



TEST REPORT

Report Number: C21T00091-RF02-V02

Applicant	Shanghai Sunmi Technology Co.,Ltd.
Product Name	Smart POS system
Model Name	T6900
Brand Name	SUNMI
FCC ID	2AH25T6900

Industrial Internet Innovation Center (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in FCC Part 2/27, ANSI/TIA-603-E, ANSI C63.26, KDB 971168 D01, KDB 412172 D01.

Prepared by		Reviewed by	
Approved by		Issue Date	2022-03-01

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



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Test Laboratory:

Industrial Internet Innovation Center (Shanghai) Co., Ltd.
Add: Building 4, No. 766 Jingang Rd, Pudong, Shanghai, China
Tel: +86 21 68866880



Revision Version

Report Number	Revision	Date	Memo
C21T00091-RF02-V00	00	2022-01-04	Initial creation of test report
C21T00091-RF02-V01	01	2022-01-12	Updated original report number
C21T00091-RF02-V02	02	2022-03-01	Add the test requirement

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1. Test Laboratory

1.1. Testing Location

Company Name	Industrial Internet Innovation Center (Shanghai) Co., Ltd.
Address	Building 4, No. 766 Jingang Rd, Pudong, Shanghai, China
FCC Designation No.	CN1177

1.2. Testing Environment

Normal Temperature	15°C~35°C
Relative Humidity	25%RH~75%RH
Supply Voltage	120V/60Hz

1.3. Project Information

Project Leader	Wang WenWen
Testing Start Date	2021-09-15
Testing End Date	2021-12-31



2. Client Information

2.1. Applicant Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	+86 18501703215

2.2. Manufacturer Information

Company Name	Shanghai Sunmi Technology Co., Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	+86 18501703215

3. Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Product Name	Smart POS system
Model name	T6900
Supported Radio Technology and Bands	GSM850/GSM900/GSM1800/GSM1900 WCDMA Band I/V/VIII LTE Band FDD1/3/5/7/8/20 TDD38/40/41 BT 4.2 WLAN 802.11b,g,n WLAN 802.11a,n NFC GPS
Hardware Version	B1691_MAIN_PCB_V1.1
Software Version	V1.0.2
FCC ID	2AH25T6900
Extreme Temperature	0°C~45°C
Nominal Voltage	7.60V
Extreme High Voltage	8.70V
Extreme Low Voltage	6.80V

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
N07	N/A	B1691_MAIN_PCB_V1.1	V1.0.2	2021-09-10
N09	N/A	B1691_MAIN_PCB_V1.1	V1.0.2	2021-11-11

*EUT ID: is internally used to identify the test sample in the lab.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN/Remark
AE1	RF cable	N/A	N/A

*AE ID: is internally used to identify the test sample in the lab.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	2020-10-01
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	2020-10-01
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard of Procedures for Compliance Testing of Licensed Transmitters Used in Licensed Radio	2015
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v03r01
KDB 412172 D01	Guidelines For Determining The Effective Radiated Power (Erp) And Equivalent Isotropically Radiated Power (Eirp) Of An Rf Transmitting System	V01r01

5. Test Summary

5.1. Summary of Test Results

LTE Band 41

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	N/A
2	Emission Limit	27.53(h), 2.1051	P
3	Frequency Stability	27.54, 2.1055	N/A
4	Occupied Bandwidth	2.1049(h)(i)	N/A
5	Emission Bandwidth	27.53(h)	N/A
6	Band Edge Compliance	27.53(h)	N/A
7	Conducted Spurious Emission	27.53(h), 2.1057	N/A
8	Peak to Average Power Ratio	27.50(a)	N/A

Note: please refer to Annex C in this test report for the detailed test results.

The following terms are used in the above table.

P	Pass, the EUT complies with the essential requirements in the standard.
NM	Not measure, the test was not measured by 3IN.
N/A	Not applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

5.2. Statements

The T6900, manufactured by Shanghai Sunmi Technology Co.,Ltd. is a variant product for testing.

This project is a variant project based on the original report I19D00121-SRD06-V00, Band 41 is the worst mode of the original report, so we tested the worst mode of the original report, and the test data of the worst mode was recorded in the report. The main difference of EUT is as below:

	Product NO.	The difference with initial certified product
Mainly Supply	N07	<ol style="list-style-type: none"> 1. Add a back up CPU(model:MT8765V/WA) 2. Add a back up 27.12MHz Crystal for NFC(model: SX20Y027120BA1T) 3. Add a back up PCB supplier ZHIHAO 4. Change mcu from MH1902 BGA121 to MH1902T BGA121 5. Add a back up NFC chip FM17660 6. Add a back up LCD(model:LMFBH055100970) 7. Add a back up Camera (model:LH-XC-5035COM-B1691-V9.0) 8. Add a back up NFC antenna(model:SH19038IB100-6) 9. back up memory
Secondary Supply	N09	<ol style="list-style-type: none"> 1. Add a back up CPU(model:MT8765V/WA) 2. Add a back up 27.12MHz Crystal for NFC(model: SX20Y027120BA1T) 3. Add a back up PCB supplier ZHIHAO 4. Change mcu from MH1902 BGA121 to MH1902T BGA121 5. Add a back up LCD(model:LMFBH055100970) 6. Add a back up Camera (model:LH-XC-5035COM-B1691-V9.0) 7. Add a back up NFC antenna(model:SH19038IB100-6) 8. back up memory

Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 5.1.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

6. Measurement Results

6.1. EMISSION LIMIT

Reference

FCC: CFR 2.1051, 27.53(g), 27.53(h), 27.53(m).

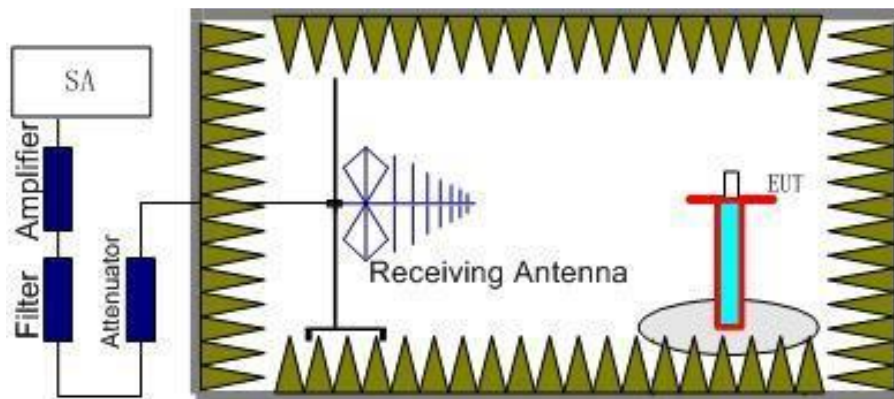
6.1.1 Measurement Method

The measurements procedures in TIA-603E-2016 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

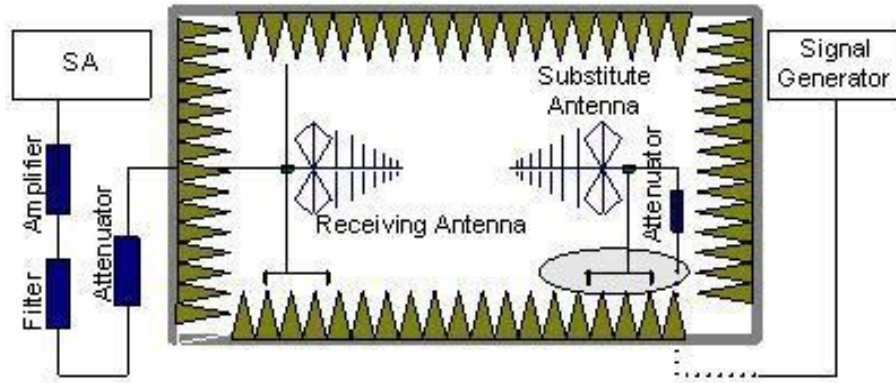
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 27.53(g), Part 27.53(h), Part 27.53(m). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Band 41.

The procedure of radiated spurious emissions is as follows:

1. Below 1 GHz, EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. 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 10th harmonic 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 (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.

An amplifier should be connected in for the test.

The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} - P_{pl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

6.1.2 Measurement Limit

Part 27.53(g), Part 27.53(h), Part 27.53(m) all specify that 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. The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

6.1.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Band 41. 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 LTE Bands 41. 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. The evaluated frequency range is from 30MHz to 26GHz.

Mainly Supply

RSE-LTE41-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
4836.4	-40.25	7.6	9.0	-38.85	-13	H
5180.0	-44.41	8.0	9.4	-43.01	-13	H
6161.6	-49.46	8.7	10.3	-47.86	-13	H
7242.0	-49.79	9.6	11.4	-47.99	-13	V
9063.2	-48.5	10.5	12.6	-46.4	-13	V
10523.6	-39.7	11.6	12.3	-39	-13	H

RSE-LTE41-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3951.6	-50.9	6.8	8.6	-49.1	-13	H
5181.6	-40.18	8.0	9.4	-38.78	-13	V
7772.4	-41.44	9.8	11.8	-39.44	-13	V
10363.6	-40.72	11.6	12.3	-40.02	-13	H
12953.0	-23.68	13.2	12.3	-24.58	-13	H
15544.8	-30.7	14.5	12.3	-32.9	-13	H

RSE-LTE41-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
4234.8	-51.61	7.1	8.9	-49.81	-13	H
5377.2	-39.49	8.1	9.8	-37.79	-13	H
6640.0	-49.88	9.1	10.9	-48.08	-13	H
8058.8	-34.01	9.9	12.2	-31.71	-13	H



10745.6	-32.47	11.7	12.3	-31.87	-13	H
13437.8	-23.85	13.7	12.3	-25.25	-13	H

Secondary Supply

RSE-LTE41-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3641.6	-51.47	6.6	7.9	-50.17	-13	V
4992.4	-38.71	7.8	9.6	-36.91	-13	V
7488.8	-37.13	9.7	11.6	-35.23	-13	H
9985.2	-36.29	11.2	12.5	-34.99	-13	H
12480.5	-34.9	12.7	12.3	-35.3	-13	H
15898.2	-31.75	15.0	12.3	-34.45	-13	H

RSE-LTE41-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3796.4	-51.42	6.7	7.9	-50.22	-13	H
5181.6	-40.37	8.0	9.4	-38.97	-13	V
7625.6	-48.52	9.7	11.8	-46.42	-13	V
9652.8	-45.43	10.9	12.7	-43.63	-13	H
12954.8	-32.93	13.2	12.3	-33.83	-13	H
16362.0	-33.63	14.8	12.3	-36.13	-13	H

RSE-LTE41-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit (dBm)	Polarization
3575.2	-51.44	6.5	7.8	-50.14	-13	V
5370.8	-40.08	8.1	9.4	-38.78	-13	V
8055.6	-39.06	9.9	12.2	-36.76	-13	H
10741.6	-37.31	11.7	12.3	-36.71	-13	V
13427.2	-27.31	13.7	12.3	-28.71	-13	H
16941.2	-29.18	16.3	12.3	-33.18	-13	V

7. Test Equipment List

Radiated Emission Test System

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. Interval
1	Universal Radio Communication Tester	CMW500	104178	R&S	2021-05-10	1 year
2	Test Receiver	ESU40	100307	R&S	2021-05-10	1 year
3	TRILOG Antenna	VULB9163	VULB9163-515	Schwarzbeck	2020-02-28	2 years
4	Double Ridged Guide Antenna	ETS-3117	135890	ETS	2020-02-28	2 years
5	2-Line V-Network	ENV216	101380	R&S	2021-05-10	1 year
6	RF Signal Generator	SMF100A	102314	R&S	2021-05-10	1 year
7	Amplifier	SCU08	10146	R&S	2021-05-10	1 year
8	EMI Test Software	EMC32 V9.15.00	N/A	R&S	N/A	N/A

Anechoic chamber

Fully anechoic chamber by ETS

Annex A: Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in 3IN documents. The detailed measurement uncertainty to see the column, k=2

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Peak Output Power-Conducted	2412MHz-2462MHz	95%	0.544dB
Peak Power Spectral Density	2412MHz-2462MHz	95%	0.502dB
Occupied 6dB Bandwidth	2412MHz-2462MHz	95%	69.26kHz
Band Edges-Conducted	2412MHz-2462MHz	95%	0.544dB
Conducted Emission	30MHz-2GHz	95%	0.90dB
Conducted Emission	2GHz-3.6GHz	95%	0.88dB
Conducted Emission	3.6GHz-8GHz	95%	0.96dB
Conducted Emission	8GHz-20GHz	95%	0.94dB
Conducted Emission	20GHz-22GHz	95%	0.88dB
Conducted Emission	22GHz-26GHz	95%	0.86dB
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	5.66dB
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	4.98dB
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	5.06dB
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	5.20dB
AC Power line Conducted Emission	0.15MHz-30MHz	95%	3.66 dB

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 12th day of April 2021.



Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2023

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

*****END OF REPORT*****