Test Report

T004 (EN ISO/IEC 17025)

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

Equipment Under Test:	Radio module
Model:	SATEL-TR489
Type:	SATEL-TA43
Manufacturer:	Satel Oy Meriniitynkatu 17 FI-24100, Salo Finland
Customer:	Satel Oy Meriniitynkatu 17 FI-24100, Salo Finland
FCC Rule Part:	15.247
IC Rule Part:	RSS-247, Issue 2, 2017 RSS-GEN Issue 5 Amendment 2, 2021
KDB:	558074 D01 15.247 Meas Guidance v05r02 Guidance for Compliance Measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under §15.247 of the FCC rules (April 2, 2019)

Date:	8 March 2022	Date:	8 March 2022
Issued by:	Henri Mäki Testing Engineer	Checked by:	Pekka Kälviäinen Testing Engineer

TABLE OF CONTENTS

GENERAL REMARKS

Disclaimer

*This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at **http://www.sgs.com/en/Terms-and-Conditions.aspx** and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at **http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx***

Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. 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 and such sample(s) are retained for 30 days only.

RELEASE HISTORY

Version	Changes	Issued
1.0	Initial release	14 June 2021
1.1	The following sections were updated: • Peripherals • EUT Test Conditions • Unwanted emissions (radiated) results	21 February 2022
1.2	Unwanted Emissions (radiated) result tables corrected	8 March 2022

PRODUCT DESCRIPTION

Equipment Under Test

Trade mark:	Satel
Model:	SATEL-TR489
Type:	SATEL-TA43
Serial no:	2105000001 (radiated tests) 2107000607 (all other tests)
FCC ID:	MRBSATEL-TA43
IC:	2422A-SATELTA43

General Description

The equipment under test is a radio module using 403-473 / 869.4-869.65 / 902-928 MHz bands. This test report contains the results for 900 MHz radio.

Classification

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

Modifications Incorporated in the EUT

No modifications.

Ports and cables

Cable / Port	Description
Serial port RS232	Device configuration and data communication. Unshielded
DC input port	3.8 – 5.5 VDC (4.6 V used during testing)
Antenna port	50Ω TNC (female)

Specifications

Operating Frequency Range (OFR):	902-928 MHz
Channels:	110
Channel separation:	230.4 kHz
Transmission technique:	FHSS
Modulation:	GMSK

Mechanical Size of the EUT

Height: 6.7 mm Width: 36 mm Length: 57 mm Weight: 0.02 kg

Peripherals

Peripheral	Description / Usage
Test PC	Device configuration with programs supplied by customer.
Laptop charger	HP L25296-002. Used during AC power-line conducted emissions test.
AC/DC adapter	Nokia AC10-E. Used during AC power-line conducted emissions test.
Whip Antenna	McGill Microwave Systems, MM-ANT-NM-915-6DBI (6 dBi nominal gain). Reference antenna used during testing, supplied by customer.
Yagi Antenna	CompleTech, CA930Y-TNC (6 dBi nominal gain). Reference antenna used during testing, supplied by customer.

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.203	Antenna requirement	PASS
§15.207(a) / RSS-GEN 8.8	AC Power-Line Conducted Emissions	PASS
§15.247(a)(1)(i) / RSS-247 5.1 a)	20 dB Bandwidth	PASS
§15.247(a)(1) / RSS-247 5.1 b)	Carrier Frequency Separation	PASS
§15.247(a)(1)(i) / RSS-247 5.1 c)	Number of Hopping Channels	PASS
§15.247(a)(1)(i) / RSS-247 5.1 c)	Average Time of Occupancy	PASS
§15.247(b)(2) / RSS-247 5.4 a)	Transmitter Output Power	PASS
§15.247(d) / RSS-247 5.5	Unwanted Emissions (radiated)	PASS
§15.247(d) / RSS-247 5.5	Band-Edge Measurement and Unwanted Emissions (conducted)	PASS
RSS-GEN 6.7	99% Occupied Bandwidth	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

The EUT was in continuous transmit mode during all the tests. The EUT was configured into the wanted channel using software provided by the manufacturer (“TypeApproval_489_UI_V030_04022021.exe”). During the tests the EUT was mounted on an evaluation kit provided by the manufacturer (model M3-TR3 Evaluation kit). During the AC Power-Line Conducted Emissions the EUT was connected to a peripheral AC/DC adapter, and the input voltage was 120 V, 60 Hz. The radiated tests were performed with two different reference antennas provided by the customer.

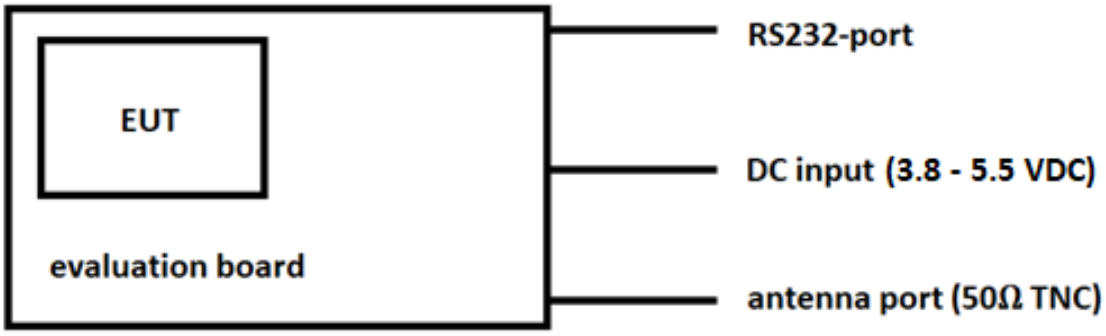

Figure 1: Test setup block diagram

Table 1: Test frequencies

Channel	Frequency (MHz)
Bottom	902.2464
Middle	914.9184
Top	927.8208

Test Facility

Testing Laboratory / address: FCC designation number: **FI0002** ISED CAB identifier: **T004**	SGS Fimko Ltd Takomotie 8 FI-00380, HELSINKI 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: HEM
Date: 21 May 2021

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 2 is used	

AC Power-Line Conducted Emissions

Standard:	ANSI C63.10-2013	
Tested by:	HEM	
Date:	6 June 2021	
Temperature:	23 °C	
Humidity:	43 %RH	
Barometric pressure:	1012 hPa	
Measurement uncertainty:	± 2.9 dB	Level of confidence 95 % (k = 2)
Test Result:	**PASS**	

FCC Rule: 15.207(a)
RSS-GEN 8.8

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 §15.207(a) and RSS-GEN 8.8, as measured using a 50 µH/50 Ω line impedance stabilization network (LISN).

For equipment that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the equipment.

Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz with 4.5 kHz steps and 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.

During the test the EUT was powered with an AC/DC adapter and was connected to a laptop for configurating the radio. The conducted emissions were measured from both the AC/DC adapter. The radio was set to hopping mode during the test.

Test results

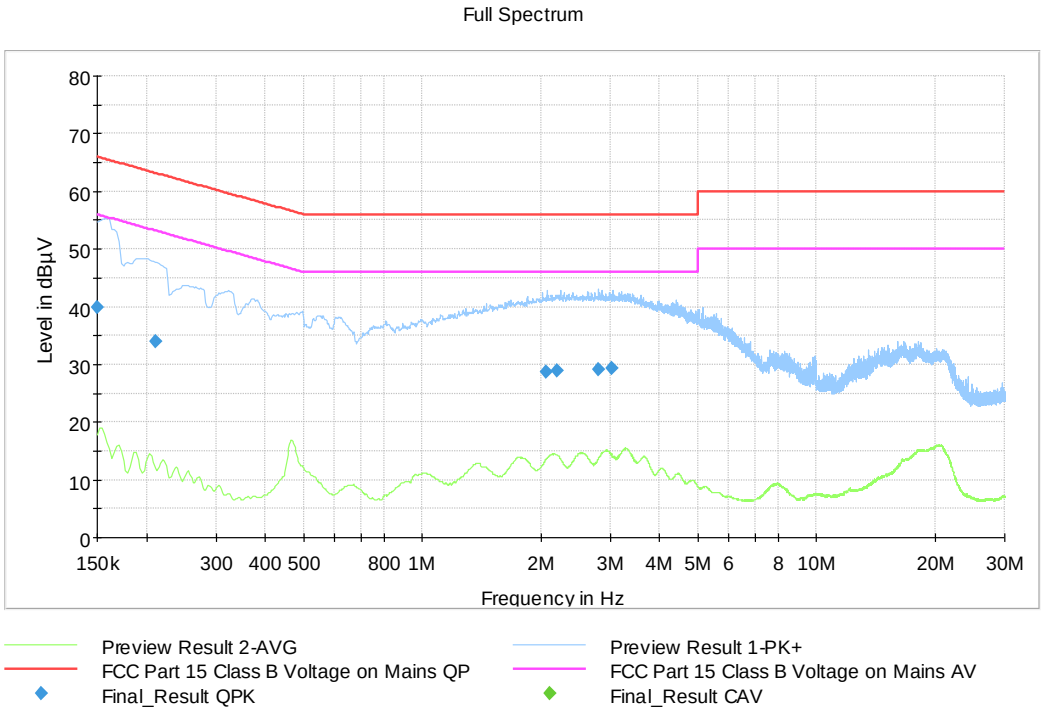

Figure 2: The measured curves with peak- and average detector

Table 2: Final measurements from the worst frequencies

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	39.86	---	66.00	26.14	15 x 1000.0	9.000	N	9.7
0.210250	33.93	---	63.20	29.27	15 x 1000.0	9.000	N	9.7
2.056250	28.75	---	56.00	27.25	15 x 1000.0	9.000	L1	9.9
2.194750	28.83	---	56.00	27.17	15 x 1000.0	9.000	L1	9.9
2.805250	29.20	---	56.00	26.80	15 x 1000.0	9.000	L1	9.9
3.031750	29.33	---	56.00	26.67	15 x 1000.0	9.000	L1	9.9

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

20 dB Bandwidth

Standard:	ANSI C63.10-2013
Tested by:	HEM
Date:	24 May 2021
Temperature:	21 ºC
Humidity:	28 %RH
Barometric pressure:	1008 hPa
Test Result:	**PASS**

FCC Rule: §15.247(a)(1)(i)
RSS-247 5.1 a)

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with hopping stopped.

Test results

Table 3: 20 dB Bandwidth test results

Channel	20 dB Bandwidth [kHz]
Bottom	131.824
Middle	131.871
Top	132.090

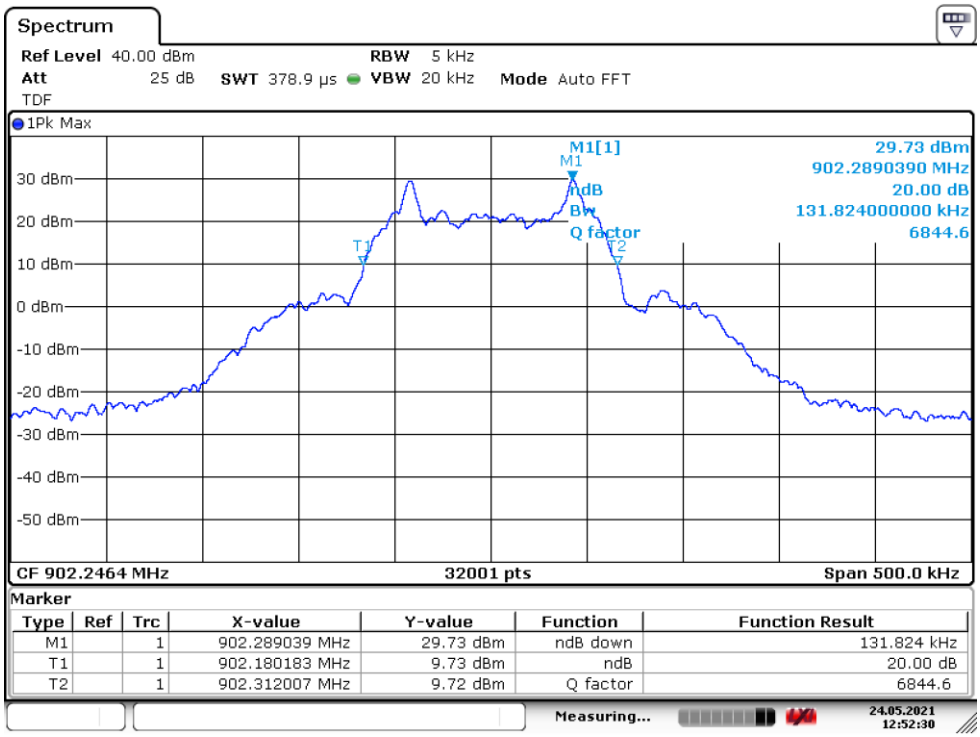

Figure 3: 20 dB Bandwidth, bottom channel

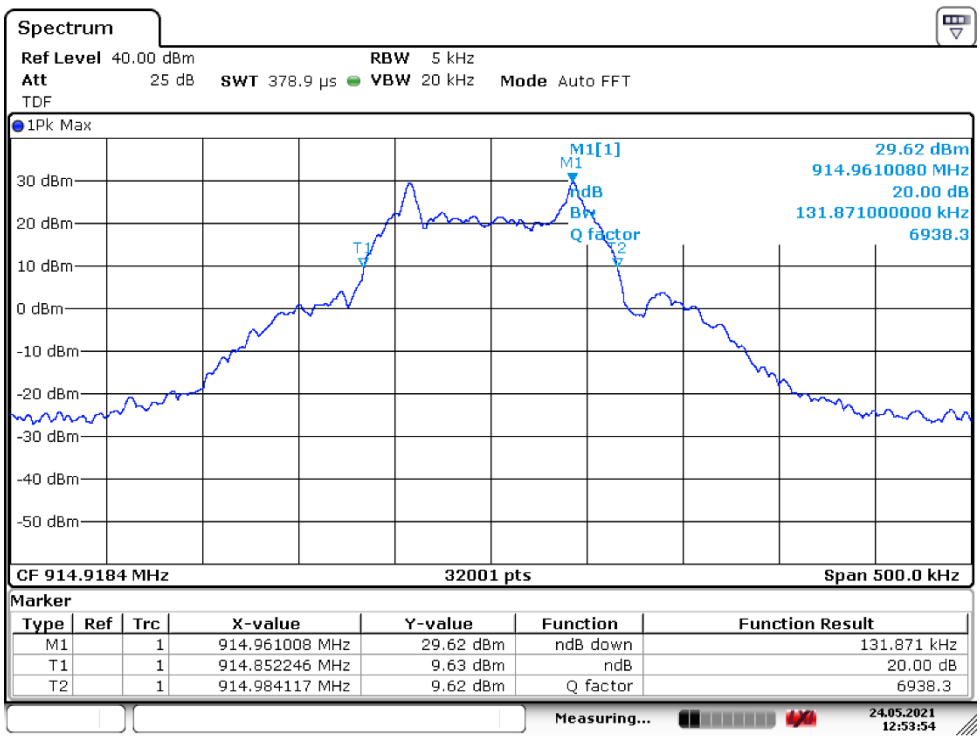

Figure 4: 20 dB Bandwidth, middle channel

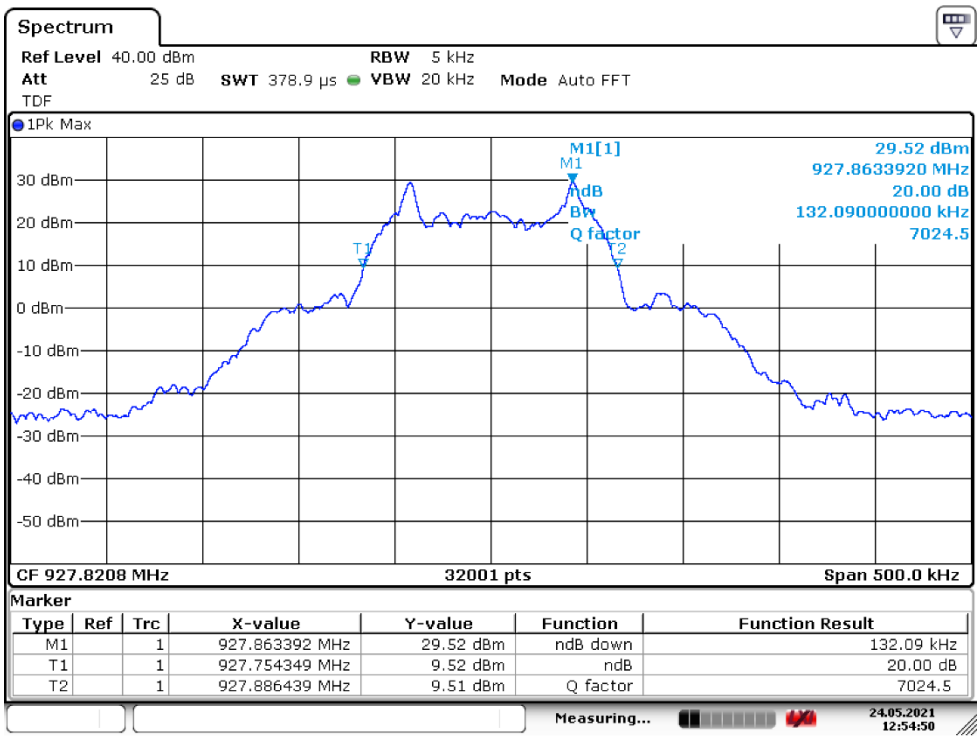

Figure 5: 20 dB Bandwidth, top channel

Carrier Frequency Separation

Standard:	ANSI C63.10-2013
Tested by:	HEM
Date:	24 May 2021
Temperature:	21 ºC
Humidity:	28 %RH
Barometric pressure:	1008 hPa
Test Result:	**PASS**

FCC Rule: §15.247(a)(1)
RSS-247 5.1 b)

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.

Test results

Table 4: Carrier Frequency Separation test results

Channel Separation [kHz]	Limit [kHz]	Result
230.400	132.090	PASS

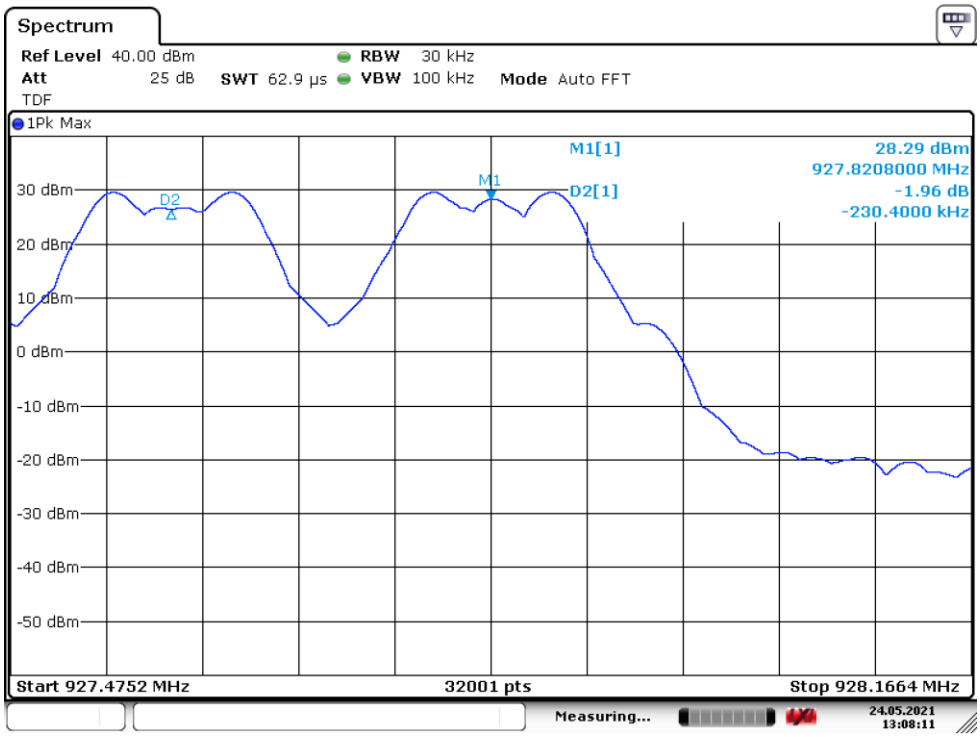

Figure 6: Carrier Frequency Separation

Number of Hopping Channels

Standard:	ANSI C63.10-2013
Tested by:	HEM
Date:	24 May 2021
Temperature:	21 ºC
Humidity:	28 %RH
Barometric pressure:	1008 hPa
Test Result:	**PASS**

FCC Rule: §15.247(a)(1)(i)
RSS-247 5.1 c)

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies.

Test results

Table 5: Number of Hopping Channels test results

Frequency Range [MHz]	Number of Channels	Total Number of Channels	Result
902.0000 – 907.8912	25	110	**PASS**
907.8912 – 913.8240	25		
913.8240 – 919.8720	25		
919.8720 – 925.6320	25		
925.6320 – 928.0000	10		

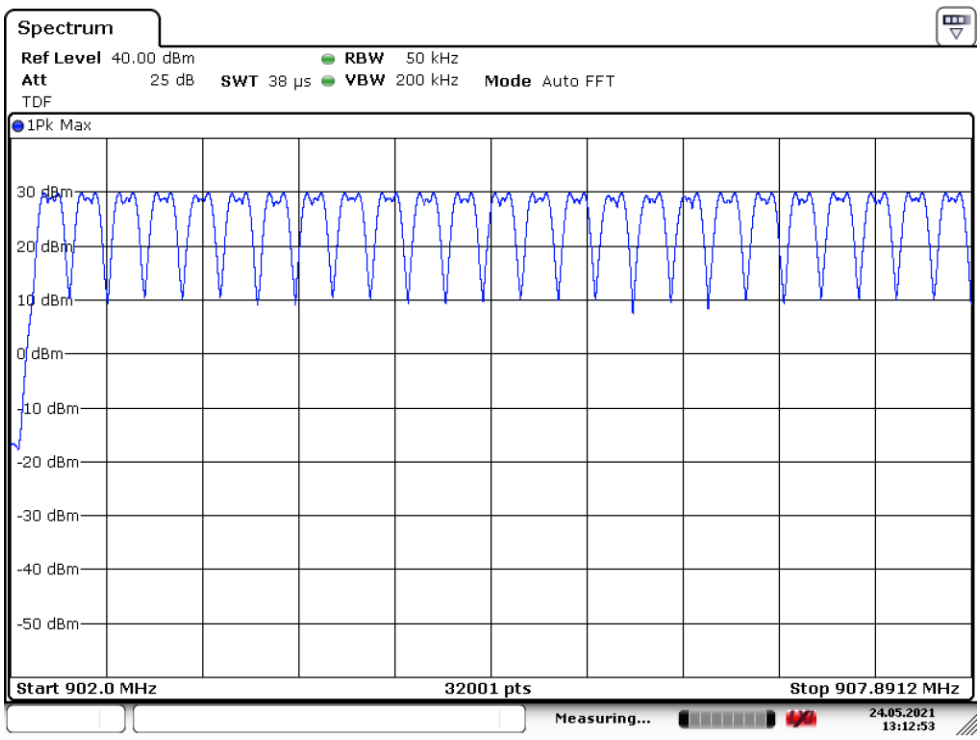

Figure 7: Number of Hopping Channels (902.0000 – 907.8912 MHz)

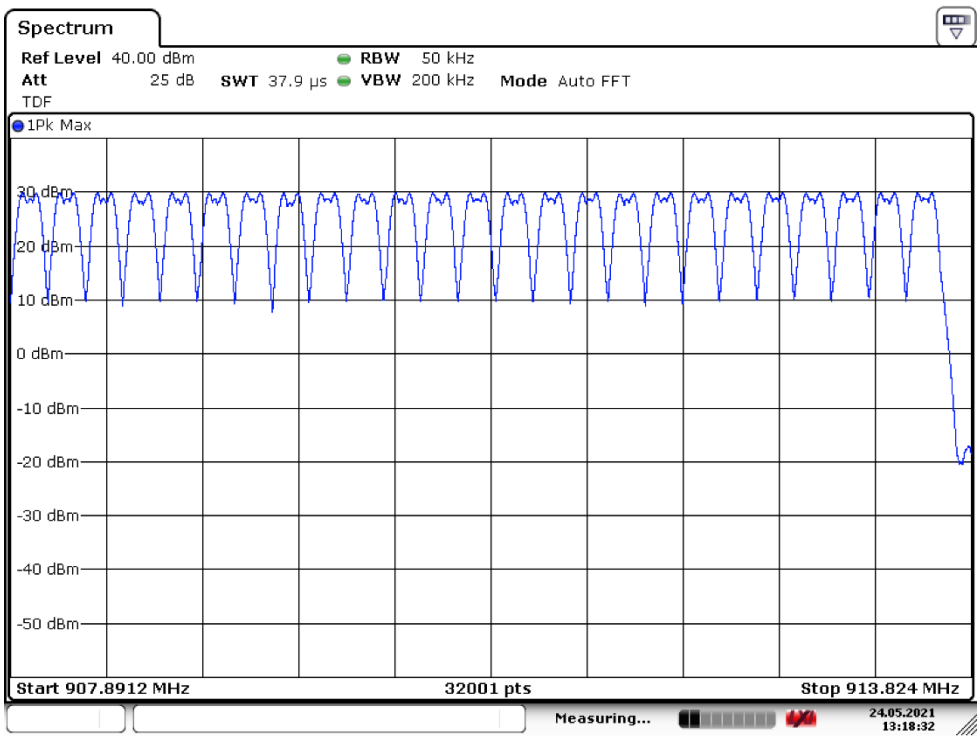

Figure 8: Number of Hopping Channels (907.8912 – 913.8240 MHz)

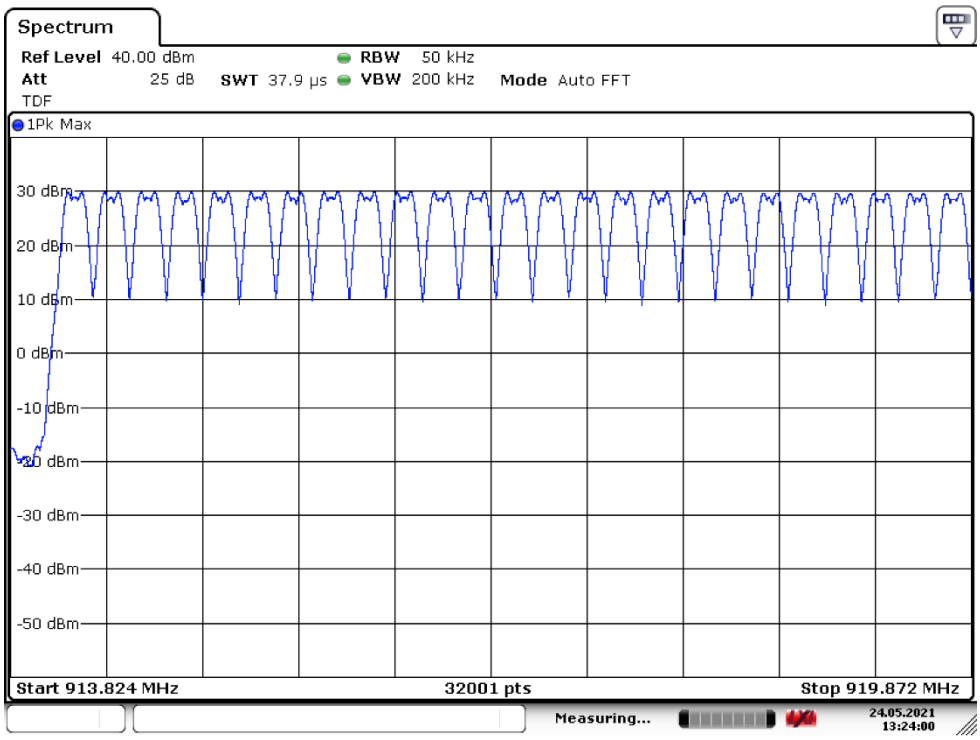

Figure 9: Number of Hopping Channels (913.8240 – 919.8720 MHz)

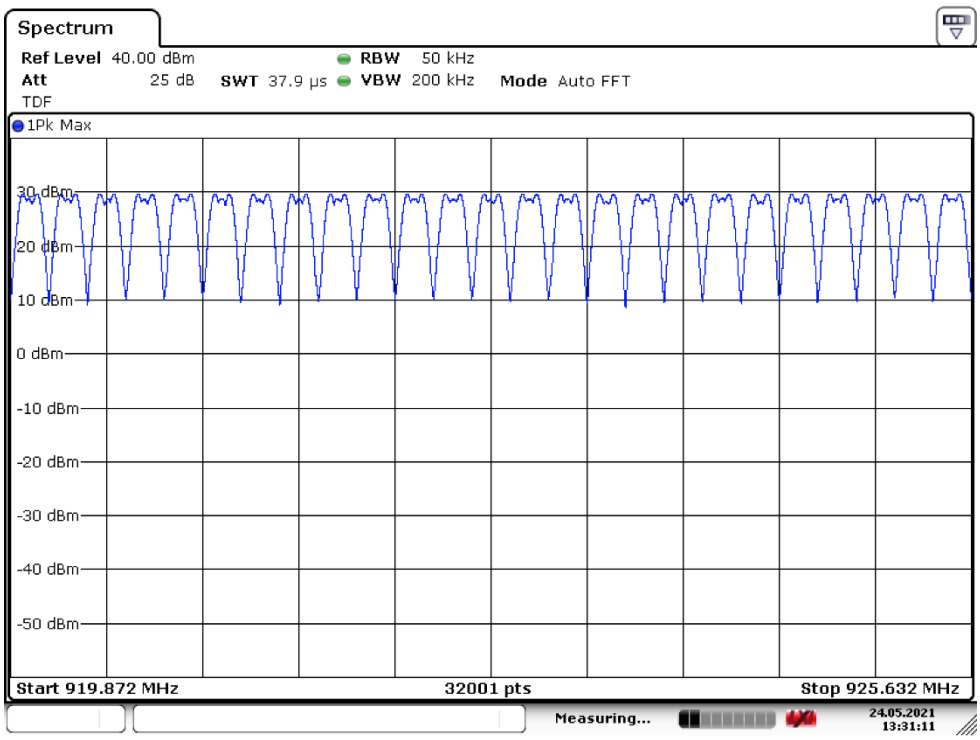

Figure 10: Number of Hopping Channels (919.8720 – 925.6320 MHz)

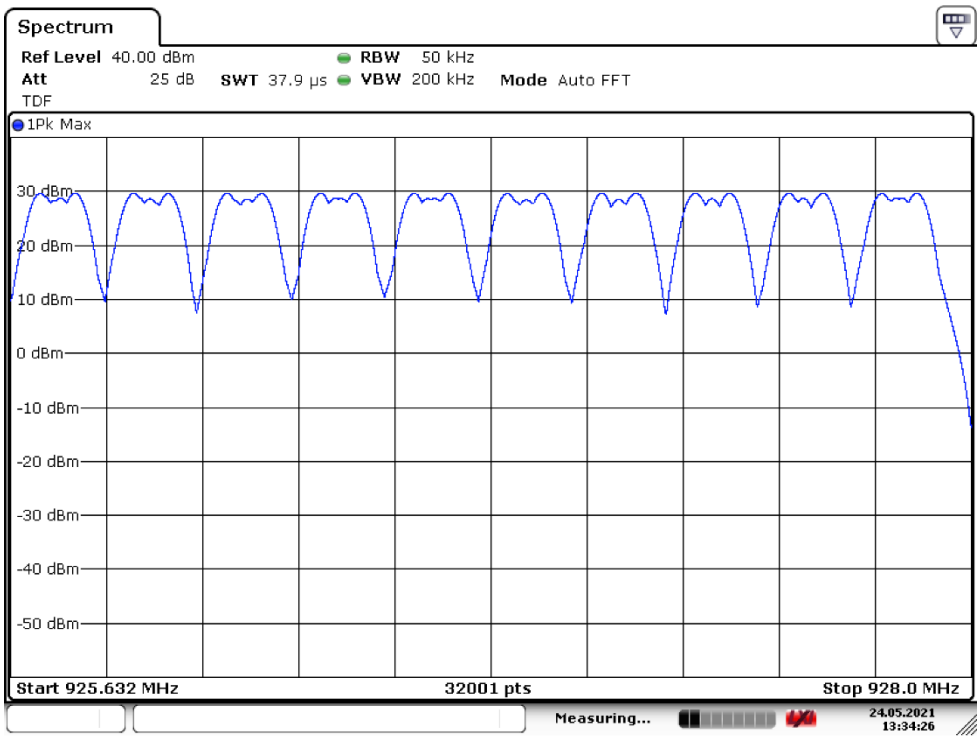

Figure 11: Number of Hopping Channels (925.6320 – 928.0000 MHz)

Average Time of Occupancy

Standard: ANSI C63.10-2013
Tested by: HEM
Date: 24 May 2021
Temperature: 21 ºC
Humidity: 28 %RH
Barometric pressure: 1008 hPa
Test Result: **PASS**

FCC Rule: §15.247(a)(1)(i)
RSS-247 5.1 c)

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period.

Test results

Table 6: Average Time of Occupancy test results

Channel	Number of Hops	Transmit time per single hop [ms]	Average Time of Occupancy [ms]	Result
Bottom	5	1.663125	8.315625	**PASS**
Middle	5	1.661250	8.306250	**PASS**
Top	5	1.662938	8.314690	**PASS**

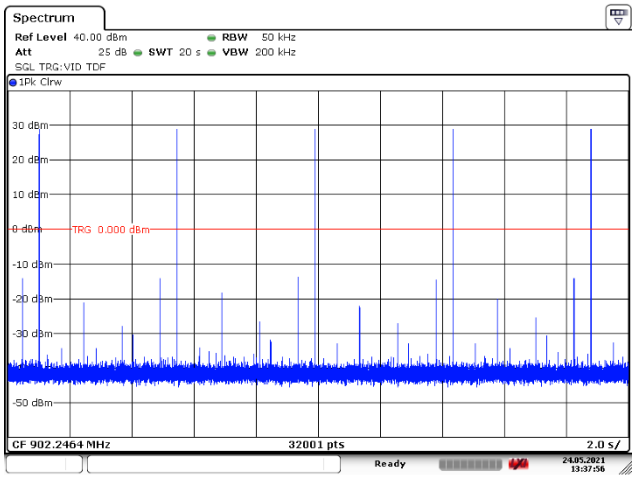

Figure 12: Number of Hops, bottom channel

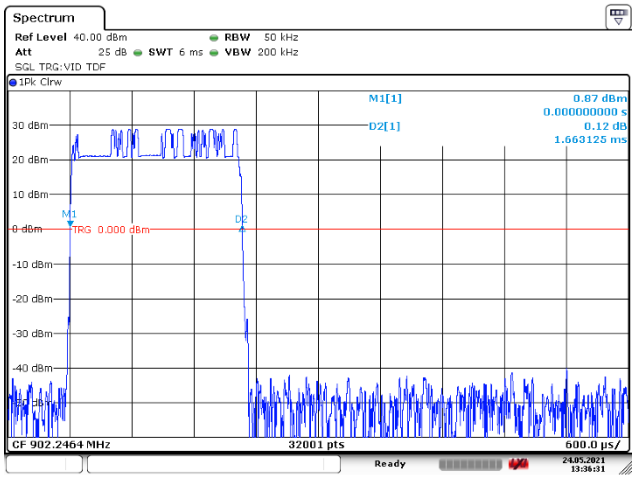

Figure 13: Single hop, bottom channel

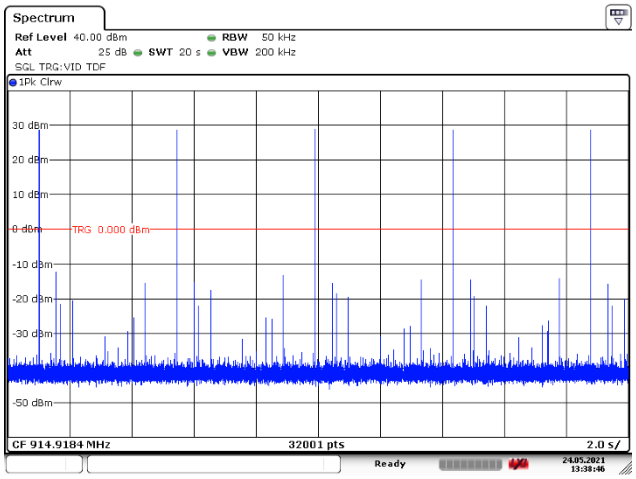

Figure 14: Number of Hops, middle channel

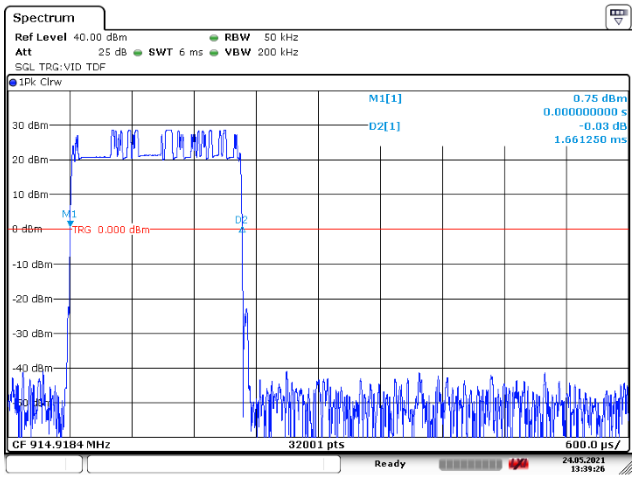

Figure 15: Single hop, middle channel

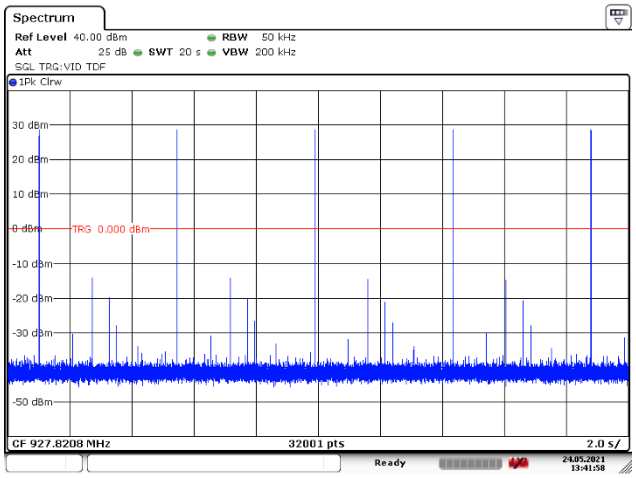

Figure 16: Number of Hops, top channel

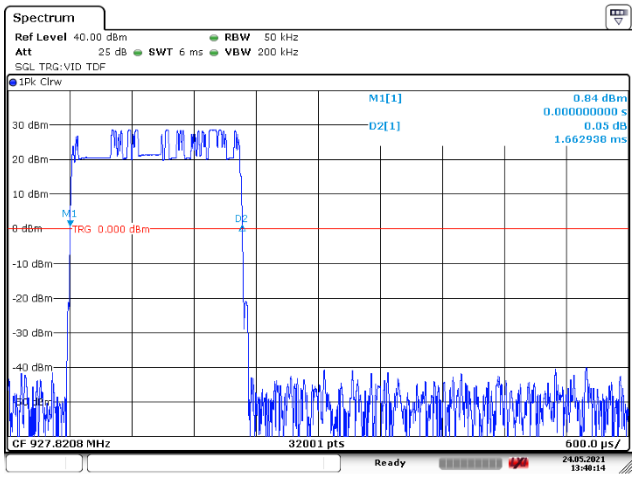

Figure 17: Single hop, top channel

Transmitter Output Power

Standard:	ANSI C63.10-2013
Tested by:	HEM
Date:	21 May 2021
Temperature:	23 ºC
Humidity:	37 %RH
Barometric pressure:	990 hPa
Test Result:	**PASS**

FCC Rule: §15.247(b)(2)
RSS-247 5.4 a)

For frequency hopping systems operating in the 902-928 MHz band, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels.

Test results

Table 7: Transmitter Output Power test results

Channel	Measured [dBm]	Attenuation *) [dB]	Output Power [dBm]	Output Power [W]	Result
Bottom	-0.29	30.01	29.72	0.938	PASS
Middle	-0.46	29.96	29.50	0.891	PASS
Top	-0.63	30.00	29.37	0.865	PASS

*) Attenuation includes the total attenuation of cable and attenuators.

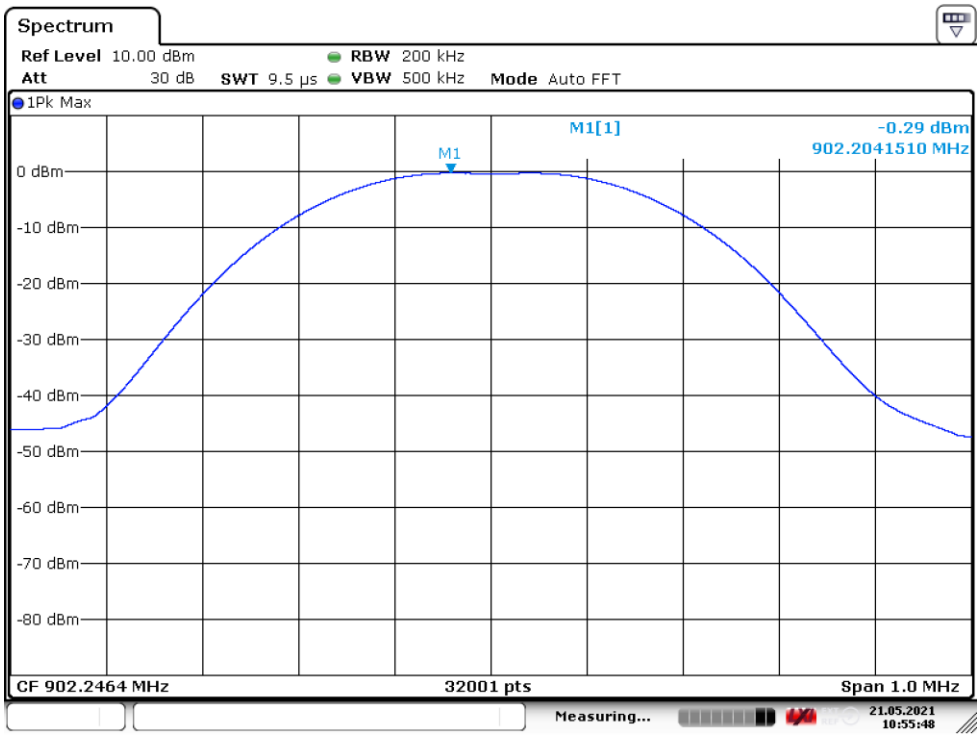

Figure 18: Transmitter Output Power, bottom channel

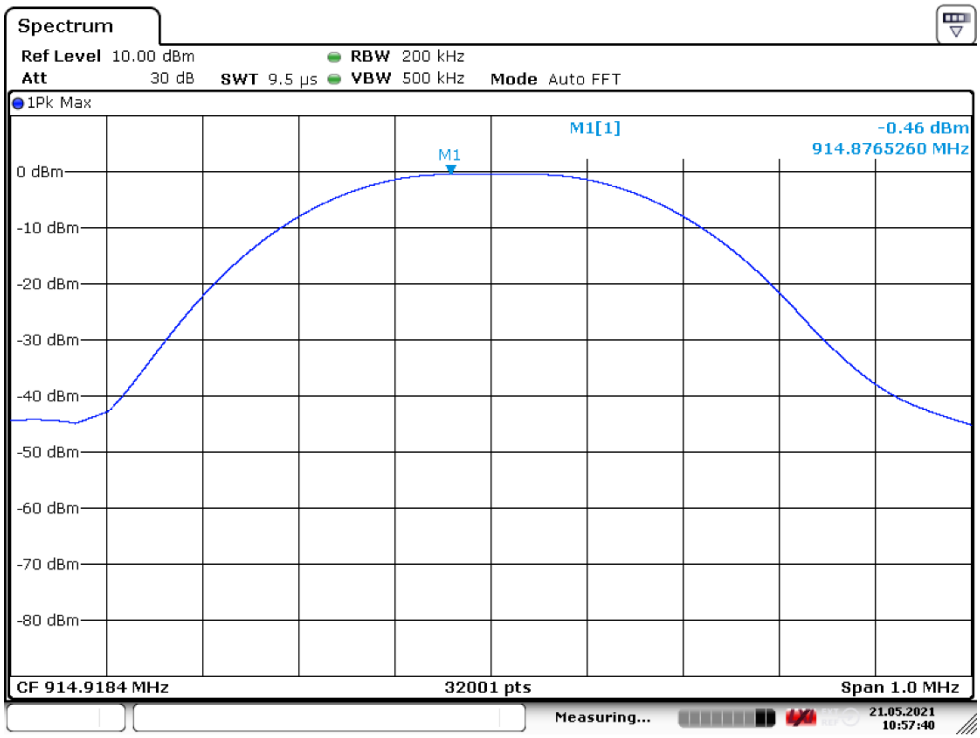

Figure 19: Transmitter Output Power, middle channel

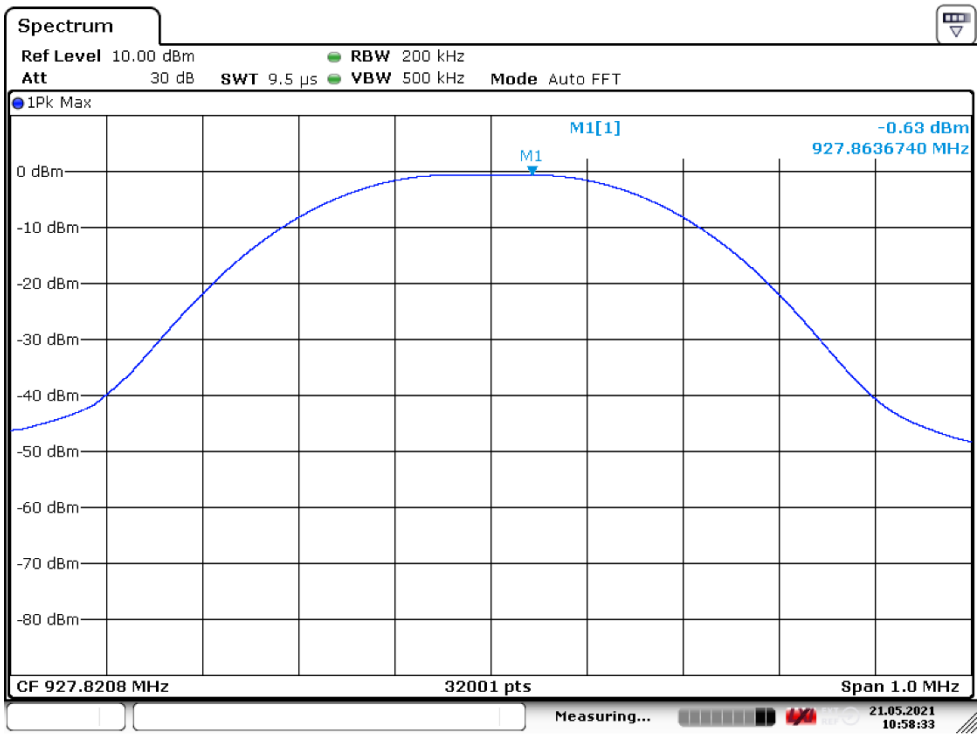

Figure 20: Transmitter Output Power, top channel

Unwanted Emissions (radiated)

Standard:	ANSI C63.10-2013	
Tested by:	HEM	
Date:	20 February 2022	21 February 2022
Temperature:	24 °C	23 °C
Humidity:	42 %RH	32 %RH
Barometric pressure:	986 hPa	981 hPa
Measurement uncertainty:	± 4.51 dB	Level of confidence 95 % (k = 2)
Test Result:	**PASS**	

FCC Rule: §15.247(d), §15.205(a), §15.209(a)

RSS-247 3.3, 5.5

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. 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).

Exploratory measurements are performed in order to find the orientation that produces the highest emissions. The final measurements are performed with the worst orientation.

The measurements are performed with two types of reference antennas (whip antenna and Yagi antenna). For Yagi antenna only the worst-case results are presented.

Test results, 9 kHz – 30 MHz

Figure 21: TX middle channel (whip antenna)

Figure 22: TX middle channel (Yagi antenna)

Test results, 30 – 1000 MHz (whip antenna)

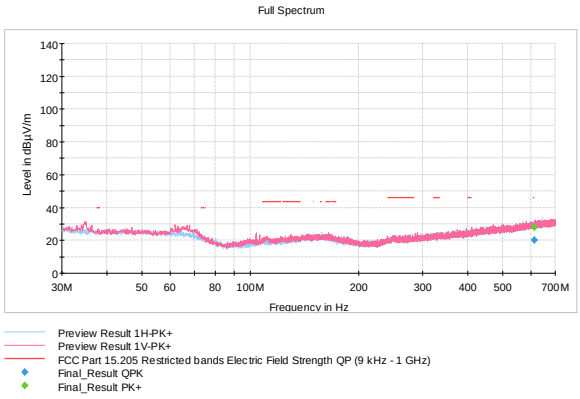

Figure 23: TX bottom channel (30-700 MHz)

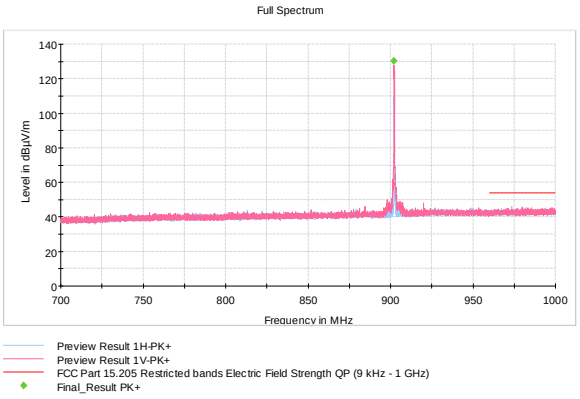

Figure 24: TX bottom channel (700-1000 MHz)

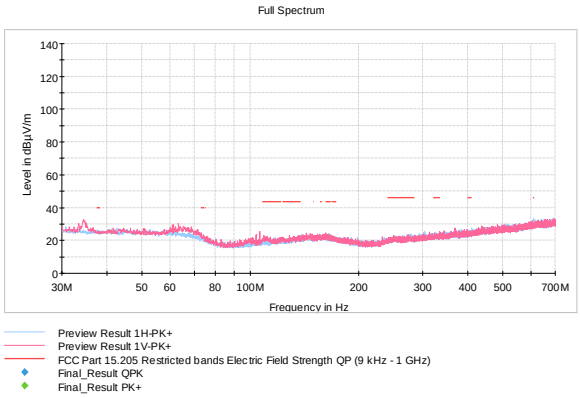

Figure 25: TX middle channel (30-700 MHz)

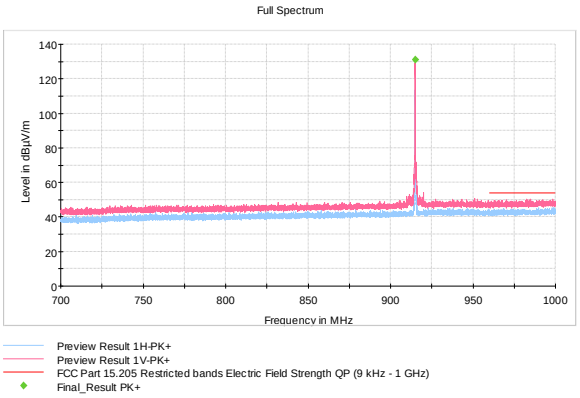

Figure 26: TX middle channel (700-1000 MHz)

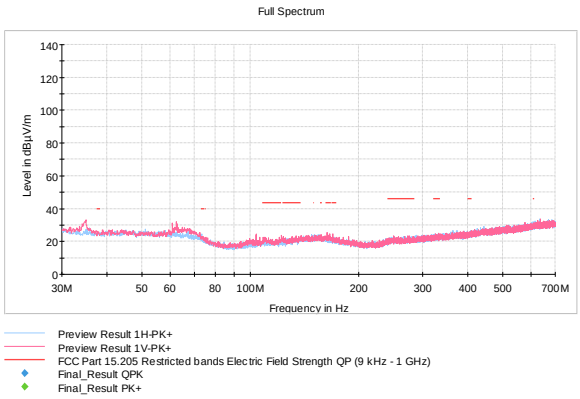

Figure 27: TX top channel (30-700 MHz)

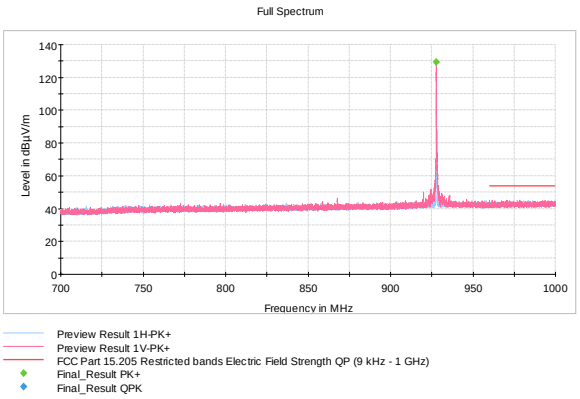

Figure 28: TX top channel (700-1000 MHz)

Test results, 1 – 10 GHz (whip antenna)

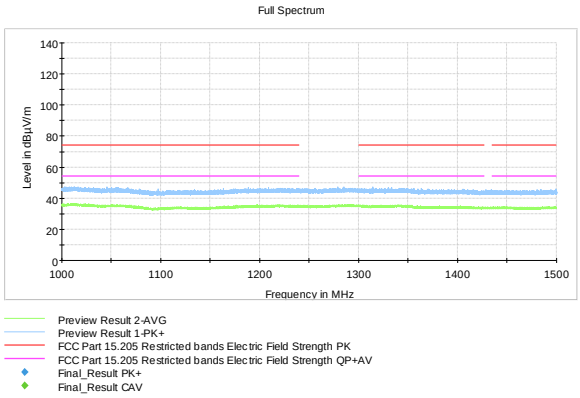

Figure 29: TX bottom channel (1.0-1.5 GHz)

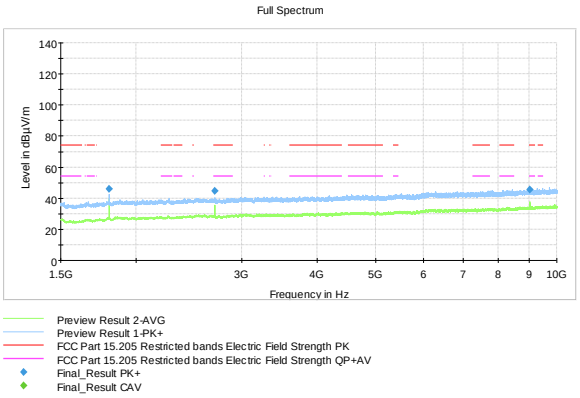

Figure 30: TX bottom channel (1.5-10.0 GHz)

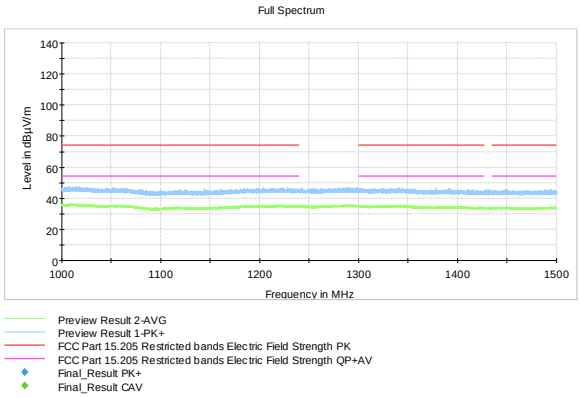

Figure 31: TX middle channel (1.0-1.5 GHz)

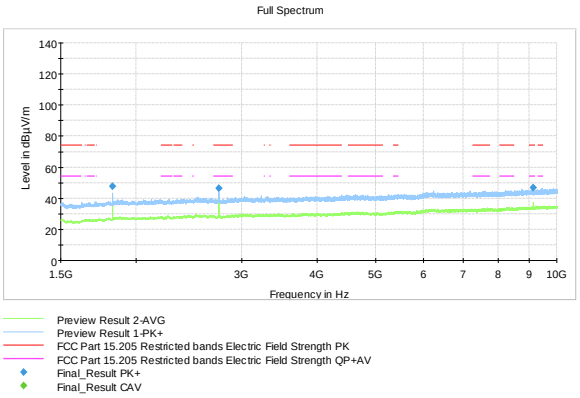

Figure 32: TX middle channel (1.5-10.0 GHz)

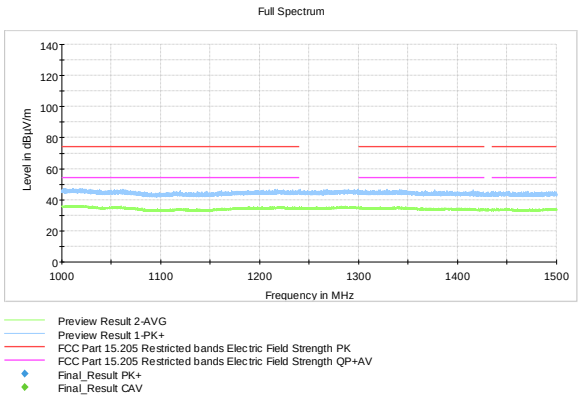

Figure 33: TX top channel (1.0-1.5 GHz)

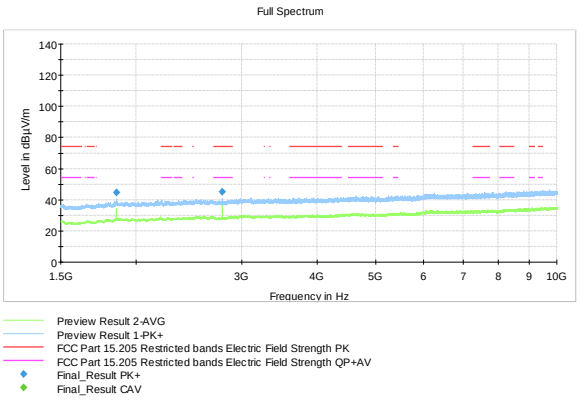

Figure 34: TX top channel (1.5-10.0 GHz)

Table 8: Final measurements from the worst frequencies (whip antenna)

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
612.940000	20.01	---	46.02	26.01	15 x 1000.0	120.000	226.0	H	240.0	27.5
902.200000	---	130.24	---	---	15 x 1000.0	120.000	155.0	V	293.0	47.5
914.960000	---	130.89	---	---	15 x 1000.0	120.000	154.0	V	132.0	47.8
927.870000	---	129.26	---	---	15 x 1000.0	120.000	162.0	V	198.0	48.1
1804.500000	---	46.03	110.24 *)	64.21	15 x 1000.0	1000.000	177.0	V	16.0	3.1
1829.800000	---	47.59	110.89 *)	63.30	15 x 1000.0	1000.000	177.0	V	30.0	2.7
1855.700000	---	44.52	109.26 *)	64.74	15 x 1000.0	1000.000	274.0	V	4.0	3.2
2706.775000	---	44.57	74.00	29.43	15 x 1000.0	1000.000	162.0	V	0.0	4.4
2744.800000	---	46.53	74.00	27.47	15 x 1000.0	1000.000	151.0	V	352.0	4.4
2783.500000	---	44.93	74.00	29.07	15 x 1000.0	1000.000	146.0	V	337.0	4.2
9017.925000	---	45.56	74.00	28.44	15 x 1000.0	1000.000	146.0	V	135.0	13.5
9149.400000	---	46.80	74.00	27.20	15 x 1000.0	1000.000	123.0	H	345.0	13.4

*) -20 dBc

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.

Test results, 30 MHz – 10 GHz (Yagi antenna)

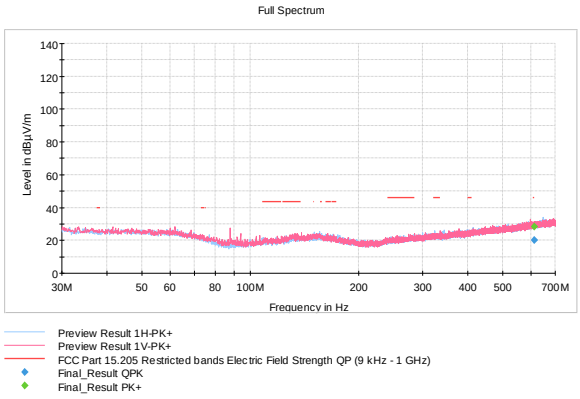

Figure 35: TX middle channel (30-700 MHz)

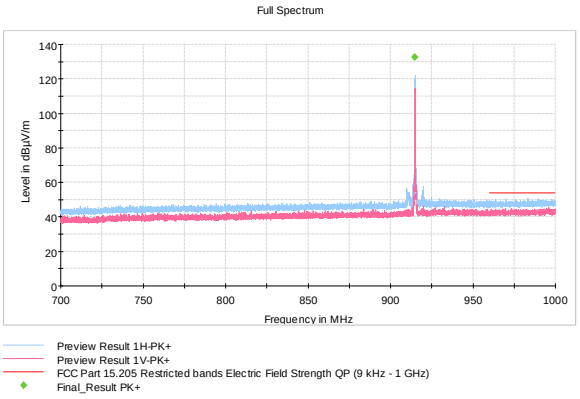

Figure 36: TX middle channel (700-1000 MHz)

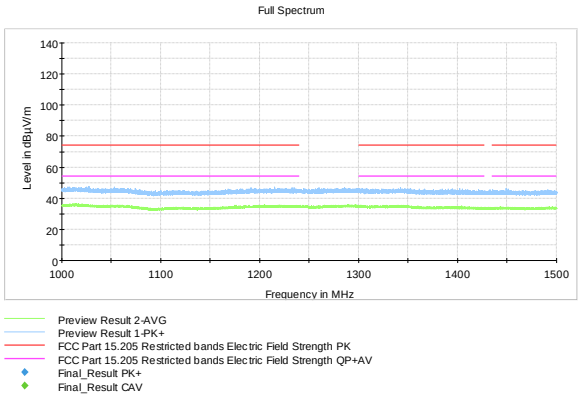

Figure 37: TX middle channel (1.0-1.5 GHz)

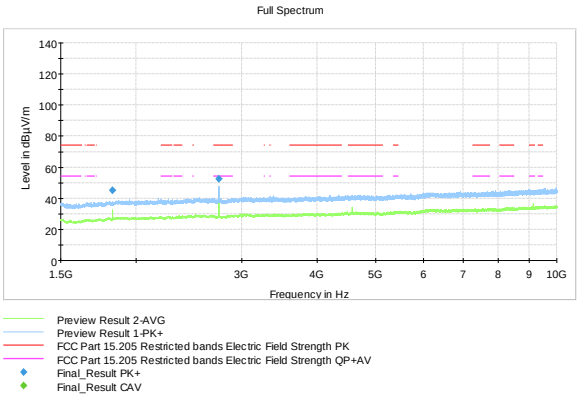

Figure 38: TX middle channel (1.5-10 GHz)

Table 9: Final measurements from the worst frequencies (Yagi antenna)

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
613.360000	20.07	---	46.02	25.95	15 x 1000.0	120.000	380.0	V	285.0	27.6
613.360000	---	28.20	---	---	15 x 1000.0	120.000	380.0	V	285.0	27.6
914.880000	132.62	---	---	---	15 x 1000.0	120.000	100.0	H	17.0	47.8
914.880000	---	132.70	---	---	15 x 1000.0	120.000	100.0	H	17.0	47.8
1829.800000	---	45.14	*)	---	15 x 1000.0	1000.000	273.0	H	333.0	2.7
2744.800000	---	52.35	74.00	21.65	15 x 1000.0	1000.000	197.0	H	45.0	4.4

*) -20 dBc

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.

Test results, RX mode 30 MHz – 10 GHz

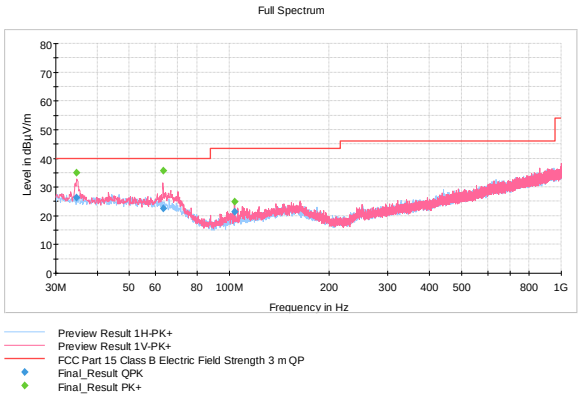

Figure 39: RX mode, whip antenna (30-1000 MHz)

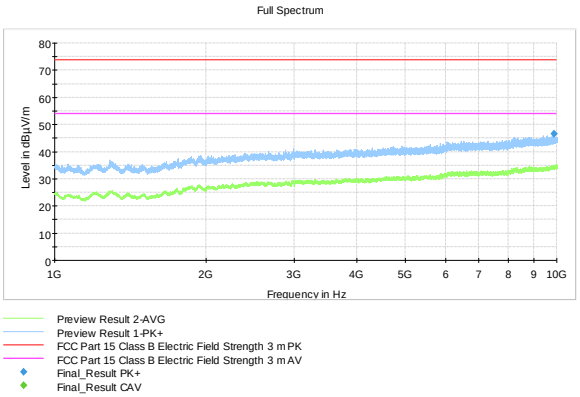

Figure 40: RX mode, whip antenna (1-10 GHz)

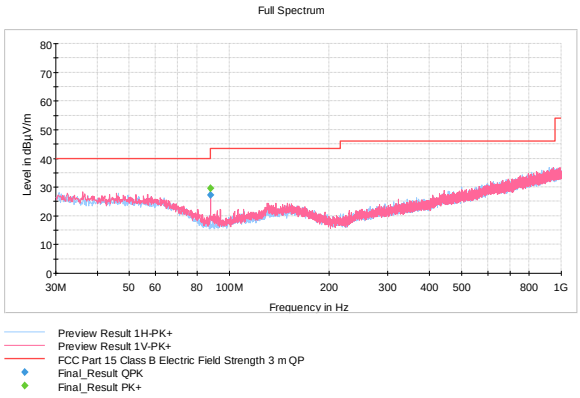

Figure 41: RX mode, Yagi antenna (30-1000 MHz)

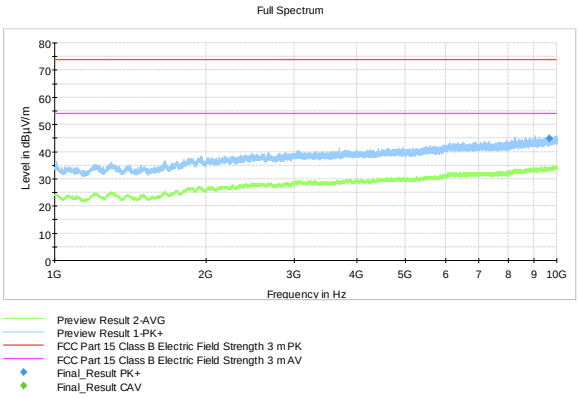

Figure 42: RX mode, Yagi antenna (1-10 GHz)

Table 10: Final measurements from the worst frequencies (whip antenna)

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.673000	26.16	---	40.00	13.84	15 x 1000.0	120.000	127.0	V	113.0	16.6
63.277000	22.61	---	40.00	17.39	15 x 1000.0	120.000	100.0	V	5.0	17.5
103.743000	21.38	---	43.50	22.12	15 x 1000.0	120.000	109.0	V	352.0	14.3
9871.550000	---	46.50	73.90	27.40	15 x 1000.0	1000.000	255.0	H	101.0	14.1

Table 11: Final measurements from the worst frequencies (Yagi antenna)

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
87.912000	27.19	---	40.00	12.81	15 x 1000.0	120.000	127.0	V	263.0	12.1
87.912000	---	29.54	---	---	15 x 1000.0	120.000	127.0	V	263.0	12.1
9675.650000	---	44.95	73.90	28.95	15 x 1000.0	1000.000	274.0	V	104.0	14.0

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.

Band-Edge Measurement and Unwanted Emissions (conducted)

Standard:	ANSI C63.10-2013	
Tested by:	HEM	
Date:	21 May 2021	24 May 2021
Temperature:	23 ºC	21 ºC
Humidity:	37 %RH	28 %RH
Barometric pressure:	990 hPa	1008 hPa
Measurement uncertainty:	± 2.87 dB, level of confidence 95 % (k = 2)	
Test Result:	**PASS**	

FCC Rule: §15.247(d), §15.205(a), §15.209(a)

RSS-247 3.3, 5.5

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. Attenuation below the general limits specified in §15.209(a) is not required.

The band-edge measurement is performed with hopping on and off. The worst results are presented (hopping off).

Test results

Table 12: Band-Edge test results

Band-Edge Attenuation	
Lower Band-Edge	**Upper Band-Edge**
-38.97	-21.90
Limit: -20 dBc	

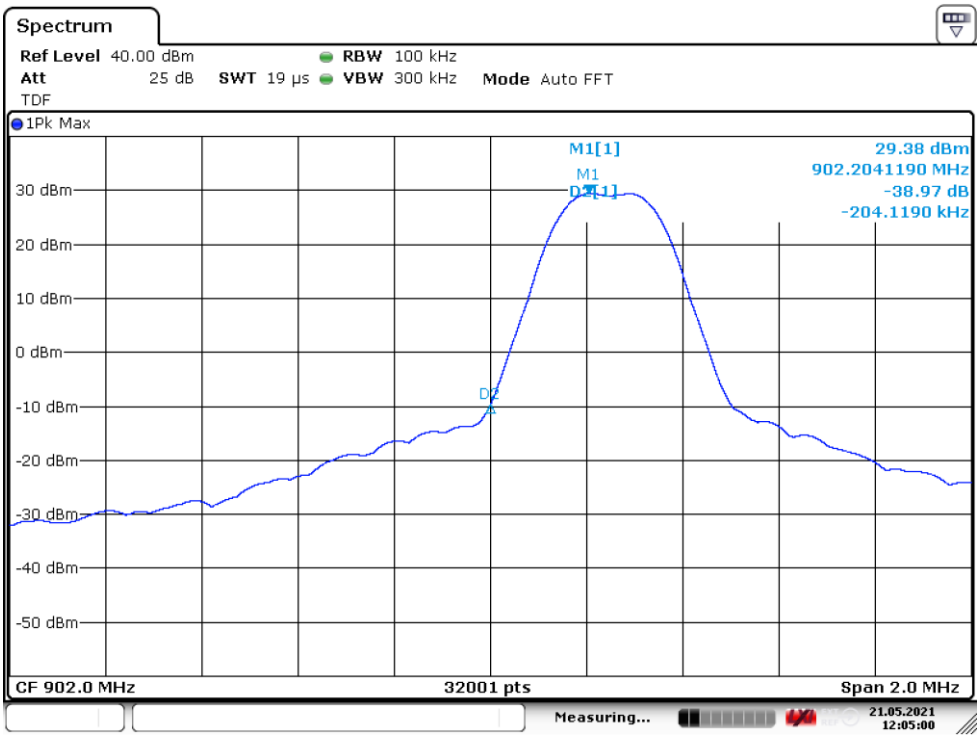

Figure 43: Lower Band-Edge

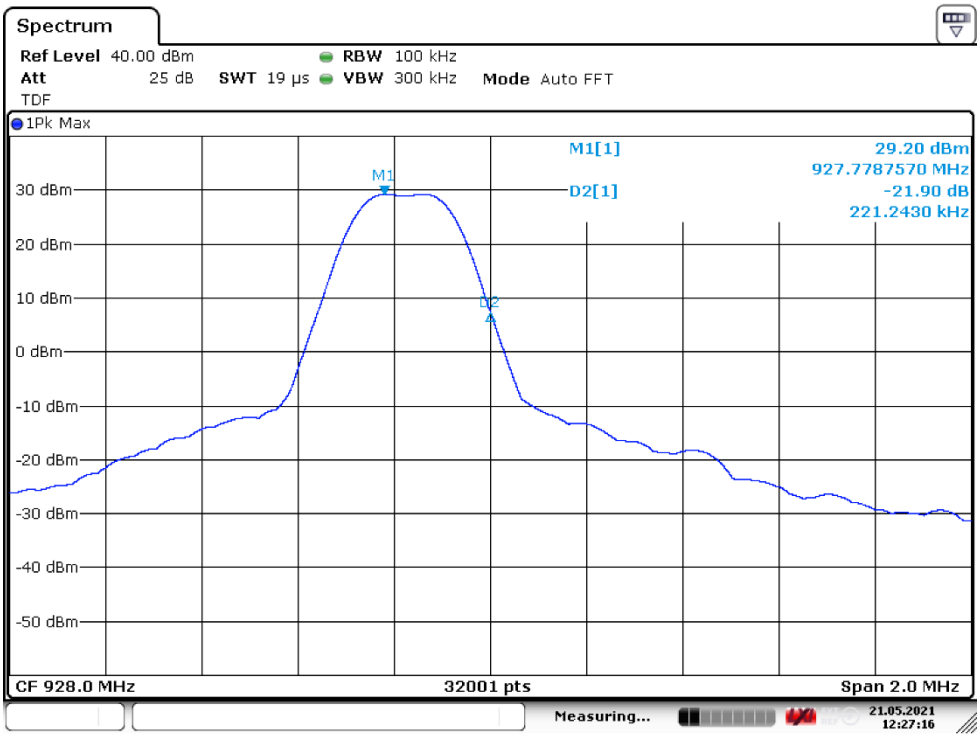

Figure 44: Upper Band-Edge

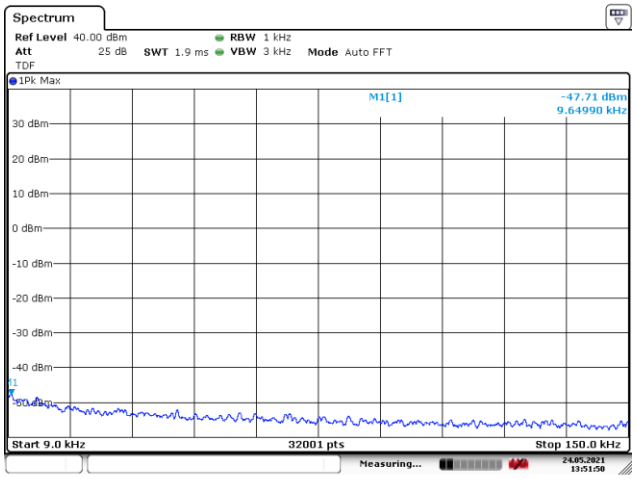

Figure 45: 9 – 150 kHz, bottom channel

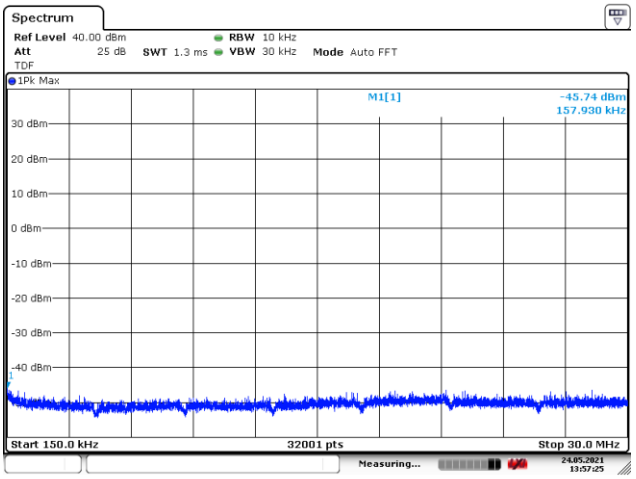

Figure 46: 150 kHz – 30 MHz, bottom channel

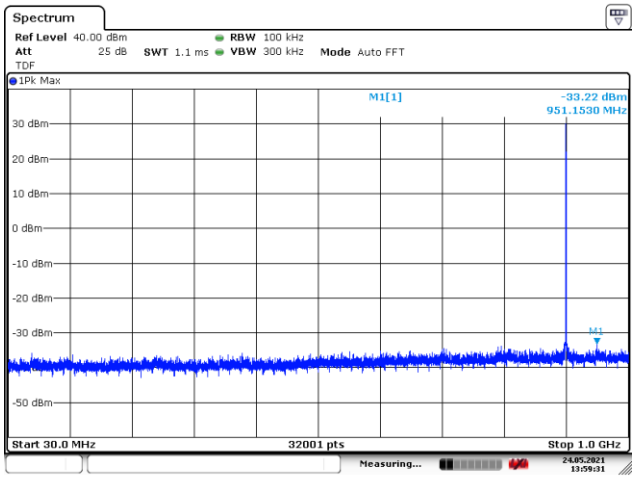

Figure 47: 30 – 1000 MHz, bottom channel

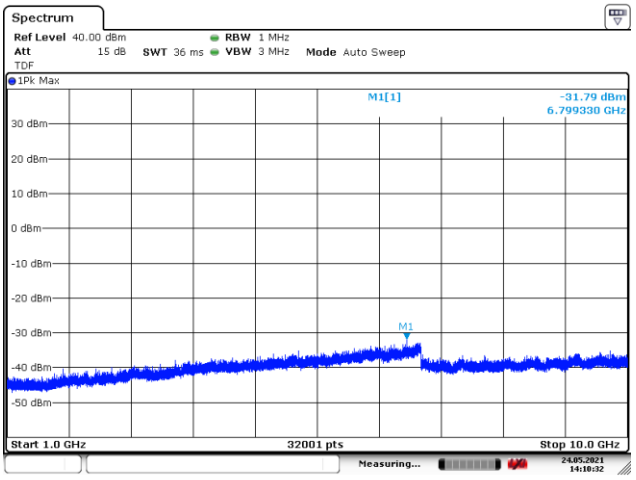

Figure 48: 1 – 10 GHz, bottom channel

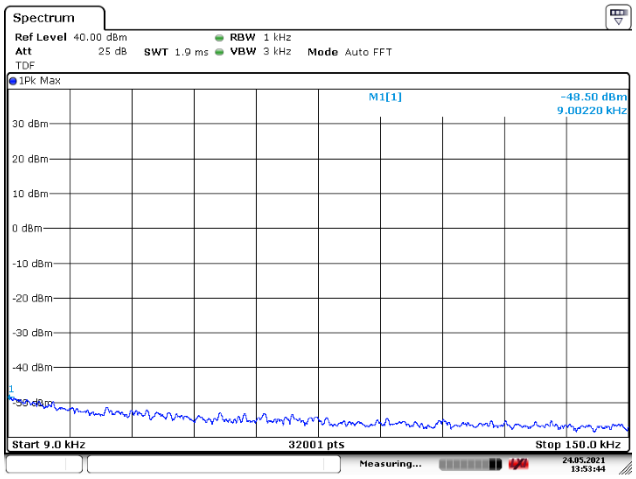

Figure 49: 9 – 150 kHz, middle channel

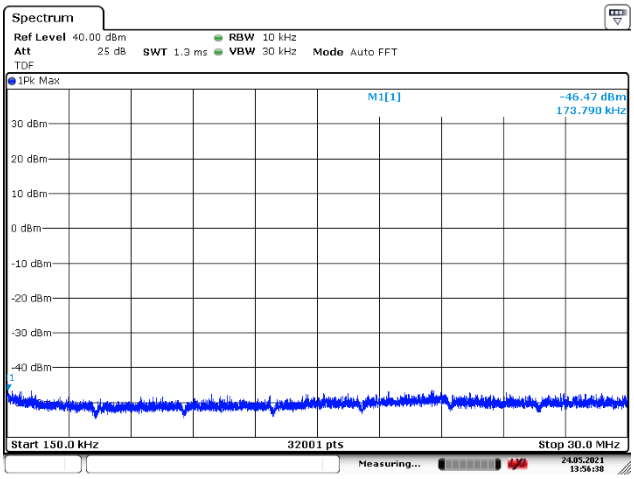

Figure 50: 150 kHz – 30 MHz, middle channel

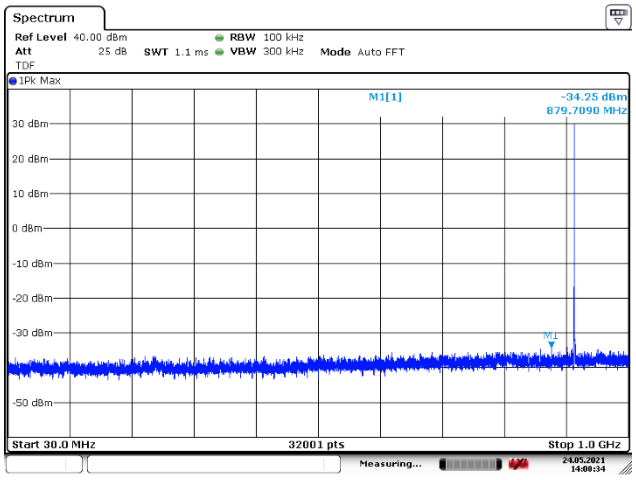

Figure 51: 30 – 1000 MHz, middle channel

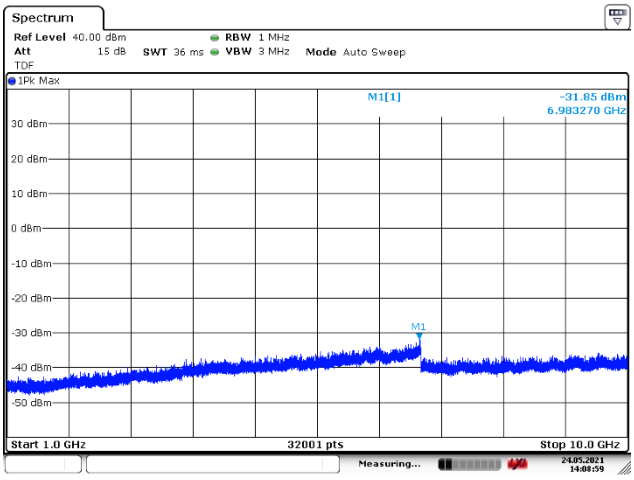

Figure 52: 1 – 10 GHz, middle channel

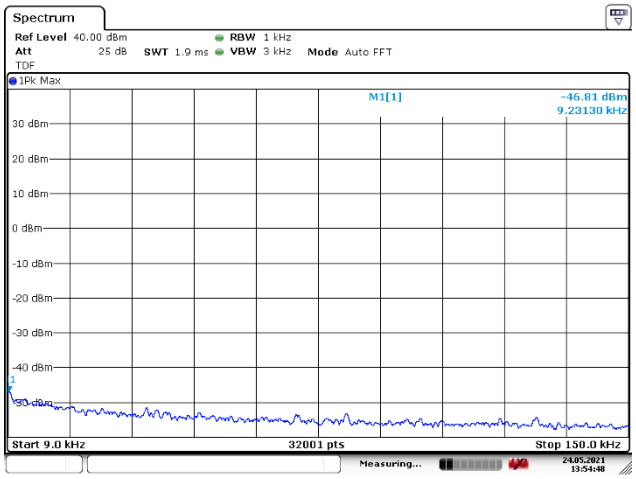

Figure 53: 9 – 150 kHz, top channel

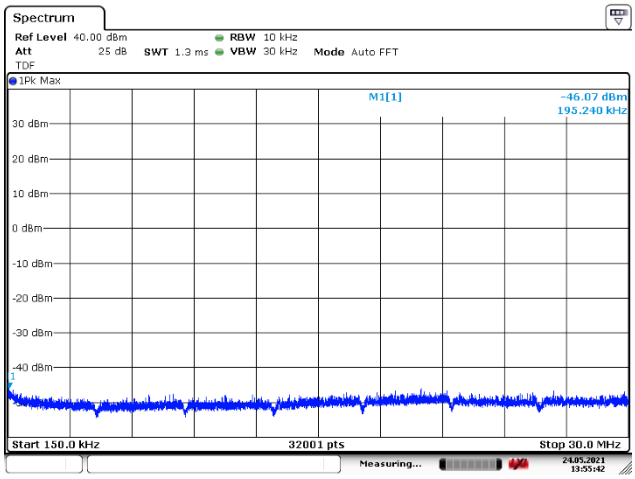

Figure 54: 150 kHz – 30 MHz, top channel

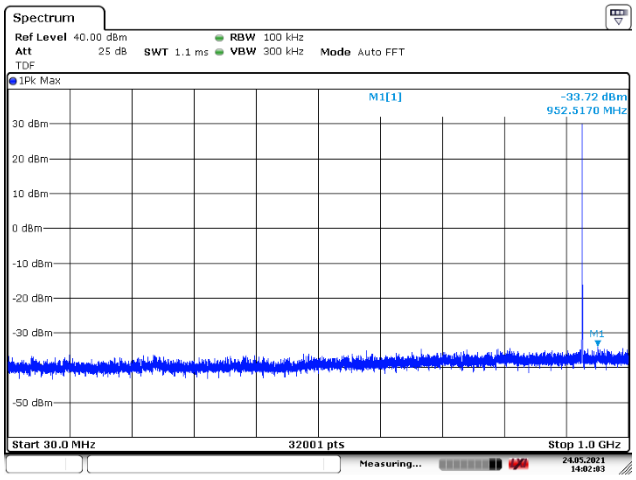

Figure 55: 30 – 1000 MHz, top channel

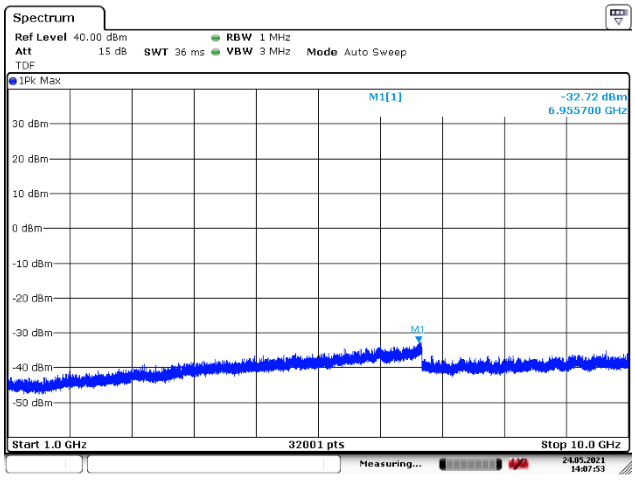

Figure 56: 1 – 10 GHz, top channel

Occupied Bandwidth

Standard:	RSS-GEN
Tested by:	HEM
Date:	24 May 2021
Temperature:	21 ºC
Humidity:	28 %RH
Barometric pressure:	1008 hPa
Test result:	**PASS**

RSS-GEN 6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

Test results

Table 13: Occupied Bandwidth test results

Channel	Occupied Bandwidth [kHz]
Bottom	127.168
Middle	125.824
Top	126.309

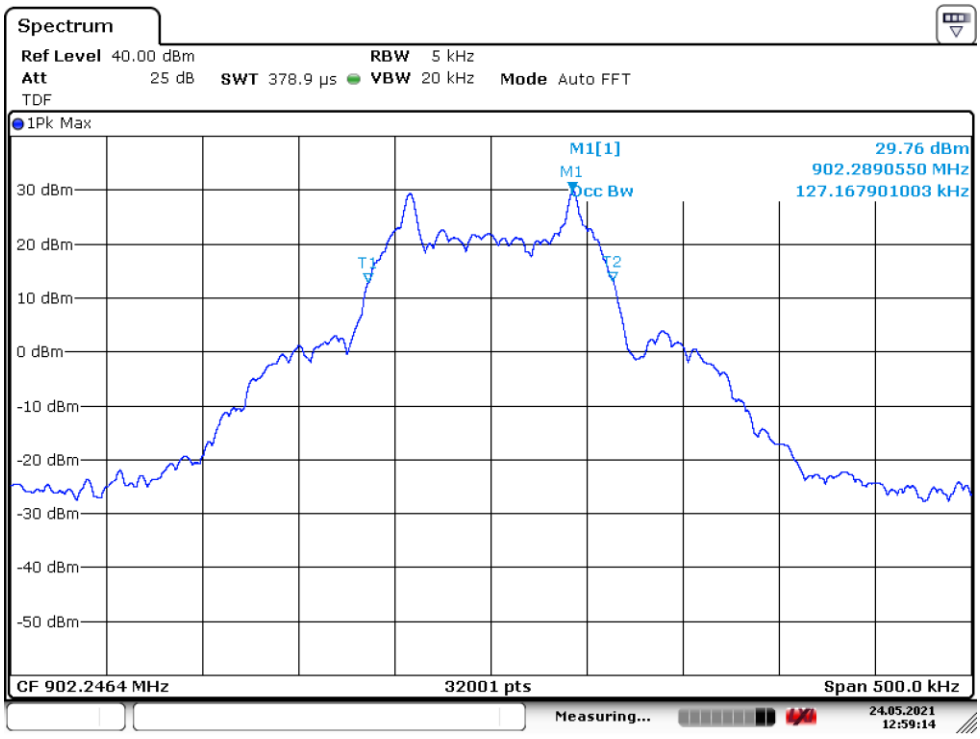

Figure 57: Occupied Bandwidth, bottom channel

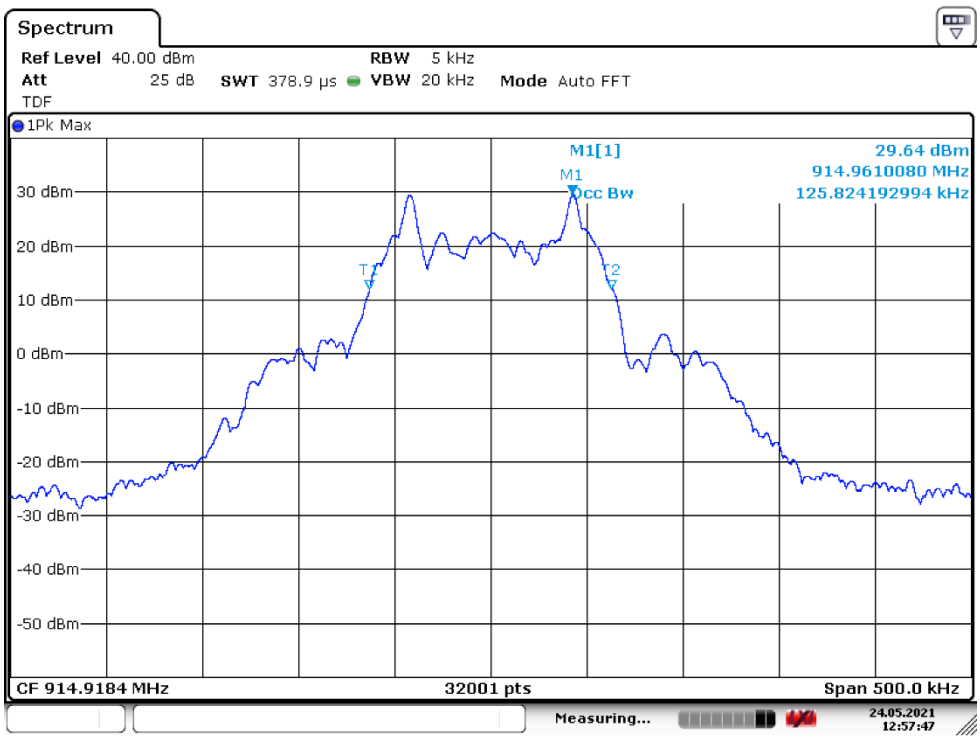

Figure 58: Occupied Bandwidth, middle channel

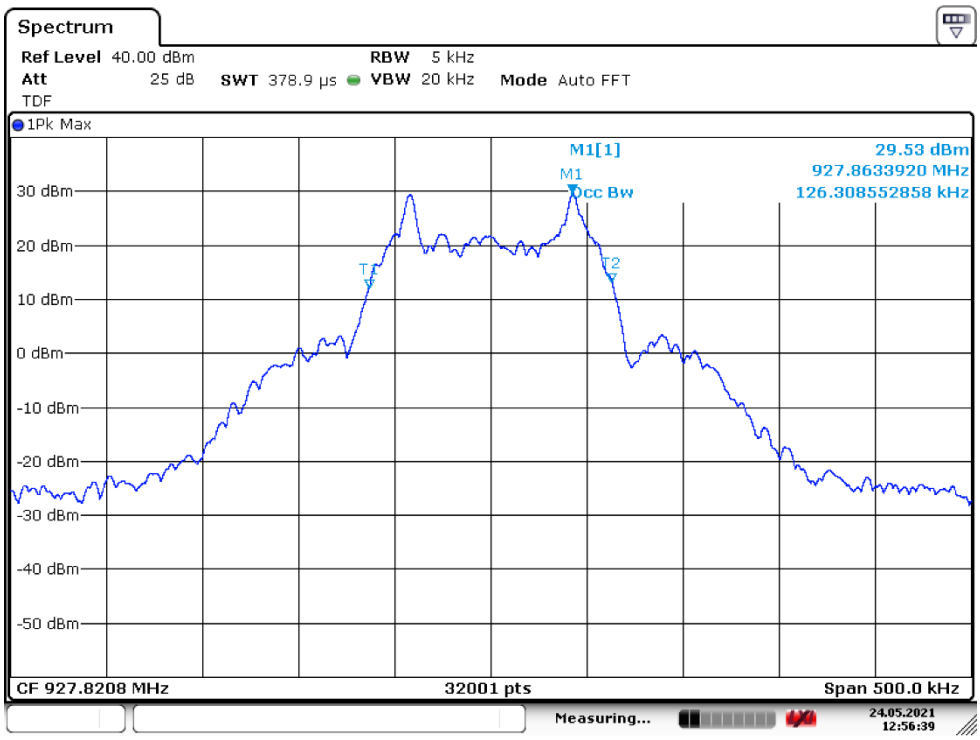

Figure 59: Occupied Bandwidth, top channel

TEST EQUIPMENT

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
ANTENNA	EMCO	3117	inv. 7293	2020-03-11	2022-03-11
ANTENNA	ROHDE & SCHWARZ	HFH2-Z2 , 335.4711.52	inv. 8013	2020-10-28	2022-10-28
ANTENNA	SCHWARZBECK	VULB 9168	inv. 8911	2020-11-04	2022-11-04
ANTENNA MAST	MATURO	TAM 4.0E	inv. 10181	NCR	NCR
ATTENUATOR	HUBER & SUHNER	6806.17.B	inv. 10391	2021-01-25	2023-01-25
ATTENUATOR	HUBER & SUHNER	6810.17.B	inv. 10390	2021-01-25	2023-01-25
ATTENUATOR	PASTERNACK	10 dB, DC-40 GHz	sn. A1	2021-04-20	2023-04-20
ATTENUATOR	PASTERNACK	PE 7004-4 (4dB)	inv. 10126	2021-03-26	2022-03-26
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv. 10679	2021-06-21	2022-06-21
FILTER	WAINWRIGHT	WHKX1.0/15G-10SS	inv. 8267	2021-01-29	2023-01-29
FILTER	WAINWRIGHT	WHKX1.5/15G-12SS	inv. 10608	2021-03-29	2023-03-29
FILTER	WAINWRIGHT	WLKS700-9SS	inv. 10606	2021-01-29	2023-01-29
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv. 10183	NCR	NCR
POWER SUPPLY	THANDAR	TS3021S	inv. 3484	NCR	NCR
RF PREAMPLIFIER	CIAO	CA118-3123	inv. 10278	2021-10-05	2022-10-05
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSV40	inv. 9093	2020-12-04	2020-12-04
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 SAC	inv. 10517	2021-10-22	2022-10-22
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
TURNTABLE	MATURO	DS430 UPGRADED	inv. 10182	NCR	NCR

NCR = No Calibration Required

END OF REPORT