

Test Report

Verified code: 821720

Report No.: E202306264850-8

Name: Yanssie HK Limited

Address: 19H MAXGRAND PLAZA NO.3 TAI,YAU STREET SAN PO KONG, KOWLOON,
HONG KONG

Sample Name: Keystone Hardware Wallet

Sample Model: KV032

Receive Sample
Date: Aug.18,2023

Test Date: Aug.20,2023 ~ Sep.18,2023

Reference
Document: CFR 47, FCC Part 2.1093 Radiofrequency radiation exposure evaluation:
portable devices.

Test Result: Pass

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GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2023-10-13

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202306264850-8	Original Issue	2023-09-26

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1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

Name: Yanssie HK Limited
Address: 19H MAXGRAND PLAZA NO.3 TAI,YAU STREET SAN PO KONG,
KOWLOON, HONG KONG

1.2 MANUFACTURER

Name: Yanssie HK Limited
Address: 19H MAXGRAND PLAZA NO.3 TAI,YAU STREET SAN PO KONG,
KOWLOON, HONG KONG

1.3 FACTORY

Name: Shenzhen Along Electronic co.,Ltd
Address: NO.35 Xinyuan Industrial Park Gushu Community Xixiang, Baoan, Shenzhen,
Guangdong

1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Keystone Hardware Wallet
Model No.: KV032
Adding Model: KV031
Model different description: See Section 1.5
Trade Name: KEYSTONE
FCC ID: 2BCRX-KV032
Power supply: DC 3.7V, 1A Max power supplied by battery
Battery Model: 523450
Specification: Ratings: 3.7V, 1000mAh, 3.7Wh
Frequency Band: 2402-2480MHz
Maximum Transmit Power: BR+EDR (GFSK:-1.81dBm, Pi/4-DQPSK:-1.82dBm)
BLE (GFSK:-1.76dBm)
Modulation type: GFSK, Pi/4-DQPSK
Antenna Specification: PCB antenna 1.5dBi
Temperature Range: 0°C~+50°C
Hardware Version: V2.0
Software Version: V 0.9.0
Sample No: E202306264850-0008
Note: Based on the differences between the two models, the high configuration covered the low configuration, and the test was performed on the model KV032.

1.5 MODEL DIFFERENT

Function	KV032	KV031
fingerprint sensor	☒	☐
Inside battery	☒	☐
IC(MAX32520)	☒	☐

Note : The product name: Keystone Hardware Wallet, Model KV032 and KV031 are same in Circuit diagram, PCB layout, Hardware version, Software version, Bluetooth chip, RF module. KV031 removes these three Function based on KV032.

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2. LABORATORY & ACCREDITATIONS

2.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

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3. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Portable Device

According to the KDB 447498 D04 Interim General RF Exposure Guidance v01:

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time averaged power or maximum time-averaged ERP, whichever is greater. If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of $\lambda/4$. As for devices with antennas of length greater than $\lambda/4$ where the gain is not well defined, but always less than that of a half-wave dipole (length $\lambda/2$), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known. The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna. The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW). This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula as below:

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

where

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

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1). The example values shown in Table B.2 are for illustration only.

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B. 1})$$

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
	5	10	15	20	25	30	35	40	45	50	
	300	39	65	88	110	129	148	166	184	201	217
	450	22	44	67	89	112	135	158	180	203	226
	835	9	25	44	66	90	116	145	175	207	240
	1900	3	12	26	44	66	92	122	157	195	236
	2450	3	10	22	38	59	83	111	143	179	219
	3600	2	8	18	32	49	71	96	125	158	195
	5800	1	6	14	25	40	58	80	106	136	169

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3.1 MEASUREMENT RESULTS

Table 1 Antenna Specification

Mode	Antenna type	Internal Identification	Maximum antenna gain (dBi)
DH5	PCB antenna	Antenna 1	1.5dBi
2DH5	PCB antenna	Antenna 1	1.5dBi
BLE	PCB antenna	Antenna 1	1.5dBi

Table 2 Transmit Power for ERP & Maximum Conducted Output Average Power

Mode	Maximum Conducted output peak Power (dBm)	ERP (dBm)	Target Maximum Conducted Output peak Power (dBm)	Tolerance (dB)	Maximum Tune-up Maximum Conducted Output peak Power (dBm)
DH5	-1.81	-2.46	-2.00	±1	-1.00
2DH5	-1.82	-2.47	-2.00	±1	-1.00
BLE	-1.76	-2.41	-2.00	±1	-1.00

ERP = Maximum Conducted Output peak Power(DH5) + antenna gain -2.15= -1.81+1.5-2.15= -2.46dBm

ERP = Maximum Conducted Output peak Power(2DH5) + antenna gain -2.15= -1.82+1.5-2.15= -2.47dBm

ERP = Maximum Conducted Output peak Power(BLE) + antenna gain -2.15= -1.76+1.5-2.15= -2.41dBm

STANDALONE MPE

Mode	Frequency (MHz)	Maximum Tune-up Maximum Conducted Output peak Power (dBm)	Maximum Tune-up Maximum Conducted Output peak Power (mW)	Exemption Limit (mW)	Verdict
DH5	2480	-1.00	0.79	2.77	PASS
2DH5	2480	-1.00	0.79	2.77	PASS
BLE	2480	-1.00	0.79	2.77	PASS

Remark:

1. Threshold Maximum Conducted Output Power (mW)=(0.5/20)^{-log(60/3060/√P)}=
(0.5/20)^{-log(60/3060/√2.480)}=2.77mW.

4. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure of portable device.

----- End of Report -----