Onity Inc.

SERENE WALL READER

Regulatory Model Number (RMN): 10108350P1, WALL READER, RFID, BLE5
Commercial Model Number (CMN): 10108351P1, WALL READER, RFID, BLE5

FCC 2.1091:2024

Bluetooth Low Energy

RFID

Report: ONIT0116.7 Rev. 1, Issue Date: May 10, 2024

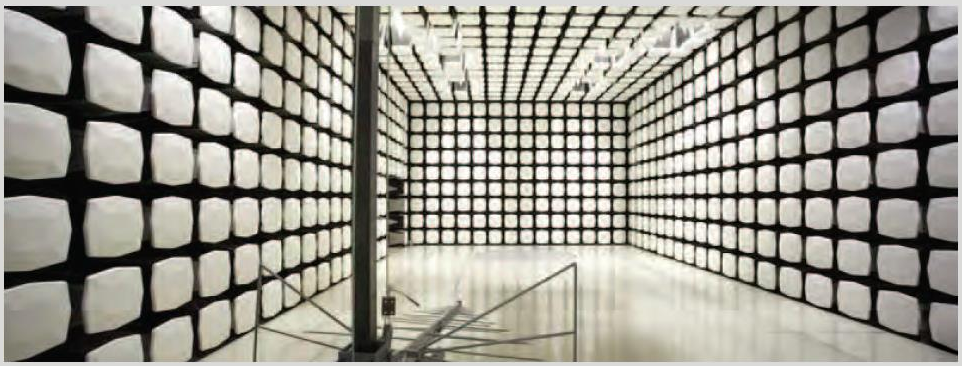


TABLE OF CONTENTS

element
2023.04.17

Section	Page Number

CERTIFICATE OF EVALUATION

Last Date of Evaluation: May 3, 2024
Onity Inc.
EUT: SERENE WALL READER
Regulatory Model Number (RMN): 10108350P1, WALL READER, RFID, BLE5
Commercial Model Number (CMN): 10108351P1, WALL READER, RFID, BLE5

RF Exposure Evaluation

Standards

Specification	Method
FCC 2.1091:2024	FCC 447498 D01 General RF Exposure Guidance v06

Results

Method Clause	Description	Applied	Results	Comments
7.2	Maximum Permissible Exposure	Yes	Pass	None

Deviations From Evaluation Standards

None

Approved By:

Donald Facteau, Process Architect

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Updated "009 Maximum Permissible Exposure.docx" - 13.56 MHz FF from (28.1 dBuV/m @ 30m) to (18.5 dBuV/m @ 30m) per ONIT0116.1 Rev. 2.	2024-06-10	12

ACCREDITATIONS AND AUTHORIZATIONS

element
2021.09.01

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:

California Minnesota Oregon Texas Washington

FACILITIES

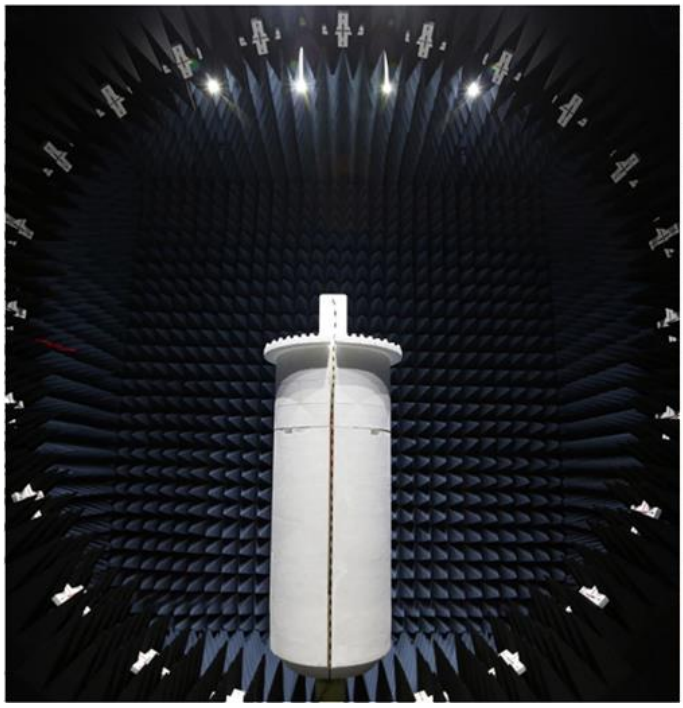
element
2023.09.21

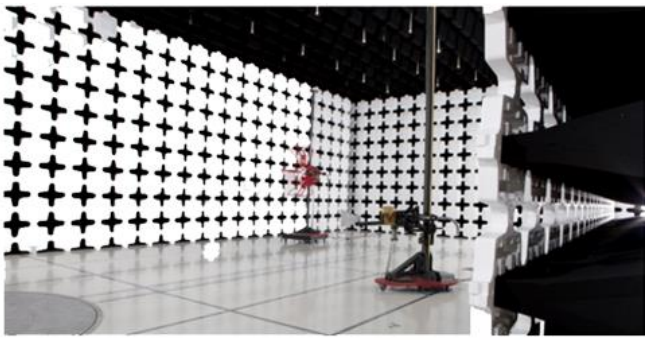
Testing was performed at the following location(s)

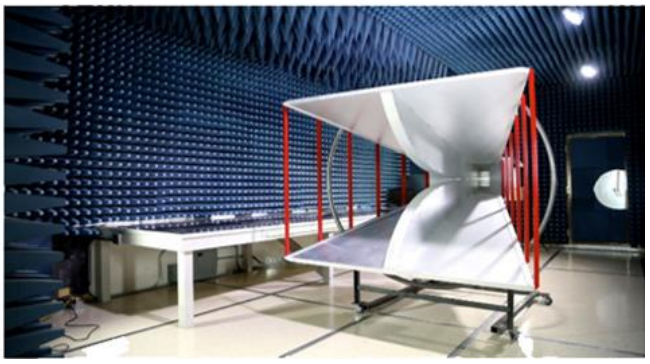
	Location	Labs (1)	Address	A2LA (2)	ISED (3)	BSMI (4)	VCCI (5)	CAB (6)	FDA (7)
☐	California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
☐	Minnesota	MN01-11	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	3310.05	2834E	SL2-IN-E-1152R	A-0109	US0175	TL-57
☒	Oregon	EV01-12	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3310.02	2834D	SL2-IN-E-1017	A-0108	US0017	TL-56
☐	Texas	TX01-09	3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	3310.03	2834G	SL2-IN-E-1158R	A-0201	US0191	TL-54
☐	Washington	NC01-05	19201 120th Ave NE Bothell, WA 98011 (425) 984-6600	3310.06	2834F	SL2-IN-E-1153R	A-0110	US0157	TL-67
☐	Offsite	N/A	See Product Description	N/A	N/A	N/A	N/A	N/A	N/A

See data sheets for specific labs

(1) The lab designations denote individual rooms within each location. (OC01, OC02, OC03, etc.)
(2) A2LA Certificate No.
(3) ISED Company No.
(4) BSMI No.
(5) VCCI Site Filing No.
(6) CAB Identifier. Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA
(7) FDA ASCA No.







PRODUCT DESCRIPTION

Client and Equipment Under Evaluation Information

Company Name:	Onity Inc.
Address:	4001 Fairview Industrial Drive
City, State, Zip:	Salem, OR 97302-1142
Evaluation Requested By:	Ali Elmi
EUT:	SERENE WALL READER Regulatory Model Number (RMN): 10108350P1, WALL READER, RFID, BLE5 Commercial Model Number (CMN): 10108351P1, WALL READER, RFID, BLE5
Date of Evaluation:	5/3/2024

Information Provided by the Party Requesting the Evaluation

Functional Description of the Equipment:

Basic Function:
The Serene wall reader is an electronic access control device intended for use in Hospitality and Commercial installations. It contains two radio-frequency interfaces; a 2.4GHz Bluetooth Low Energy radio and a 13.56MHz RFID contactless smartcard interface.

Maximum Dimensions of Serene wall reader is :- 4 inches (102 mm) height, 1.6 inches (40 mm) width, 1.1 inches depth (28 mm)

Bluetooth LE Description
BTLE functionality is controlled by the Texas Instruments CC26xx-series system-on-chip, as are most access control functions. The BTLE driver inside this chip is directly connected to a 2.4GHz balun for impedance transformation, then to a separate matching network to match impedance to the on-board chip antenna. An un-populated coaxial connector is available for development and regulatory compliance testing, but not available for end customer use.
Wireless (BLE) MCU, TI – CC2642
Chip Antenna: Johansson 2450AT18D0100
Bluetooth LE Characteristics
Frequencies: 2.402GHz to 2.480GHz
Channeling: 40 evenly spaced channels between 2.402GHz to 2.480GHz
Modulations: GFSK
Data rate: 4 data rates: 2M (2Mb/s), 1M (1Mb/s), Coded S2 (500Kbps), Coded S8 (125Kbps)
o NOTE: only 2M and 1M modulations are used in the Serene Wall Reader
Bandwidth: 2MHz
Antenna type / gain: PCB-mounted chip antenna / peak gain = 1.5dBi, average gain = -1.0dBi

---

13.56MHz RFID Description
RFID functionality is also controlled by the Texas Instruments CC26xx-series chip using a digital interface to a NXP CLRC663-series RFID driver IC. This IC is connected directly to a combination filter and feedback circuit, then through a board-to-board connector between the Control Board and Antenna Board, then into a combination matching and resonant tank circuit to enable RFID read functionality. The trace antenna on the Antenna Board is an integral part of this circuit.

13.56MHz RFID Characteristics
Frequencies: 13.56MHz
Channeling: 1 channel
Modulations:
o Reader to Card: 100% ASK, Miller Coded
o Card to Reader: Subcarrier load modulation, Manchester Coded or BPSK

PRODUCT DESCRIPTION

Data rate: capable of 106 kbits/s to 848kbits/s
o 106kbits/s is the only data rate used by the Serene Wall Reader
Bandwidth: 330kHz at 106kbits/s data rate
Antenna type / Inductance: Custom PCB trace coil antenna, Antenna inductance ~2uH
Protocols supported: ISO/IEC 14443A/B/MIFARE, JIS X 6319-4, ISO/IEC18092 (passive initiator), ISO/IEC 15693
o Only ISO/IEC 14443A/MIFARE is supported by the serene wall Reader.

_____

Objective:
To demonstrate compliance with FCC requirements for RF exposure for 2.1091 mobile/fixed devices

RF EXPOSURE CONDITION

element
2018-07-17

The following RF Exposure conditions were used for the assessment documented in this report:	
Intended Use	Mobile
Location on Body (if applicable)	n/a
How is the Device Used	The radios are located more than 20 cm from the user
Radios Contained in the Same Host Device	Bluetooth Low Energy RFID
Simultaneous Transmitting Radios	Bluetooth Low Energy, RFID
Body Worn Accessories	n/a
Environment	General Population/Uncontrolled Exposure

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

element
EXRPT.2022.07.12.0

OVERVIEW

Human exposure to RF emissions from mobile devices (47 CFR §2.1091) may be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and/or power density, as appropriate, since exposures are assumed to occur at distances of 20 cm or more from persons. ANSI C95.1:2005 + Amd 1:2010 specifies a minimum separation distance of 20 cm for performing reliable field measurements to determine adherence to MPE limits. If the minimum separation distance between a transmitter and nearby persons is more than 20 cm under normal operating conditions, compliance with MPE limits may be determined at such distance from the transmitter. When applicable, operation instructions and prominent warning labels may be used to alert the exposed persons to maintain a specified distance from the transmitter or to limit their exposure durations and usage conditions to ensure compliance. If the use of warning labels on a transmitter is not effective or desirable, the alternative of performing SAR evaluation with the device at its closest range to persons under normal operating conditions may be used. The field strength and power density limits adopted by the FCC are based on whole-body averaged exposure and the assumption of RF field levels relate most accurately to estimating whole-body averaged SAR. This means some local values of exposures exceeding the stated field strength and power density limits may not necessarily imply non-compliance if the spatial average of spatially averaged RF fields over the exposed portions of a person's body does not exceed the limits.

COMPLIANCE WITH FCC 2.1091

47 CFR §1.1307
"(b)(1) Requirements. (i) With respect to the limits on human exposure to RF provided in §1.1310 of this chapter, applicants to the Commission for the grant or modification of construction permits, licenses or renewals thereof, temporary authorities, equipment authorizations, or any other authorizations for radiofrequency sources must either:

(A) Determine that they qualify for an exemption pursuant to §1.1307(b)(3);

(B) Prepare an evaluation of the human exposure to RF radiation pursuant to §1.1310 and include in the application a statement confirming compliance with the limits in §1.1310; or

(C) Prepare an Environmental Assessment if those RF sources would cause human exposure to levels of RF radiation in excess of the limits in §1.1310.

47 CFR §2.1091
"A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the RF source's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location while transmitting. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal desktop computer, are considered to be mobile devices if they meet the 20-centimeter separation requirement."

The device will only be used with a separation distance between the antenna and the body of the user or nearby persons as shown in the table below and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b).

COMPLIANCE WITH FCC KDB 447498 D01 General RF Exposure Guidance v06

"KDB 447498 D01 General RF Exposure Guidance v06" provides the procedures, requirements, and authorization policies for mobile and portable devices.

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Devices operating in standalone mobile device exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously are covered in section 7.1.

Devices containing multiple transmitters capable of simultaneous transmissions are covered in section 7.2.

LIMITS

Limits for General Population /Uncontrolled Exposure: 47 CFR 1.1310

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic 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 - 1500			f/1500	30
1500 - 100000			1	30

f = frequency in MHz
* = Plane-wave equivalent power density

ASSESSMENT

The exposure level for the radio is evaluated at a 20 cm distance from the radio's transmitting antenna using the general equation:

$$S = \frac{P * G}{4 * \pi * R^2}$$

Where: S = power density (mW/cm^2)
P = power input to the antenna (mW)
G = numeric power gain relative to an isotropic radiator
R = distance to the center of the radiation of the antenna (20 cm = limit for MPE estimates)
P*G = EIRP

Solving for S, the maximum power density 20 cm from the transmitting antenna is determined. This level is then compared to the applicable limit for the transmit frequency. If limits were not met at the 20 cm boundary the evaluation distance is increased until the limit is met as shown in the table below.

For co-located radios, the ratio of the calculated level to the limit is determined. The ratios for each co-located radio are summed. If the sum is less than or equal to one, then the device is excluded from testing and is deemed compliant.

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

element
EXRPT.2022.07.12.0

The standalone MPE and summed MPE ratios are summarized in the following table(s):

Radio	Transmit Frequency (MHz)	Field Strength (dBuV/m @ 30m)	Power Tolerance (dB)	Duty Cycle	Minimum Separation Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Ratio
RFID (CLRC663-series RFID driver IC	13.56	18.5	0.0	100.0%	20	0.0	1.0	0.00
							Max Ratio	0.00

The information in the table above was obtained from:

A measured value and a worst case 100% duty cycle were used in these calculations. From customer provided information and Element report No. ONIT0116.1 Rev. 2.

Radio	Transmit Frequency (MHz)	Conducted Output Power	Power Tolerance (dB)	Duty Cycle	Antenna Assembly Gain (dBi)	Minimum Separation Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Ratio
BLE (CC2642 Controller)	2440	5 dBm	0.0	100.0%	1.5	20	0.0	1.0	0.00
								Max Ratio	0.00

The information in the table above was obtained from:

The rated value and a worst case 100% duty cycle were used in these calculations. From customer provided information and Element report No. ONIT0116.2.

Sum of Maximum Ratios	Limit	Compliant
0.00	1	Yes

Evaluator: Nolan De Ramos

End of Test Report