1 Cover Page

RF MPE REPORT

Application No.:	SHCR2201000054AT
FCC ID:	2AH25T6A10
IC :	22621-T6A10
Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Address of Applicant:	Room 505,KIC Plaza,No.388 Song Hu Road Yang Pu District, Shanghai,China
Manufacturer:	Shanghai Sunmi Technology Co.,Ltd.
Address of Manufacturer:	Room 505,KIC Plaza,No.388 Song Hu Road Yang Pu District, Shanghai,China
Factory:	Shanghai Sunmi Technology Co.,Ltd.
Address of Factory:	Room 505,KIC Plaza,No.388 Song Hu Road Yang Pu District, Shanghai,China

Equipment Under Test (EUT):

EUT Name:	Smart POS Terminal
Model No.:	T6A10
Trade mark:	SUNMI
Standard(s) :	FCC Rules 47 CFR §2.1091 KDB 447498 D04 interim General RF Exposure Guidance v01 RSS-102 Issue 5 Amendment 1 (February 2, 2021)
Date of Receipt:	2022-01-05
Date of Test:	2022-01-05 to 2022-01-25
Date of Issue:	2022-02-10

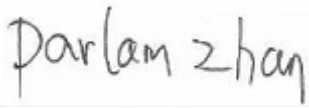
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan
Laboratory Manager

Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2022-02-10	/

Authorized for issue by:				
				
		Micheal Niu / Project Engineer		
				
		Parlam Zhan / Reviewer		

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3 General Information

3.1 General Description of E.U.T.

Power supply:	DC 12V/1A or DC 5V/1A by adapter Adapter 1 Model:AT-506E-120100C02 INPUT: AC100~40V 50/60Hz OUTPUT: DC 12V/1A 12.0W Adapter 2 Model:AT-538A-050100A INPUT: AC100~240V 50/60Hz OUTPUT: DC 5.0V/1A 5.0W
Firmware Version:	V1.0.1
Serial Number:	PD04D1BN00063

3.2 Technical Specifications

2.4GHz

Antenna Gain:	-3.52dBi (Provided by manufacturer)
Antenna Type:	FPC Antenna
Channel Spacing:	5MHz
Data Rate:	802.11b: 1/2/5.5/11Mbps, 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS 0 to 7 for HT20MHz/HT40
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
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz

BT

Antenna Gain:	-3.52dBi (Provided by manufacturer)
Antenna Type:	FPC Antenna
Bluetooth Version:	V5.0 Dual mode
Channel Spacing:	1MHz
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channels:	79
Operation Frequency:	2402MHz to 2480MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Data Rate	1/2/3Mbps

BLE

Antenna Gain:	-3.52dBi (Provided by manufacturer)
Antenna Type:	FPC Antenna
Bluetooth Version:	V5.0 Dual mode
Data Rate:	1Mbps
Channel Spacing:	2MHz

Modulation Type:	GFSK
Number of Channels:	40
Operation Frequency:	2402MHz to 2480MHz
Data Rate	1Mbps

13.56MHz

Antenna Type	Loop Antenna
Modulation Type	ASK
Number of Channels	1
Operation Frequency	13.56MHz

Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band I	802.11a/n(HT20)/ac(VHT20)	5180-5240	4
		802.11n(HT40)/ac(VHT40)	5190-5230	2
		802.11ac(VHT80)	5210	1
	UNII Band III	802.11a/n(HT20)/ac(VHT20)	5745-5825	5
		802.11n(HT40)/ac(VHT40)	5755-5795	2
		802.11ac(VHT80)	5775	1
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(HT20)/ac(VHT20): 20MHz 802.11n(HT40)/ac(VHT40): 40MHz 802.11ac(VHT80): 80MHz			
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0-7 802.11ac: MCS0-9			
Antenna Gain:	-3.79dBi (Provided by manufacturer)			
Antenna Type:	FPC Antenna			

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.

3.4 Test Facility

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

• CNAS (No. CNAS L4354)

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 2541.01)

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

• FCC (Designation Number: CN1172)

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

• ISED (CAB identifier: CN0072)

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 (Member No.: 1938)

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 Test Standards and Limits

4.1 FCC Radiofrequency radiation exposure limits:

According to§1.1310, the limit for general population/uncontrolled exposures

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

4.2 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

For 13.56MHz device, the limit of worse case is 1W

5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHCR220100005401, SHCR220100005402, SHCR220100005403, SHCR220100005404, SHCR220100005405

2.4GHz

Test Mode	Test Channel	Ant	Power [dBm]	Power [mW]
11B	2412	Ant1	11.84	15.28
11B	2437	Ant1	12.20	**16.60**
11B	2462	Ant1	11.95	15.67
11G	2412	Ant1	12.12	16.29
11G	2437	Ant1	11.87	15.38
11G	2462	Ant1	11.88	15.42
11N20SISO	2412	Ant1	12.16	16.44
11N20SISO	2437	Ant1	11.92	15.56
11N20SISO	2462	Ant1	11.81	15.17
11N40SISO	2422	Ant1	12.17	16.48
11N40SISO	2437	Ant1	11.95	15.67
11N40SISO	2452	Ant1	11.77	15.03

13.56MHz:

81.36 dBuV/m@3m, @20cm=@3m+40log(3/0.2)=128.40dBuV/m

BT

Test Mode	Test Frequency (MHz)	Output Power (dBm)	Reading Power (mW)
GFSK	2402	7.89	6.15
	2441	8.01	6.32
	2480	8.36	6.85
π/4DQPSK	2402	7.86	6.11
	2441	7.99	6.30
	2480	8.28	6.73
8DPSK	2402	8.15	6.53
	2441	8.28	6.73
	2480	8.58	**7.21**

BLE

Test Mode	Test Frequency (MHz)	Output Power (dBm)	Output Power (mW)
1M	2402	-1.42	0.72
	2442	-1.61	0.69
	2480	-1.10	**0.78**

5GHz for FCC

Test Mode	Test Channel	Antenna Power[dBm]	Antenna Power[mW]
802.11a	5180	14.43	27.73
	5200	14.38	27.42
	5240	14.43	27.73
	5745	14.79	30.13
	5785	14.37	27.35
	5825	14.52	28.31
802.11n(HT20)	5180	14.51	28.25
	5200	14.46	27.93
	5240	14.50	28.18
	5745	14.83	30.41
	5785	14.45	27.86
	5825	14.53	28.38
802.11n(HT40)	5190	14.72	29.65
	5230	14.95	**31.26**
	5755	14.70	29.51
	5795	14.20	26.30
802.11ac(VHT20)	5180	14.54	28.44
	5200	14.56	28.58
	5240	14.44	27.80
	5745	14.80	30.20
	5785	14.29	26.85
	5825	14.60	28.84
802.11ac(VHT40)	5190	14.66	29.24
	5230	14.63	29.04
	5755	14.73	29.72
	5795	14.44	27.80

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802.11ac(VHT80)	5210	14.57	28.64
	5775	14.76	29.92

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5.2 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 meter) = 20cm
3) MPE limit = 1mW/cm²

For FCC:

For 13.56MHz: 128.40dBuV/m=2.63V/m< 60.77 V/m.

For 2.4G WiFi

The max. antenna gain is		-3.52	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
16.6	0.445	20	0.00147	1	Pass

BT

The max. antenna gain is		-3.52	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
7.21	0.445	20	0.00064	1	Pass

BLE

The max. antenna gain is		-3.52	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
0.78	0.445	20	0.00007	1	Pass

For 5G WiFi:

The max. antenna gain is		-3.79	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
31.26	0.418	20	0.00260	1	Pass

13.56MHz,2.4G WiFi,BT and 5G WiFi can simultaneous transmitting, so the maximum rate of MPE is 2.63/60.77+0.00147/1.0+0.00064/1+0.00260/1.0=0.0480<=1.0.

For IC:

For 13.56MHz

81.36dBuV/m=0.0404W< 1W

For 2.4GHz WiFi mode:

E.I.R.P.= P*G= 0.0166*0.445=0.007W<2.68W

For BT mode:

E.I.R.P.= P*G= 0.00721*0.445=0.003W<2.68W

For BLE mode:

E.I.R.P.= P*G= 0.00078*0.445=0.0003W<2.68W

For 5GHz WiFi mode:

E.I.R.P.= P*G= 0.03126×0.418=0.013W<4.53W

13.56MHz,2.4G WiFi,BTand 5G WiFi can simultaneous transmitting, so the maximum rate of MPE is 0.0404/1+0.007/2.68+0.003/2.68+0.013/4.53=0.047<=1

So the device is exclusion from SAR test

--End of the Report--

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