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Precisely Right.

RF Exposure Report

FCC Part 2.1091

EUT Name: SLS-630i
Model No.: SLS-1

Prepared for:

Codonics, Inc.
17991 Englewood Drive
Middleburg Heights OH 44130, USA

Prepared by:

TUV Rheinland of North America, Inc.
5015 Brandin Ct. Fremont CA 94538 USA
Tel: (929) 249-9123
Fax: (925) 249-9124
<http://www.tuv.com/>

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Statement of Compliance

Manufacturer: Codonics, Inc.
17991 Englewood Drive
Middleburg Heights OH 44130, USA
Name of Equipment: SLS-630i
Model No. SLS-1
Application of Regulations: FCC Part 2.1091

Guidance Documents:

FCC Part 2.1091

Test Methods:

FCC Part 1.1310, KDB 447498 D01

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in this report.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

Oswaldo Casorla February 22, 2023

Test Engineer Date

Richard Decker February 22, 2023

Laboratory Signatory Date



Test Cert. # 3331.02

Revisions

Revision No.	Date	Reason for Change	Author
1/25/2023	US22KWTX.002	Section 1.2. Include name of Antenna located at the Print Path UHF Antenna Mikro-e-4503	OC
2/6/2023	US22KWTX.003	Corrected measurement units for antenna	OC
2/22/2023	US22KWTX.004	Simultaneous transmission summation	OC

Note: Latest revision report will replace all previous reports.

1 Product Specifications

1.1 Product Description

1.2 Product Specifications

EUT Specifications	
Exposure Type	<input checked="" type="checkbox"/> General Population / Uncontrolled <input type="checkbox"/> Occupational / Controlled
Multiple Antenna Feeds:	<input type="checkbox"/> Yes and how many 1 <input checked="" type="checkbox"/> No
Hardware Version	The units tested were serial numbers 170C00004C, 170C00005C
Software Version	SLS SW 4.0.0-dev
Antenna	Print Path UHF Antenna Mikroe-4503
Note:	

1.3 Air Interfaces

Air Interface	Supported Capabilities	Modulation	Maximum Duty Cycle %	Band (MHz)	Frequency Range (MHz)	Maximum Output Power Including Tolerance (dBm)
UHF Mikroe-4503	• UHF RFID	• PR-ASK	52.5	902 - 928 MHz	902 - 928 MHz	21.85
UHF Abracon APAG-0007	• UHF RFID	• PR-ASK	6.2%	902 - 928 MHz	902 - 928 MHz	28.51

2 RF Exposure Evaluation

2.1 Purpose

This report will demonstrate the compliance of RF exposure to the human body of the SLS-1 according to FCC rule part 2.1091. All transmitters, regardless if it is categorically excluded, are assessed to ensure the product can operate in manners that meet or exceed the minimum test separation distance as required by KDB 447498.

2.2 Exemption Threshold

Table 2. Single RF Sources Subject to Routine Environmental Evaluation under MPE-Based Exemptions, $R \geq \lambda/2\pi$

Transmitter Frequency	Threshold ERP
0.3 – 1.34	1,920 R ²
1.34 – 30	3,450 R ² /f ²
30 – 300	3.83 R ²
300 – 1,500	0.0128 R ² f
1,500 – 100,000	19.2 R ²

Note: Transmitter Frequency is in MHz, Threshold ERP is in watts, R is in meters, f is in MHz.

2.3 Maximum Permissible Exposure Limit

The Maximum Permissible Exposure (MPE) limits according to FCC rule part 1.1310 for general population/uncontrolled exposure is as follows:

Frequency Range (MHz)	E-field strength (V/m)	H-field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500	-	-	f/1500	30
1,500-100,000	-	-	1.0	30

* = Plane-wave equivalent power density

2.4 Assessment Methods

The power density is calculated according to the following equation

$$S = \frac{EIRP}{4\pi R^2}$$

Where

S = Power Density (mW/cm²)

EIRP = Effective Isotropic Radiated Power (mW)

R = Minimum distance between the human body and antenna (cm)

When the calculated power density exceeds the MPE limits, the power density is measured.

2.5 Assessment Calculation

The maximum output power and antenna gain is declared by the manufacturer and used in this assessment. The minimum RF exposure distance during normal operation is 20 cm.

Stand Alone Analysis

Frequency (MHz)	Operating Mode	Max. Conducted Power (mW)	Numeric Antenna Gain	ERP (W)	Exemption Limit ERP (W)	Ei Power Density (mW/cm ²)	Eref Power Density Limit (mW/cm ²)	Percentage of Limit %
902.75	UHF RFID Print Path	153.11	0.005	0.00043	0.46	0.00014	0.60	0.02
902.75	UHF RFID Front Cover	709.58	0.36	0.16	0.46	0.05	0.60	8.48
13.56	HF RFID Front Cover	176.20	0.00000045	0.000000049	0.75	0.000000016	0.98	0.00000162
13.56	HF RFID Print Path	168.27	0.00000002	0.000000003	0.75	0.000000001	0.98	0.00000008

Note: Calculations for this report are based on highest power measurement and its antenna gain.

Simultaneous Transmission Analysis

For each simultaneous transmission configuration, the sum of the ratios to the limit of each radio should not exceed 1.

Simultaneous Transmission Configuration	Summation Ei/Eref	Total Evaluation
Print Path UHF Antenna Mikro-e-4503	0.0002	0.085
Front Cover UHF Antenna Abracon APAG-0007	0.0848	
Front Cover HF PCB Loop Antenna	0.00000002	
Print Path HF PCB Loop Antenna	0.00000001	

Note: The sum of the ratios of the applicable terms for MPE-based and measured MPE found to be less than 1, to determine simultaneous transmission test exception exposure compliance.

2.6 Conclusion

The EUT was found to be exempt from RF Exposure evaluation.

The EUT was found to be compliant to the requirements of FCC part 1.1310 and part 2.1091 with a minimum distance of 20 cm.