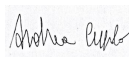


FCC Part 1.1310, 2,1091 and ISED TEST REPORT

Report Number	326/24/04412/FCC	Rev. 00
Date of document	2024-09-18	
Total number of pages	Pag. 8	
OBJECT	Compliance to FCC Part 1.1310, 2,1091 and ISED RSS-102 Issue 6	
CUSTOMER	pro-micron GmbH	
EQUIPMENT UNDER TEST	transmitter	
MODEL	spike2	
SUMMARY		
1	OBJECT OF THE TESTS	3
2	IDENTIFICATION	3
3	EQUIPMENT UNDER TEST (EUT)	3
4	REFERENCE STANDARDS	4
5	Test method & Test RESULT – MPE Requirements	5
Verified by (Name + Signature)	ANDREA CUPIDO <i>Lab Manager</i>	 Documento firmato da: CUPIDO ANDREA 19.09.2024 07:01:14 UTC
Approved and issued by (Name + Signature)	ALESSANDRO ZUCCATO <i>Lab Director</i>	 Documento firmato da: ZUCCATO ALESSANDRO 19.09.2024 08:19:14 UTC

History sheet of test Report

Report Number	Rev.	Date	Description of modification
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1 OBJECT OF THE TESTS

The objective of the tests is prepared, in accordance with FCC Part 1.1310, 2,1091 and ISED RSS-102 Issue 6 , to evaluate RF exposure compliance of radiocommunication apparatus.

2 IDENTIFICATION

2.1 Laboratory

Name : Kiwa Creiven S.r.l.
 Street: Corso Spagna, 12
 City : 35127 Padova - ITALY
 Phone : +39.049.8704036
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 E-mail : info.creiven@kiwa.com

FCC Designation

number: IT0016

ISED CAB Identifier: IT0007

2.2 Customer

Manufacturer: pro-micron GmbH
 Street: Gottlieb-Daimler Str. 6
 City: 87600 Kaufbeuren
 Phone: +49 8341 9560 50
 Refer to: Mr Marco Lombardini

3 EQUIPMENT UNDER TEST (EUT)

3.1 EUT identification (declared under responsibility of the customer)

EUT Description: transmitter
 Model: spike2
 Code: 42000808
 Serial N°: 0xA4CC; 0xA4CD; 0xA4CE; 0xA4CF
 Software release: WEPO41120A00_sha256.hex
 Size: Ø63x136mm
 Manufacturer: pro-micron GmbH
 Supply voltage: 5V USB loaded / battery inside
 Frequency: 2,4 GHz (ZigBee)
 Rated Electrical Power: 2,5W
 Rated Input Current: 0,5A

3.1.1 EUT classifications

The manufacturer declared the following classification:

Object	Descriptions
Operating frequency range	2400 – 2484 MHz
Equipment type	ZigBee (IEEE 802.15.4)
Nominal Channel Bandwidth	162 MHz
Frequency Hopping Spread Spectrum	NO
Listen Before Talk	NO
Adaptive	NO
Number of Channels	16 (CH11 – 26)
Antenna Type	Integrated antenna
Extreme Temperature Range	-10°C ÷ 60°C

3.1.2 EUT additional information

Object	Descriptions
Classification of installation and use	☐ Stand-alone ☒ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment) ☐ Plug-in radio device (Equipment intended for a variety of host systems) ☐ Other
Means for connection to the supply:	☐ Supply cord fitted with a plug ☐ Supply cord without plug (for permanently connection to fixed wiring) ☒ Appliance inlet ☐ Appliance provided with a set of terminals allowing the connection of cables or fixed wiring
Date of receipt of test item	2024-06-24
Date(s) of performance of tests	See the data specified in test results details

3.2 EUT cables

Classification	Description	Cable		note
		Shielded	Specified max. length	
DC power port (used only for the recharge)	d.c. input cable	☐	☐ none ☒ ≤ 1m ☐ ≤ 3m ☐ ≤ 10m ☐ ≤ 30m	type of power source: ☐ Internal Power Supply ☐ External Power Supply or AC/DC adapter ☒ Battery ☐ Other

3.3 EUT Auxiliary Equipments (AEs)

To ensure the correct functioning of the EUT, it has been necessary to make use of the following auxiliary equipment (AE):

Auxiliary Equipment AE01

Description : AC/DC adapter
Model: S005AYB0500100
Manufacturer: I.T.E.

3.4 EUT Sampling and adopted criteria

Equipment used for testing was selected by the customer. Sampling criteria adopted by the customer is unknown to Kiwa Creiven laboratory.

3.5 EUT documents

The following documentations have been provide by the customer

Kiwa Creiven document reference	Descriptions
326/24/04320/FCC	Reference test report

4 REFERENCE STANDARDS

4.1 Reference standards

DOCUMENT	OBJECT
FCC CFR47	Rule Parts 1.1310, 2.1091
ISED	Rule RSS-102 Issue 6

5 TEST METHOD & TEST RESULT – MPE REQUIREMENTS

5.1 FCC MPE Requirements

The FCC MPE limits from CFR 47 Part 1.1310, 2.1091 are shown in the table below.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

5.2 ISED MPE Requirements

The ISED MPE limits from RSS-102 Issue 6 are shown in the table below.

Remark: If the operating frequency of the device is between two frequencies located in Table, linear interpolation is applied for the applicable separation distance.

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 f	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10 ⁻⁴ $f^{0.5}$	6.67 x 10 ⁻⁵ f	616000/ $f^{1.2}$
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

5.3 Calculation

FCC

In order to perform the MPE assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst-case" or conservative prediction:

$$\text{Power density: } S[mW/cm^2] = \frac{P_{E.I.R.P.}[mW]}{4\pi R[cm]^2}$$

Where:

S = power density

$P_{E.I.R.P.}$ = Equivalent isotropically radiated power

R = distance to the center of radiation of the antenna (evaluation distance)

ISED

In order to perform the MPE assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst-case" or conservative prediction:

$$\text{Power density: } S[W/m^2] = \frac{P_{E.I.R.P.}[W]}{4\pi R[m]^2}$$

Where:

S = power density

$P_{E.I.R.P.}$ = Equivalent isotropically radiated power

R = distance to the center of radiation of the antenna (evaluation distance)

5.3 Test result

FCC RF Exposure

RF Mode	Frequency	Evaluation Distance	Antenna Gain	Duty Cycle	EIRP	EIRP	Power density	Limit for uncontrolled Exposure	Distance require to meet uncontrolled Exposure Limit	Result
	MHz	(cm)	(dBi)	(%)	(dBm)	(W)	(mW/cm ²)	(mW/cm ²)	(cm)	
ZigBee (IEEE 802.15.4)	2400-2484	20	4	100	3,61	0,0023	0.00115	1	20	Pass

ISED RF Exposure

RF Mode	Frequency	Evaluation Distance	Antenna Gain	Duty Cycle	EIRP	EIRP	Power density	Limit for uncontrolled Exposure	Distance require to meet uncontrolled Exposure Limit	Result
	MHz	(cm)	(dBi)	(%)	(dBm)	(W)	(W/m ²)	(W/m ²)	(cm)	
ZigBee (IEEE 802.15.4)	2400-2484	20	4	100	3,61	0,0023	0.0115	5,35	20	Pass

PASS= SAR evaluation is not required because the output power value is less than exemption limit.

Note:

*EIRP is the maximum eirp power of this EUT, and the data comes from the RF report for this EUT
(See Par. 3.6 of this test report)