Radio Frequency Exposure Evaluation Report

For:

IOSiX, LLC

Model Name:

IO-2110

Product Description:

OBD vehicle data interface with Bluetooth and WiFi connectivity

FCC ID: 2AICQ-2110
IC: 21520-2110

Applied Rules and Standards:
CFR 47 Part 2 (2.1093),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISED RSS-102 Issue 5

Report number: EMC_LOOMA-011-22001_SAREX_Rev1

DATE: 3-3-2023

A2LA Accredited

IC recognized #
3462B-1

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecom.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

Contents

1. Assessment

The following device was evaluated against the limits for general population uncontrolled exposure specified in CFR 47 Part 2.1093 according to SAR evaluation exclusion requirements specified in FCC regulation as listed in KDB 447498, and ISEDC RSS-102 Issue 5.

The device meets the requirements for SAR exclusion as stipulated by the above given FCC / ISEDC rules.

Company	Description	Model #
IOSiX, LLC	OBD vehicle data interface with Bluetooth and WiFi connectivity	IO-2110

Responsible for Testing Laboratory:

Date	Section	Name	Signature
3-3-2023	Compliance	Arndt Stoecker (Director of Regulatory Services)	Arndt Stoecker Digitally signed by: Arndt Stoecker DN: CN = Arndt Stoecker email = arndt.stoecker@cetecom.com C = US O = CETECOM Inc Date: 2023.03.03 11:54:14 -08'00'

Responsible for the Report:

Date	Section	Name	Signature
3-3-2023	Compliance	Kris Lazarov (Senior EMC Engineer)	Kris Lazarov Digitally signed by Kris Lazarov Date: 2023.03.03 10:22:29 -08'00'

2. Administrative Data

2.1. Identification of the Testing Laboratory Issuing the 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
Fax:	+1 (408) 586 6299
Director of Regulatory Services:	Arndt Stoecker
Responsible Project Leader:	Akanksha Baskaran

2.2. Identification of the Client / Manufacturer

Client's Name:	IOSiX, LLC
Street Address:	1161 Oak Valley Dr
City/Zip Code	Ann Arbor, MI 48108
Country	USA

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

3. Equipment under Assessment

Model No	IO-2110
HW Version	5.0b
SW Version	1.0
FCC-ID	2AICQ-2110
IC:	21520-2110
FWIN:	-
HVIN	IO-2110
PMN	IO-2110
Product Description	OBD vehicle data interface with Bluetooth and WiFi connectivity
Device Category	☐Fixed Installation ☐Mobile ■ Portable ☐ Mixed Mobile and Portable
Frequency Range / number of channels	BT LE: 2404 MHz (ch 0) – 2480 MHz (ch 39), 40 channels 802.11b,g,n: 2412 MHz (ch 1) – 2462 MHz (ch 11), 11 channels
Declared Output power	BT LE: 5 dBm + 2 dB 802.11b,g,n: 14 dBm +2dB
Max. declared antenna gain	0.44 dBi
Minimum distance of antenna or radiating parts to user	20mm
Power Supply/ Rated Operating Voltage Range	5-27V DC
Operating Temperature Range	-40 C to 125 C
Co-located Transmitters / Antennas	☐Yes ■No
Sample Revision	☐Prototype ☐ Production ■ Pre-Production
Exposure Category	☐ Occupational/ Controlled ■ General Population/ Uncontrolled

4. FCC and ISEDC Exemption Limits for Routine Evaluation

4.1. FCC SAR-Based Exemption per KDB 447498 2.1.3 and FCC CFR 47 § 1.1307(b)(3)(i)(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);

4.2. ISED SAR-Based Exemption per IC RSS-102 Issue 5

ISED RSS-102 Section: 2.5.1 Exemption Limits for Routine Evaluation — SAR Evaluation
SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power.

Table with limits for the frequencies off interest

Frequency (MHz)	d[mm]	Exemption Limits [mW]
2450	20	30

For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5.

5. Stand-alone Transmission SAR Exclusion Evaluation

5.1. Justification for using the 20 mm Distance

The conservative distance of 20 mm is an estimate of how close a human body can be to the devise in its typical application.

5.2. FCC Pth @ 20 mm calculation

f = 2480 MHz
d = 20 mm
ERP = 3060 mW
$X = - \text{Log}_{10} (60/(3060*1.57)) = 1.51$
$P_{th} = 3060*(2/20)^{1.51} = 94.49$ mW ERP

5.3. ISED Limit (limb-worn) @ 20 mm calculation

f = 2480 MHz
d = 20 mm
RSS-102 Section 2.5.1 SAR evaluation limit = 30*2.5 = 75 mW EIRP

5.4. SAR Exclusion Calculation Table

FCC / ISED Standalone Transmission SAR Exclusion Calculations						
Band	**f [MHz]**	**Max EIRP [mW]**	**Max ERP [mW]**	**FCC ERP Pth @ 20 mm [mW]**	**ISED EIRP Limit @ 20 mm [mW]**	**SAR Exclusion applicable (Yes/No)**
BT LE	2480	5.6	3.4	94.5	75	Yes
802.11b,g,n	2480	44	26.9	94.5	75	Yes

.

6. Revision History

Date	Report Name	Changes to report	Report prepared by
2-9-2023	EMC_LOOMA-011-22001_SAREX	Initial version	Kris Lazarov
3-3-2023	EMC_LOOMA-011-22001_SAREX_Rev1	Updated table in section 3 to 20mm minimum distance, and no cotransmission.	Kris Lazarov

<<< The End >>>