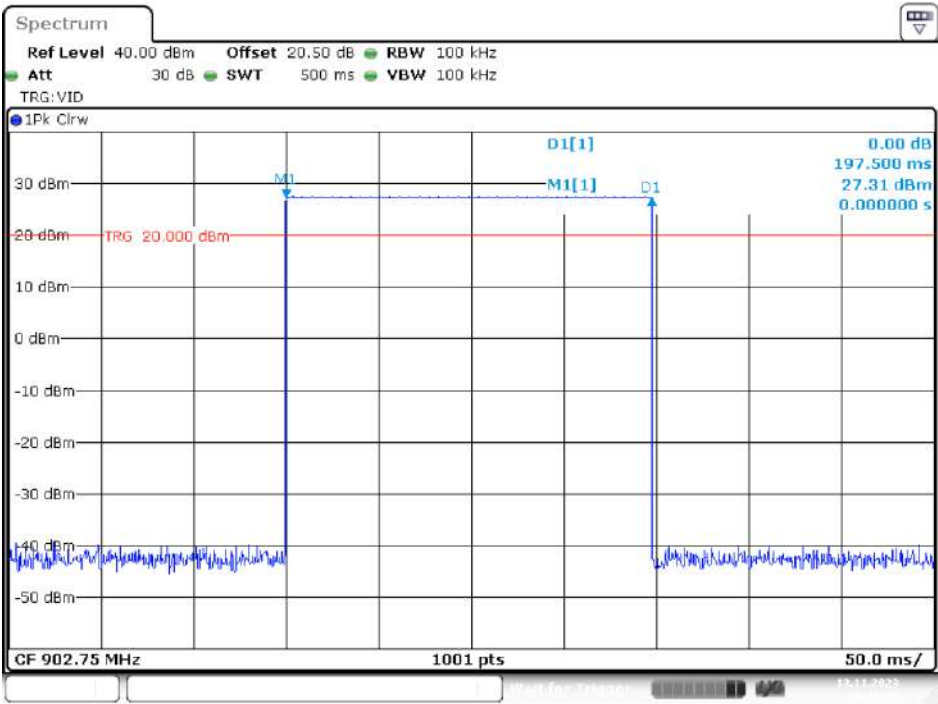
Date: 13.NOV.2023 16:06:31

Hopping Number



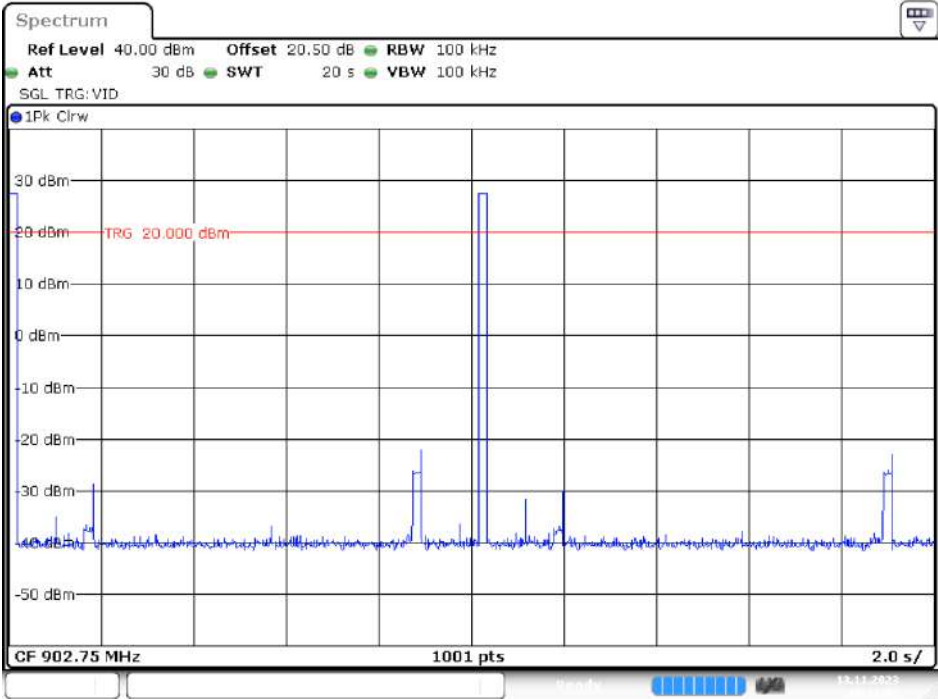
Date: 13.NOV.2023 16:06:09

PR-ASK Mode Antenna Port 3
Pulse Width



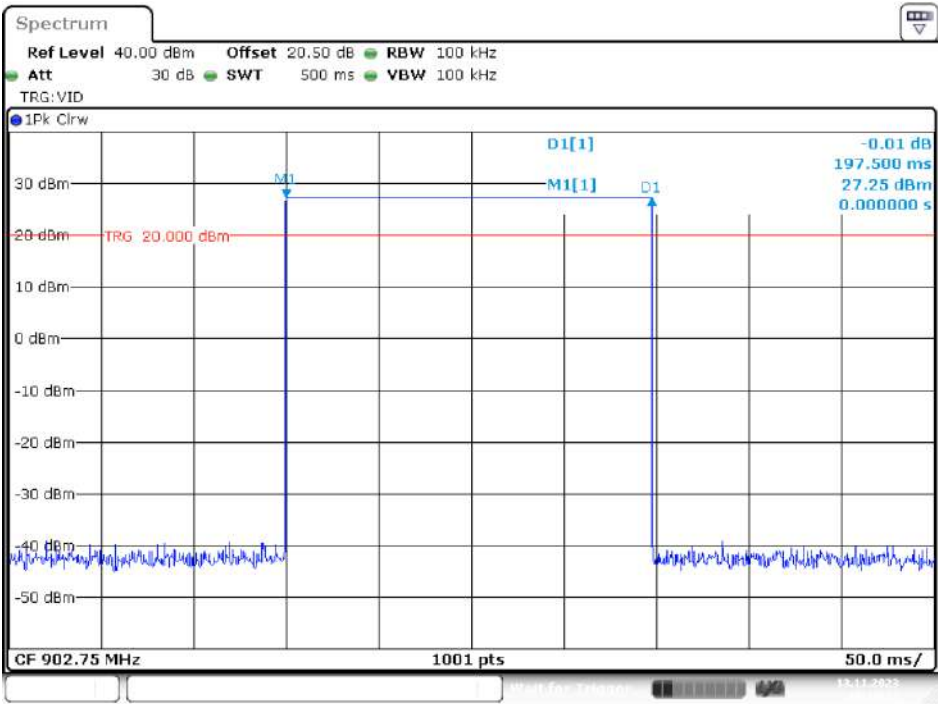
Date: 13.NOV.2023 16:10:35

Hopping Number



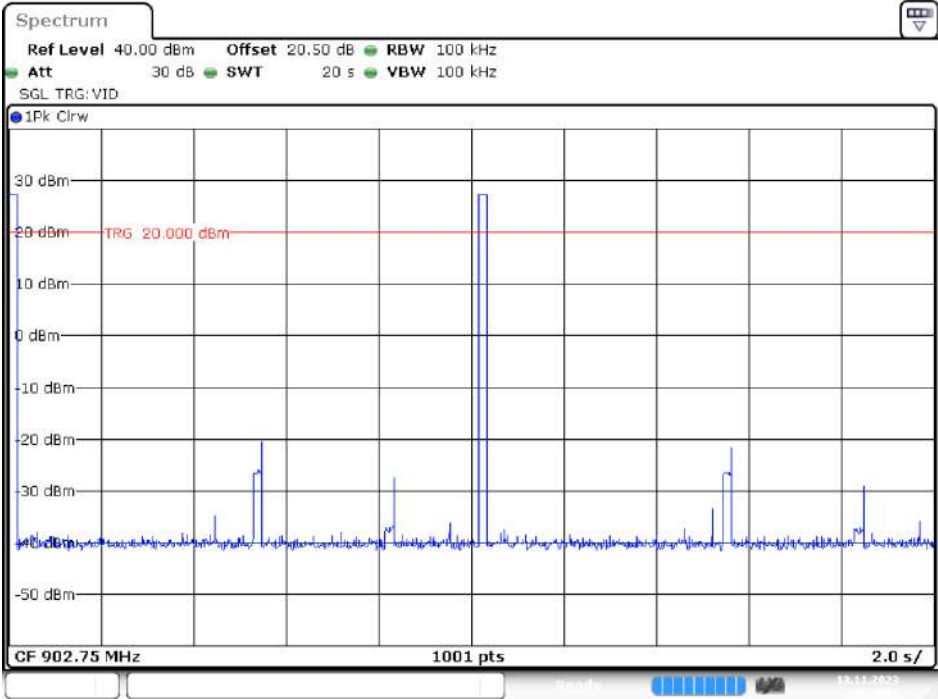
Date: 13.NOV.2023 16:11:31

PR-ASK Mode Antenna Port 4
Pulse Width



Date: 13.NOV.2023 16:13:13

Hopping Number



Date: 13.NOV.2023 16:12:52

12. FCC §15.247(a)(1)(i) –Quantity of hopping channel Test

12.1. Applicable Standard

According to FCC §15.247(a) (1) (i).

For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

12.2. Test Procedure

According to ANSI C63.10-2013 Section 7.8.3

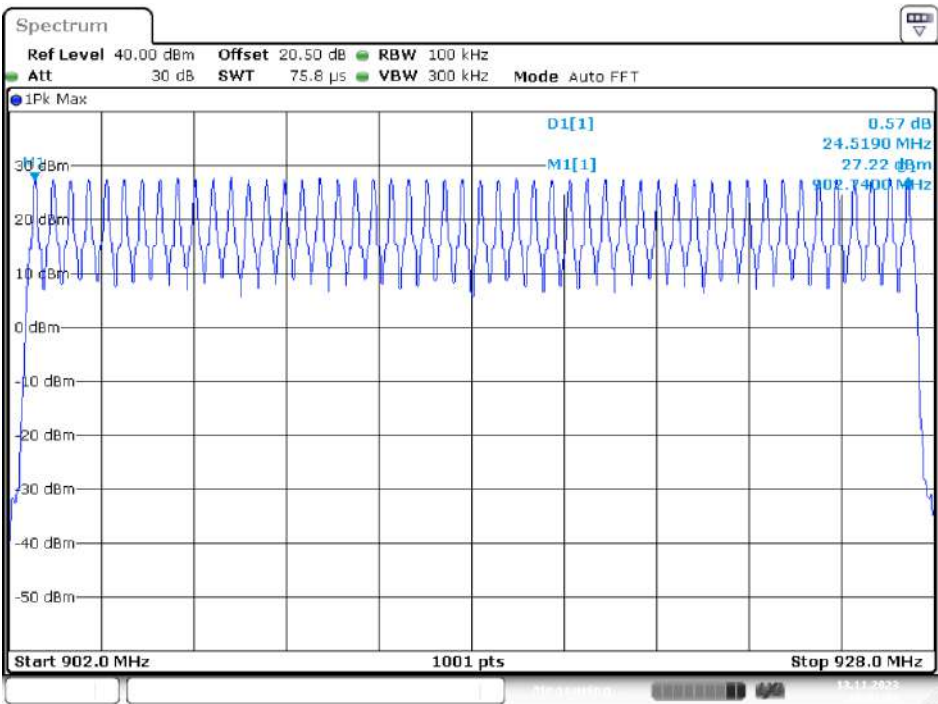
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

12.3. Test Results

Mode	Frequency Range (MHz)	Number of Hopping Channel				Limit	Result
		Antenna Port 1	Antenna Port 2	Antenna Port 3	Antenna Port 4		
DSB-ASK	902.75~927.25	50				≥25	Pass
PR-ASK	902.75~927.25	50				≥50	Pass

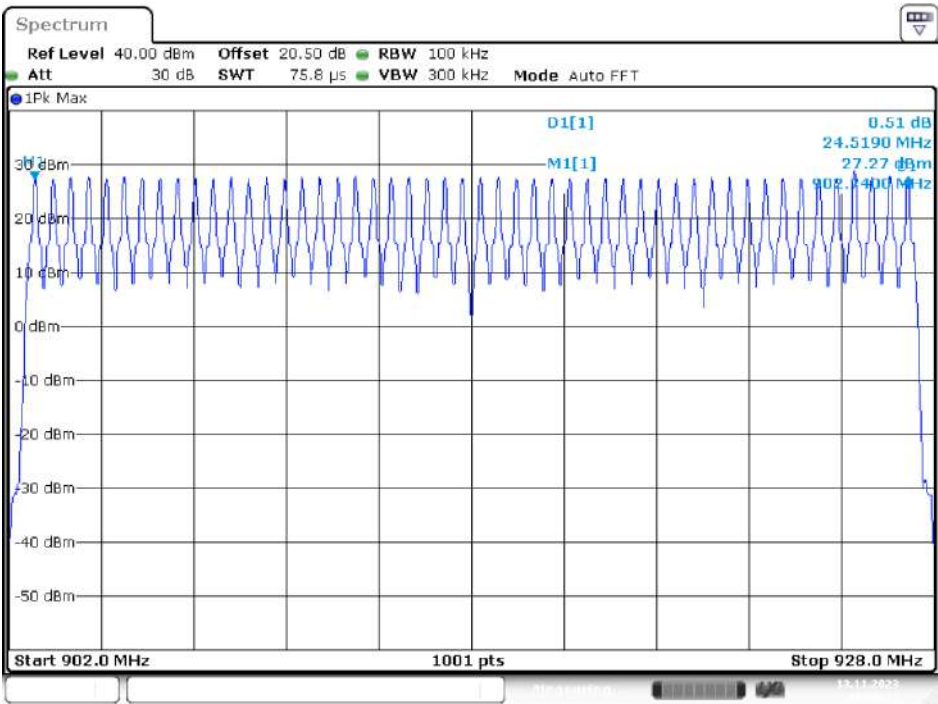
Please refer to the following plots

DSB-ASK Mode Antenna Port 1



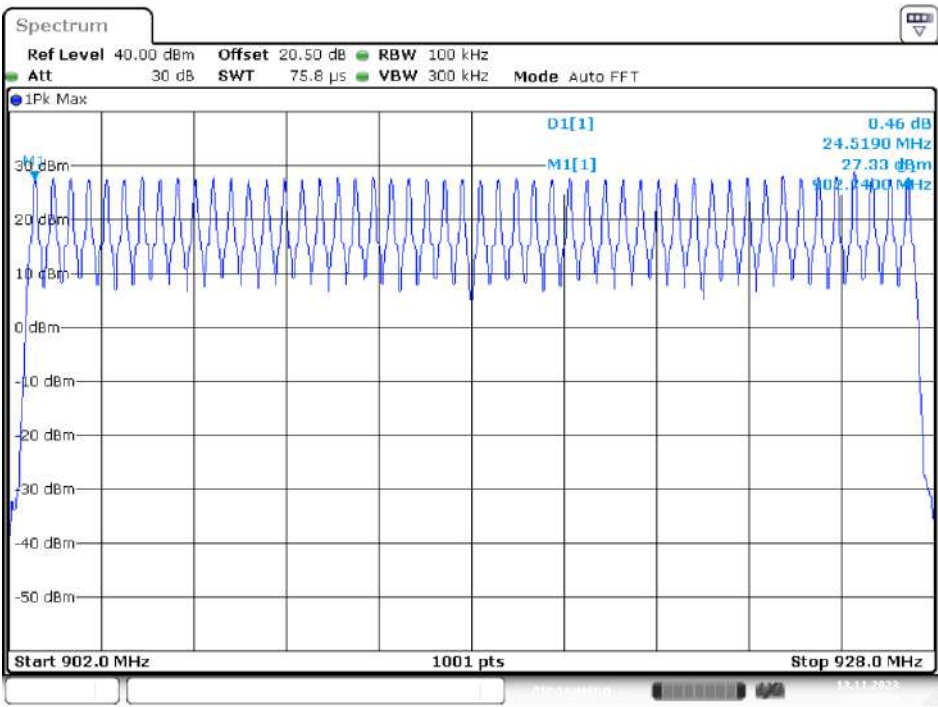
Date: 13.NOV.2023 16:41:05

DSB-ASK Mode Antenna Port 2



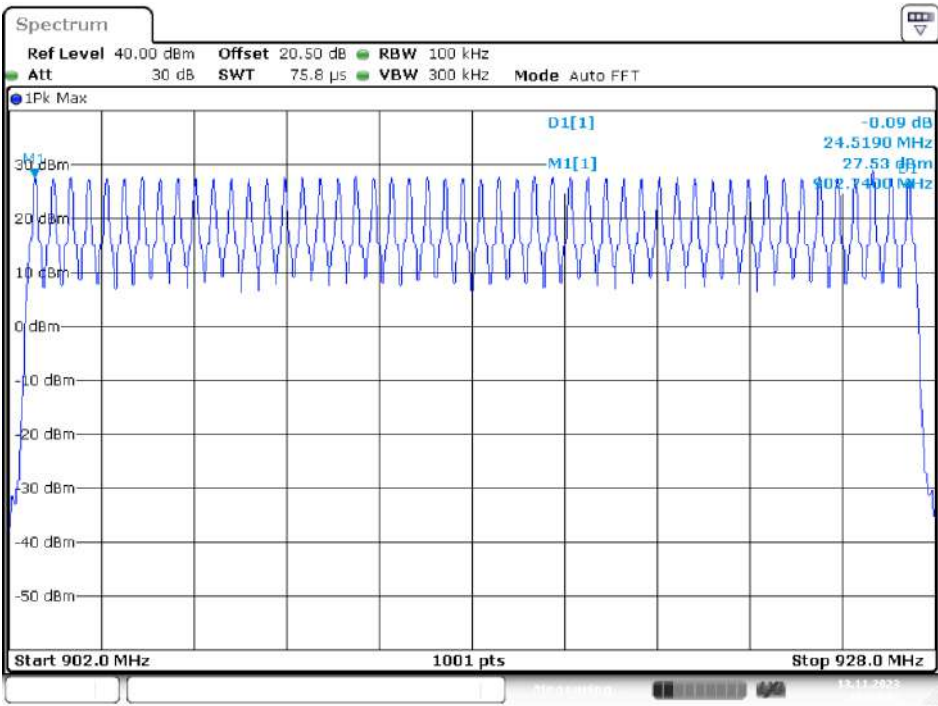
Date: 13.NOV.2023 16:38:28

DSB-ASK Mode Antenna Port 3



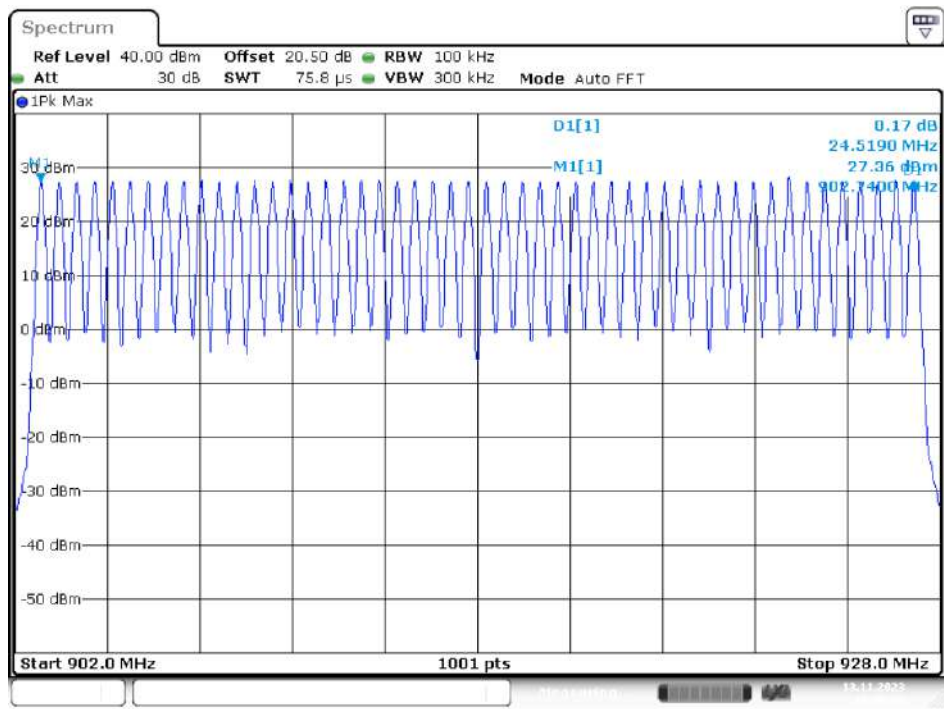
Date: 13.NOV.2023 16:37:09

DSB-ASK Mode Antenna Port 4

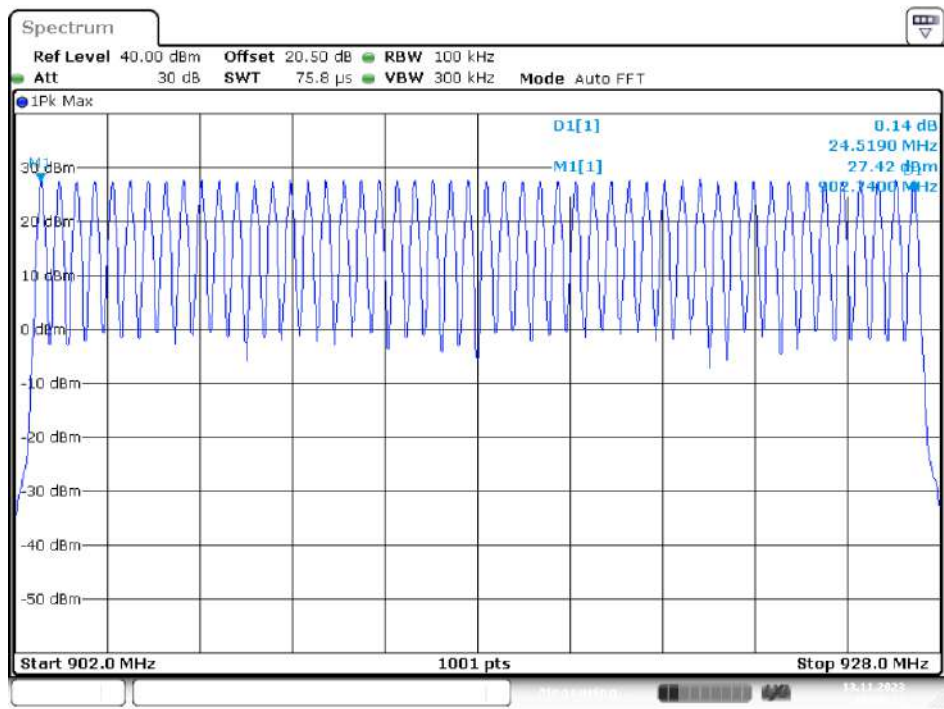


Date: 13.NOV.2023 16:34:42

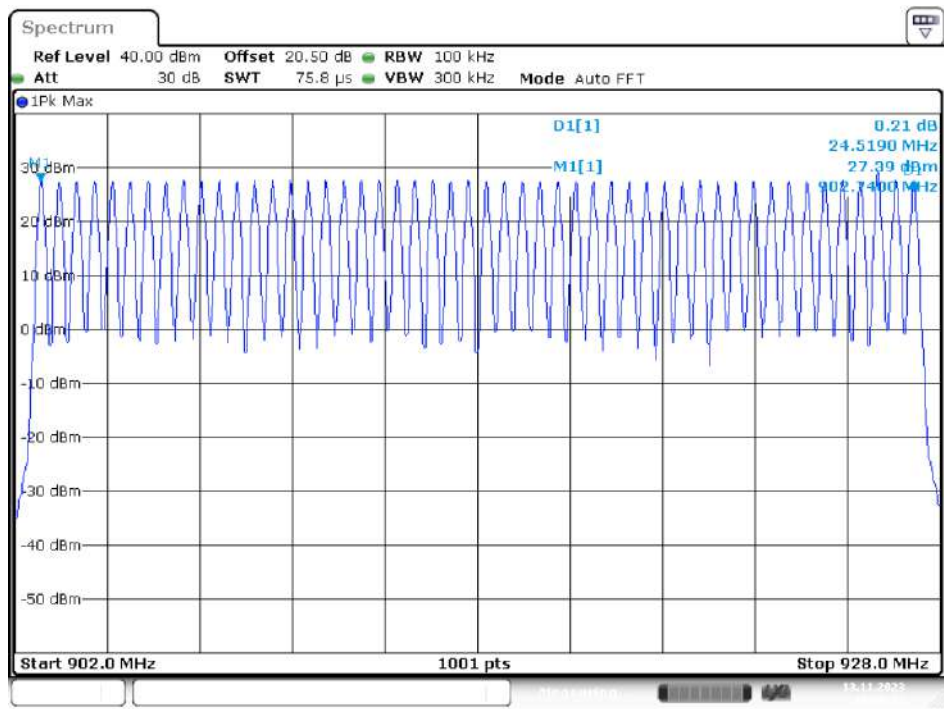
PR-ASK Mode Antenna Port 1



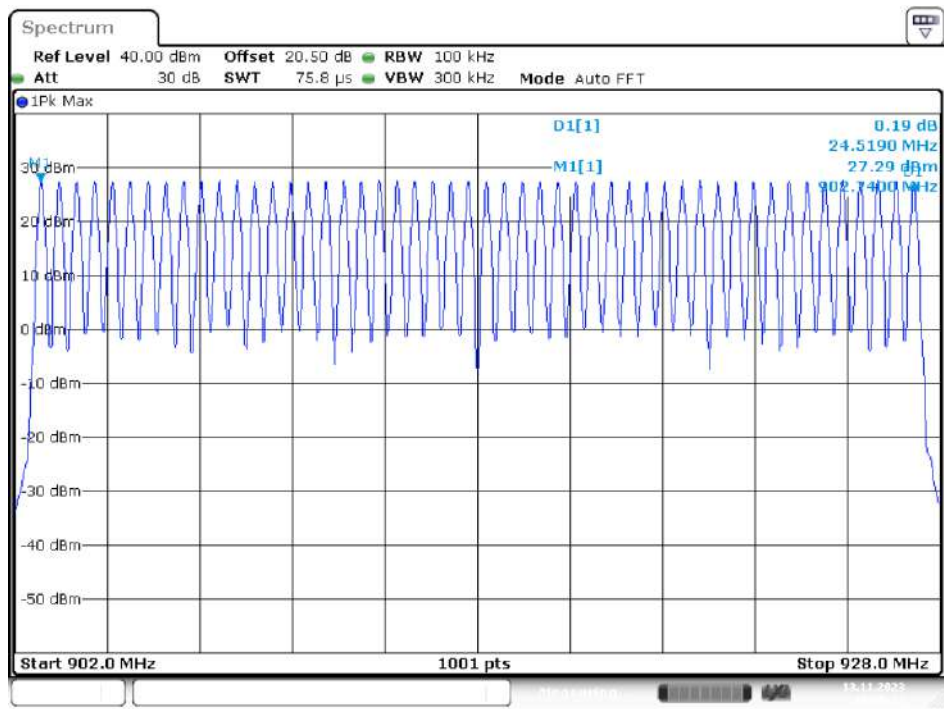
PR-ASK Mode Antenna Port 2



PR-ASK Mode Antenna Port 3



PR-ASK Mode Antenna Port 4



13. FCC §15.247(b)(2) – Maximum Output Power

13.1. Applicable Standard

According to FCC §15.247(b) (2).

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

13.2. Test Procedure

According to ANSI C63.10-2013 Section 7.8.5

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to measuring equipment.

13.3. Test Results

Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)				Limit (dBm)	Result
		Antenna Port 1	Antenna Port 2	Antenna Port 3	Antenna Port 4		
DSB-ASK Mode							
Low	902.75	28.37	28.42	28.34	28.35	30	PASS
Mid	915.25	28.39	28.44	28.39	28.38	30	PASS
High	927.25	29.87	29.83	29.86	29.93	30	PASS
PR-ASK Mode							
Low	902.75	28.18	28.25	28.20	28.16	30	PASS
Mid	915.25	28.20	28.27	28.21	28.19	30	PASS
High	927.25	29.98	29.99	29.97	29.84	30	PASS

14. FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

14.1. Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

14.2. Test Procedure

According to ANSI C63.10-2013 Section 7.8.6

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.

RBW = 100 kHz VBW = 300 kHz

Sweep = auto coupled

Detector function = peak , Trace = max hold

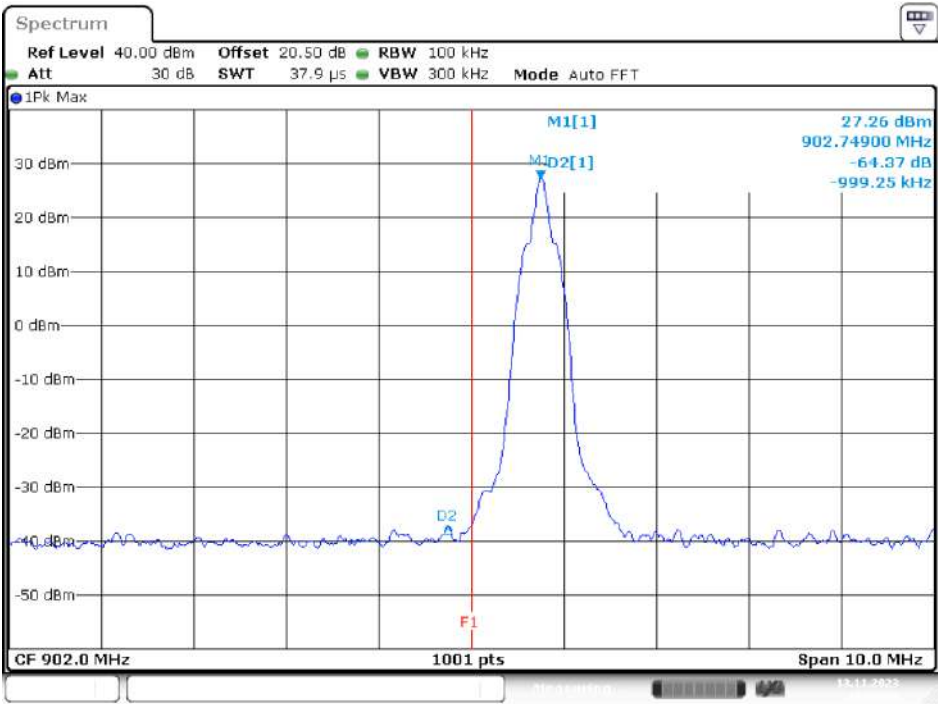
14.3. Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)				Limit (dBc)	Result
		Antenna Port 1	Antenna Port 2	Antenna Port 3	Antenna Port 4		
DSB-ASK Mode							
Low	902.75	64.37	64.34	63.49	63.24	≥ 20	PASS
High	927.25	60.01	60.39	57.47	65.25	≥ 20	PASS
DSB-ASK Hopping Mode							
Low	902.75	64.92	66.40	65.91	66.31	≥ 20	PASS
High	927.25	68.55	65.62	65.61	65.17	≥ 20	PASS
PR-ASK Mode							
Low	902.75	61.51	60.92	61.07	61.17	≥ 20	PASS
High	927.25	61.98	58.37	60.95	58.21	≥ 20	PASS
PR-ASK Hopping Mode							
Low	902.75	65.47	64.38	65.16	63.70	≥ 20	PASS
High	927.25	66.49	66.87	64.10	61.87	≥ 20	PASS

Please refer to the following plots.

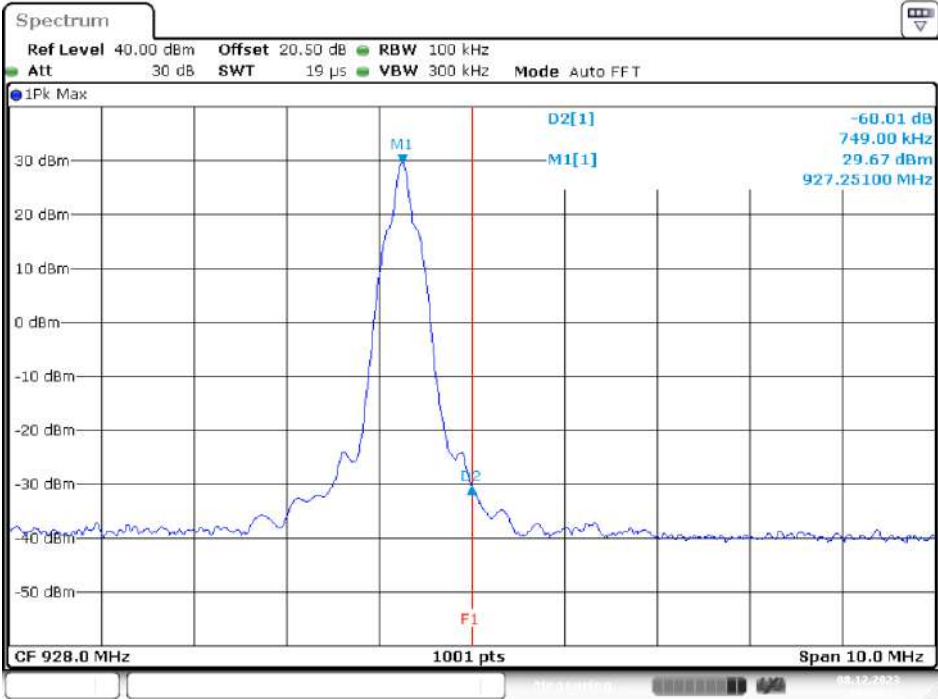
Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

DSB-ASK Mode Antenna Port 1
Band Edge, CH Low



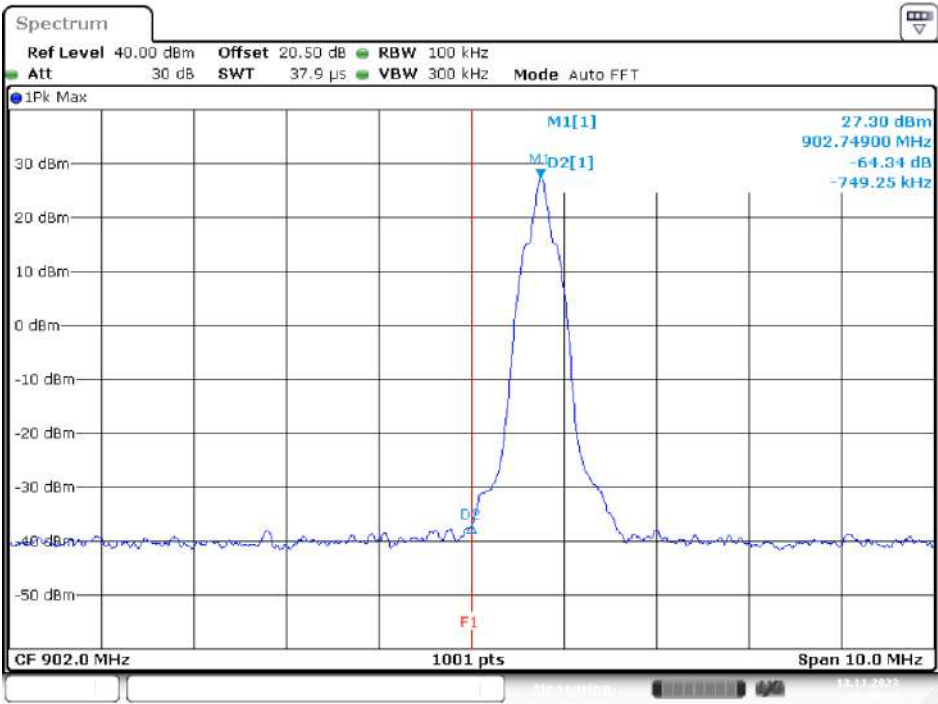
Date: 13.NOV.2023 15:23:08

Band Edge, CH High

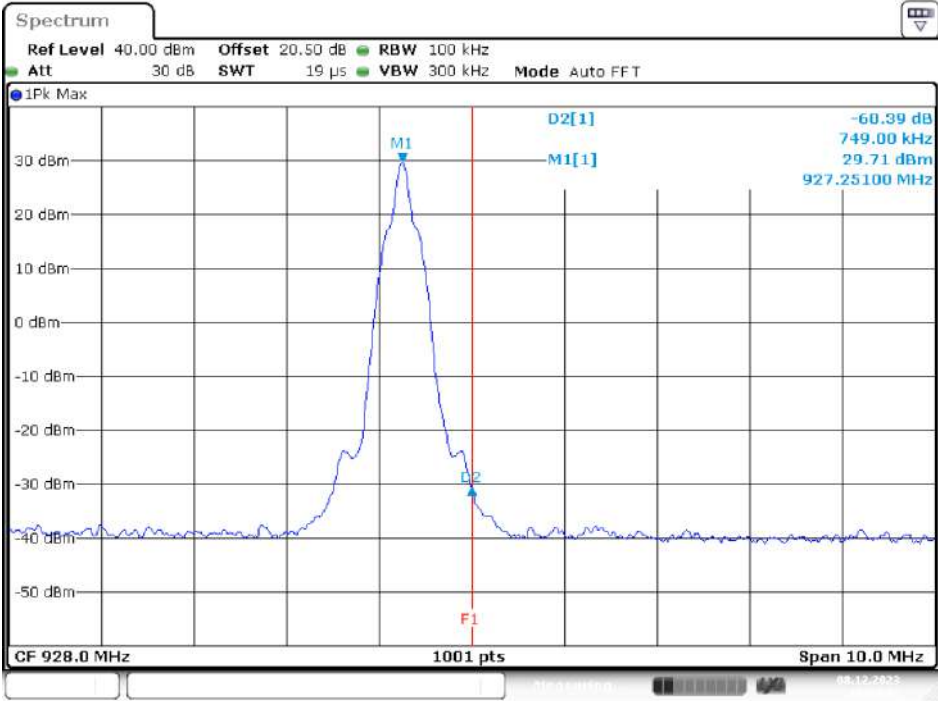


Date: 8.DEC.2023 14:23:22

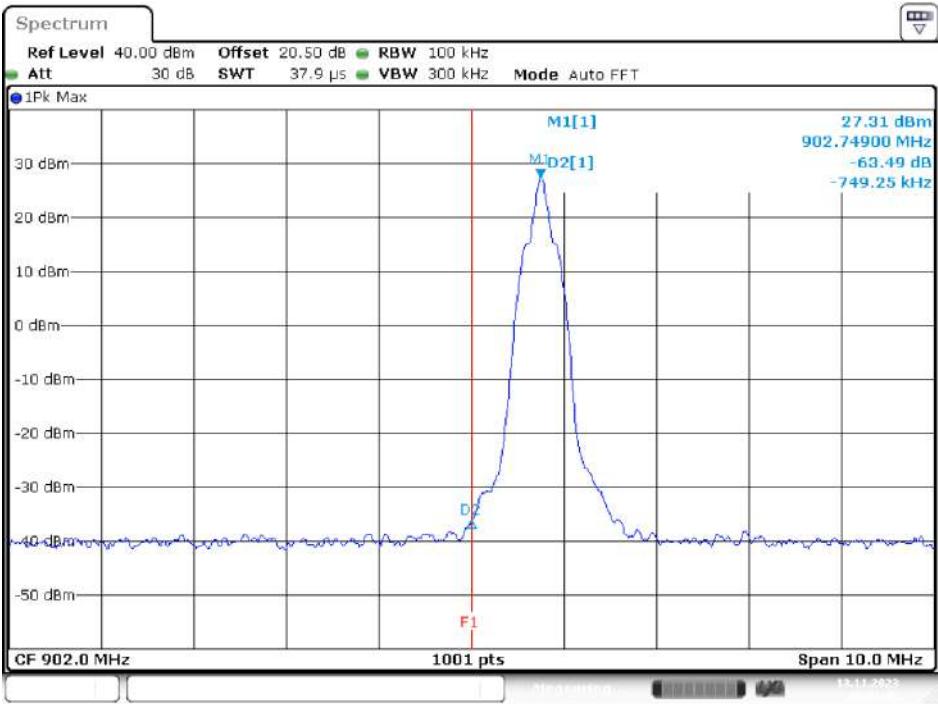
DSB-ASK Mode Antenna Port 2
Band Edge, CH Low



Band Edge, CH High

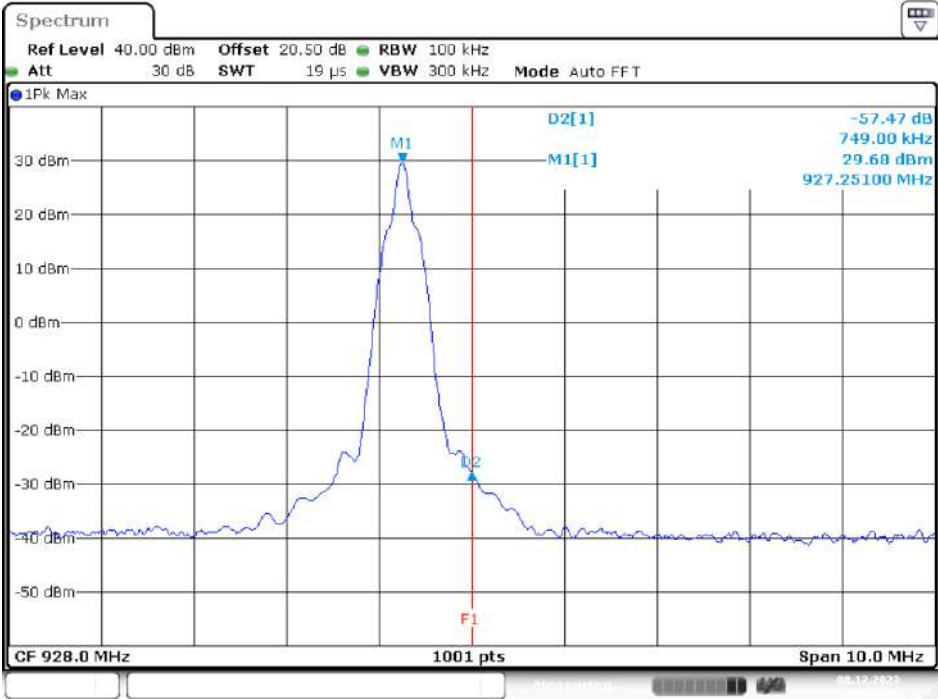


DSB-ASK Mode Antenna Port 3
Band Edge, CH Low



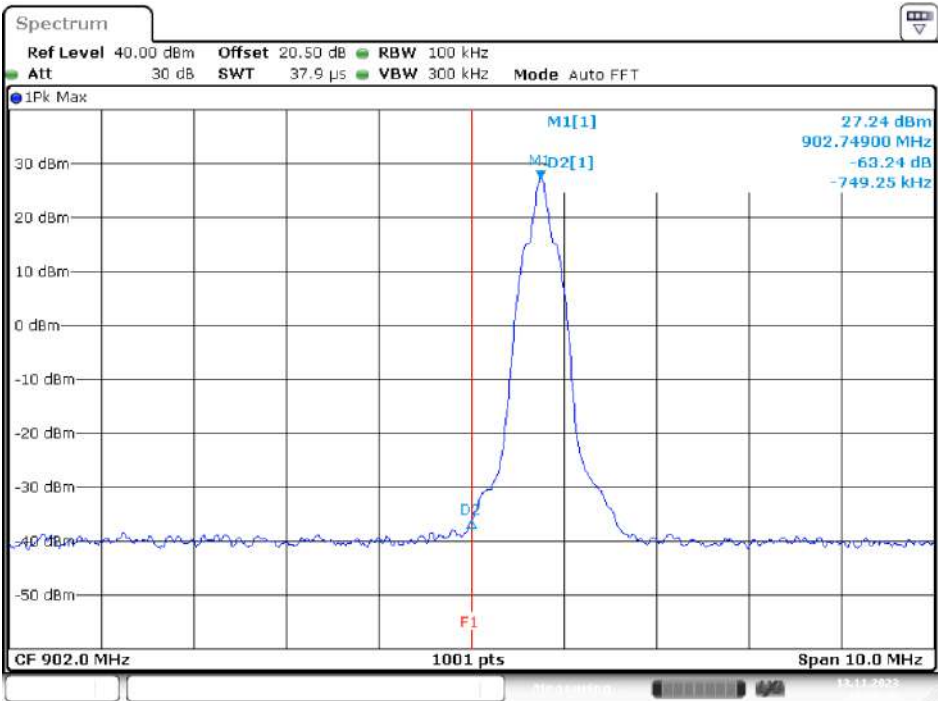
Date: 13.NOV.2023 15:41:46

Band Edge, CH High



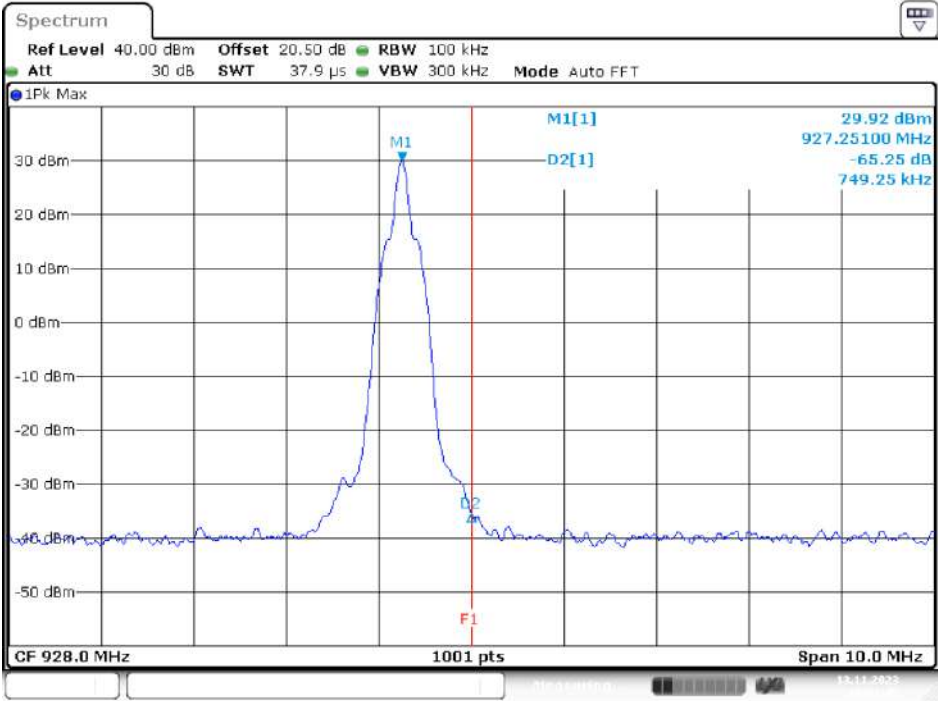
Date: 8.DEC.2023 14:23:42

DSB-ASK Mode Antenna Port 4
Band Edge, CH Low



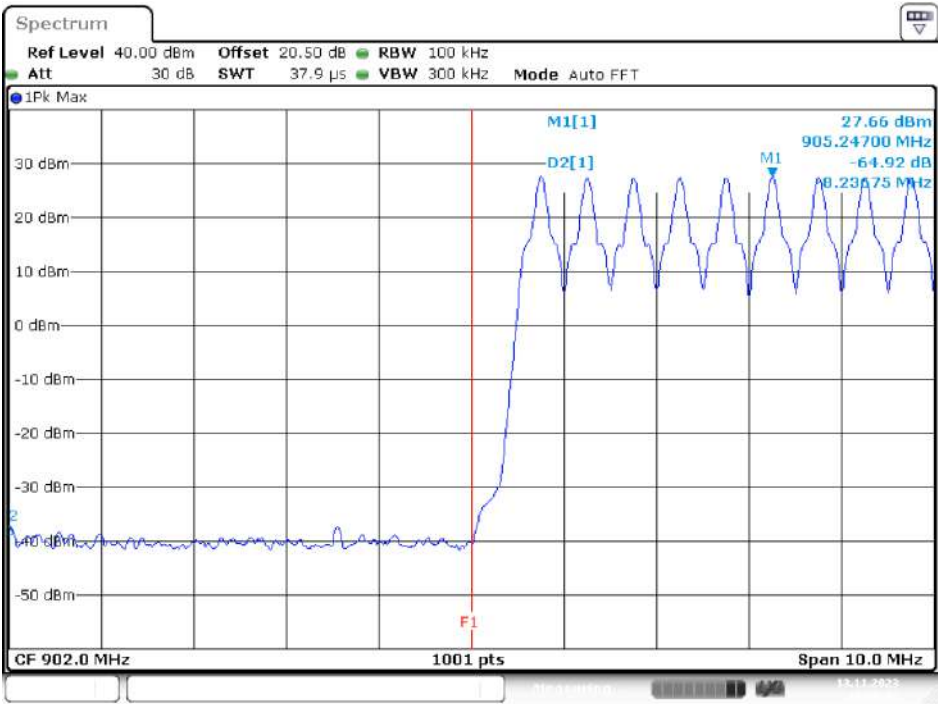
Date: 13.NOV.2023 15:59:46

Band Edge, CH High

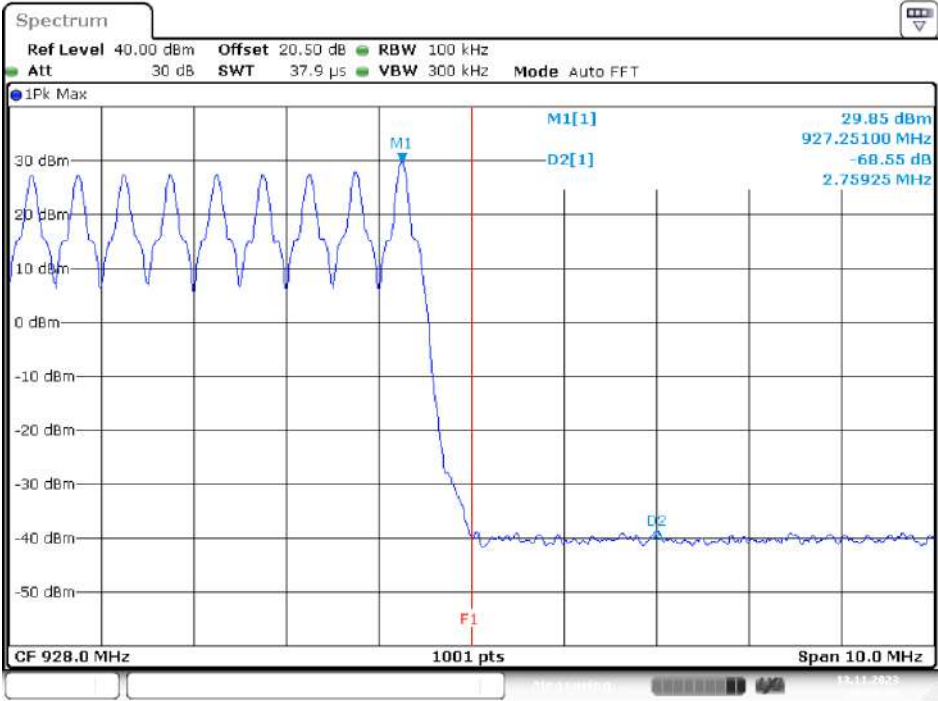


Date: 13.NOV.2023 15:51:45

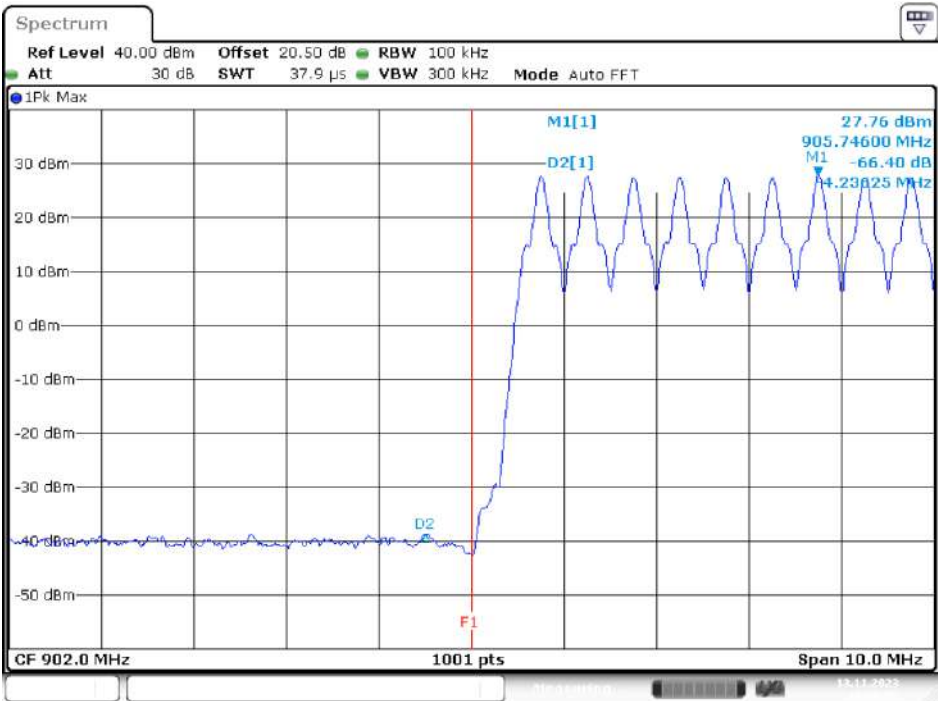
DSB-ASK Hopping Mode Antenna Port 1
Band Edge, CH Low



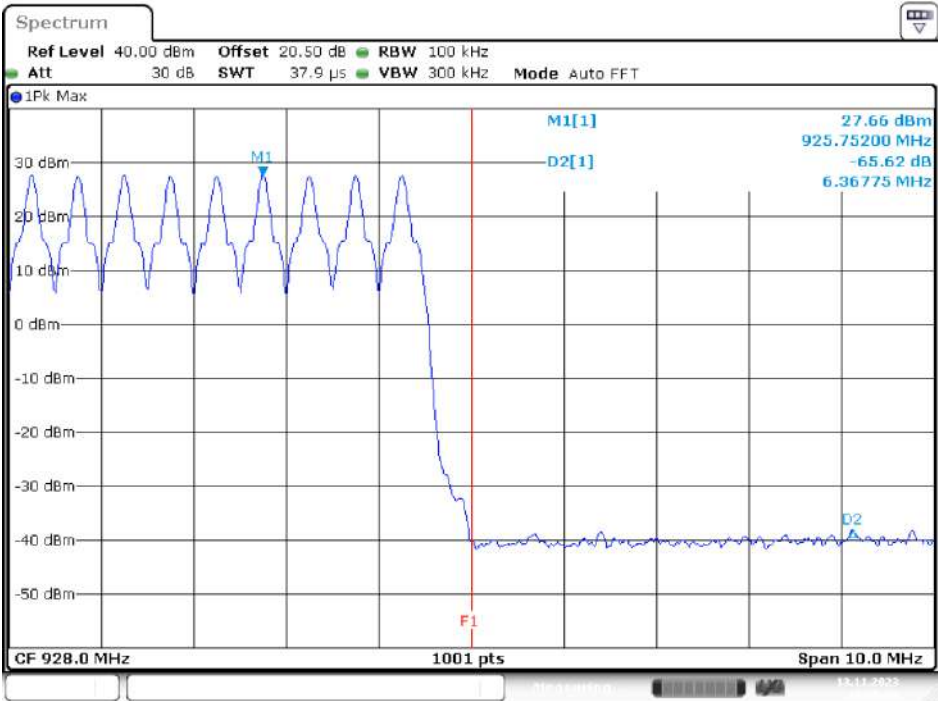
Band Edge, CH High



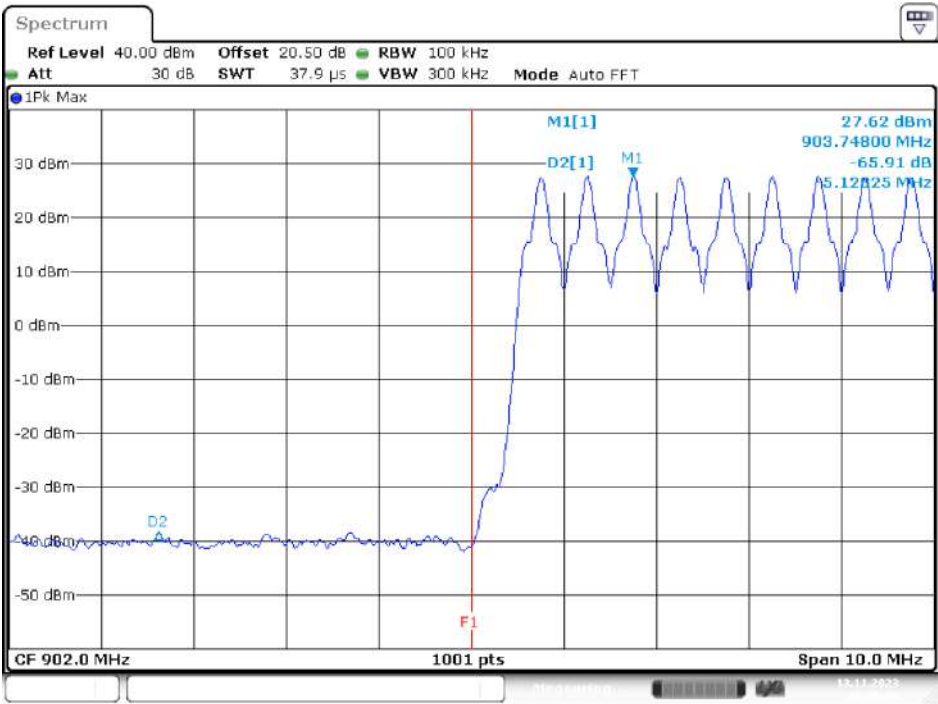
DSB-ASK Hopping Mode Antenna Port 2
Band Edge, CH Low



Band Edge, CH High

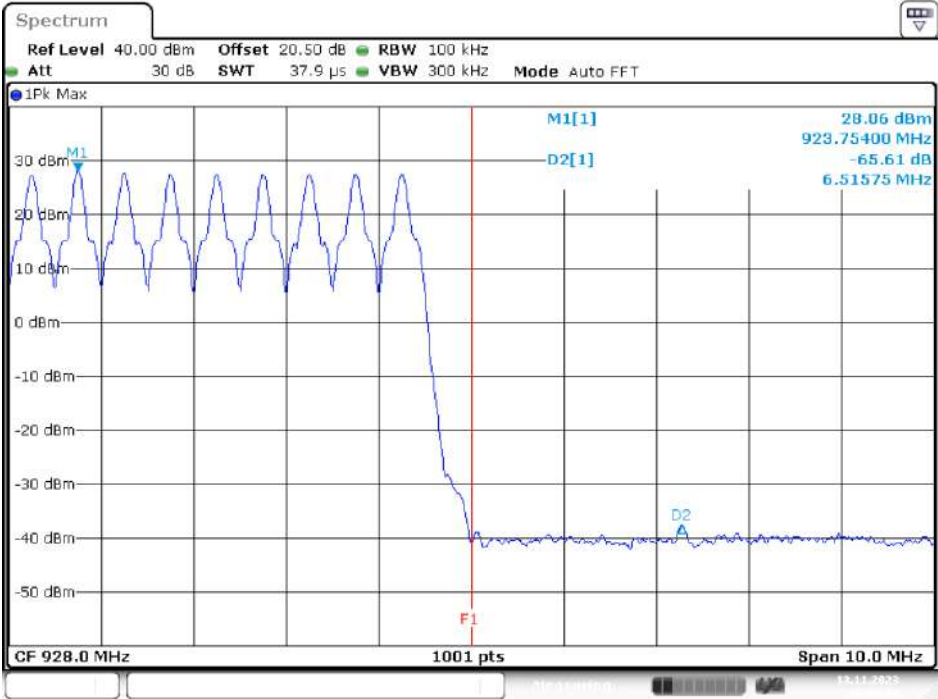


DSB-ASK Hopping Mode Antenna Port 3
Band Edge, CH Low



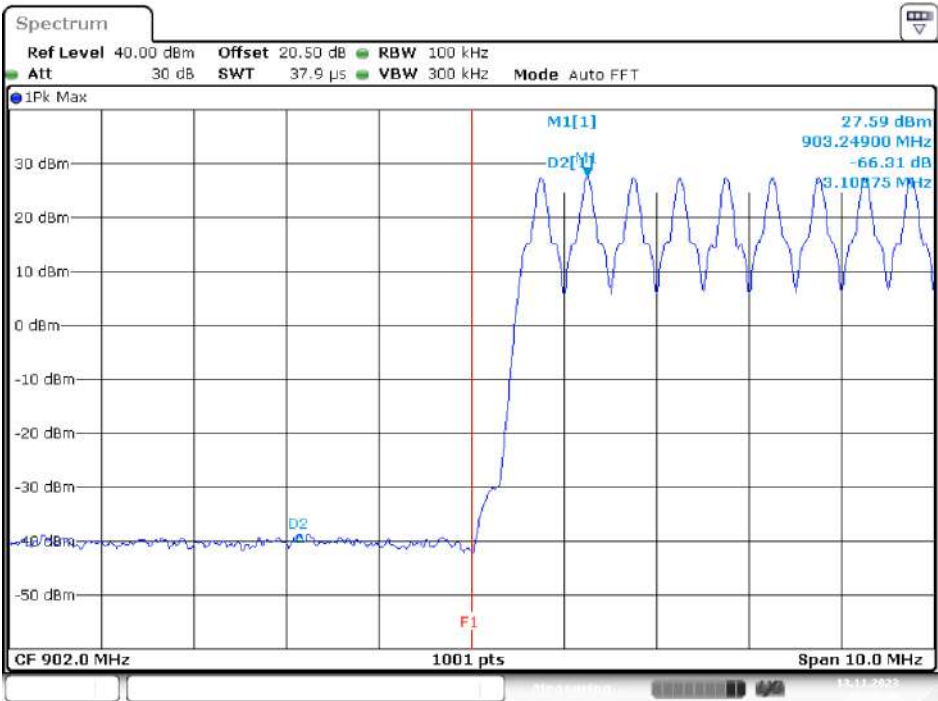
Date: 13.NOV.2023 15:45:49

Band Edge, CH High



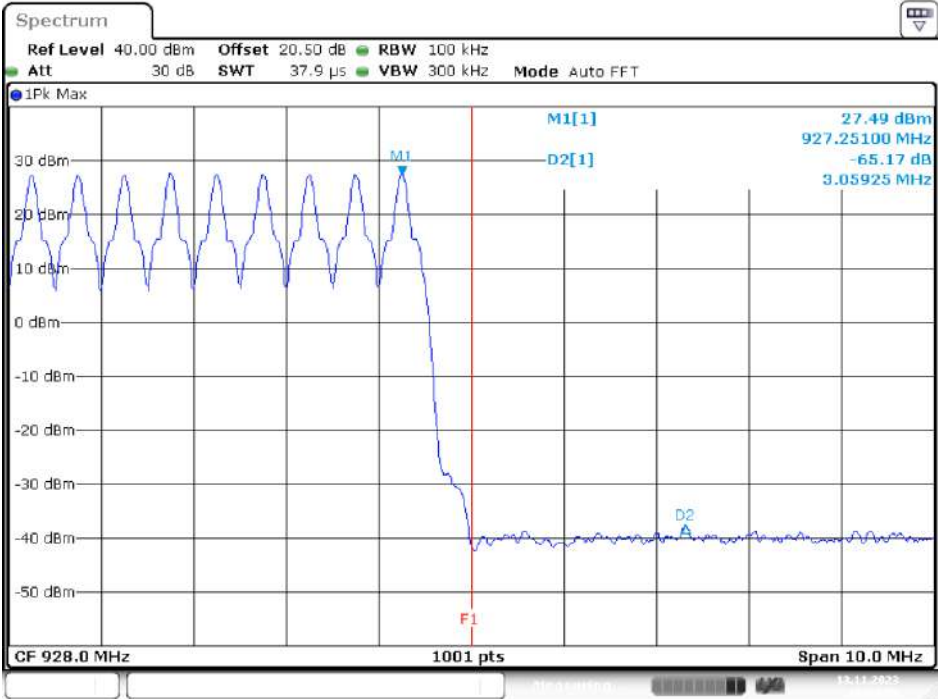
Date: 13.NOV.2023 15:47:09

DSB-ASK Hopping Mode Antenna Port 4
Band Edge, CH Low



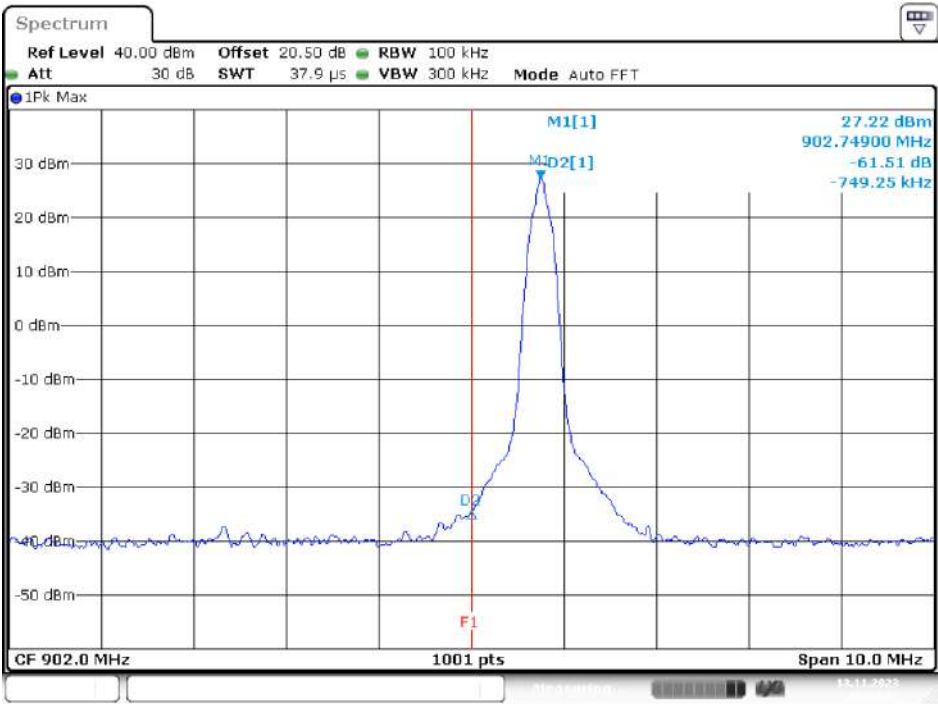
Date: 13.NOV.2023 15:56:31

Band Edge, CH High

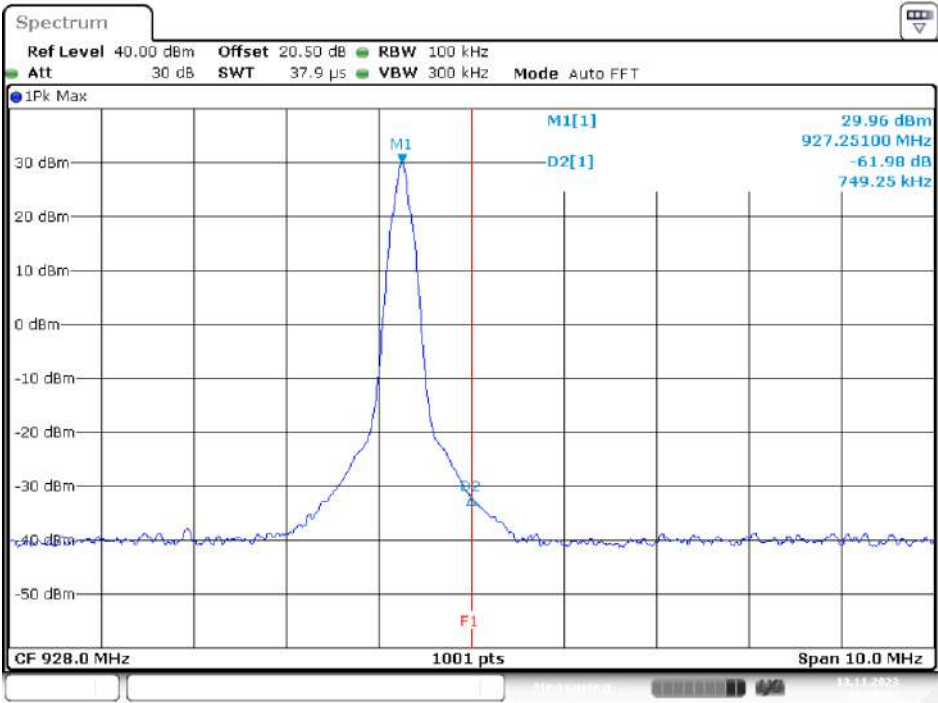


Date: 13.NOV.2023 15:54:29

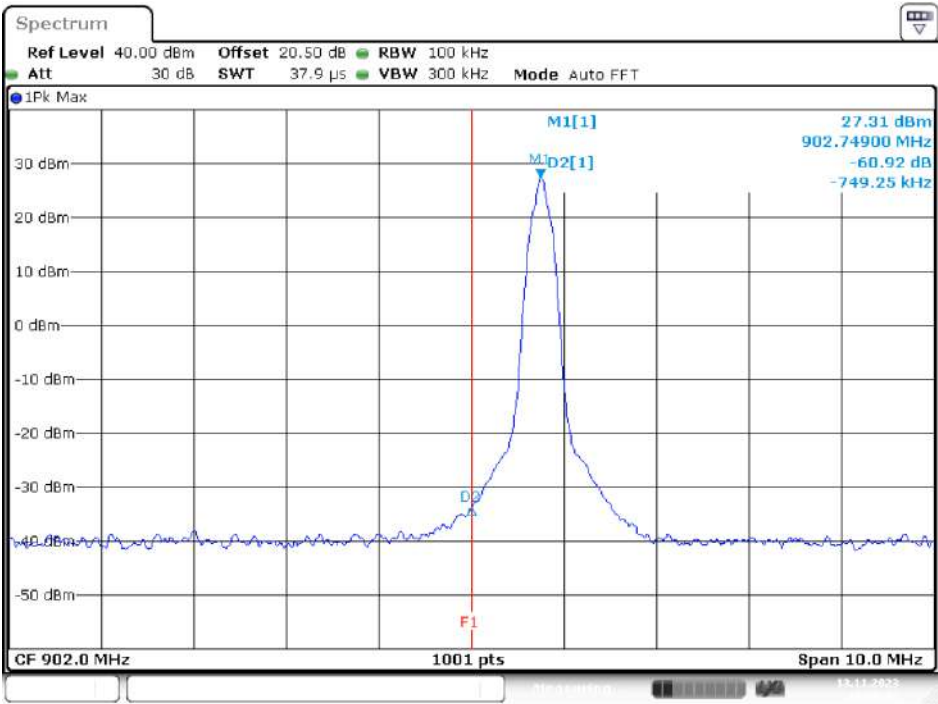
PR-ASK Mode Antenna Port 1
Band Edge, CH Low



Band Edge, CH High

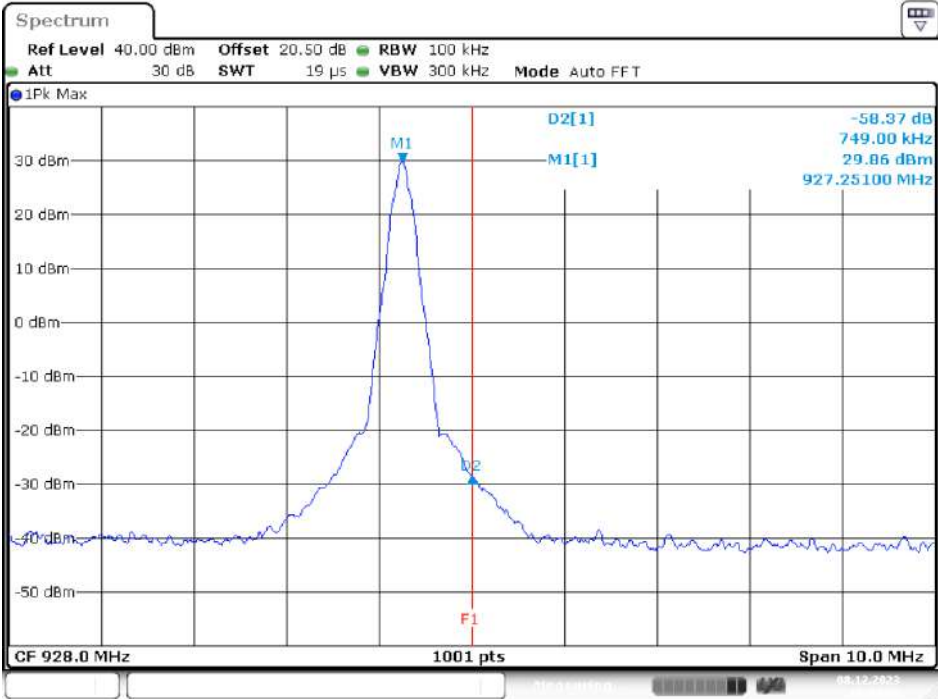


PR-ASK Mode Antenna Port 2
Band Edge, CH Low



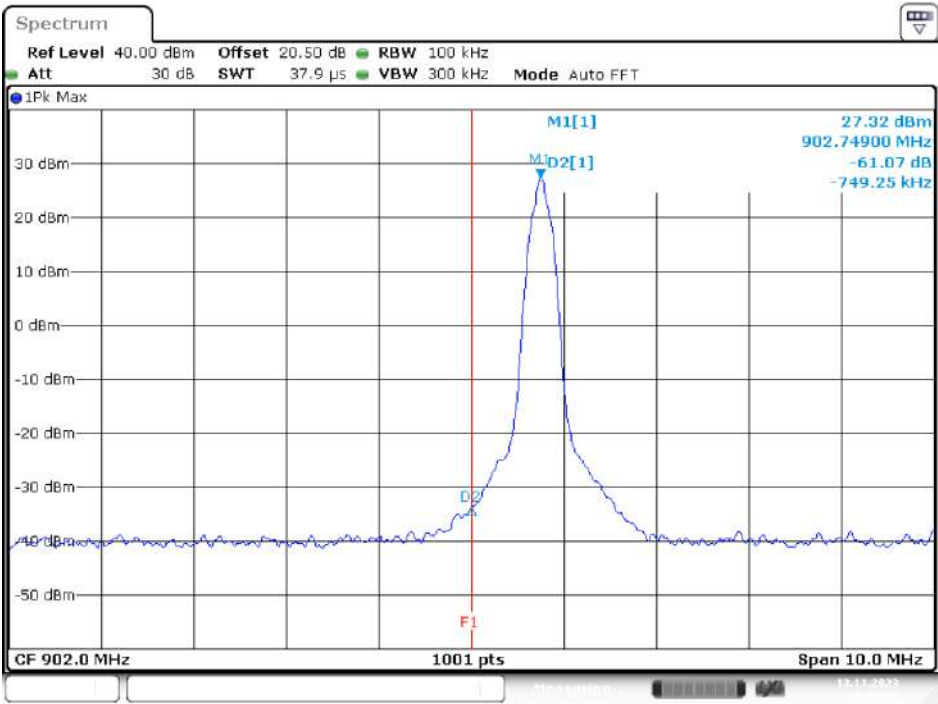
Date: 13.NOV.2023 15:39:38

Band Edge, CH High



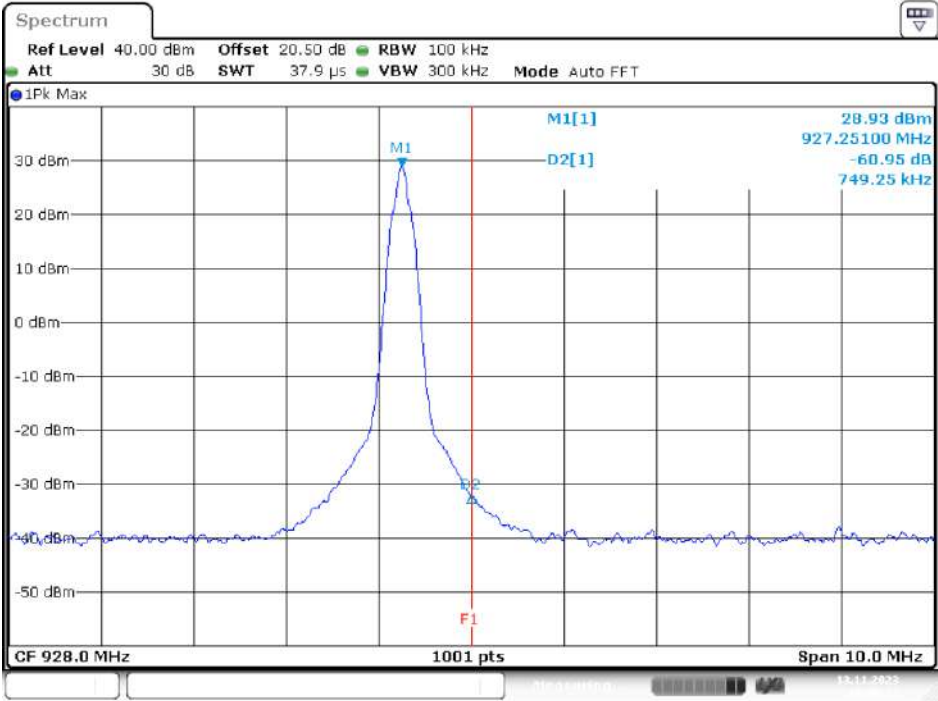
Date: 08.DEC.2023 14:44:27

PR-ASK Mode Antenna Port 3
Band Edge, CH Low



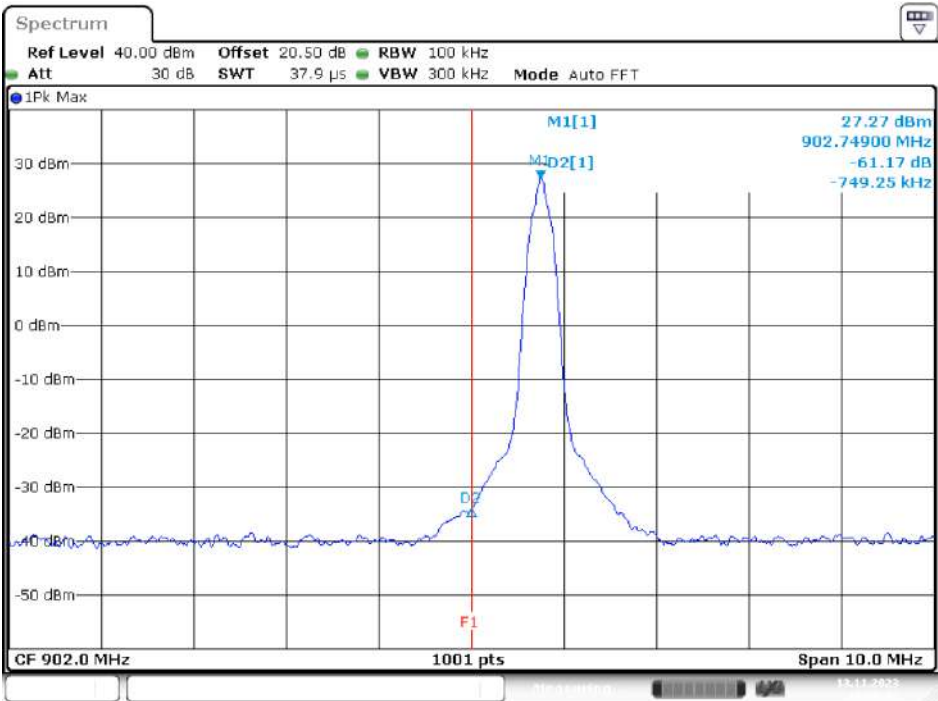
Date: 13.NOV.2023 15:42:51

Band Edge, CH High

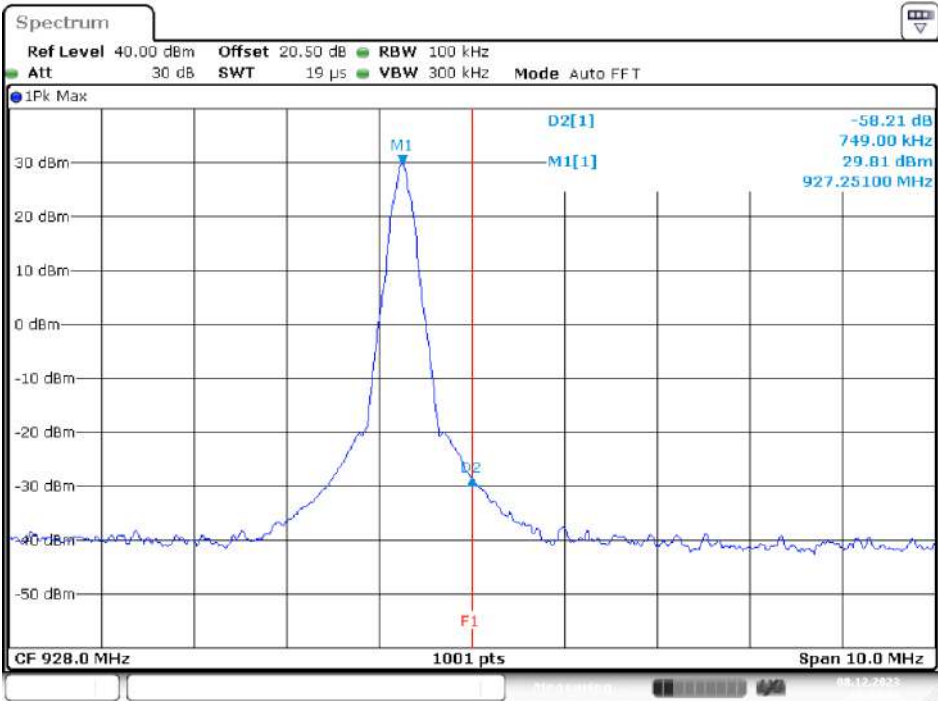


Date: 13.NOV.2023 15:49:14

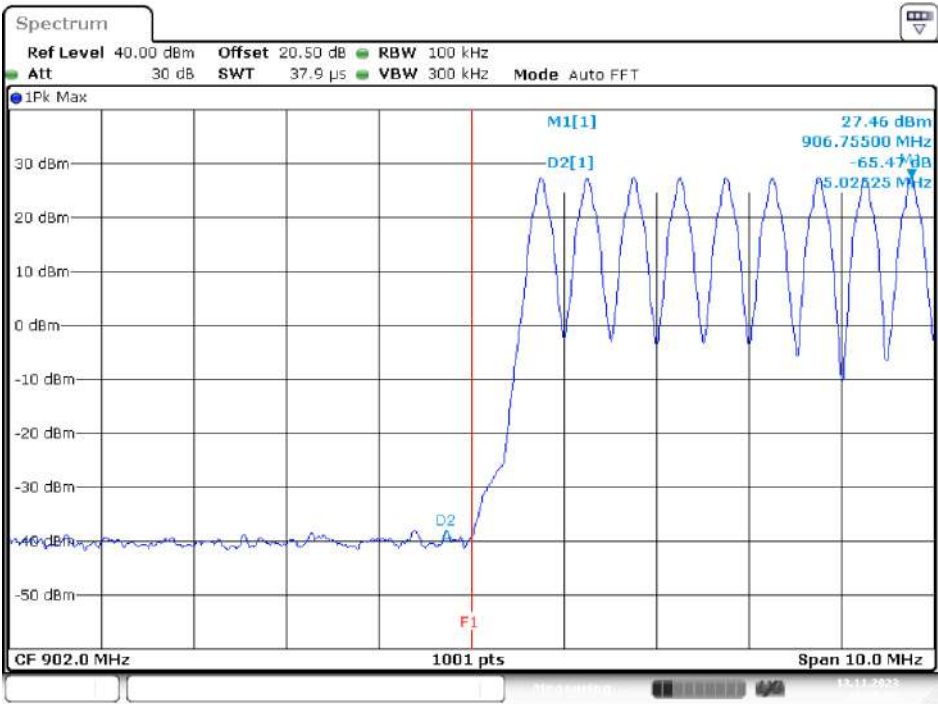
PR-ASK Mode Antenna Port 4
Band Edge, CH Low



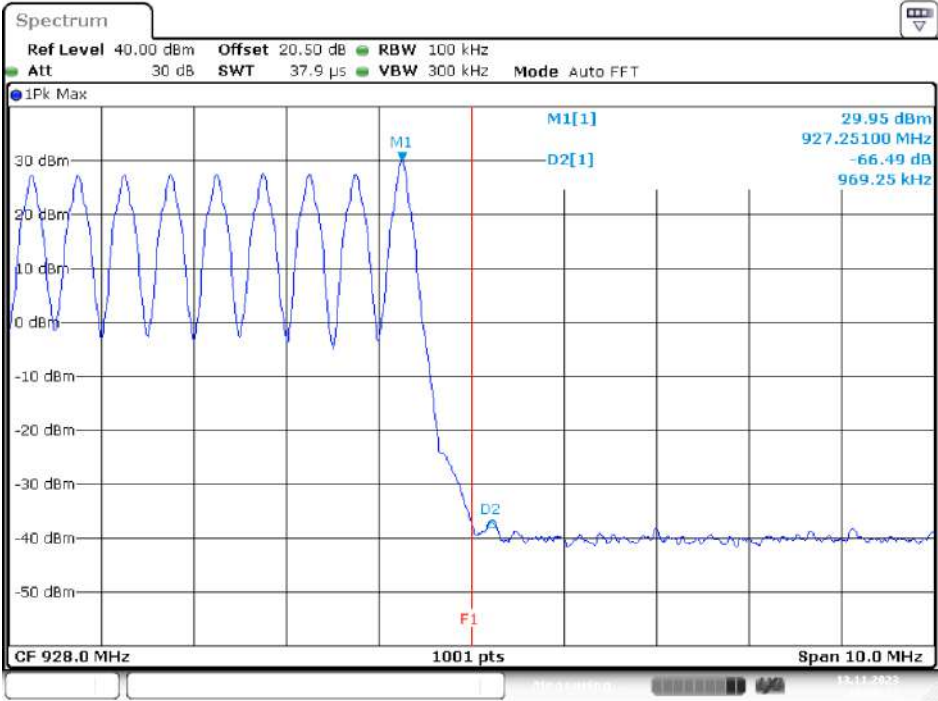
Band Edge, CH High



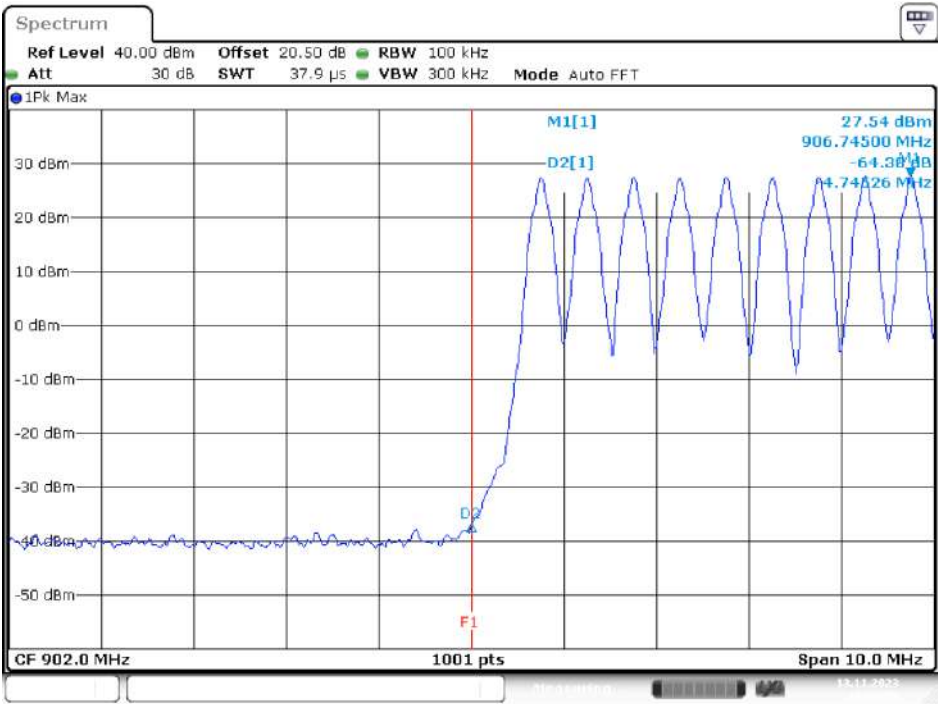
PR-ASK Hopping Mode Antenna Port 1
Band Edge, CH Low



Band Edge, CH High

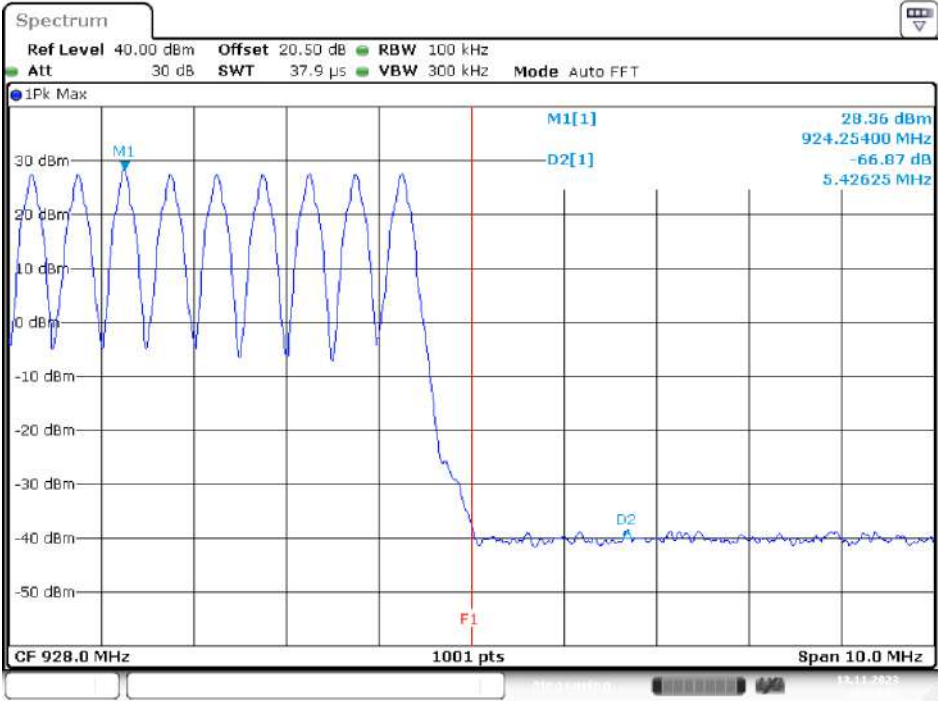


PR-ASK Hopping Mode Antenna Port 2
Band Edge, CH Low



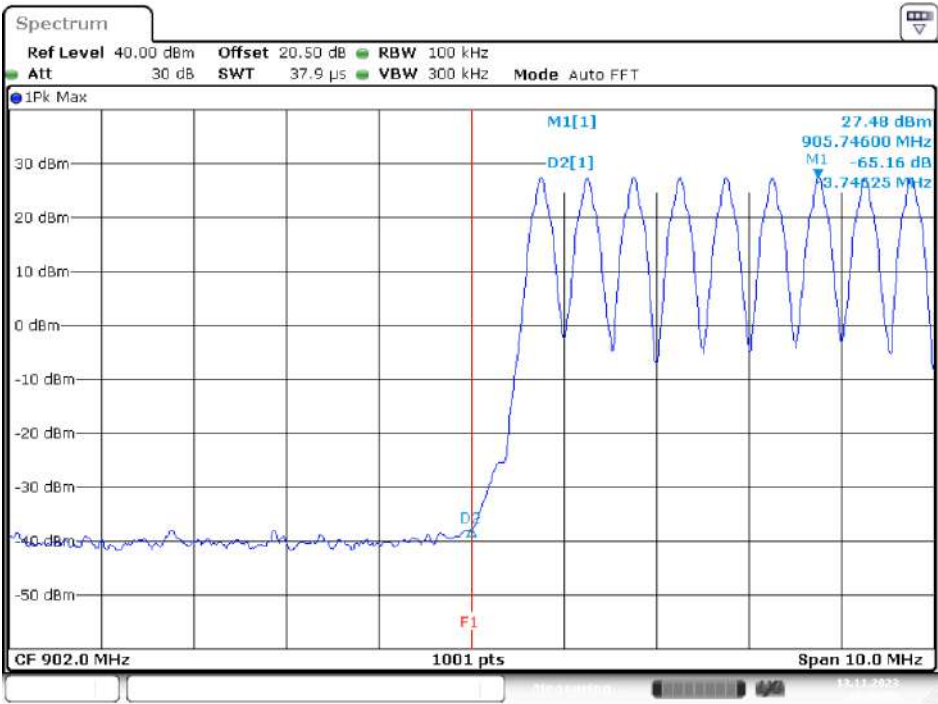
Date: 13.NOV.2023 15:37:59

Band Edge, CH High



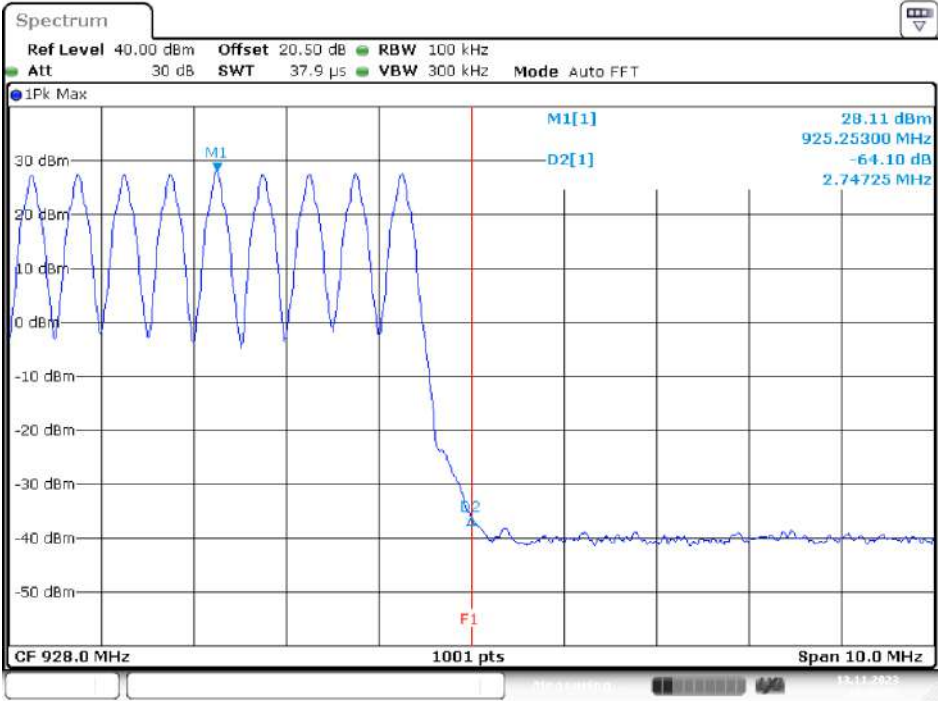
Date: 13.NOV.2023 15:34:43

PR-ASK Hopping Mode Antenna Port 3
Band Edge, CH Low



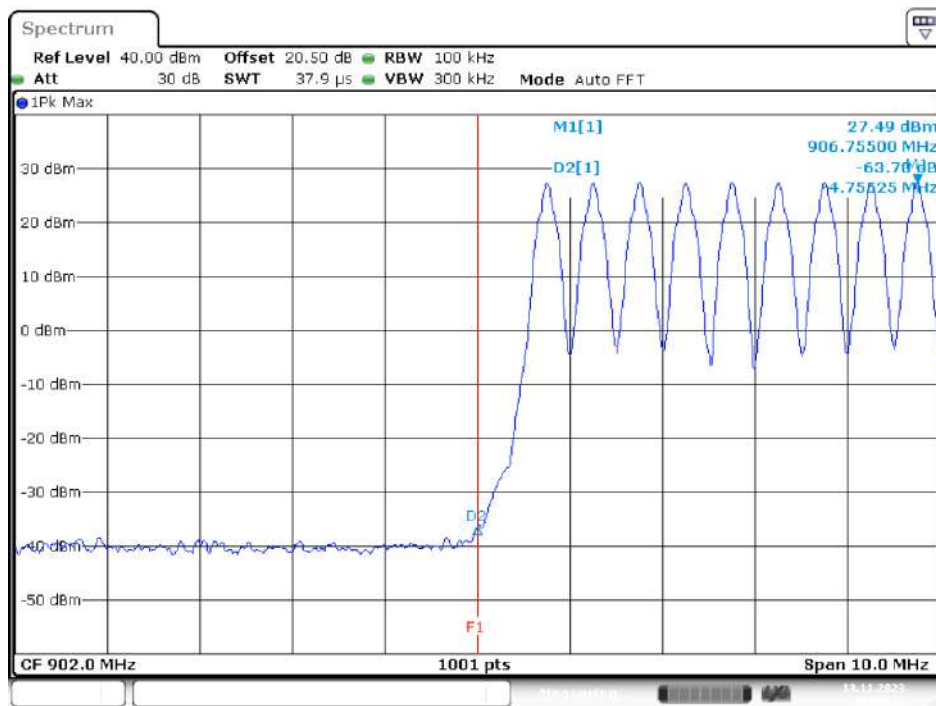
Date: 13.NOV.2023 15:43:29

Band Edge, CH High



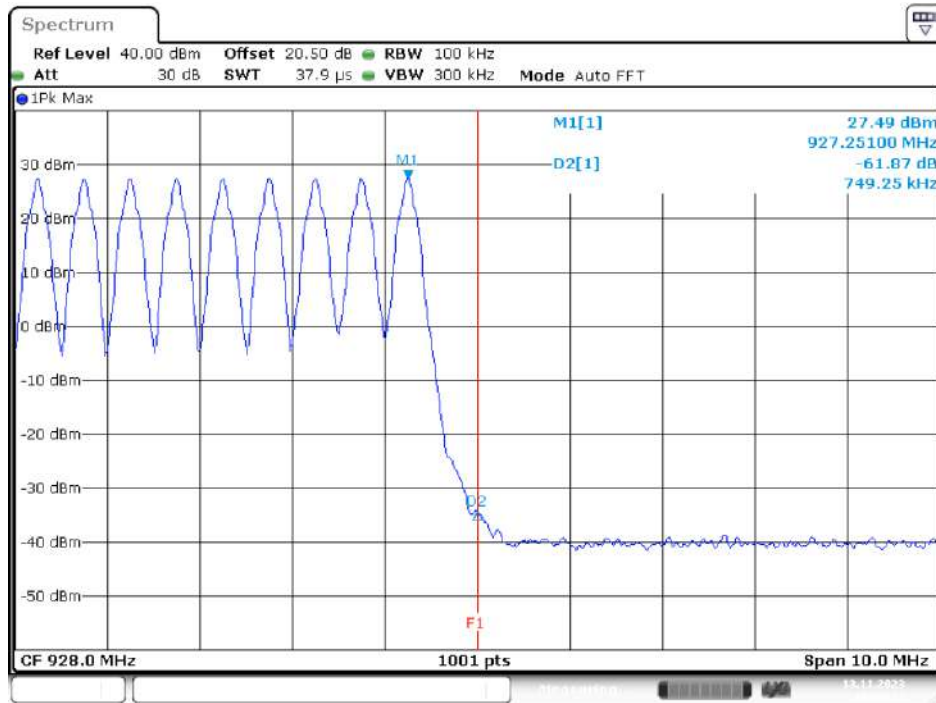
Date: 13.NOV.2023 15:47:55

Band Edge, CH Low



Date: 13.NOV.2023 15:57:13

Band Edge, CH High



Date: 13.NOV.2023 15:53:13

***** END OF REPORT *****