Low Power Exemption Report for FCC

Applicant Name	:	***Verkada Inc***
Applicant Address	:	***405 E. 4th Ave. San Mateo California 94401 United States***
Product Name	:	***Keypad Door Reader***
Brand Name	:	***Verkada***
Model Number	:	***AD64-HW***
FCC ID	:	***2AWUU60B0701***
Report Number	:	***USSC248005001***
Compliant Standards	:	***FCC 47 CFR §2.1091***
Sample Received Date	:	***Aug. 01, 2024***
Report Issued Date	:	***Sep. 10, 2024***

*The above equipment has been tested by **Eurofins E&E Wireless Taiwan Co., Ltd.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Device Under Test (DUT) configurations represented herein are true and accurate accounts of the measurements of the sample's characteristics under the conditions specified in this report.*

Note:

1. The test results are valid only for samples provided by customers and under the test conditions described in this report.

2. This report shall not be reproduced except in full, without the written approval of Eurofins E&E Wireless Taiwan Co., Ltd.

3. The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.
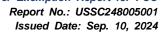
Approved By：

Testing Laboratory
1330

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Roy Wu / SAR Technical Director

Table of Contents

Revision History

Rev.	*Issued Date*	*Description*	*Revised by*
00	Sep. 10, 2024	Initial Issue	Rowan Hsieh

1. Test Regulations

1.1. Reference Standard and Guidance

The Maximum Permissible Exposure (MPE) evaluation documented in this report were performed in accordance with following FCC published KDB guidance and standard：

47 CFR Part 1.1307

47 CFR Part 1.1310

47 CFR Part 2.1093

KDB Publication 447498 D01 – General RF Exposure Guidance v06

KDB Publication 447498 D04 – Interim General RF Exposure Guidance v01

2. Information of Testing Laboratory

Test Facilities

Company Name:	Eurofins E&E Wireless Taiwan Co., Ltd.
Address No.:	140-1, Changan Street, Bade District, Taoyuan City 334025, Taiwan
Website:	https://www.atl.com.tw
Telephone:	+886-3-271-0188
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E-mail:	infoEETW@eurofins.com

Test Site Location

■ No. 140-1, Changan Street, Bade District, Taoyuan City 334025, Taiwan

☐ No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan

Laboratory Accreditation

Location	TAF	FCC	ISED
No. 140-1, Changan Street, Bade District, Taoyuan City 334025, Taiwan	Accreditation No.: 1330	Designation No.: TW0010	Company No.: 7381A CAB ID: TW1330
No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan	Accreditation No.: 1330	Designation No.: TW0034	Company No.: 28922 CAB ID: TW1330

3. DUT (Device Under Test) Information

3.1. Device Overview

Product Name	Keypad Door Reader	
Brand Name	❖ Verkada	
Model Name	AD64-HW	
FCC ID	2AWUU60B0701	
Supported Wireless Technologies	**Tx Frequency (MHz)**	**Operating Mode**
	Bluetooth 2402 ~ 2480	LE
	NFC 13.56	ASK
	RFID 125 kHz	FSK

Note:

The above DUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

4. Lowe Power Exemption Assessment

4.1. Introduction

According to *47 CFR §2.1093*, a portable 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 the RF source's radiating structure(s) is/are within 20 centimeters of the body of the user. the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for portable devices having single RF sources with more than an available maximum time-averaged power of 1 mW, more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), or more than the *Pth* in the following formula, whichever is greater. The following formula shall only be used in conjunction with portable devices not exempt by § 1.1307(b)(3)(i)(C) at distances from 0.5 centimeters to 20 centimeters and frequencies from 0.3 GHz to 6 GHz.

4.2. Determination of Exemption for Low Power Devices

For Single RF Sources, a single RF source is exempt if:

Option A：

The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph *§1.1307(b)(3)(ii)(A)*. Medical implant devices may only use this exemption and that in paragraph *§1.1307(b)(3)(ii)(A).*

Option B：

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:

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

Where

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

and

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

d = the separation distance (cm).

Option C：

Using *Table 1* and the minimum separation distance (*R* in meters) from the body of a nearby person for the frequency (*f* in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, *R* must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1: Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (Watts)
0.3 – 1.34	$1.920 \times R^2$
1.34 – 30	$3.450 \times R^2 / f^2$
30 – 300	$3.83 \times R^2$
300 – 1500	$0.0128 \times R^2 \times f$
1500 – 100000	$19.2 \times R^2$

For Multiple RF Sources, multiple RF sources are exempt if:

Option A :

The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is *§1.1307(b)(3)(i)(A)*. Medical implant devices may only use this exemption and that in *§1.1307(b)(3)(i)(A)*.

Option B :

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.

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

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption per *§1.1307(b)(3)(i)(B)* for *Pth*, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption per *§1.1307(b)(3)(i)(C)* for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

Pi = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source *i* at a distance between 0.5 cm and 40 cm (inclusive).

Pth,i = the exemption threshold power (*Pth*) according to *§1.1307(b)(3)(i)(B)* for fixed, mobile, or portable RF source *i*.

ERPj = the ERP of fixed, mobile, or portable RF source *j*.

ERPth,j = exemption threshold ERP for fixed, mobile, or portable RF source *j*, at a distance of at least λ/2π according to the applicable formula of *§1.1307(b)(3)(i)(C)*.

Evaluatedk = the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limitk = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source *k*, as applicable from *§1.1310*.

Tx Bands	Frequency (MHz)	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Peak Antenna / Directional Gain (dBi)	ERP (mW)	LPE Level in Option A (mW)	LPE Level in Option B (mW)	LPE Level in Option C (mW)	Low-Power Exemption Verdict
Bluetooth	2402	3.12	2	4.20	3.29	N/A	3060	768	*Pass by Option B*

Tx Bands	Frequency (MHz)	E-Field at 1m (dBuV/m)	EIRP (dBm)	ERP (mW)	LPE Level in Option A (mW)	LPE Level in Option B (mW)	LPE Level in Option C (mW)	Low-Power Exemption Verdict
NFC	13.56	52.55	-52.22	0.0000	1.00	N/A	N/A	*Pass by Option A*
RFID	0.128	13.78	-90.99	0.0000	1.00	N/A	N/A	*Pass by Option A*

Summary:

Since the maximum EIRP of this device is less than the LPE level and this device is qualified for Low Power Exemption under the field reference level exposure exemption limits of §1.1310, the emitted RF fields will be incapable of producing exposures that exceed the exposure limits. Hence, this device complies with the reference levels and a complete SAR evaluation is not required.

4.3. Standalone Maximum Permissible Exposure Evaluation

Maximum Permissible Exposure Assessment Method:

Calculations can be made to predict RF field strength and power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the general Equations below. This equation is generally accurate in the far-field of an antenna but will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction.

$$S_{eq} = \frac{P_{avg} \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:

Seq   =   Equivalent Plane Wave Power Density in mW/cm2.

Pavg =   Average Power at Antenna Terminals in Watts.

G   =   Gain of the Transmitting Antenna.

R   =   Distance from the Transmitting Antenna in meters.

Evaluation for Standalone MPE:

The manufacturer expects that the radiated component of this device will not close to the human body during normal usage and the warning statement was also stated in the user instruction. Since the transmitting antenna will be kept at least **20 cm** away from the human body, the MPE level is calculated based on this condition and the result is listed in below table.

Tx Bands	Frequency (MHz)	EIRP (mW)	Separation Distance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)	MPE Compliance
Bluetooth	2402	3.3	20	0.001	1.00	Pass

Tx Bands	Frequency (MHz)	EIRP (mW)	Separation Distance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)	MPE Compliance
NFC	13.56	0.0000	20	0.0000000	0.98	Pass
RFID	0.128	0.0000	20	0.0000000	N/A	Pass

4.4. Total Exposure Ratio Evaluation for Simultaneous Transmission

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency.

$$\sum_{i=1}^{\infty} \frac{S_{eq,i}}{S_{Limit,i}} \leq 1$$

Where:

Seq,i = Power Density for the source *i*.

SLimit,i = Power Density Limit for the source *i*.

Evaluation for Simultaneous Exposure:

Tx Bands	Power Density (mW/cm²)	MPE Limit (mW/cm²)	Exposure Ratio
Bluetooth	0.001	1.0	0.001

Tx Bands	Power Density (mW/cm²)	MPE Limit (mW/cm²)	Exposure Ratio
NFC	0.0000000	1.0	0.0000000
RFID	0.0000000	N/A	N/A

Conclusion:

Since the Maximum Permissible Exposure evaluation for standalone and simultaneous exposure is below the criteria of *47 CFR §1.1310*, this device complies with *FCC* RF exposure requirements.

Since the summation of the ratio on worst condition comply the above formula; the simultaneous transmission operations also complies with the FCC restriction as specified in 47 CFR §1.1310.

Note:

The basic calculation formula is a conservative formula used to estimate RF field strength or power density. No uncertainty estimates are required when using these formulas. Determination of MPE compliance is based on calculation results and does not take measurement uncertainty into account.

********************************* End of Report *********************************