



**RF EXPOSURE EVALUATION
 Maximum Permissible Exposure (MPE)**

Applicant Name:
 Elster Solutions, LLC
 208 South Rogers Lane
 Raleigh, NC, 27610
 United States

Date of Testing:
 03/15/2022 – 03/24/2022
Test Site/Location:
 Element Lab. Columbia, MD, USA
Test Report Serial No.:
 1M2203310044-03.QZC

FCC ID:	QZC-SNRGK4
IC:	4557A-SNRGK4
APPLICANT:	Elster Solutions, LLC

Application Type: Certification
Model: SNRGK4 G01
EUT Type: Non-Metering Gatekeeper/Synergynet Router
FCC Classification: FCC Part 15 Spread Spectrum Transmitter
FCC Rule Part: FCC Part 1 (§1.1310) and Part 2 (§2.1091)
Test Procedure(s): KDB 447498 D01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC KDB 447498 D01. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



RJ Ortanez
 Executive Vice President



FCC ID: QZC-SNRGK4	MAXIMUM PERMISSIBLE EXPOSURE REPORT		Approved by: Technical Manager
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1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations and RSS-102 of Industry Canada.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310 and RSS-102: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	...	...	f/300	6
1500-100,000	...	...	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	1.0	30

Table 1-1. Limits for Maximum Permissible Exposure (MPE) FCC

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Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
0.1 - 10	...	1.6/f	...	6
1.1 - 10	193/f ^{0.5}	...	...	6
10 - 20	61.4	0.163	10	6
20 – 48	129.8/f ^{0.25}	0.3444/f ^{0.25}	44.72/f ^{0.5}	6
48 - 300	49.33	0.1309	6.455	6
300 - 6000	15.60f ^{0.25}	0.04138f ^{0.25}	0.6455f ^{0.5}	6
6000 – 15,000	137	0.364	50	6
15,000 – 150,000	137	0.364	50	616000/f ^{1.2}
150,000 – 300,000	0.354f ^{0.5}	9.4x10 ⁻⁴ f ^{0.5}	3.33x10 ⁻⁴ f	616000/f ^{1.2}
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
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	3.142f ^{0.3417}	0.008335f ^{0.3417}	0.02619f ^{0.6834}	6
6000 – 15,000	61.4	0.163	10	6
15,000 – 150,000	61.4	0.163	10	616000/f ²
150,000 – 300,000	0.158f ^{0.5}	4.21x10 ⁻⁴ f ^{0.5}	6.67x10 ⁻⁵ f	616000/f ²

Table 1-2. Limits for Maximum Permissible Exposure (MPE) ISED

1.2 EUT Description

The **Elster Solutions, LLC FCC ID: QZC-SNRGK4** is a Non-Metering Gatekeeper/Synergynet Router containing a 900 MHz ISM frequency hopping module. The module is integrated and is limited to operation within the host device. The radio module can operate in one of two modes: (1) Energy Axis (EA) mode with 25 channels at 250mW or (2) SynergyNet mode with 50 channels at 1W. Only the highest power mode is assessed for compliance.

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1.3 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements.

The power generated by each transmitter used in this product was initially measured by a power meter or spectrum analyzer and the powers were recorded. Through use of the Friis transmission formula and knowledge of the maximum antenna gain to be used, the power density level is calculated at a distance of 20cm.

Friis Transmission Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm²)

π = 3.1416

P_{out} = output power to antenna (mW)

r = distance between observation point and center of the radiator (cm)

G = gain of antenna in linear scale

Calculated MPE

The power density limit for General Population/Uncontrolled Exposure at each frequency is determined based on the information in Table 1-1.

For this MPE assessment, the highest peak output power is shown without consideration of the average power due to channel hopping.

Frequency	902.4	MHz
FCC Limit	0.602	mW/cm ²
ISED Limit	2.741	W/m ²
Distance	20	cm
Max Power	30	dBm
Power	1000	mW
Tx Ant Gain	3	dBi
FCC Power Density	0.397	mW/cm ²
ISED Power Density	3.969	W/m ²

Table 1-3. Calculated MPE Data for CH 0

1.4 Summary of Results

Frequency Band [MHz]	Maximum Antenna Gain [dBi]	MPE @ 20cm (mW/cm ²)	Test Result
902-928	3	0.277	PASS

Table 1-4. Maximum Permissible Exposure Summary Table FCC

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Frequency Band [MHz]	Maximum Antenna Gain [dBi]	MPE @ 20cm (W/m ²)	Test Result
902-928	3	3.969	PASS

Table 1-5. Maximum Permissible Exposure Summary Table ISED

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2.0 CONCLUSION

The device meets the mobile RF exposure limit at a 20cm separation distance as specified in §2.1091 of the FCC Rules and Regulations and Health Canada Safety Code 6. An appropriate RF exposure compliance statement will be placed in the user's manual.

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