



# Test Report - FCC PART 1.1310 / MPE

## Applicant: n-fuse GmbH

Approved for Release By:

Signature: *Bruno Clavier*

Name & Title: Bruno Clavier, General Manager

Date of Signature 4/7/2022

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Timco Engineering, Inc., an IIA Company  
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## 1. Customer Information

Applicant: n-fuse GmbH  
Address: Ossietzkystrasse 4  
              Stuttgart, BW 70174  
              Germany

## 2. Location of Testing

### 2.1 Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA"). Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45, Newberry, Florida 32669

FCC test firm # 578780  
FCC Designation # US1070  
FCC site registration is under A2LA certificate # 0955.01  
ISED Canada test site registration # 2056A  
EU Notified Body # 1177  
For all designations see A2LA scope # 0955.01



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## 2.2 Testing was performed, reviewed by

Dates of Testing: March 17 – April 26, 2021

Signature:

A handwritten signature of "Tim Royer" in black ink.



Name & Title: Tim Royer, EMC Engineer

Date of Signature 4/7/2022



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### 3. Test Sample(s) (EUT/DUT)

The test sample was received: March 17, 2021

#### 3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

Identification	
FCC ID:	2AY53LRWCC1915
Brief Description	LoRaWAN Concentrator Card
Type of Modular	n/a
Model(s) #	LRWCC1/8
Trade name	n/a
Firmware version	1.0
Software version	n/a
Serial Number	n/a

Technical Characteristics	
Technology	DTS
Frequency Range	902 – 928 MHz
RF O/P Power (Max.)	22.01 dBm
Modulation	GFSK
Bandwidth & Emission Class	130.2 kHz, F1D
Number of Channels	8
Duty Cycle	n/a
Antenna Type	Integrated
Antenna Gain (for each ant.)	0 dBi
Antenna Connector	UFL
Voltage Rating (AC or Batt.)	DC 5 V

Antenna Characteristics			
Frequency Range	Mode / BW	Ant Gain 1	Ant Gain 2
902-928	n/a	0 dBi	n/a



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#### 4. Test methods & Applicable Regulatory Limits

##### 4.1 Test methods/Standards/Guidance:

The following guidance FCC KDB 447498 D01 General RF Exposure Guidance v06 was used for RF exposure evaluation as per FCC Part 1.1310 and FCC Part 2.1091 and part 2.1093. Full test results are available in this report.

###### 4.1.1 FCC Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	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 <sup>2</sup> )	<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 <sup>2</sup> )	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30



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## 4.2 Equations

### POWER DENSITY

$$E(V/m) = \text{SQRT} ( 30 * P * G ) / d$$

$$Pd(W/m^2) = E^2 / 377$$

$$S = \text{EIRP} / ( 4 * \text{Pi} * D^{2v} )$$

Where:

S = Power density, in  $\text{mW/cm}^2$

EIRP = Equivalent Isotropic Radiated Power, in mW

D = Separation distance in cm

Power density is converted from units of  $\text{mW/cm}^2$  to units of  $\text{W/m}^2$  by multiplying by 10.

### DISTANCE

$$D = \text{SQRT} ( \text{EIRP} / ( 4 * \text{Pi} * S ) )$$

Where:

D = Separation distance in cm

EIRP = Equivalent Isotropic Radiated Power, in mW

S = Power density in  $\text{mW/cm}^2$

**SOURCE-BASED DUTY CYCLE** (When applicable (for example, multi-slot mobile phone applications) A duty cycle factor may be applied.)

$$\text{Source-based time-average EIRP} = ( DC / 100 ) * \text{EIRP}$$

Where:

DC = Duty Cycle in % as applicable.

EIRP = Equivalent Isotropic radiated Power, in mW



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## 5. RF Exposure Results

Separation Distance: 20 cm

MPE									
Frequency Band	Evaluation Distance (cm)	Max Power + Tolerance (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	EIRP (W)	Power Density	Limit for Uncontrolled Exposure	Limit for Controlled Exposure	Distance Required to meet Uncontrolled Exposure Limit (cm)
902-928 MHz	20	22.01	0.00	100%	0.16	0.032 mW/cm <sup>2</sup>	0.601 mW/cm <sup>2</sup>	3.007 mW/cm <sup>2</sup>	20.00

RESULT: Pass at DISTANCE 20 cm



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## 6. History of Test Report Changes

Test Report #	Revision #	Description	Date of Issue
TR_1217-21_FCC PT 1.1310/ MPE_	1	Initial release	3/17/2021
	2	Updated Page 8	February 25, 2022
	3	Updated Page 8	4/7/2022



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END OF TEST REPORT

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