RF Exposure Evaluation Report

Report No.:	JYTSZ-R12-2400422
Applicant:	Voxx Electronics Corporation
Address of Applicant:	2365 Pontiac Road, Auburn Hills, Michigan 48326 - USA

Equipment Under Test (EUT)

Product Name:	KiB Ekey
Model No.:	1412VD
Trade mark:	N/A
FCC ID:	EZS1412VD
Applicable standards:	FCC CFR Title 47 Part 2 (§2.1091)
Date of sample receipt:	17 Apr., 2024
Date of Test:	18 Apr., to 25 Jun., 2024
Date of report issue:	09 Jul., 2024
Test Result:	PASS

Project by:	Project Engineer	***Date:***	*09 Jul., 2024*
Reviewed by:	Senior Engineer	***Date:***	*09 Jul., 2024*
Approved by:	Manager	***Date:***	*09 Jul., 2024*

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

1 Version

Version No.	Date	Description
00	*26 Jun., 2024*	*Original*
01	*09 Jul., 2024*	*Updated reports on pages 4 and 7.*

2 Contents

3 General Information

3.1 Client Information

Applicant:	Voxx Electronics Corporation
Address:	2365 Pontiac Road, Auburn Hills, Michigan 48326 - USA
Manufacturer:	Nutek Coropration
Address:	no. 167, Lane 235, Bauchiau Rd, Xindian District, New Taeipi City 23145, Taiwan
Factory:	Voxx Automotive Corporation
Address:	2351 J. Lawson Blvd, Orlando, FL 32824 - USA

3.2 General Description of E.U.T.

Product Name:	KiB Ekey
Model No.:	1412VD
Operation Frequency:	BLE: 2402MHz~2480MHz UHF: 312.1MHz~315.12MHz; 433.58MHz~433.92MHz; 902.365MHz~903.417MHz
Modulation technology:	BLE: GFSK UHF: FSK, OOK
Antenna Type:	PCB Antenna
Antenna gain:	BLE: 1.1 dBi (declare by Applicant); UHF: -9.7 dBi (declare by Applicant)
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

3.3 Operating Modes

Operating mode	Detail description
BLE mode	Keep the EUT in continuously transmitting in BLE mode
UHF mode	Keep the EUT in continuously transmitting in UHF mode

3.4 Additions to, deviations, or exclusions from the method

No

3.5 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

3.6 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.
Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info-JYTee@lets.com, Website: http://jyt.lets.com

4 Technical Requirements Specification

4.1 Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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
1500–100,000			1.0	30

4.2 Test Procedure

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

4.3 Result

According to the calculation formula of power:
EIRP = P*G = $(E*d)^2/30$, So P = $(E*d)^2/(30*G)$.
Where:
P = transmitter output power in watts,
G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator (unitless),
E = electric field strength in V/m, --- $10^{((dBuV/m)/20)}/10^6$,
d = measurement distance in meters (m)---3m,

Maximum Output power of UHF:

Frequency (MHz)	Maximum field strength@3m (dBuV/m)	Maximum field strength@3m (V/m)	Antenna Gain (dBi)	Antenna Gain (numeric)	Distance (m)	Output power (mW)
312.1MHz	71.80	0.0039	-9.7	0.107	3	0.0423
315MHZ	74.63	0.0054	-9.7	0.107	3	0.0813
433.92MHz	77.30	0.0073	-9.7	0.107	3	0.1504
902MHz	77.74	0.0077	-9.7	0.107	3	0.1664

Frequency (MHz)	Maximum Output power (dBm)	Maximum Output power (mW)	Antenna Gain (dBi)	Antenna Gain (numeric)	Distance (cm)	Result (mW/cm^2)	Limits for General Population/ Uncontrolled Exposure (mW/cm^2)
BLE							
2402	0.048	1.01	1.1	1.29	20.00	0.0003	1.00
UHF							
312.1	-13.73	0.0423	-9.7	0.107	20.00	0.0000001	0.21
315	-10.90	0.0813	-9.7	0.107	20.00	0.0000002	0.21
433.92	-8.229	0.1504	-9.7	0.107	20.00	0.0000004	0.29
902	-7.789	0.1664	-9.7	0.107	20.00	0.0000004	0.60

Simultaneous transmission(Worse mode):

Mode	Ratio	Total Ratio	Limit	Verdict
BLE	0.0003	0.0003	1	Pass
UHF(902MHz)	0.0000007			

Note: Just the worst case mode was shown in report.

4.4 Conclusion

The device is exempt from the SAR test and satisfies RF exposure evaluation.

------End of report------