ETSI EN 300 220-1 V3.1.1 (2017-02)
ETSI EN 300 220-2 V3.2.1 (2018-06)

TEST REPORT

For

Xiamen Milesight IoT Co., Ltd.

Building C09, Software Park Phase III, Xiamen 361024, Fujian, China

Tested Model: UG67-L04EU-868M
Multiple Models: UG67-L00E-868M, UG67-868M,UG67-L04EU-868M-H32, UG67-L00E-868M-H32, UG67-868M-H32, UG67-868M-H512,UG67-L04EU-868M-H512, UG67-L00E-868M-H512,UG67-868M-H8, UG67-L04EU-868M-H8,UG67-L00E-868M-H8

Report Type: Amended Report	**Product Type:** LoRaWAN Gateway
Report Number:	XMDN220516-20735E-22AA1
Report Date:	2022-06-10
Reviewed By:	Rocky Xiao RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RXM210219050-22A	Original Report	2021-10-18
1	XMDN220516-20735E-22AA1	Amended Report	2022-06-10

Note: This is the first amended report application which was based on the original report. The differences between them as following:

1. Changed the applicant's address to **Building C09, Software Park Phase III, Xiamen 361024, Fujian, China;**
2. Added EUT models: **UG67-868M-H512, UG67-L04EU-868M-H512, UG67-L00E-868M-H512, UG67-868M-H8, UG67-L04EU-868M-H8, UG67-L00E-868M-H8;**
3. Changed the trade name to Milesight;
4. Change the **silk screen** on the EUT appearance.

The change between the previous equipment and the current equipment is stated and guaranteed by the applicant. The difference between them will not affect the test results, we will keep the test results, test photos, but updated the related EUT photos.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "△". Customer model name, addresses, names, trademarks etc. are not considered data.

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

This report cannot be reproduced except in full, without prior written approval of the Company.

This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".

EXHIBIT A – EUT PHOTOGRAPHS

For photos in this section, please refer to report No.: XMDN220516-20735E-02A1 EXHIBIT A.

DECLARATION LETTER

Xiamen Milesight IoT Co., Ltd.
Add:Building C09, Software Park Phase III, Xiamen 361024, Fujian, China
Tel: 0592-5023060
Fax: 0592-5023065
Emal: tongzl@ursalink.com

DECLARATION OF SIMILARITY

Date: 2022-5-9

To whom it may concern

We, Xiamen Milesight IoT Co., Ltd., hereby declare that the product: LoRaWAN Gateway, model:UG67-L00E-868M,UG67-868M ,UG67-L04EU-868M-H32,UG67-L00E-868M-H32, UG67-868M-H32,UG67-868M-H512,UG67-L04EU-868M-H512,UG67-L00E-868M-H512, UG67-868M-H8,UG67-L04EU-868M-H8,UG67-L00E-868M-H8 is electrically identical with the model: UG67-L04EU-868M which was tested by BACL with the same electromagnetic emissions and electromagnetic compatibility characteristics.
A description of the differences between the tested model and those that are declared similar are as follows:
The models have same software.
All the above models share one PCB board. The only difference between models is that some function devices paste or not paste. The below table show differences:
√: paste --: not paste

	LTE module	WiFi	GPS	POE	LoRa	External antenna	Other differences
UG67-L04EU-868M	√ (EC25-EUX)	√	√	√	√ (868)	√	model names
UG67-L00E-868M	√ (EC25-EUX)	√	√	√	√ (868)	√	
UG67-868M	--	√	√	√	√ (868)	√	
UG67-L04EU-868M-H32	√ (EC25-EUX)	√	--	√	√ (868)	√	model names
UG67-L00E-868M-H32	√ (EC25-EUX)	√	--	√	√ (868)	√	
UG67-868M-H32	--	√	--	√	√ (868)	√	
UG67-868M-H512	--	√	--	√	√ (868)	√	
UG67-L04EU-868M-H512	√ (EC25-EUX)	√	--	√	√ (868)	√	model names
UG67-L00E-868M-H512	√ (EC25-EUX)	√	--	√	√ (868)	√	
UG67-868M-H8	--	√	--	√	√ (868)	√	
UG67-L04EU-868M-H8	√ (EC25-EUX)	√	--	√	√ (868)	√	model names

UG67-L00E-868M-H8	√ (EC25-EUX)	√	--	√	√ (868)	√	

Please contact me should there be need for any additional clarification or information.
Best Regards,
Signature:

Printed Name: Zhenlong Tong
Title: Manager

BELOW IS THE ORIGINAL REPORT

ETSI EN 300 220-1 V3.1.1 (2017-02)
ETSI EN 300 220-2 V3.2.1 (2018-06)

TEST REPORT

For

Xiamen Milesight IoT Co., Ltd.

4/F,NO. 63-2 Wanghai Road, 2nd Software Park,Xiamen ,China

Tested Model: UG67-L04EU-868M
Multiple Models: UG67-L00E-868M, UG67-868M, UG67-L04EU-868M-H32, UG67-L00E-868M-H32, UG67-868M-H32

Report Type: Original Report	**Product Type:** LoRaWAN Gateway
Report Number:	RXM210219050-22A
Report Date:	2021-10-18
Reviewed By:	Rocky Xiao RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	LoRaWAN Gateway
Test Model:	UG67-L04EU-868M
Multiple Models:	UG67-L00E-868M, UG67-868M, UG67-L04EU-868M-H32,UG67-L00E-868M-H32, UG67-868M-H32
Model Difference:	Refer to Dos
Rated Input Voltage:	DC 56V from POE
Serial Number:	RXM210219050-RF-S1
EUT Received Date:	2021.02.20
EUT Received Status:	Good

Technical Specification

Operation Frequency Range (MHz):		863-870MHz
RF Output Power (ERP) (dBm):		9.52
Number of Chains	**Transmit:**	2(1 internal Antenna, Lora 1; 1 extenal Antenna, ANT1)
	Receive:	2(1 internal Antenna, Lora 2; 1 extenal Antenna, ANT2)
Antenna Gain (dBi)▲:		2dBi for internal Antenna; 4dBi for extenal Antenna.
Modulation Type:		FSK

Note: LoRa1 and ANT1 only support TX, LoRa2 and ANT2 only support RX in the report.

Objective

The test report is prepared on behalf of the ***Xiamen Milesight IoT Co., Ltd.*** in accordance with ETSI EN 300 220-2 V3.2.1 (2018-06), Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard for access to radio spectrum for non specific radio equipment.

The objective is to determine the compliance of the EUT with ETSI EN 300 220-2 V3.2.1 (2018-06).

Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 220-1 V3.1.1 (2017-02).

Measurement Uncertainty

Parameter	Flab	Maximum allow uncertainty
Radio frequency	±0,5 ppm	±0,5 ppm
RF power, conducted	±0.73dB	±1.5dB
Conducted spurious emission of transmitter, valid up to 6 GHz	±1.6dB	±3dB
Conducted emission of receivers	±1.6dB	±3dB
Below 1GHz emissions, radiated	±4.75dB	±6dB
Above 1GHz emissions, radiated	±4.88dB	±6dB
RF level uncertainty for a given BER	±1.5dB	±1.5 dB
Occupied BandWidth	±5%	±5%
Temperature	±1 °C	±2,5 °C
Humidity	±1%	±10%

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

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

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

This report cannot be reproduced except in full, without prior written approval of the Company.

This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The product was configured for testing in engineering mode which provided by manufacturer.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	867.1	5	867.9
2	867.3	6	868.1
3	867.5	7	868.3
4	867.7	8	868.5

The normal and extreme test condition as below:

L.T.: Low Temperature -20℃; N.T.: Normal Temperature +25℃; H.T.: High Temperature +50℃;
L.V.: Low Voltage 203VAC; N.V.: Normal Voltage 230VAC; H.V.: High Voltage 253VAC;

The extreme test condition is declared by applicant.

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

Software: 'putty.exe▲', and the maximum power level is configured as below setting, which was provided by manufacturer.

Mode	Channel	Frequency (MHz)	Power level	
			LoRa1	ANT1
LORA	Low	867.1	6	7
	High	868.5	6	7

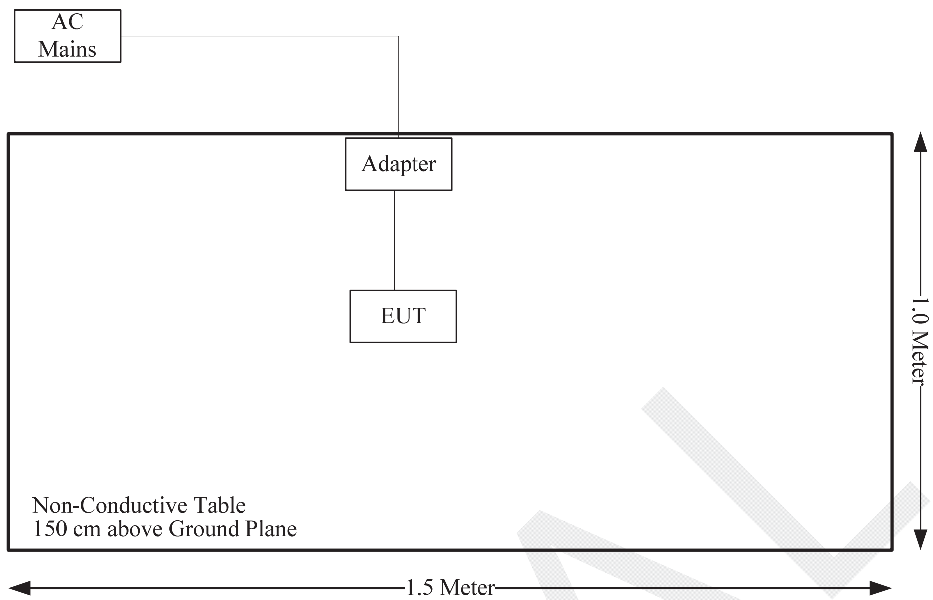
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

Support Cable List and Details

Cable Description	Shielding Cable	Ferrite Core	Length (m)	From Port	To
Power Cable	No	Yes	1.5	adapter	EUT

Block Diagram of Test Setup



Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-2	2020-08-25	2023-08-25
R&S	EMI Test Receiver	ESCI	100224	2020-09-12	2021-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2020-08-19	2021-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2020-08-19	2021-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2020-08-19	2021-08-18
Sonoma	Amplifier	310N	185914	2020-08-19	2021-08-18
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2020-09-04	2021-09-03
Agilent	Signal Generator	E8247C	MY43321350	2021-04-25	2022-04-24
Radiated above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Agilent	Spectrum Analyzer	E4440A	SG43360054	2020-07-22	2021-07-21
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2020-09-04	2021-09-03
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	2020-09-04	2021-09-03
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2020-09-04	2021-09-03
Agilent	Signal Generator	E8247C	MY43321350	2021-04-25	2022-04-24
RF conducted					
R&S	Spectrum Analyzer	FSV40	101474	2020-07-07	2021-07-07
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201047	2020-05-06	2021-05-06
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	2020-09-06	2021-09-06
Agilent	MXG Vector Signal Generator	N5182B	MY51350142	2020-11-08	2021-11-07
Agilent	Signal Generator	E8247C	MY43321350	2020-12-09	2021-12-08
UNI-T	Multimeter	UT39A	M130199938	2020-08-25	2021-08-24
BACL	TEMP&HUMI Test Chamber	BTH-150	30022	2021-02-24	2022-02-23

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Environmental Conditions

Test Item:	Radiated emissions	RF conducted
Temperature:	28.3~28.8℃	24.5~26.3°C
Relative Humidity:	60~63%	49~56%
ATM Pressure:	101.1 kPa	101.2~101.3kPa
Tester:	Jeremy Liang, Burt Hu	Jack Zou
Test Date:	2021.06.15	2021.03.16, 2021.10.17

SUMMARY OF TEST RESULTS

Rules	Description of Test	Result	Condition
4.2.1	Operating frequency	Compliance	/
4.2.2	Unwanted emissions in the spurious domain	Compliance	/
4.3.1	Effective radiated power	Compliance	/
4.3.2	Maximum e.r.p. spectral density	Not Applicable	Applies to EUT using annex B band I. Applies to EUT using DSSS or wideband techniques other than FHSS modulation, using annex C band W, AA or AC.
4.3.3	Duty cycle	Compliance	Not applicable to EUT with polite spectrum access where permitted in annex B, table B.1.
4.3.4	Occupied Bandwidth	Compliance	/
4.3.5	Tx Out of Band Emissions	Compliance	Applies to EUT with OCW > 25 kHz.
4.3.6	Transient Power	Compliance	/
4.3.7	Adjacent channel power	Not Applicable	Applies to EUT with OCW ≤ 25 kHz.
4.3.8	TX behaviour under Low Voltage Conditions	Not Applicable	Applies to battery powered EUT.
4.3.9	Adaptive Power Control	Not Applicable	Applies to EUT with adaptive power control using annex C band AF.
4.3.10	FHSS equipment	Not Applicable	Applies to FHSS EUT using the band 863 MHz to 870 MHz.
4.3.11	Short term behaviour	Not Applicable	Applies to EUT using annex C bands AD, AE, AF, AG, AH, or AI.
4.4.1	RX sensitivity	Not Applicable	Applies to EUT employing polite spectrum access.
4.4.2	Blocking	Compliance	/
4.5.2	Clear Channel Assessment threshold	Not Applicable	Applies to EUT employing polite spectrum access.
4.5.3	Polite spectrum access timing parameters	Not Applicable	Applies to EUT employing polite spectrum access.
4.5.4	Adaptive Frequency Agility	Not Applicable	Applies to EUT with AFA.

4.2.1 – OPERATING FREQUENCY

Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.1.1, the nominal operating frequency is the centre of a channel of width OCW.

Limit

The manufacturer may declare either one or more operating frequencies and operating channels.
Operating channel(s) shall be entirely within operational frequency bands allowed by annexes B, C or any NRI

The below information shall be recorded in the test report

Value	Note
Operational Frequency band or bands	Declared by the manufacturer
Nominal Operating Frequency or Frequencies	Declared by the manufacturer
Operating Channel width(s) - OCW	Declared by the manufacturer

Result

The operational frequency band or bands, nominal operating frequency or Frequencies and operating channel width(s) – OCW are declared by the manufacturer

Note: Compliance, which is declared by the manufacturer.

Operating frequency band		Operating frequency (MHz)	Operating channel width (kHz)
AA	863-870 MHz	867.1-868.5	125

4.2.2 – UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.9.1.

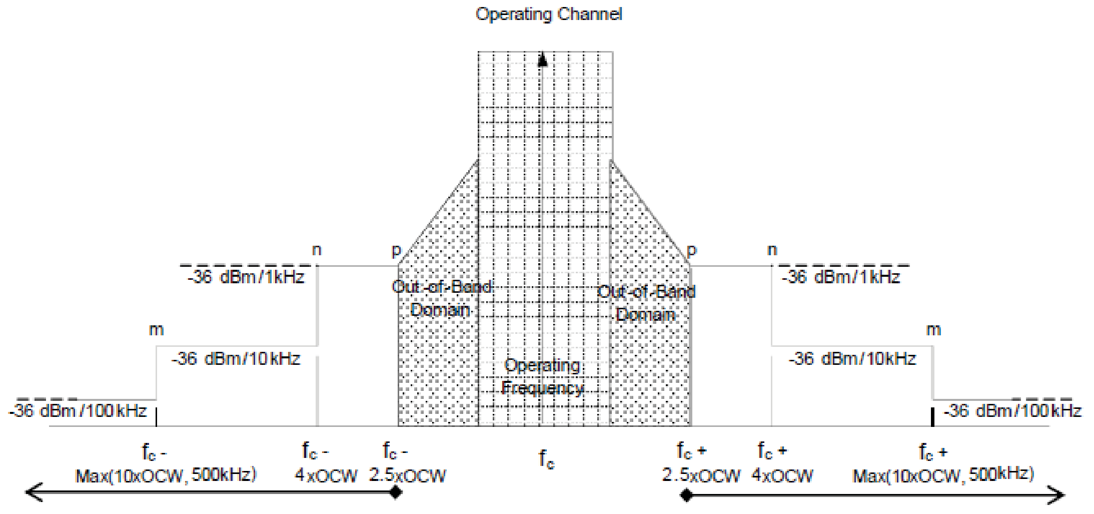


Figure 7: Spectrum Mask for Unwanted Emissions in the Spurious Domain with reference BW

Spurious emissions are unwanted emissions in the spurious domain at frequencies other than those of the Operating Channel and its Out Of Band Domain. The relevant spurious domain is shown in Figure 7.

Limit

The power of any unwanted emission in the spurious domain shall not exceed the values given in Table 19.

Table 19: Spurious domain emission limits

Frequency / State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
TX mode	-54 dBm	-36 dBm	-30 dBm
RX and all other modes	-57 dBm	-57 dBm	-47 dBm

Method of Measurement

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.9.3.

Test Data

Test result: Compliance. Please refer to the following tables.

Radiated spurious emissions:

TX_low channel _ LoRa1 867.1 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
179.50	H	30.14	-81.07	0.00	0.24	-81.31	-54.00	27.31
266.68	V	30.30	-77.34	0.00	0.28	-77.62	-36.00	41.62
1734.20	H	44.97	-58.92	10.90	0.73	-48.75	-30.00	18.75
1734.20	V	48.57	-55.92	10.90	0.73	-45.75	-30.00	15.75
2601.30	H	39.97	-63.03	13.20	1.31	-51.14	-30.00	21.14
2601.30	V	43.98	-59.31	13.20	1.31	-47.42	-30.00	17.42
3468.40	H	40.17	-59.00	13.89	1.62	-46.73	-30.00	16.73
3468.40	V	42.30	-56.90	13.89	1.62	-44.63	-30.00	14.63

TX_high channel _ LoRa1 868.5 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
183.15	H	29.30	-81.76	0.00	0.23	-81.99	-54.00	27.99
377.26	V	29.00	-75.78	0.00	0.36	-76.14	-36.00	40.14
1737.00	H	41.95	-61.96	10.91	0.72	-51.77	-30.00	21.77
1737.00	V	46.86	-57.65	10.91	0.72	-47.46	-30.00	17.46
2605.50	H	43.98	-58.97	13.19	1.31	-47.09	-30.00	17.09
2605.50	V	44.08	-59.16	13.19	1.31	-47.28	-30.00	17.28
3474.00	H	39.53	-59.61	13.88	1.62	-47.35	-30.00	17.35
3474.00	V	37.19	-61.98	13.88	1.62	-49.72	-30.00	19.72

RX_low channel_ LoRa2 867.1 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
156.26	H	45.54	-65.12	0.00	0.24	-65.36	-57.00	8.36
322.50	V	44.90	-61.45	0.00	0.33	-61.78	-57.00	4.78
1744.00	H	39.87	-64.08	10.93	0.72	-53.87	-47.00	6.87
1744.00	V	40.23	-64.32	10.93	0.72	-54.11	-47.00	7.11

RX_high channel _ LoRa2 868.5 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
165.25	H	45.41	-65.50	0.00	0.24	-65.74	-57.00	8.74
326.36	V	44.7	-61.54	0.00	0.33	-61.87	-57.00	4.87
1200.00	H	38.53	-64.45	7.30	1.09	-58.24	-47.00	11.24
1200.00	V	38.59	-65.49	7.30	1.09	-59.28	-47.00	12.28

TX_low channel _ ANT1 867.1 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
123.60	H	46.03	-63.66	0.00	0.21	-63.87	-36.00	27.87
355.4	V	44.9	-60.51	0.00	0.35	-60.86	-36.00	24.86
1734.20	H	42.76	-61.13	10.90	0.73	-50.96	-30.00	20.96
1734.20	V	42.27	-62.22	10.90	0.73	-52.05	-30.00	22.05
2601.30	H	40.39	-62.61	13.20	1.31	-50.72	-30.00	20.72
2601.30	V	39.13	-64.16	13.20	1.31	-52.27	-30.00	22.27
3468.40	H	35.76	-63.41	13.89	1.62	-51.14	-30.00	21.14
3468.40	V	36.31	-62.89	13.89	1.62	-50.62	-30.00	20.62

TX_high channel _ ANT1 868.5 MHz

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
236.15	H	45.20	-64.34	0.00	0.25	-64.59	-36.00	28.59
328.70	V	44.6	-61.57	0.00	0.33	-61.90	-36.00	31.90
1737.00	H	43.79	-60.12	10.91	0.72	-49.93	-30.00	19.93
1737.00	V	42.78	-61.73	10.91	0.72	-51.54	-30.00	21.54
2605.50	H	37.92	-65.03	13.19	1.31	-53.15	-30.00	23.15
2605.50	V	38.53	-64.71	13.19	1.31	-52.83	-30.00	22.83
3474.00	H	37.03	-62.11	13.88	1.62	-49.85	-30.00	19.85
3474.00	V	35.85	-63.32	13.88	1.62	-51.06	-30.00	21.06

RX_low channel_ ANT2 867.1 MHz

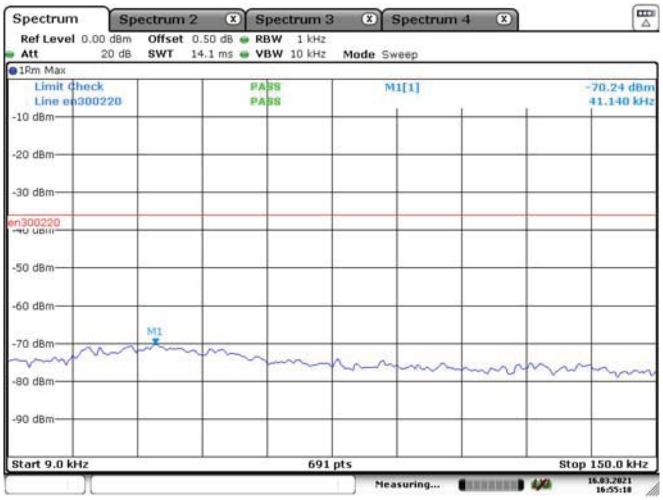
Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
170.56	H	45.36	-65.66	0.00	0.24	-65.90	-57.00	8.90
267.50	V	44.70	-62.93	0.00	0.28	-63.21	-57.00	6.21
1200.00	H	39.73	-63.25	7.30	1.09	-57.04	-47.00	10.04
1200.00	V	38.76	-65.32	7.30	1.09	-59.11	-47.00	12.11

RX_high channel _ ANT2 868.5 MHz

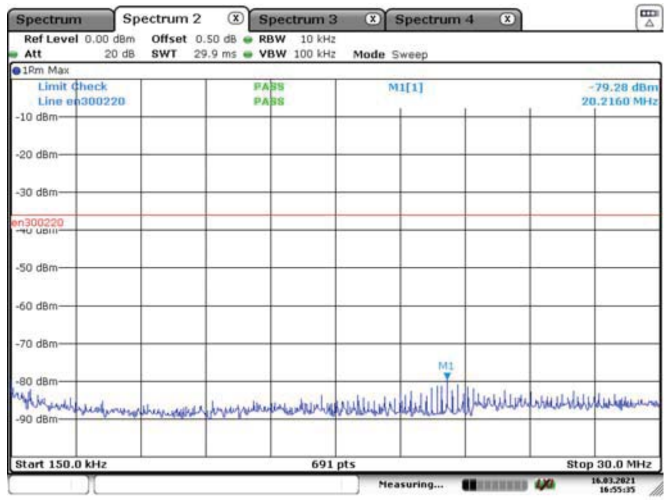
Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
286.40	H	46.1	-62.72	0.00	0.30	-63.02	-57.00	6.02
320.84	V	44.58	-61.81	0.00	0.32	-62.13	-57.00	5.13
1072.00	H	38.04	-65.79	7.54	0.94	-59.19	-47.00	12.19
1072.00	V	38.12	-66.17	7.54	0.94	-59.57	-47.00	12.57

Note 1: The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.
Note 2:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

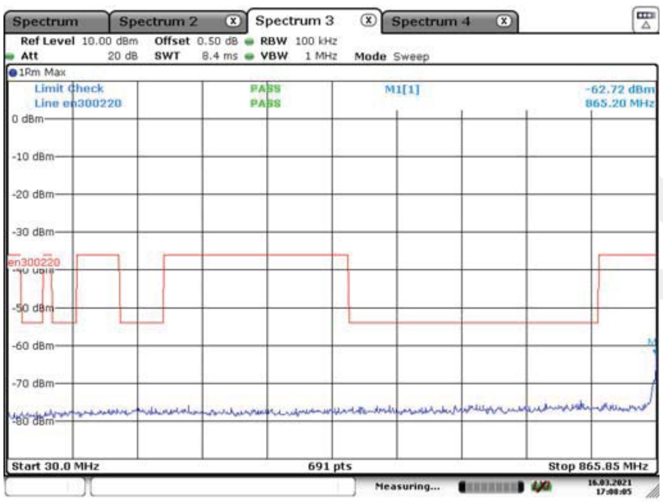
Conducted spurious emissions:
TX_low channel _ LoRa1:



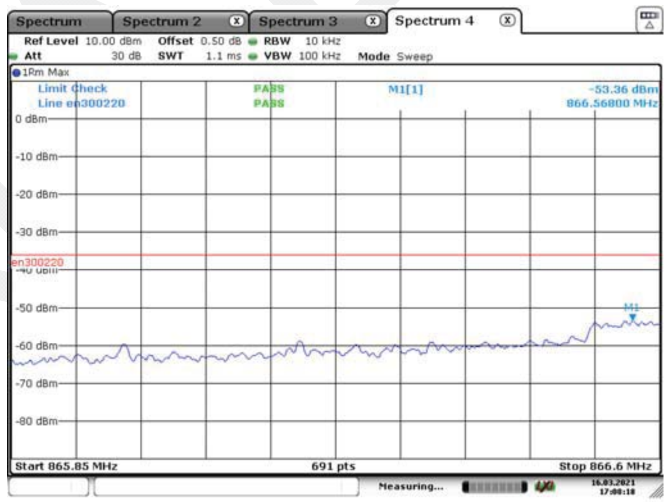
Date: 16.MAR.2021 16:55:18



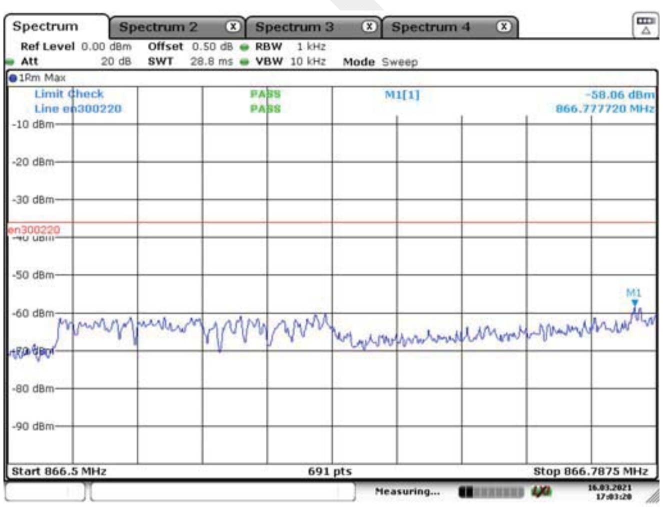
Date: 16.MAR.2021 16:55:35



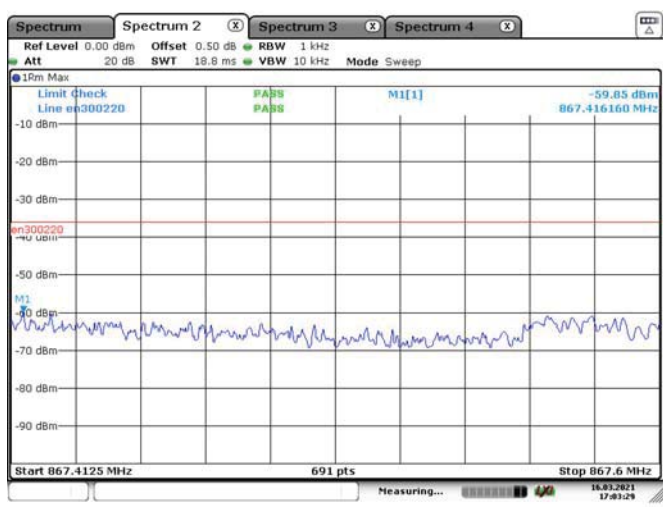
Date: 16.MAR.2021 17:08:05



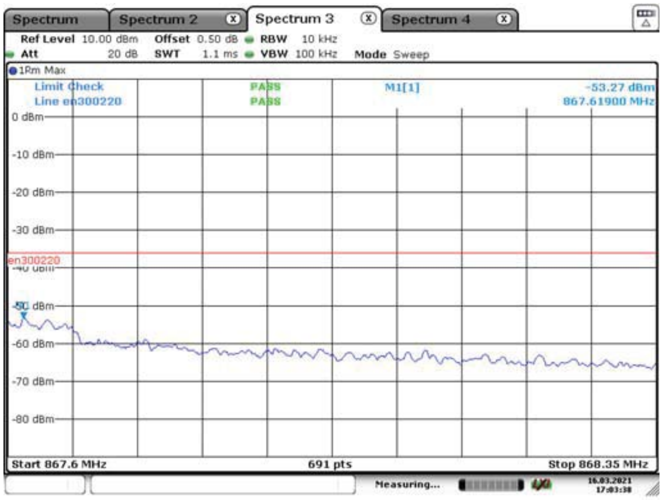
Date: 16.MAR.2021 17:08:18



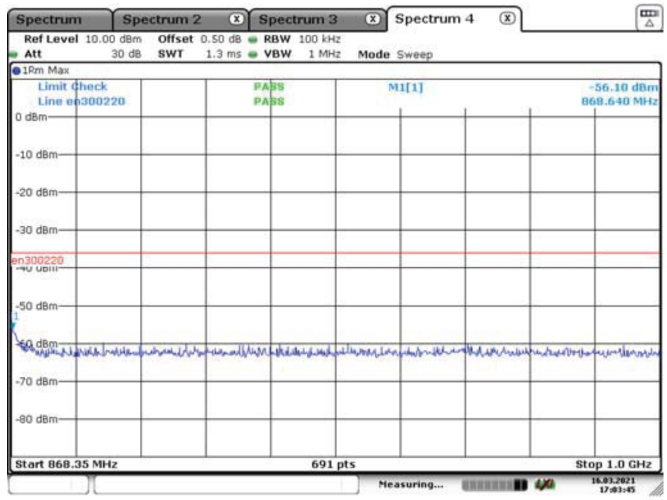
Date: 16.MAR.2021 17:03:20



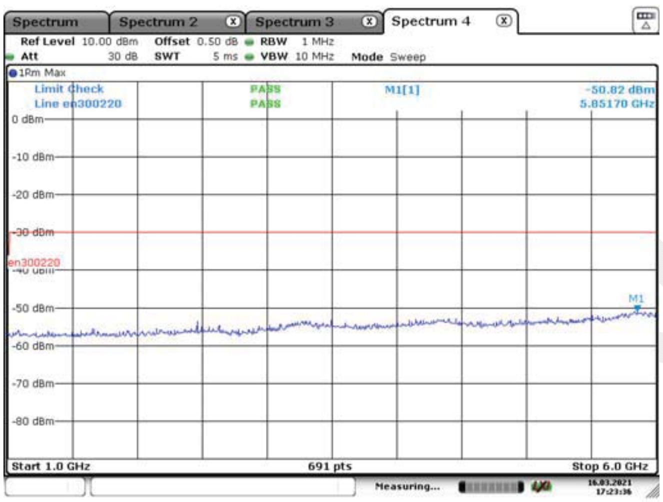
Date: 16.MAR.2021 17:03:30



Date: 16.MAR.2021 17:03:39

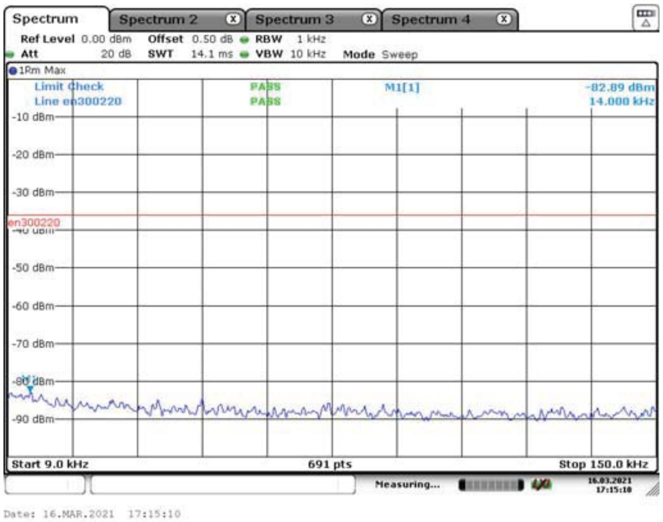


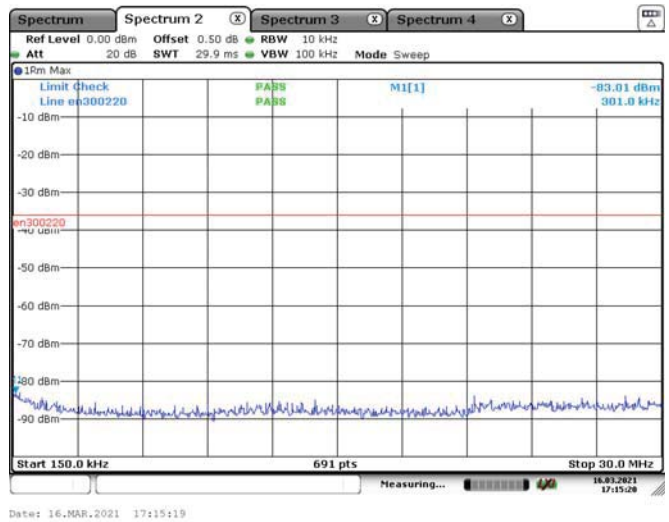
Date: 16.MAR.2021 17:03:46

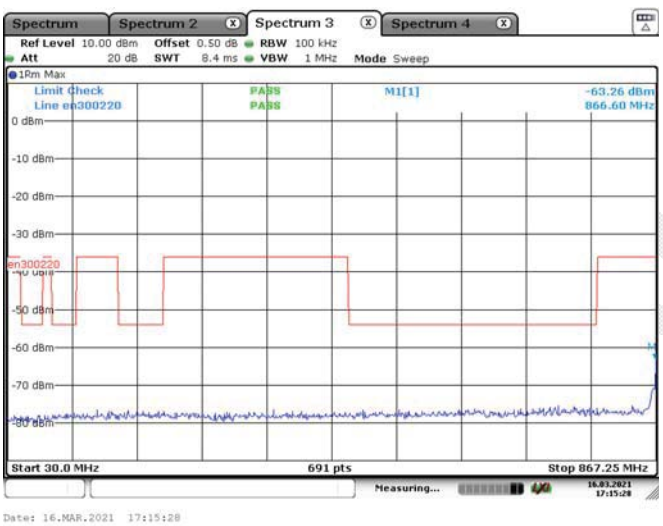


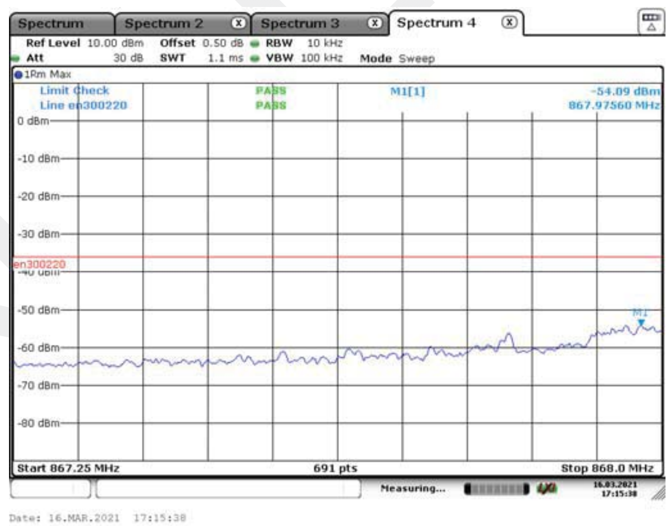
Date: 16.MAR.2021 17:23:36

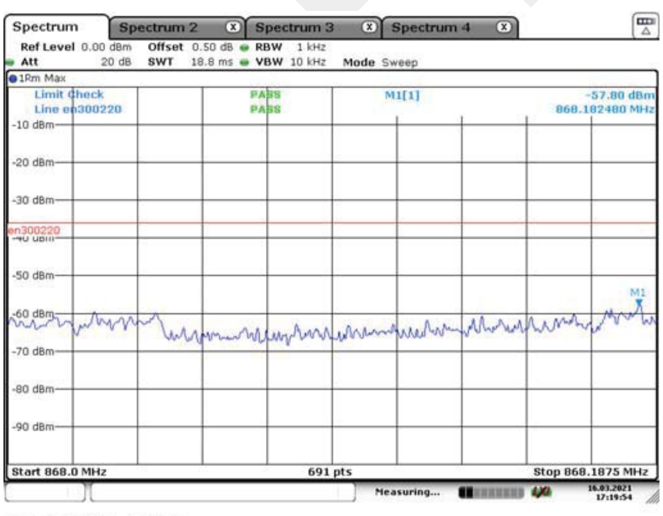
TX_high channel _ LoRa1:

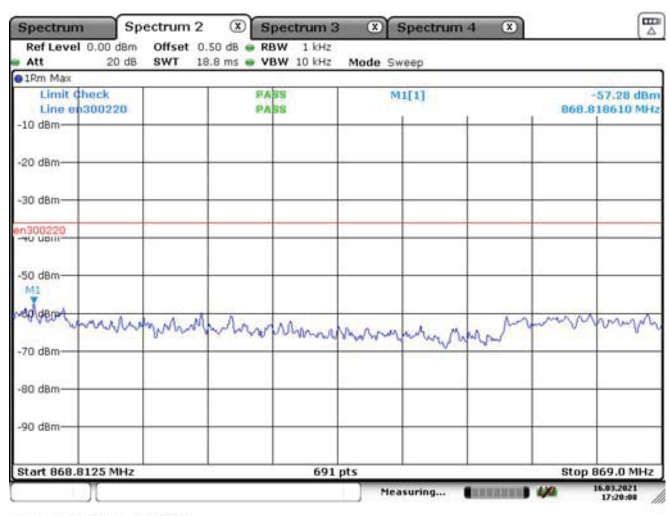


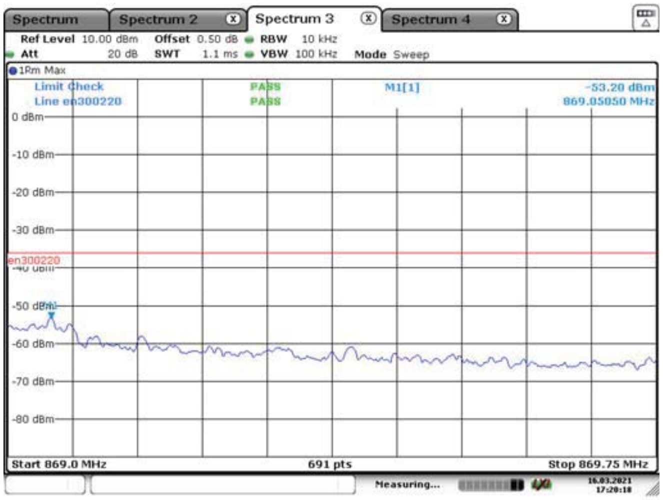




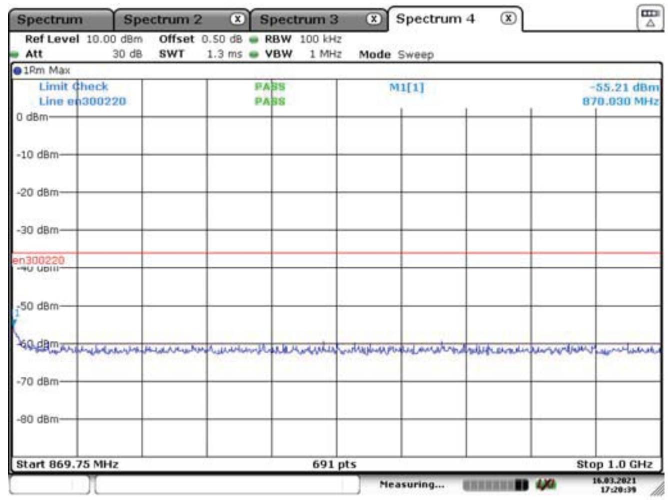




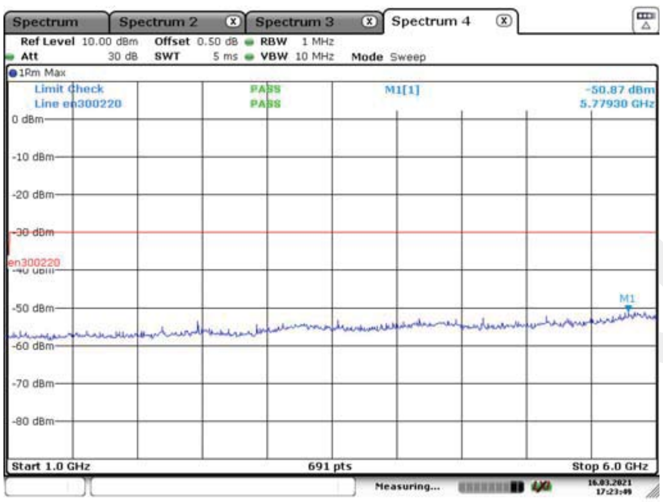




Date: 16.MAR.2021 17:20:18

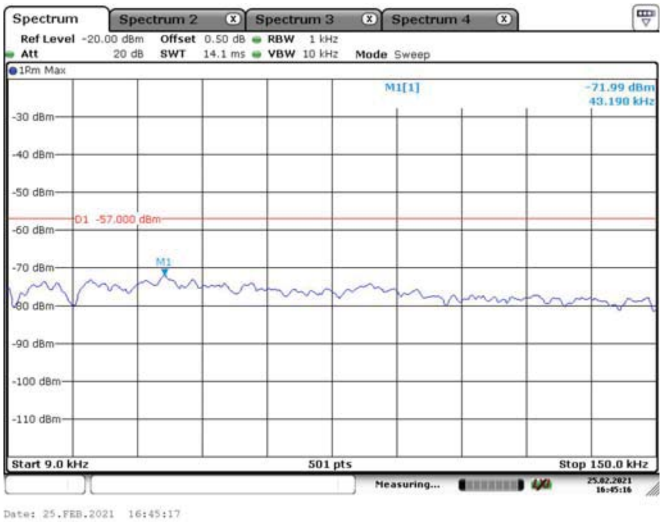


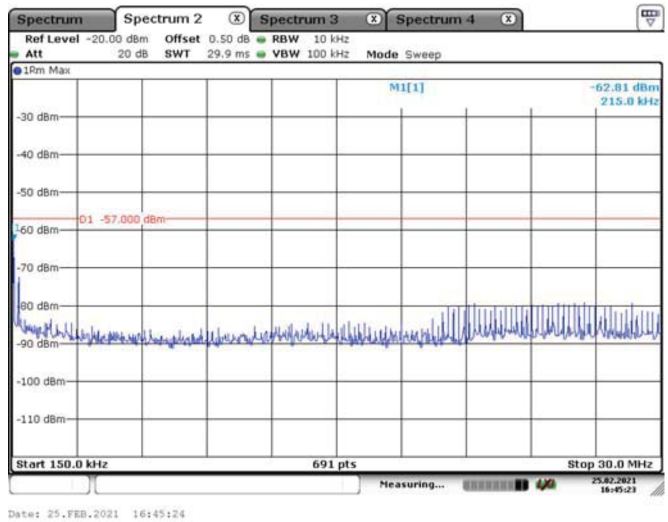
Date: 16.MAR.2021 17:20:39

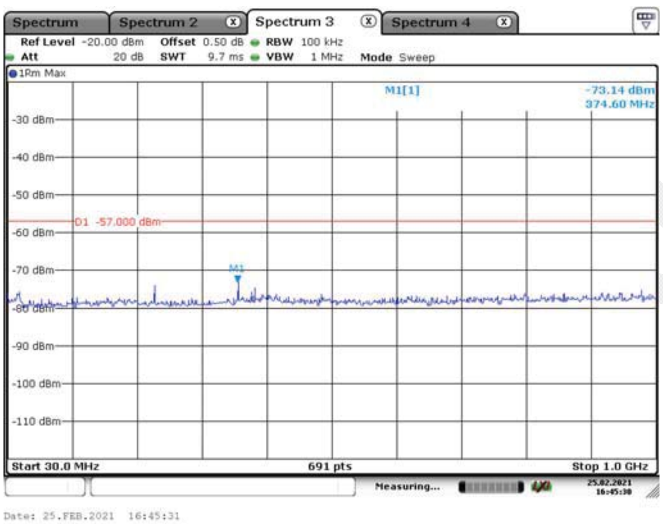


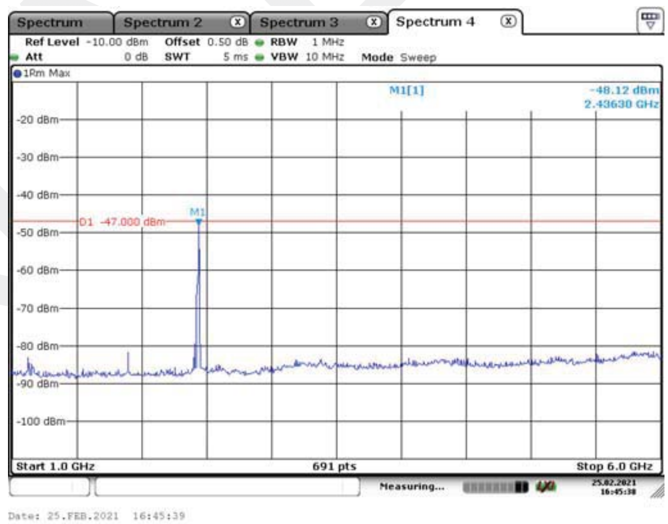
Date: 16.MAR.2021 17:23:49

RX_low channel _ LoRa2:

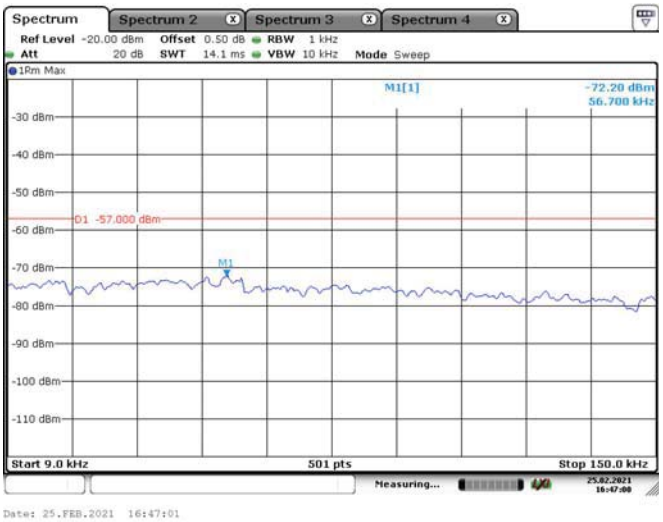


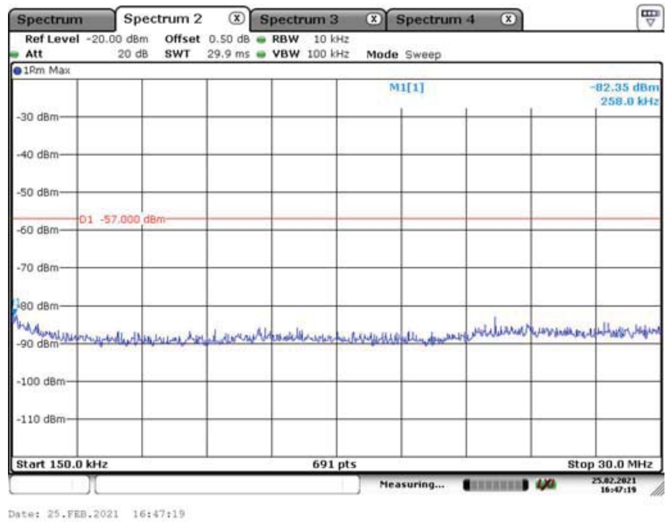


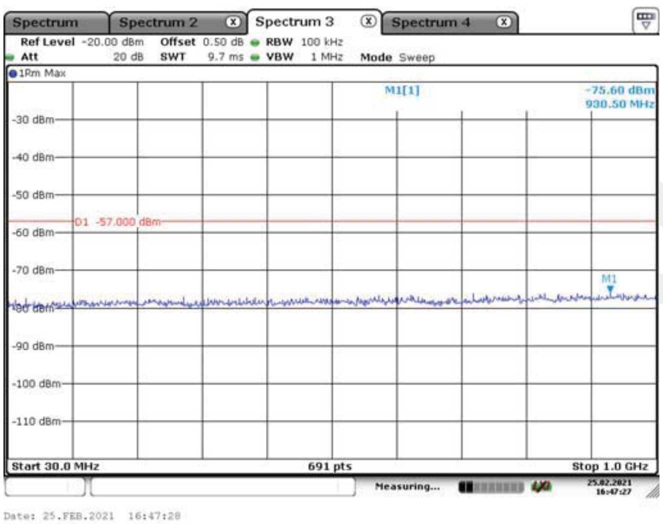


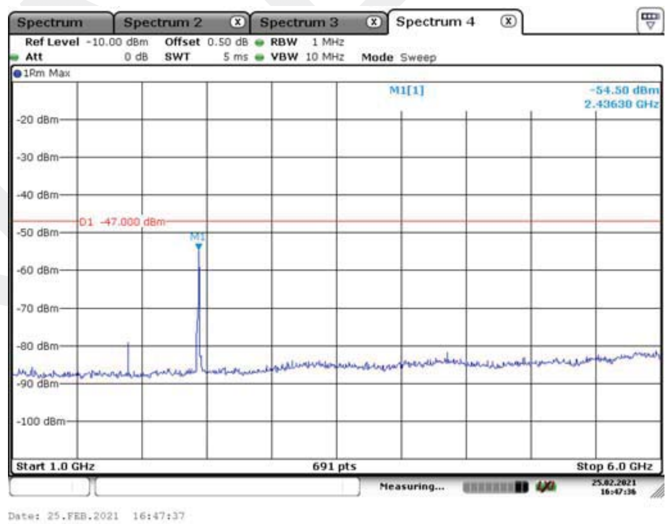


RX_high channel _ LoRa2:

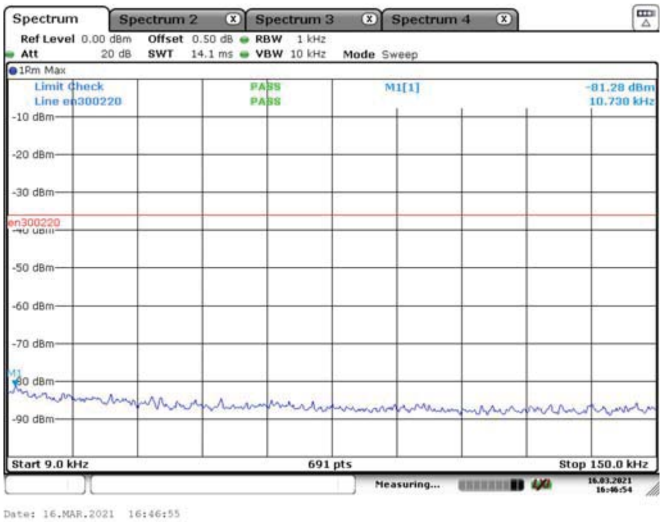


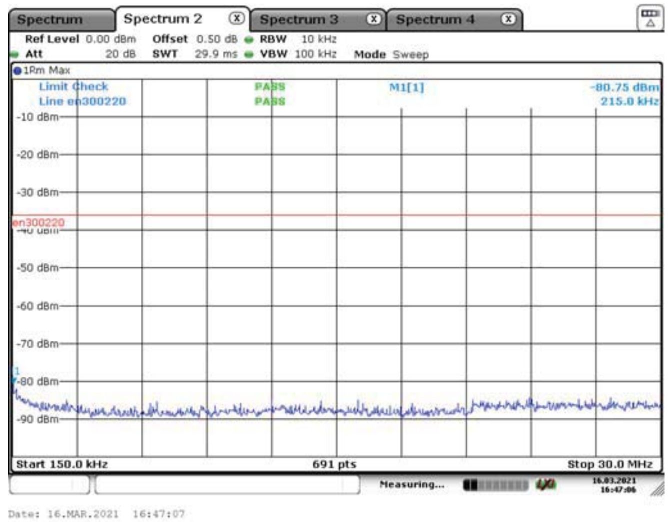


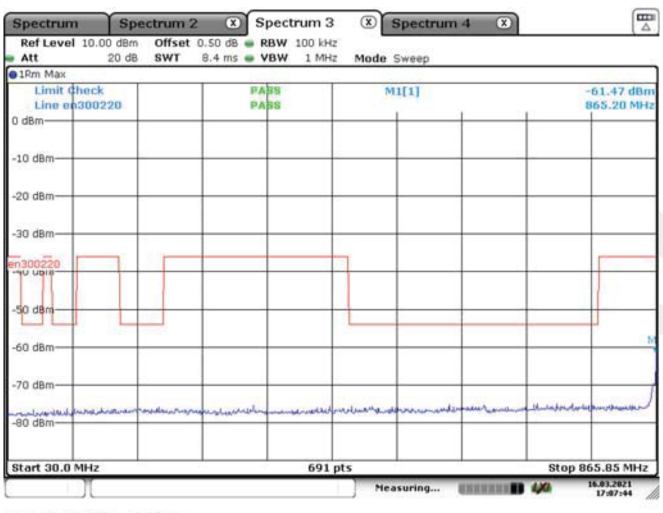


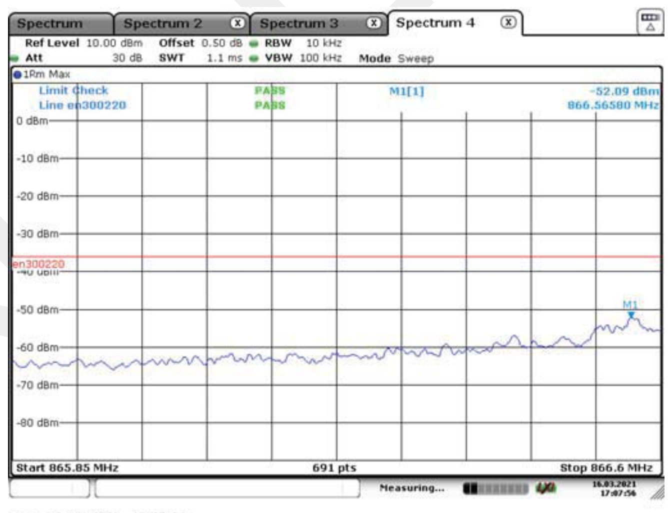


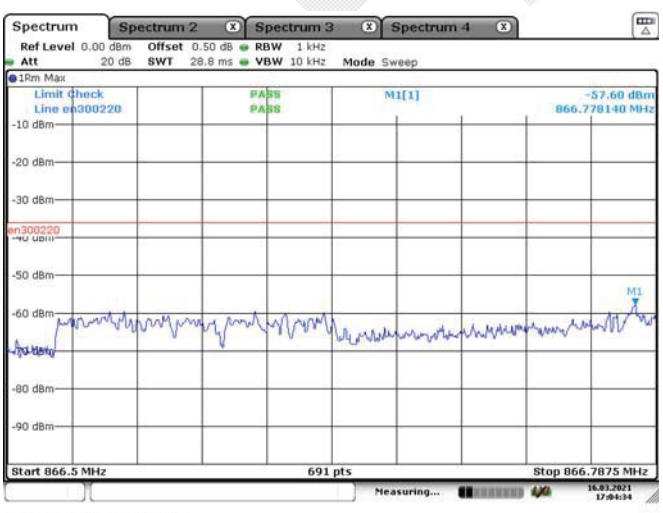
TX_low channel _ ANT1:

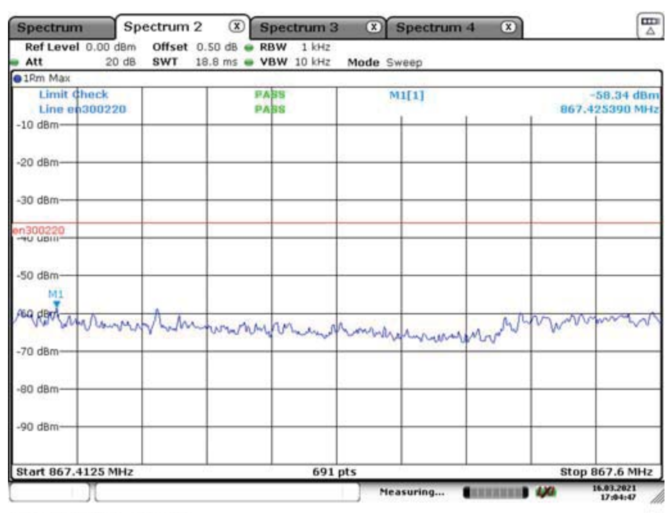


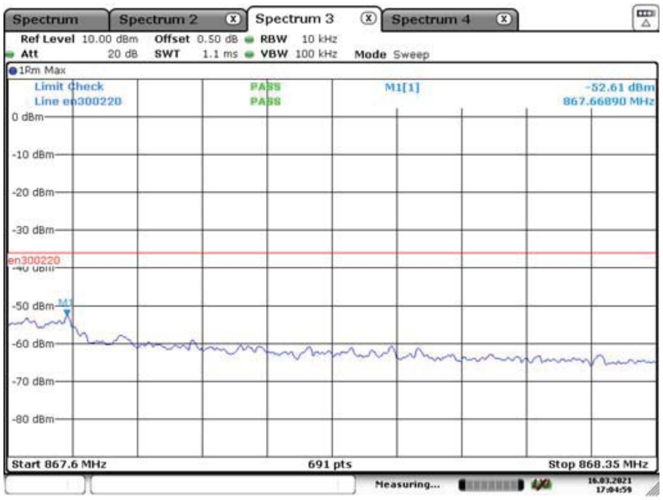




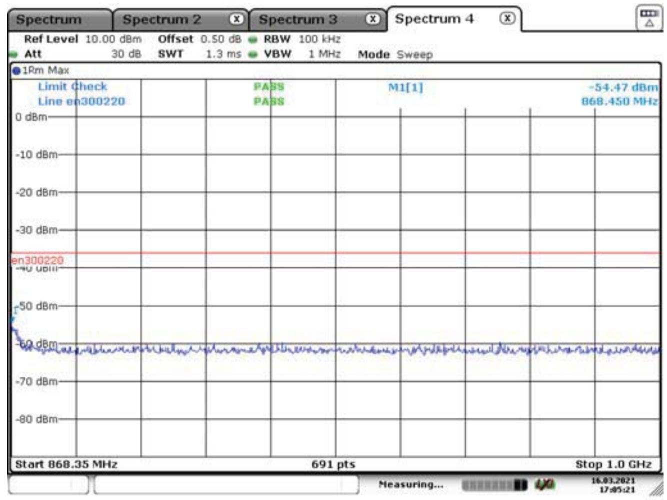




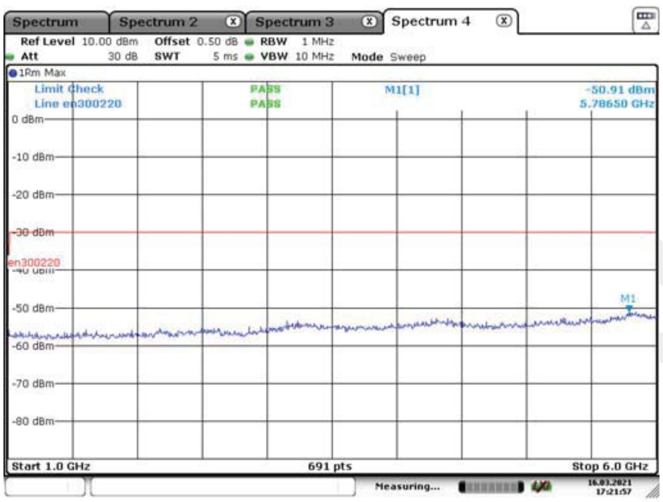




Date: 16.MAR.2021 17:04:59

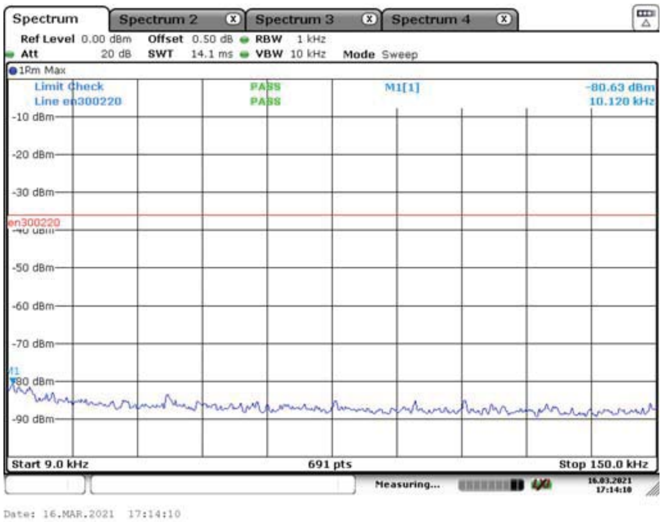


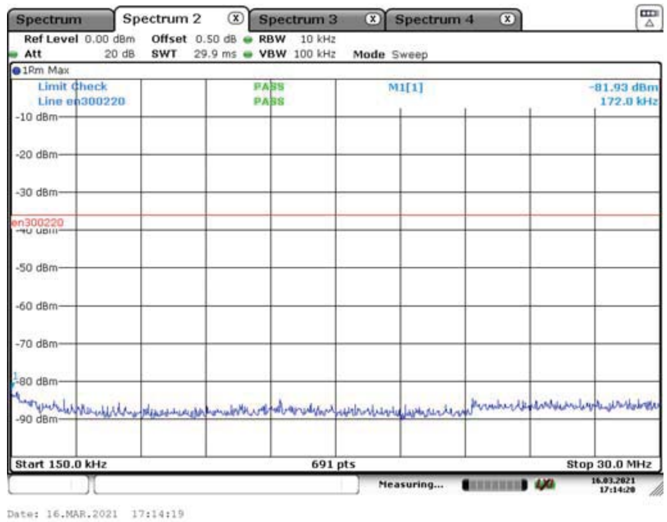
Date: 16.MAR.2021 17:05:22

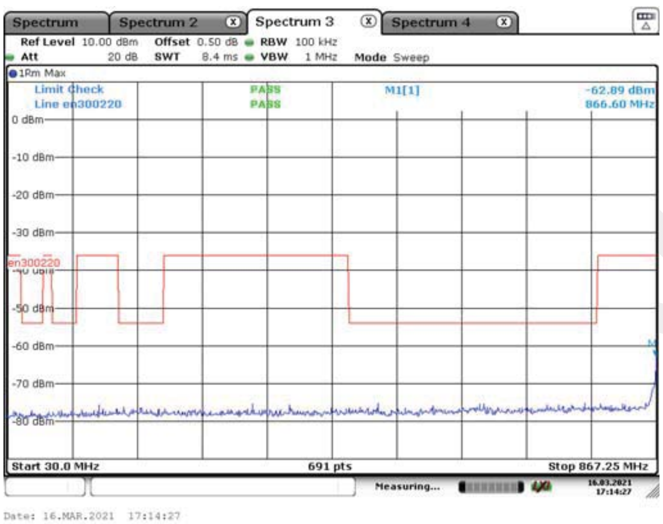


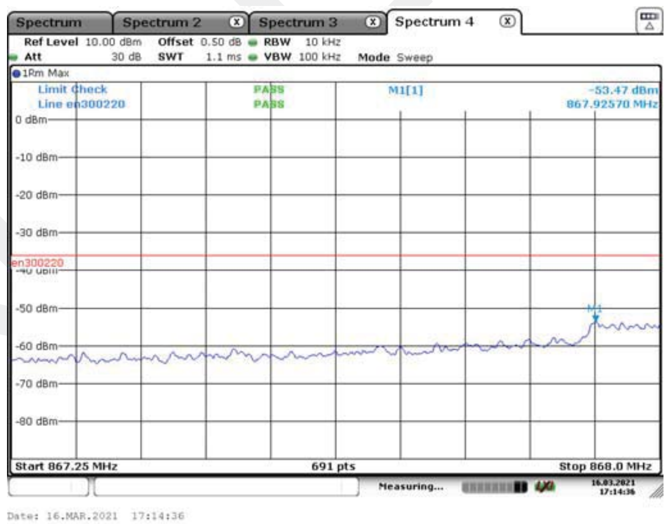
Date: 16.MAR.2021 17:21:57

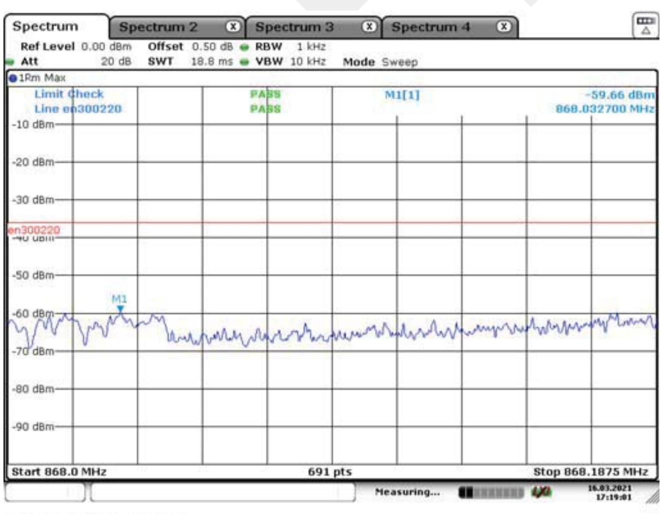
TX_high channel _ ANT1:

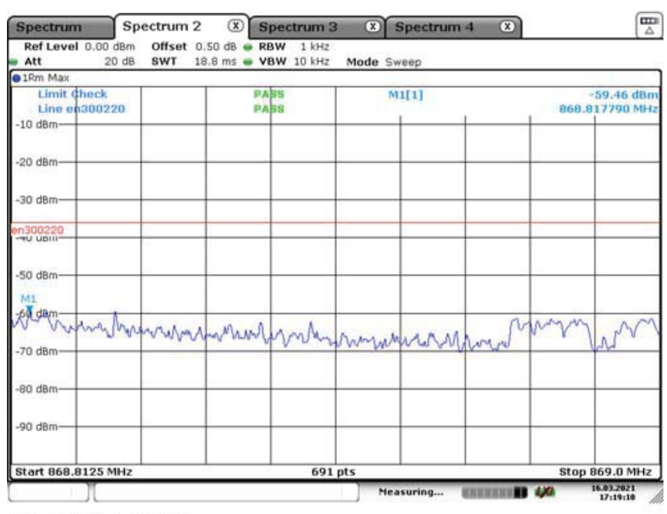


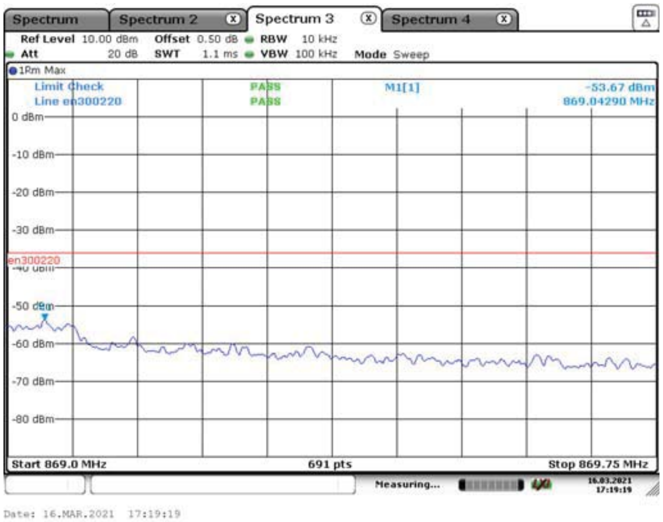


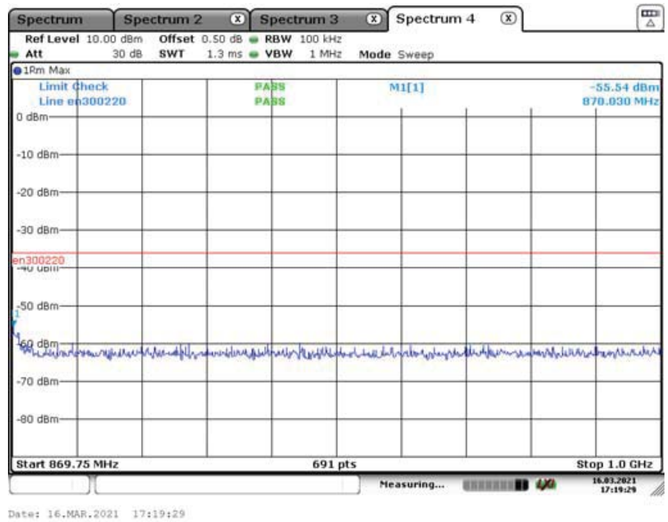


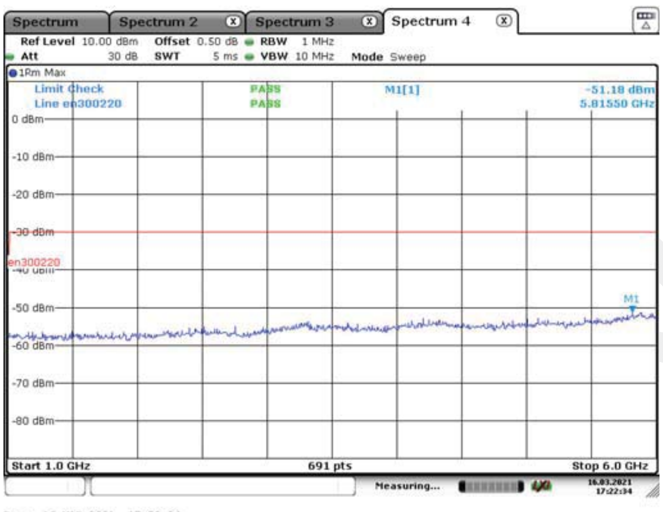




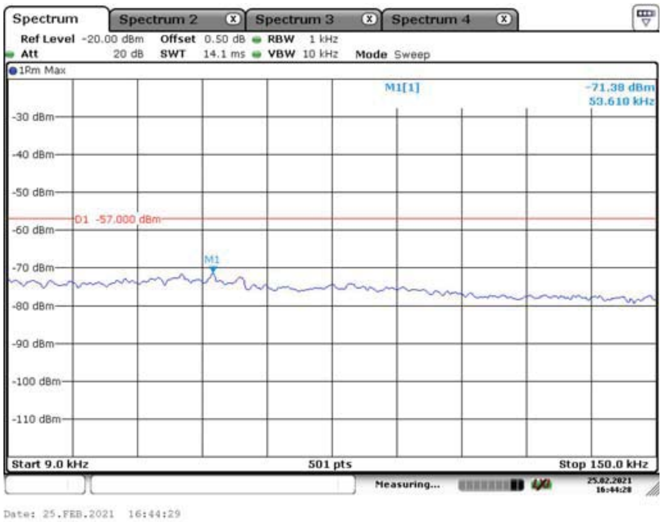


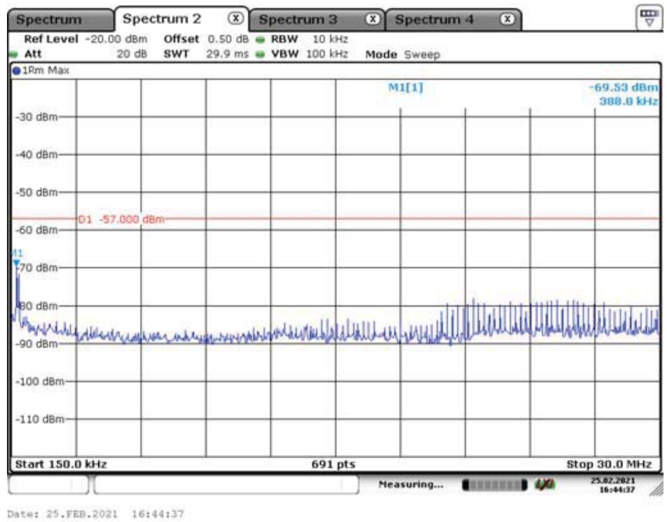

Spectrum
Spectrum 2
Spectrum 3
Spectrum 4
Ref Level 10.00 dBm Offset 0.50 dB RBW 10 kHz
Att 20 dB SWT 1.1 ms VBW 100 kHz Mode Sweep
1Rm Max
Limit Check PASS
Line en300220 PASS
M1[1] -53.67 dBm
869.04290 MHz
en300220
Start 869.0 MHz
691 pts
Stop 869.75 MHz
Measuring...
Date: 16.MAR.2021 17:19:19

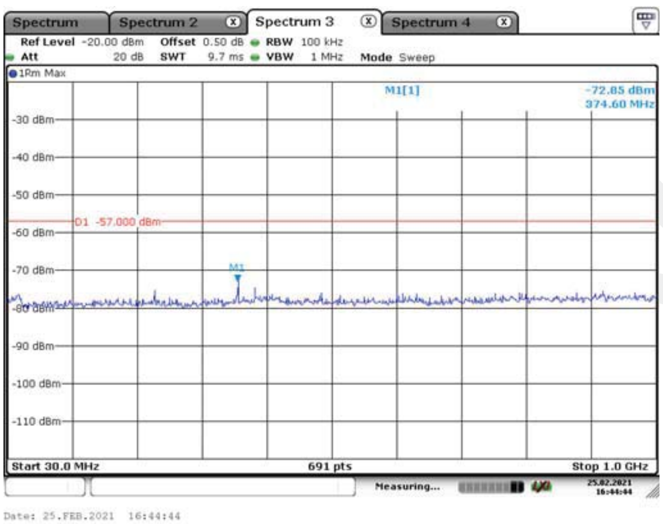

Spectrum
Spectrum 2
Spectrum 3
Spectrum 4
Ref Level 10.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 1.3 ms VBW 1 MHz Mode Sweep
1Rm Max
Limit Check PASS
Line en300220 PASS
M1[1] -55.54 dBm
870.030 MHz
en300220
Start 869.75 MHz
691 pts
Stop 1.0 GHz
Measuring...
Date: 16.MAR.2021 17:19:29

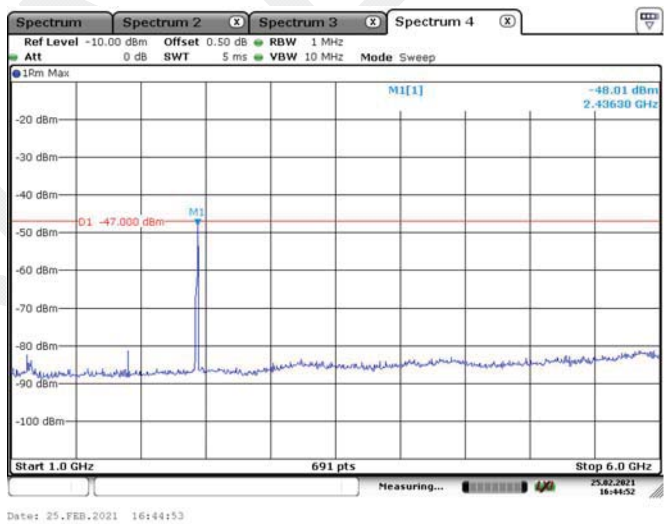

Spectrum
Spectrum 2
Spectrum 3
Spectrum 4
Ref Level 10.00 dBm Offset 0.50 dB RBW 1 MHz
Att 30 dB SWT 5 ms VBW 10 MHz Mode Sweep
1Rm Max
Limit Check PASS
Line en300220 PASS
M1[1] -51.18 dBm
5.81550 GHz
en300220
M1
Start 1.0 GHz
691 pts
Stop 6.0 GHz
Measuring...
Date: 16.MAR.2021 17:22:34

RX_low channel _ ANT2:

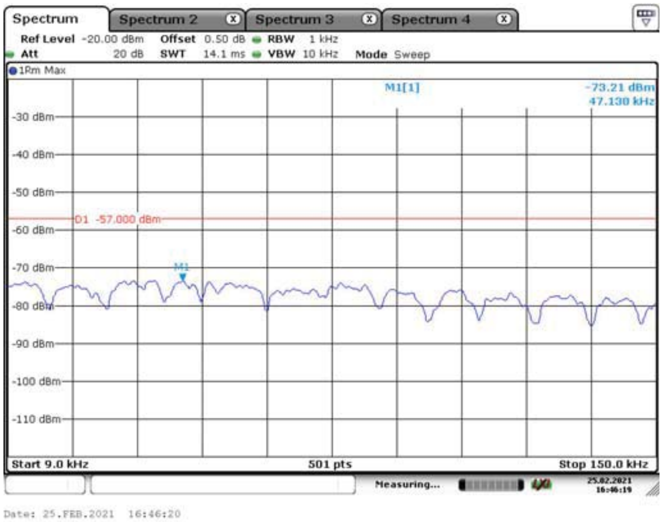


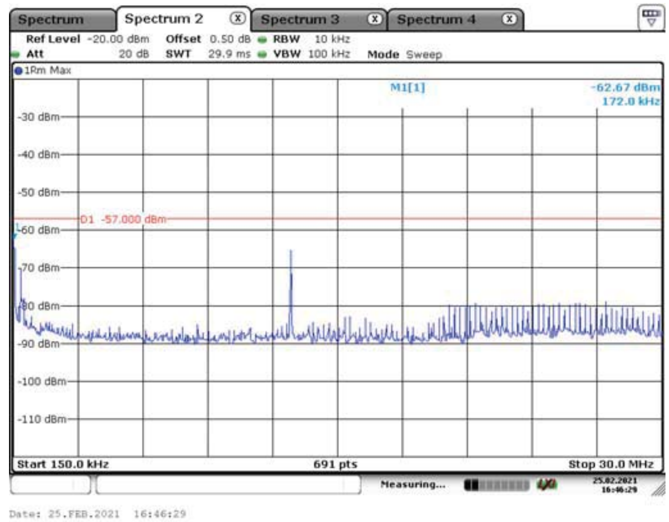


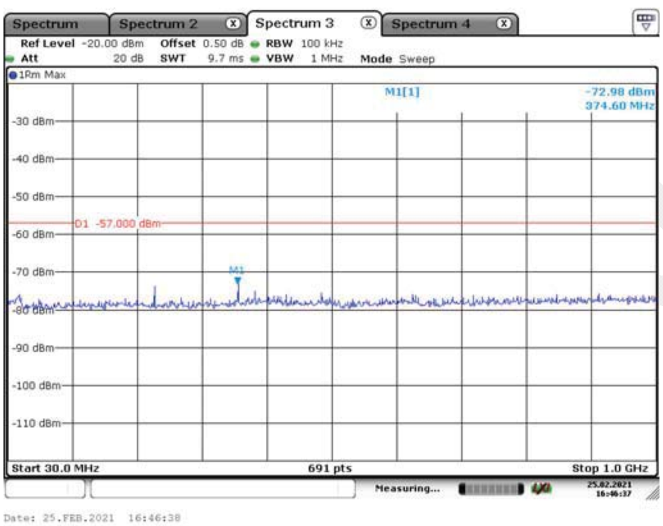


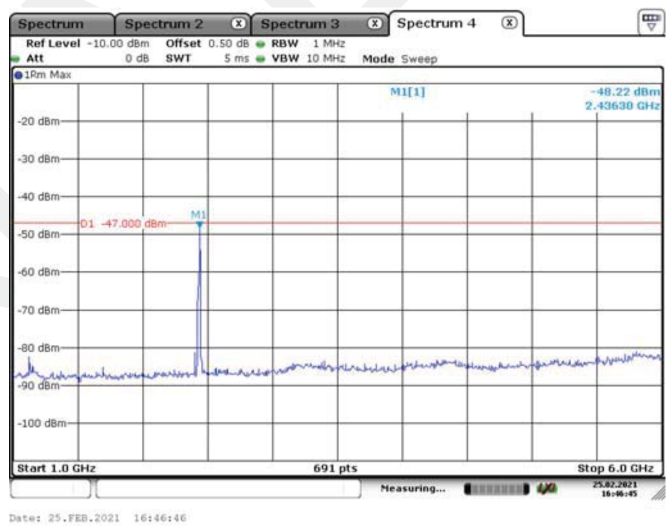


RX_high channel _ ANT2:









4.3.1 - EFFECTIVE RADIATED POWER

Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.2.1:

The effective radiated power (e.r.p) is the power radiated in the direction of the maximum radiated power under specified conditions of measurements for any condition of modulation. For equipment with a permanent or temporary antenna connection it may be taken as the power delivered from that connector taking into account the antenna gain.

According to ETSI EN 300 220-2 V3.1.1 (2017-02) clause 4.3.1.2:

Limit

The effective radiated power shall not be greater than the value allowed in annexes B or C for the chosen operational frequency band(s).

Method of Measurement

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.2.2.1:

Effective Radiated Power (conducted measurement):

This method applies only to EUT with a permanent external antenna connector.

The transmitter shall be connected to a dummy load as described in clause 4.3.7 and the conducted power delivered shall be measured with a measurement receiver according to clause 4.3.10.

In the case of non-constant envelope modulation, a peak detector shall be used.

The maximum gain of the antenna to be used together with the equipment shall be declared by the manufacturer and this shall be recorded in the test report.

Perp, the radiated power (e.r.p.) limit applies to the maximum measured conducted power (Pconducted) value adjusted by the antenna gain (relative to a dipole) (Perp=Pconducted+antenna gain).

The information shown in Table 7 shall be recorded in the test report.

Table 7: Information Recorded in the Test Report for conducted Effective Radiated Power

Value	Notes
Test environment	Normal operation or unmodulated carrier
Centre frequency	Nominal Operating Frequency
Measured Effective Radiated Power	maximum measured conducted power value adjusted by the antenna gain (relative to a dipole)
NOTE: In case of a dedicated antenna the antenna gain (in dB, i.e. relative to a dipole) is declared by the manufacturer.	

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.2.2.2:

Effective radiated power (radiated measurement):

This measurement method applies to EUT other than those measured using clause 5.2.2.1.

A suitable test site shall be selected from those described in clause C.1 and the radiated power established using the procedures described in clause C.5.1 (or clause C.5.2) depending on the test site, followed by clause C.5.3.

In the case of non-constant envelope modulation, a peak detector shall be used.

The information shown in Table 8 shall be recorded in the test report.

Table 8: Information Recorded in the Test Report for Effective Radiated Power

Value	Notes
Test environment	Normal operation or unmodulated carrier
Centre frequency	Nominal Operating Frequency
Measure of Effective Radiated Power	Larger value from horizontal and vertical measurement equivalent radiated power, plus equipment antenna gain
NOTE: In case of a removable antenna the antenna gain (in dB, i.e. relative to a dipole) is declared by the manufacturer.	

Test Data

Test Mode: Transmitting

LoRa1:

OCW (kHz)	Test Condition	Frequency (MHz)	Test result (dBm)	Antenna (dBi)	EIRP (dBm)	ERP (dBm)	Limit (dBm)
125	NVNT	**867.1**	6.8	2	8.8	6.65	14
		868.5	6.72	2	8.72	6.57	14
	LVLT	**867.1**	6.95	2	8.95	6.8	14
		868.5	6.74	2	8.74	6.59	14
	LVHT	**867.1**	6.85	2	8.85	6.7	14
		868.5	6.61	2	8.61	6.46	14
	HVLT	**867.1**	6.78	2	8.78	6.63	14
		868.5	6.62	2	8.62	6.47	14
	HVHT	**867.1**	6.8	2	8.8	6.65	14
		868.5	6.65	2	8.65	6.5	14

ANT1:

OCW (kHz)	Test Condition	Frequency (MHz)	Test result (dBm)	Antenna (dBi)	EIRP (dBm)	ERP (dBm)	Limit (dBm)
125	NVNT	**867.1**	6.75	4	10.75	8.6	14
		868.5	6.72	4	10.72	8.57	14
	LVLT	**867.1**	7.67	4	11.67	9.52	14
		868.5	7.42	4	11.42	9.27	14
	LVHT	**867.1**	6.83	4	10.83	8.68	14
		868.5	6.56	4	10.56	8.41	14
	HVLT	**867.1**	6.79	4	10.79	8.64	14
		868.5	6.71	4	10.71	8.56	14
	HVHT	**867.1**	6.81	4	10.81	8.66	14
		868.5	6.69	4	10.69	8.54	14

Note: ERP=EIRP-2.15dB

4.3.3 - DUTY CYCLE

Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.4:

Duty cycle is the ratio expressed as a percentage, of the cumulative duration of transmissions T_{on_cum} within an observation interval T_{obs}. = T_{on_cum} / T_{obs} on an observation bandwidth Fobs. Unless otherwise specified, T_{obs} is 1 hour and the observation bandwidth Fobs is the operational frequency band. Each transmission consists of an RF emission, or sequence of RF emissions separated by intervals < T_{Dis}.

An equipment may operate on several bands simultaneously (i.e. multi transmissions), Duty Cycle limit of each individual band applies to each transmission within that band.

In case of a multicarrier modulation in a band, the duty cycle applies to the whole signal used for a transmission (e.g. O

It has to be noted that on some bands Duty Cycle value may depend on the presence of a primary radio service.

Equipment may be triggered manually, by internal timing or by external stimulus. Depending on the method of triggering the timing may be predictable or random.

Method of measurement

An assessment of the overall Duty Cycle shall be made for a representative period of T_{obs} over the observation bandwidth F_{obs}. Unless otherwise specified, T_{obs} is 1 hour and the observation bandwidth Fobs is the operational frequency band.

The representative period shall be the most active one in normal use of the device. As a guide "Normal use" is considered as representing the behaviour of the device during transmission of 99 % of transmissions generated during its operational lifetime.

Procedures such as setup, commissioning and maintenance are not considered part of normal operation.

Where an acknowledgement is used, the additional transmitter on-time from a message responder shall be declared only once whether included in the message initiator Duty Cycle or in the message responder Duty Cycle.

Test Data

The duty cycle is less than 0.1% which was declared by manufacturer.

4.3.4 - OCCUPIED BANDWIDTH

Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.6:

The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β, which, in cases of symmetrical spectra, splits up into β/2 on each side of the spectrum. Unless otherwise specified, β/2 is taken as 0,5 % as described in Figure 3.

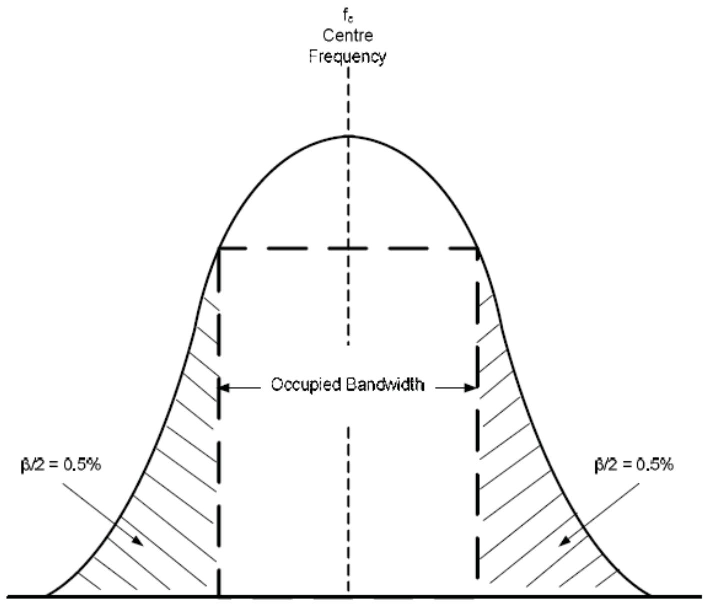


Figure 3: Signal occupied bandwidth

The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions.

Limit

The Operating Channel shall be declared and shall reside entirely within the Operational Frequency Band.

The Maximum Occupied Bandwidth at 99 % shall reside entirely within the Operating Channel defined by F_{low} and F_{high}.

Method of measurement

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.6.3:

The spectrum analyser shall be configured as appropriate for the parameters shown in Table 12.

Table 12: Test Parameters for Max Occupied Bandwidth Measurement

Setting	Value	Notes
Centre frequency	The nominal Operating Frequency	The highest or lowest Operating Frequency as declared by the manufacturer
RBW	1 % to 3 % of OCW without being below 100 Hz	
VBW	3 x RBW	Nearest available analyser setting to 3 x RBW
Span	At least 2 x Operating Channel width	Span should be large enough to include all major components of the signal and its side bands
Detector Mode	RMS	
Trace	Max hold	

If the equipment is capable of producing an unmodulated carrier and the test in clause 5.7 is performed, then the OBW measurements need only be performed under normal test conditions. Any required results for Maximum OBW under extreme conditions are obtained by addition and substraction of the upper and lower frequency error results to each bandwidth measurement obtained in this test.

Step 1: Operation of the EUT shall be started, on the highest operating frequency as declared by the manufacturer, with the appropriate test signal.

The signal attenuation shall be adjusted to ensure that the signal power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals on either side of the power envelope being included in the measurement.

Step 2: When the trace is completed the peak value of the trace shall be located and the analyser marker placed on this peak.

Step 3: The 99 % occupied bandwidth function of the spectrum analyser shall be used to measure the occupied bandwidth of the signal.

Test Data

Test Condition					Result
Normal	LVLT	LVHT	HVLT	HVHT	Compliance
Normal	LVLT	LVHT	HVLT	HVHT	Compliance

Normal condition test data as below:

LoRa1:

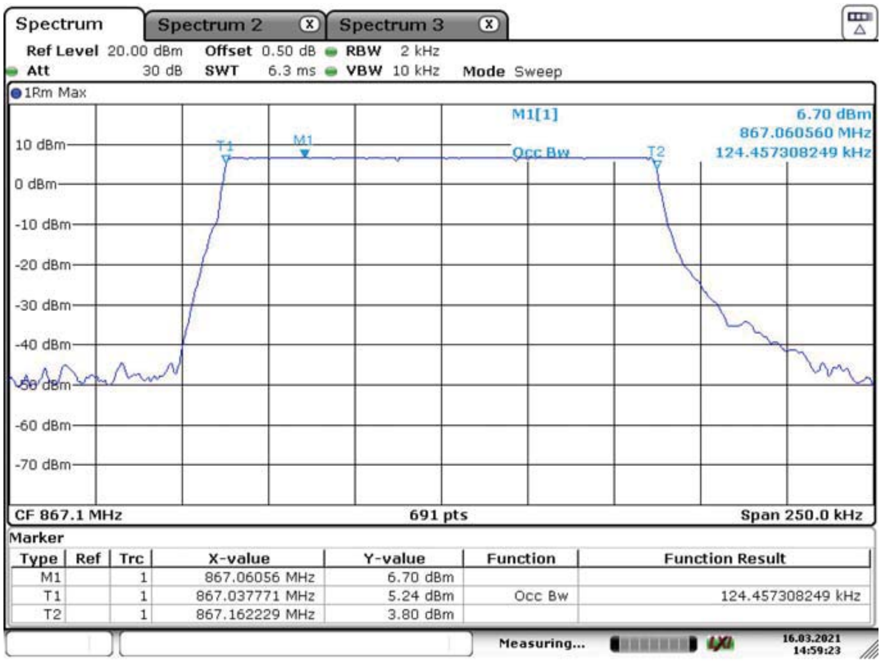
OCW (kHz)	Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
125	Low Channel	867.1	124.457
	High Channel	868.5	124.457

ANT1:

OCW (kHz)	Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
125	Low Channel	867.1	124.819
	High Channel	868.5	124.457

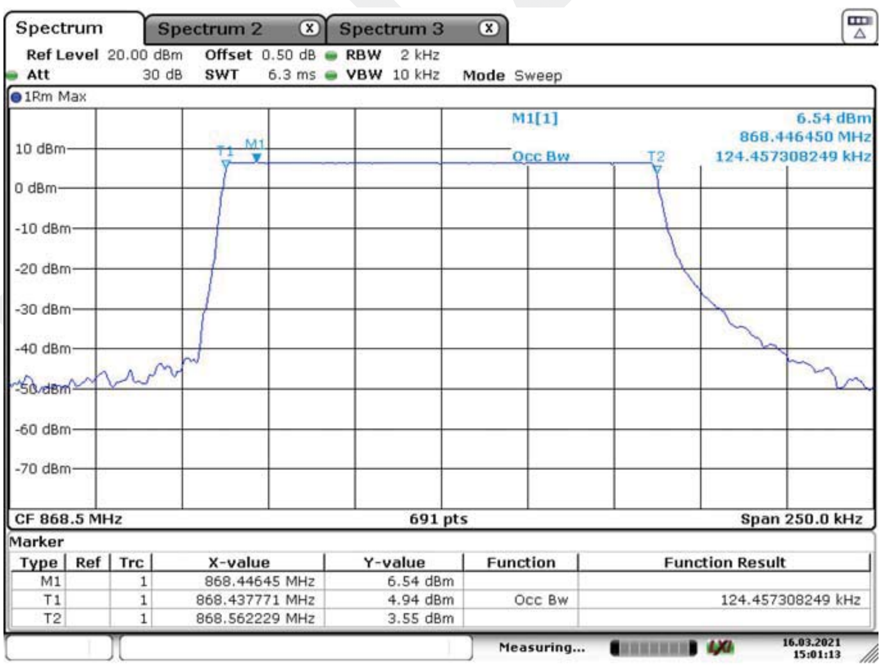
LoRa1:

867.1



Date: 16.MAR.2021 14:59:23

868.5

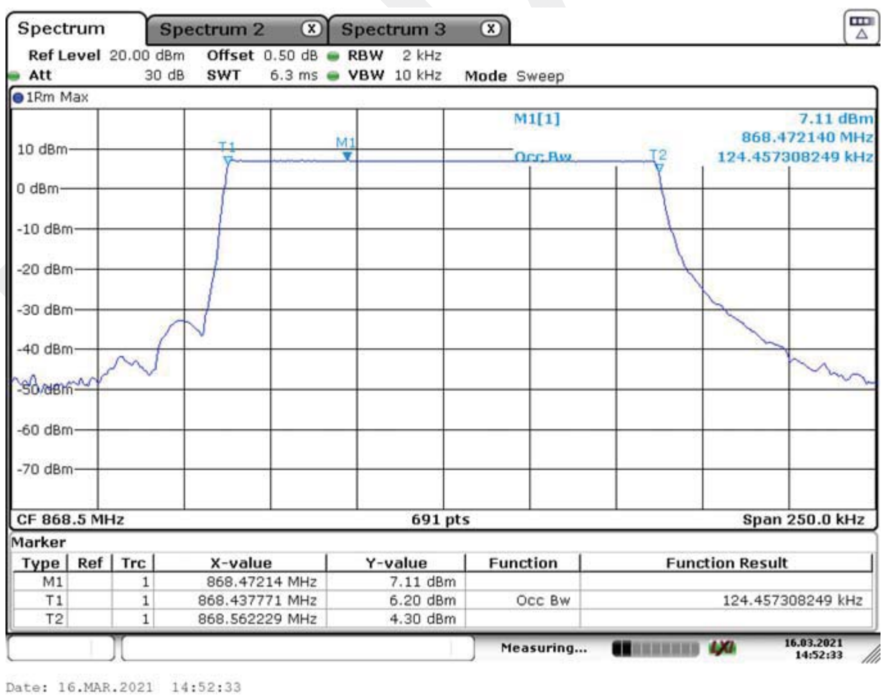


Date: 16.MAR.2021 15:01:13

ANT1:

867.1

868.5



4.3.5 – TX OUT OF BAND EMISSIONS

Applicable Standard

Two OOB domains are defined, one for OC and one for Operational Frequency band.

The spectrum masks for these two OOB domains may overlap.

Limit

The EUT emissions level in OOB domains for the Operating Channel and the Operational Frequency Band shall be less or equal to Table 15 spectrum mask.

Table 15: Emission limits in the Out Of Band domains

Domain	Frequency Range	RBW_{REF}	Max power limit
OOB limits applicable to Operational Frequency Band (See Figure 6)	$f \le f_{low\_OFB}$ - 400 kHz	10 kHz	-36 dBm
	F_{low_OFB} - 400 kHz $\le f \le f_{low\_OFB}$ - 200 kHz	1 kHz	-36 dBm
	f_{low} - 200 kHz $\le f < f_{low\_OFB}$	1 kHz	See Figure 6
	$f = f_{low\_OFB}$	1 kHz	0 dBm
	$f = f_{high\_OFB}$	1 kHz	0 dBm
	$F_{high\_OFB} < f \le f_{high\_OFB}$ + 200 kHz	1 kHz	See Figure 6
	F_{high_OFB} + 200 kHz $\le f \le f_{high\_OFB}$ + 400 kHz	1 kHz	-36 dBm
	F_{high_OFB} + 400 kHz $\le f$	10 kHz	-36 dBm
OOB limits applicable to Operating Channel (See Figure 5)	$f = f_c$ - 2.5 x OCW	1 kHz	-36 dBm
	f_c - 2,5 x OCW $\le f \le f_c$ - 0,5 x OCW	1 kHz	See Figure 5
	$f = f_c$ - 0,5 x OCW	1 kHz	0 dBm
	$f = f_c$ + 0,5 x OCW	1 kHz	0 dBm
	f_c + 0,5 x OCW $\le f \le f_c$ + 2,5 x OCW	1 kHz	See Figure 5
	$f = f_c$ + 2,5 x OCW	1 kHz	-36 dBm

NOTE: f is the measurement frequency.
f_c is the Operating Frequency.
F_{low_OFB} is the lower edge of the Operational Frequency Band.
F_{high_OFB} is the upper edge of the Operational Frequency Band.
OCW is the operating channel bandwidth.

Measurement Procedure

According to ETSI EN 300 220-1 clause 5.8.3

Test Data

Test Mode: Transmitting

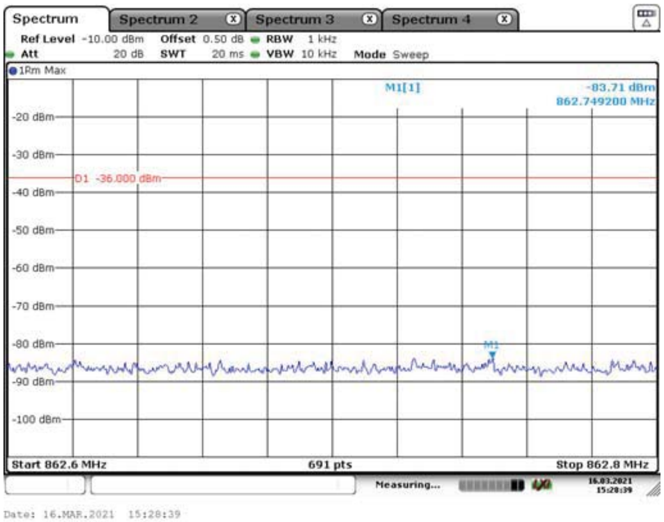
Frequency Domain	Test Condition					Result
Operational Frequency Band	Normal	LVLT	LVHT	HVLT	HVHT	Compliance
Operating Channel	Normal	LVLT	LVHT	HVLT	HVHT	Compliance

Normal condition test data as below:

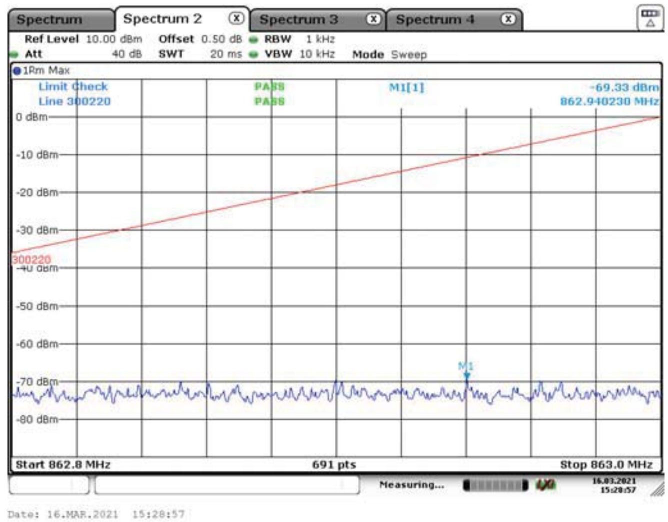
Please refer to following plots:

LoRa1:

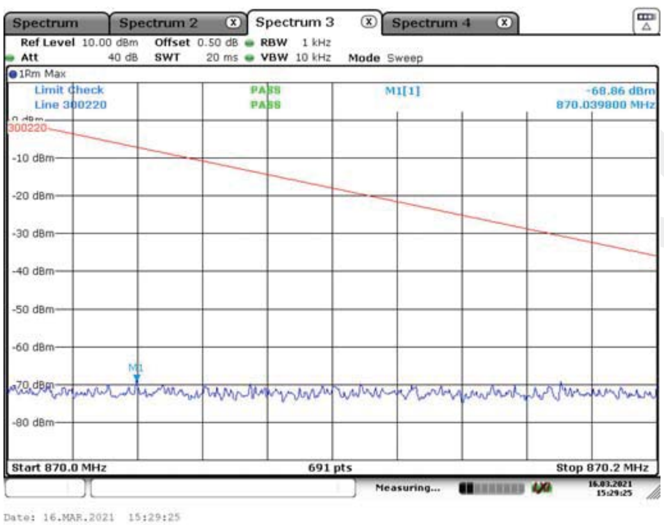
863-400K~863-200K



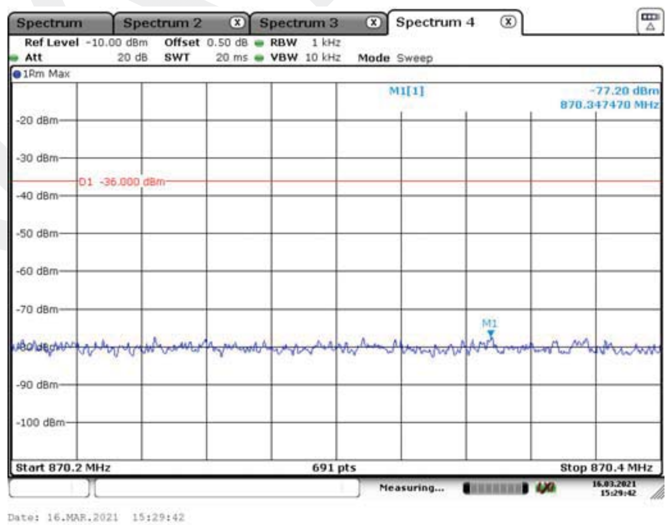
863-200K~863



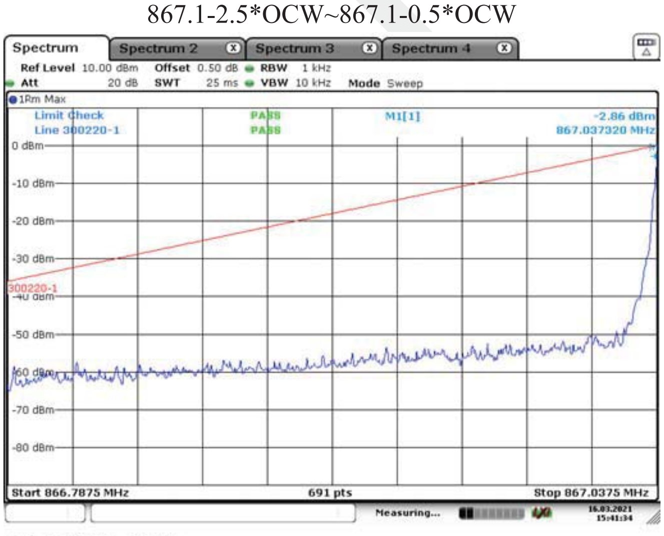
870~870+200K



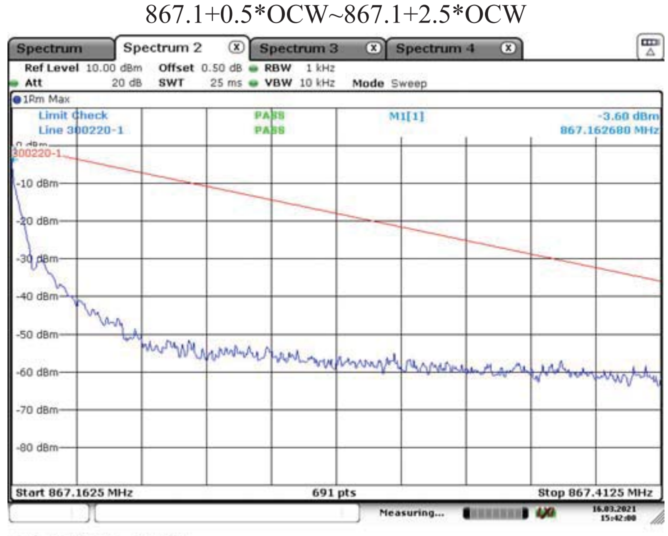
870+200K~870+400K



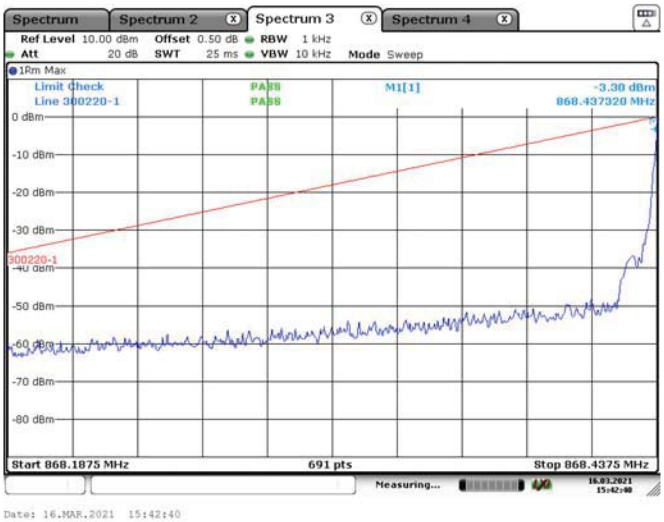
867.1-2.5*OCW~867.1-0.5*OCW



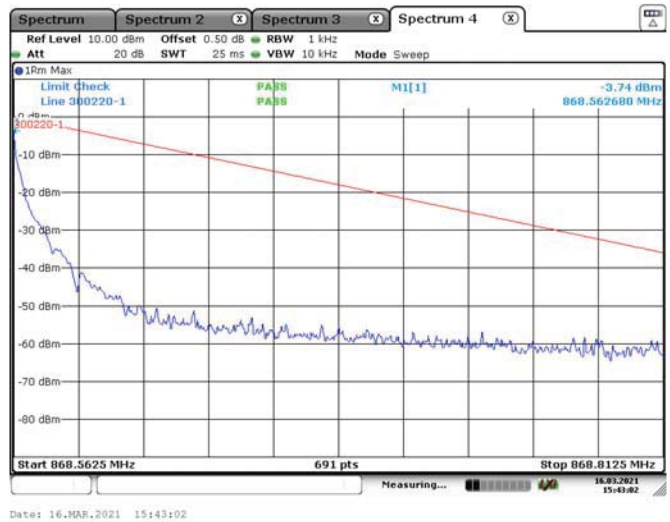
867.1+0.5*OCW~867.1+2.5*OCW



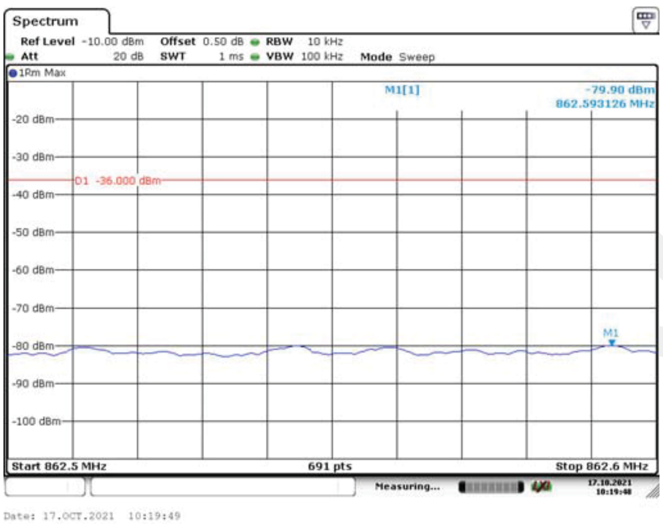
868.5-2.5*OCW~868.5-0.5*OCW



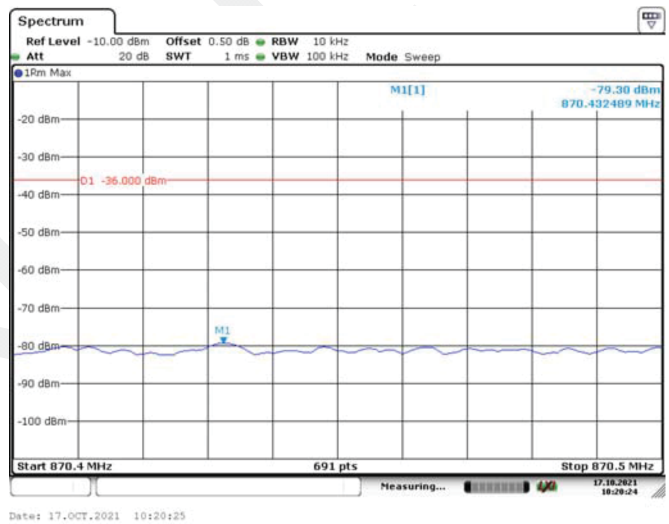
868.5+0.5*OCW~868.5+2.5*OCW



F≤863M-400K

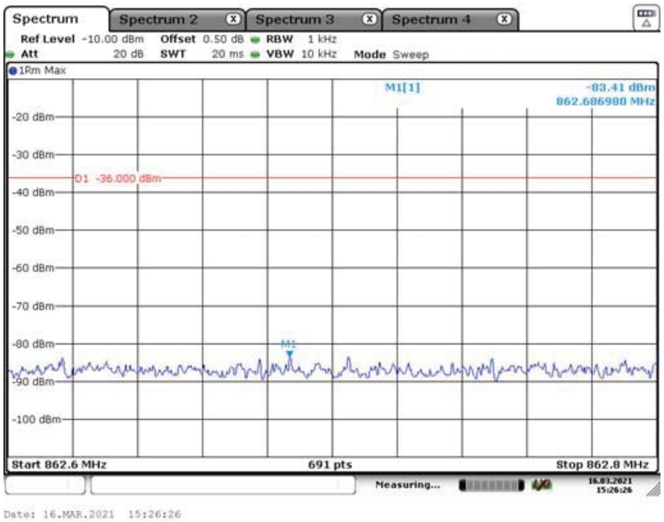


F≥870M+400K

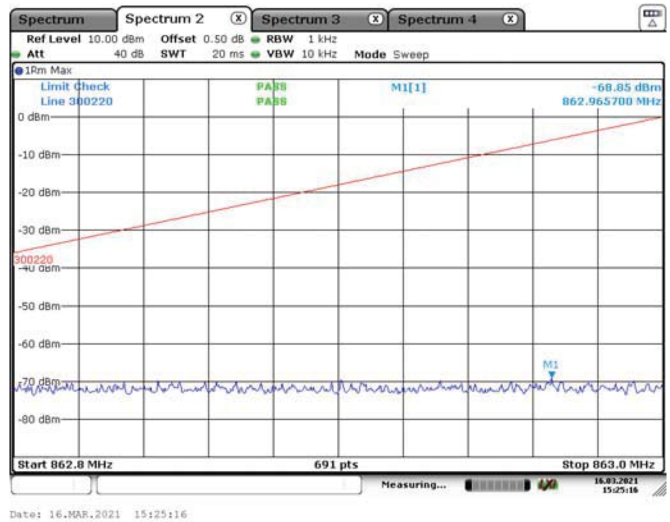


ANT1:

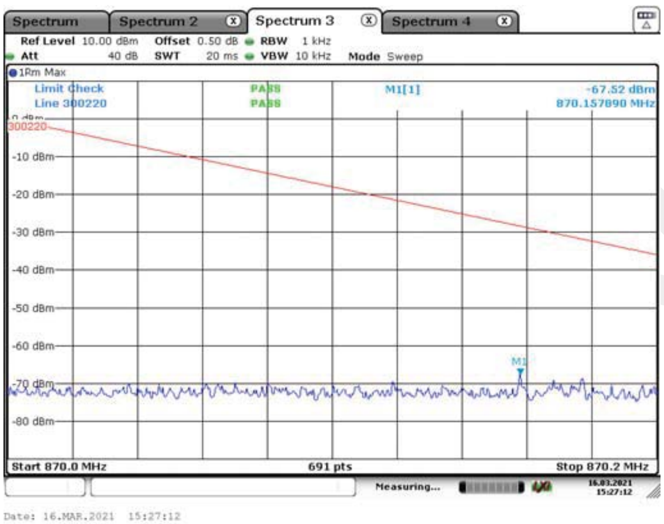
863-400K~863-200K



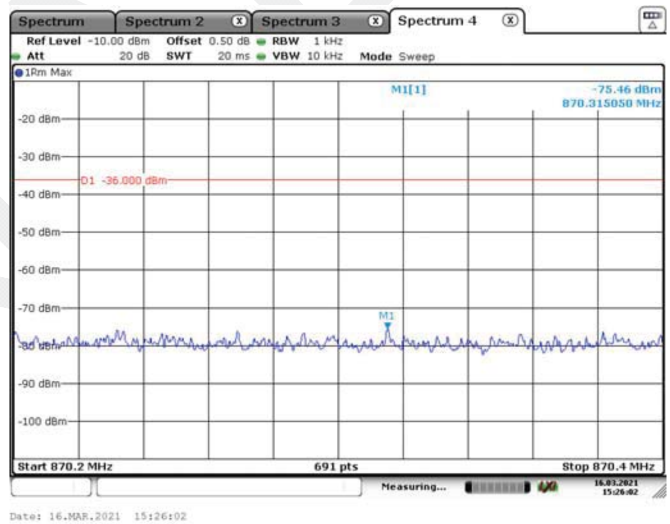
863-200K~863



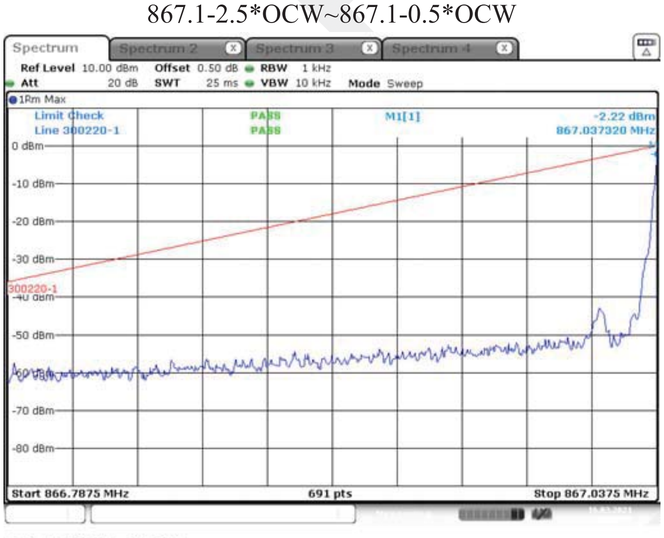
870~870+200K



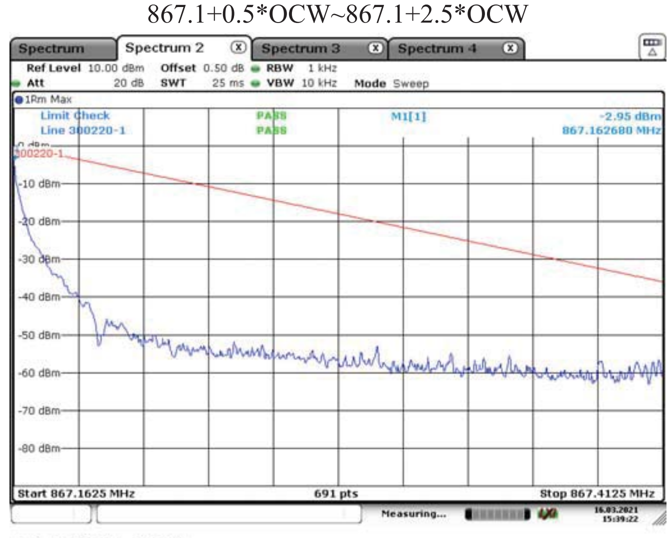
870+200K~870+400K



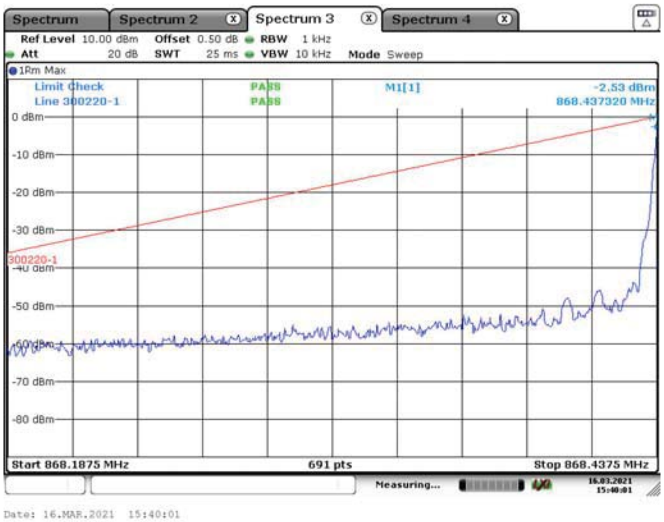
867.1-2.5*OCW~867.1-0.5*OCW



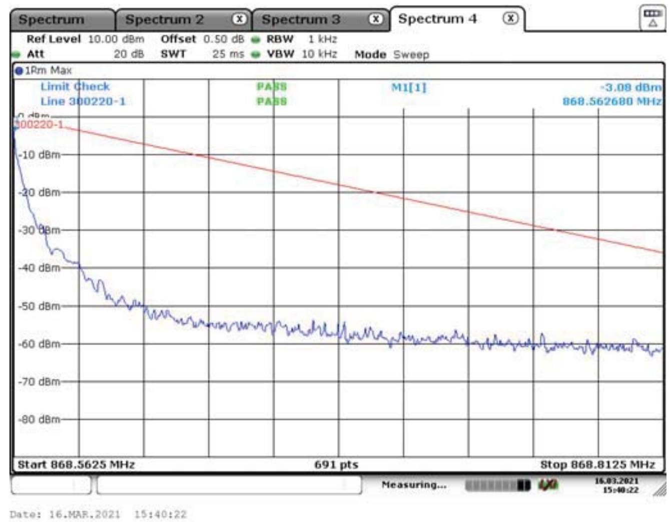
867.1+0.5*OCW~867.1+2.5*OCW



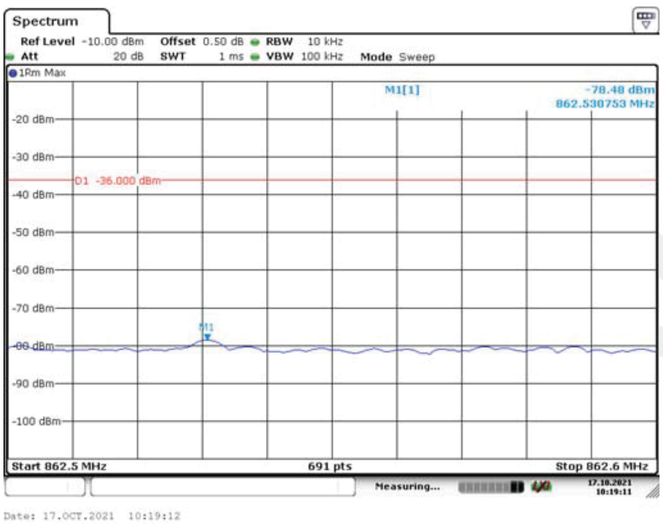
868.5-2.5*OCW~868.5-0.5*OCW



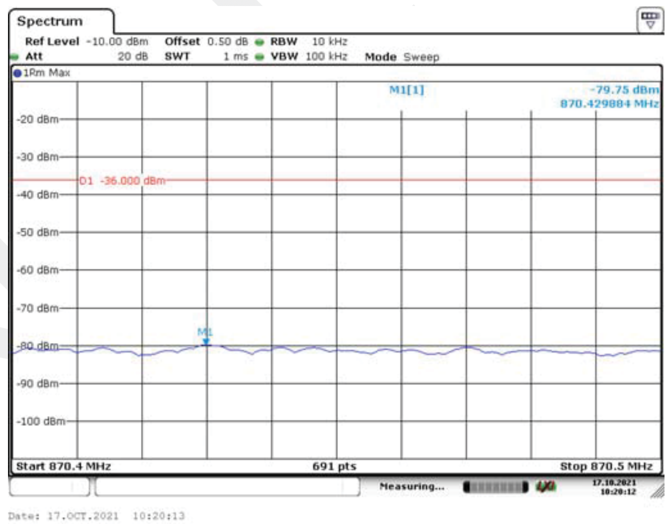
868.5+0.5*OCW~868.5+2.5*OCW



F≤863M-400K



F≥870M+400K



4.3.6 - Transient power

Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.10:

Transmitter transient power is power falling into frequencies other than the operating channel as a result of the transmitter being switched on and off.

Limit

The transient power shall not exceed the values given in Table 23.

Table 23: Transmitter Transient Power limits

Absolute offset from centre frequency	RBW_{REF}	Peak power limit applicable at measurement points
≤ 400 kHz	1 kHz	0 dBm
> 400 kHz	1 kHz	-27 dBm

Method of measurement

The output of the EUT shall be connected to a spectrum analyser or equivalent measuring equipment.

The measurement shall be undertaken in zero span mode. The analyser's centre frequency shall be set to an offset from the operating centre frequency. These offset values and their corresponding RBW configurations are listed in Table 24.

Table 24: RBW for Transient Measurement

Measurement points: offset from centre frequency	Analyser RBW	RBW_{REF}
-0,5 x OCW - 3 kHz 0,5 x OCW + 3 kHz Not applicable for OCW < 25 kHz	1 kHz	1kHz
±12,5 kHz or ±OCW whichever is the greater	Max (RBW pattern 1, 3, 10 kHz) ≤ Offset frequency/6 (see note)	1 kHz
-0,5 x OCW - 400 kHz 0,5 x OCW + 400 kHz	100 kHz	1 kHz
-0,5 x OCW -1 200 kHz 0,5 x OCW + 1 200 kHz	300 kHz	1 kHz
NOTE: Max (RBW pattern 1, 3, 10 kHz) means the maximum bandwidth that falls into the commonly implemented 1, 3, 10 kHz RBW filter bandwidth incremental pattern of spectrum analysers. EXAMPLE: If OCW is 25 kHz then the RBW value corresponding to one OCW offset frequency is 3 kHz. The rest of the analyser settings are listed in Table 25, and if OCW is 250 kHz then the RBW value corresponding to one OCW offset frequency is 30 kHz.		

The used modulation shall be D-M3. The analyser shall be set to the settings of Table 25 and a measurement shall be started for each offset frequency. The EUT shall transmit at least five D-M3 test signal. The peak value shall be recorded and the measurement shall be repeated at each offset frequency mentioned in Table 24.

The recorded power values shall be converted to power values measured in RBWREF by the formula in clause 4.3.10.1.

Table 25: Parameters for Transient Measurement

Spectrum Analyser Setting	Value	Notes
VBW/RBW	10	At higher RBW values VBW may be clipped to its maximum value
Sweep time	500 ms	
RBW filter	Gaussian	
Trace Detector Function	RMS	
Trace Mode	Max hold	
Sweep points	501	
Measurement mode	Continuous sweep	
NOTE: The ratio between the number of sweep points and the sweep time shall be the same ratio as above if different number of sweep points is used.		

The used modulation shall be D-M3. The analyser shall be set to the settings of Table 25 and a measurement shall be started for each offset frequency. The EUT shall transmit at least five D-M3 test signal. The peak value shall be recorded and the measurement shall be repeated at each offset frequency mentioned in Table 24.

The recorded power values shall be converted to power values measured in RBWREF by the formula in clause 4.3.10.1.

When $RBW_{measured} > RBW_{REF}$ the result for broadband emissions should be normalized to the bandwidth Ratio according to the formula (2):

$$B = A + 10\ \log \frac{RBWref}{RBW_{MEASURED}} \qquad (2)$$

Where:

- A is the measured value at the wider measurement bandwidth $RBW_{measured}$;
- B is the corresponding value at RBW_{REF}.

Test Data

Test mode: Transmitting. Please refer to the below tables and plots

LoRa1:

OCW (kHz)	Frequency (MHz)	Frequency Range	Measured Value (dBm/RBW measured)	Corresponding Value at RBWREF (dBm/kHz)	Limit (dBm/kHz)
125	867.1	-0.5 x OCW -1 200 kHz	-58.74	-83.51	-27
		-0,5 x OCW - 400 kHz	-53.11	-73.11	-27
		-OCW	-47.42	-57.42	0
		-0,5 x OCW - 3 kHz	-16.58	-16.58	0
		0,5 x OCW + 3 kHz	-17.23	-17.23	0
		+OCW	-45.20	-55.20	0
		0,5 x OCW + 400 kHz	-51.72	-71.72	-27
		0,5 x OCW + 1 200 kHz	-58.35	-83.12	-27
	868.5	-0.5 x OCW -1 200 kHz	-57.48	-82.25	-27
		-0,5 x OCW - 400 kHz	-52.84	-72.84	-27
		-OCW	-46.44	-56.44	0
		-0,5 x OCW - 3 kHz	-16.92	-16.92	0
		0,5 x OCW + 3 kHz	-17.42	-17.42	0
		+OCW	-45.70	-55.70	0
		0,5 x OCW + 400 kHz	-53.13	-73.13	-27
		0,5 x OCW + 1 200 kHz	-59.25	-84.02	-27

ANT1:

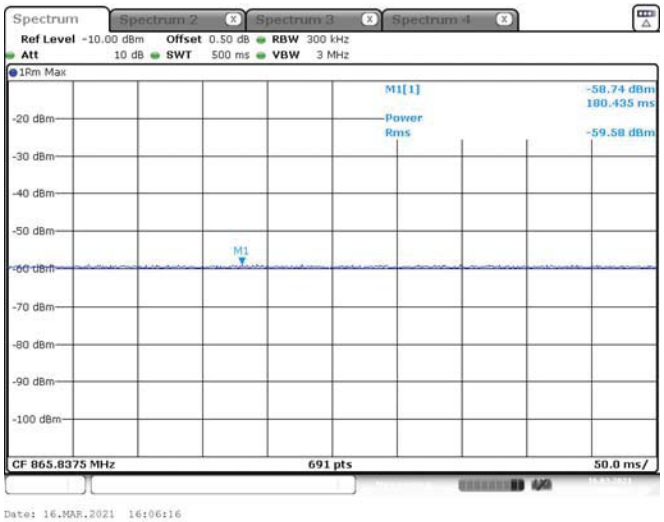
OCW (kHz)	Frequency (MHz)	Frequency Range	Measured Value (dBm/RBW measured)	Corresponding Value at RBWREF (dBm/kHz)	Limit (dBm/kHz)
125	867.1	-0.5 x OCW -1 200 kHz	-57.82	-82.59	-27
		-0,5 x OCW - 400 kHz	-51.92	-71.92	-27
		-OCW	-46.38	-56.38	0
		-0,5 x OCW - 3 kHz	-15.75	-15.75	0
		0,5 x OCW + 3 kHz	-16.45	-16.45	0
		+OCW	-43.30	-53.30	0
		0,5 x OCW + 400 kHz	-50.36	-70.36	-27
		0,5 x OCW + 1 200 kHz	-56.67	-81.44	-27
	868.5	-0.5 x OCW -1 200 kHz	-56.82	-81.59	-27
		-0,5 x OCW - 400 kHz	-50.60	-70.60	-27
		-OCW	-45.49	-55.49	0
		-0,5 x OCW - 3 kHz	-16.19	-16.19	0
		0,5 x OCW + 3 kHz	-16.63	-16.63	0
		+OCW	-44.79	-54.79	0
		0,5 x OCW + 400 kHz	-52.56	-72.56	-27
		0,5 x OCW + 1 200 kHz	-58.61	-83.38	-27

Note: Correct factor=10*log(RBWref/RBWmeas)
Transient power=Reading+Correct factor

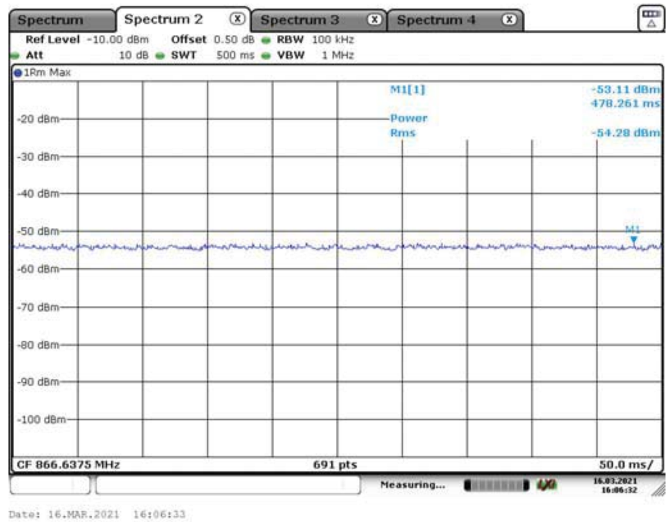
Please refer to following plots:

LoRa1(Low Channel):

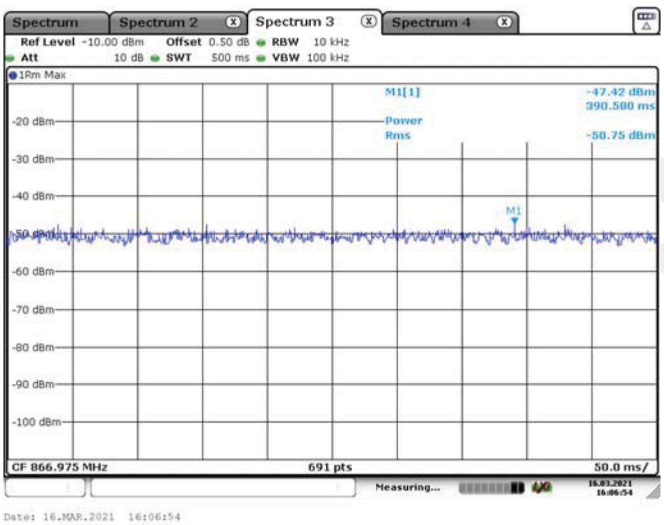
867.1-0.5 x OCW -1 200 kHz



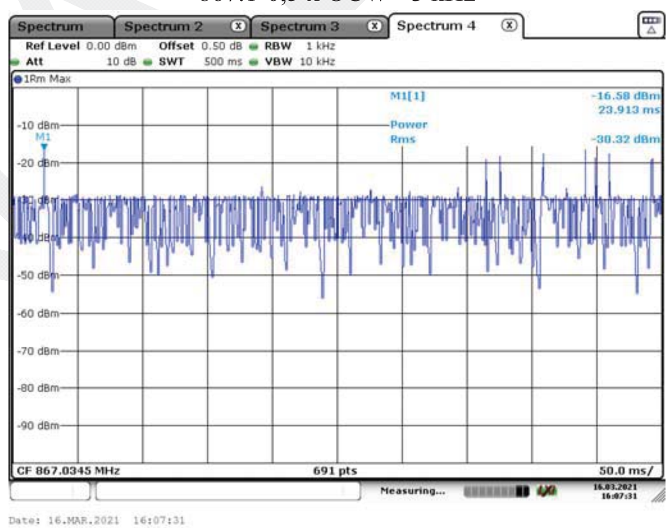
867.1-0,5 x OCW - 400 kHz



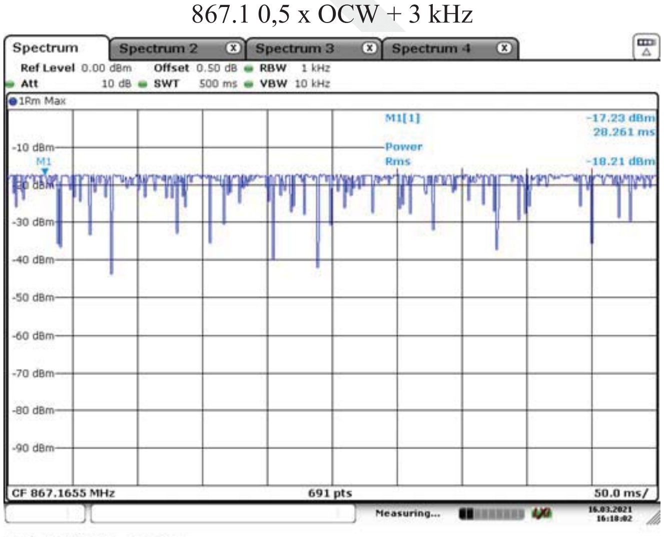
867.1-OCW



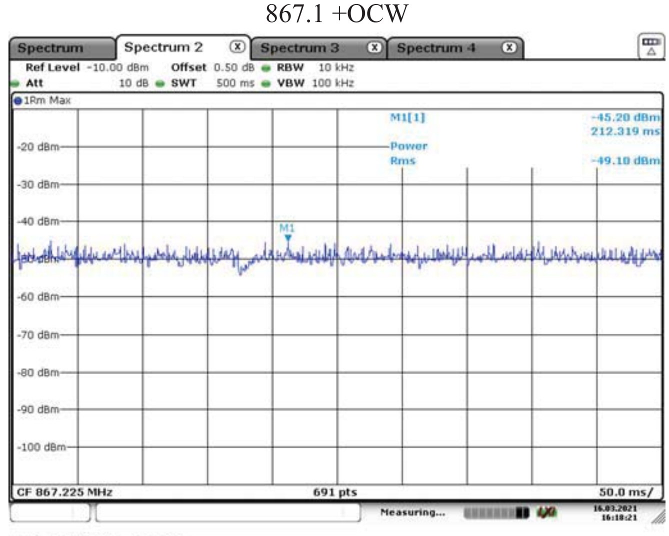
867.1-0,5 x OCW - 3 kHz



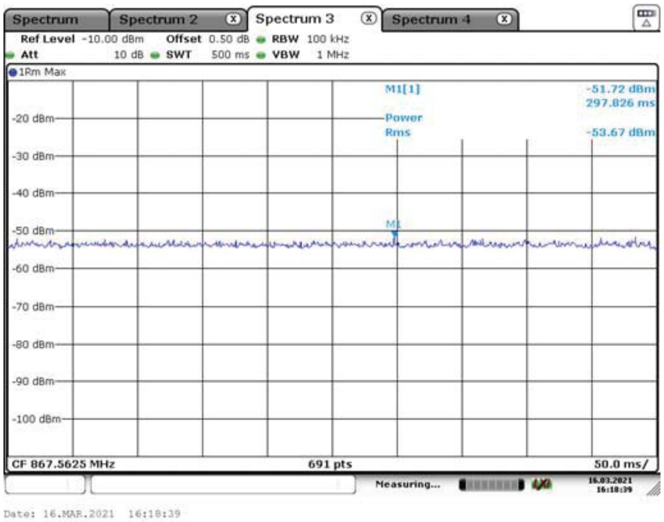
867.1 0,5 x OCW + 3 kHz



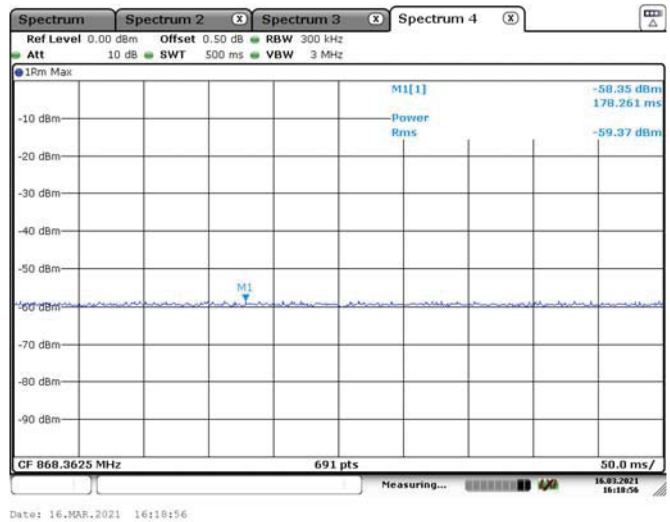
867.1 +OCW



867.1 0.5 x OCW + 400 kHz

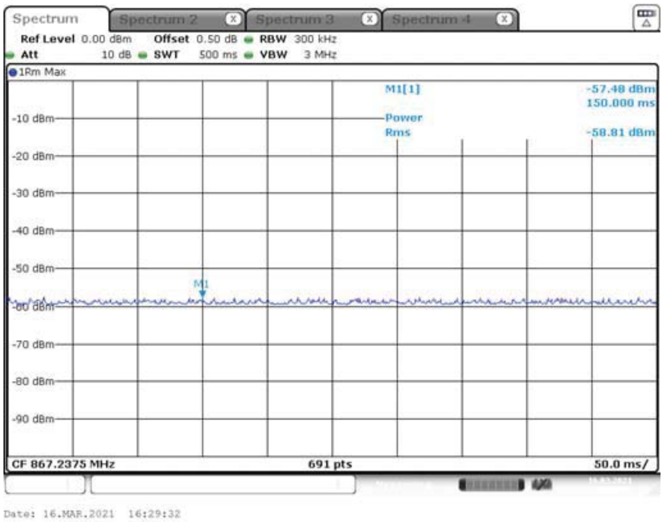


867.1 0.5 x OCW + 1200 kHz

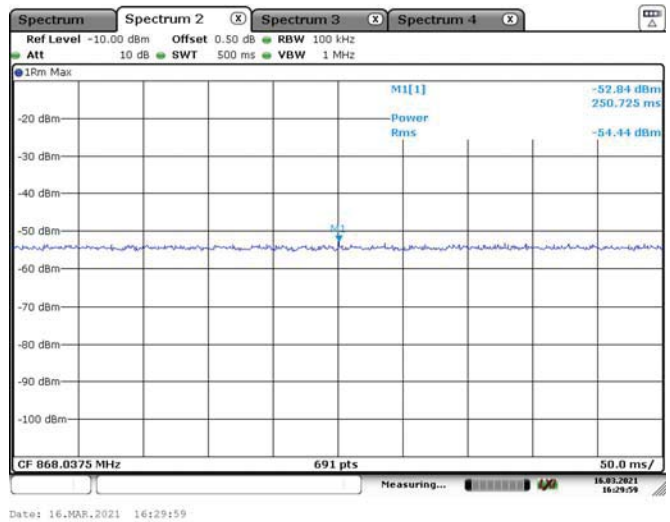


LoRa1(High Channel):

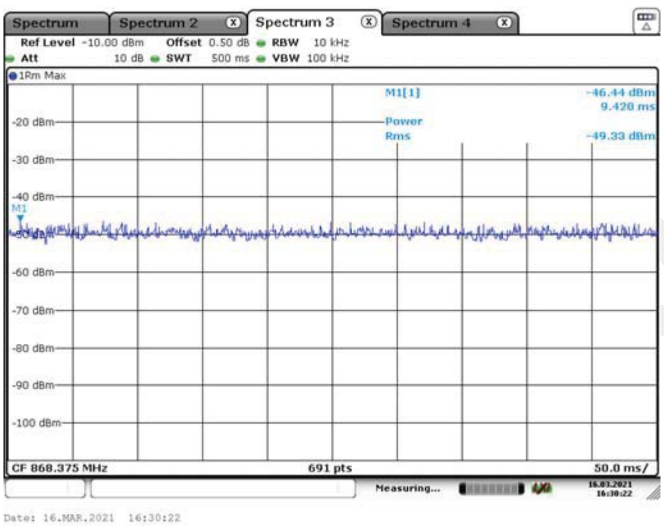
868.5 -0.5 x OCW -1 200 kHz



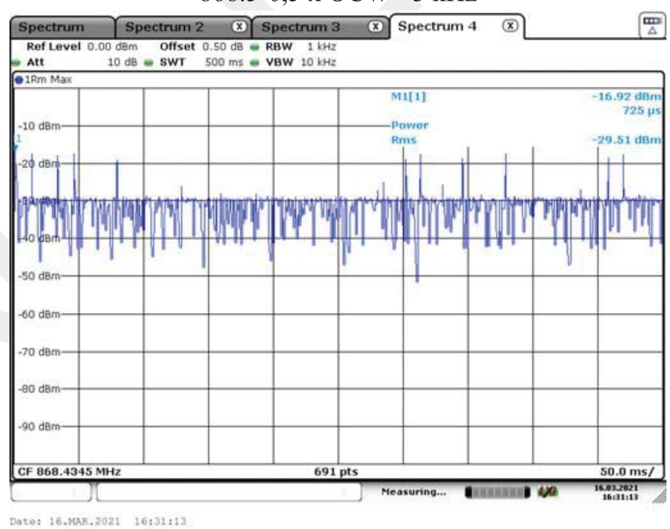
868.5-0,5 x OCW - 400 kHz



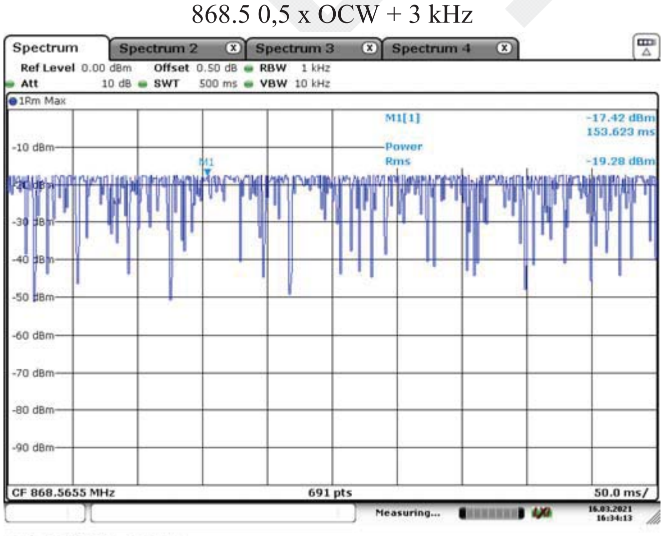
868.5 -OCW



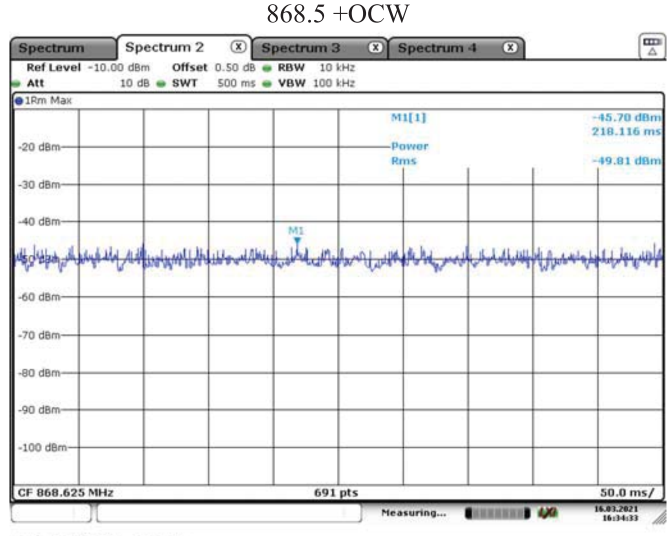
868.5-0,5 x OCW - 3 kHz



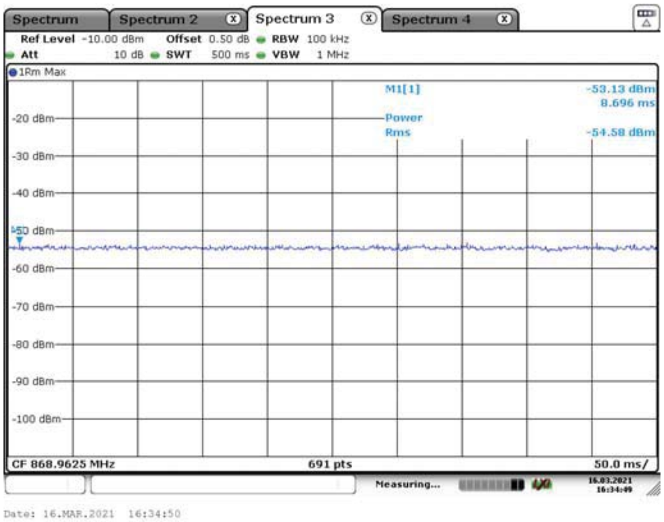
868.5 0,5 x OCW + 3 kHz



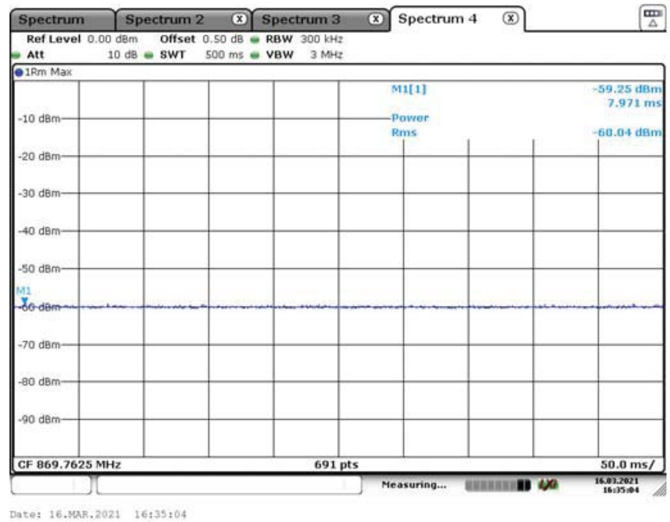
868.5 +OCW



868.5 0.5 x OCW + 400 kHz

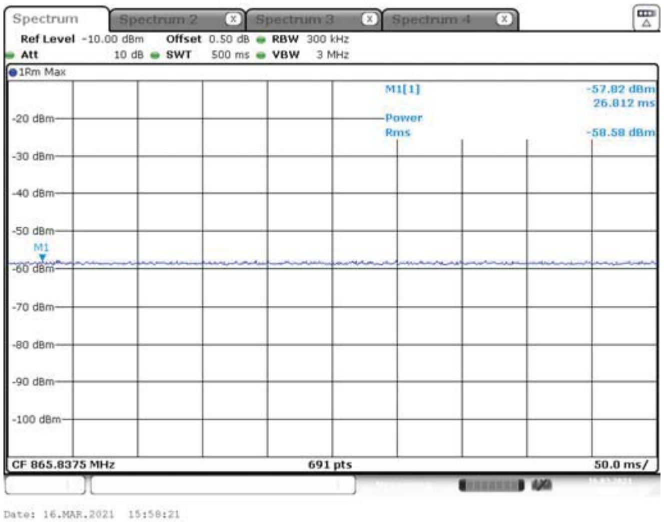


868.5 0.5 x OCW + 1200 kHz

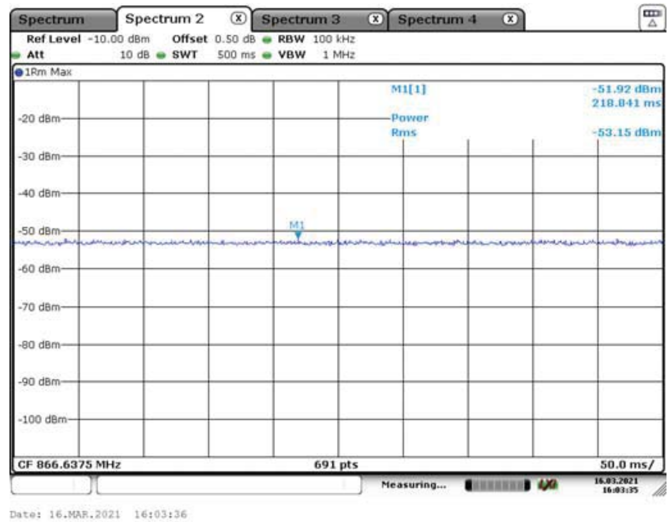


ANT1(Low Channel):

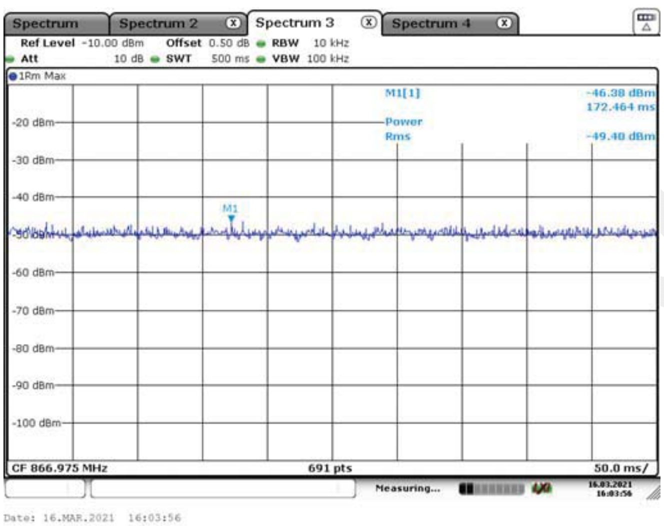
867.1-0.5 x OCW -1 200 kHz



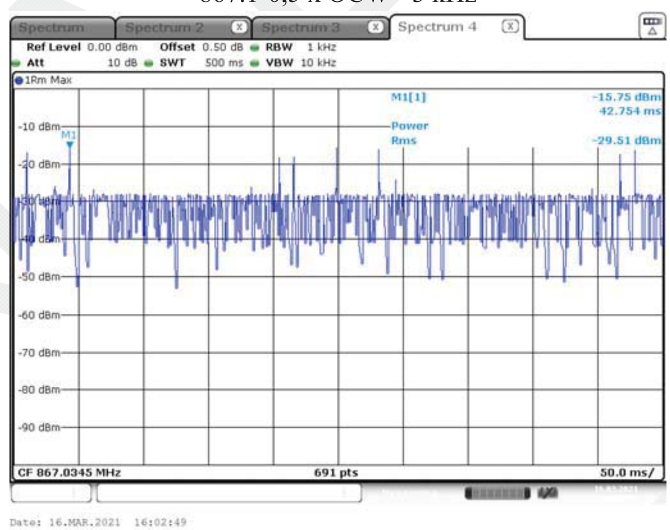
867.1-0,5 x OCW - 400 kHz



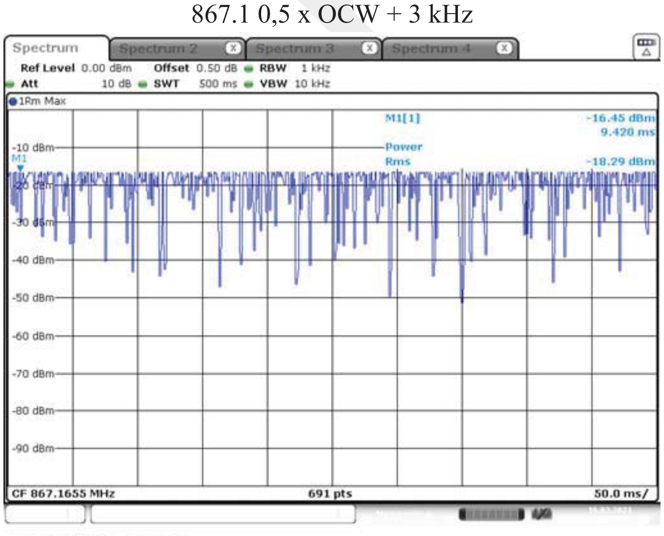
867.1-OCW



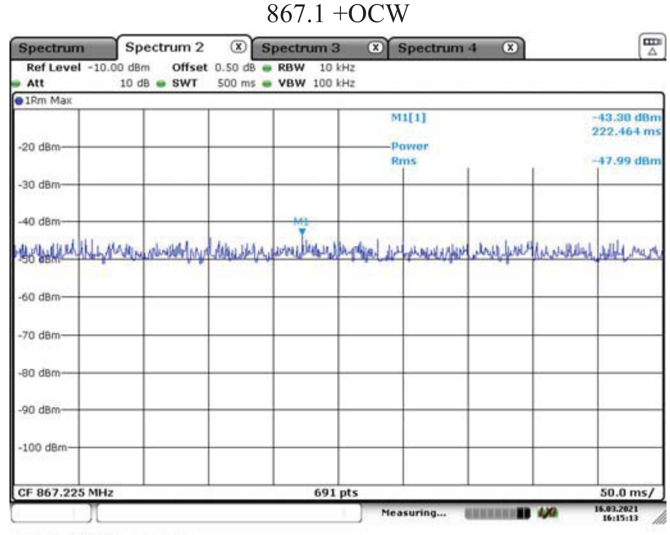
867.1-0,5 x OCW - 3 kHz



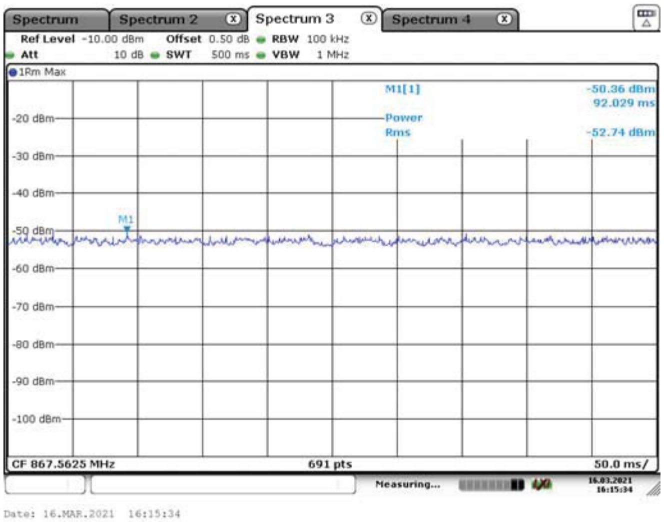
867.1 0,5 x OCW + 3 kHz



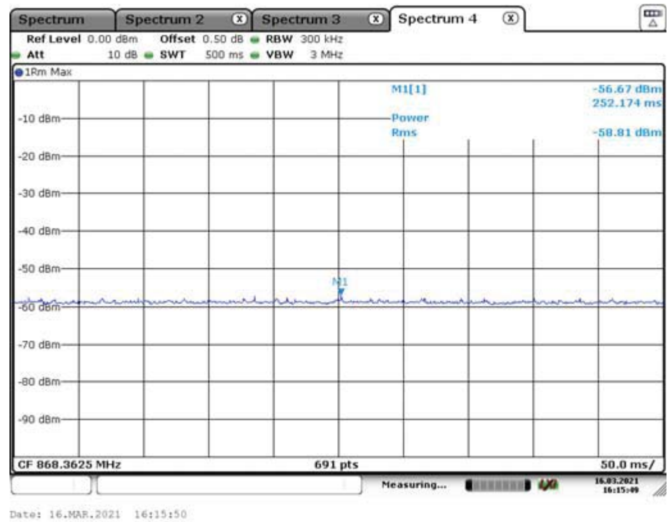
867.1 +OCW



867.1 0.5 x OCW + 400 kHz

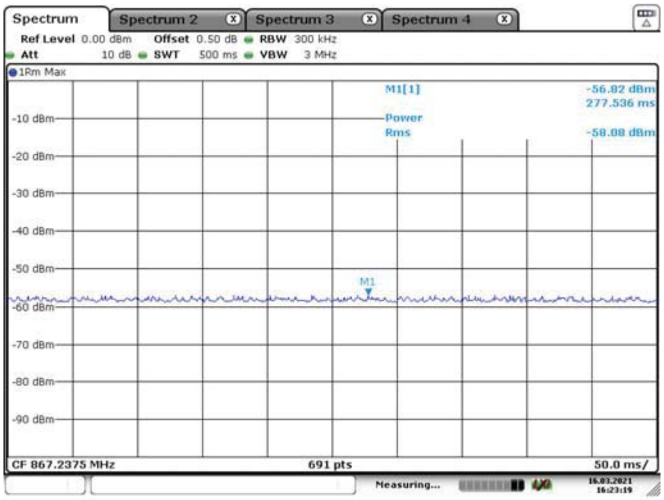


867.1 0.5 x OCW + 1200 kHz



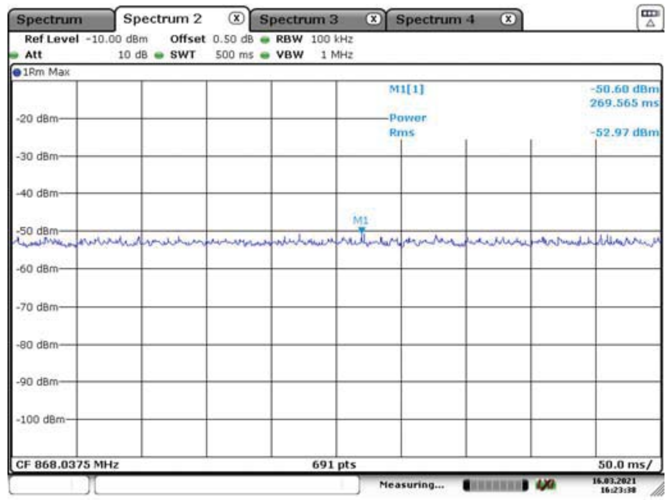
ANT1(High Channel):

868.5 -0.5 x OCW -1 200 kHz



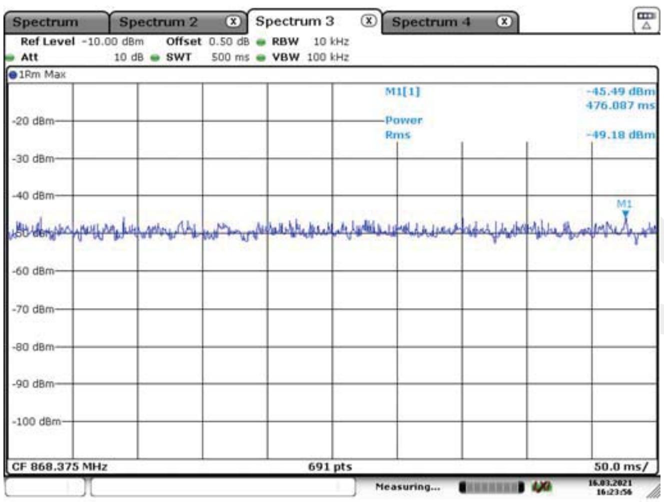
Date: 16.MAR.2021 16:23:19

868.5-0,5 x OCW - 400 kHz



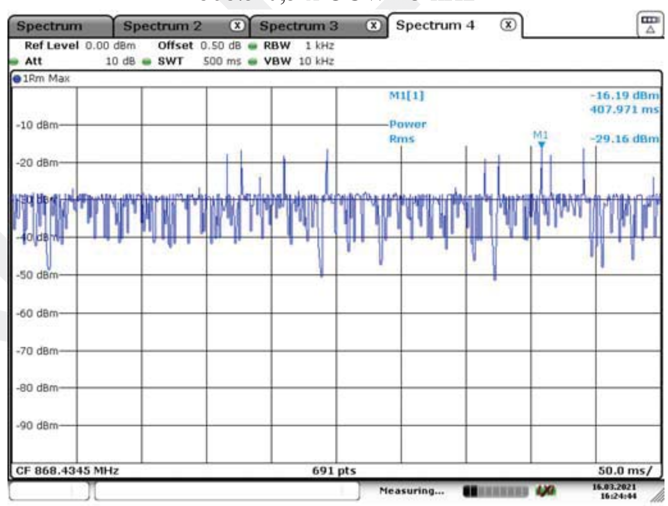
Date: 16.MAR.2021 16:23:39

868.5 -OCW



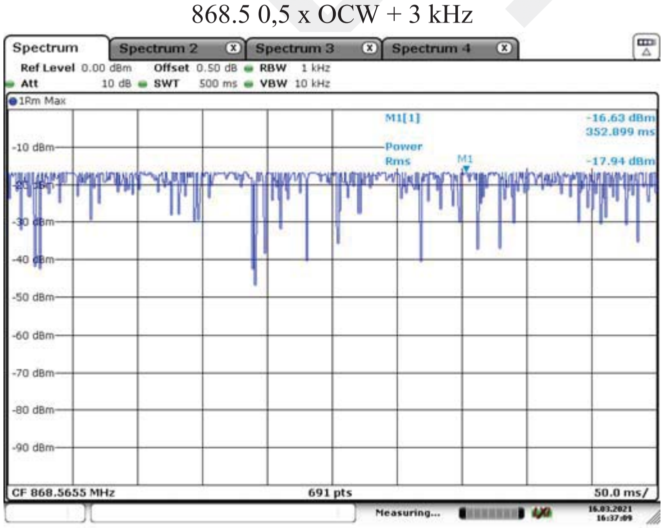
Date: 16.MAR.2021 16:23:56

868.5-0,5 x OCW - 3 kHz



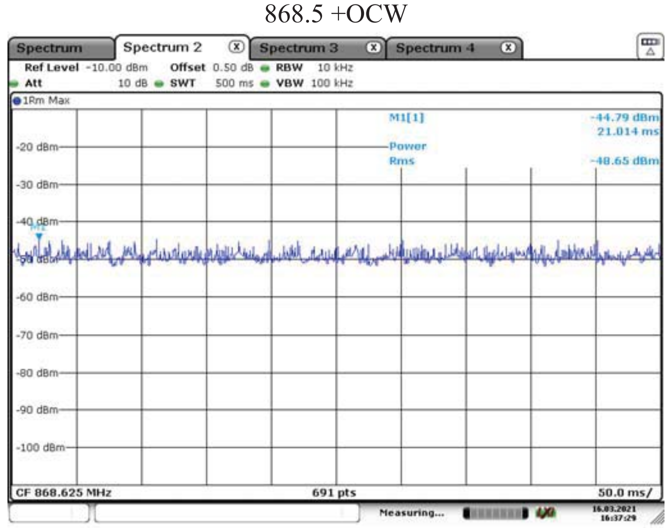
Date: 16.MAR.2021 16:24:45

868.5 0,5 x OCW + 3 kHz



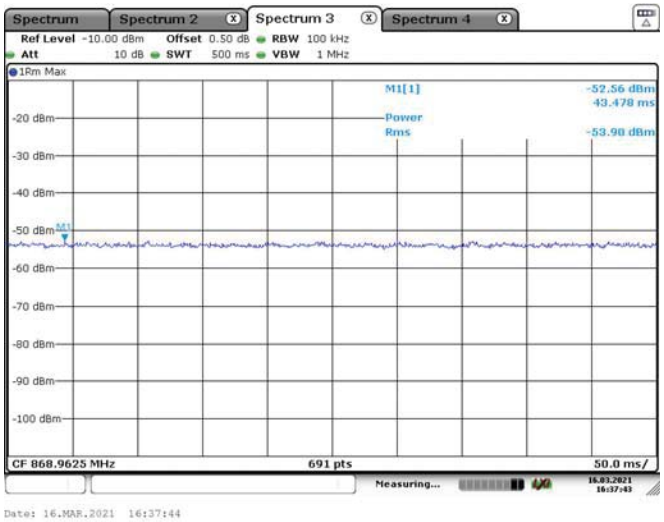
Date: 16.MAR.2021 16:37:10

868.5 +OCW

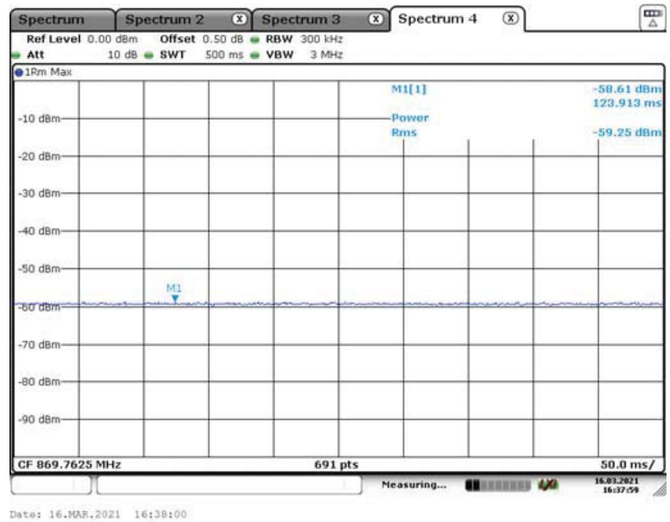


Date: 16.MAR.2021 16:37:29

868.5 0.5 x OCW + 400 kHz



868.5 0.5 x OCW + 1200 kHz



4.4.2 – BLOCKING

Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.18.1.

Limit:

The blocking level shall be better or equal to category 3 reference limits level defined in ETSI EN 300 220-1, clause 5.18.2.

NOTE: After December 31st, 2018, the receiver category 3 will be withdrawn, therefore receiver category 2 will be the minimum applicable level.

Method of measurement

Signal generator A shall be set to an appropriate modulated test signal at the operating frequency of the EUT receiver.

Signal generator B shall be unmodulated.

Measurements shall be carried out at frequencies of the unwanted signal at approximately the frequency(ies) offset(s) defined in technical requirement avoiding those frequencies at which spurious responses occur. Additional measurement points may be requested by technical requirements clause.

If several operational frequency bands are used by the equipment, at least one blocking measurement by bands has to be performed.

Step 1: Signal generator B shall be powered off. Signal generator A shall be set to the minimum level which gives the wanted performance criterion of EUT or the reference level in Table 32, whichever is the higher The output level of generator A shall then be increased by 3 dB unless otherwise specified in technical requirement.

Step 2: Signal generator B is powered on and set to operate at the nominal operating frequency - offset frequency. Signal generator B is then switched on and the signal amplitude is adjusted to the minimum level at which the wanted performance criterion is not achieved.
With signal generator B settings unchanged, the receiver shall be replaced with a suitable RF power measuring equipment. The power into the measuring equipment shall be measured and noted.
The blocking level is then the conducted power received from generator B at the EUT antenna connector.
This can either be measured on the antenna connector for conducted test or be calculated for radiated test (see clause C.5.4).
The blocking level shall be higher or equal to the blocking power level requested in the technical requirement clause.

Step 3: The measurement in steps 1 to 3 shall be repeated with signal offsets at required frequencies.

Step 4: The information shown in Table 44 shall be recorded in the test report for each measured signal level and unwanted signal offset.

Table 44: Information Recorded in the Test Report

Value	Notes
Operating Frequency	Nominal centre frequency of the receiver
Signal generator A	Power level of signal generator A
Blocking level	Power level of signal generator B

For equipment using CCA whatever is the receiver category, steps 1 to 4 shall be repeated with signal generator A level adjusted +13 dB higher than in the measurements in clause 5.18.6.4

Test Data

LoRa2:

OCW (kHz)	Frequency (MHz)	Frequency offset (MHz)	Test result (dBm)	Limit (dBm)	Result
125	867.1	-2 MHz from OC edge f_{high} and f_{low}	-45.0	⩾-69	Compliance
		+2 MHz from OC edge f_{high} and f_{low}	-44.0	⩾-69	Compliance
		-10 MHz from OC edge f_{high} and f_{low}	-35.0	⩾-44	Compliance
		+10 MHz from OC edge f_{high} and f_{low}	-36.0	⩾-44	Compliance
		-5 % of Centre Frequency or 15 MHz, whichever is the greater	-33.0	⩾-44	Compliance
		+5 % of Centre Frequency or 15 MHz, whichever is the greater	-33.0	⩾-44	Compliance
	868.5	-2 MHz from OC edge f_{high} and f_{low}	-46.0	⩾-69	Compliance
		+2 MHz from OC edge f_{high} and f_{low}	-46.0	⩾-69	Compliance
		-10 MHz from OC edge f_{high} and f_{low}	-35.0	⩾-44	Compliance
		+10 MHz from OC edge f_{high} and f_{low}	-35.0	⩾-44	Compliance
		-5 % of Centre Frequency or 15 MHz, whichever is the greater	-35.0	⩾-44	Compliance
		+5 % of Centre Frequency or 15 MHz, whichever is the greater	-34.0	⩾-44	Compliance

ANT2:

OCW (kHz)	Frequency (MHz)	Frequency offset (MHz)	Test result (dBm)	Limit (dBm)	Result
125	867.1	-2 MHz from OC edge f_{high} and f_{low}	-45.0	⩾-69	Compliance
		+2 MHz from OC edge f_{high} and f_{low}	-45.0	⩾-69	Compliance
		-10 MHz from OC edge f_{high} and f_{low}	-34.0	⩾-44	Compliance
		+10 MHz from OC edge f_{high} and f_{low}	-33.0	⩾-44	Compliance
		-5 % of Centre Frequency or 15 MHz, whichever is the greater	-33.0	⩾-44	Compliance
		+5 % of Centre Frequency or 15 MHz, whichever is the greater	-31.0	⩾-44	Compliance
	868.5	-2 MHz from OC edge f_{high} and f_{low}	-44.0	⩾-69	Compliance
		+2 MHz from OC edge f_{high} and f_{low}	-44.0	⩾-69	Compliance
		-10 MHz from OC edge f_{high} and f_{low}	-35.0	⩾-44	Compliance
		+10 MHz from OC edge f_{high} and f_{low}	-36.0	⩾-44	Compliance
		-5 % of Centre Frequency or 15 MHz, whichever is the greater	-33.0	⩾-44	Compliance
		+5 % of Centre Frequency or 15 MHz, whichever is the greater	-33.0	⩾-44	Compliance

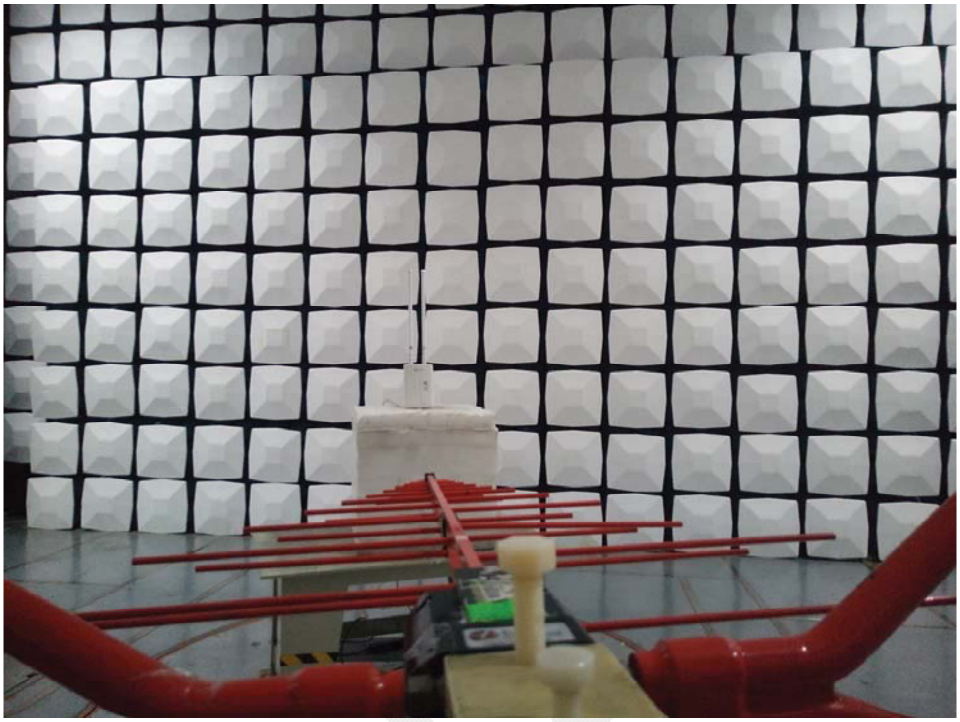
Note: The equipment provider declared that the receiver category for the EUT is 2

EXHIBIT A - EUT PHOTOGRAPHS

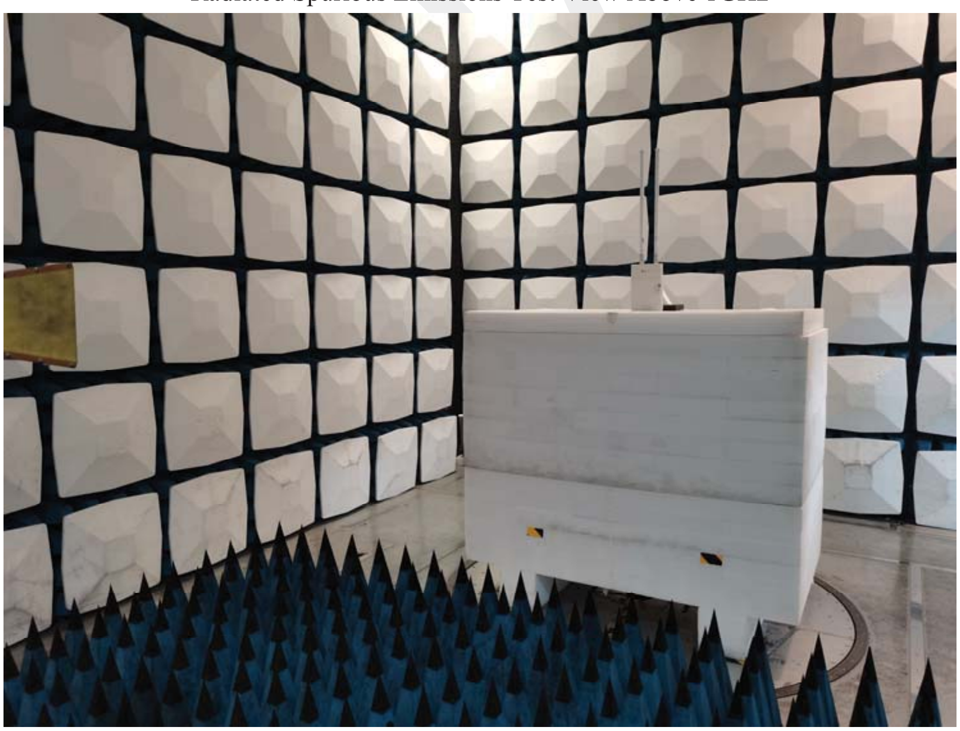
For photos in this section, please refer to report No.: RXM210219050-02 EXHIBIT A.

EXHIBIT B - TEST SETUP PHOTOGRAPHS

Radiated Spurious Emissions Below 1GHz



Radiated Spurious Emissions Test View Above 1GHz



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