

Applicant:

Elatec GmbH
Zeppelinstraße 1
82178 Puchheim
Germany
Tel.: +49 89 5529961-0

Test report no.:

230594-AU02+W04

for:

Elatec GmbH
RFID reader
TWN4 Mini EVP SE M HF

according to:

47 CFR Part 1
RSS-102



Deutsche
Akkreditierungsstelle
D-PL-12155-01-00

Accreditation:

FCC test firm accreditation expiration date: 2025-09-19
MRA US-EU, FCC designation number: DE0010
Test firm registration number: 997268
FCC Registration Number (FRN): 0032245045
BNetzA-CAB-02/21-02/7 Valid until 2028-11-26

Recognized until 2025-03-16 by the
Department of Innovation, Science and Economic Development Canada (ISED)
as a recognized testing laboratory
CAB identifier: DE0011
Company number: 3472A

Location of Testing:

Element Materials Technology Straubing GmbH
Tel.: +49 9421 56868-0
Fax: +49 9421 56868-100
Email: info.straubing@element.com
Gustav-Hertz-Straße 35
94315 Straubing, Germany

The technical accuracy is guaranteed through the quality management of
Element Materials Technology Straubing GmbH.

Table of contents

1	Summary of test results	4
1.1	FCC standard	4
1.2	IC standard	4
2	Test regulations	5
2.1	FCC standards	5
2.2	IC standards	5
3	Equipment under Test	6
3.1	General information	6
3.2	Radio specifications	7
3.3	Human exposure specifications	7
3.4	Photographs of EUT	7
4	Test results	8
4.1	FCC	8
4.2	Canada	10
5	Revision history	12

List of tables

Table 1: Table 1 to §1.1310(e)(1) Limits for Maximum Permissible Exposure (MPE) for General Population/Uncontrolled Exposure	8
Table 2: Result of evaluation of compliance	9
Table 3: Result of exemption for routine evaluation of RF exposure	11

1 Summary of test results

1.1 FCC standard

<i>FCC standard</i>	<i>Requirement</i>	<i>Result</i>	<i>Page</i>
47 CFR Part Part 1, § 1.1310(e)(1)	Maximum permissible exposure, except WPT, calculation	Passed	8

1.2 IC standard

<i>IC standard</i>	<i>Requirement</i>	<i>Result</i>	<i>Page</i>
RSS-102 Issue 5, section 2.5.2	Evaluation for separation distance > 20 cm, except 3 kHz – 10 MHz	Passed	10

Straubing, July 2, 2024



Tested by
Konrad Graßl
Department Manager Radio



Approved by
Christian Kiermeier
Reviewer

2 Test regulations

2.1 FCC standards

Standard	Title
IEEE C95.3-2002 (R2008) Approved December 11, 2002 Reaffirmed June 12, 2008	IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz–300 GHz
Part 1, Subpart I, Section 1.1310 October 2023	Radiofrequency radiation exposure limits
ANSI C63.10 June, 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2.2 IC standards

Standard	Title
RSS-102 Issue 5 (March 19, 2015) Amendment 1 (February 2, 2021)	Spectrum Management and Telecommunications Radio Standards Specification Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)
IEEE C95.3-2002 (R2008) Approved December 11, 2002 Reaffirmed June 12, 2008	IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz–300 GHz

3 Equipment under Test

3.1 General information

Product type:	RFID reader / writer module		
Model name:	TWN4 Mini EVP SE M HF		
Serial number(s):	Prototype		
Applicant:	Elatec GmbH		
Manufacturer:	Elatec GmbH		
Hardware version:	B/T4MP-F-203		
Software version:	TWN4_xKx481_CONT202_MT2.bix		
Additional modifications:	None		
FCC ID:	WP5TWN4F26		
IC registration number:	7948A-TWN4F26		
Power supply:	DC supply		
	Nominal voltage:	5 V	
	Minimum voltage:	4.25 V	
	Maximum voltage:	5.75 V	
Temperature range:	-25 °C to +85 °C (customer defined)		
Device type:	☐ Portable	☒ Mobile	☐ Fixed

3.2 Radio specifications

System type:	RFID Reader		
Application frequency band:	13.110 MHz – 14.010 MHz		
Operating frequencies:	13.56 MHz		
Short description:	EUT is a RFID reader / writer module operating at the frequency 13.56 MHz		
Number of RF channels	1		
Highest internal frequency:	120 MHz		
Modulation	ASK		
Antenna:	Type:	PCB antenna	
	Connector:	☒ external	☐ internal
		☐ temporary	☐ none (integral antenna)

3.3 Human exposure specifications

Exposure tier:	Body
Separation distance:	> 20 cm
Evaluated against exposure limits:	General public use
Simultaneous transmissions:	no

3.4 Photographs of EUT

See Annex B of test report 230594-AU02+W03 of test laboratory Element Materials Technology Straubing GmbH.

4 Test results

This clause gives details about the test results as collected in the summary of test results on page 4.

4.1 FCC

4.1.1 Maximum permissible exposure, except WPT, calculation

Requirement: Part 1, § 1.1310(e)(1)

Reference: ---

Performed by:	Konrad Graßl	Date of test:	June 3, 2024
Result:	☒ Limits kept	☐ Limits not kept	

4.1.1.1 Requirements and limits maximum permissible exposure

According to §1.1310(e)(1):

Table 1 to § 1.1310(e)(1) sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

<i>Frequency range (MHz)</i>	<i>Electric field strength (V/m)</i>	<i>Magnetic field strength (A/m)</i>	<i>Power density (mW/cm²)</i>	<i>Averaging time (minutes)</i>
1.34-30	824/f	2.19/f	180/f ² (see note 2)	<30

Table 1: Table 1 to §1.1310(e)(1) Limits for Maximum Permissible Exposure (MPE) for General Population/Uncontrolled Exposure

Notes:

1. F = frequency in MHz
2. Plane-wave equivalent power density

4.1.1.2 Results

The following data are based on applicants document: Test report 230594-AU02+W03 of the test laboratory Element Materials Technology Straubing GmbH.

Operation frequency: 13.56 MHz
Field strength:: 46.7 dBμV/m at 30 m

Information related to Exposure:

Tune-up tolerance (according to the manufacturer): 0 dB
Separation distance: 20 cm
Exposure: general public
Power averaging over time: not applied

<i>Operation f requency (MHz)</i>	<i>EIRP + tune-up tolerance (dBm)</i>	<i>Power density (mW/cm²)</i>	<i>Limit (mW/cm²)</i>	<i>Ratio of limit</i>	<i>Result</i>
13.56	-28.5	0.0000003	0.9789334	0.0000003	Passed

Table 2: Result of evaluation of compliance

EIRP is calculated using the formula of ANSI C63.10-2013 clause 9.5:

$$\text{EIRP} = E + 20\log(d) - 104.7$$

Where: EIRP = equivalent isotropically radiated power in dBm
E = electric field strength in dBμV/m
d = measurement distance in meters (m)

4.2 Canada

4.2.1 Evaluation for separation distance > 20 cm, except 3 kHz – 10 MHz

Requirement: RSS-102 Issue 5, section 2.5.2

Reference: n/a

Performed by:	Konrad Graßl	Date of test:	June 3, 2024
---------------	--------------	---------------	--------------

Result:	☒ Limits kept	☐ Limits not kept
---------	---	--

4.2.1.1 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

According to RSS 102 Clause 2.5.2:

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

4.2.1.2 Results

The following data are based on applicants document: Test report 230594-AU02+W03 of the test laboratory Element Materials Technology Straubing GmbH.

Operation frequency: 13.56 MHz
Field strength:: 46.7 dB μ V/m at 30 m

Information related to Exposure:

Tune-up tolerance (according to the manufacturer): 0 dB
Separation distance: 20 cm
Exposure: general public
Power averaging over time: not applied

Channel Frequency (MHz)	EIRP + tuneup tolerance (dBm)	EIRP (W)	EIRP limit (W)	Ratio of limit	Result
	-28.5	0.0000014	1.0000000	0.0000014	Passed

Table 3: Result of exemption for routine evaluation of RF exposure

EIRP is calculated using the formula of ANSI C63.10-2013 clause 9.5:

$$\text{EIRP} = E + 20\log(d) - 104.7$$

Where: EIRP = equivalent isotropically radiated power in dBm
E = electric field strength in dB μ V/m
d = measurement distance in meters (m)

5 Revision history

<i>Revision</i>	<i>Date</i>	<i>Issued by</i>	<i>Description of modifications</i>
0	2024-07-02	Konrad Graßl	First edition

Template: RF_FCC_IC_Human Exposure_V1.8