RF Exposure Evaluation Report

For:

Sentrilock, LLC

Model:
Remote Access Device 3G

Product Description:
Cellular-enabled Wireless Smartcard Reader

Per:

CFR Part Part 1 (FCC 2.1093) and
FCC KDB 447498 D01 General RF Exposure Guidance v06

Report number: EMC-SENTR-002-16001-FCC-SAR-EX-Rev1
DATE: November 29, 2016

***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

1. Assessment

The following device was evaluated against the limits for general population uncontrolled exposure specified in FCC 2.1093 according to SAR evaluation exclusion requirements specified in FCC regulation as listed in KDB 447498.
This assessment deviates from 2.1093 d) 5) as a load based time averaging correction has been applied with the justification given in 4.2

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

Company	Description	Model #
Sentrilock LLC	Cellular-enabled Wireless Smartcard Reader	Remote Access Device 3G

Report reviewed by: TCB Evaluator

Date	Section	Name	Signature
Nov 29, 2016	Compliance	Kris Lazarov (EMC Engineer)	Kris Lazarov Digitally signed by Kris Lazarov DN: cn=Kris Lazarov, o, ou, email=kris.lazarov@cetecom.com, c=US

Responsible for the Report:

Date	Section	Name	Signature
Nov 29, 2016	Compliance	James Donnellan (Senior EMC Engineer)	James Donnellan Digitally signed by James Donnellan DN: cn=James Donnellan, c=US, o=Cetecom Inc., ou=Compliance, email=james.donnellan@cetecom.com Date: 2016.11.29 11:55:23 -08'00'

2 Administrative Data

1.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (858) 362 2400
Fax:	+1 (858) 687-4809
Compliance Manager:	Franz Engert
Project Engineer:	Laith Saman

1.2 Identification of the Client / Manufacturer

Applicant's Name:	Sentrilock, LLC
Street Address:	7701 Service Center Dr
City/Zip Code	West Chester, OH 45069
Country	USA

3 Equipment under Assessment

Model #:	Remote Access Device 3G
Product Description:	Handheld, battery-powered smart card reader used to access SentriLock lockboxes via 802.15.4 radio, and to transfer access data with a remote database over GPRS.
FCC-ID:	W9T-P10305
Module Information:	Manufacturer: Gemalto Module: EHS5-US FCC-ID: QIPEHS5-US
Technology/ Type(s) of Modulation:	Dual band 850&1900MHz GSM/GPRS Multislot Class 12; UMTS/HSPA FDD BAND II, V; Zigbee using ATmega128RFA1 from Atmel With O-QPSK modulation.
Operating Frequency Ranges (MHz)/ Channels:	GSM 850: 824 - 848 MHz; 124 channels; GSM 1900: 1850 - 1910 MHz; 373 channels; UMTS FDD BAND V: 826 - 847 MHz; 288 channels; UMTS FDD BAND II: 1852 - 1908 MHz; 107 channels; Zigbee: Nominal band: 2400 – 2483.5 MHz; 2405 MHz (Ch. 1) – 2480 (Ch.16), 16 channels;
Antenna info:	Cellular radio: trace to surface mount antenna, Antenova Reflexus peak gain: 2.0 dBi @ 850 MHz, 3.7 dBi @ 1900 MHz Zigbee radio: dual pcb trace dipole; peak gain: -1.0 dBi
Maximum conducted output power + tune up of integrated module	GPRS850: 33.5dBm GPRS1900: 30.5dBm
Minimum distance of antenna or radiating parts to user:	5mm when operating scroll button as needed to stimulate radio transmission
Maximum payload per transmission:	750Bytes
Co-located Transmitters/ Antennas?	■Yes ☐ No
Device Category:	☐ Fixed Installation ☐Mobile ■ Portable ☐ Mixed Mobile and Portable
Exposure Category:	☐ Occupational/ Controlled ■ General Population/ Uncontrolled
Power Supply/ Rated Operating Voltage Range:	3.7 V lithium ion polymer battery, Rechargeable via a standard micro USB interface
operating temperature range	Tlow: -40° C/ Tnom: 25° C/ Tmax: 85° C
Test Sample Status:	Production

4 Subject of Investigation

The objective of the evaluation done by CETECOM Inc. was to assess the applicability of SAR evaluation exclusion according to methods described in applicable standards.

4.1 The FCC Exposure Criteria

The FCC SAR test exclusions are set by FCC KDB 447498 section 4.3 (a).

According to KDB 447498, SAR evaluation can be excluded if the following equation is satisfied:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR ,

Where f(GHz) is the RF channel transmit frequency in GHz

Band/modulation/ timeslots	d[mm]	f[GHz]	Max Power + tune up [mW]	Source based duty cycle. (See Notes)	Load based duty cycle based on Maximum payload. (See Notes)	Effective average max power [mW]	Limit @ 5 mm [mW]	Exclusion
GPRS850/CS1/1	5	0.85	2239	0.125 (1)	0.029 (2)	8.073	40.674	OK
GPRS1900/CS1/1	5	1.9	1122	0.125 (1)	0.029 (2)	4.046	27.205	OK
UMTS V / RMC	5	0.85	281	1.000 (3)	0.019 (4)	5.296	40.674	OK
UMTS II / RMC	5	1.9	281	1.000 (3)	0.019 (4)	5.296	27.205	OK

Note1: The source based duty cycle has been determined by the worst case data rate of 8kbit/s/slot at CS-1 using 1 timeslot. With 1 Timeslot used for the uplink we have a 0.125 Duty cycle.

Note 2: The load base Duty cycle is based on the minimum duration of time it takes to do the transfer of the 750 byte upload, based on the worst case data transfer rate of the GPRS technology of 8000 bps (excluding overhead, with lowest order modulation, and lowest coding rate) and the mechanics of the process of initiating, executing and completing a single upload to the server in 26 seconds. 750 byte is 6000 bits which uploads in .75 seconds of the 26 seconds which give a load based duty cycle of 0.029

Note 3: The source based duty cycle for UMTS is 1.00.

Note 4: The load base Duty cycle is based on the minimum length of time it takes to do the transfer of the 750 byte upload, based on a worst case 12.2kbit/s RMC uplink coding rate (excluding overhead, with lowest order modulation, and lowest coding rate) and the mechanics of the process of initiating, executing and completing a single upload to the server in 26 seconds. 750 byte is 6000 bits which uploads in 0.49 seconds of the 26 seconds which give a load based duty cycle of 0.019.

Maximum powers + tune up, represent worst of case power base on tune up procedure of module.

4.2 Justification for use of load based time averaging

The minimum time interval to trigger a single 750Byte radio transmission after one presses on the scroll button and scrolls down to the correct menu item to start a connection is 26 seconds as outlined below.

- Power up and enable the radio. 4s
- Connect to UMTS/GSM and Attach to GPRS. 10s
- The Connection itself last 6s.
- To display a completion message before returning to the menu 6s
- Press the button again to start another connection 0s.

Thus the shortest possible time to go through one sequence of transmission has been determined to be 26 seconds driven by the mechanics involved in making the connection, uploading the data and displaying the completion message.

4.3 Justification for using the extremity limit of 7.5 SAR Threshold limit

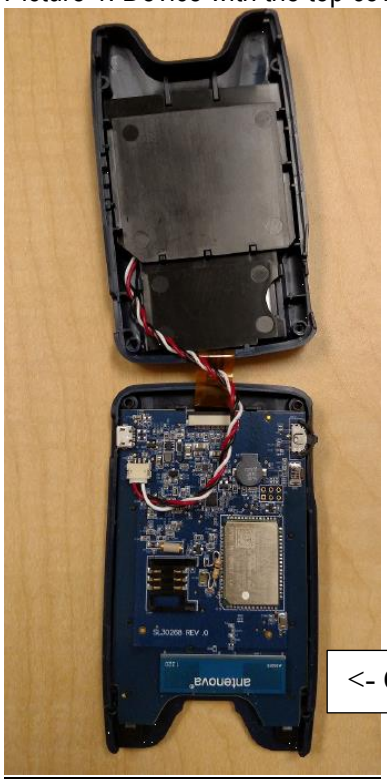
The device is handheld and intended to be operated with the thumb of the hand holding it.

4.4 Justification for using the 5 mm Distance

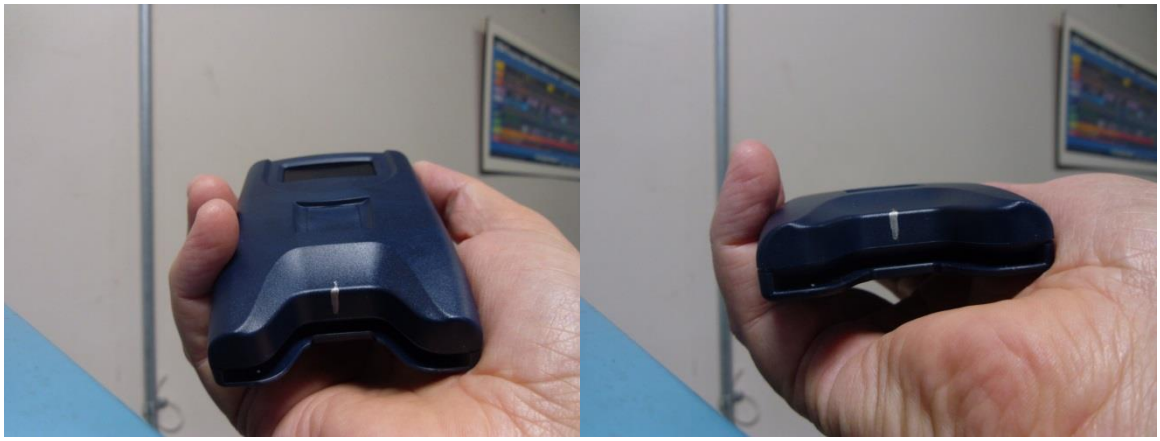
The device is handheld and the cellular antenna is near the bottom centre of the device as shown below in picture 1. The top surface of the PCB is 7mm from the back of the plastic housing, and the top layer of the cellular antenna chip is another 3mm off the PCB. The antenna is slightly off-centre toward the right side. It is 11mm in from the right side, and extends 40mm across.

As can be seen on picture 2 and 3, when the device is held in the hand with ones thumb on the thumb switch there is much more than 5mm distance from any part of the antenna structure to the hand holding it.

Picture 1: Device with the top cover lifted showing the cellular antenna.



Pictures 2 and 3: Holding the Device while placing ones thumb on the thumbwheel.



5 Revision History

Date	Report Name	Changes to Report	Prepared by
Nov 14, 2016	EMC-SENTR-002-16001–FCC-SAR-EX	Initial Release	James Donnellan
Nov 29, 2016	EMC-SENTR-002-16001–FCC-SAR-EX-Rev1	Updated source based timing based on customer feedback and Expanded explanation of source and load based timing per FCC feedback. Added pictures and explanation of minimum distance used.	James Donnellan