Industrial Internet Innovation Center (Shanghai) Co.,Ltd.

RF TEST REPORT

PRODUCT	Smart POS system
BRAND	SUNMI
MODEL	T6F10
APPLICANT	Shanghai Sunmi Technology Co.,Ltd.
FCC ID	2AH25T6F10
ISSUE DATE	August 6, 2024
STANDARD(S)	FCC Part 2, FCC Part 22H, FCC Part 24E,FCC Part27

Prepared by: ***Fan Yuhang*** **Reviewed by:** ***Yang Fan*** **Approved by:** ***Zhang Min***

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1. Summary of Test Report

1.1 Test Standard (s)

No.	Test Standard	Title	Version
1	FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	--
2	FCC Part 22H	CELLULAR RADIOTELEPHONE SERVICE	--
3	FCC Part 24E	BROADBAND PCS	--
4	FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	--
Note: FCC Part 2 have not been accredited by A2LA.			

1.2 Reference Documents

No.	Test Standard	Title	Version
1	ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
2	ANSI C63.26	American National Standard of Procedures for Compliance Testing of Licensed Transmitters Used in Licensed Radio	2015
3	KDB 971168 D01 Power Meas License Digital Systems	Measurement Guidance for Certification of Licensed Digital Transmitters	v03r01
Note: KDB 971168 D01 Power Meas License Digital Systems have not been accredited by A2LA.			

1.3 Summary of Test Results

WCDMA II

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	2.1046,24.232(c)	Pass
2	Emission Limit	2.1053/24.238(a)	Pass

WCDMA IV

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	2.1046/27.50(d)(4)	Pass
2	Emission Limit	2.1053/27.53(h)	Pass

WCDMA V

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	2.1046/22.913(a)	Pass

2	Emission Limit	2.1053/22.917(a)	Pass

Note:
The T6F10 manufactured by Shanghai Sunmi Technology Co.,Ltd. is a variant product for testing.
This project is a C2PC project based on the FCC ID: 2AH25T6F10(Date of Grant:02/06/2024), the content of the change is referred to the Product Change Description.
According to the Product Change Description, We mainly verified the output power of the worst mode and retest Radiated Spurious Emission.
There are two configurations Mainly Supply (S02aa) and Secondary Supply (S06aa) in this project, we tested the Mainly Supply (S02aa) and the worst mode of Secondary Supply (S06aa).
The description of the dfferences between Mainly Supply (S02aa) and Secondary Supply (S06aa) are as follows:

Model / Difference	T6F10 (High Configuration) Mainly Supply (S02aa)	T6F10 (Basic Configuration) Secondary Supply(S06aa)
Scanner	Yes	No
LCD (Just different manufacturers)	SHENZHEN DJN PHOTOELECTRIC TECHNOLOGY CO., LTD	CPT Technology (Group) Co.,Ltd
DDR	It's just that the manufacturer and memory are different	
EMMC	It's just that the manufacturer and memory are different	

Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 1.3.
Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 4.1 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 6 of this test report.

1.4 Data Provided by Applicant

No.	Item(s)	Data
1	WCDMA Band 2	0.46dBi
2	WCDMA Band 4	-0.42dBi
3	WCDMA Band 5	-1.63dBi
Note: The data of antenna gain is provided by the Antenna specification may affect the validity of the test results in this report, and the impact and consequences of this shall be undertaken by the customer.		

2. General Information of The Laboratory

2.1 Testing Laboratory

Lab Name	Industrial Internet Innovation Center (Shanghai) Co.,Ltd.
Address	Building 4，No. 766，Jingang Road，Pudong，Shanghai，China
Telephone	021-68866880
FCC Registration No.	708870
FCC Designation No.	CN1364

2.2 Laboratory Environmental Requirements

Temperature	15℃~35℃
Relative Humidity	25%RH~75%RH
Atmospheric Pressure	86kPa~106kPa

2.3 Project Information

Project Manager	Gao Hongning
Test Date	JuLy 2, 2024 to July 23, 2024

3. General Information of The Customer

3.1 Applicant

Company	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, No.388,Song Hu Road, Yang Pu District, Shanghai, China
Telephone	18826519551

3.2 Manufacturer

Company	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, No.388,Song Hu Road, Yang Pu District, Shanghai, China
Telephone	18826519551

4. General Information of The Product

4.1 Product Description for Equipment under Test (EUT)

Product	Smart POS system
Model	T6F10
Date of Receipt	S02aa/S04aa: July 02, 2024 S06aa: July 03, 2024
EUT ID*	S02aa/S04aa/S06aa
SN/IMEI	S02aa: 868393070001276'868393070003272 S04aa: 868393070001227'868393070003223 S06aa: 868393070001219'868393070003215
Supported Radio Technology and Bands	GSM850/GSM900/DCS1800/PCS1900 WCDMA Band I/II/IV/V/VI/VIII/XIX LTE Band 1/2/3/4/5/7/8/18/19/20/26/28/34/38/39/40/41 BT 5.0 BLE/BR/EDR WLAN 802.11b/g/n WLAN 802.11a/n/ac GPS/GLONASS/BDS/Galileo NFC
Hardware Version	V1.0(LA+EU)
Software Version	V3.0.0
FCC ID	2AH25T6F10
NOTE1: EUT ID is the internal identification code of the laboratory. NOTE2: Samples in the test report are provided by the customer. The test results are only applicable to the samples received by the laboratory.	

4.2 Description for Auxiliary Equipment (AE)

AE ID*	Description	Model	SN/Remark
AE1	RF Cable	N/A	N/A
CA01	Adapter	TPA-141A050200UU01	N/A
CB01	Adapter	UC13US	N/A
CC01	Adapter	TPA-23A050200UU01	N/A
UA01	AC Cable	N/A	N/A
BA02	Battery	HPPA	Guangdong Highpower NewEnergy Technology Co., Ltd.
NOTE1: AE ID is the internal identification code of the laboratory. NOTE2: By verifying that CC01+BA02 is the worst battery and adapter combination, this battery and adapter are used in all tests.			

4.3 Additional Information

Modulation:

Type of modulation	QPSK/16QAM

Band Frequency Range:

Band	Frequency Range(MHz)
Band II	1850 -1910
Band IV	1710 -1755
Band V	824 – 849

Band List:

Band	Low Channel	Low Freq. (MHz)	Mid Channel	Mid Freq. (MHz)	High Channel	High Freq. (MHz)
Band II	9262	1852.4	9400	1880	9538	1907.6
Band IV	1312	1712.4	1413	1732.6	1513	1752.6
Band V	4132	826.4	4183	836.6	4233	846.6

5. Test Configuration Information

5.1 Laboratory Environmental Conditions

5.1.1 Permanent Facilities

Relative Humidity	Min. = 45%, Max. = 55 %		
Atmospheric Pressure	101kPa		
Temperature	Normal	Minimum	Maximum
	25℃	-10℃	50℃
Working Voltage of EUT	Normal	Minimum	Maximum
	7.7V	6.0V	8.8 V

5.2 Test Equipments Utilized

Conduction test system

No.	Name	Model	S/N	SW Version	HW Version	Manufacturer	Cal. Date	Cal. Interval
1	Software	Eagle V3.3	N/A	V3.3	N/A	3IN	N/A	N/A
2	Frequency spectrum analyzer	FSQ	101091	V4.75	V11.00	R&S	2023-07-26	1 Year
3	Wideband Radio Communication Tester	CMW 500	148874	V3.5.136	N/A	R&S	2023-07-27	1 Year
4	Temperature Chamber	B-TF-107C	201804107	N/A	N/A	BoYi	2024-06-07	1 Year
5	Programmable power supply	Keithley 2303	4039070	N/A	N/A	Keithley	2024-06-07	1 Year
6	RF Test Automation Box	RF 2021B	2001	V3.3	N/A	RANATEC	N/A	N/A

Radiated emission test system

No.	Name	Model	S/N	SW Version	HW Version	Manufacturer	Cal. Date	Cal. Interval
1	Universal Radio Communication Tester	CMU200	123126	V5.2.1	B12	R&S	2023-10-16	1 Year
2	Universal Radio Communication Tester	CMW500	104178	V3.7.20	1206.0600.00	R&S	2023-10-16	1 Year

3	EMI Test Receiver	ESU40	100307	V5.1-24-3	01	R&S	2023-12-19	1 Year
4	TRILOG Broadband Antenna	VULB9163	01345	N/A	N/A	Schwarzbeck	2024 03-23	1 Year
5	Double- ridged Waveguide Antenna	ETS-3117	00135890	N/A	N/A	ETS	2023-07-28	2 Years
6	EMI Test Software	EMC32 V10.35.02	N/A	N/A	N/A	R&S	N/A	N/A
7	Preamplifier	SCU08F1	8320024	N/A	N/A	R&S	2023-10-16	1 year
8	Preamplifier	SCU18	10155	N/A	N/A	R&S	2023-10-16	1 year
9	Antenna	SWB-VUBA 9117	9117-266	N/A	N/A	Schwarzbeck	2023-9-8	1 year
10	Antenna	BBHA9120 D	02112	N/A	N/A	Schwarzbeck	2023-7-28	1 year
11	Signal Generator	SMF100A	102314	3.20.390.24	05.10	R&S	2023-10-16	1 year

Anechoic chamber

Fully anechoic chamber by ETS.

5.3 Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in 3IN documents. The detailed measurement uncertainty is defined in 3IN documents.

Measurement Uncertainty of Radiation test

Frequency Range	Uncertainty(dB)
30MHz ≤ f ≤ 1GHz	±5.10
1GHz ≤ f ≤ 18GHz	±5.66
18GHz ≤ f ≤ 40GHz	±5.22

Measurement Uncertainty of Conduction test

No	Item	Extended uncertainty （k=2）	
1	Frequency Tolerance	23Hz	
2	RF Output Power	0.7dB	
3	conducted spurious	9kHz～3.6GHz	1.5dB
		3.6GHz～8.4GHz	2.8dB
		8.4GHz～12.75GHz	3.4dB
4	EVM	2.1%	
5	Occupied Bandwidth	Bandwidth 1.4MHz	0.03MHz
		Bandwidth 3MHz	0.03MHz
		Bandwidth 5MHz	0.03MHz
		Bandwidth 10MHz	0.05MHz

		Bandwidth 15MHz	0.06MHz
		Bandwidth 20MHz	0.08MHz
6	Emission intermodulation	Adjacent channel	1.4dB
		Alternate channel	1.4dB
7	Range of frequency	0.08MHz	

6. Test Results

6.1 Output Power

6.1.1 Measurement Limit

FCC §22.913(a) Mobile stations are limited to 7watts.
FCC §24.232(c) Mobile and portable stations are limited to 2 watts.
FCC §27.50d(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

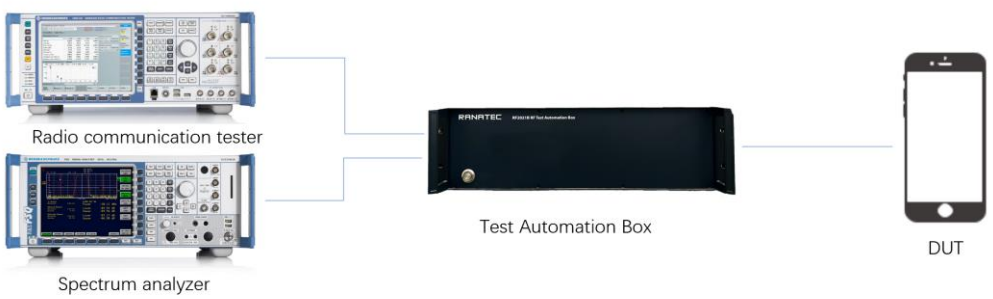
6.1.2 Method of Measurements

Method of measurements please refer to KDB971168 D01 v03 clause 5.
The EUT was set up for the max output power with pseudo random data modulation.
The power was measured with Rhode & Schwarz base station CMW500.
These measurements were done at 3 frequencies.(bottom, middle and top of operational frequency range).
1. The transmitter output port was connected to base station.
2. Set the EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record maximum average power for other modulation signal.
5. During the process of testing, the EUT was controlled Rhode & Schwarz Digital Radio.
6. Communication tester to ensure max power transmission and proper modulation.
7. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.
EIRP= Conducted power+Gain, ERP = EIRP -2.15dBi.

6.1.3 Test procedures

The transmitter output power was connected to calibrated attenuator, the other end of which was connected to signal analyzer. Transmitter output power was read off the power in dBm. The power outputs at the transmitter antenna port was determined by adding the value of attenuator to the base station reading.

6.1.4 Test Setup



6.1.5 Output Powe results

BAND	Mode	Output power(dBm)
Band 2	RMC	22.23
Band 4	RMC	22.15
Band 5	RMC	22.71

Note1: The power of the worst part is verified to meet the requirements.

6.1.6 EIRP/ERP results

BAND	Mode	EIRP (dBm)	ERP (dBm)
Band 2	RMC	22.69	20.54
Band 4	RMC	21.73	19.58
Band 5	RMC	21.08	18.93

6.2 Emission Limit

6.2.1 Measurement Limit

After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB. Limit -13 dBm

FCC §22.917(a):The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

FCC §24.238(a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

FCC §27.53(h):

AWS emission limits —

(1) General protection levels. Except as otherwise specified below, for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

(2) Additional protection levels. Notwithstanding the foregoing paragraph (h)(1) of this section:

(i) Operations in the 2180–2200 MHz band are subject to the out-of-band emission requirements set forth in § 27.1134 for the protection of federal government operations operating in the 2200–2290 MHz band.

(ii) For operations in the 2000–2020 MHz band, the power of any emissions below 2000 MHz shall be attenuated below the transmitter power (P) in watts by at least 70 + 10 log10(P) dB.

(iii) For operations in the 1915–1920 MHz band, the power of any emission between 1930–1995 MHz shall be attenuated below the transmitter power (P) in watts by at least 70 + 10 log10(P) dB.

(iv) For operations in the 1995–2000 MHz band, the power of any emission between 2005–2020 MHz shall be attenuated below the transmitter power (P) in watts by at least 70 + 10 log10(P) dB.

6.2.2 Method of Measurement

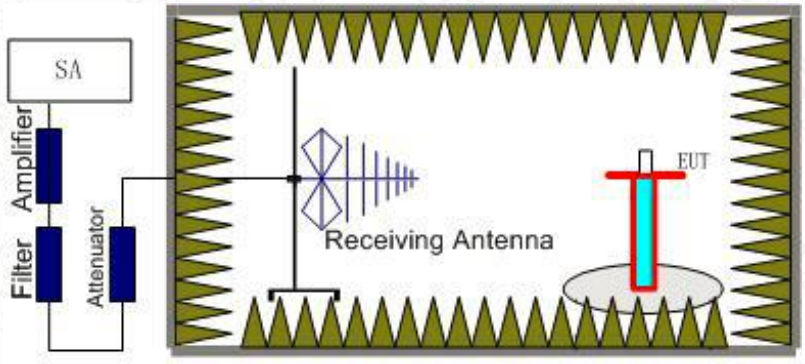
The measurements procedures in TIA-603E-2016 are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238 and Part 24.917.

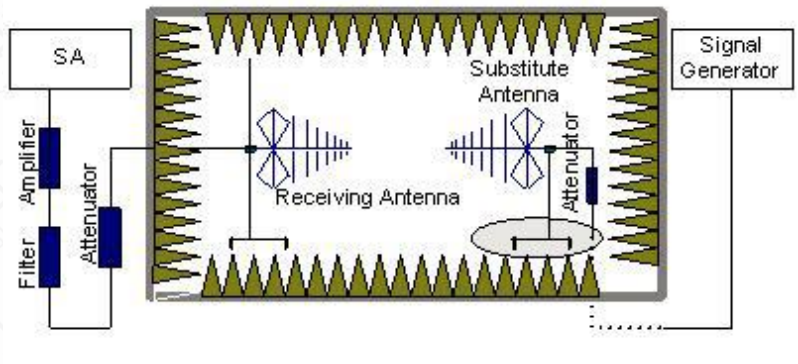
The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band V.

The procedure of radiated spurious emissions is as follows

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10thharmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (Pcl) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (Ga) should be recorded after test.
A amplifier should be connected in for the test.
The Path loss (Pcl) is the summation of the cable loss .
The test results are obtained as described below:
Power(EIRP)=PMea- Pcl+ Ga
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi

6.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the WCDMA Band IV . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the WCDMA Band IV into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.
test Frequency range：30M-20G
Only the worst mode data is provided
Mainly Supply
RSE-W2-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3703.2	-58.41	6.6	7.9	-57.11	-13	44.11	V
5553.6	-57.24	8.2	9.8	-55.64	-13	42.64	V
7414.4	-50.46	9.7	11.6	-48.56	-13	35.56	V
9258.4	-49.47	10.7	12.7	-47.47	-13	34.47	V
11102.9	-54.94	12.1	12.3	-54.74	-13	41.74	V
12947.4	-55.22	13.0	12.3	-55.92	-13	42.92	H

RSE-W4-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3463.2	-52.64	6.4	7.8	-51.24	-13	38.24	H
5200.4	-59.99	8.0	9.4	-58.59	-13	45.59	H
6935.2	-60.16	9.3	11.1	-58.36	-13	45.36	V
8662.0	-49.96	10.3	12.7	-47.56	-13	34.56	V

10346.4	-56.71	11.5	12.3	-55.91	-13	42.91	H
12071.0	-54.87	12.6	12.3	-55.17	-13	42.17	H

RSE-W5-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
1691.4	-58.82	4.5	4.7	-58.62	-13	45.62	H
2537.3	-54.32	5.4	5.6	-54.12	-13	41.12	V
3383.2	-65.14	6.3	7.8	-63.64	-13	50.64	H
4228.0	-62.5	7.1	8.9	-60.7	-13	47.70	V
5076.4	-61.62	7.9	9.6	-59.92	-13	46.92	H
5917.2	-62.09	8.5	10.2	-60.39	-13	47.39	H

Secondary Supply

RSE-W4-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Test Result (dBm)	Limit(dBm)	Margin(dBm)	Polarization
3462.8	-57.49	6.4	7.8	-56.09	-13	43.09	H
5195.6	-49.23	8.0	9.4	-47.83	-13	34.83	H
8658.8	-51.22	10.3	12.7	-48.82	-13	35.82	V
12199.4	-54.17	12.6	12.3	-54.47	-13	41.47	V
14779.6	-53.32	14.3	12.3	-55.32	-13	42.32	V
17364.8	-49.3	15.7	12.3	-52.7	-13	39.70	V

Annex A: Revised History

Version	Revised Content
V0	Initial

Annex B: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

INDUSTRIAL INTERNET INNOVATION CENTER (SHANGHAI) CO., LTD.

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

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*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 20th day of September 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2025

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

END OF REPORT