

Test report No:
75151REM.002

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B
(10-1-21 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	32001552BUS
(*) Trademark	MIPOT S.P.A.
(*) Model and /or type reference	32001552BUS
Other identification of the product	FCC ID: 2AQJP-MIP IC: 28566-MIP
(*) Features	Features: LoRa Transceiver HW version: 0 SW version: 01.01.00.03
Manufacturer	MIPOT S.P.A. VIA CORONA 5 34071, CORMONS (GO), ITALY
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-21 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez EMC Consumer & RF Lab. Manager
Date of issue	2023-06-26
Report template No	FDT08_24 (*) "Data provided by the client"



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Acronyms

Acronym ID	Acronym Description
Code	EMC Test Code
Freq Rng	Frequency Range
MP	Measurement Point
OM	Operation Mode
S/	Sample
V	Verdict
RE	Radiated Emission
LR	Low Range
HR	High Range

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is $I = \pm 4,9$ dB for quasi-peak measurements, $I = \pm 4,6$ dB for peak measurements ($k=2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 12.75 GHz is $I = \pm 2,6$ dB for peak and average measurements ($k=2$).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of a TRX MICRO SMD MiP-Lw-2C256S-US. 902-928 MHz LoRaWAN Transceiver.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	75151_1.1	Module	32001552BUS	--	2023-06-08	Element Under Test
	69260B_17.1	Cable connection	--	--	2021-10-21	Auxiliary Element
	69260B_5.1	Antenna	--	--	2021-09-21	Auxiliary Element
	69260B_7.1	USB Cable	--	--	2021-09-21	Auxiliary Element

Notes referenced to samples during the project:

Id	Note
S/01	Sample used for emission testing

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
		UART	1.5	[X]	[]	[]	
		Power Supply	1.5	[X]	[]	[]	
		Antenna	n/a	[X]	[]	[]	
--		[]	[]	[]			
Supplementary information to the ports..... :							
Rated power supply..... :	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[]	AC:	[]	[]	[]	[]	[]
	[X]	DC: 2.1 V minimum, 3.6 V maximum					
Rated Power	500 mW						
Clock frequencies..... :	32 MHz TCXO, 32.768 kHz XO						
Other parameters..... :	--						
Software version	01.01.00.03						
Hardware version	0						
Dimensions in cm (W x H x D)..... :	1.13 cm x 0.25 cm x 0.89 cm						
Mounting position	[]	Table top equipment					
	[]	Wall/Ceiling mounted equipment					
	[]	Floor standing equipment					
	[]	Hand-held equipment					
	[X]	Other: n/a					
Modules/parts	Module/parts of test item		Type		Manufacturer		
	32001552BUS		MODULE		MIPOT S.P.A.		
	--						
Accessories (not part of the test item)	Description		Type		Manufacturer		
	32001495		CARRIER		MIPOT S.P.A.		
	--						
Documents as provided by the applicant	Description		File name		Issue date		
	USER MANUAL		32001552-US_		07/06/2023		
	SCHEMATICS		32001552_SCH		06/06/2023		
	BoM		32001552BEUB		07/06/2023		
	COMPONENTS PLACEMENT		32001552_PM_		06/06/2023		
	--						

⁽³⁾ Only for Medical Equipment

Identification of the client

MIPO T S.P.A.
VIA CORONA 5
34071, CORMONS (GO), ITALY

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-06-15
Date (finish)	2023-06-15

Document history

Report number	Date	Description
75151REM.002	2023-06-26	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860mbar Max. = 1060mbar

Remarks and comments

The tests have been performed by the technical personnel: Antonio Ruiz and Salvador Cuellar.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P
Partial Passed	P*

List of equipment used during the test

Control No.	Equipment	Model	Manufacturer	Next Calibration
8866	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-09-21
6132	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2024-04-21
6126	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2024-04-21
4612	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2024-07-13
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2024-09-15
5705	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2023-07-21
6064	SEMIANECHOIC ABSORBER LINED CHAMBER	SAC-3	FRANKONIA	N/A
6329	SHIELDED ROOM	--	FRANKONIA	N/A
4848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A

Summary

Test Specification	Requirement – Test case	Verdict	Remark
FCC CFR 47, Part 15, Subpart B (10-1-21 Edition) & ICES-003 Issue 7 (October 2020)	RE Radiated emission. Electromagnetic field measure	P	(1)
	CE Continuous conducted emission	N/A	(2)
<u>Supplementary information and remarks:</u> (1) Range: $f > 12.75$ GHz. Test required only to the 5th harmonics of the maximum internal work frequency in the EUT. (2) According to the standard, this test is not applicable because EUT is powered in DC (EUT is a module)			

Appendix A: Test results

Appendix A content

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<i>RE Radiated emission. Electromagnetic field measure</i>	15

Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself.
The operation modes used by the samples to which the present report refers, are shown in the following table:

Id	Description
OM/01	EUT ON. LoRa in reception mode. Power supply: 3Vdc.

Test standards version applied

The product standards and test standards applied for each test cases are shown in the following table:

Product Test Standard	Test standard	Requirement – Test case
FCC CFR 47, Part 15, Subpart B (10-1-21 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	RE Radiated emission.

Test Cases Details

RE Radiated emission. Electromagnetic field measure

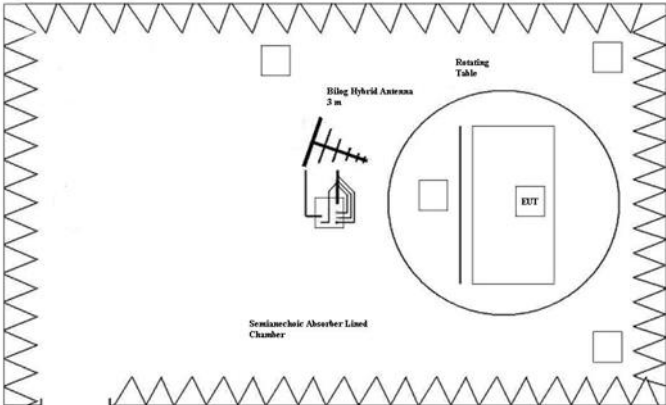
Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according to the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-21 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

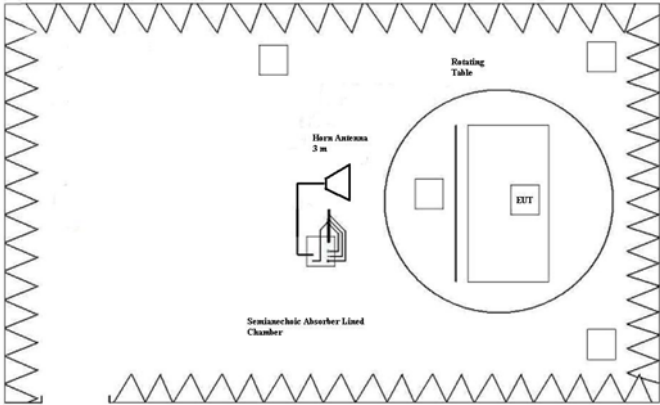
Frequency range (MHz)	FCC Part 15B		ICES-003 Issue 7		FCC Part 15B & ICES-003 Issue 7	
	QP Limit for 3 m		QP Limit for 3 m		PK Limit for 3 m	AVG Limit for 3 m
	(μ V/m)	(dB μ V/m)	(μ V/m)	(dB μ V/m)	(dB μ V/m)	(dB μ V/m)
30 to 88	100	40	100	40	---	---
88 to 216	150	43.5	150	43.5	---	---
216 to 230	200	46	200	46	---	---
230 to 960	200	46	224	47		
960 to 1000	500	54	500	54	---	---
Above 1000	---	---	---	---	74	54

Limits according to FCC Part 15B, are equal or more stringent than those of ICES-003 Issue 7.

Setup for measurements



Setup for measurements < 1GHz.



Setup for measurements > 1GH

Results

SI	OM	Code	Freq Rng (MHz)	V
01	OM/01	RE0101LR	[30, 1000]	P
01	OM/01	RE0101HR	[1000, 12750]	P

Verdict

Pass

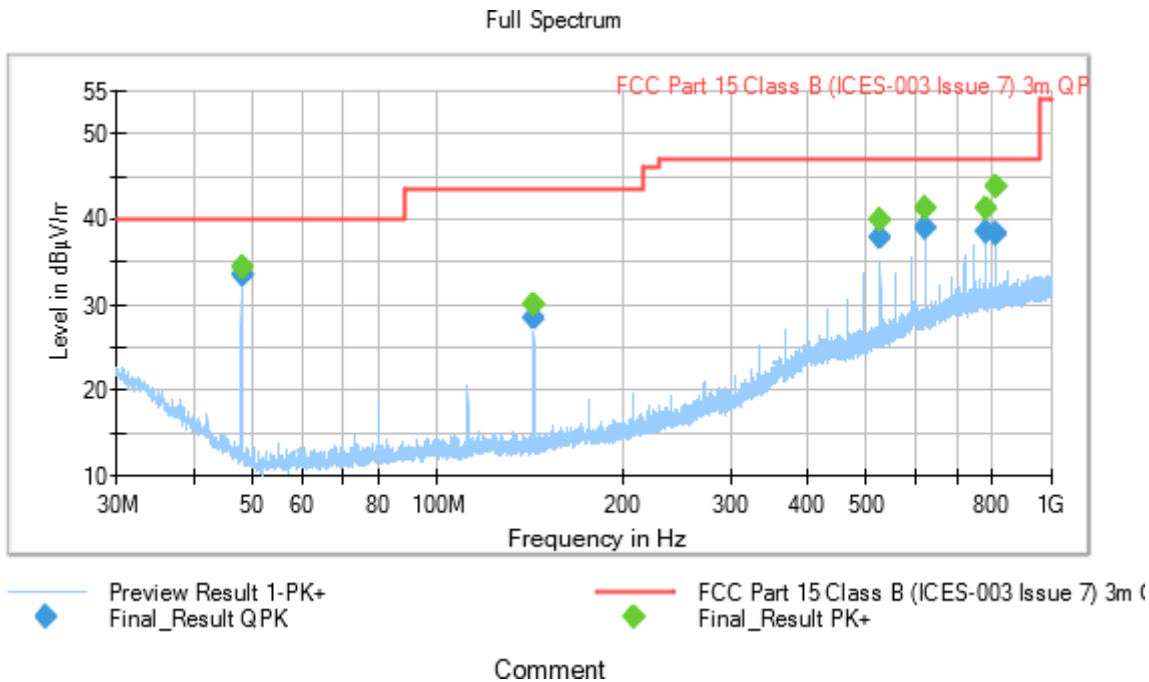
Attachments

EMC Test Code = RE0101LR Frequency Range MHz = [30, 1000]

Sample ID: S/01

Operation Mode: OM/01. EUT ON. LoRa in reception mode. Power supply: 3Vdc.

Images:



Tables:

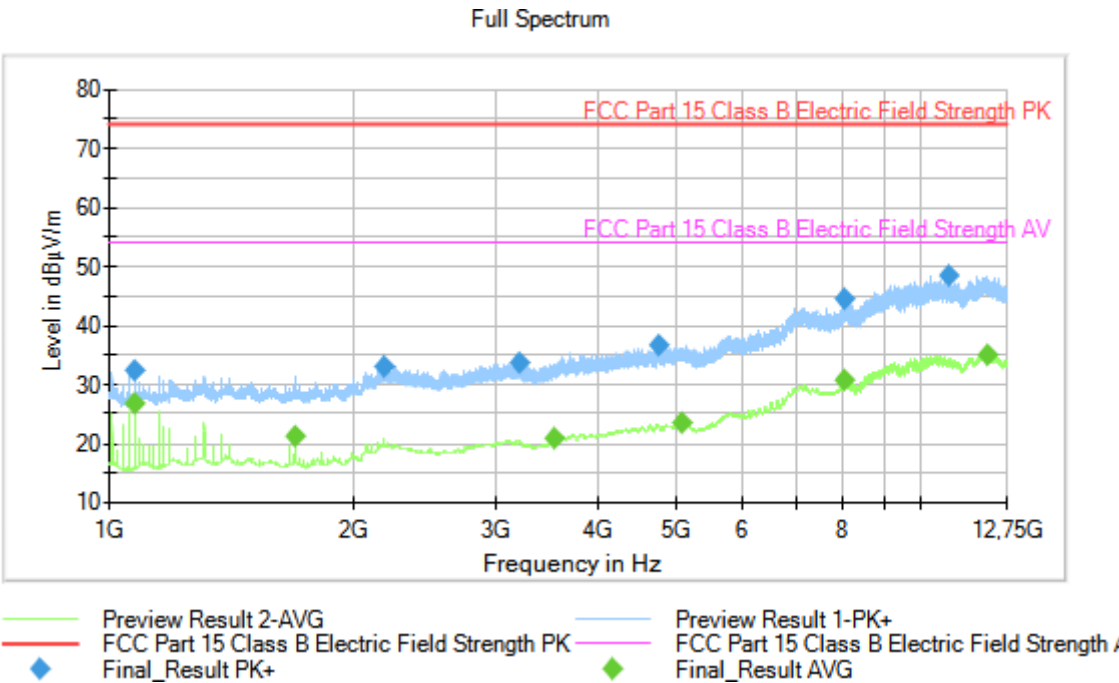
Frequency(MHz)	QuasiPeak(dBµV/m)	MaxPeak(dBµV/m)	Limit(dBµV/m)	Margin(dB)	Height(cm)	Po l	Azimuth(deg)
47.997000	33.51	---	40.00	6.49	100.0	V	61.0
47.997000	---	34.36	---	---	100.0	V	61.0
143.992000	28.39	---	43.52	15.13	100.0	V	137.0
143.992000	---	29.96	---	---	100.0	V	137.0
528.002000	37.72	---	47.00	9.28	100.0	V	180.0
528.002000	---	39.92	---	---	100.0	V	180.0
623.997000	38.83	---	47.00	8.17	186.0	V	180.0
623.997000	---	41.14	---	---	186.0	V	180.0
783.985000	---	41.27	---	---	145.0	V	5.0
783.985000	38.54	---	47.00	8.46	145.0	V	5.0
816.012000	---	43.86	---	---	149.0	V	-111.0
816.012000	38.30	---	47.00	8.70	149.0	V	-111.0

EMC Test Code = RE0101HR Frequency Range MHz = [1000, 12750]

Sample ID: S/01

Operation Mode: OM/01. EUT ON. LoRa in reception mode. Power supply: 3Vdc.

Images:



Tables:

Frequency(MHz)	MaxPeak(dBµV/m)	Average(dBµV/m)	Limit(dBµV/m)	Margin(dB)
1072.000000	---	26.84	53.97	27.13
1072.250000	32.44	---	73.97	41.53
1696.000000	---	21.13	53.97	32.84
2183.500000	33.12	---	73.97	40.85
3192.750000	33.62	---	73.97	40.35
3525.750000	---	20.69	53.97	33.28
4760.250000	36.52	---	73.97	37.45
5062.500000	---	23.54	53.97	30.43
8054.500000	---	30.81	53.97	23.16
8055.000000	44.62	---	73.97	29.35
10795.000000	48.55	---	73.97	25.42
12039.000000	---	35.10	53.97	18.87