

Test Report

HELEM2301000042-1 v1.2



INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C AND ISED CANADA REQUIREMENTS

Equipment Under Test: Personal Protection and Surveillance Device

Model: TLP54US

Trademark: TWIG

Manufacturer/Customer: Twig Com Ltd
Lairolantie 14
FI-24910, SALO
FINLAND

FCC Rule Part: 15.249
IC Rule Part: RSS-210, Issue 11, 2024
RSS-Gen, Issue 5 Amendment 2, 2021

Date: 1 August 2025

Issued by:


Lauri Sippola
Testing Engineer

1 August 2025


Henri Mäki
Testing Engineer

TABLE OF CONTENTS

TABLE OF CONTENTS	2
GENERAL REMARKS.....	3
Disclaimer	3
RELEASE HISTORY	4
PRODUCT DESCRIPTION	5
Equipment Under Test	5
General Description.....	5
Ratings and declarations	6
SUMMARY OF TESTING.....	7
EUT Test Conditions during Testing	8
TEST RESULTS.....	9
Antenna requirement.....	9
Conducted Emissions In The Frequency Range 150 kHz - 30 MHz.....	10
Maximum Radiated Output Power	12
Radiated Emissions 9 kHz to 10 GHz	13
99% Occupied Bandwidth	19
20 dB Bandwidth	21
TEST EQUIPMENT	23
Conducted Emissions.....	23
Radiated Emissions.....	23
99 % Occupied Bandwidth, 20 dB Bandwidth.....	23

GENERAL REMARKS**Disclaimer**

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

RELEASE HISTORY

Version	Changes	Issued
1.0	Initial release	9 August 2023
1.1	Updated RSS-210 standard version to Issue 11	26 July 2024
1.2	Product description: FCC/IC IDs added. Test result tables for Maximum Radiated Output Power and Radiated Emissions 9 kHz – 10 GHz corrected. Test results for 99 % Occupied Bandwidth and 20 dB Bandwidth updated. Test equipment list updated.	1 August 2025

PRODUCT DESCRIPTION

Equipment Under Test

Type:	Personal Protection and Surveillance Device
Model:	TLP54US
Trade Mark:	TWIG
Serial no:	122X4820029109 (SDR1 tests) 122X4820027222 (SDR2 tests) 122X4820029111 (conducted emissions test)
Software version:	-
Hardware version:	-
FCC ID:	2A95KTLP54US
IC:	30482-TLP54US
Contains FCC ID:	2A95KPLS63X (cellular module)
Contains IC:	30482-PLS63X (cellular module)
Contains FCC ID:	2A95KNINAW15 (Wi-Fi/Bluetooth module)
Contains IC:	30482-NINAW15 (Wi-Fi/Bluetooth module)
Peripherals	
Charging station:	CTX50EU, s/n: 119X0100000406
AC adapter:	FW8005/EU/05, input voltage 100-240 V 50/60 Hz

General Description

The EUT is a personal tracking and alarm device. It contains:

- Cellular, Wi-Fi / Bluetooth transceivers and GNSS
- SRD 1: 918.219 MHz
- SRD 2: 918.675 MHz

The tests presented in this test report are made for SRD 1 and SRD 2.

Classification

- | | |
|--|-------------------------------------|
| Fixed device | ☐ |
| Mobile Device (Human body distance > 20cm) | ☐ |
| Portable Device (Human body distance < 20cm) | ☒ |

Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

Ratings and declarations

Nominal Operating Frequency:	918.219 MHz and 918.675 MHz
Channels:	2
Rated Operating channel width:	50 kHz
Modulation:	GFSK
Antenna Type:	Internal
Antenna Gain:	0 dBi
EUT Dimensions:	62 x 47 x 22 mm
Power Requirements:	Integrated battery

Ports and cables

Cable / Port	Description
USB	USB, length = 1.0 m
AC cable	AC mains to AC adapter, length = 1.0 m or 2.0 m

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.203	Antenna requirement	PASS
§15.207(a) / RSS-Gen 8.8	Conducted Emissions on Power Supply Lines	PASS
§15.249(a) / RSS-210 B.10 (a)	Maximum Radiated Output Power	PASS
RSS-Gen 6.7	99 % Occupied Bandwidth	PASS
§15.215(c)	20 dB Bandwidth	PASS
§15.249(a), (d) / RSS-210 B.10 (a)-(b)	Unintentional Radiated Emissions	PASS

The decision rule applied for the tests results stated in this test report is according to the requirements of section 1.3 of ANSI C63.10-2013.

EUT Test Conditions during Testing

The EUT was configured into the wanted channel and was in continuous transmit mode during all the tests. During the radiated measurements above 1 GHz the EUT was on 150 cm high Styrofoam table. The EUT was tested in X, Y, Z positions. The highest levels were reported.



Figure 1: Test setup block diagram

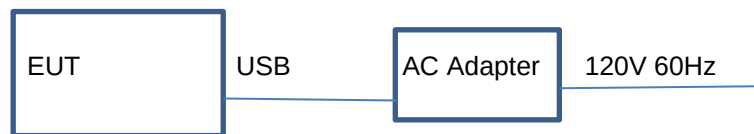


Figure 2: Test setup block diagram, radiated emissions 9kHz - 30 MHz only

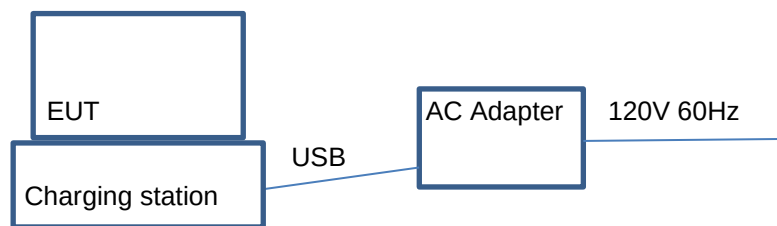


Figure 3: Test setup block diagram, conducted emissions only

Table 1: Test frequencies and settings

Channel	Frequency (MHz)
SRD1	918.219
SRD2	918.675

Test Facility

Testing Laboratory / address: FCC designation number: FI0002 ISED CAB identifier: T004	SGS Fimko Ltd Karakaarenkuja 4 FI-02610, ESPOO FINLAND
Test Site:	☐ K10LAB, ISED Canada registration number: 8708A-1 ☒ K5LAB, ISED Canada registration number: 8708A-2 ☐ T10LAB

TEST RESULTS

Antenna requirement

Standard: FCC Rule §15.203
Tested by: PKA
Date: 9 August 2023

FCC Rule: 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.

Specification	Requirement (at least one of the following shall be applied)	Conclusion
§15.203	1. Permanently attached antenna 2. Unique coupling to the intentional radiator 3. Professionally installed radio. The installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	PASS
Note	Option 1 is used	

Conducted Emissions In The Frequency Range 150 kHz - 30 MHz

Conducted Emissions In The Frequency Range 150 kHz - 30 MHz

Standard: ANSI C63.10-2013
Tested by: PKA
Date: 28 July 2023
Temperature: 23 ± 3°C
Humidity: 20 - 60 % RH
Measurement uncertainty: ± 2.9 dB

Level of confidence 95 % (k = 2)

FCC Rule: 15.207(a)
RSS-Gen 8.8

Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz a resolution bandwidth of 9 kHz. Measurements were carried out with peak and average detectors.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

Conducted Emissions In The Frequency Range 150 kHz - 30 MHz

Test results

Full Spectrum

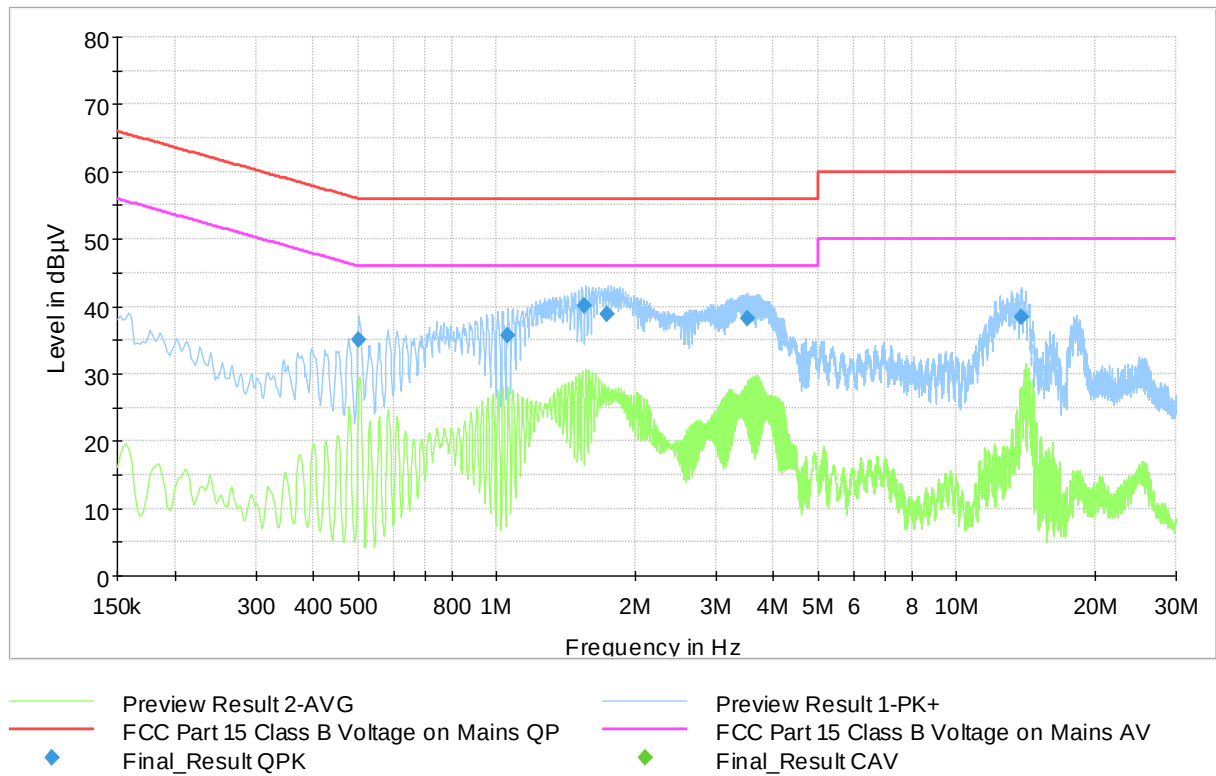


Figure 4: The measured curves with peak- and average detector

Final measurements from the worst frequencies

Table 2: Final Final quasi-peak and average results

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.502250	35.06	---	56.00	20.94	15x1000.0	9.000	L1	9.7
1.057500	35.74	---	56.00	20.26	15x1000.0	9.000	L1	9.8
1.557500	40.04	---	56.00	15.96	15x1000.0	9.000	L1	9.8
1.742000	38.93	---	56.00	17.07	15x1000.0	9.000	L1	9.9
3.509250	38.28	---	56.00	17.72	15x1000.0	9.000	L1	9.9
13.821250	38.40	---	60.00	21.60	15x1000.0	9.000	L1	10.4

The correction factor in the final result table contains the sum of the transducers (LISN + transient limiter + cables). The result value is the measured value corrected with the correction factor.

Maximum Radiated Output Power**Maximum Radiated Output Power**

Standard: ANSI C63.10-2013
Tested by: PKA
Date: 20 July 2023
Temperature: $23 \pm 3^{\circ}\text{C}$
Humidity: 20 - 60 % RH
Measurement uncertainty $\pm 4.5 \text{ dB}$

Level of confidence 95 % ($k = 2$)

FCC Rule: 15.249(a)
RSS-210 B.10 (a)

According to 15.249(a), the field strength of fundamental from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Limit [mV/m]	Limit [dB μ V/m]	Detector
902 – 928 MHz	50	93.98	Quasi-peak
2400 – 2483.5 MHz	50	93.98	Average
2400 – 2483.5 MHz	500	113.98	Peak
5725 – 5875 MHz	50	93.98	Average
5725 – 5875 MHz	500	113.98	Peak
24.0 – 24.25 GHz	250	107.96	Average
24.0 – 24.25 GHz	2500	127.96	Peak

Results:**Table 3:** Maximum Peak radiated output power

Channel	Radiated *) Power/Peak [dB μ V/m]	Quasi-Peak Limit [dB μ V/m]	Margin [dB]	Result
SRD1	84.63	93.98	9.35	PASS
SRD2	75.16	93.98	18.82	PASS

*) Peak result, lower than quasi-peak limit

Radiated Emissions 9 kHz to 10 GHz**Radiated Emissions 9 kHz to 10 GHz**

Standard: ANSI C63.10-2013
Tested by: PKA
Date: 20 and 28 July 2023
Temperature: 23 ± 3°C
Humidity: 20 - 60 % RH
Measurement uncertainty ± 4.51 dB
Level of confidence 95 % (k = 2)

FCC Rule: 15.249(a), (d)
RSS-210 B.10 (a)-(b)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

Field strength of harmonics shall comply with the following:

Fundamental Frequency	Limit [µV/m]	Limit [dBµV/m]	Detector
902 – 928 MHz	500	53.9	Average
2400 – 2483.5 MHz	500	53.9	Average
5725 – 5875 MHz	500	53.9	Average
24.0 – 24.25 GHz	2500	67.9	Average

Radiated emission limits according to 15.209:

Frequency range [MHz]	Limit [µV/m]	Limit [dBµV/m]	Detector
0.009-0.490	2400/F(kHz)	48.5-13.8	Quasi-peak
0.490-1.705	24000/F(kHz)	33.8-22.97	Quasi-peak
1.705-30.0	30	29.54	Quasi-peak
30 - 80	100	40.0	Quasi-peak
88 - 216	150	43.5	Quasi-peak
216 - 960	200	46.0	Quasi-peak
960 - 1000	500	53.9	Quasi-peak
Above 1000	500	53.9	Average
Above 1000	5000	73.9	Peak

The correction factor in the final result table contains the sum of the transducers (antenna + amplifier + cables).
The result value is the measured value corrected with the correction factor.

The pre-measurements were performed with the EUT being in three orthogonal positions (X, Y, Z). Final measurements were done in worst position.

Results

Full Spectrum

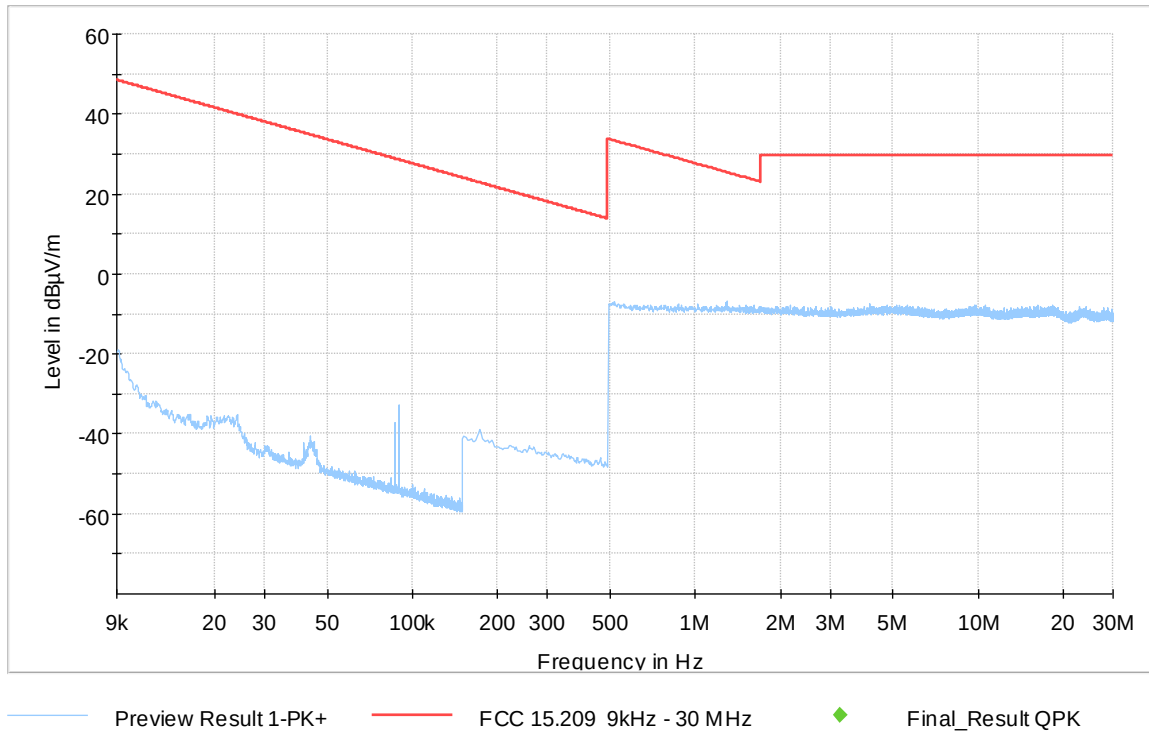


Figure 5: SRD1 (9 kHz – 30 MHz)

Full Spectrum

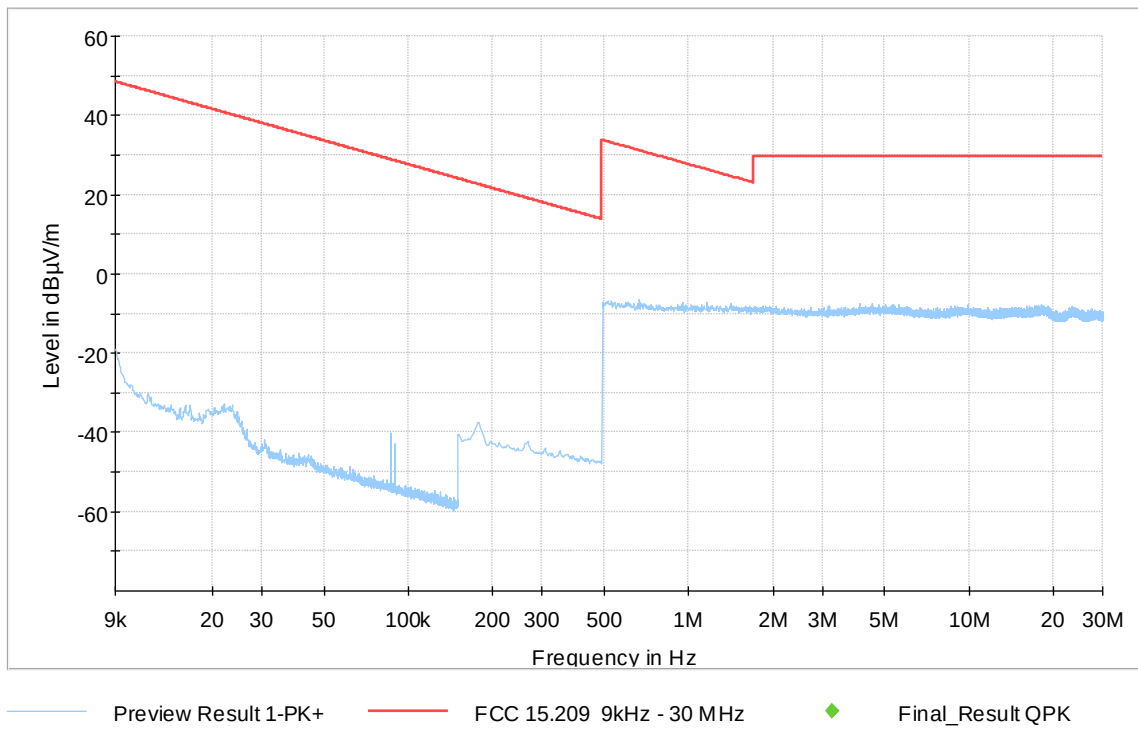


Figure 6: SRD2 (9 kHz – 30 MHz)

Radiated Emissions 9 kHz to 10 GHz

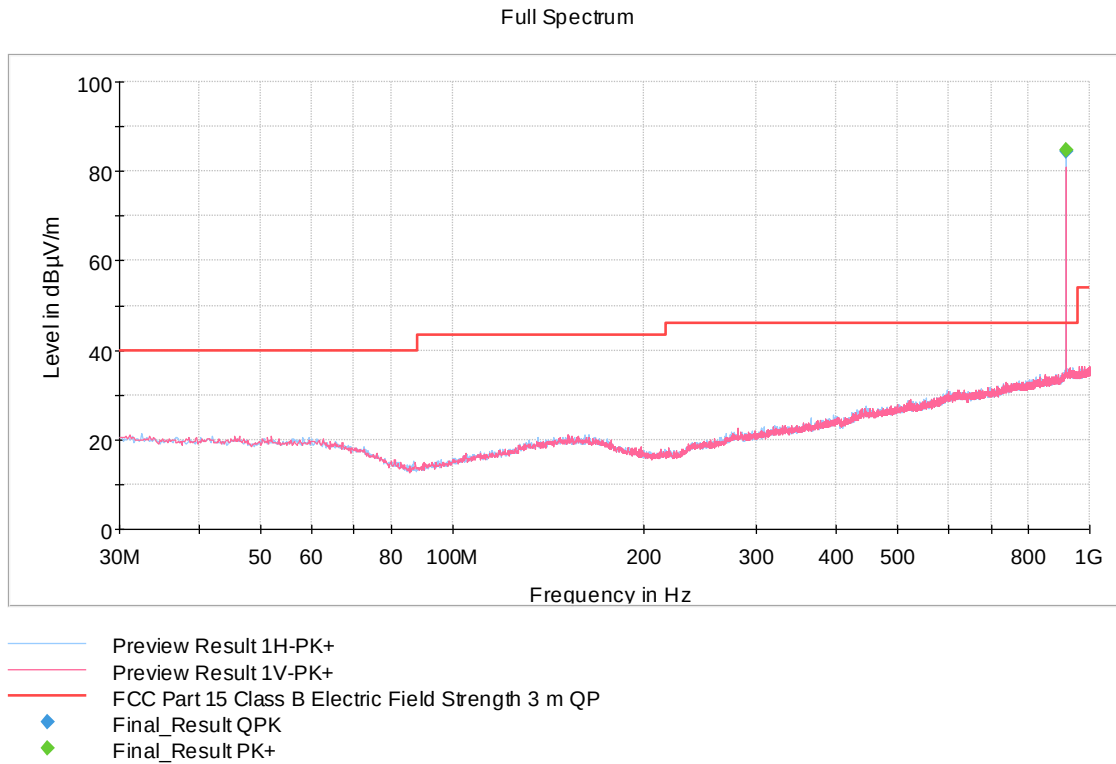


Figure 7: SRD1 (30 MHz – 1000 MHz)

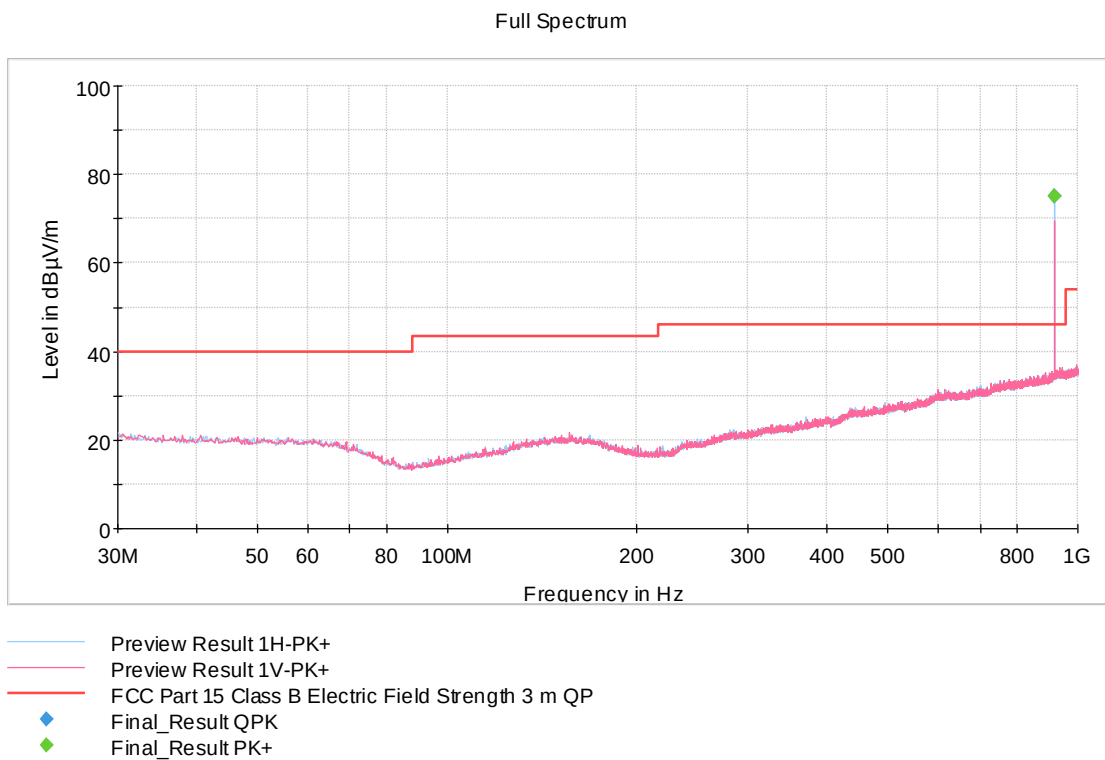


Figure 8: SRD2 (30 MHz – 1000 MHz)

Radiated Emissions 9 kHz to 10 GHz

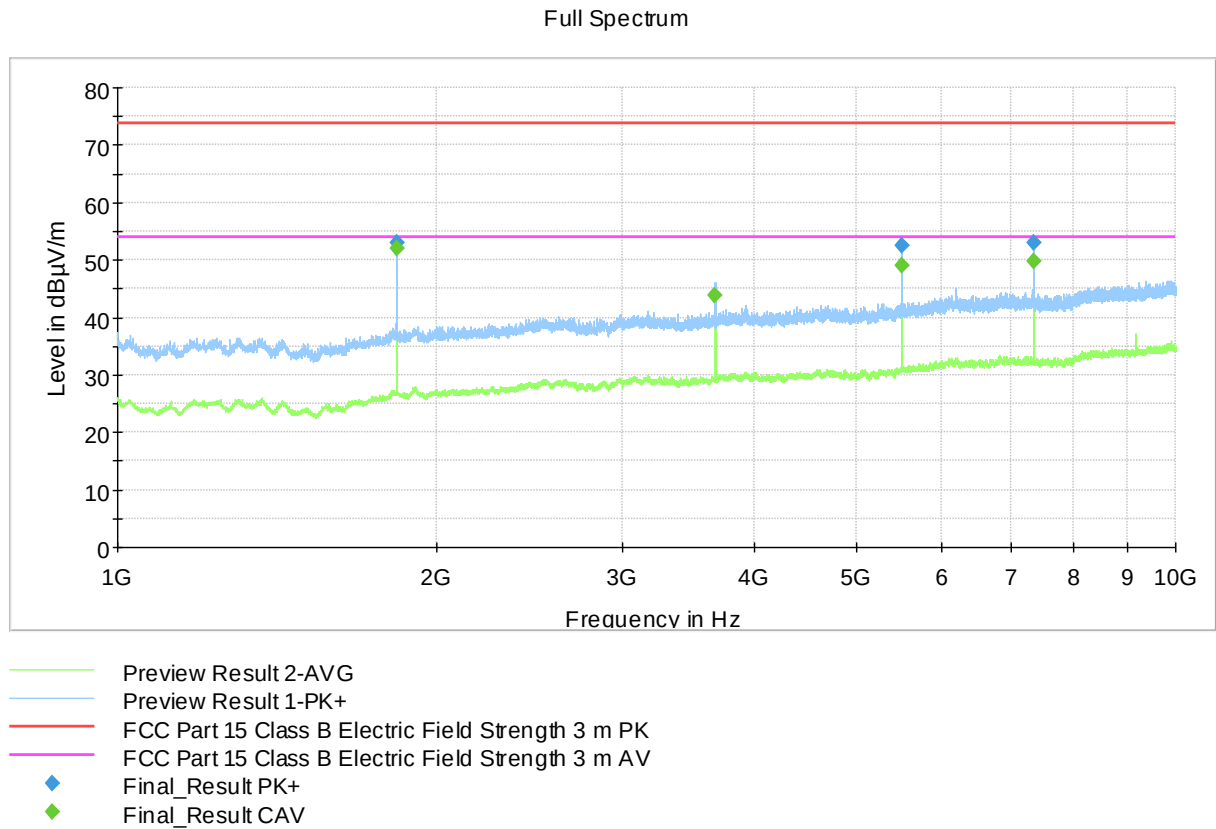


Figure 9: SRD1 (1 MHz – 10 GHz)

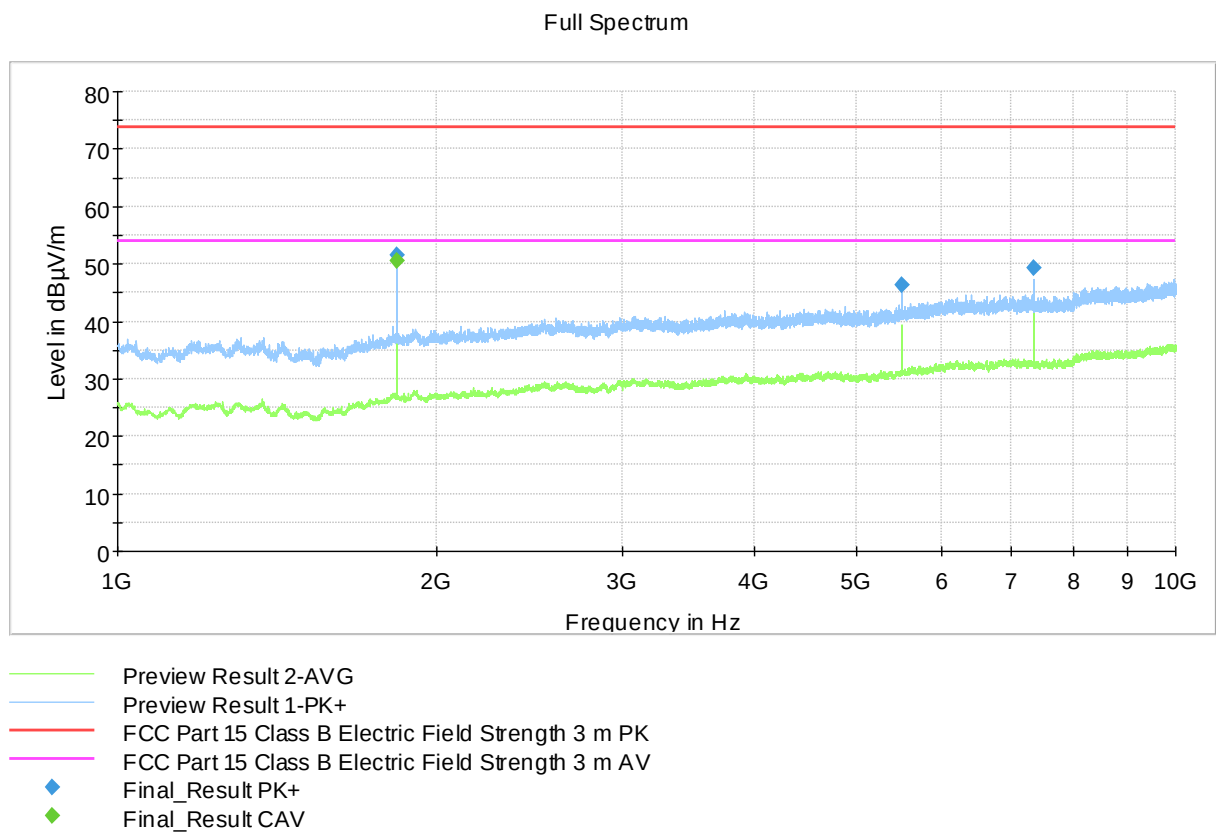


Figure 10: SRD2 (1 MHz – 10 GHz)

Full Spectrum

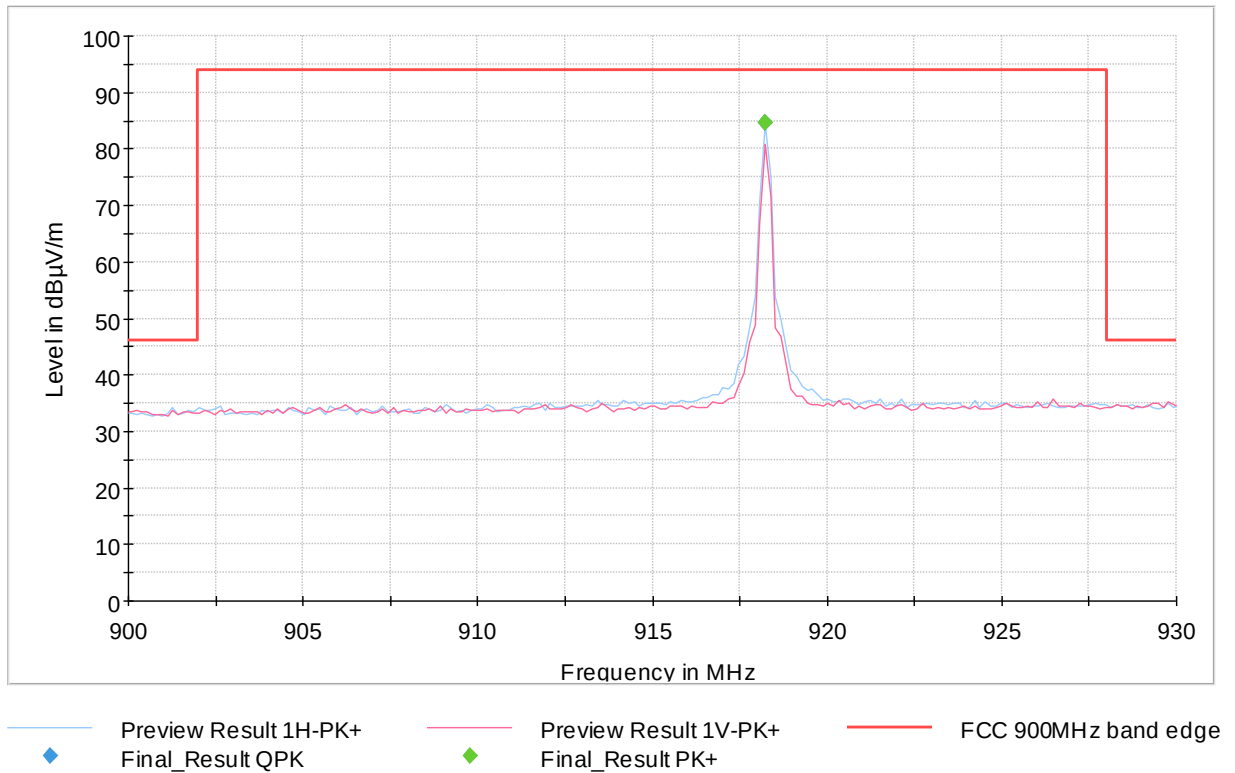


Figure 11: SRD1 (902 - 928 MHz)

Full Spectrum

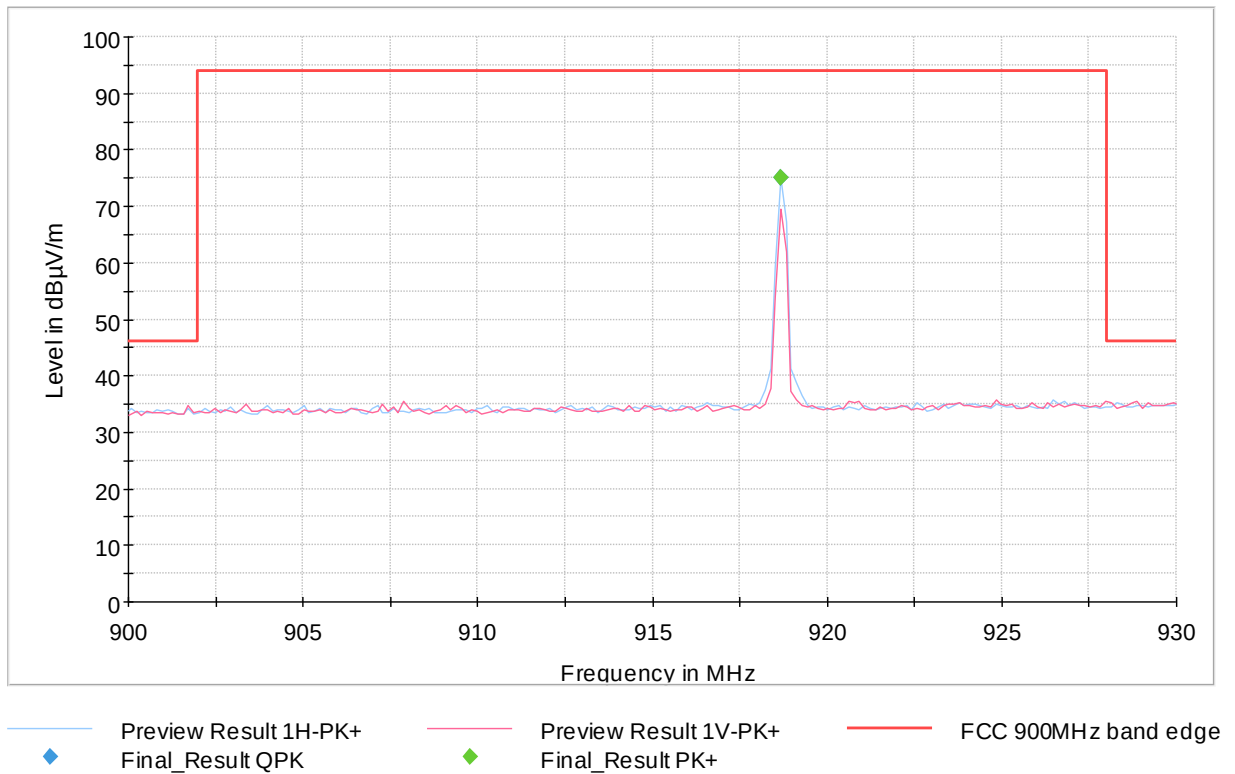


Figure 12: SRD2 (902 - 928 MHz)

Radiated Emissions 9 kHz to 10 GHz

Table 4: Peak and average results SRD1

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1836.300000	---	51.91	53.90	1.99	15x1000.0	1000.000	153.0	V	184.0	2.4
1836.350000	53.01	---	73.90	20.89	15x1000.0	1000.000	123.0	V	191.0	2.4
3672.800000	---	43.83	53.90	10.07	15x1000.0	1000.000	206.0	V	190.0	5.2
5509.250000	---	49.07	53.90	4.83	15x1000.0	1000.000	123.0	H	108.0	7.9
5509.250000	52.55	---	73.90	21.35	15x1000.0	1000.000	107.0	H	113.0	7.9
7345.650000	52.96	---	73.90	20.94	15x1000.0	1000.000	100.0	V	117.0	10.5
7345.700000	---	49.66	53.90	4.24	15x1000.0	1000.000	100.0	V	118.0	10.5

Table 5: Peak and average results SRD2

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1837.250000	51.46	---	73.90	22.44	15x1000.0	1000.000	100.0	V	191.0	2.4
1837.400000	---	50.46	53.90	3.44	15x1000.0	1000.000	100.0	V	203.0	2.4
5511.950000	46.33	---	73.90	27.57	15x1000.0	1000.000	100.0	H	285.0	7.9
7349.300000	49.23	---	73.90	24.67	15x1000.0	1000.000	100.0	V	104.0	10.5

99% Occupied Bandwidth

Standard: RSS-Gen
Tested by: HEM
Date: 28 March 2025
Temperature: 23 ± 3°C
Humidity: 20 - 60 % RH

RSS-Gen 6.7

Results:

Table 6: 99 % OBW test results

Channel	Limit	99 % BW [kHz]	Result
SRD1	-	13.7	PASS
SRD2	-	13.9	PASS

99% Occupied Bandwidth

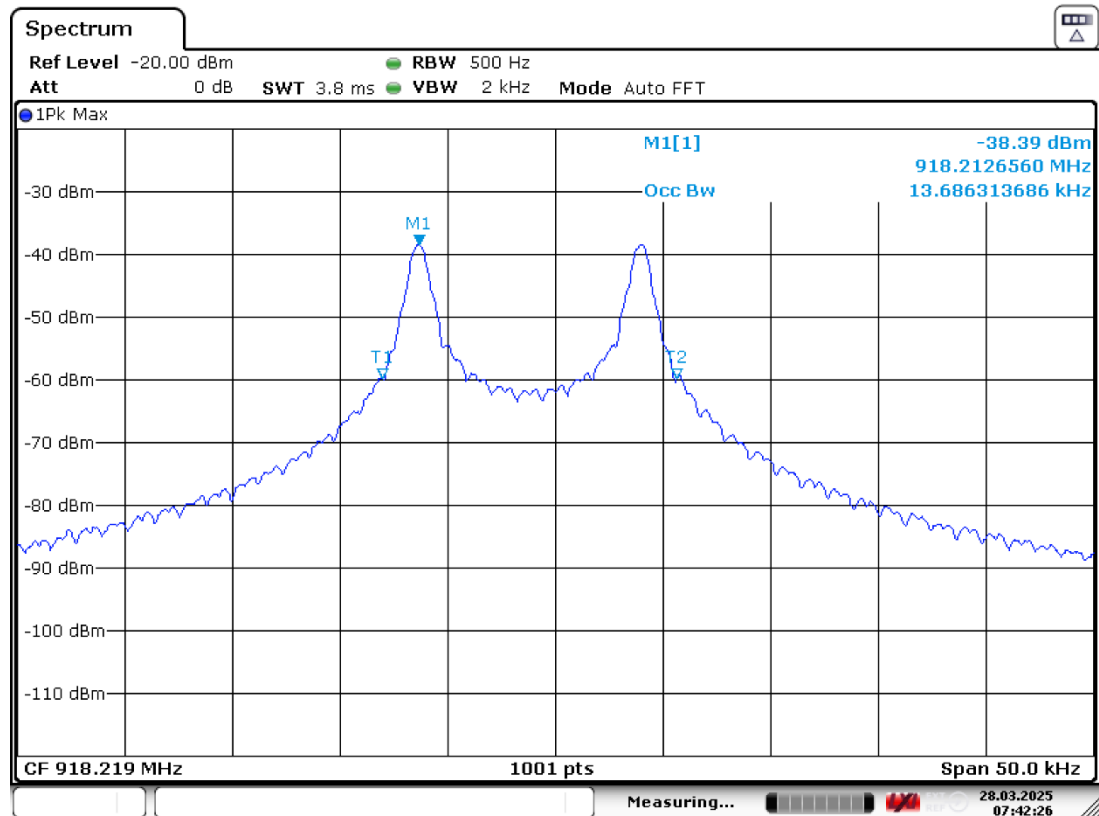


Figure 13: 99 % OBW. SRD1

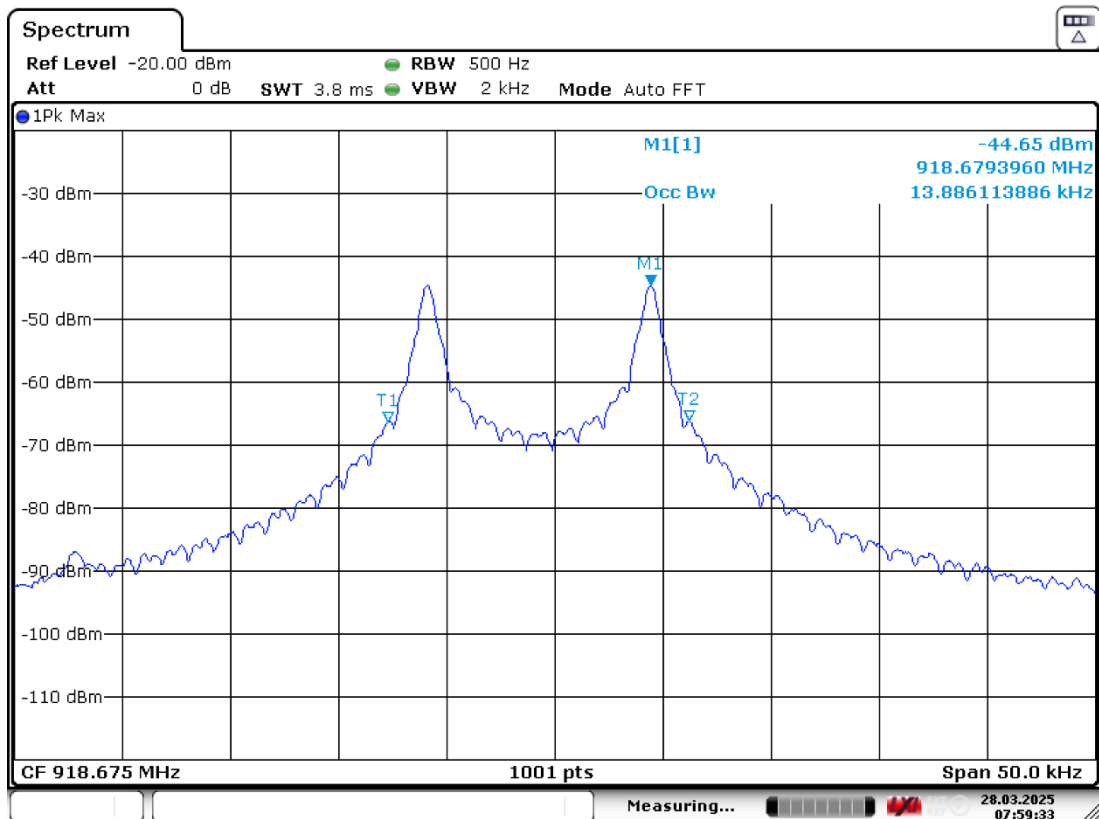


Figure 14: 99 % OBW. SRD2

20 dB Bandwidth

Standard: ANSI C63.10-2013
Tested by: HEM
Date: 28 March 2025
Temperature: 23 ± 3°C
Humidity: 20 - 60 % RH

FCC Rule: §15.215(c)

Results:

Table 7: 20 dB BW test results

Channel	Limit	20 dB BW [kHz]	Result
SRD1	-	13.3	PASS
SRD2	-	13.3	PASS

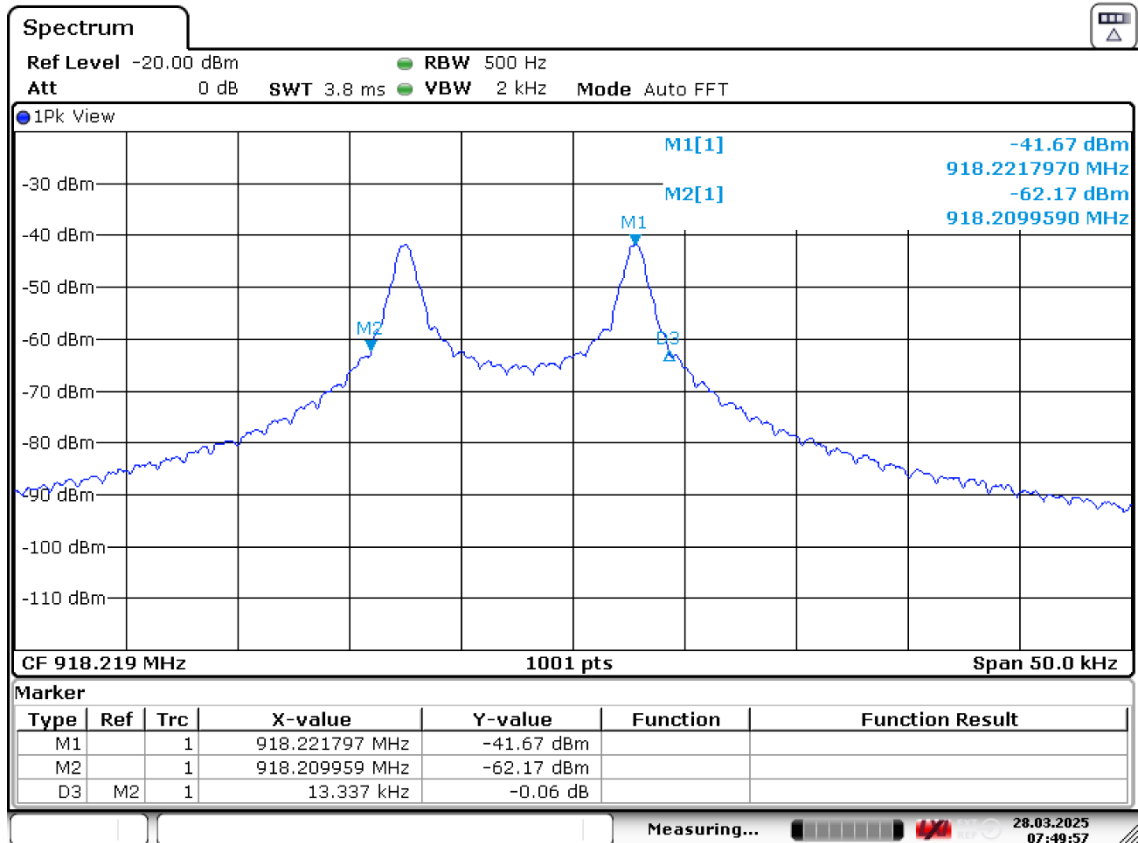


Figure 15: 20 dB BW. SRD1

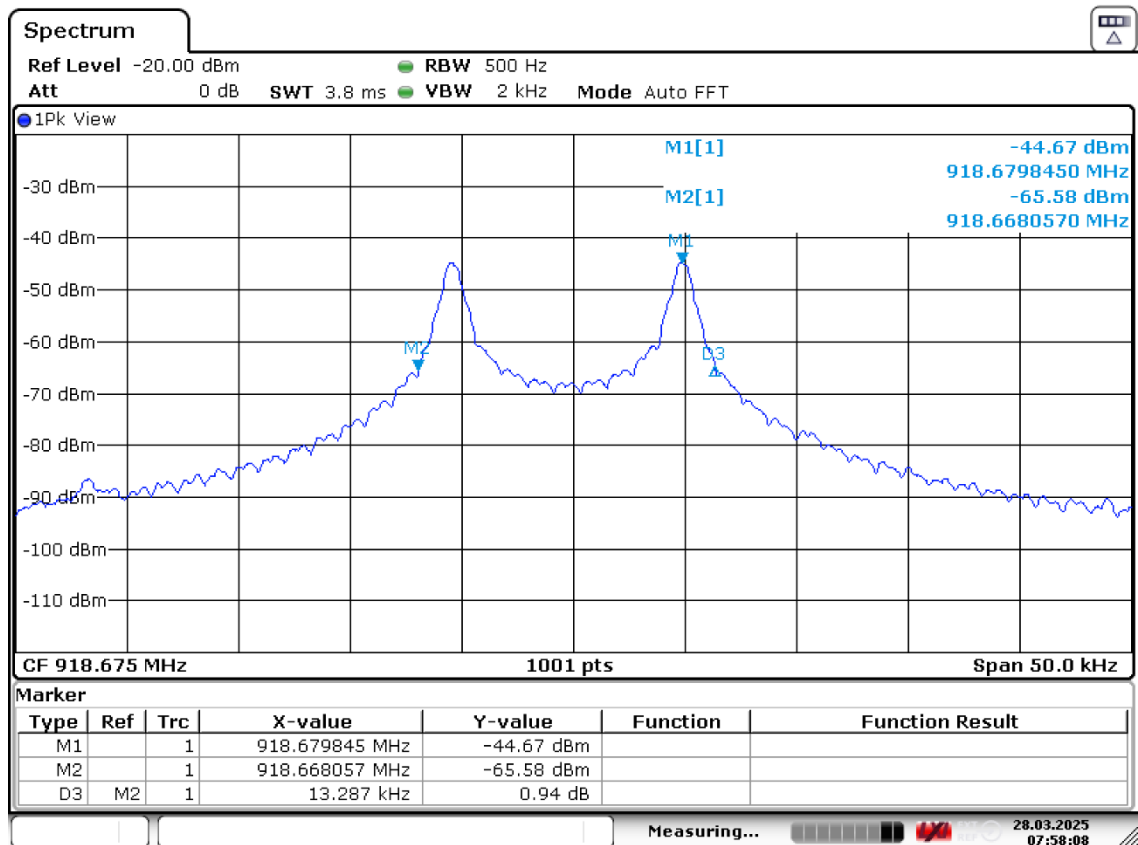


Figure 16: 20 dB BW. SRD2

TEST EQUIPMENT

Conducted Emissions

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
CABLE	SUHNER	SUCOFLEX 104P	inv. C119	2023-07-16	2024-07-16
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv:10670	2023-06-19	2024-06-19
LISN	ROHDE & SCHWARZ	ENV216	inv:9611	2023-02-01	2024-02-01
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 SAC	inv:10517	2022-10-27	2023-10-27
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-

Radiated Emissions

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
ANTENNA	ROHDE & SCHWARZ	HFH2-Z2 , 335.4711.52	inv:8013	2022-10-25	2024-10-25
ANTENNA	SCHWARZBECK	VULB 9168	inv:8911	2022-11-29	2024-11-29
ANTENNA	EMCO	3117, emi 1-18GHz	inv:7293	2022-06-16	2024-06-16
ANTENNA MAST	MATURO	TAM 4.0E	inv:10181	NCR	NCR
ATTENUATOR	PASTERNAK	PE 7004-4 (4dB)	inv. 10126	2022-12-11	2024-12-11
CABLE	SUHNER	SUCOFLEX 126E 1-18GHz	inv. C137	2023-04-05	2024-04-05
COAX CHAIN K5 EMI < 1GHz	-	C053+FP3AirC+C138	-	2023-03-28	2024-03-28
COAX CHAIN K5 EMI 1GHz-26.5GHz	-	C135+C149	-	2023-03-28	2024-03-28
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv:10670	2023-06-19	2024-06-19
FILTER	WAINWRIGHT	HP, WHKX1.0/15G-10SS	inv:8267	2022-12-10	2024-12-10
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv:10183	NCR	NCR
RF PREAMPLIFIER	CIAO	CA118-3123	inv:10278	2022-09-21	2023-09-21
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 SAC	inv:10517	2022-10-27	2023-10-27
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
TURNTABLE	MATURO	DS430 UPGRADED	inv:10182	NCR	NCR

99 % Occupied Bandwidth, 20 dB Bandwidth

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
ANTENNA	ETS LINDGREN	3117	inv. 9569	2023-05-05	2025-05-05
CABLE	SUHNER	SUCOTEST	inv. C121	2024-07-16	2025-07-16
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSV40	inv. 9093	2024-06-13	2025-06-12
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 EMC	inv. 10516	2024-11-02	2025-11-02

NCR = No Calibration Required

END OF REPORT