Test Report

INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 90 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: IC Rule Part: KDB:	90 RSS-119, Issue 12, May 2015 971168 D01 Power Meas License Digital Systems v03r01 Measurement Guidance for Certification of Licensed Digital Transmitters (April 9, 2018)

Date:	14 June 2021	Date:	14 June 2021
Issued by:	Henri Mäki Testing Engineer	Checked by:	Mikko Halonen Development Engineer

Table of Contents

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	14 June 2021

PRODUCT DESCRIPTION

Equipment Under Test

Trade mark:	Satel
Model:	SATEL-TR489
Type:	SATEL-TA43
Serial no:	2107000607
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 400 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

Frequency:	406.1-430 MHz and 450-470 MHz
Channel width:	12.5 kHz, 25 kHz
Channel spacing:	12.5 kHz, 25 kHz
Modulation:	4FSK
Carrier power:	0.1, 0.2, 0.5, 1 W

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 and monitoring with programs supplied by customer.

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§90.205 / RSS-119 5.4	Transmitter output power	PASS
§90.210 / RSS-119 5.5	Occupied bandwidth	PASS
§90.210 / RSS-119 5.5	Spectrum emission mask	PASS
§90.210 / RSS-119 5.8	Spurious emissions (conducted)	PASS
§90.210 / RSS-119 5.8	Spurious emissions (radiated)	PASS
§90.213 / RSS-119 5.3	Frequency stability	PASS
§90.214 / RSS-119 5.9	Transient frequency behaviour	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 C63.26-2015.

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).

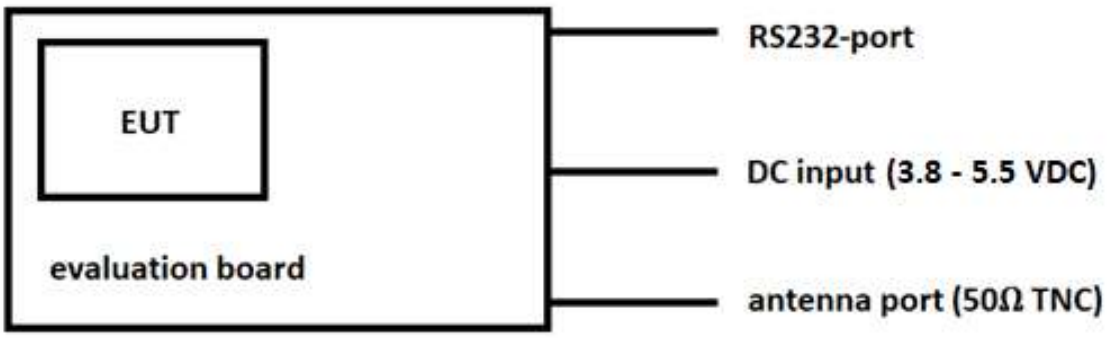

Figure 1: Test setup block diagram

Table 1: Test frequencies

Channel	Frequency (MHz)
Bottom	410.0
Middle 1	429.5
Middle 2	450.5
Top	469.5

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

Transmitter output power

Standard:	ANSI C63.26-2015
Tested by:	HEM
Date:	21 May 2021
Temperature:	23 °C
Humidity:	37 %RH
Barometric pressure	992 hPa
Measurement uncertainty:	± 0.470 dB, level of confidence 95.45 % (k = 2)
Test result:	**PASS**

FCC Rule: §90.205
RSS-119 5.4

The output power shall be within ±1 dB of the manufacturer's rated power listed in the equipment specifications.

The test was performed with a spectrum analyser.

Test results

Table 2. Rated output power 100 mW (20.00 dBm)

Frequency [MHz]	Channel Width [kHz]	Measured [dBm]	Result
410.0	12.5	20.04	PASS
	25.0	20.04	PASS
429.5	12.5	19.78	PASS
	25.0	19.74	PASS
450.5	12.5	19.95	PASS
	25.0	19.96	PASS
469.5	12.5	20.22	PASS
	25.0	20.23	PASS

Table 3. Rated output power 200 mW (23.01 dBm)

Frequency [MHz]	Channel Width [kHz]	Measured [dBm]	Result
410.0	12.5	23.11	PASS
	25.0	23.10	PASS
429.5	12.5	22.82	PASS
	25.0	22.84	PASS
450.5	12.5	23.04	PASS
	25.0	23.03	PASS
469.5	12.5	23.06	PASS
	25.0	23.05	PASS

Table 4. Rated output power 500 mW (26.99 dBm)

Frequency [MHz]	Channel Width [kHz]	Measured [dBm]	Result
410.0	12.5	27.39	PASS
	25.0	27.39	PASS
429.5	12.5	26.92	PASS
	25.0	26.93	PASS
450.5	12.5	26.99	PASS
	25.0	26.99	PASS
469.5	12.5	26.91	PASS
	25.0	26.91	PASS

Table 5. Rated output power 1000 mW (30.00 dBm)

Frequency [MHz]	Channel Width [kHz]	Measured [dBm]	Result
410.0	12.5	29.76	PASS
	25.0	29.62	PASS
429.5	12.5	29.83	PASS
	25.0	29.81	PASS
450.5	12.5	29.76	PASS
	25.0	29.77	PASS
469.5	12.5	29.59	PASS
	25.0	29.57	PASS

Occupied bandwidth

Standard:	ANSI C63.26-2015
Tested by:	HEM
Date:	7 June 2021
Temperature:	21 °C
Humidity:	46 %RH
Barometric pressure:	1011 hPa
Measurement uncertainty:	± 0.0005 %, level of confidence 95.45 % (k = 2)
Test result:	**PASS**

FCC Rule: §90.210
RSS-119 5.5

The occupied 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.

The maximum permissible occupied bandwidth shall not exceed the authorized bandwidth specified for the equipment's frequency band. The authorized bandwidth is defined as the maximum width of the band of frequencies used to derive spectrum masks and is not necessarily equivalent to the bandwidth found on radio and spectrum licenses.

Frequency Band (MHz)	Channel Bandwidth (kHz)	Authorized Bandwidth (kHz)
406.1-430 and 450-470	12.5	11.25
	25	20

Test results

Table 6: Occupied bandwidth test results

Frequency [MHz]	Channel Width [kHz]	Occupied Bandwidth [kHz]	Result
410.0	12.5	7.985	**PASS**
410.0	25.0	15.812	**PASS**
429.5	12.5	7.886	**PASS**
429.5	25.0	15.660	**PASS**
450.5	12.5	7.834	**PASS**
450.5	25.0	15.687	**PASS**
469.5	12.5	7.989	**PASS**
469.5	25.0	15.593	**PASS**

Channel width 12.5 kHz

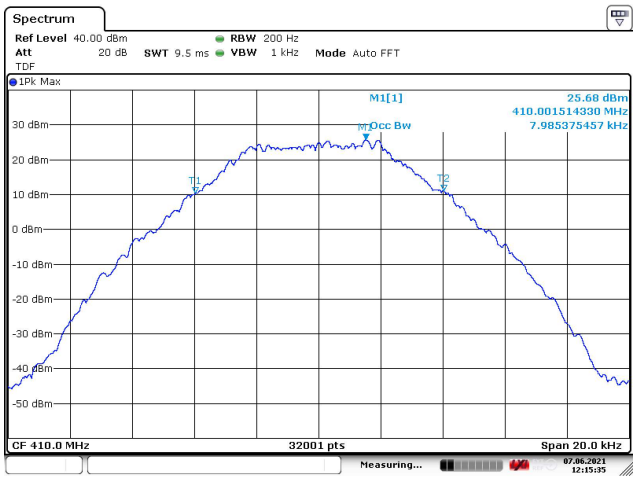

Figure 2: 410.0 MHz

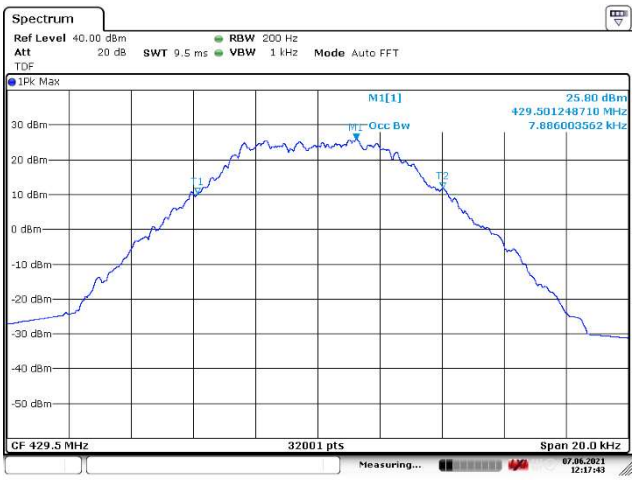

Figure 3: 429.5 MHz

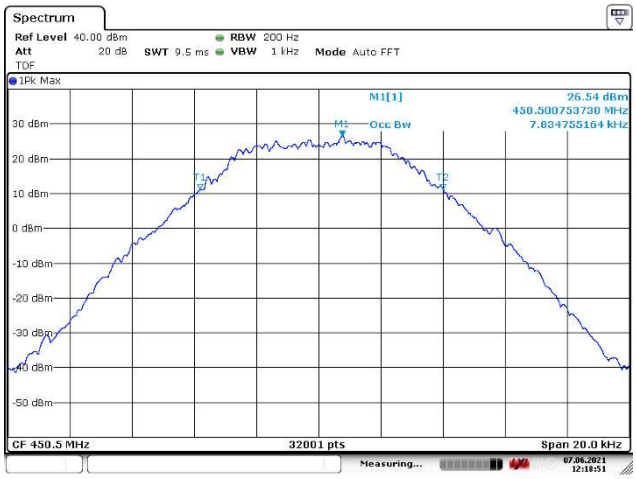

Figure 4: 450.5 MHz

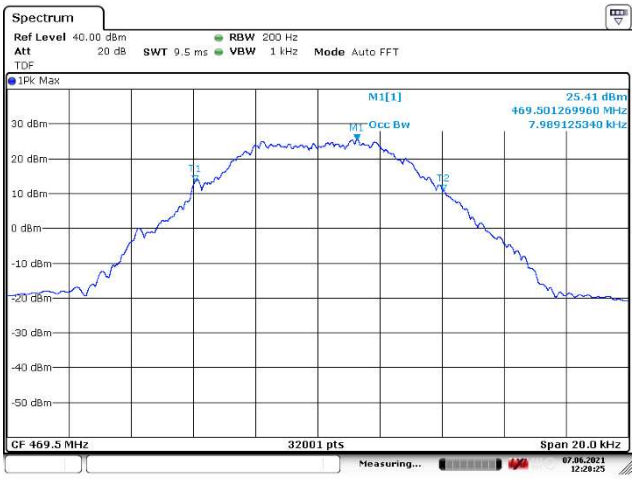

Figure 5: 469.5 MHz

Channel width 25 kHz

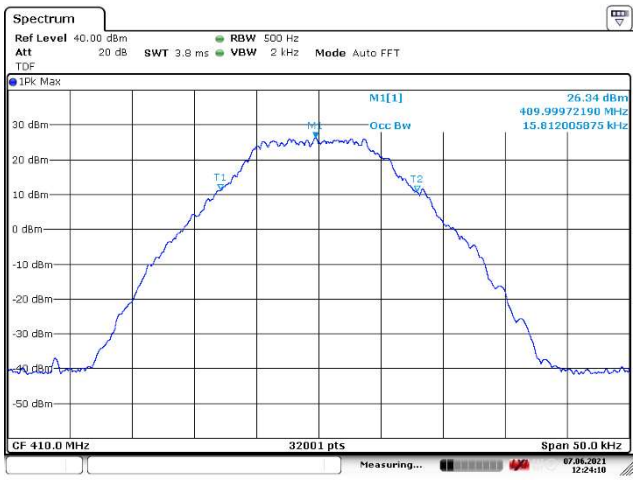

Figure 6: 410.0 MHz

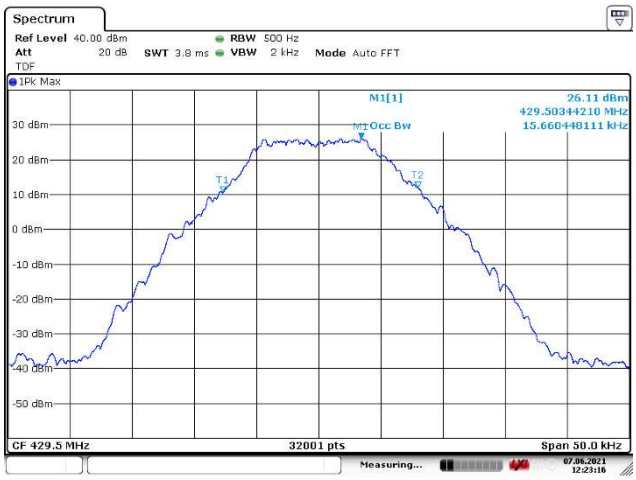

Figure 7: 429.5 MHz

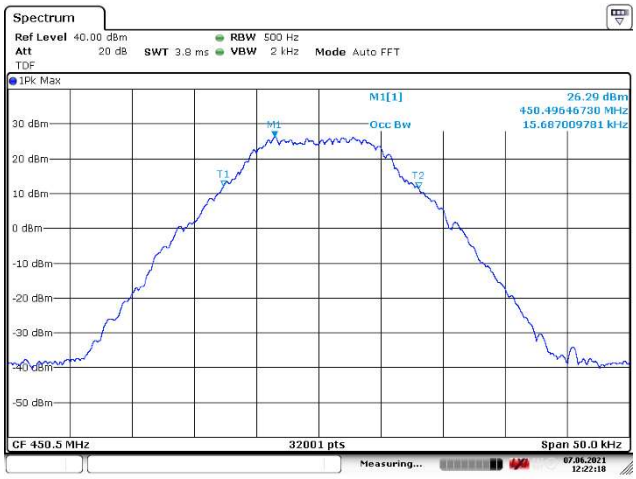

Figure 8: 450.5 MHz

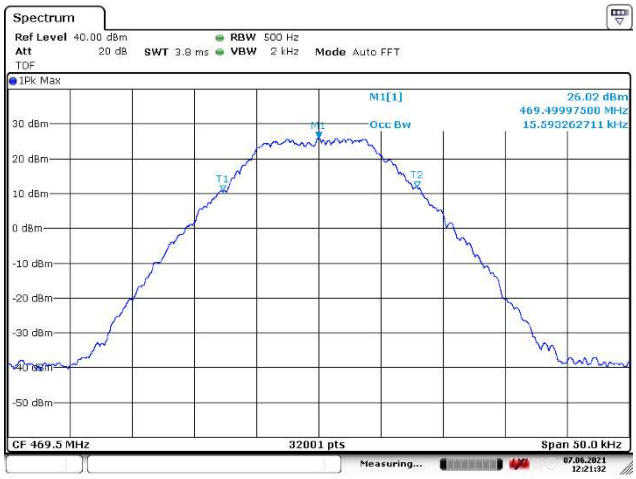

Figure 9: 469.5 MHz

Spurious emission mask

Standard:	ANSI C63.26-2015
Tested by:	HEM
Date:	21 May 2021
Temperature:	23 °C
Humidity:	37 %RH
Barometric pressure:	992 hPa
Measurement uncertainty:	± 2.90 dB, level of confidence 95.45 % (k = 2)
Test result:	**PASS**

FCC Rule: §90.210
RSS-119 5.5

Emission Mask C. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation

3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth; At least 43 + 10 log (P) dB

Emission Mask D – 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0: Zero dB

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(f_d – 2.88 kHz) dB

3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) or 70 dB, whichever is the lesser attenuation

Test Results

Frequency (MHz)	Channel Width (kHz)	Mask	Result
410.0	12.5	D	PASS
410.0	25.0	C	PASS
429.5	12.5	D	PASS
429.5	25.0	C	PASS
450.5	12.5	D	PASS
450.5	25.0	C	PASS
469.5	12.5	D	PASS
469.5	25.0	C	PASS

Emission Mask C

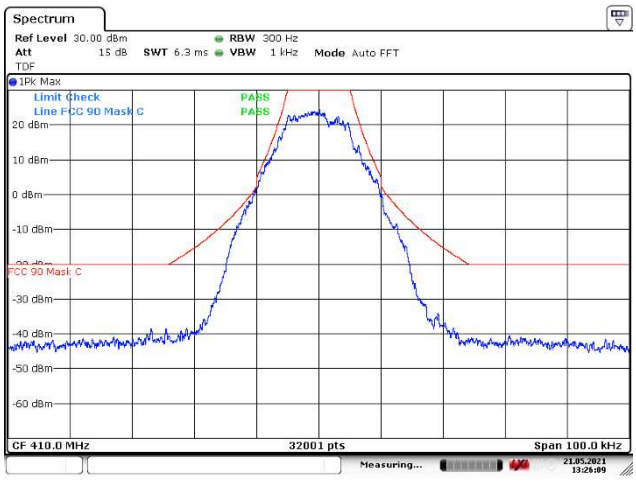

Figure 10: 410.0 MHz

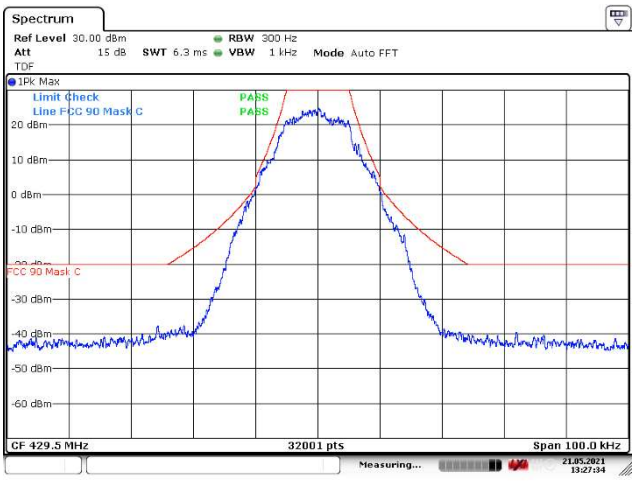

Figure 11: 429.5 MHz

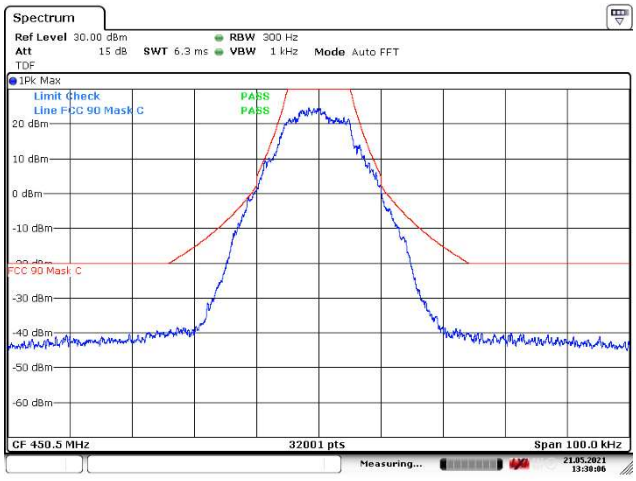

Figure 12: 450.5 MHz

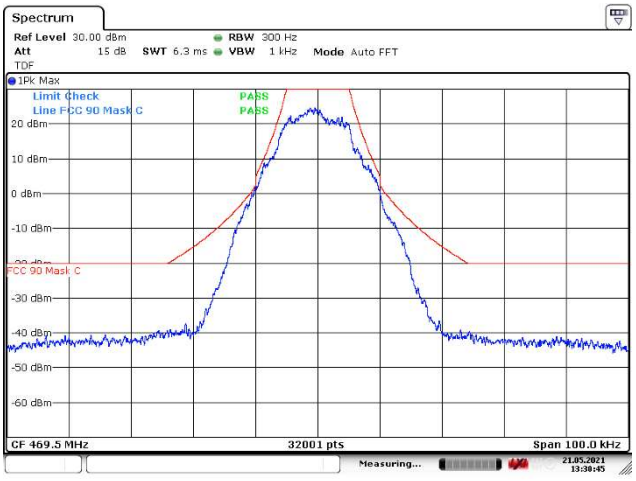

Figure 13: 469.5 MHz

Emission Mask D

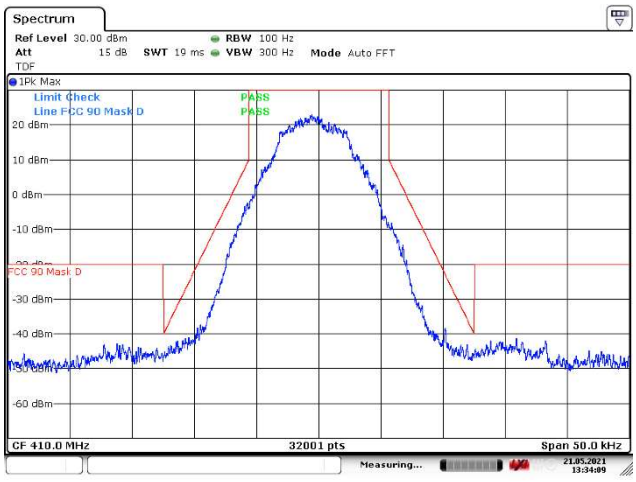

Figure 14: 410.0 MHz

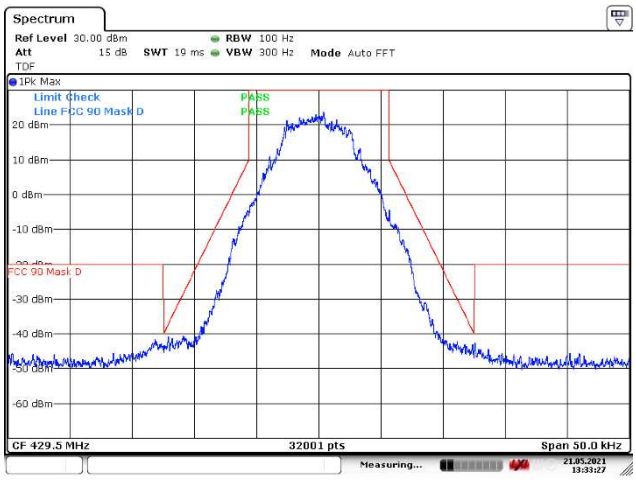

Figure 15: 429.5 MHz

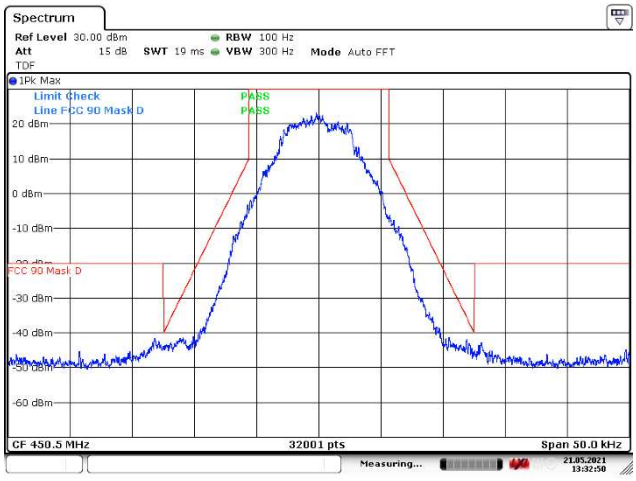

Figure 16: 450.5 MHz

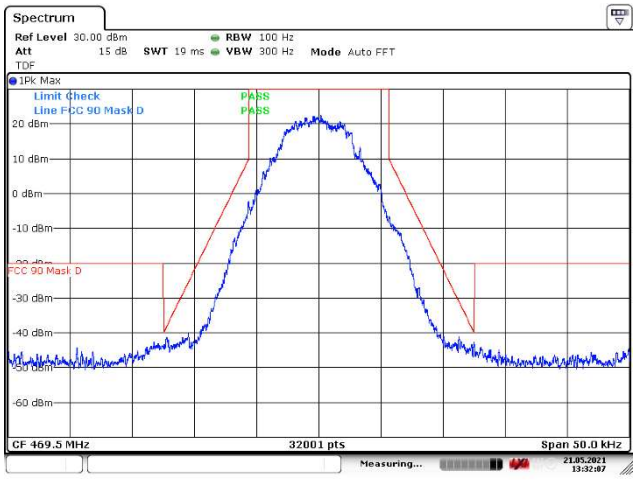

Figure 17: 469.5 MHz

Spurious emissions (conducted) 9 kHz – 5 GHz

Standard:	ANSI C63.26-2015
Tested by:	HEM
Date:	7 June 2021
Temperature:	21 °C
Humidity:	46 %RH
Barometric pressure:	1011 hPa
Measurement uncertainty:	± 2.90 dB, level of confidence 95.45 % (k = 2)
Test result:	**PASS**

FCC Rule: §90.210
RSS-119 5.8

For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows: on any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth; at least 43 + 10 log (P) dB.

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows: on any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: at least 50 + 10 log (P) or 70 dB, whichever is the lesser attenuation.

Frequency Band (MHz)	Channel Bandwidth (kHz)	Authorized Bandwidth (kHz)	Limit (dBm)
406.1-430 and 450-470	12.5	11.25	-20
	25	20	-13

The test was performed at maximum power level.

Test Results

Frequency (MHz)	Channel Width (kHz)	Result
410.0	12.5	**PASS**
410.0	25.0	**PASS**
429.5	12.5	**PASS**
429.5	25.0	**PASS**
450.5	12.5	**PASS**
450.5	25.0	**PASS**
469.5	12.5	**PASS**
469.5	25.0	**PASS**

TX 410.0 MHz, channel width 12.5 kHz

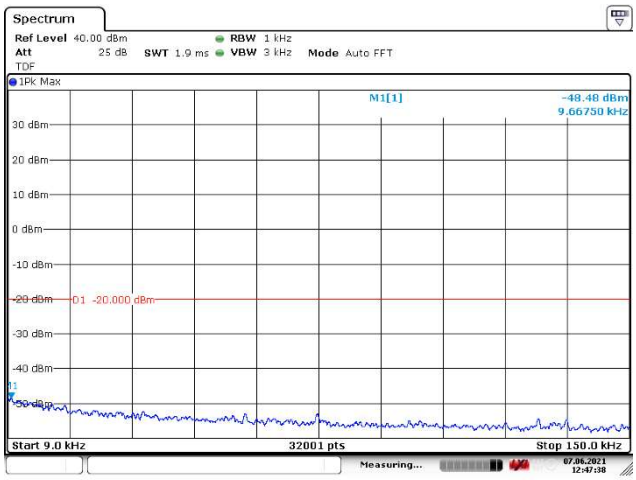

Figure 18: 9 – 150 kHz

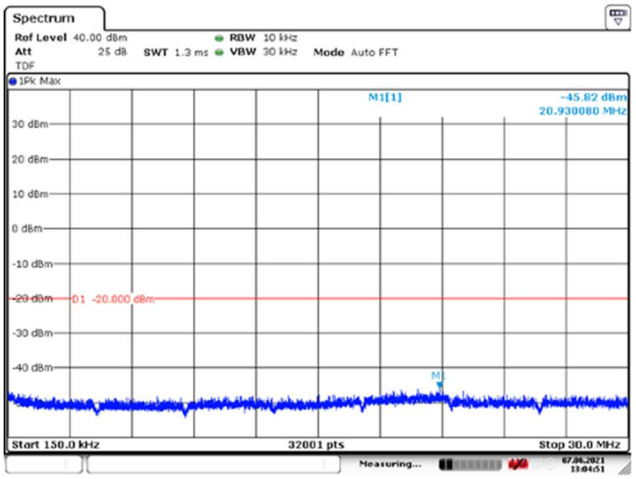

Figure 19: 150 kHz – 30 MHz

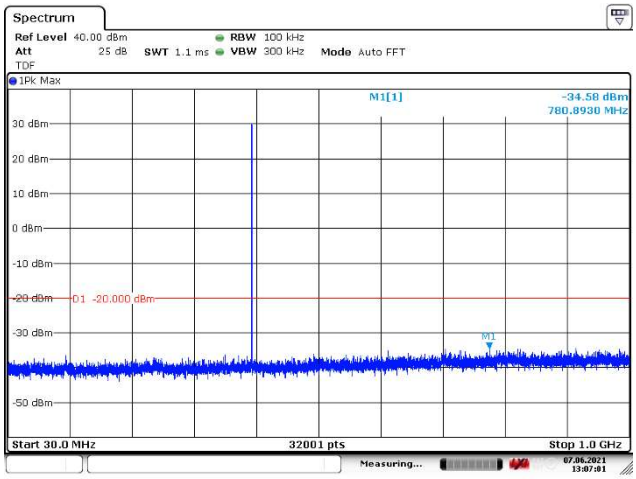

Figure 20: 30 – 1000 MHz

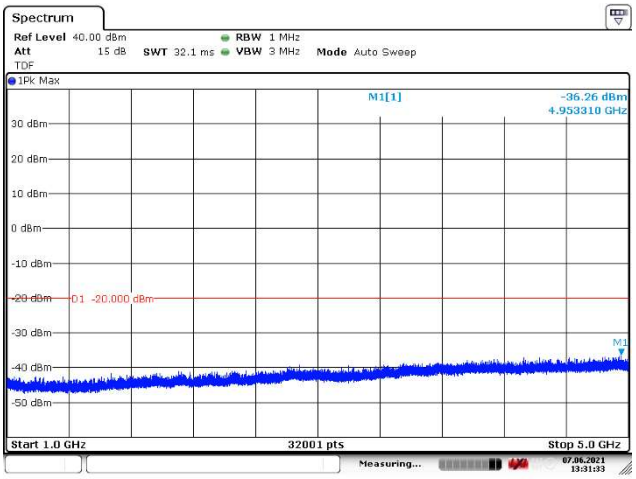

Figure 21: 1 – 5 GHz

TX 410.0 MHz, channel width 25 kHz

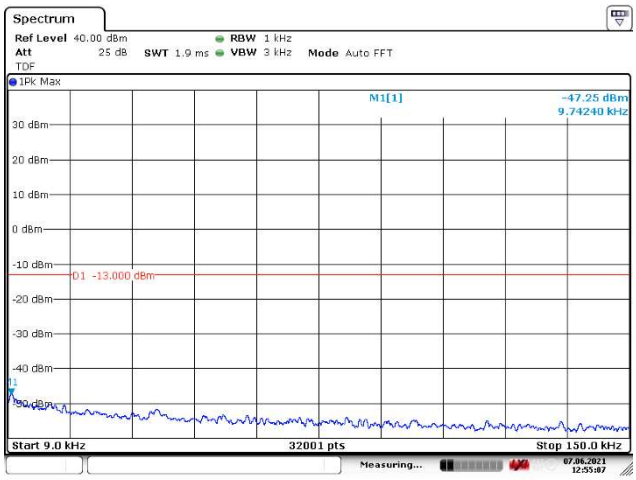

Figure 22: 9 – 150 kHz

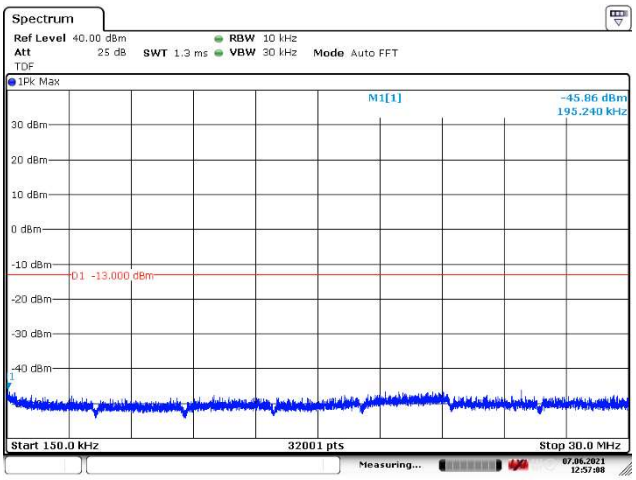

Figure 23: 150 kHz – 30 MHz

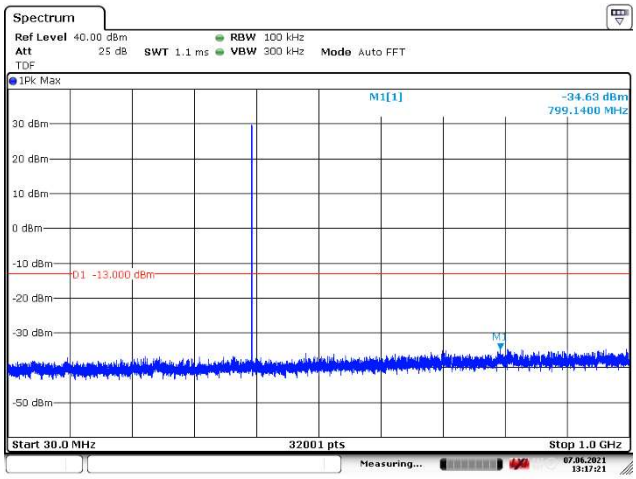

Figure 24: 30 – 1000 MHz

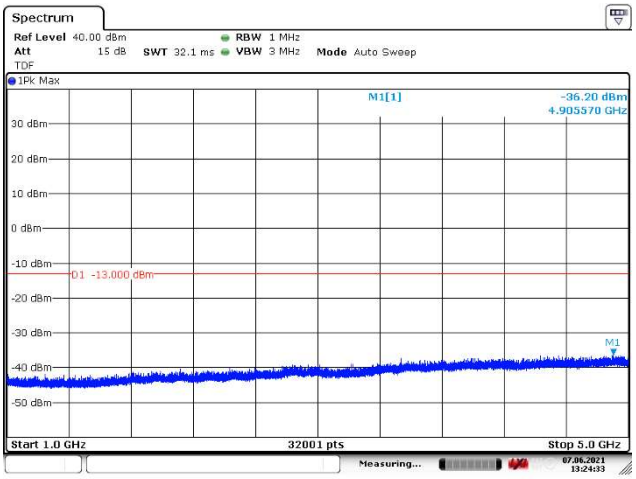

Figure 25: 1 – 5 GHz

TX 429.5 MHz, channel width 12.5 kHz

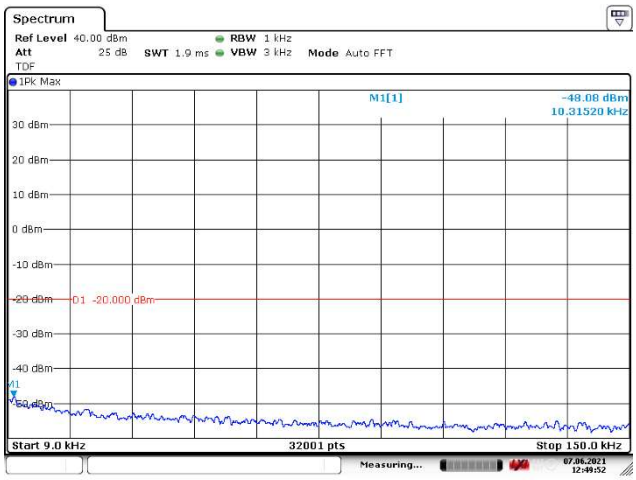

Figure 26: 9 – 150 kHz

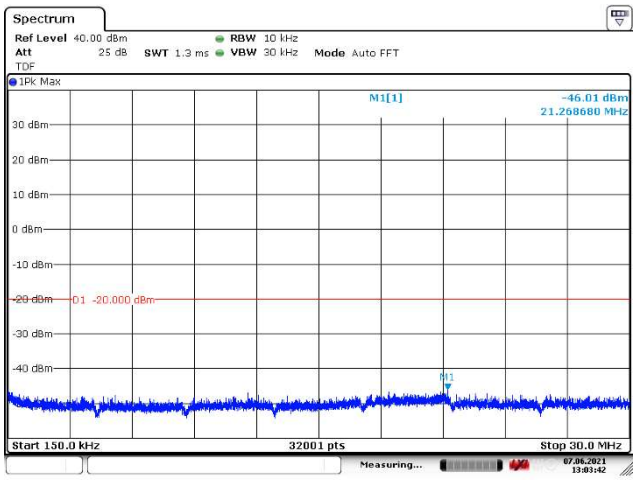

Figure 27: 150 kHz – 30 MHz

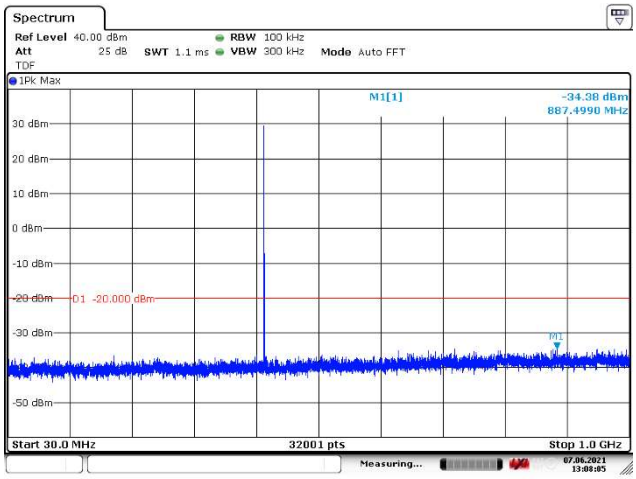

Figure 28: 30 – 1000 MHz

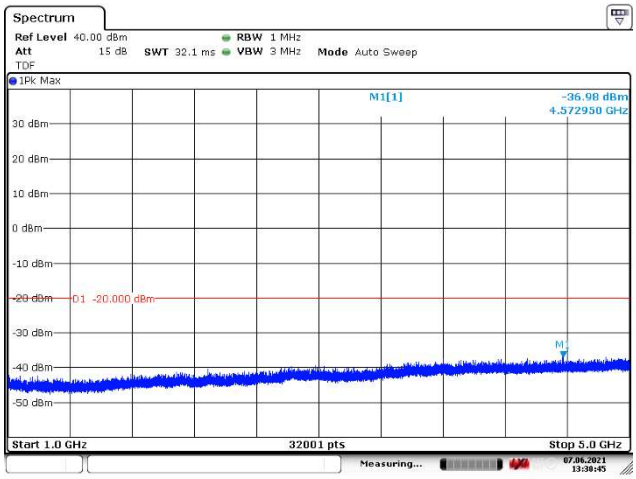

Figure 29: 1 – 5 GHz

TX 429.5 MHz, channel width 25 kHz

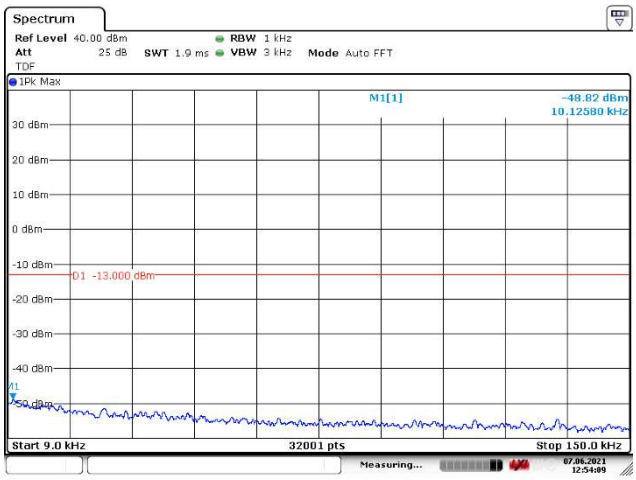

Figure 30: 9 – 150 kHz

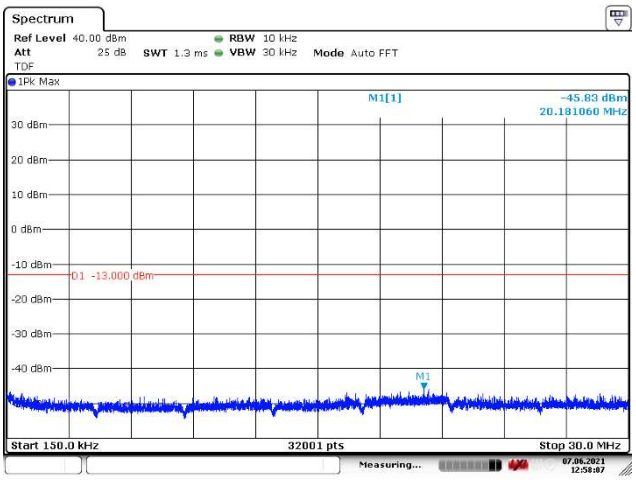

Figure 31: 150 kHz – 30 MHz

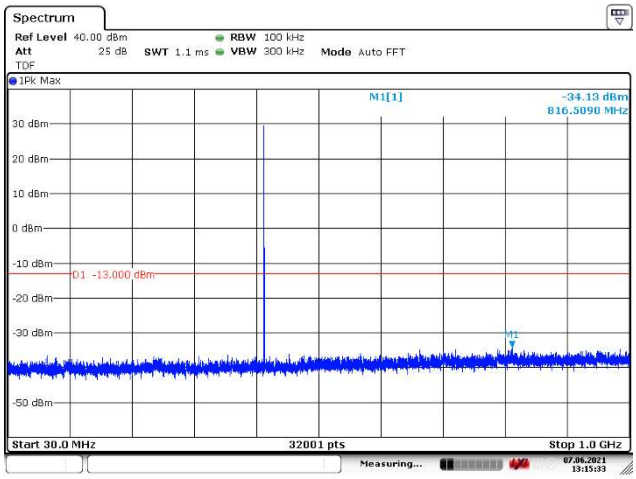

Figure 32: 30 – 1000 MHz

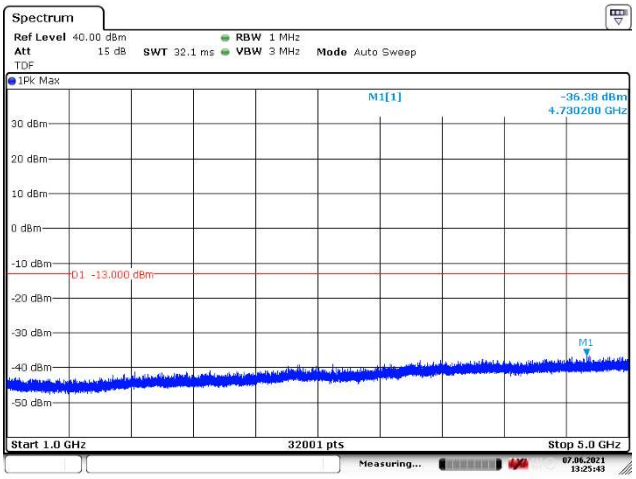

Figure 33: 1 – 5 GHz

TX 450.5 MHz, channel width 12.5 kHz

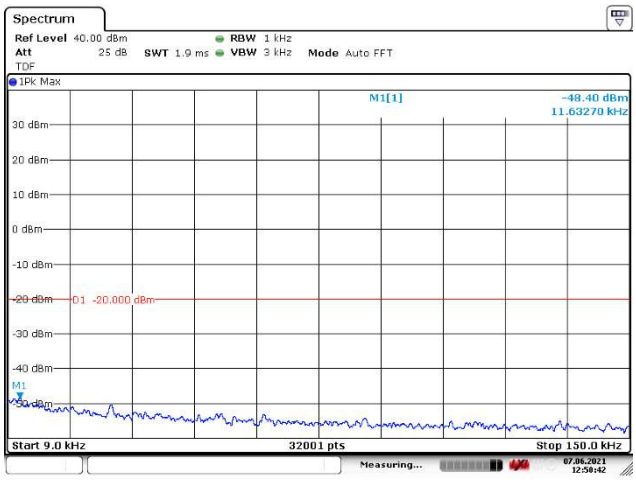

Figure 34: 9 – 150 kHz

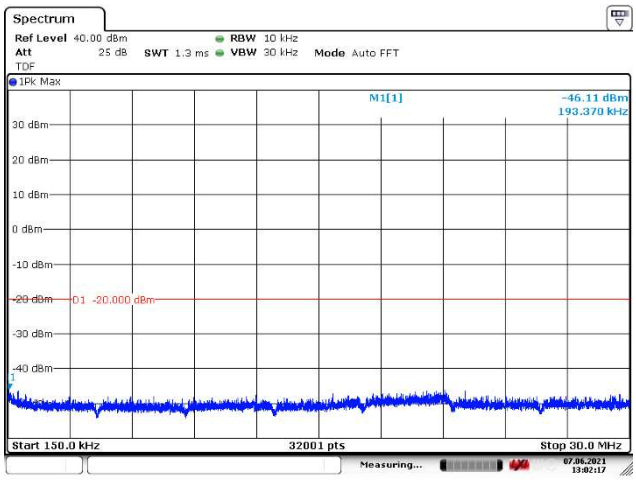

Figure 35: 150 kHz – 30 MHz

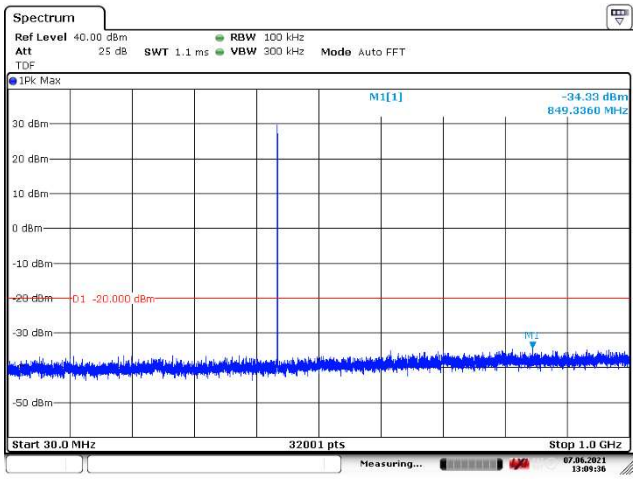

Figure 36: 30 – 1000 MHz

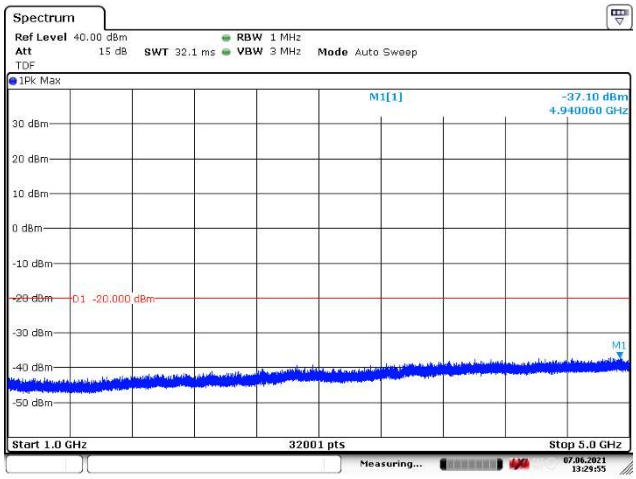

Figure 37: 1 – 5 GHz

TX 450.5 MHz, channel width 25 kHz

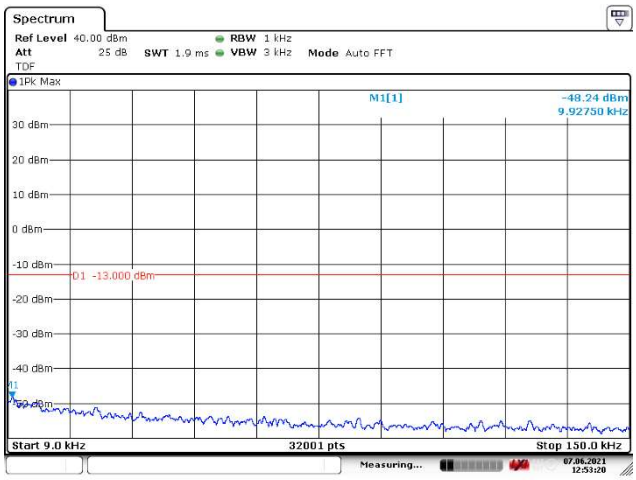

Figure 38: 9 – 150 kHz

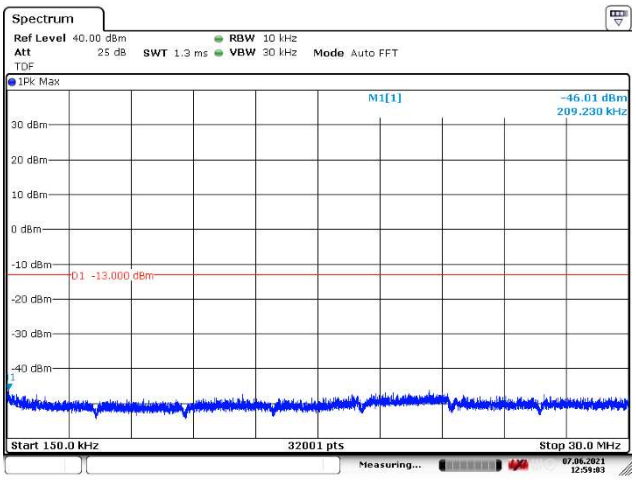

Figure 39: 150 kHz – 30 MHz

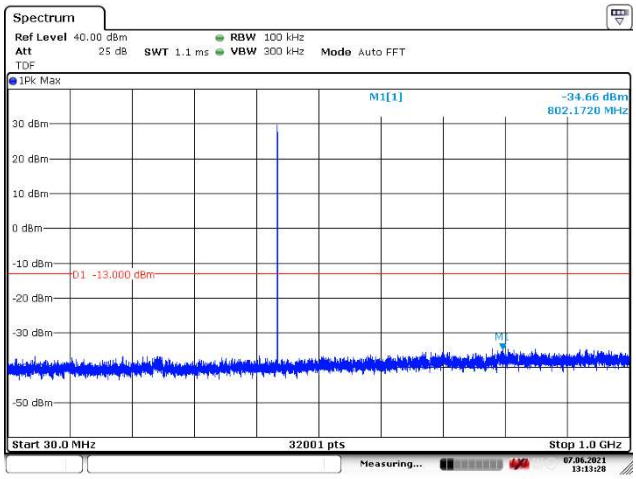

Figure 40: 30 – 1000 MHz

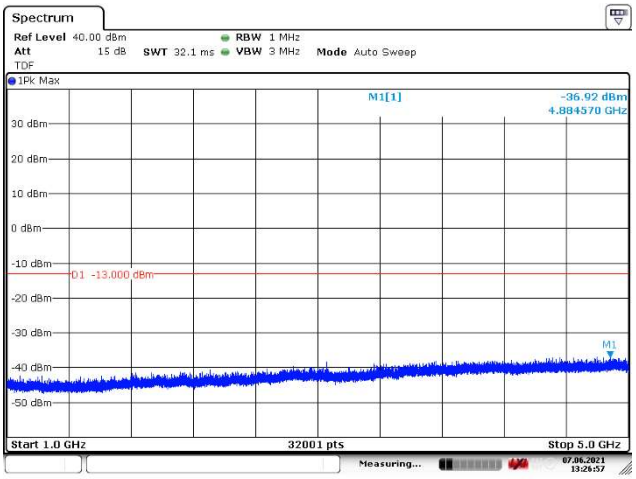

Figure 41: 1 – 5 GHz

TX 469.5 MHz, channel width 12.5 kHz

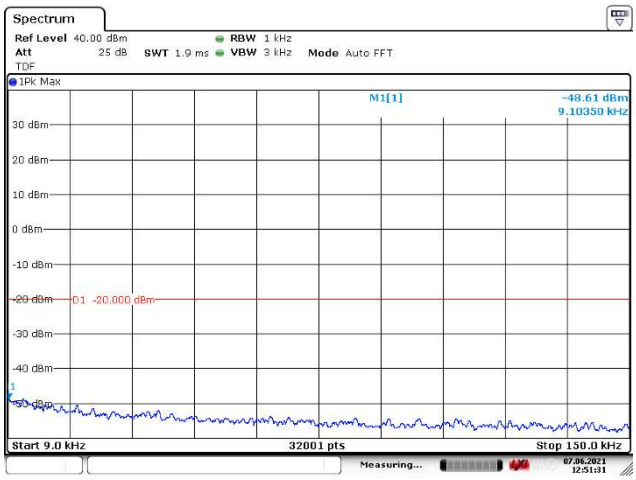

Figure 42: 9 – 150 kHz

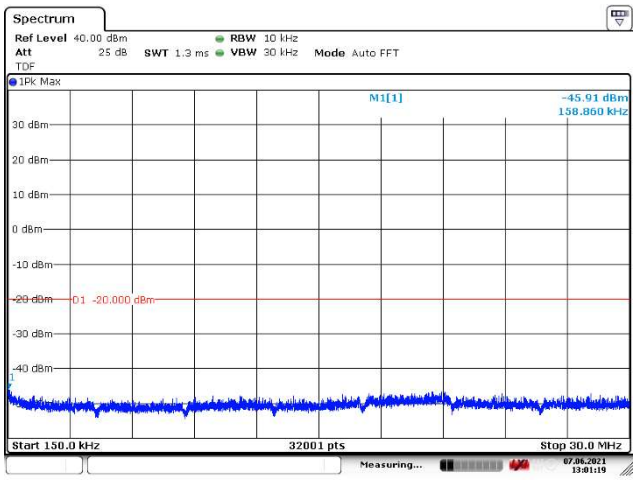

Figure 43: 150 kHz – 30 MHz

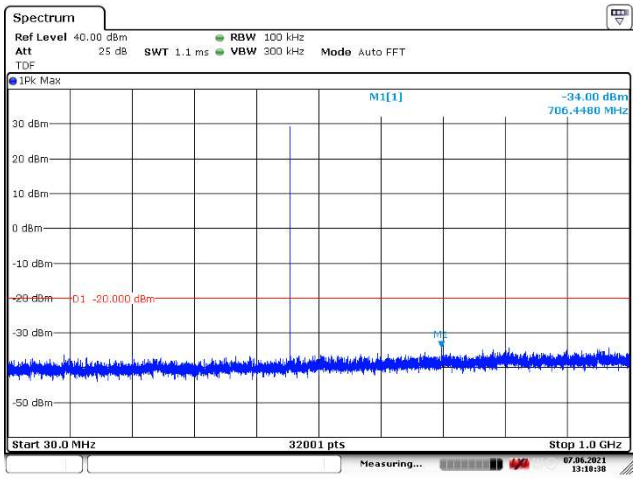

Figure 44: 30 – 1000 MHz

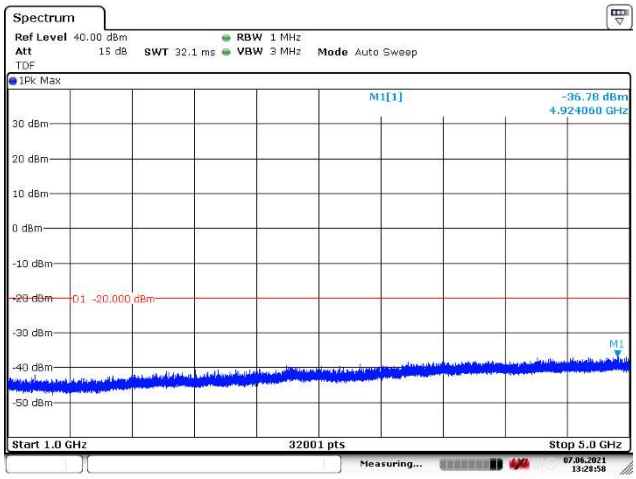

Figure 45: 1 – 5 GHz

TX 469.5 MHz, channel width 25 kHz

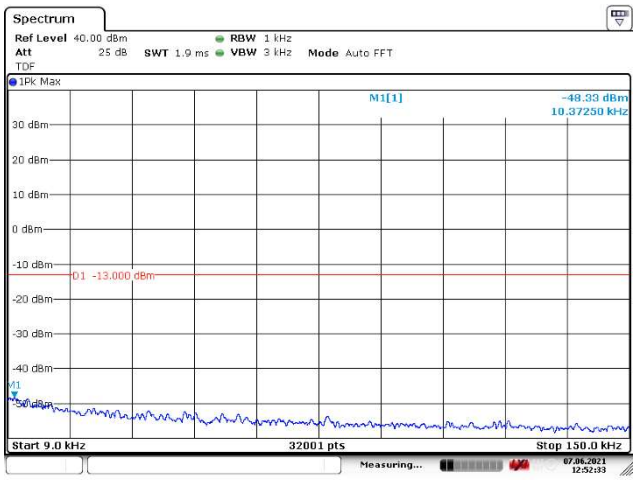

Figure 46: 9 – 150 kHz

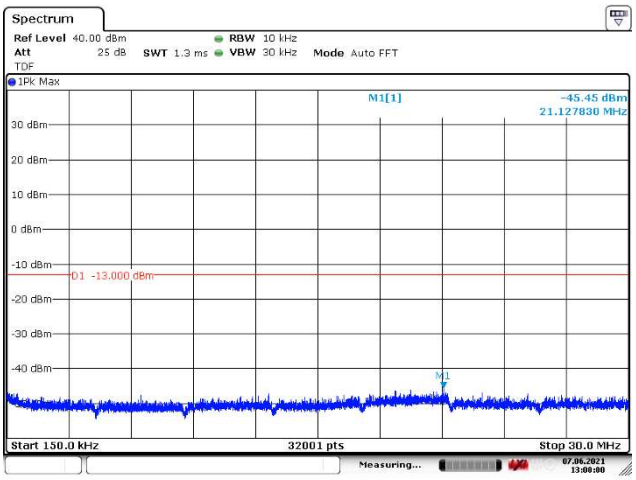

Figure 47: 150 kHz – 30 MHz

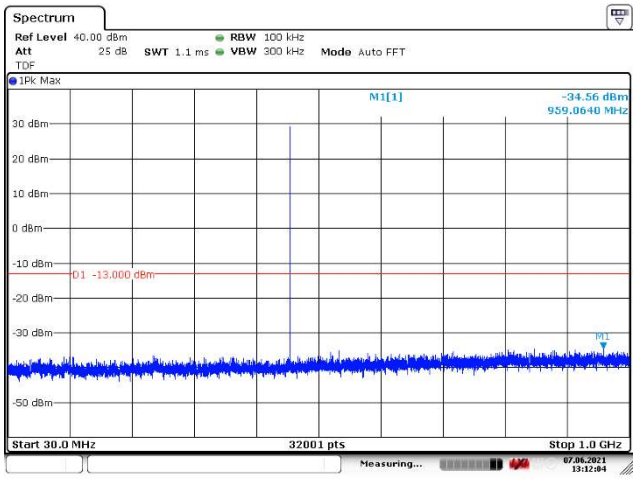

Figure 48: 30 – 1000 MHz

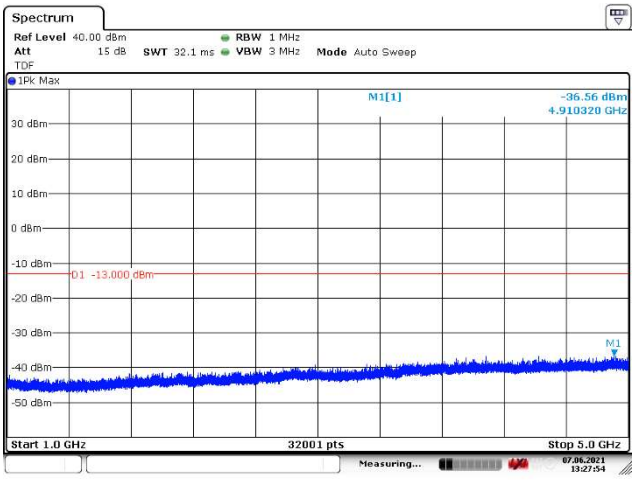

Figure 49: 1 – 5 GHz

Spurious emissions (radiated) 9 kHz – 5 GHz

Standard:	ANSI C63.26-2015	
Tested by:	HEM	
Date:	5 June 2021	5 June 2021
Temperature:	23 °C	23 °C
Humidity:	41 %RH	42 %RH
Barometric pressure:	1015 hPa	1012 hPa
Measurement uncertainty:	± 5.29 dB, level of confidence 95.45 % (k = 2)	
Test result:	**PASS**	

FCC Rule: §90.210

RSS-119 5.8

For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows: on any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth; at least 43 + 10 log (P) dB.

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows: on any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: at least 50 + 10 log (P) or 70 dB, whichever is the lesser attenuation.

Frequency Band (MHz)	Channel Bandwidth (kHz)	Authorized Bandwidth (kHz)	Limit (dBm)
406.1-430 and 450-470	12.5	11.25	-20
	25	20	-13

Test plan

The test was performed in a semi-anechoic chamber. The EUT was placed on a non-conductive table standing on a turntable. The distance between the EUT and the measurement antenna was 3 m. In order to find the maximum levels of the disturbance radiation the angle of the turntable, and the height of the measuring antenna were varied during the tests. The test was performed with the measurement antenna in both horizontal and vertical polarizations.

The EUT is tested in different combinations of channel bandwidth, TX frequency, and EUT orientation. If emissions near the limit are detected with any combination, other combinations are investigated as well. The antenna connector was terminated with a 50 Ω load.

Frequency	Channel	Channel width [kHz]	Orientation
9 kHz – 30 MHz	bottom	12.5	X
	middle 1	25	Y
	middle 2	12.5	Z
	top	25	X
30 – 1000 MHz	bottom	25	Y
	middle 1	12.5	Z
	middle 2	25	X
	top	12.5	Y
1 – 5 GHz	bottom	12.5	Z
	middle 1	25	X
	middle 2	12.5	Y
	top	25	Z

Test Results, 9 kHz – 30 MHz

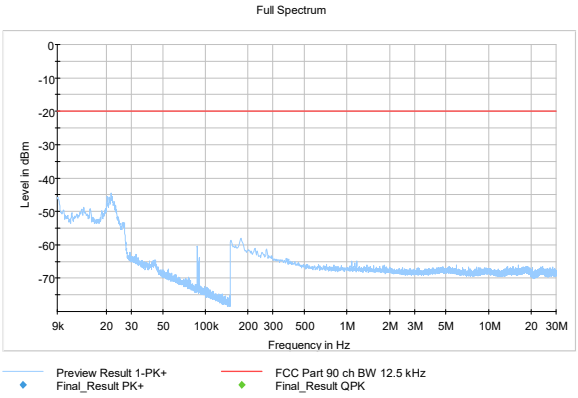

Figure 50: TX 410.0 MHz

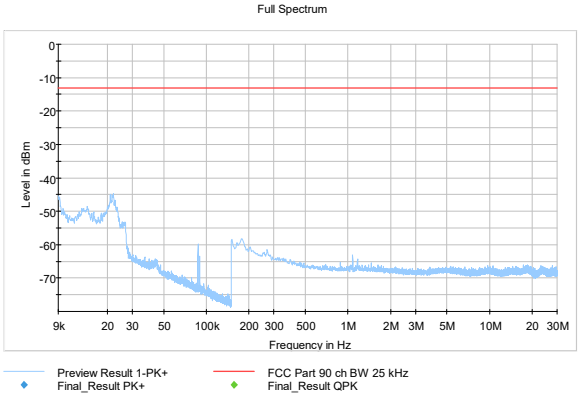

Figure 51: TX 429.5 MHz

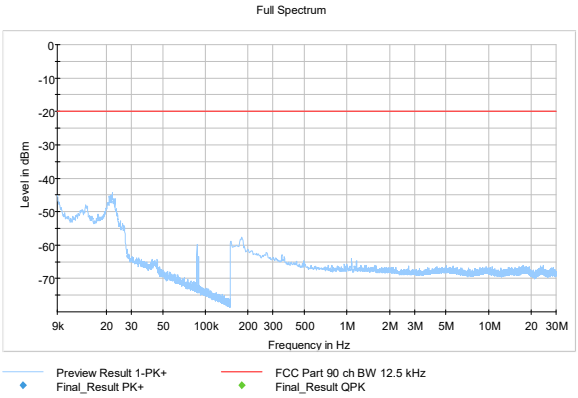

Figure 52: TX 450.5 MHz

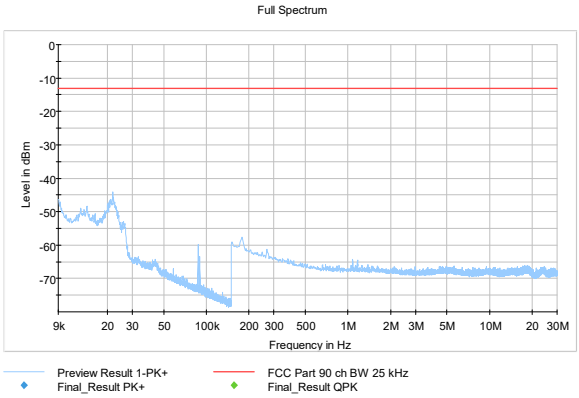

Figure 53: TX 469.5 MHz

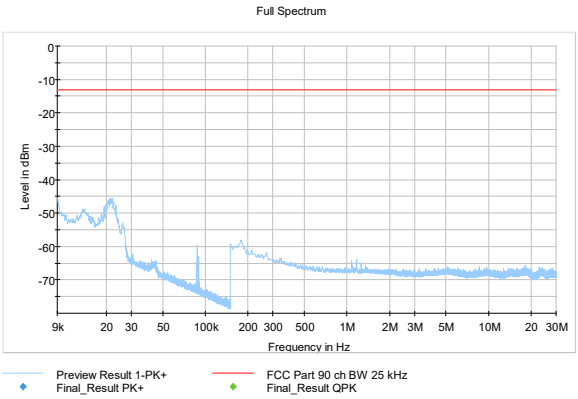

Figure 54: RX 469.5 MHz

Test Results, 30 – 1000 MHz

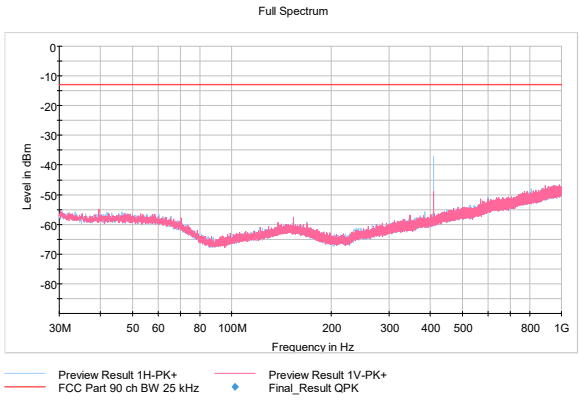

Figure 55: TX 410.0 MHz

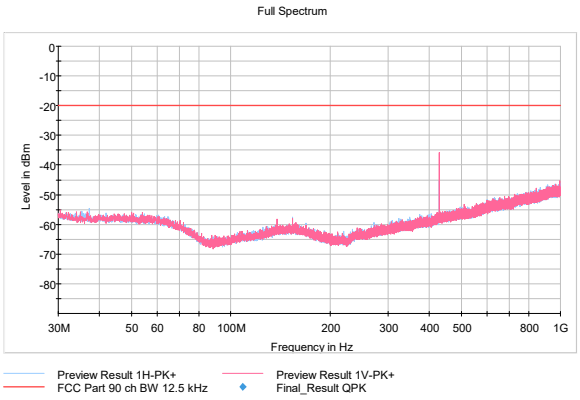

Figure 56: TX 429.5 MHz

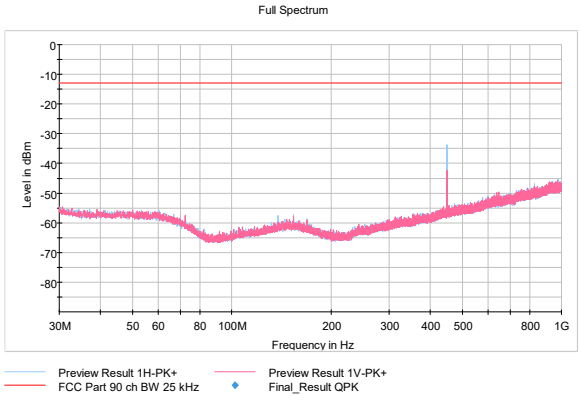

Figure 57: TX 450.5 MHz

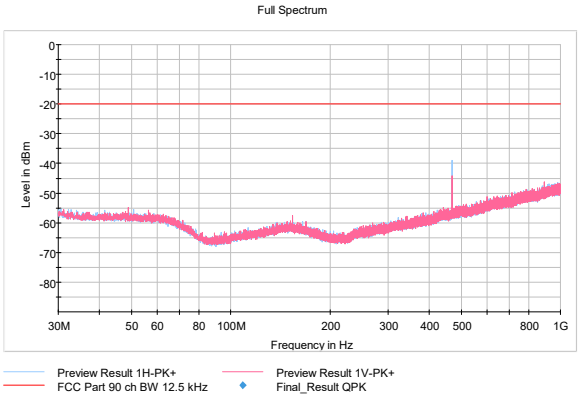

Figure 58: TX 469.5 MHz

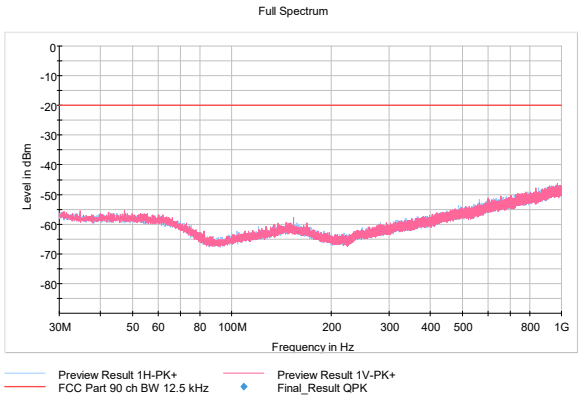

Figure 59: RX 469.5 MHz

Test Results, 1 – 5 GHz

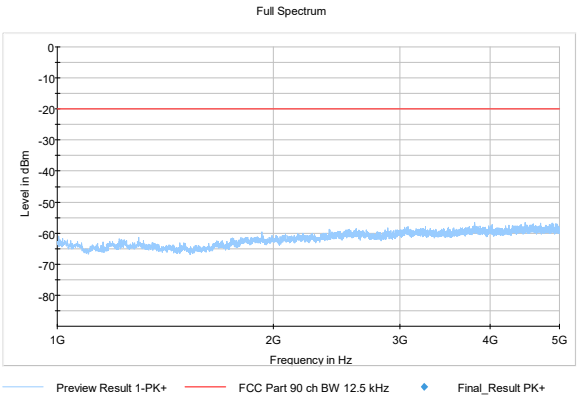

Figure 60: TX 410.0 MHz

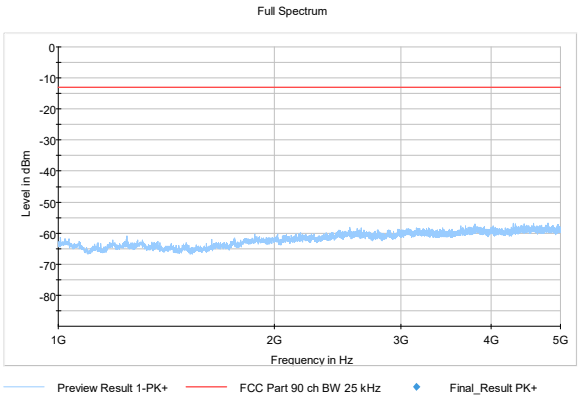

Figure 61: TX 429.5 MHz

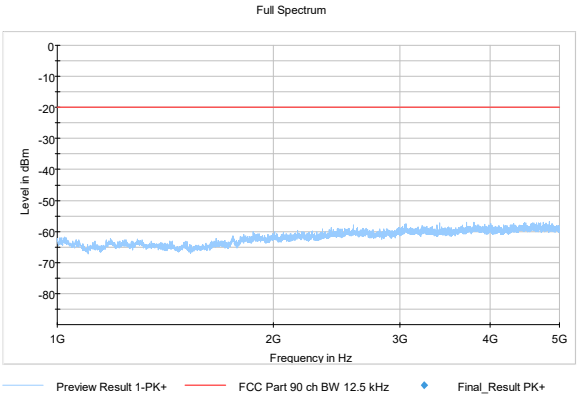

Figure 62: TX 450.5 MHz

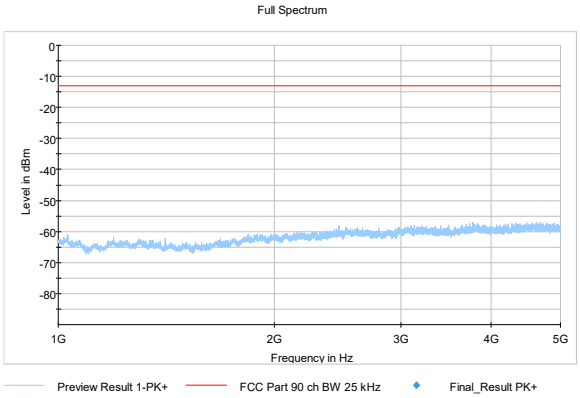

Figure 63: TX 469.5 MHz

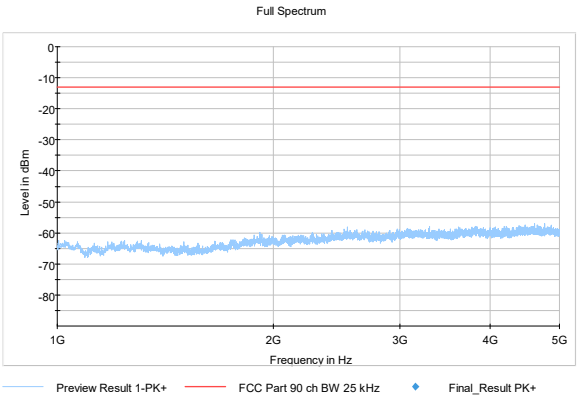

Figure 64: RX 469.5 MHz

Frequency stability

Standard:	ANSI C63.26-2015	
Tested by:	HEM	
Date:	4 June 2021	8 June 2021
Temperature:	21 °C	22 °C
Humidity:	42 %RH	52 %RH
Barometric pressure:	1021 hPa	1012 hPa
Measurement uncertainty:	± 0.470 dB, level of confidence 95.45 % (k = 2)	
Test result:	**PASS**	

FCC Rule: §90.213

RSS-119 5.3

Frequency stability is a measure of drift due to temperature and supply voltage variations, with reference to the frequency measured at an appropriate reference temperature and the rated supply voltage. The carrier frequency shall not depart from the nominal frequency in excess of the values specified for the equipment's frequency band:

Frequency Band (MHz)	Channel Bandwidth (kHz)	Frequency Stability (ppm)
406.1-430 and 450-470	12.5	± 2.5
	25.0	± 5

The test was performed with unmodulated carrier at maximum power level.

Test results, channel width 12.5 kHz

Table 7: Frequency stability (normal temperature)

Test Conditions		Frequency (MHz)		Deviation from Nominal (ppm)	Result
Temperature (°C)	Voltage (V)	Nominal	Measured		
+20	3.8	410.0	409.999725950	-0.668	PASS
		469.5	469.500124370	0.265	PASS
	4.6	410.0	409.999839380	-0.392	PASS
		469.5	469.500123430	0.263	PASS
	5.5	410.0	409.999835320	-0.402	PASS
		469.5	469.500122180	0.260	PASS

Table 8: Frequency stability (extreme temperature, input voltage 4.6 V)

Temperature (°C)	Frequency (MHz)		Deviation from Nominal (ppm)	Result
	Nominal	Measured		
-30	410.0	409.999860940	-0.339	PASS
	469.5	469.500247800	0.528	PASS
-20	410.0	409.999900000	-0.244	PASS
	469.5	469.500241550	0.514	PASS
-10	410.0	409.999890000	-0.268	PASS
	469.5	469.500193120	0.411	PASS
0	410.0	409.999895000	-0.256	PASS
	469.5	469.500190930	0.407	PASS
+10	410.0	409.999883130	-0.285	PASS
	469.5	469.500162810	0.347	PASS
+20	410.0	409.999839380	-0.392	PASS
	469.5	469.500123430	0.263	PASS
+30	410.0	409.999845630	-0.377	PASS
	469.5	469.500111870	0.238	PASS
+40	410.0	409.999859070	-0.344	PASS
	469.5	469.500106250	0.226	PASS
+50	410.0	409.999976560	-0.057	PASS
	469.5	469.500079060	0.168	PASS
+60	410.0	409.999968440	-0.077	PASS
	469.5	469.500077810	0.166	PASS

Test results, channel width 25 kHz

Table 9: Frequency stability (normal temperature)

Test Conditions		Frequency (MHz)		Deviation from Nominal (ppm)	Result
Temperature (°C)	Voltage (V)	Nominal	Measured		
+20	3.8	410.0	409.999718130	-0.687	PASS
		469.5	469.500121870	0.260	PASS
	4.6	410.0	409.999832820	-0.408	PASS
		469.5	469.500145930	0.311	PASS
	5.5	410.0	409.999835320	-0.402	PASS
		469.5	469.500132500	0.282	PASS

Table 10: Frequency stability (extreme temperature, input voltage 4.6 V)

Temperature (°C)	Frequency (MHz)		Deviation from Nominal (ppm)	Result
	Nominal	Measured		
-30	410.0	409.999879070	-0.295	PASS
	469.5	469.500263120	0.560	PASS
-20	410.0	409.999908750	-0.223	PASS
	469.5	469.500241240	0.514	PASS
-10	410.0	409.999890630	-0.267	PASS
	469.5	469.500194990	0.415	PASS
0	410.0	409.999894690	-0.257	PASS
	469.5	469.500207180	0.441	PASS
+10	410.0	409.999846570	-0.374	PASS
	469.5	469.500150310	0.320	PASS
+20	410.0	409.999832820	-0.408	PASS
	469.5	469.500145930	0.311	PASS
+30	410.0	409.999831880	-0.410	PASS
	469.5	469.500112810	0.240	PASS
+40	410.0	409.999865940	-0.327	PASS
	469.5	469.500105930	0.226	PASS
+50	410.0	409.999861570	-0.338	PASS
	469.5	469.500085930	0.183	PASS
+60	410.0	409.999972190	-0.068	PASS
	469.5	469.500091870	0.196	PASS

Transient frequency behaviour

Standard:	ANSI C63.26-2015
Tested by:	HEM
Date:	4 June 2021
Temperature:	21 °C
Humidity:	42 %RH
Barometric pressure:	1021 hPa
Test result:	**PASS**

FCC Rule: §90.214
RSS-119 5.9

When a transmitter is turned on or off, the radio frequency may take some time to stabilize. During this initial period, the frequency error or frequency difference (i.e., between the instantaneous and the steady state frequencies) shall not exceed the limits specified for the equipment's frequency band and channel bandwidth:

Channel Bandwidth (kHz)	Time Intervals	Maximum Frequency Difference (kHz)	Transient Duration Limit (ms)
12.5	t_1	±12.5	10
	t_2	±6.25	25
	t_3	±12.5	10
25	t_1	±25	10
	t_2	±12.5	25
	t_3	±25	10

- t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing
- t_1 is the time period immediately following t_{on}
- t_2 is the time period immediately following t_1
- t_3 is the time period from the instant when the transmitter is turned off until t_{off}
- t_{off} is the instant when the 1 kHz test signal starts to rise

The test was performed with unmodulated carrier at maximum power level.

Transmitter OFF to ON (12.5 kHz channel bandwidth)

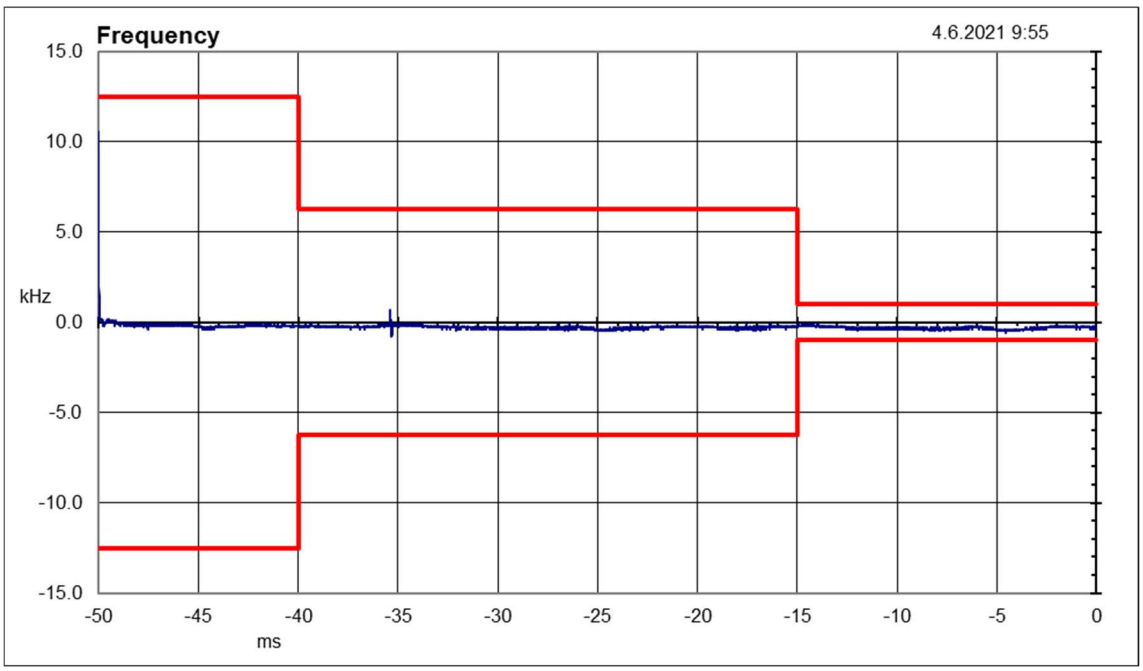

Figure 65: 410.0 MHz

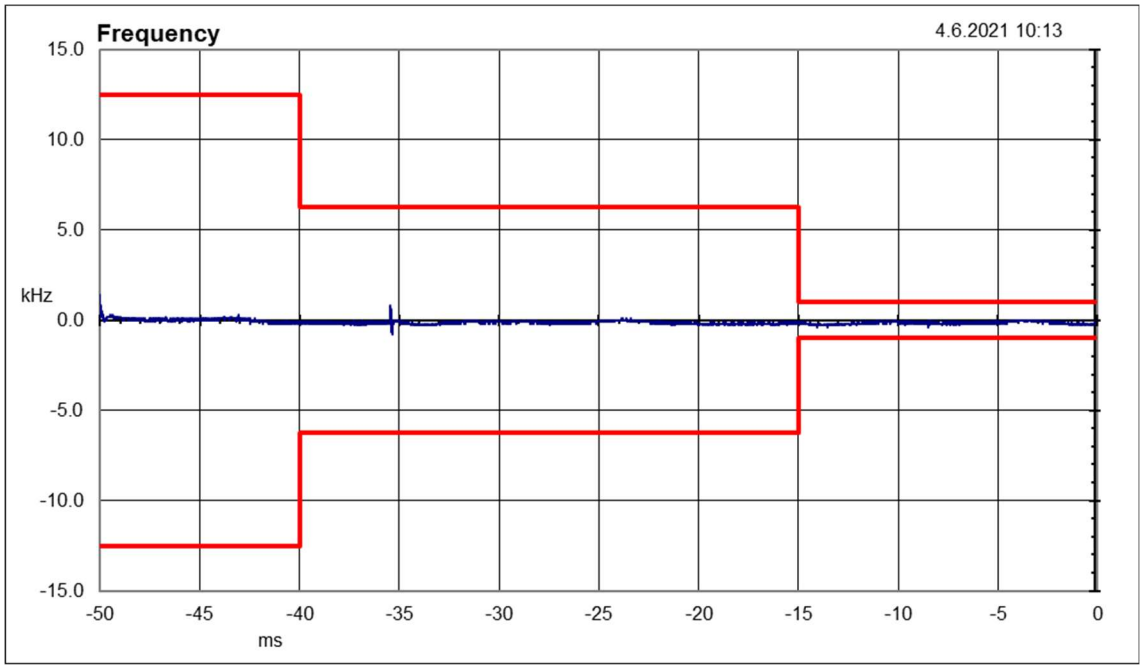

Figure 66: 429.5 MHz

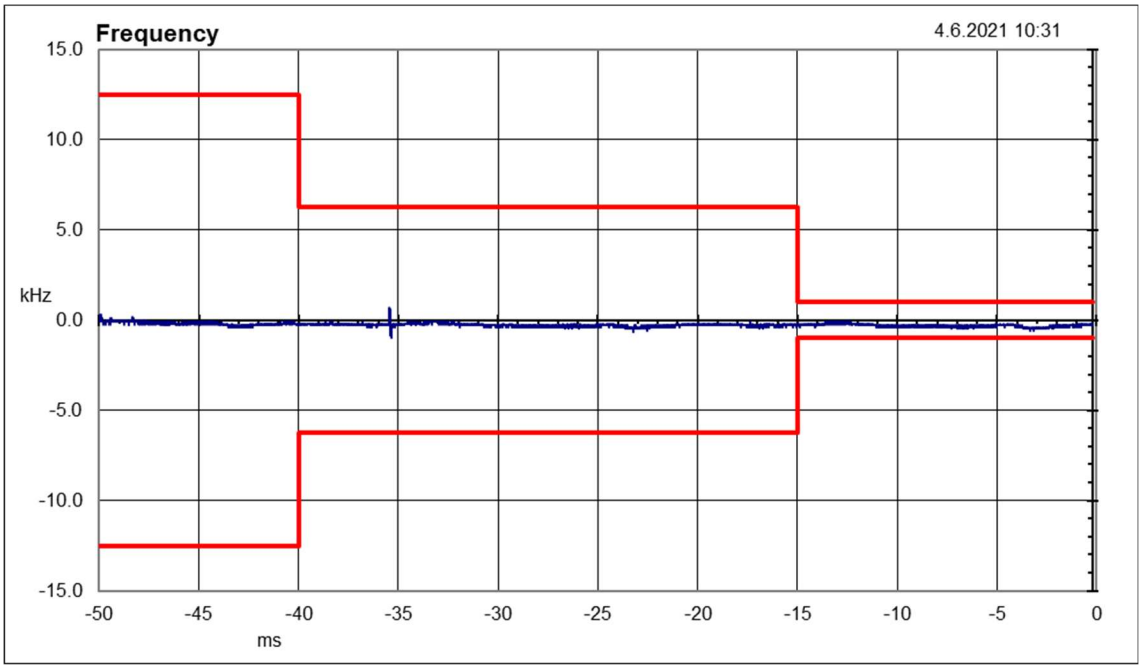

Figure 67: 450.5 MHz

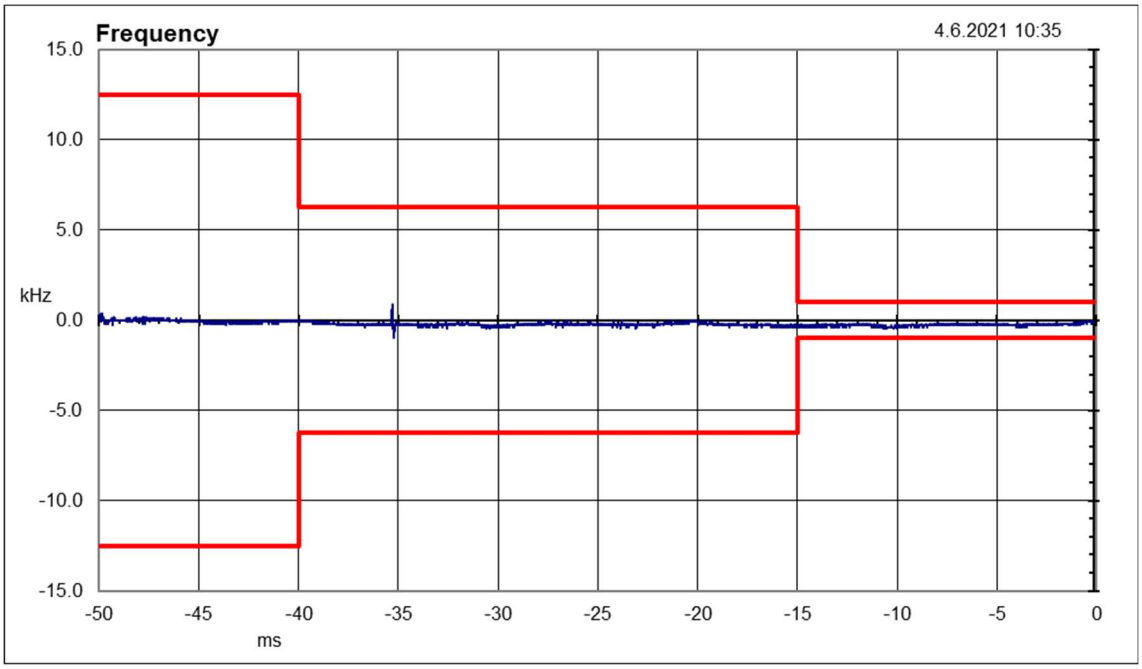

Figure 68: 469.5 MHz

Transmitter OFF to ON (25 kHz channel bandwidth)

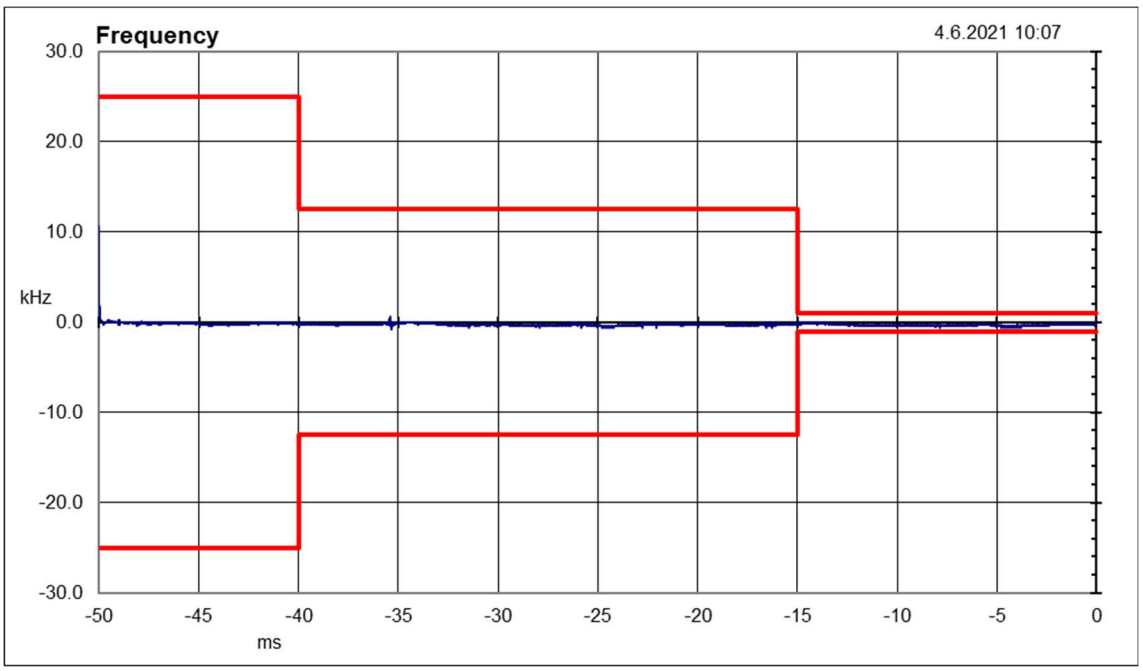

Figure 69: 410.0 MHz

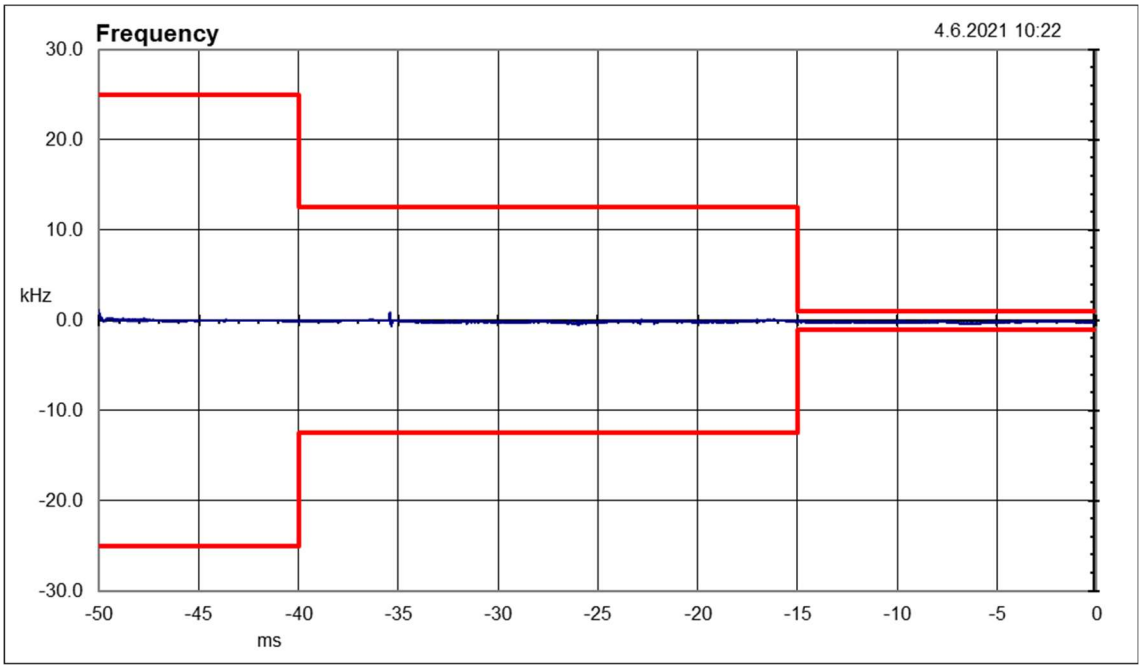

Figure 70: 429.5 MHz

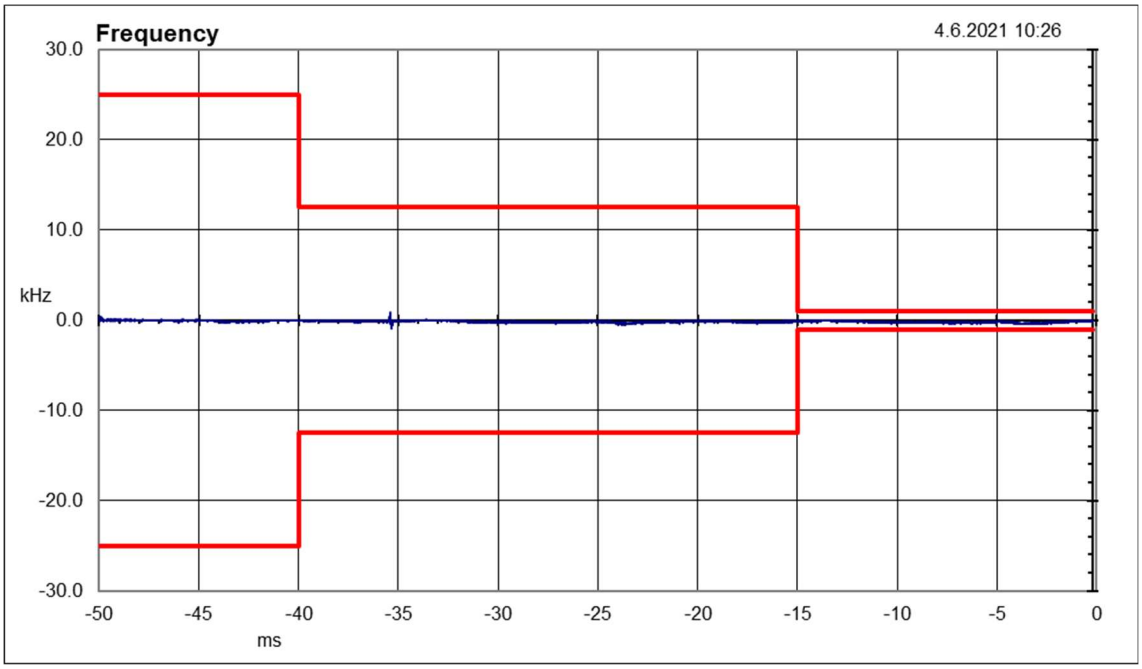

Figure 71: 450.5 MHz

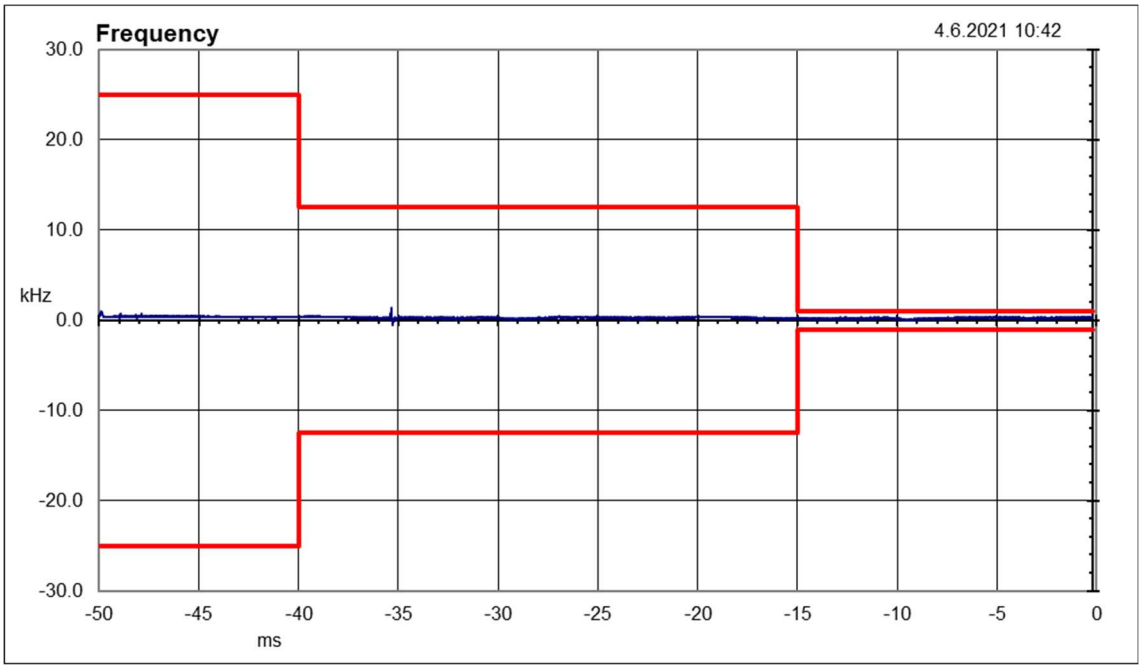

Figure 72: 469.5 MHz

Transmitter ON to OFF (12.5 kHz channel bandwidth)

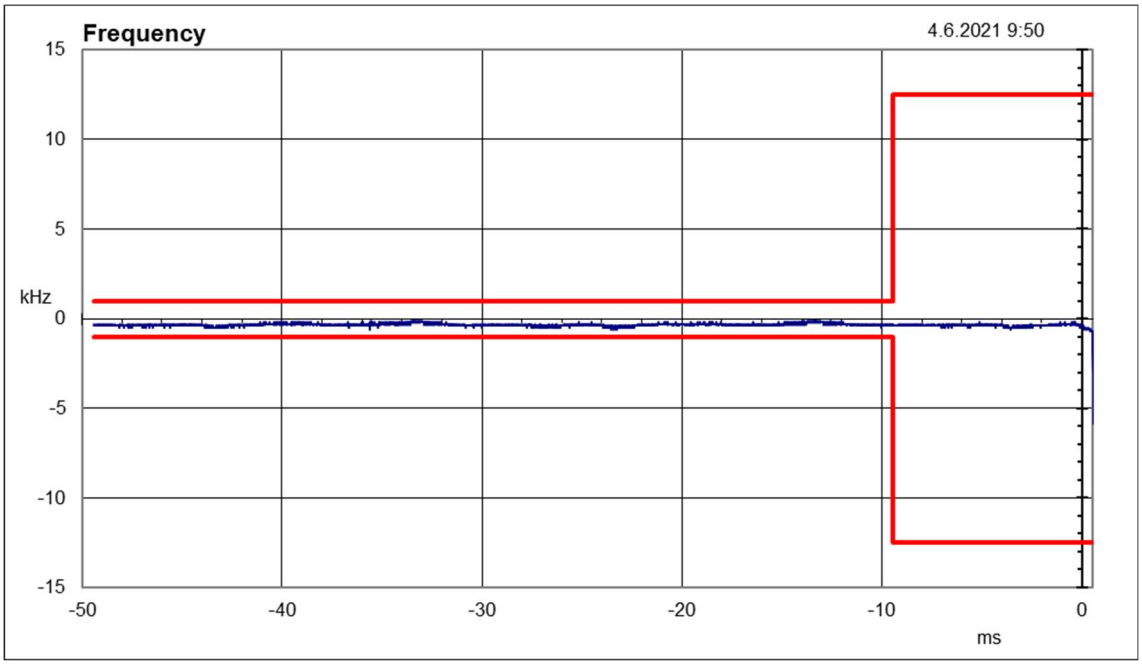

Figure 73: 410.0 MHz

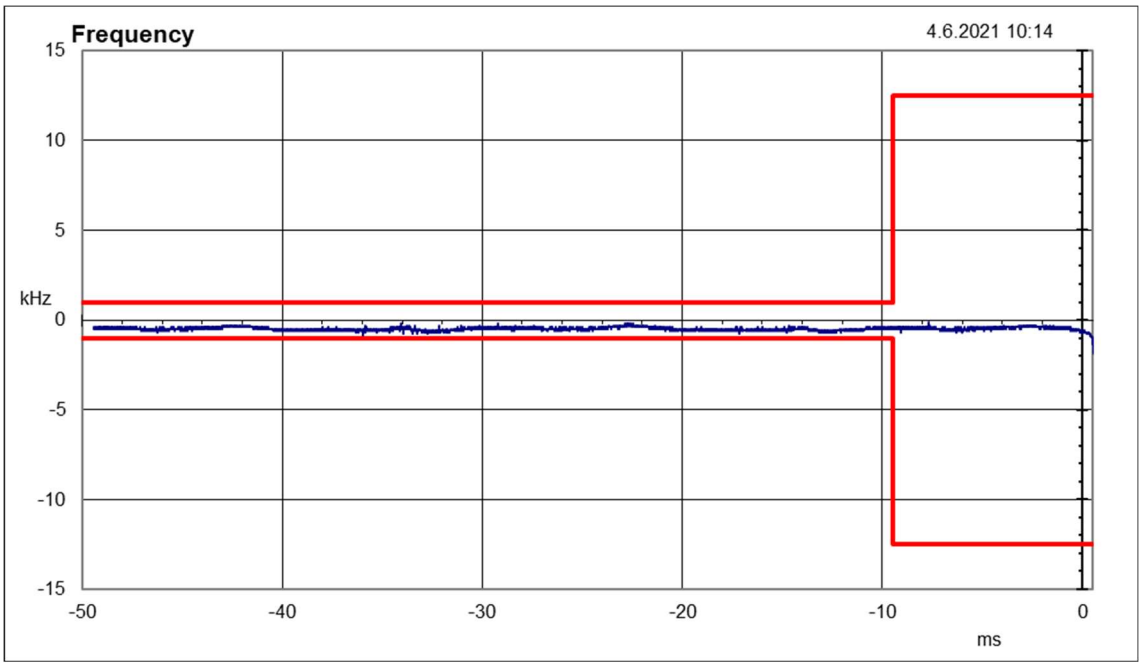

Figure 74: 429.5 MHz

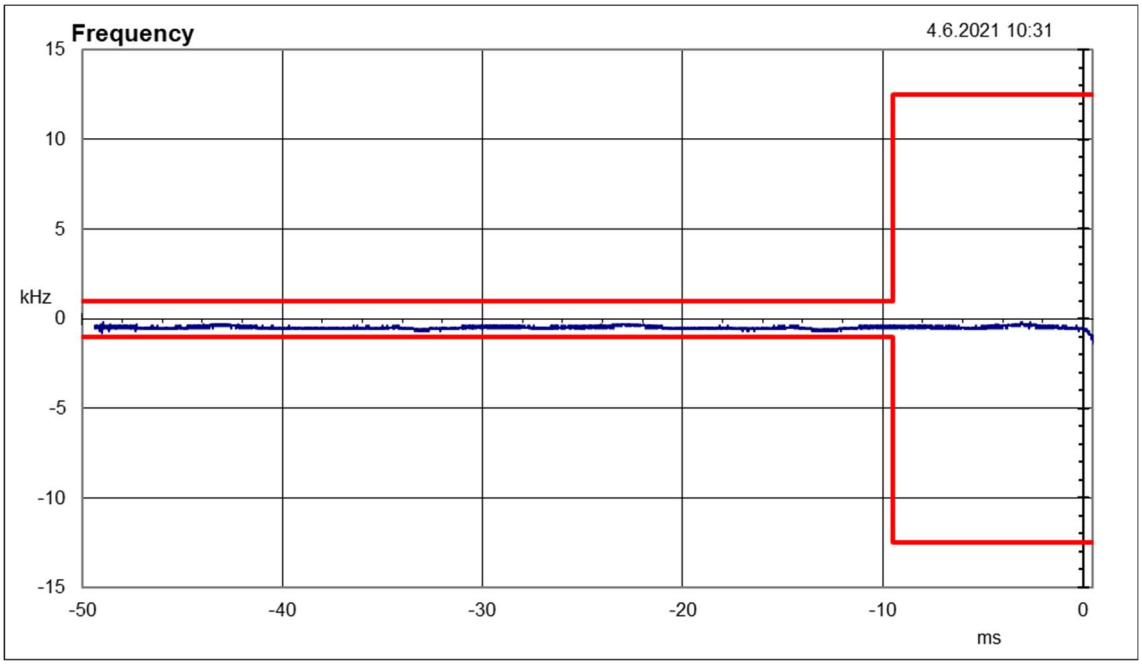

Figure 75: 450.5 MHz

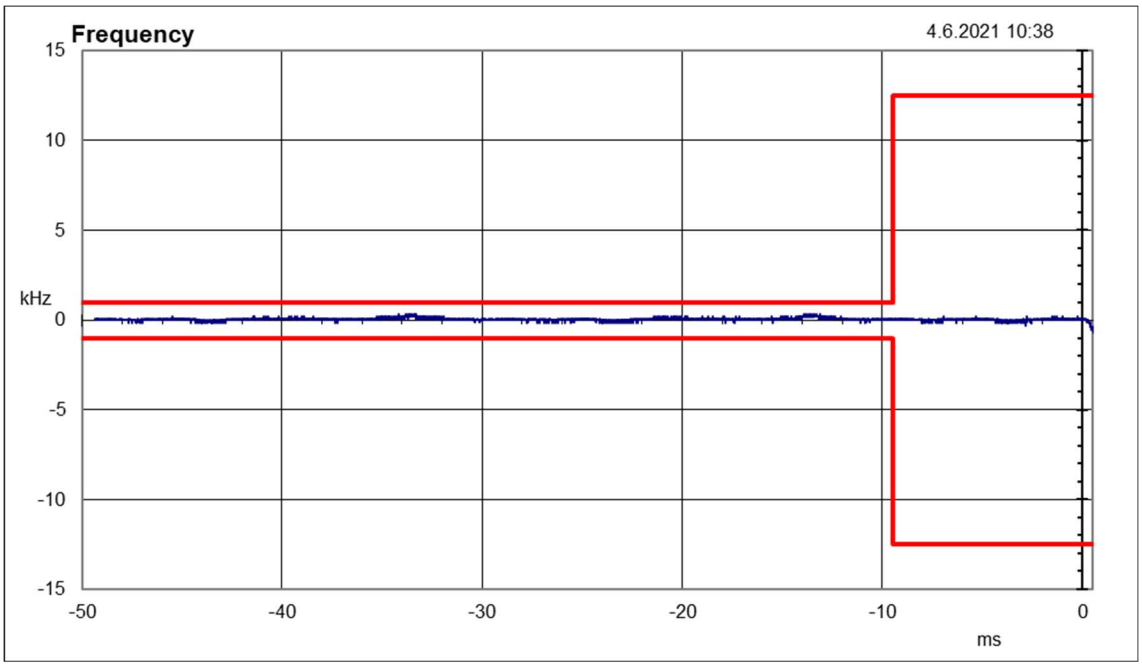

Figure 76: 469.5 MHz

Transmitter ON to OFF (25 kHz channel bandwidth)

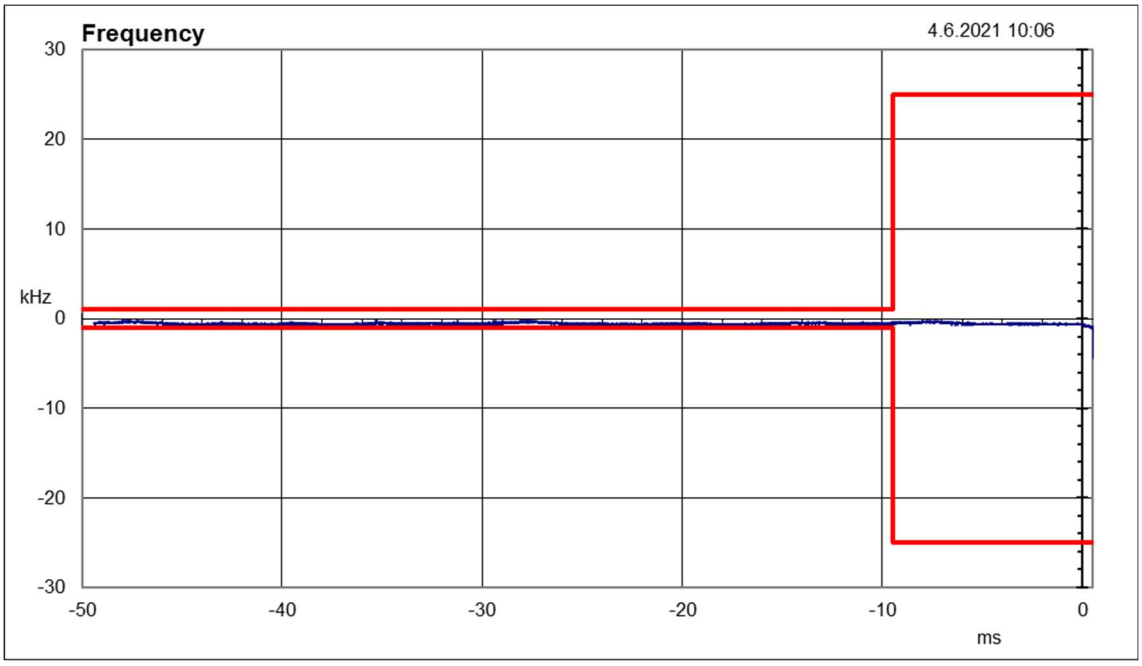

Figure 77: 410.0 MHz

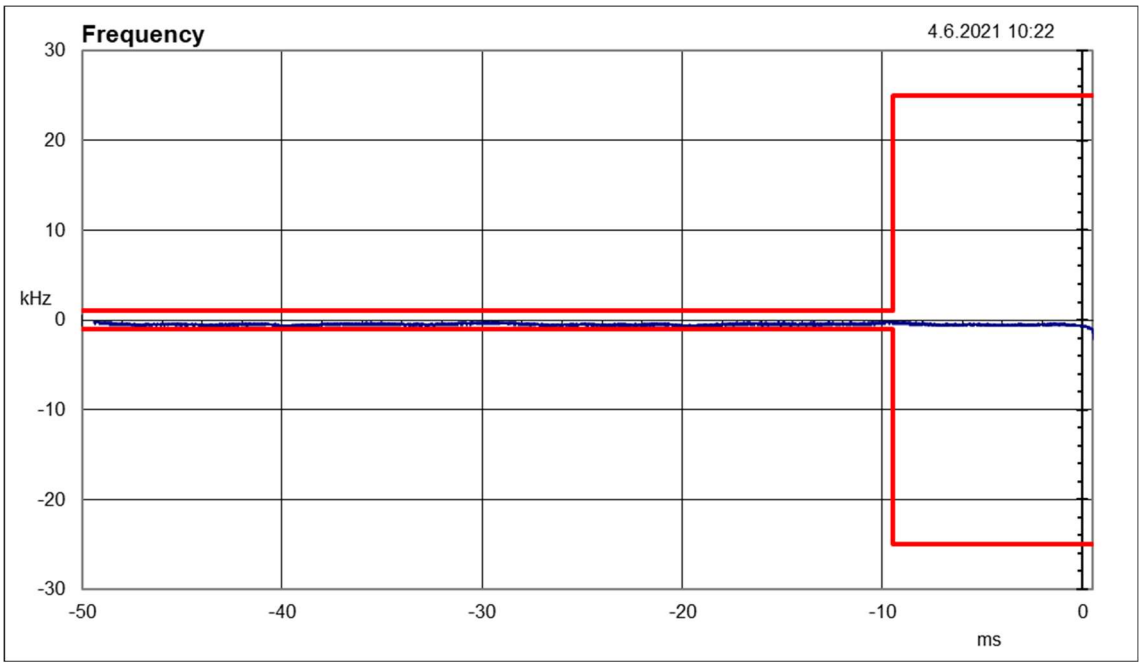

Figure 78: 429.5 MHz

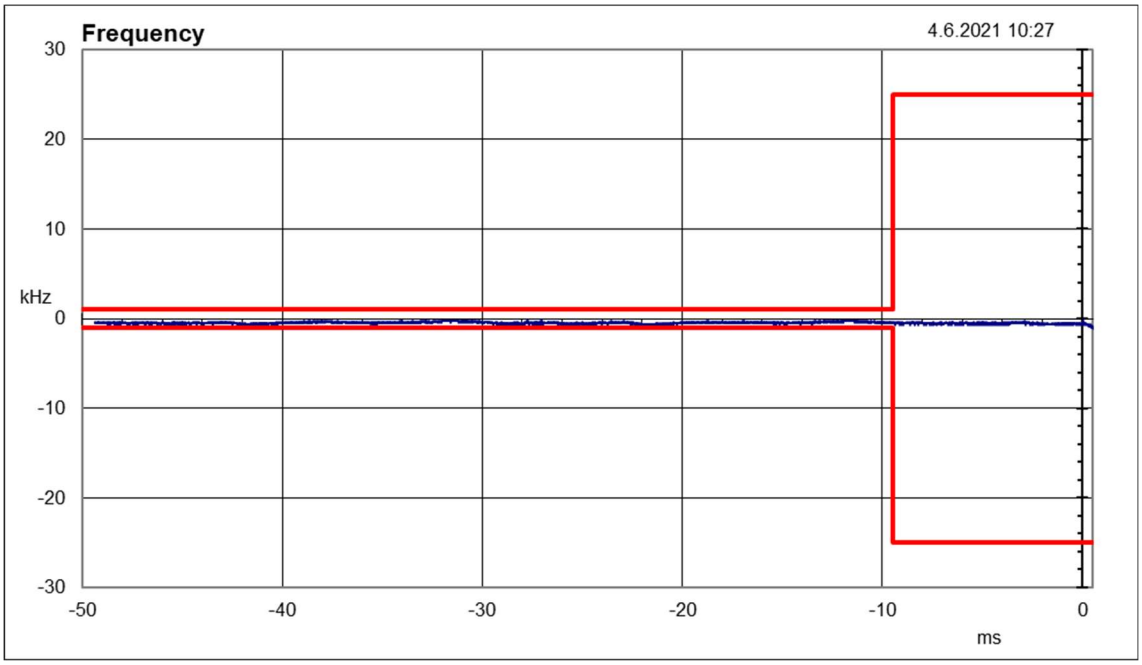

Figure 79: 450.5 MHz

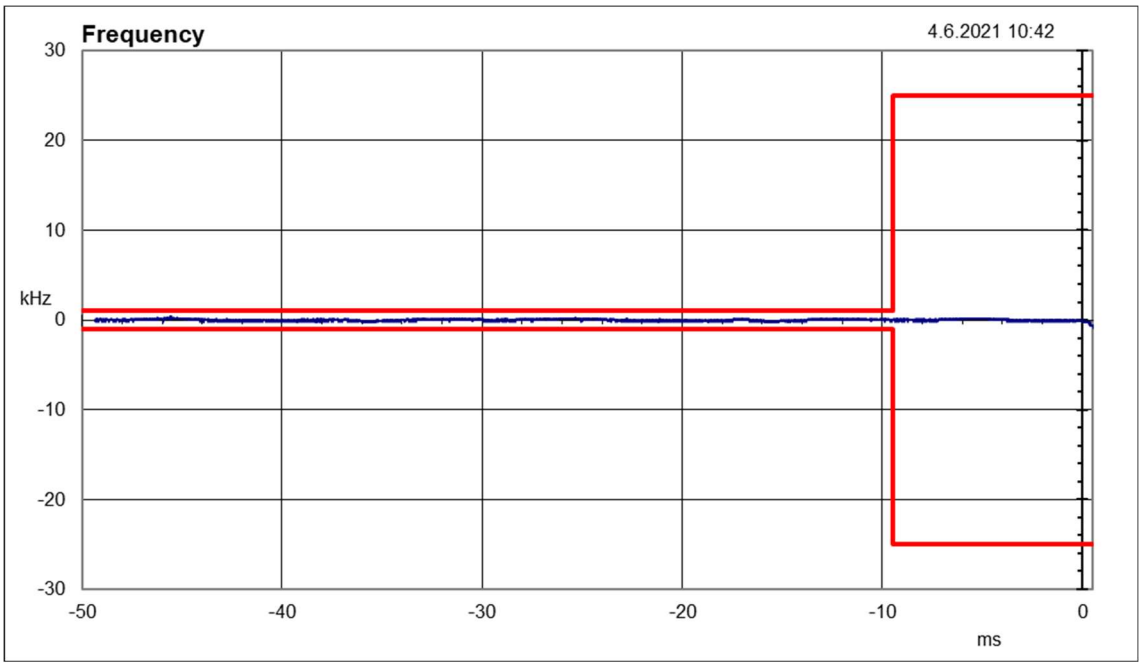

Figure 80: 469.5 MHz

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	NARDA	757 C – 20 dB	inv. 9493	2021-01-25	2023-01-25
ATTENUATOR	PASTERNACK	PE 7004-4 (4Db)	inv. 10126	2021-03-26	2022-03-26
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv. 10679	2020-07-20	2021-07-20
FILTER	WAINWRIGHT	WHKX1.0/15G-10SS	inv. 8267	2021-01-29	2023-01-29
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv. 10183	NCR	NCR
POWER SUPPLY	THANDAR	TS3021	inv. 3484	NCR	NCR
RF PREAMPLIFIER	CIAO	CA118-3123	inv. 10278	2020-10-09	2021-10-09
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSV40	inv. 9093	2020-12-04	2021-12-04
TEMPERATURE/ HUMIDITY SENSOR	EDS	OW-ENV-TH, K5 SAC	inv. 10517	2020-11-11	2021-11-11
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
TURNTABLE	MATURO	DS430 UPGRADED	inv. 10182	NCR	NCR

NCR = No Calibration Required

END OF TEST REPORT