



## Compliance Certification Services (Kunshan) Inc.

CCSEM-TRF-001 Rev. 02 Sep 01, 2023

Report No.: KSCR230800151707

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### 1 Cover Page

## ***RF Exposure Evaluation Report***

**Application No.:** KSCR2308001517AT  
**FCC ID:** 2AH25K2  
**IC:** 22621-K2  
**Applicant:** Shanghai Sunmi Technology Co.,Ltd.  
**Address of Applicant:** Room 505, No.388 Song Hu Road, Yang Pu District, Shanghai, China  
**Manufacturer:** Shanghai Sunmi Technology Co.,Ltd.  
**Address of Manufacturer:** Room 505, No.388 Song Hu Road, Yang Pu District, Shanghai, China  
**Equipment Under Test (EUT):**  
**EUT Name:** Self-Checkout Kiosk  
**Model No.:** F4E00  
**HVIN:** F4E00-A  
FCC Rules 47 CFR §2.1091  
**Standard(s) :** KDB 447498 D04 interim General RF Exposure Guidance v01  
RSS-102 Issue 5 Amendment 1 (February 2, 2021)  
**Date of Receipt:** 2023-08-29  
**Date of Test:** 2023-08-31 to 2023-09-08  
**Date of Issue:** 2023-11-17

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



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<i>Revision Record</i>			
<i>Version</i>	<i>Description</i>	<i>Date</i>	<i>Remark</i>
00	Original	2023-11-17	/

<b>Authorized for issue by:</b>			
<b>Tested By</b>	<i>Damon Zhou</i>		
	_____ Damon_Zhou/Project Engineer		
<b>Approved By</b>	<i>Terry Hou</i>		
	_____ Terry Hou /Reviewer		



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### 3 General Information

#### 3.1 General Description of E.U.T.

Power supply:	AC 100-120V,1.5A,50/60Hz
Serial Number:	K217232800030
Firmware Version:	1.5.3

#### 3.2 Details of E.U.T.

##### 2.4G

Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz;802.11n(HT40): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK);802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20):11;802.11n(HT40):7
Channel Spacing:	5MHz
Antenna Type:	PIFA Antenna
Antenna Gain:	3.52dBi(Provided by the manufacturer)

##### BT

Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 Dual mode
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Antenna Type:	PIFA Antenna
Antenna Gain:	3.52dBi (Provided by the manufacturer)

##### BLE

Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 Dual mode
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	PIFA Antenna
Antenna Gain:	3.52dBi (Provided by the manufacturer)



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### 5G

Operation Frequency/Number of channels (20MHz):	U-NII-1: 5180-5240MHz (4 Channels) U-NII-3: 5745-5825MHz (5 Channels)
Operation Frequency/Number of channels/(40MHz):	U-NII-1: 5190-5230MHz (2 Channels) U-NII-3: 5755-5795MHz (2 Channels)
Operation Frequency/Number of channels (80MHz):	U-NII-1: 5210MHz (1 Channel) U-NII-3: 5775MHz (1 Channel)
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing:	802.11a/n/ac20: 20MHz; 802.11n/ac40: 40MHz; 802.11ac80: 80MHz
Antenna Type:	PIFA Antenna
Antenna Gain:	U-NII-1: 2.07dBi(Provided by the manufacturer) U-NII-3: 0.89dBi(Provided by the manufacturer)

### 13.56MHz

Operation Frequency:	13.56MHz
Modulation Type:	ASK
Antenna Type:	Loop Antenna

### 125KHz

Antenna Type:	Loop Antenna
Modulation Type:	ASK
Number of Channels:	1
Operation Frequency:	125KHz

### **3.3 Test Location**

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

- 1.SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc ) is provided by the applicant. (if applicable).
- 2.SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).
3. Sample source: sent by customer.

### **3.4 Test Facility**

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

- **A2LA**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

- **FCC**

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

- **ISED**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

- **VCCI**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.



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### 4 FCC Radiofrequency radiation exposure limits

According to §1.1310, 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 part 1.1307(b)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3–3.0	614	1.63	*(100)	≤6
3.0–30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<6
30–300	61.4	0.163	1.0	<6
300–1,500			f/300	<6
1,500–100,000			5	<6
(ii) 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 <sup>2</sup> )	<30
30–300	27.5	0.073	0.2	<30
300–1,500			f/1500	<30
1,500–100,000			1.0	<30

## **5 IC Radiofrequency radiation exposure limits:**

According to RSS-102 section 2.5.2, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

For 2.4G device, the limit of worse case is 2.68 W

For 5G device, the limit of worse case is 4.53W



## 6 Measurement and Calculation

### 6.1 Maximum transmit power

#### 2.4G

Test Mode	Test Channel	Ant	Power [dBm]	Power [mW]
802.11b SISO	2412	Ant1	13.42	21.98
802.11b SISO	2412	Ant1	13.69	<b>23.39</b>
802.11b SISO	2412	Ant1	13.38	21.78
802.11g SISO	2412	Ant1	13.01	20.00
802.11g SISO	2437	Ant1	12.94	19.68
802.11g SISO	2462	Ant1	12.61	18.24
802.11n(HT20) SISO	2412	Ant1	12.22	16.67
802.11n(HT20) SISO	2437	Ant1	11.62	14.52
802.11n(HT20) SISO	2462	Ant1	11.79	15.10
802.11n(HT40) SISO	2422	Ant1	12.09	16.18
802.11n(HT40) SISO	2437	Ant1	11.99	15.81
802.11n(HT40) SISO	2452	Ant1	11.80	15.14

#### BT

Test Mode	Test Frequency (MHz)	Output Power (dBm)	Reading Power (mW)
GFSK	2402	2.14	1.64
	2441	3.24	2.11
	2480	3.08	2.03
Pi/4DQPSK	2402	2.04	1.60
	2441	3.16	2.07
	2480	3.01	2.00
8DPSK	2402	2.33	1.71
	2441	3.42	<b>2.20</b>
	2480	3.27	2.12

#### BLE

Test Mode	Test Frequency (MHz)	Output Power (dBm)	Reading Power (mW)
BLE	2402	1.12	1.29
	2440	2.23	1.67
	2480	2.31	1.70

**5G**

Test Mode	Frequency (MHz)	Ant	Measured Output Power (dBm)	Power [mW] (Conducted Power)	EIRP (dBm)	Power [mW] (EIRP)
802.11a SISO	5180	Ant1	10.88	/	12.95	19.72
	5200	Ant1	10.78	/	12.85	19.28
	5240	Ant1	10.81	/	12.88	19.41
	5745	Ant1	<b>10.93</b>	12.39	/	/
	5785	Ant1	10.78	11.97	/	/
	5825	Ant1	10.79	11.99	/	/
802.11n(HT20) SISO	5180	Ant1	10.77	/	12.84	19.23
	5200	Ant1	10.77	/	12.84	19.23
	5240	Ant1	10.73	/	12.80	19.05
	5745	Ant1	10.71	11.78	/	/
	5785	Ant1	10.56	11.38	/	/
	5825	Ant1	10.63	11.56	/	/
802.11n(HT40) SISO	5190	Ant1	10.81	/	12.88	19.41
	5230	Ant1	10.44	/	12.51	17.82
	5755	Ant1	10.61	11.51	/	/
	5795	Ant1	10.45	11.09	/	/
802.11ac(VHT20) SISO	5180	Ant1	10.72	/	12.79	19.01
	5200	Ant1	10.77	/	12.84	19.23
	5240	Ant1	10.88	/	12.95	19.72
	5745	Ant1	10.87	12.22	/	/
	5785	Ant1	10.69	11.72	/	/
	5825	Ant1	10.76	11.91	/	/
802.11n(VHT40) SISO	5190	Ant1	10.76	/	12.83	19.19
	5230	Ant1	<b>10.99</b>	/	13.06	20.23
	5755	Ant1	10.88	12.25	/	/
	5795	Ant1	10.67	11.67	/	/
802.11n(VHT80) SISO	5210	Ant1	10.59	/	12.66	18.45
	5775	Ant1	10.23	10.54	/	/

**6.2 MPE Calculation**

According to the formula  $S=P/4\pi R^2$ , we can calculate S which is MPE.

Note:

- 1) P (mW)
- 2) R = distance to the center of radiation of antenna (in centimeter)

Test Mode	Max Output Power (dBm)	Antenna Gain (dBi)	Operation Distance R(cm)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density S(mW/cm <sup>2</sup> ) for FCC	Result
Bluetooth	3.42	3.52	20	0.001	1	Pass
2.4G WLAN	13.69	3.52	20	0.010	1	Pass
5G UNII-1	10.99	2.07	20	0.004	1	Pass
5G UNII-3	10.93	0.89	20	0.003	1	Pass

13.56MHz: 67.59dBuV/m@3m=0.002mW

125KHz: 77.56dBuV/m@3m=0.02mW

The 2.4G WiFi,BT,5G WiFi, 13.56MHz and 125kHz function can simultaneous transmitting.But the maximum rate of MPE is  $0.01/1+0.001/1+0.004/1+0.002/1+0.02/1= 0.037\leq 1.0$

So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.

For IC

For 2.4GHz WiFi mode:

E.I.R.P.= P\*G= 0.0526W<2.68W

For BT mode:

E.I.R.P.= P\*G= 0.005W<2.68W

For 5G mode:

E.I.R.P.= P\*G= 0.0202W<4.53W

For 13.56MHz

13.56MHz=0.000002W.

For 125KHz:

125KHz=0.00002W.

The 2.4G WiFi,BT,5G band, 13.56MHz and 125kHz function can simultaneous transmitting.But the maximum rate of MPE is  $0.0526/2.68+0.005/2.68+0.0202/4.53+0.000002+0.00002= 0.026\leq 1.0$

So the device is exclusion from SAR test.

**--End of the Report--**