Test Report

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

Equipment Under Test:	Radio module
Model:	TR400900
Type:	UHF Radio Module
Manufacturer:	Trimble Inc. 4450 Gibson Drive Tipp City, Ohio 45371 United States
Customer:	Trimble Inc. 4450 Gibson Drive Tipp City, Ohio 45371 United States
FCC Rule Part:	15.247: 2019
IC Rule Part:	RSS-247, Issue 2, 2017 RSS-GEN Issue 5 Amendment 1, 2019
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:	21 February 2022	Date:	21 February 2022
Issued by:		Checked by:	
	Henri Mäki Testing Engineer		Pekka Kälviäinen Testing Engineer

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GENERAL REMARKS

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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	29 April 2021
1.1	The following sections were updated: • Peripherals • EUT Test Conditions • Unwanted emissions (radiated) results	21 February 2022

PRODUCT DESCRIPTION

Equipment Under Test

Trade mark:	Trimble
Model:	TR400900
Type:	UHF Radio Module
Serial no:	2024000279
FCC ID:	S9E123130
IC:	5817A-123130

General Description

The equipment under test is a dual-band radio module using 410-475 MHz / 902-928 MHz bands. Only one of the bands can be operated at a time. This test report contains the results for 900 MHz radio. The results for 400 MHz radio are presented in Test Report HELEM2103000053-7.

Classification

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

Modifications Incorporated in the EUT

Some modifications were implemented on the 400 MHz radio of the module. More details about the modifications are presented in the Test Report HELEM2103000053-7.

Ports and cables

Cable / Port	Description
Serial port RS232	Device configuration and data communication. Unshielded
DC input port	9 – 16 VDC (12 V used during testing)
Antenna port	50Ω TNC (female)

Specifications

Frequency range:	902 – 928 MHz
Channels:	50
Channel separation:	510 kHz
Transmission technique:	FHSS
Modulation:	BPSK
Power supply:	3.8 – 4.4 VDC (tested with 4.1 V regulated by the evaluation board)

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.
Laptop charger	HP HSTNN-LA40. Used during AC power-line conducted emissions test.
AC/DC adapter	XP Power VER12US120-JA. 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
KDB Publication 558074 D02	Duty Cycle	-
§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 during Testing

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_Mikimoto_UI_V032_10062020.exe”). During the tests the EUT was mounted on an evaluation kit provided by the manufacturer (model M3-TR3 Evaluation kit). The radiated tests were performed with two different reference antennas provided by the customer.

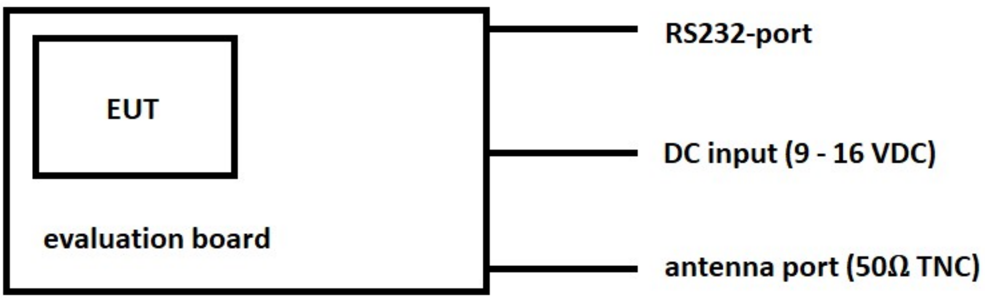

Figure 1: Test setup block diagram

Table 1: Test frequencies

Channel	Frequency (MHz)
LOW	902.621429
MID	914.850000
HIGH	927.588095

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: 7 July 2020

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:	16 July 2020	
Temperature:	23 °C	
Humidity:	45 %RH	
Barometric pressure:	1007 hPa	
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 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 and laptop charger. The radio was set to hopping mode during the test.

Test results

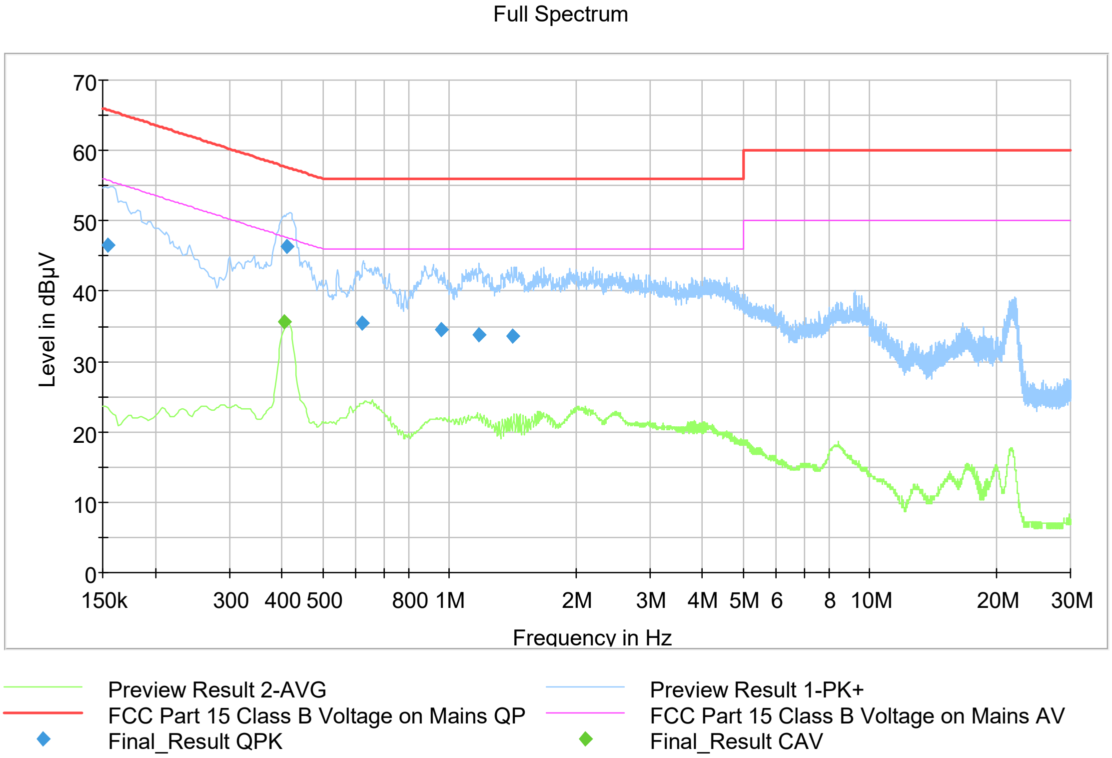

Figure 2: The measured curves with peak- and average detector (AC/DC adapter)

Table 2: Final QuasiPeak measurements from the worst frequencies (AC/DC adapter)

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.154000	46.50	65.78	19.28	1000.0	9.000	N	9.6
0.411000	46.29	57.63	11.34	1000.0	9.000	L1	9.7
0.619750	35.42	56.00	20.58	1000.0	9.000	L1	9.7
0.960250	34.50	56.00	21.50	1000.0	9.000	L1	9.8
1.176750	33.71	56.00	22.29	1000.0	9.000	L1	9.8
1.416750	33.60	56.00	22.40	1000.0	9.000	L1	9.8

Table 3: Final Average measurements from the worst frequencies (AC/DC adapter)

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.406500	35.61	47.72	12.11	1000.0	9.000	L1	9.7

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

Full Spectrum

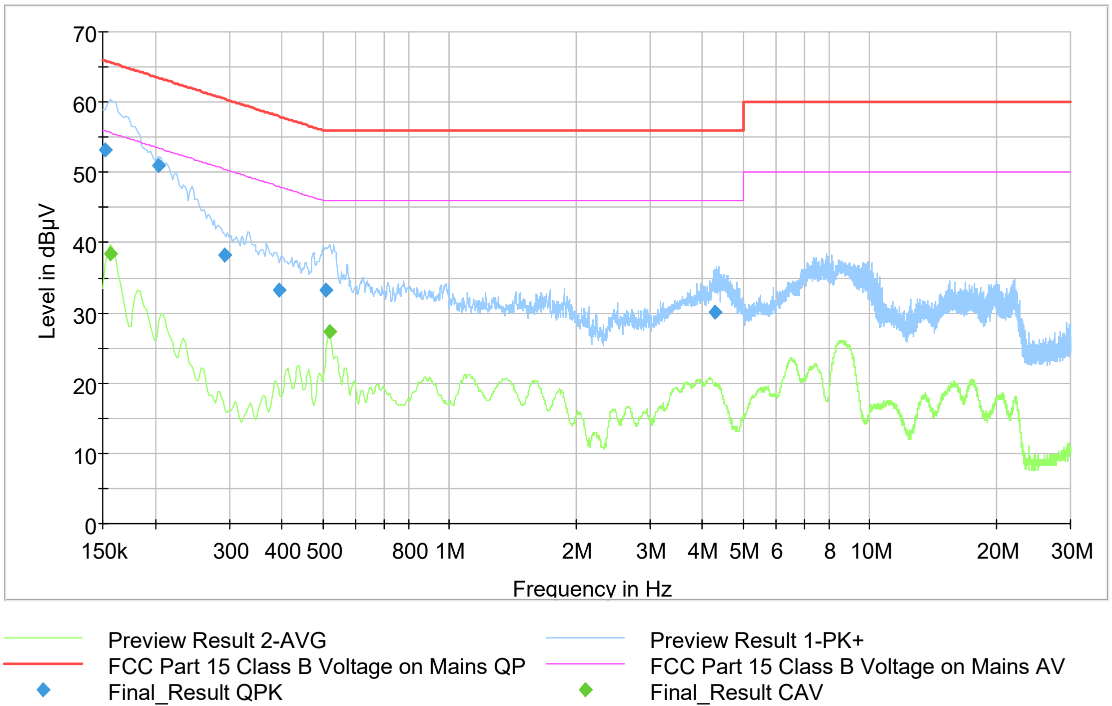

Figure 3: The measured curves with peak- and average detector (laptop charger)

Table 4: Final QuasiPeak measurements from the worst frequencies (laptop charger)

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.152250	53.14	65.88	12.74	1000.0	9.000	L1	GND	10.0
0.204000	50.95	63.45	12.50	1000.0	9.000	L1	GND	10.0
0.291750	38.32	60.47	22.15	1000.0	9.000	L1	GND	10.0
0.393000	33.21	58.00	24.79	1000.0	9.000	N	GND	10.0
0.507750	33.19	56.00	22.81	1000.0	9.000	N	GND	10.0
4.287250	30.17	56.00	25.83	1000.0	9.000	L1	GND	10.4

Table 5: Final Average measurements from the worst frequencies (laptop charger)

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.156750	38.50	55.63	17.13	1000.0	9.000	N	GND	10.0
0.519000	27.32	46.00	18.68	1000.0	9.000	L1	GND	10.1

The correction factor in the final result table contains the sum of the transducers (transient limiter + 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:	8 July 2020	
Temperature:	22 °C	
Humidity:	48 %RH	

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

Test results

Table 6: 20 dB bandwidth test results

Channel	20 dB BW [kHz]
LOW	182.322
MID	185.025
HIGH	184.619

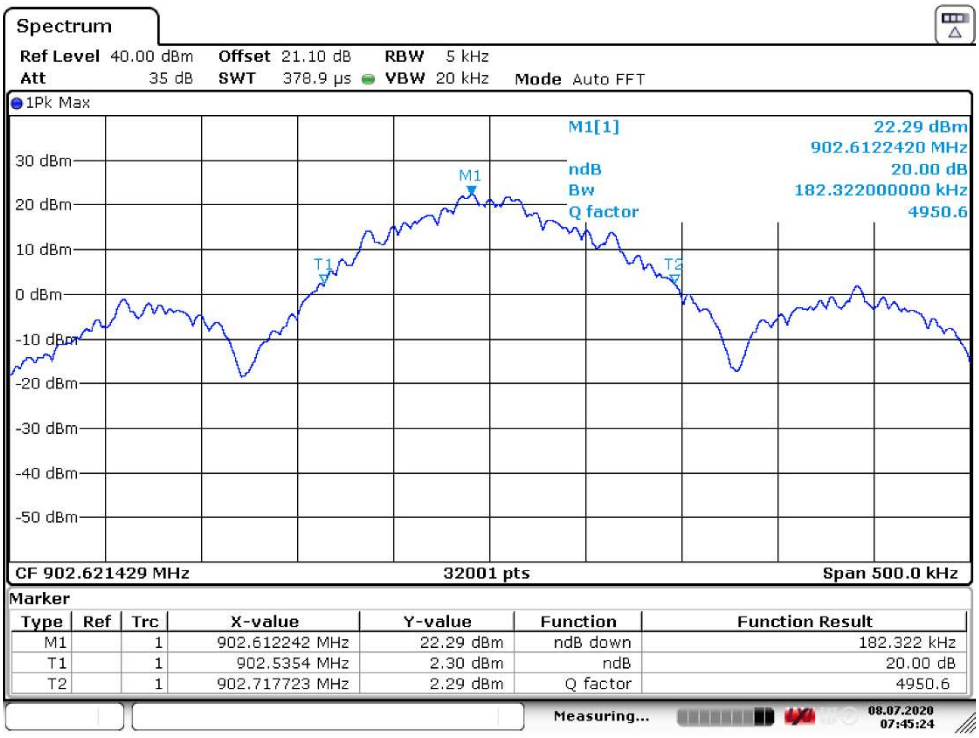

Figure 4: 20 dB channel BW, channel LOW

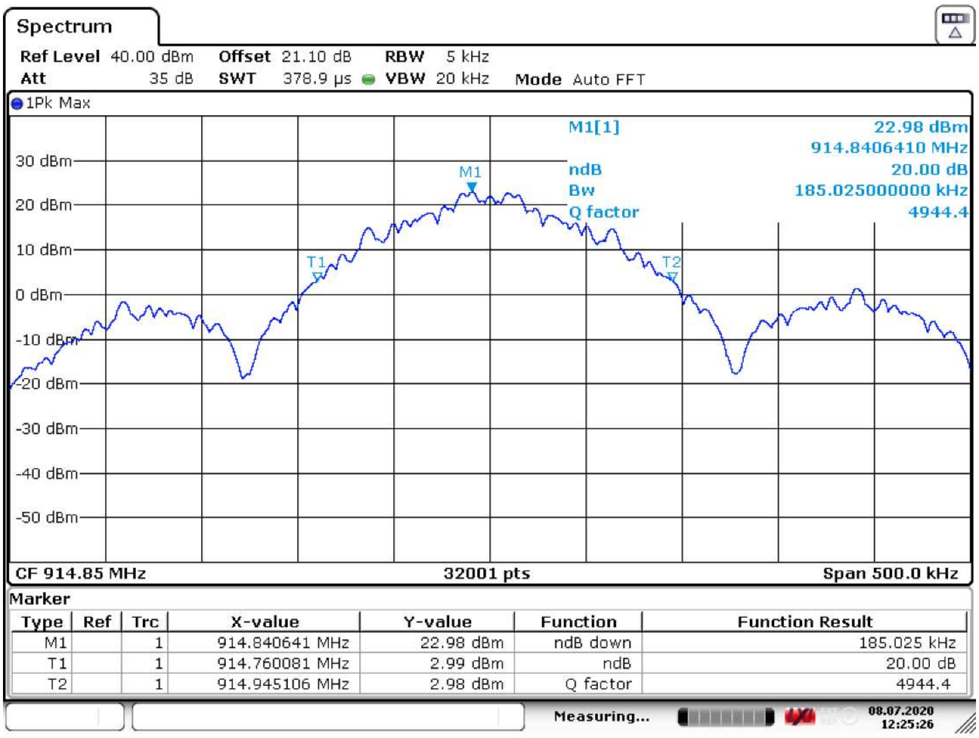

Figure 5: 20 dB channel BW, channel MID

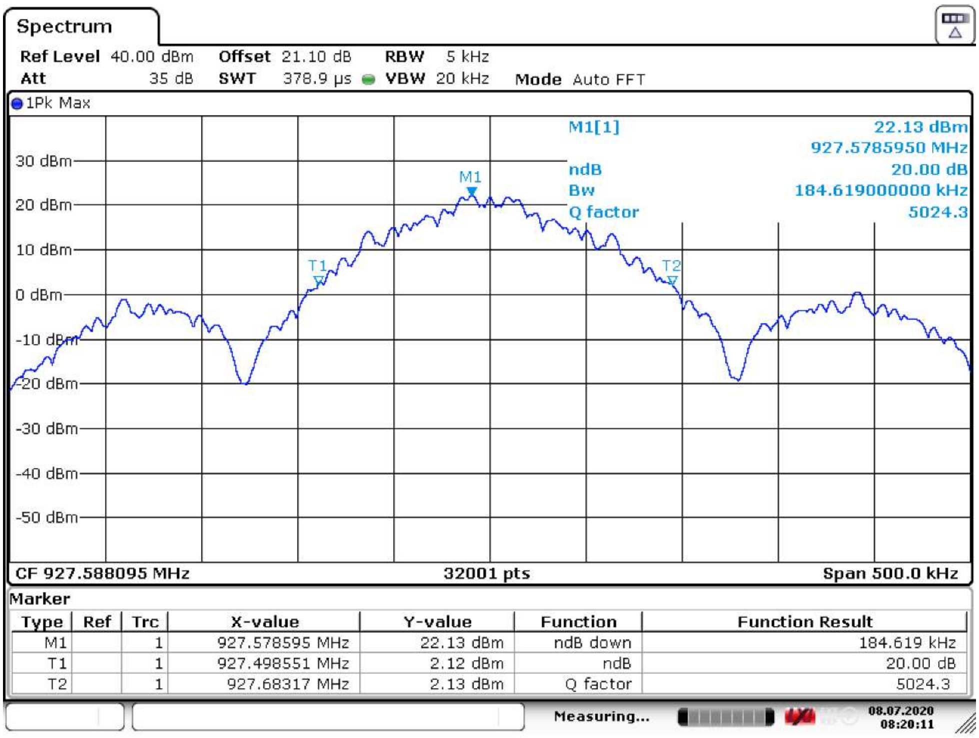

Figure 6: 20 dB channel BW, channel HIGH

Carrier Frequency Separation

Standard:	ANSI C63.10	(2013)
Tested by:	HEM	
Date:	8 July 2020	
Temperature:	22 °C	
Humidity:	48 %RH	

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 result

Table 7: Hopping channel carrier frequency separation test result

Channel Separation [kHz]	Limit (20 dB BW) [kHz]	Result
510.0150	185.025	PASS

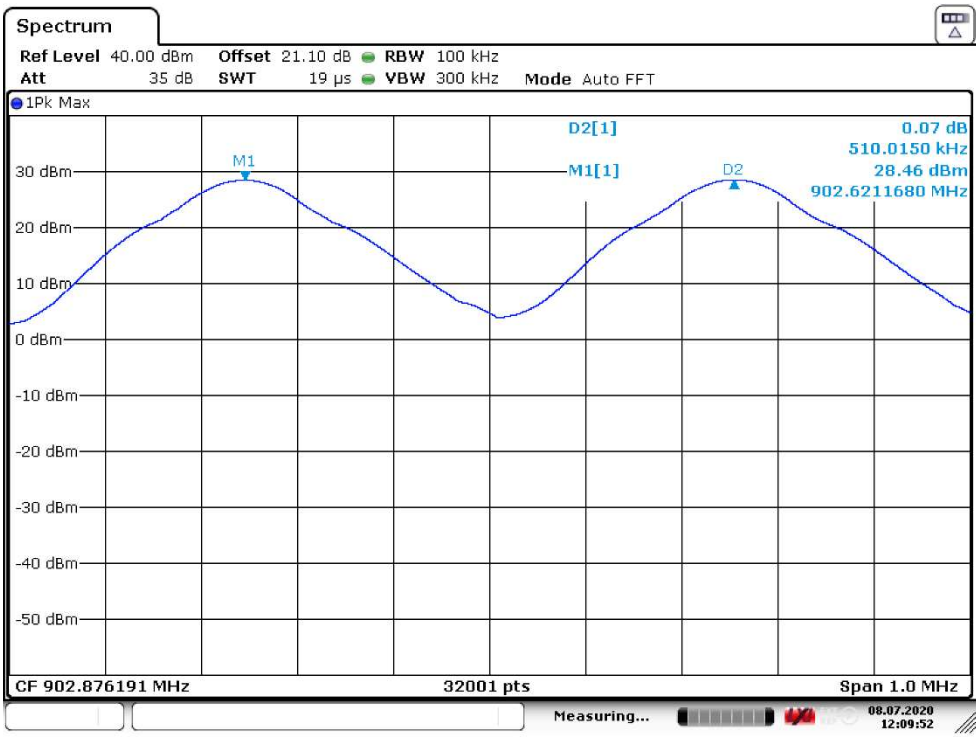

Figure 7: Measured hopping channel carrier frequency separation

Number of Hopping Channels

Standard:	ANSI C63.10	(2013)
Tested by:	HEM	
Date:	8 July 2020	
Temperature:	22 °C	
Humidity:	48 %RH	

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 channels.

Test results

Table 8: Number of hopping channels

Frequency range [MHz]	Number of channels	Minimum Limit	Result
902.0 – 915.1	25	50	PASS
915.1 – 928.0	25		

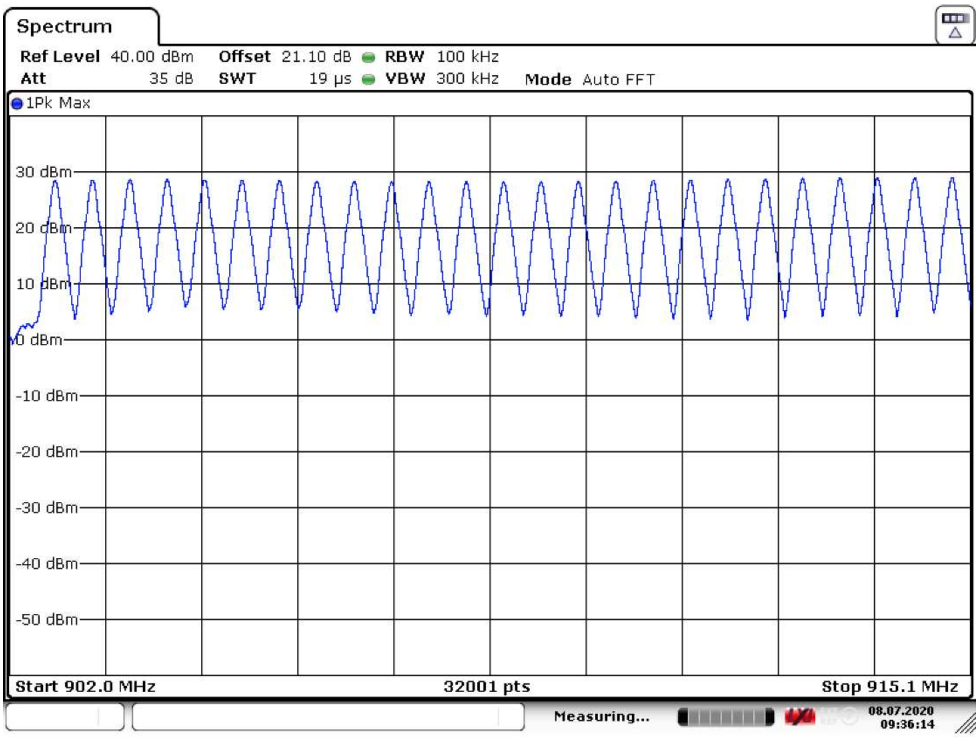

Figure 8: Number of hopping channels (902.0 – 915.1 MHz)

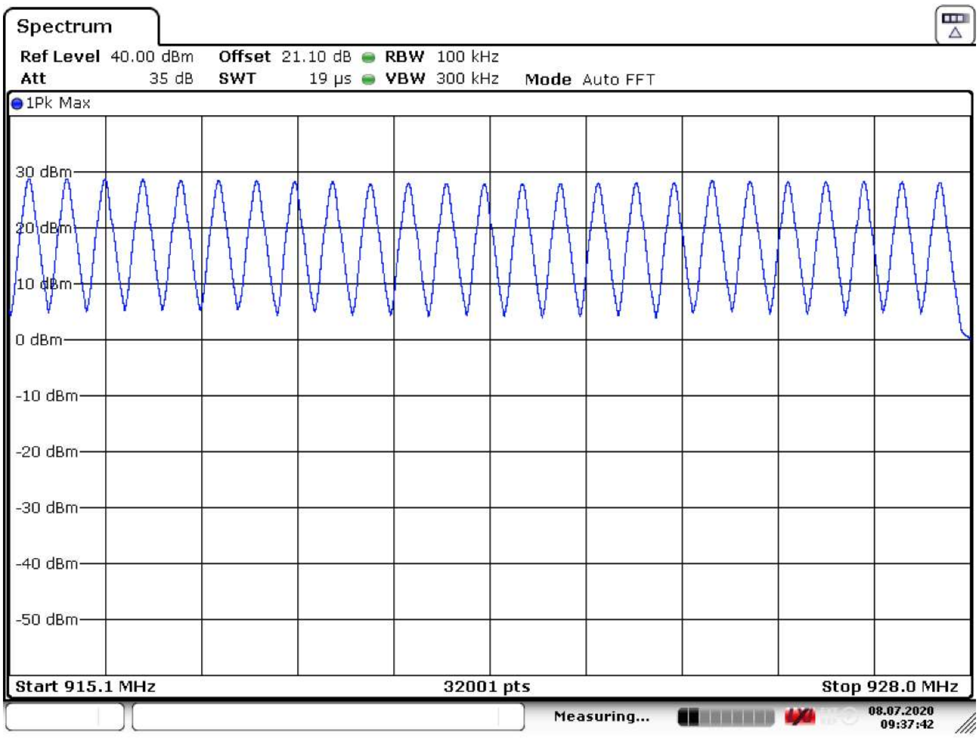

Figure 9: Number of hopping channels (915.1 – 928.0 MHz)

Average Time of Occupancy

Standard:	ANSI C63.10	(2013)
Tested by:	HEM	
Date:	8 July 2020	
Temperature:	22 °C	
Humidity:	48 %RH	

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 result

Table 9: Result

Frequency (MHz)	Number of Hops	Transmit time per single hop (ms)	Average Time of Occupancy (ms)	Result
902.621429	3	43.64687	130.94061	PASS
914.850000	4	43.64687	174.58748	PASS
927.588095	3	43.65000	130.95000	PASS

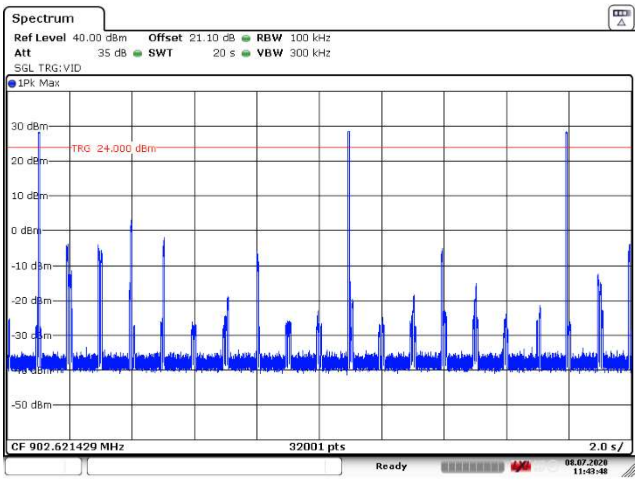

Figure 10: Time of Occupancy LOW ch.

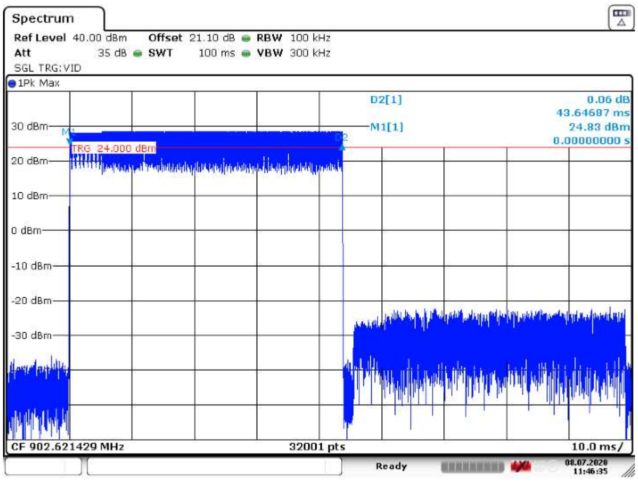

Figure 11: Transmit time per single hop LOW ch.

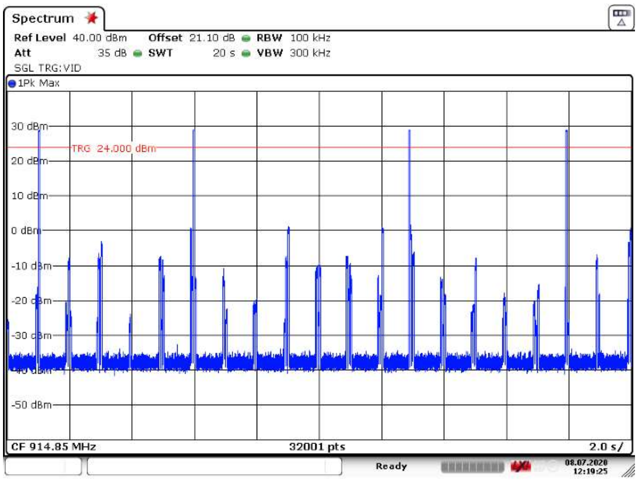

Figure 12: Time of Occupancy MID ch.

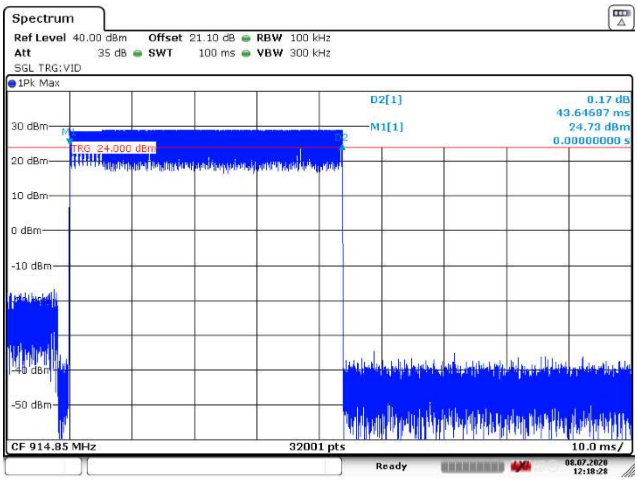

Figure 13: Transmit time per single hop MID ch.

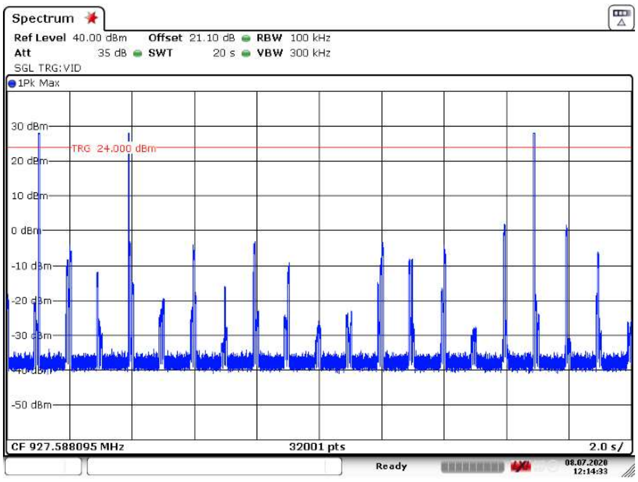

Figure 14: Time of Occupancy HIGH ch.

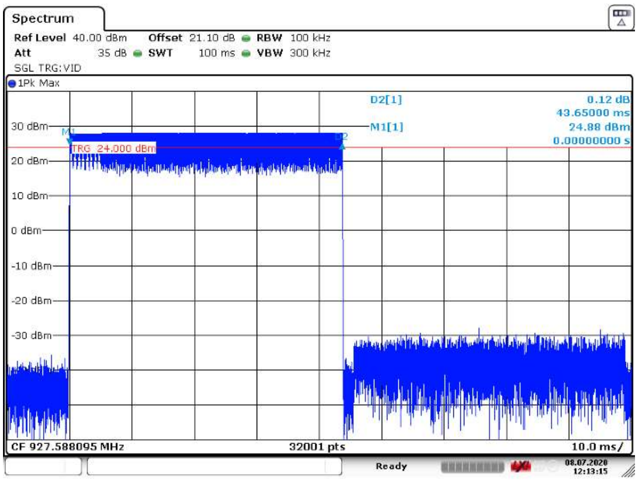

Figure 15: Transmit time per single hop HIGH ch.

Transmitter Output Power

Standard:	ANSI C63.10	(2013)
Tested by:	HEM	
Date:	8 July 2020	
Temperature:	22 °C	
Humidity:	48 %RH	
Measurement uncertainty:	± 2.87dB	Level of confidence 95 % (k = 2)

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 no exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels.

Measured values are peak values.

Test results

Table 10: Maximum conducted output power

Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
LOW	28.42	30	1.58	PASS
MID	28.85	30	1.15	PASS
HIGH	27.60	30	2.40	PASS

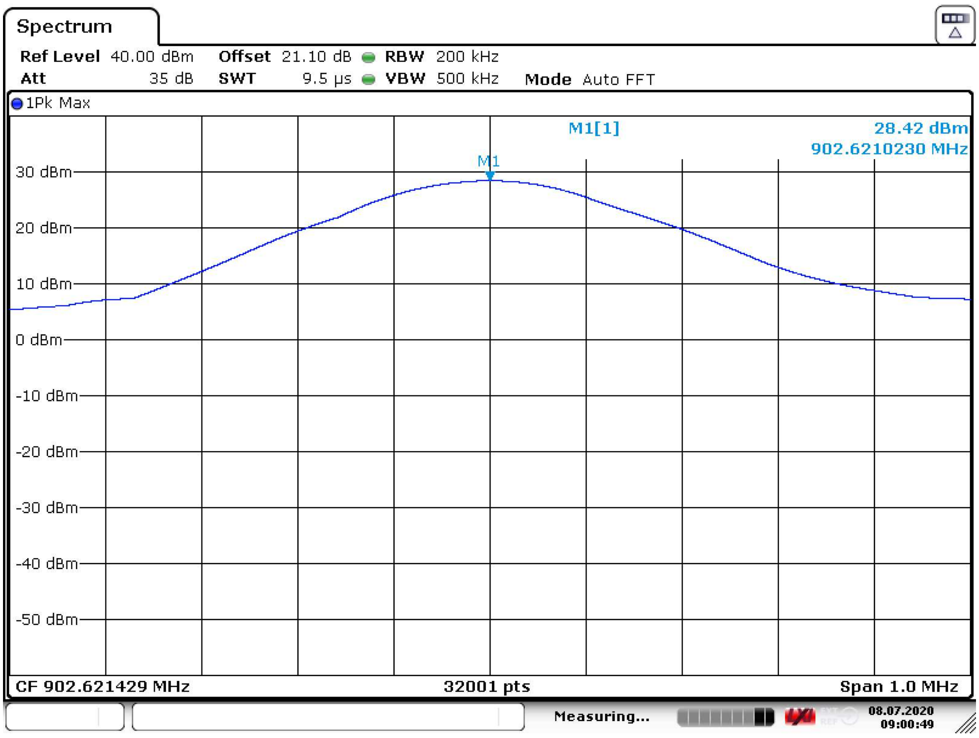

Figure 16: Transmitter output power, LOW channel

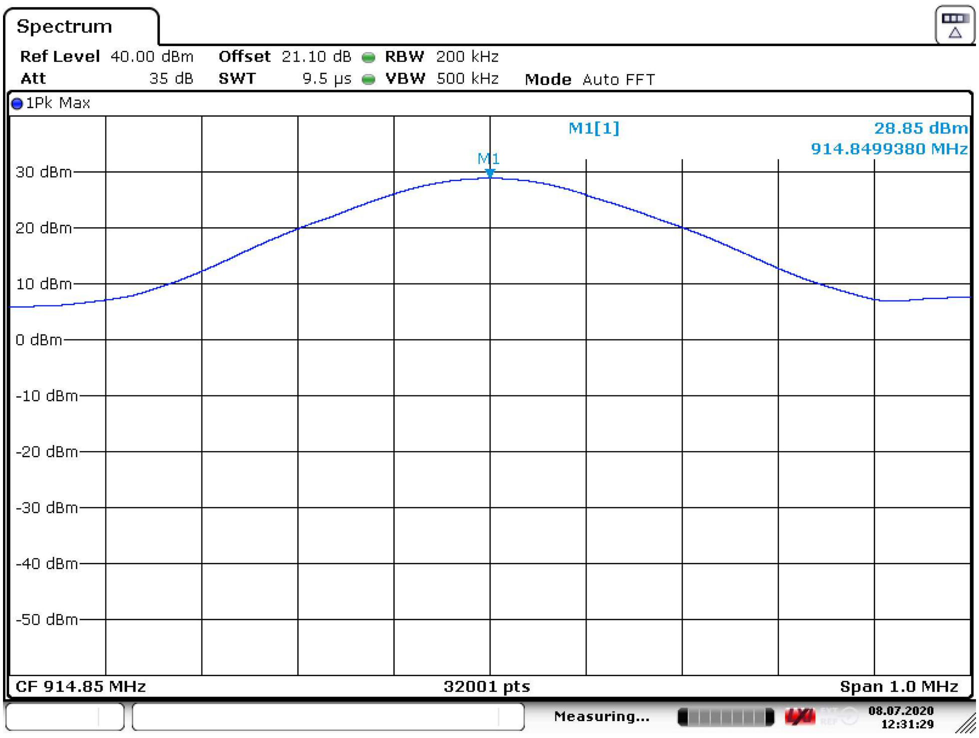

Figure 17: Transmitter output power, MID channel

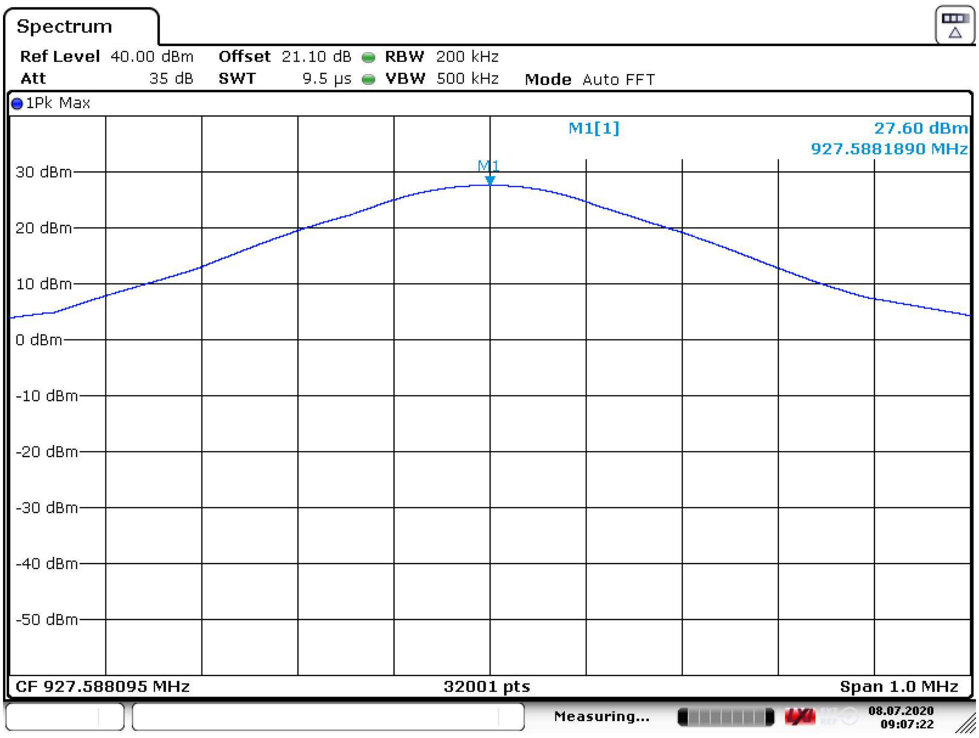

Figure 18: Transmitter output power, HIGH channel

Duty Cycle

Standard:	ANSI C63.10	(2013)
Tested by:	HEM	
Date:	8 July 2020	
Temperature:	22 °C	
Humidity:	48 %RH	

KDB Publication 558074 D02: Clause 6 and 9
ANSI C63.10-2013: Clause 11.6

The use of a duty cycle correction factor (DCCF) is permitted for calculating average radiated field strength emission levels for an FHSS device in §15.247. This DCCF can be applied when the unwanted emission limit is subject to an average field strength limit and the conditions specified in Section §15.35(c) can be satisfied. The average radiated field strength is calculated by subtracting the DCCF from the maximum radiated field strength level as determined through measurement.

Duty cycle is measured using the zero-span mode on a spectrum analyser, introduced in ANSI C63.10-2013 clause 11.6. The measurement is performed on the LOW, MID, and HIGH channels.

Test results

Table 11: Duty cycle

Channel	T_{ON}	T_{TOT}	Duty Cycle	DCCF
LOW	43.531 ms	3954.344 ms	1.101 %	19.58 dB
MID	43.531 ms	3045.219 ms	1.429 %	18.45 dB
HIGH	43.750 ms	2908.937 ms	1.504 %	18.23 dB

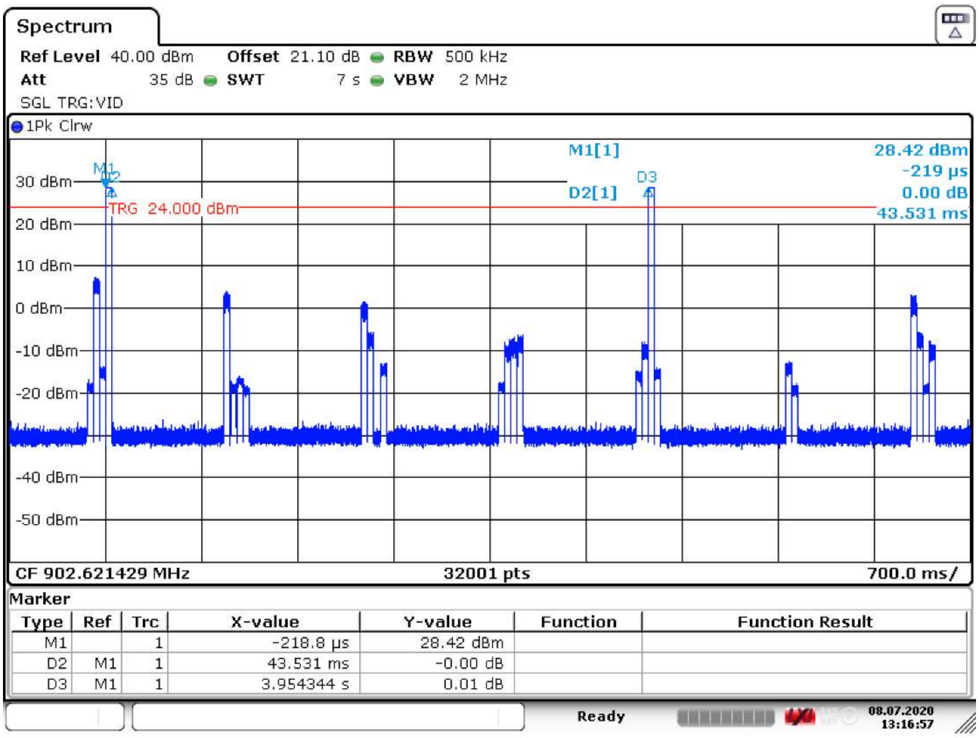

Figure 19: Duty cycle LOW channel

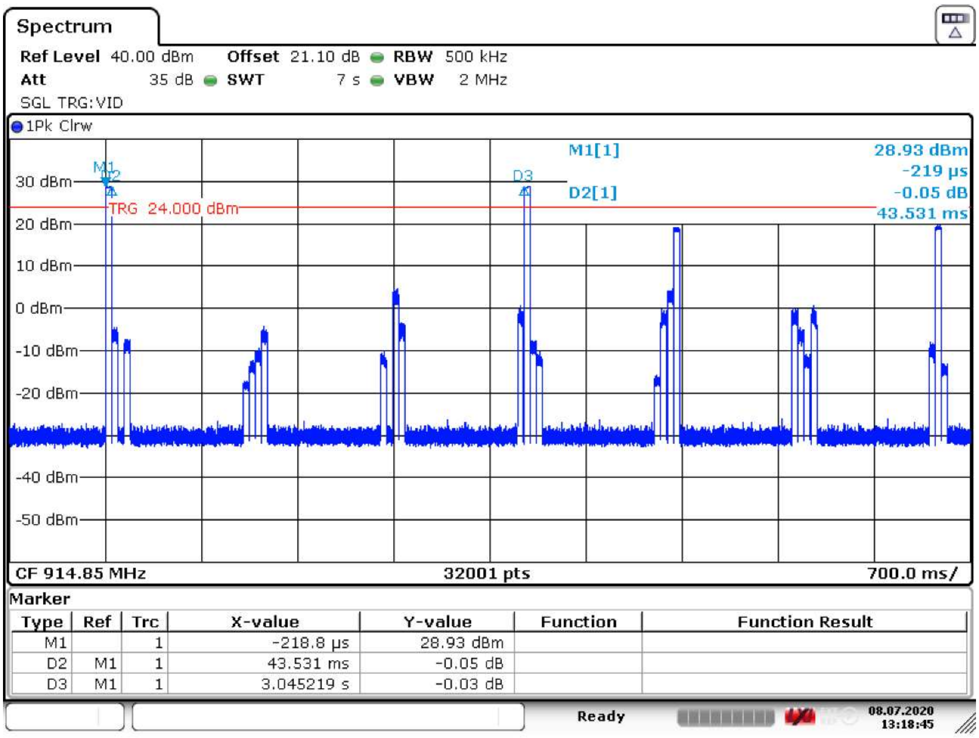

Figure 20: Duty cycle MID channel

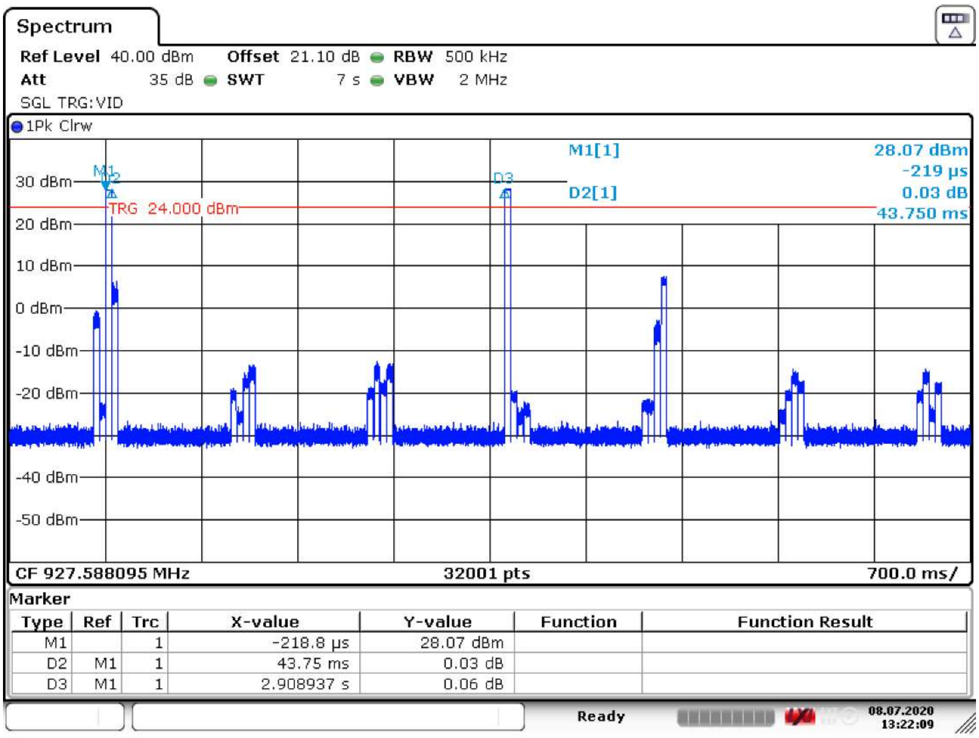

Figure 21: Duty cycle HIGH channel

Unwanted Emissions (radiated)

Standard:	ANSI C63.10	(2013)	
Tested by:	HEM		
Date:	19 February 2022	20 February 2022	21 February 2022
Temperature:	24 °C	24 °C	23 °C
Humidity:	42 %RH	42 %RH	32 %RH
Measurement uncertainty:	± 4.51 dB	Level of confidence 95 % (k = 2)	

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 of 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

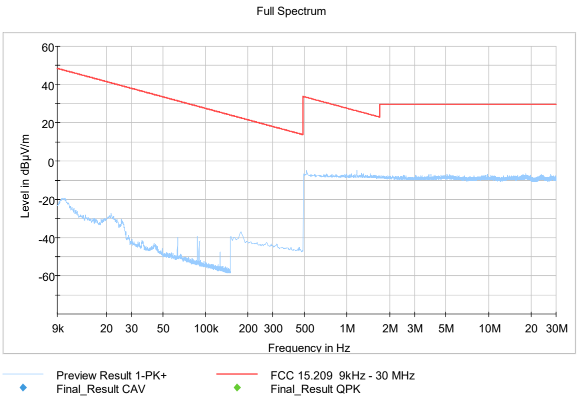

Figure 22: TX middle channel (whip antenna)

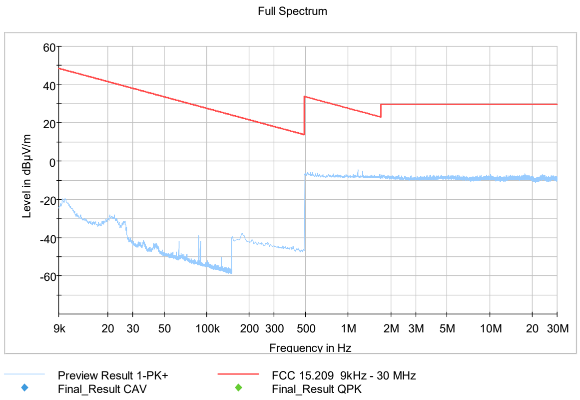

Figure 23: TX middle channel (Yagi antenna)

Test results, 30 – 1000 MHz (whip antenna)

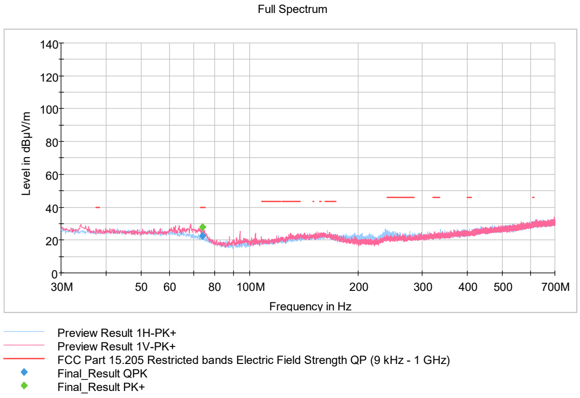

Figure 24: TX bottom channel (30-700 MHz)

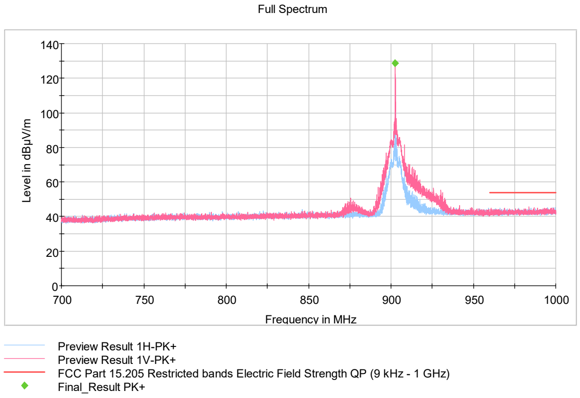

Figure 25: TX bottom channel (700-1000 MHz)

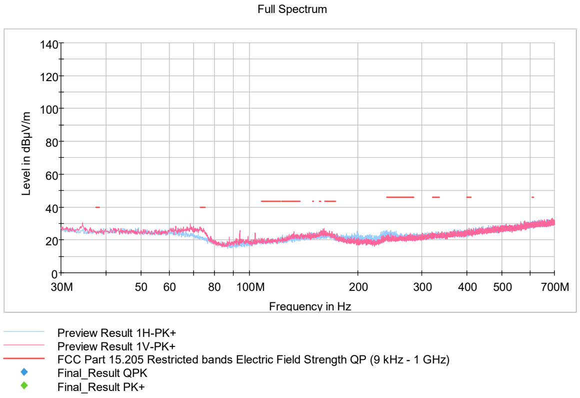

Figure 26: TX middle channel (30-700 MHz)

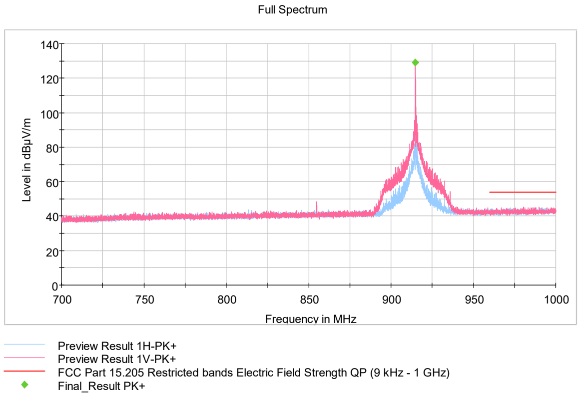

Figure 27: TX middle channel (700-1000 MHz)

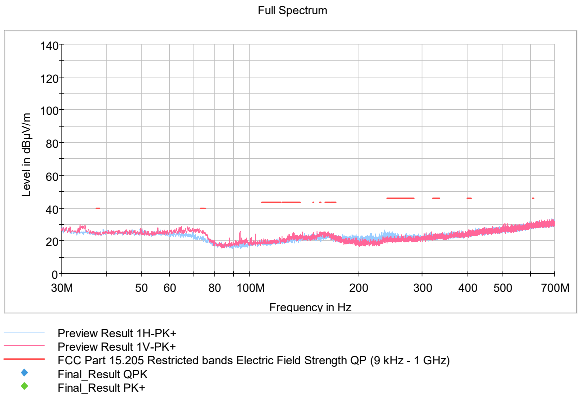

Figure 28: TX top channel (30-700 MHz)

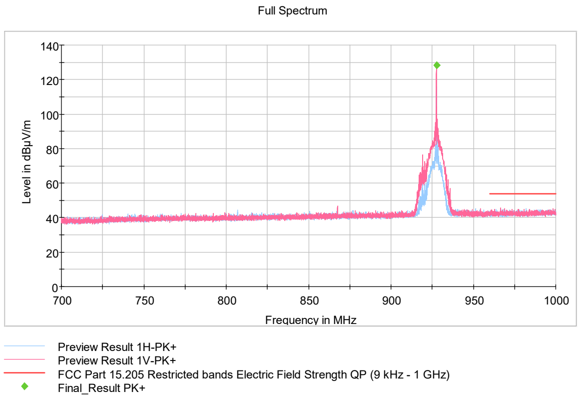

Figure 29: TX top channel (700-1000 MHz)

Test results, 1 – 10 GHz (whip antenna)

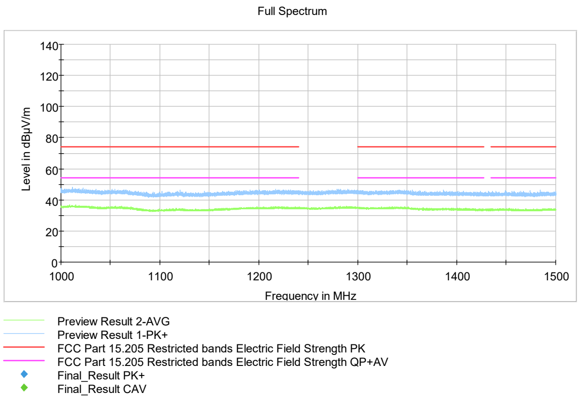

Figure 30: TX bottom channel (1.0-1.5 GHz)

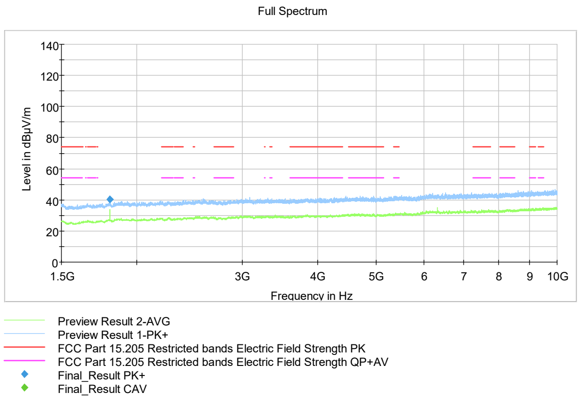

Figure 31: TX bottom channel (1.5-10.0 GHz)

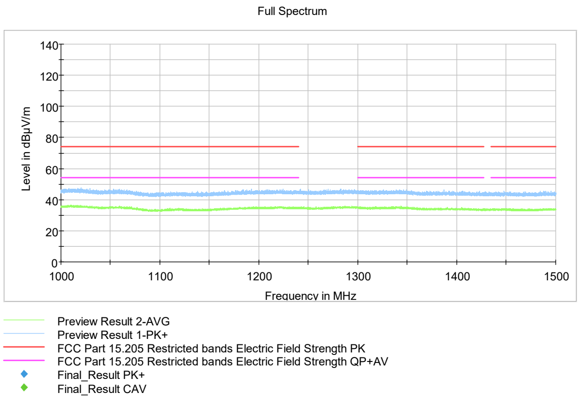

Figure 32: TX middle channel (1.0-1.5 GHz)

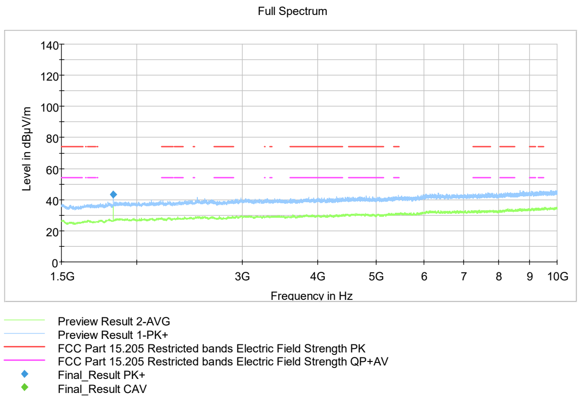

Figure 33: TX middle channel (1.5-10.0 GHz)

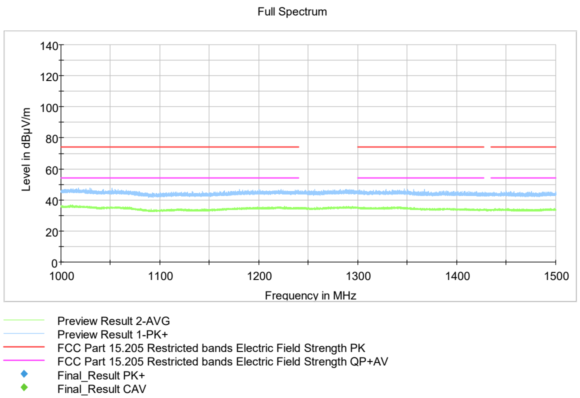

Figure 34: TX top channel (1.0-1.5 GHz)

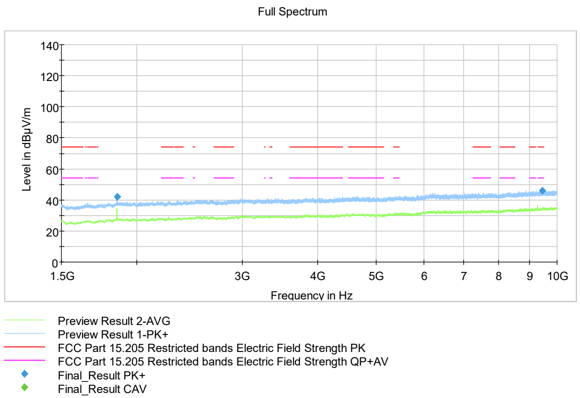

Figure 35: TX top channel (1.5-10.0 GHz)

Table 12: 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)
73.898000	22.57	---	40.00	17.43	15 x 1000.0	120.000	100.0	V	5.0	15.2
902.620000	---	128.80	---	---	15 x 1000.0	120.000	154.0	V	336.0	47.5
914.860000	---	128.91	---	---	15 x 1000.0	120.000	109.0	V	199.0	47.8
927.590000	---	128.19	---	---	15 x 1000.0	120.000	155.0	V	340.0	48.1
1805.350000	---	40.31	108.80 *)	68.49	15 x 1000.0	1000.000	138.0	V	34.0	3.1
1829.600000	---	43.28	108.91 *)	65.63	15 x 1000.0	1000.000	139.0	V	329.0	2.7
1855.500000	---	42.20	108.19 *)	65.99	15 x 1000.0	1000.000	131.0	V	351.0	3.2
9458.725000	---	45.73	74.00	28.27	15 x 1000.0	1000.000	213.0	V	189.0	14.3

*) -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)

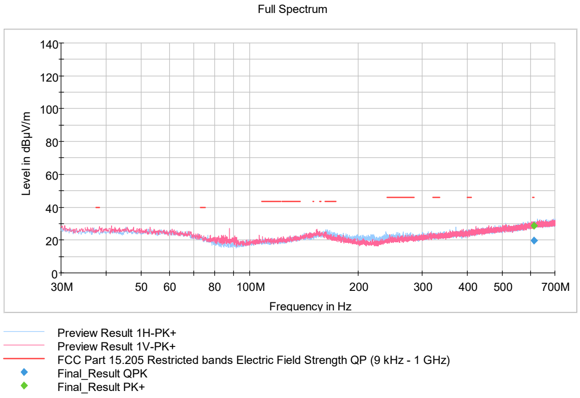

Figure 36: TX middle channel (30-700 MHz)

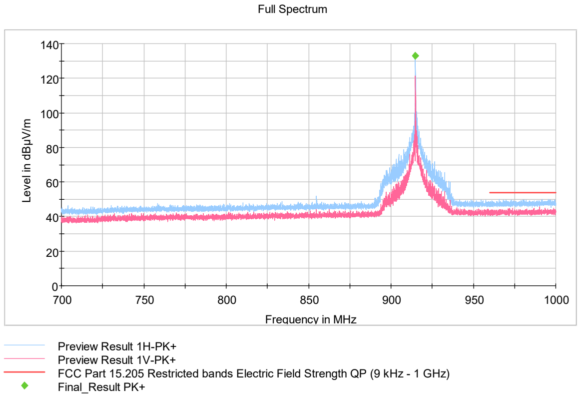

Figure 37: TX middle channel (700-1000 MHz)

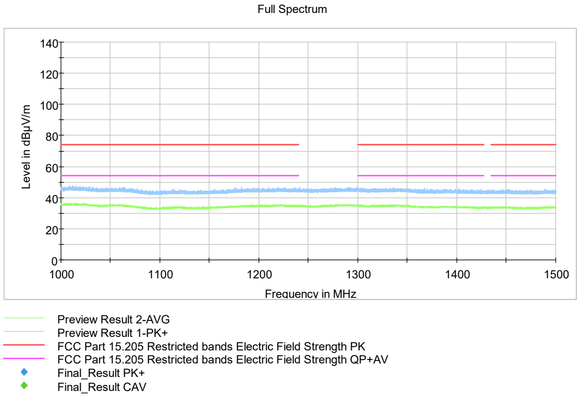

Figure 38: TX middle channel (1.0-1.5 GHz)

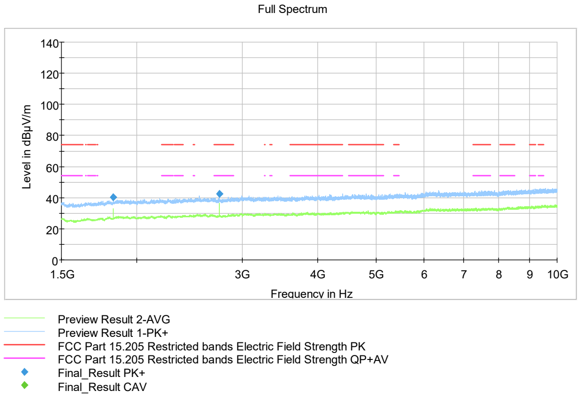

Figure 39: TX middle channel (1.5-10 GHz)

Table 13: 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)
613.220000	19.62	---	46.02	26.40	15 x 1000.0	120.000	370.0	V	348.0	27.1
914.840000	---	133.16	---	---	15 x 1000.0	120.000	100.0	H	12.0	47.8
1829.775000	---	40.43	113.16 *)	72.73	15 x 1000.0	1000.000	226.0	H	352.0	2.7
2744.200000	---	42.58	74.00	31.42	15 x 1000.0	1000.000	222.0	H	57.0	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

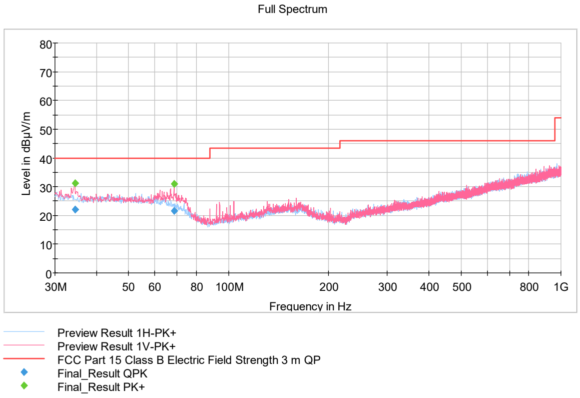

Figure 40: RX mode, whip antenna (30-1000 MHz)

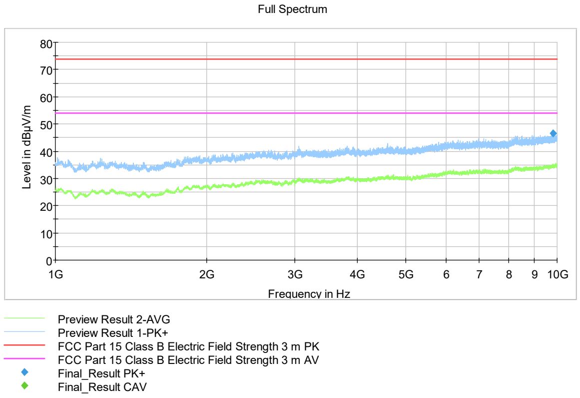

Figure 41: RX mode, whip antenna (1-10 GHz)

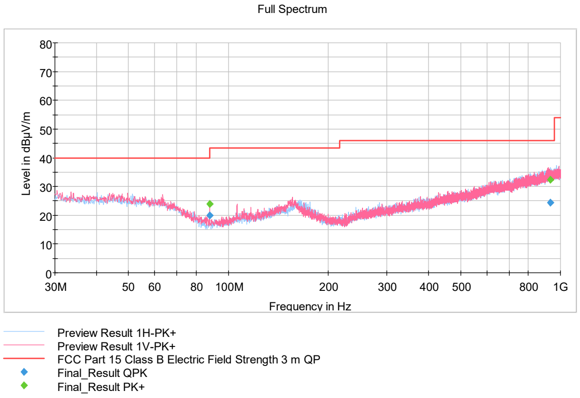

Figure 42: RX mode, Yagi antenna (30-1000 MHz)

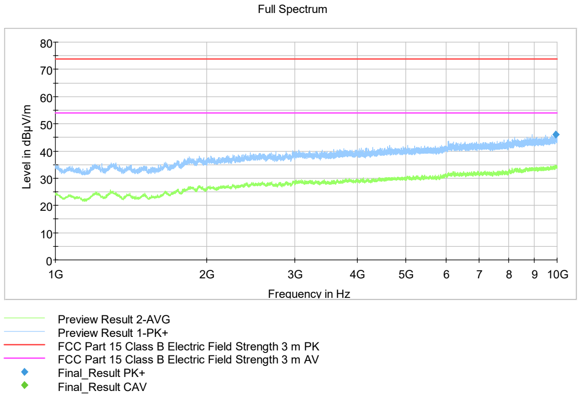

Figure 43: RX mode, Yagi antenna (1-10 GHz)

Table 14: 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)
34.465000	22.10	---	40.00	17.90	15 x 1000.0	120.000	193.0	V	226.0	16.5
68.669000	21.48	---	40.00	18.52	15 x 1000.0	120.000	154.0	V	228.0	16.5
9809.400000	---	46.64	73.90	27.26	15 x 1000.0	1000.000	247.0	V	194.0	14.5

Table 15: 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)
87.852000	19.87	---	40.00	20.13	15 x 1000.0	120.000	100.0	V	260.0	12.0
930.647000	24.36	---	46.00	21.64	15 x 1000.0	120.000	109.0	H	125.0	31.9
9935.150000	---	46.00	73.90	27.90	15 x 1000.0	1000.000	290.0	H	75.0	14.3

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:	8, 17 July 2020	
Temperature:	22 °C	
Humidity:	48 %RH	
Measurement uncertainty:	± 2.87 dB	Level of confidence 95 % (k = 2)

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. 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Test results

Table 16: Band edge attenuation

Band Edge Attenuation	
Lower Band Edge	**Upper Band Edge**
-28.17	-24.99
Limit: -20 dBc	

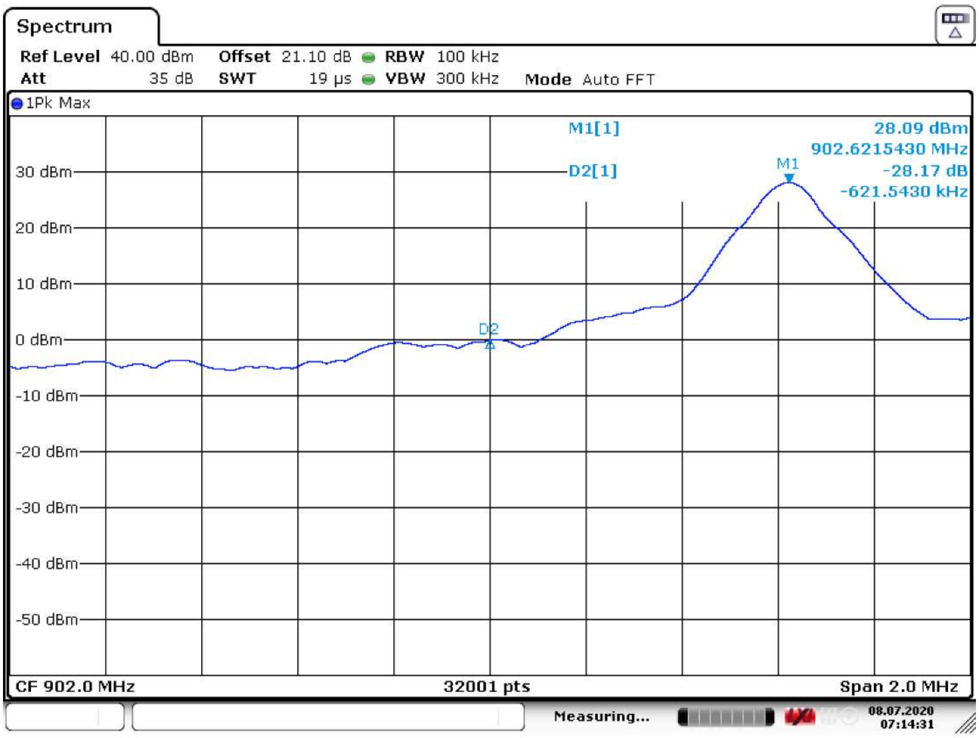

Figure 44: Lower Band-Edge

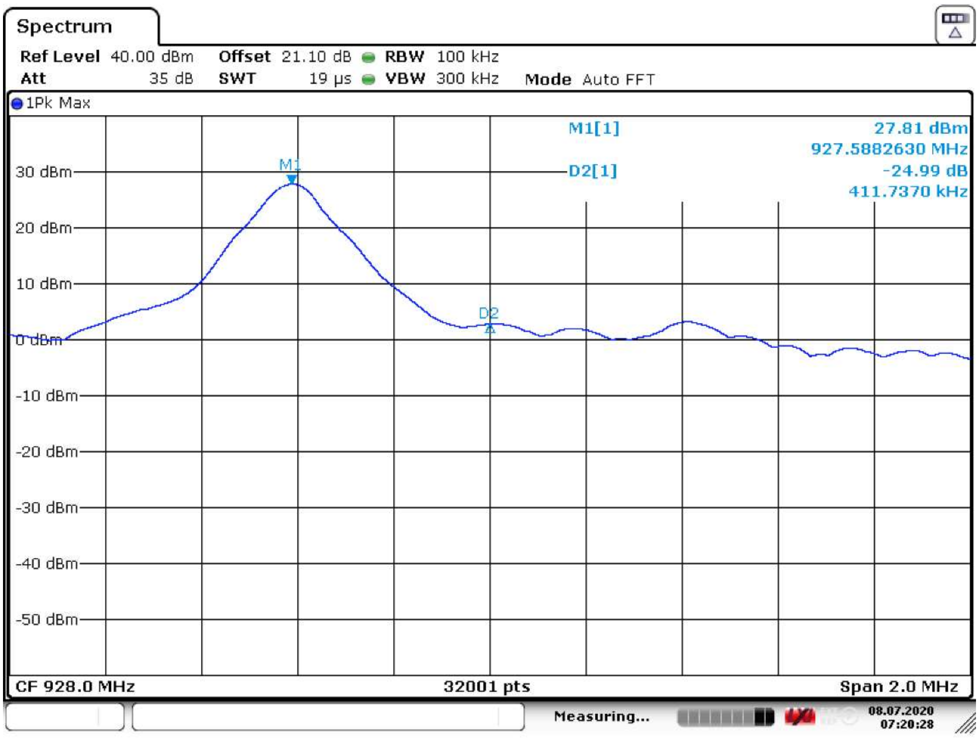

Figure 45: Upper Band-Edge

Unwanted emissions LOW channel

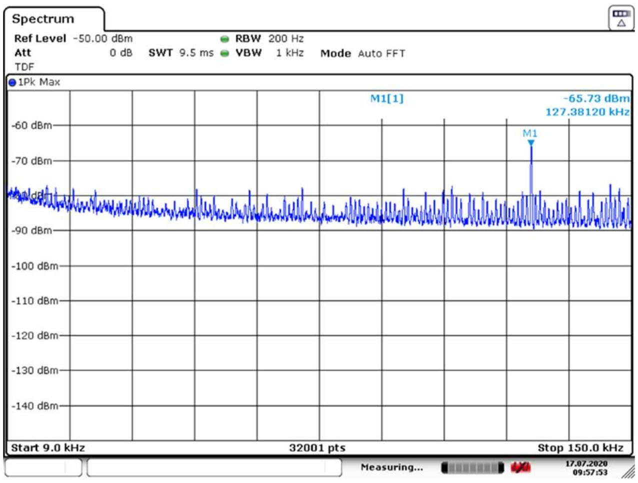

Figure 46: TX LOW channel (9 kHz – 150 kHz)

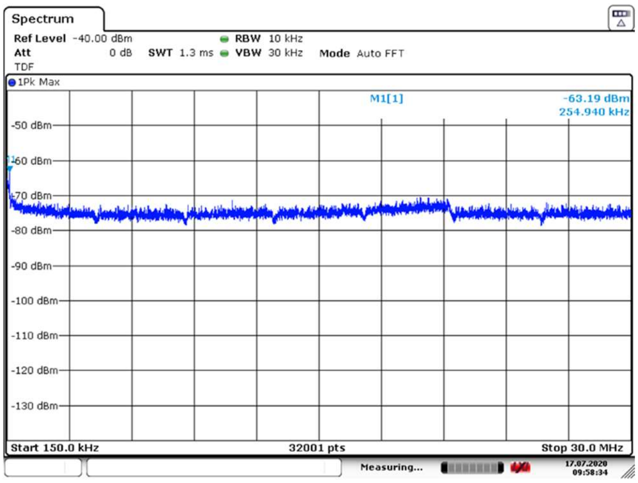

Figure 47: TX LOW channel (150 kHz – 30 MHz)

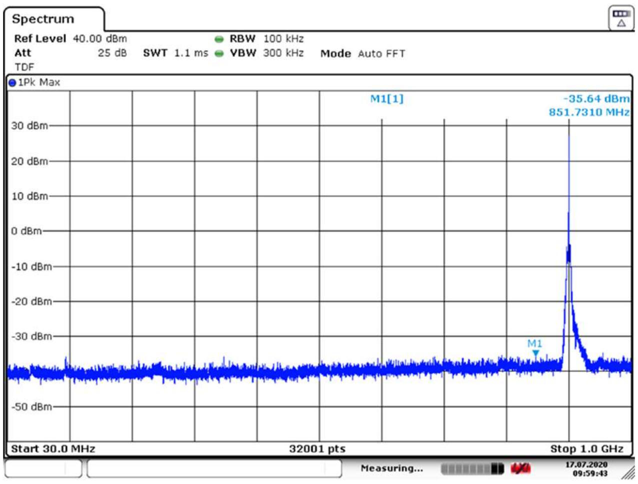

Figure 48: TX LOW channel (30 MHz – 1 GHz)

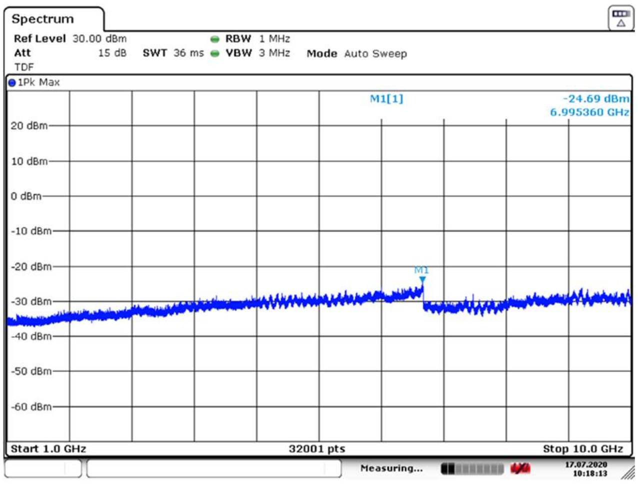

Figure 49: TX LOW channel (1 GHz – 10 GHz)

Unwanted Emissions MID channel

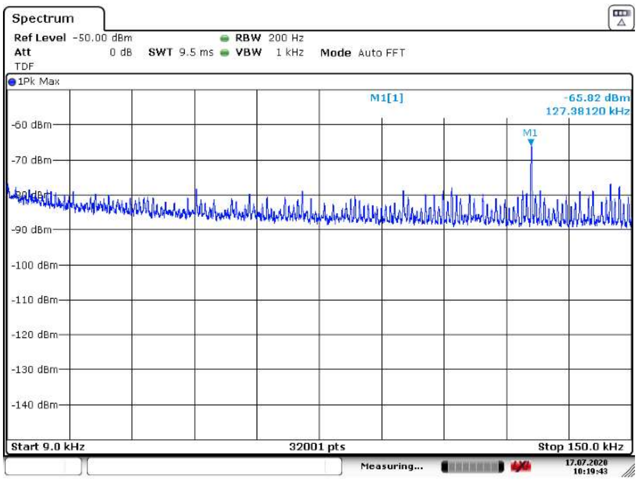

Figure 50: TX MID channel (9 kHz – 150 kHz)

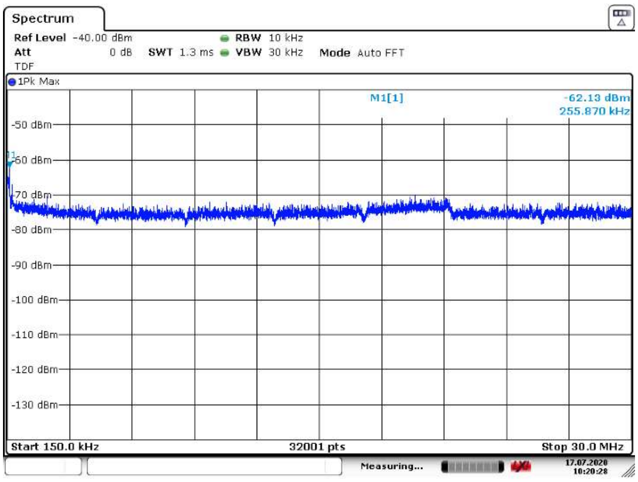

Figure 51: TX MID channel (150 kHz – 30 MHz)

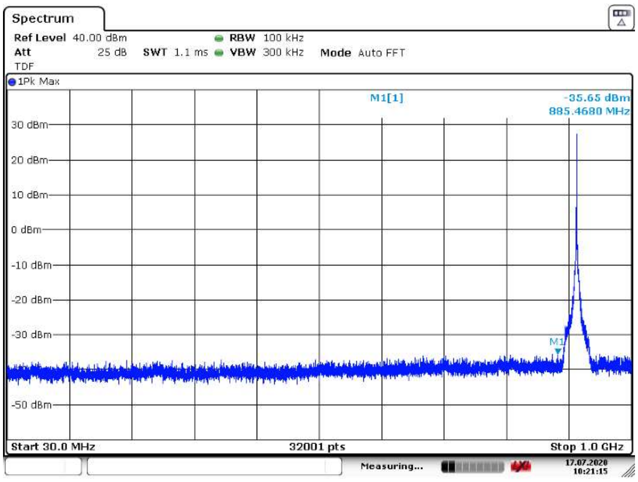

Figure 52: TX MID channel (30 MHz – 1 GHz)

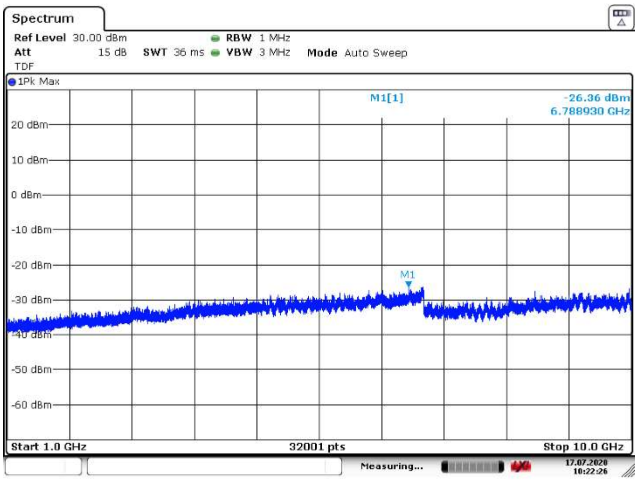

Figure 53: TX MID channel (1 GHz – 10 GHz)

Unwanted Emissions HIGH channel

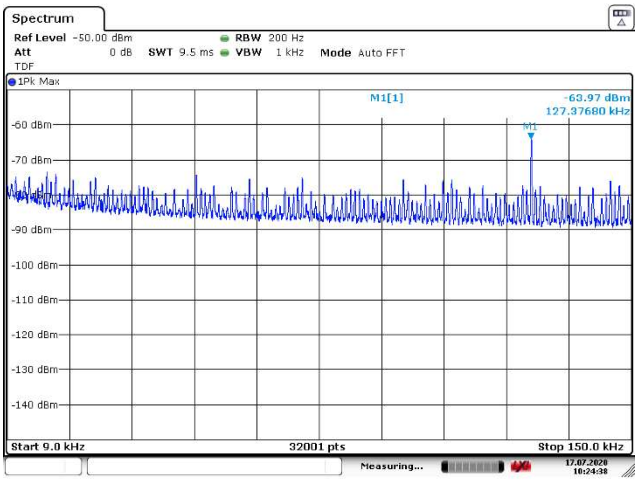

Figure 54: TX HIGH channel (9 kHz – 150 kHz)

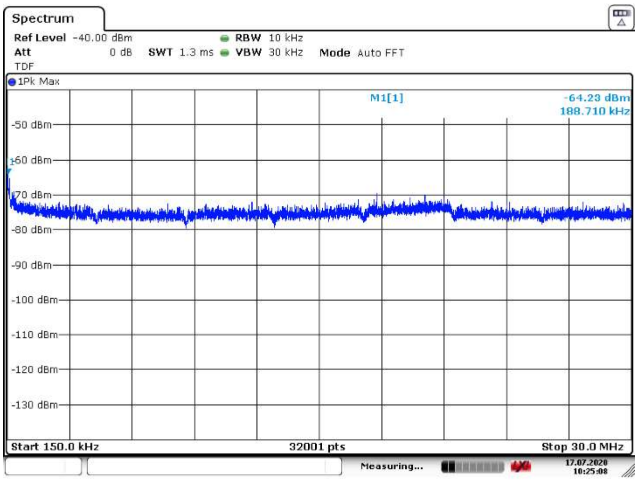

Figure 55: TX HIGH channel (150 kHz – 30 MHz)

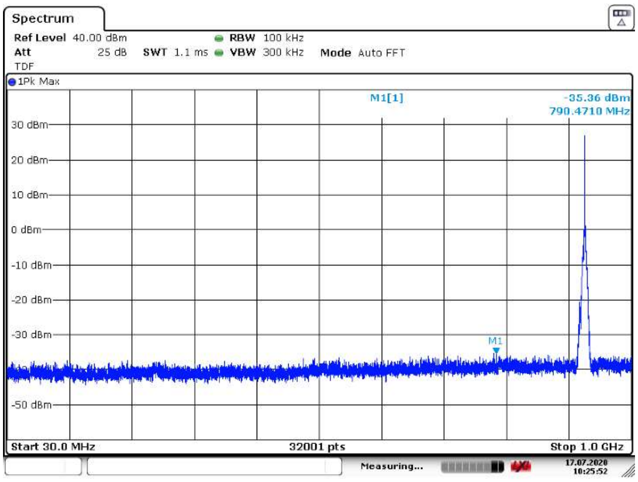

Figure 56: TX HIGH channel (30 MHz – 1 GHz)

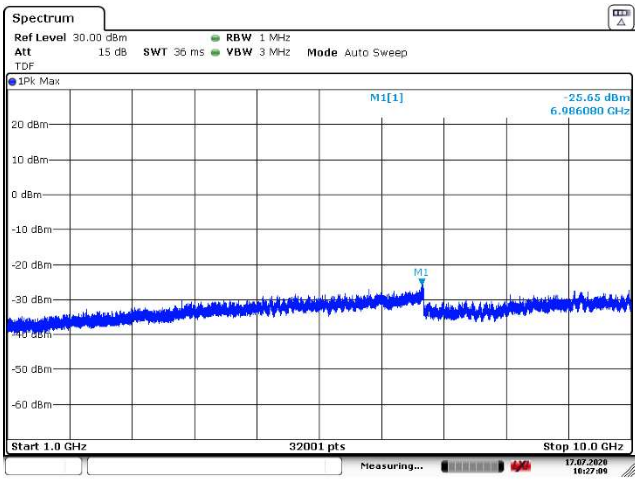

Figure 57: TX HIGH channel (1 GHz – 10 GHz)

99% Occupied Bandwidth

Standard: RSS-GEN (2019)
Tested by: HEM
Date: 8 July 2020
Temperature: 22 °C
Humidity: 48 %RH

RSS-GEN 6.7

Results

Table 17: 99% Occupied Bandwidth test results

Channel	99% BW [kHz]
LOW	383.457
MID	339.739
HIGH	382.301

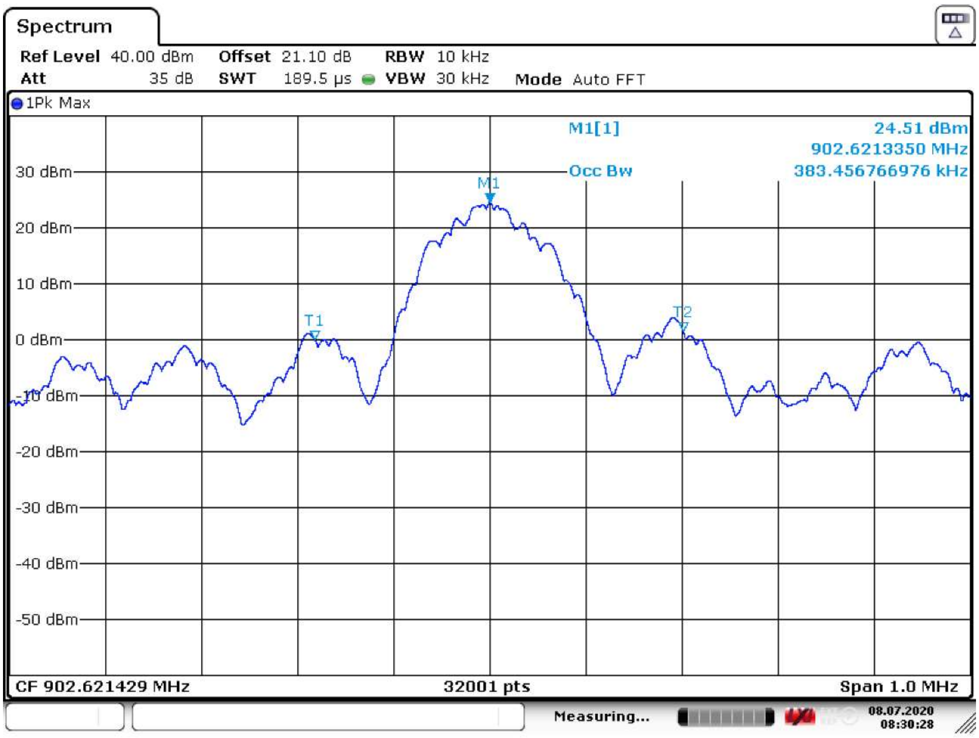

Figure 58: 99% OBW, LOW channel

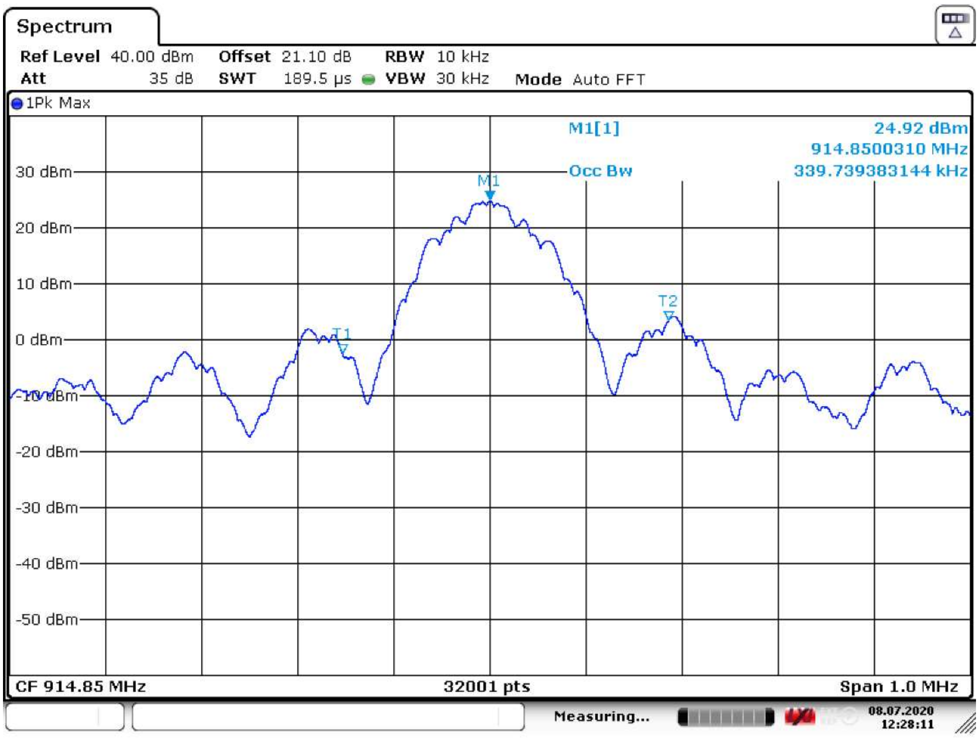

Figure 59: 99% OBW, MID channel

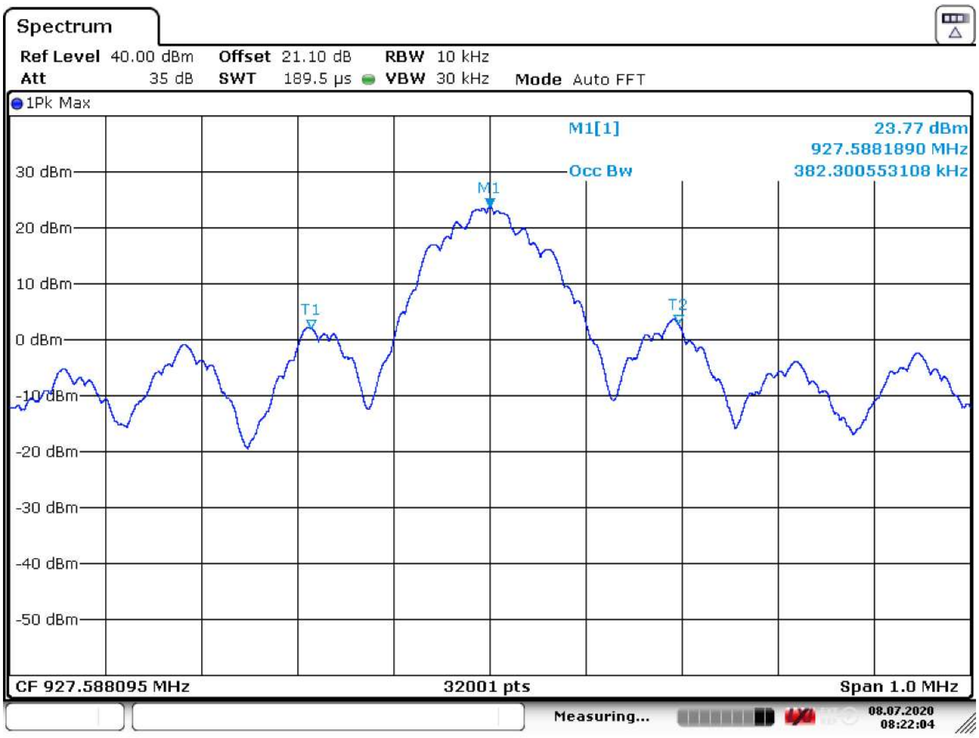

Figure 60: 99% OBW, HIGH channel

TEST EQUIPMENT

EQUIPMENT	MANUFACTURER	TYPE	INV OR SERIAL	PREV CALIB	NEXT CALIB
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
LISN	ROHDE & SCHWARZ	ENV216	inv:9611	2020-03-03	2021-03-03
LISN	ROHDE & SCHWARZ	ESH3-Z5	inv:8019	2020-05-19	2021-05-19
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv:10183	NCR	NCR
POWER SUPPLY	CALIFORNIA INSTR.	500 iX Series II	inv:7826	NCR	NCR
PRECISION DC POWER SUPPLY	THANDAR	TS3021S	inv:3484	NCR	NCR
RF PREAMPLIFIER	CIAO	CA118-3123	inv. 10278	2021-10-05	2022-10-05
SIGNAL ANALYZER	ROHDE & SCHWARZ	FSV40	inv:9093	2019-11-18	2020-11-18
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	NCR	NCR
TRANSIENT LIMITER	ROHDE & SCHWARZ	ESH3-Z2	inv:8395	2019-11-12	2020-11-12
TURNTABLE	MATURO	DS430 UPGRADED	inv:10182	NCR	NCR

NCR = No calibration required

END OF REPORT