RF Exposure Evaluation Report

For:
Elster Solutions, LLC

Model:
NXCMR300

Product Description:
900MHz ISM radio, LTE Cat-M1 MODEM, gas & water metering metrology

FCC ID: QZC-NXCMR300
IC: 4577A-NXCMR300

Per:
CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D04 Interim General RF Exposure Guidance v01
ISED RSS-102 Issue 6

Report number: EMC_HONEY_235_24001_FCC_ISED_RF_Exposure_Rev1

DATE: 2024-06-25

A2LA Accredited

IC recognized # 3462B

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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the equipment (as identified in section 3 of this test report) with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 1.1307, Part 2 (2.1091) and ISED standard RSS-102 issue 6 under worst case conditions (measured or rated RF output power including tune-up tolerance, antenna gain, the distance towards the human body, multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits stipulated by the above given FCC and ISED rule parts based on available specifications for worst-case conditions at a separation distance greater than 20cm to the body.

Company	Description	Model No.
Elster Solutions, LLC	900MHz ISM radio, LTE Cat-M1 MODEM, gas & water metering metrology	NXCMR300

Responsible for the Report:

Date	Section	Name	Signature
2024-06-25	Compliance	Cheng Song (EMC Engineer)	cheng.song@cetecom.com Digitally signed by: cheng.song@cetecom.com DN: CN = cheng.song@cetecom.com Date: 2024.06.25 16:26:43 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
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EMC Engineer:	Cheng Song
Responsible Project Leader:	Akanksha Baskaran

2.2 Identification of the Client

Client Firm/Name:	Elster Solutions, LLC
Street Address:	208 South Rogers Lane
City/Zip Code	Raleigh, NC 27610
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

Model No:	NXCMR300
HW Version :	1.1
SW Version :	1.1
FCC-ID :	QZC-NXCMR300
IC:	4577A-NXCMR300
PMN:	NXCMR300
Product Description:	Provides metrology for gas and water meters, communicates metering data over LTE Cat-M1. 900MHz ISM radio used for initial setup/configuration, or walk-by metering in areas of poor cellular coverage.
Frequency Range / number of channels:	902 – 928 MHz, 25 channels frequency hopping Data rate: 35.5 kbps or 142.2 kbps
Radios included in device	**ISM:** • SiLabs EFR32FG28 SoC • FSK modulation • 25 channels frequency hopping
Other Radios included in the device:	Sequans GM02S
Antenna Information as declared:	Max Gain 1.5 dBi
Max. declared output Powers:	6.05 dBm
Power Supply/ Rated Operating Voltage Range:	3.2 VDC – 3.8 VDC
Operating Temperature Range	-40º to 85º C
Sample Revision	■Production Unit; ☐Pre-Production
EUT Dimensions	17.78 x 11.43 x 7.62 cm
Weight	544.31 grams
Note: Details about the Equipment Under Test (EUT) are provided by the client or applicant.	

4 RF Exposure Limits and FCC and ISED Basic Rules

4.1 Routine Environmental Evaluation Categorical Exclusion Limits according to FCC 1.1307(b)(3)(i)(B), and FCC 1.1307(b)(3)(ii)(B)

Single RF sources is exempt if the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a}\frac{P_i}{P_{\text{th},i}} + \sum_{j=1}^{b}\frac{ERP_j}{ERP_{\text{th},j}} + \sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k} \le 1$$

4.2 Field reference level (FRL) exposure exemption limits according to RSS-102 Issue 6, section 6.6

Field reference level (FRL) 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 (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP. 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 $4.49/f0.5$ 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 x 10-2 $f0.6834$ 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 EIRP was derived.

5 Evaluations

5.1 FCC RF Exposure (Standalone)

Radio	Modulation	Freq-Low$_{[GHz]}$	Pwr$_{[dBm]}$	Power$_{[W]}$	Ant-G$_{[dBi]}$	ERP$_{[W]}$	ERP$_{[mW]}$	Threshold ERP$_{[W]}$	ERP < Threshold ERP$_{[W]}$	FCC 2.1091(c)(1) Pth$_{[mW]}$ = ERP$_{20cm}$
LoRa	FSK	0.9020	6.05	0.0040	1.50	0.003	3.47	0.46	Yes	1840.08

5.2 ISED RF Exposure (Standalone)

									RF Exposure	
									RSS-102 2.5.2 D>20 cm (300 ≤ Freq < 6000 MHz)	
Radio	Modulation	Freq-Low [MHZ]	Pwr$_{[dBm]}$	Power$_{[W]}$	Ant-G [dBi]	Ant-G [lin]	EIRP$_{[W]}$	EIRP$_{[mW]}$	Exemption limit for Routine Evaluation	Exemption (Y/N)
LoRa	FSK	902.00	6.05	0.00	1.50	1.41	0.01	5.69	1.37	Yes

Conclusion:

- The Equipment Under Test (EUT) met the RF Exposure exemption requirements as per FCC and ISED rules, thus qualifying for an exemption from RF exposure evaluation.

6 Revision History

Date	Report Name	Changes to report	Prepared by
5/30/2024	EMC_HONEY_235_24001_FCC_ISED_RF_Exposure	Initial Version	Cheng Song
6/25/2024	EMC_HONEY_235_24001_FCC_ISED_RF_Exposure_Rev1	Updated the reference to Issue 6 of RSS-102 on the report cover page and in Section 1, Assessment.	Cheng Song

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