CMC Centro Misure Compatibilità S.r.l. Via della Fisica 20, 36016 Thiene (VI), Tel./Fax +39 0445 367702 - www.cmclab.it - info@cmclab.it
Independent Testing Laboratory

TEST REPORT
Nr. R21232601

Federal Communication Commission (FCC)

Report Reference No. ..... :	R21232601
Date of issue: ..... :	17.11.2021
Total number pages: ..... :	15
Applicant´s name ..... :	Embit S.r.l.
Address ..... :	Via Emilia Est, 911 – 41122 Modena (MO) – Italy
Test specification:	
Standards ..... :	KDB 447498 D01 General RF Exposure Guidance v06
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	SAR_FCCCMC
Test Report Form(s) Originator .. :	CMC Centro Misure Compatibilità S.r.l.
Master TRF ..... :	2021-07

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of CMC Centro Misure Compatibilità S.r.l.

Test item description ..... :	EMB-LR1302-mPCIe LoRaWAN Gateway Module
Trademark ..... :	Embit
Manufacturer ..... :	Embit S.r.l.
Model / Type reference ..... :	EMB-LR1302-mPCIe-SPI-915
FCC ID ..... :	Z7HEMBLR1302
Rating(s) ..... :	120 V ~ 60 Hz single-phase

Report

Tested by (name + signature) ..... :	C. Panozzo	.....
Approved by (name + signature) ..... :	R. Beghetto	.....

1 Summary

2	Reference standard	
KDB 447498 D01 General RF Exposure Guidance v06		RF exposure procedures and equipment authorization policies for mobile and portable devices
3	**List of attachments**	
Attachment 1: Instruments list, measurement uncertainty, judgement of compliance and quality manual references		
4	**Deviation(s) from test specification**	
None		
5	**Testing location**	
CMC Centro Misure Compatibilità S.r.l. Via della Fisica, 20 – 36016 Thiene (VI) – Italy Test site facility's FCC registration number: 182474		

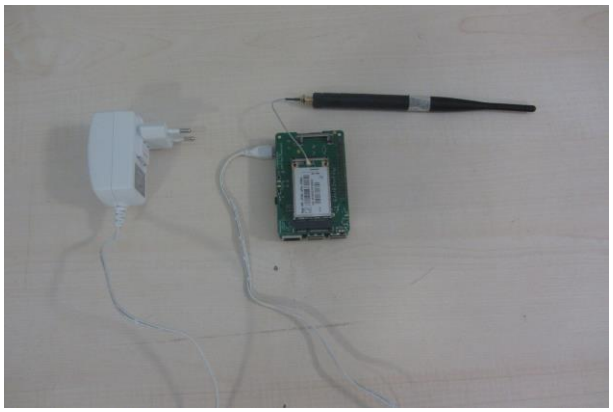
Revision index	***Date***	***Change history***
1.0	17.11.2021	--

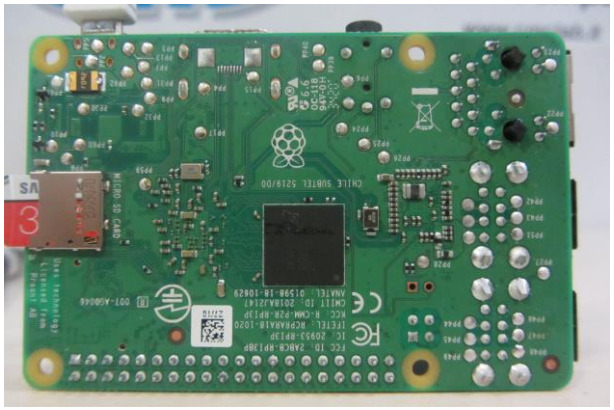
Testing and sampling:	
Date of receipt of test item	08.10.2021
Testing start date	12.11.2021
Testing end date	12.11.2021
Sampling procedure	Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion. The results relate to the sample as it has been received.
Internal identification	Adhesive label with the product number P211144
General remarks:	
This report shall not be reproduced, except in full, without the written approval of CMC. The test results presented in this report relate only to the object tested. “(see appended table)": refers to a table appended to the report. Throughout this report a comma is used as the decimal separator.	
Possible test case verdicts:	
Test case does not apply to the test object:	N/A (Not Applicable)
Test object does meet the requirement:	P (Pass)
Test object does not meet the requirement:	F (Fail)
Test object does not performed:	N/E (Not Executed)
Definition of symbols used in this test report:	
☒ Indicates that the listed condition, standard or equipment is applicable for this report. ☐ Indicates that the listed condition, standard or equipment is not applicable for this report.	

6 General description of test item(s)

Description ..... :	EMB-LR1302-mPCIe LoRaWAN Gateway Module						
Model Number ..... :	EMB-LR1302-mPCIe-SPI-915						
FCC ID ..... :	Z7HEMBLR1302						
Serial Number ..... :	--						
Brand name ..... :	Embit						
Frequency band ..... :	902 – 928 MHz						
Nominal frequencies (LoRa 125 kHz) ..... :	F_L: 903,90 MHz		F_M: 904,50 MHz		F_H: 905,30 MHz		
Nominal frequencies (LoRa 500 kHz) ..... :	F_L: 923,30 MHz		F_M: 925,00 MHz		F_H: 927,50 MHz		
Rated power supply ..... :		Voltage and Frequency	Reference poles				
			N	L1	L2	L3	PE
	☒	AC: 120 V, 60 Hz	☒	☒	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☐	DC:					☐
Software version ..... :	v2.0.0						
Test configuration ..... :	☒	Table top equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
Type of equipment ..... :	☒	Transmitter unit					
	☒	Receiver unit					
Type of station ..... :	☐	Portable station					
	☒	Mobile station					
Operating modes ..... :	No.	Operating mode of test item					
	1	EUT in continuous transmission at maximum power					

6.1 Photos of the test item






0519HB

7 Verdict summary section

KDB 447498 D01 General RF Exposure Guidance v06			
Clause	**Requirement – Test case**	**Basic standard**	**Verdict**
cl. 4	RF Exposure analysis	ANSI C63.10	**P**

Normative references	
Reference no.	***Description***
KDB 447498 D01 General RF Exposure Guidance v06	RF exposure procedures and equipment authorization policies for mobile and portable devices
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

8 Test conditions

8.1 General

<table>
<tr><td>Environmental reference conditions.....:</td><td colspan="3">The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment.
The climatic conditions during the tests were within the following limits:</td></tr>
<tr><td rowspan="3"></td><td>Temperature</td><td>Humidity</td><td>Atmospheric pressure</td></tr>
<tr><td>15 °C – 35 °C</td><td>30 % - 60 %</td><td>800 hPa – 1060 hPa</td></tr>
<tr><td colspan="3">If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.</td></tr>
<tr><td>Measurement uncertainties .....:</td><td colspan="3">Attachment 1</td></tr>
</table>

9 Test results

9.1 RF Exposure analysis

Tested by ..... :	C. Panozzo
Test date ..... :	12.11.2021
Reference standards ..... :	KDB 447498 D01 cl. 4 ANSI C63.10
Test specification ..... :	--

Acceptance limits
1 mW/cm^2 max at 20 cm of distance

Result – LoRa 125 kHz, spread factor 10

Frequency (MHz)	*Peak Output Power (dBm)*	*Peak Output Power (mW)*	*Power Density at 20 cm (mW/cm^2)*	*Power Density Limit (mW/cm^2)*
903,90	20,94	124,17	3,91E-02	1,00
904,50	20,80	120,23	3,79E-02	1,00
905,30	20,80	120,23	3,79E-02	1,00

Result – LoRa 125 kHz, spread factor 7

Frequency (MHz)	*Peak Output Power (dBm)*	*Peak Output Power (mW)*	*Power Density at 20 cm (mW/cm^2)*	*Power Density Limit (mW/cm^2)*
903,90	20,92	123,59	3,90E-02	1,00
904,50	20,94	124,17	3,91E-02	1,00
905,30	20,44	110,66	3,49E-02	1,00

Result – LoRa 500 kHz, spread factor 12

Frequency (MHz)	*Peak Output Power (dBm)*	*Peak Output Power (mW)*	*Power Density at 20 cm (mW/cm^2)*	*Power Density Limit (mW/cm^2)*
923,30	26,44	440,55	1,39E-01	1,00
925,00	26,55	451,86	1,42E-01	1,00
927,50	27,36	544,50	1,72E-01	1,00

Result – LoRa 500 kHz, spread factor 7

Frequency (MHz)	*Peak Output Power (dBm)*	*Peak Output Power (mW)*	*Power Density at 20 cm (mW/cm^2)*	*Power Density Limit (mW/cm^2)*
923,30	26,44	440,55	1,39E-01	1,00
925,00	26,41	437,52	1,38E-01	1,00
927,50	27,47	558,47	1,76E-01	1,00

Attachment 1

Instruments list

Id. number	*Manufacturer*	*Model*	*Description*	*Serial number*	*Last calibration*	*Due date calibration*
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January ‘21	January ‘22

Attachment 1

Measurement uncertainty

Test	*Test Setup*	*Expanded uncertainty*	*Note*
Conducted emission CISPR 16 LISN 50uH 0,009-0,0150 MHz	PE001_01	3,4 dB	1
Conducted emission CISPR 16 LISN 50uH 0,150-30,0 MHz	PE001_01	3,0 dB	1
Conducted emission CISPR 16 Voltage Probe 0,15-30 MHz	PE001_02	2,3 dB	1
Conducted emission CISPR 16 Current Probe 0,15-30 MHz	PE001_03	2,6 dB	1
Conducted emission CISPR 16 ISN 0,15-30 MHz	PE001_04	4,7 dB	1
Clic CISPR 16 LISN 50uH 0,150-30,0 MHz	PE001_05	2,9 dB	1
Radiated Emission CDNE 30-300 MHz	PE001_06	3,3 dB	1
Disturbance Power 30-300 MHz	PE002_01	3,8 dB	1
Radiated Emission LAS 0,15-30 MHz	PE003_01	2,0 dB	1
Radiated Emission CISPR 16 Loop Ant. 0,15-30 MHz	PE004_01	4,2 dB	1
Radiated Emission CISPR 16 Bicon. Ant. 30-300 MHz	PE004_02	4,1 dB	1
Radiated Emission CISPR 16 LogP. Ant. 300-1000 MHz	PE004_03	3,9 dB	1
Radiated Emission CISPR 16 Horn Ant. 1-18 GHz	PE004_04	4,1 dB	1
Human Exposure to electromagnetic fields	PE005_01	16,7 %	1
Harmonics	PE006_01	10 mA + 2,9 %	1
Flicker	PE007_01	4,36 %	1
Radiated Immunity 80 MHz - 6 GHz	PE102_XX	2,20 dB 0,87 V/m a 3V/m	1
Conducted Immunity 0,15 - 230 MHz	PE105_XX	1,20 dB 0,44 V a 3V	1
AC Magnetic field	PE106_01	1,55 % 0,15 A/m a 10A/m	1
Pulse Magnetic field	PE107_01	6,23 % 18,7 A/m a 300A/m	1
Dumped Magnetic field	PE108_01	6,23 % 1,87 A/m a 30A/m	1
Common mode conducted immunity	PE112_01	2,16 % 0,22 V a 10V	1

Attachment 1

Test	Test Setup	Expanded uncertainty	Note
Power/Spurious 9kHz-30MHz	PR001_01	4,2 dB	1
Power/Spurious ERP 30-1000MHz d=10m	PR001_02+03	4,7 dB	1
Misura della potenza EiRP 1-18GHz d=3m	PR001_04+05	4,7 dB	1
Misura della potenza EiRP 18-40GHz d=3m	PR001_06	5,4 dB	1
Frequency error	PR002_01+02	< 1x10-7	1
Timing zero span (1001pts.)	PR002_01+02	0,2 % SWT	1
Modulation bandwidth	PR002_01+02	< 1x10-7	1
Conducted RF power and spurious emission	PR002_01+02	1,1 dB	1
Adjacent channel power	PR002_01+02	1,1 dB	1
Blocking	PR002_01+02	1,1 dB	1

Test	Test Setup	Expanded uncertainty	Note
Electrostatic discharge immunity test	PE101_0X		2
Electrical fast transients / burst immunity test	PE103_0X		2
Surge immunity test	PE104_0X		2
Short interruption immunity test	PE109_01		2
Ring Wave immunity test	PE110_01		2
Low frequency immunity test	PE111_01		2
Dumped Oscillotary immunity test	PE113_01		2
Rev_21_01 date 23/02/2021			

Note 1:

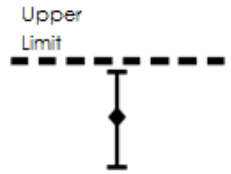
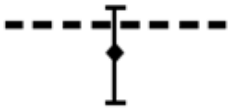
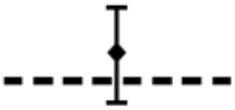
The expanded uncertainty reported according to the document EA-4-02 is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of p = 95%

Note 2:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence, covering factor k=2

Attachment 1

Judgement of compliance

Case 1	Case 2	Case 3	Case 4
			
The sample complies with the requirements.	The sample complies with the requirements.	The sample does not comply with the requirements.	The sample does not comply with the requirements.
The measurement results is within the specification limit when the measurement uncertainty is taken into account.	It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty although the measurement result is below the limit.	It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty also the measurement result is upper the limit.	The measurement results is outside the specification limit when the measurement uncertainty is taken into account.

In agreement with ILAC-G8:09/2019 cl.4.2.1 Guidelines on Decision Rules and Statements of Conformity

Quality manual references – Internal procedure

Internal Procedure PM001 rev. 3.1 (Quality Manual)	Measure procedure
Internal Procedure INC_M rev. 9.5 (Quality Manual)	Measurement uncertainty calculation