



FCC PART 15.247

TEST REPORT

For

Shanghai Sunmi Technology Co.,Ltd.

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FCC ID: 2AH25D2SLITE

Report Type: CIIPC Report		Product Type: POS System
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FCC Part 15.247

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai Sunmi Technology Co.,Ltd.
Tested Model	L1552
Series Model	L1551, L3552
Product Type	POS System
Power Supply	DC 24V from Adapter
RF Function	2.4G Wi-Fi, BLE
Operating Band/Frequency	2.4G Wi-Fi: 2412-2462MHz BLE: 2402-2480MHz
Channel Number	2.4G Wi-Fi: 11, BLE: 40
Channel Separation	2.4G Wi-Fi: 5MHz, BLE: 2MHz
Modulation Type	Wi-Fi: OFDM,DSSS; BLE: GFSK
Antenna Type	Wi-Fi/BLE: FPC Antenna
Maximum Antenna Gain	Wi-Fi/BLE: 1.86 dBi

Adapter Information: Model: CYZS36-240150 Input: AC100-240V 50/60Hz 1.5A Output: 24V, 1.5A

Note: The model difference was explained in the declaration letter.

*All measurement and test data in this report was gathered from production sample serial number: 20200320002. (Assigned by the BACL. The EUT supplied by the applicant was received on 2020-03-20)

Objective

This report is prepared on behalf of *Shanghai Sunmi Technology Co.,Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine Compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

This is a CIIPC report base on the original report RKSA200320002-00A with FCC ID: 2AH25D2SLITE which was granted on 2020-06-02, the differences between the original device and the current one are as follows:

1. Add a new model of adapter and this change will affect conducted emissions and radiation spurious testing (below 1GHz), other data were referred to the original report.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS and FCC Part 15B JAB Submittal with FCC ID: 2AH25D2SLITE.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

	Item	Uncertainty
AC Power Line	es Conducted Emissions	3.19dB
RF conducte	ed test with spectrum	0.9dB
RF Output Po	wer with Power meter	0.5dB
	30MHz~1GHz	6.11dB
De diste d'amienian	1GHz~6GHz	4.45dB
Radiated emission	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0°C
	Humidity	6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Test channel list is as below:

For 802.11b, 802.11g and 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11.

Channel	Frequency (MHz) Channel		Frequency (MHz)	
1	2412	7	2442	
2	2417	8	2447	
3	2422	9	2452	
4	2427	10	2457	
5	2432	11	2462	
6	2437	/	/	

For BLE mode, EUT was tested with channel 0, 19 and 39.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404		
18	2438	38	2478
19	2440	39	2480

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

RF test tool: cmd command.

Pre-scan with all the data rates, and the worst case was performed as below:

Mode	Data Rate	Power Level
802.11b	1 Mbps	16
802.11g	6 Mbps	13
802.11n-HT20	MCS0	13
BLE	1 Mbps	Default

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	
/	Cash Box	/	/	
DELL	Notebook	GX620	D65874152	
/	USB flash disk*4	/	/	
HUAWEI	Earphone	AM116	/	
/	Card	/	/	
/	Load	/	/	

External I/O Cable

Cable Description	Length (m)	From Port	То
Power Cable	1.0	EUT	Adapter
Type-C Cable	3.0	EUT	Notebook
Cable	1.0	EUT	Cash Box
Cable	3.0	EUT	Load

Block Diagram of Test Setup

For Conducted Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.207 (a)	AC Line Conducted Emissions	Compliant
FCC §15.209, §15.205 & §15.247(d)	SPURIOUS EMISSIONS	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
	Radiate	d Emission Test(Chan	nber 1#)		
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2019-11-30	2020-11-29
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2019-12-26	2022-12-25
Sonoma Instrument	Pre-amplifier	310N	171205	2019-08-14	2020-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03 -101746-zn	2019-07-11	2020-07-10
Rohde & Schwarz	LISN	ENV216	3560655016	2019-11-30	2020-11-29
Audix	Test Software	e3	V9	/	/
Rohde & Schwarz	Pulse limiter	ESH3-Z2	0357.8810.54	2019-08-10	2020-08-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2019-08-15	2020-08-14

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

ANSI C63.10-2013 clause 6.2

During the conducted emission test, the EUT was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Factor & Over Limit Calculation

The Factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit of 7 dB means the emission is 7 dB above the limit. The equation for Over Limit calculation is as follows:

Over Limit (dB) = Read level (dB μ V) + Factor (dB) - Limit (dB μ V)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

Environmental Conditions

Temperature:	22.5 °C			
Relative Humidity:	51 %			
ATM Pressure:	101.1 kPa			

The testing was performed by Carry Cai on 2020-03-31.

Test Result: Compliant.

For Wi-Fi Mode:

EUT operation mode: Transmitting in 802.11g mode low channel (worst case)

AC 120V/60 Hz, Line



	Read			Limit	0ver	
Freq	Level	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dB	
0.150	16.60	19.82	36.42	56.00	-19.58	Average
0.150	35.50	19.82	55.32	66.00	-10.68	QP
0.169	14.50	19.83	34.33	54.99	-20.66	Average
0.169	32.50	19.83	52.33	64.99	-12.66	QP
0.222	7.80	19.82	27.62	52.74	-25.12	Average
0.222	25.50	19.82	45.32	62.74	-17.42	QP
0.544	11.20	19.75	30.95	46.00	-15.05	Average
0.544	17.80	19.75	37.55	56.00	-18.45	QP
1.819	0.69	19.84	20.53	46.00	-25.47	Average
1.819	7.99	19.84	27.83	56.00	-28.17	QP
2.133	-1.00	19.73	18.73	46.00	-27.27	Average
2.133	6.70	19.73	26.43	56.00	-29.57	QP
	Freq MHz 0.150 0.150 0.169 0.169 0.222 0.222 0.222 0.544 0.544 1.819 1.819 1.819 2.133 2.133	Read Freq Level MHz dBuV 0.150 16.60 0.150 35.50 0.169 14.50 0.169 32.50 0.222 7.80 0.222 7.80 0.222 25.50 0.544 11.20 0.544 17.80 1.819 0.69 1.819 7.99 2.133 -1.00 2.133 6.70	Read Freq Level Factor MHz dBuV dB 0.150 16.60 19.82 0.150 35.50 19.82 0.169 14.50 19.83 0.169 32.50 19.83 0.222 7.80 19.82 0.222 25.50 19.82 0.544 11.20 19.75 0.544 17.80 19.75 1.819 0.69 19.84 1.819 7.99 19.84 2.133 -1.00 19.73 2.133 6.70 19.73	Read Freq Level Factor Level MHz dBuV dB dBuV 0.150 16.60 19.82 36.42 0.150 35.50 19.82 55.32 0.169 14.50 19.83 34.33 0.169 32.50 19.83 52.33 0.222 7.80 19.82 27.62 0.222 25.50 19.82 45.32 0.544 11.20 19.75 30.95 0.544 17.80 19.75 37.55 1.819 0.69 19.84 20.53 1.819 7.99 19.84 27.83 2.133 -1.00 19.73 18.73 2.133 6.70 19.73 26.43	ReadLimitFreqLevel FactorLevelLineMHzdBuVdBdBuVdBuV0.15016.6019.8236.4256.000.15035.5019.8255.3266.000.16914.5019.8334.3354.990.16932.5019.8352.3364.990.2227.8019.8227.6252.740.22225.5019.8245.3262.740.54411.2019.7530.9546.000.54417.8019.7537.5556.001.8190.6919.8420.5346.001.8197.9919.8427.8356.002.133-1.0019.7318.7346.002.1336.7019.7326.4356.00	Read Limit Over Freq Level Factor Level Line Limit MHz dBuV dB dBuV dBuV dB 0.150 16.60 19.82 36.42 56.00 -19.58 0.150 35.50 19.82 55.32 66.00 -10.68 0.169 14.50 19.83 34.33 54.99 -20.66 0.169 32.50 19.82 27.62 52.74 -25.12 0.222 7.80 19.82 45.32 62.74 -17.42 0.544 11.20 19.75 30.95 46.00 -15.05 0.544 17.80 19.75 37.55 56.00 -18.45 1.819 0.69 19.84 20.53 46.00 -25.47 1.819 7.99 19.84 27.83 56.00 -28.17 1.819 7.99 19.84 26.53 46.00 -27.27 2.133 -1.00 19.73

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AC 120V/60 Hz, Neutral

		Kead			Limit	Over		
	Freq	Level	Factor	Level	Line	Limit	Remark	
-	MHz	dBuV	dB	dBuV	dBuV	dB		-
1	0.150	16.60	19.82	36.42	56.00	-19.58	Average	
2	0.150	34.30	19.82	54.12	66.00	-11.88	QP	
3	0.184	13.41	19.82	33.23	54.28	-21.05	Average	
4	0.184	29.31	19.82	49.13	64.28	-15.15	QP	
5	0.234	6.30	19.82	26.12	52.30	-26.18	Average	
6	0.234	22.30	19.82	42.12	62.30	-20.18	QP	
7	0.524	11.91	19.75	31.66	46.00	-14.34	Average	
8	0.524	19.01	19.75	38.76	56.00	-17.24	QP	
9	1.000	7.50	19.82	27.32	46.00	-18.68	Average	
10	1.000	15.00	19.82	34.82	56.00	-21.18	QP	
11	2.915	0.20	19.46	19.66	46.00	-26.34	Average	
12	2.915	9.40	19.46	28.86	56.00	-27.14	QP	

Note:

1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

2) Over Limit (dB) = Read level (dB μ V) + Factor (dB) - Limit (dB μ V)

For BLE Mode:

EUT operation mode: Transmitting in high channel (worst case)

AC 120V/60 Hz, Line



		Read			Limit	0ver	
	Freq	Level	Factor	Level	Line	Limit	Remark
	MHZ	aBuv	aB	aBuv	aBuv	aB	
1	0.151	16.80	19.82	36.62	55.96	-19.34	Average
2	0.151	36.00	19.82	55.82	65.96	-10.14	QP
3	0.170	15.10	19.83	34.93	54.94	-20.01	Average
4	0.170	33.00	19.83	52.83	64.94	-12.11	QP
5	0.238	6.10	19.82	25.92	52.17	-26.25	Average
6	0.238	23.20	19.82	43.02	62.17	-19.15	QP
7	0.541	11.71	19.75	31.46	46.00	-14.54	Average
8	0.541	18.11	19.75	37.86	56.00	-18.14	QP
9	1.032	1.20	19.82	21.02	46.00	-24.98	Average
10	1.032	9.10	19.82	28.92	56.00	-27.08	QP
11	1.698	1.10	19.84	20.94	46.00	-25.06	Average
12	1.698	8.20	19.84	28.04	56.00	-27.96	QP

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AC 120V/60 Hz, Neutral

	Read			Limit	0ver	
Freq	Level	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB	dBuV	dBuV	dB	
0.150	16.80	19.82	36.62	56.00	-19.38	Average
0.150	34.80	19.82	54.62	66.00	-11.38	QP
0.185	13.71	19.82	33.53	54.24	-20.71	Average
0.185	29.81	19.82	49.63	64.24	-14.61	QP
0.518	13.30	19.76	33.06	46.00	-12.94	Average
0.518	20.30	19.76	40.06	56.00	-15.94	QP
0.953	6.20	19.78	25.98	46.00	-20.02	Average
0.953	13.20	19.78	32.98	56.00	-23.02	QP
1.433	7.81	19.83	27.64	46.00	-18.36	Average
1.433	13.81	19.83	33.64	56.00	-22.36	QP
1.959	0.30	19.83	20.13	46.00	-25.87	Average
1.959	7.40	19.83	27.23	56.00	-28.77	QP
	Freq MHz 0.150 0.150 0.185 0.185 0.518 0.518 0.953 0.953 1.433 1.433 1.959 1.959	Read Freq Level MHz dBuV 0.150 16.80 0.150 34.80 0.185 13.71 0.185 29.81 0.518 13.30 0.518 20.30 0.953 6.20 0.953 13.20 1.433 7.81 1.959 0.30 1.959 7.40	Read Freq Level Factor MHz dBuV dB 0.150 16.80 19.82 0.150 34.80 19.82 0.150 34.80 19.82 0.185 13.71 19.82 0.185 29.81 19.82 0.518 13.30 19.76 0.518 20.30 19.76 0.953 6.20 19.78 0.953 13.20 19.78 1.433 7.81 19.83 1.433 13.81 19.83 1.959 0.30 19.83 1.959 7.40 19.83	Read Freq Level Factor Level MHz dBuV dB dBuV 0.150 16.80 19.82 36.62 0.150 34.80 19.82 54.62 0.185 13.71 19.82 33.53 0.185 29.81 19.82 49.63 0.518 13.30 19.76 33.06 0.518 20.30 19.76 40.06 0.953 6.20 19.78 25.98 0.953 13.20 19.78 32.98 1.433 7.81 19.83 27.64 1.433 13.81 19.83 20.13 1.959 0.30 19.83 20.13 1.959 7.40 19.83 27.23	Read Limit Freq Level Factor Level Line MHz dBuV dB dBuV dBuV dBuV 0.150 16.80 19.82 36.62 56.00 0.150 34.80 19.82 54.62 66.00 0.185 13.71 19.82 33.53 54.24 0.185 29.81 19.82 49.63 64.24 0.518 13.30 19.76 33.06 46.00 0.518 20.30 19.78 25.98 46.00 0.953 6.20 19.78 32.98 56.00 1.433 7.81 19.83 27.64 46.00 1.433 13.81 19.83 20.13 46.00 1.959 0.30 19.83 20.13 46.00	Read Limit Over Freq Level Factor Level Line Limit MHz dBuV dB dBuV dBuV dB dBuV dB 0.150 16.80 19.82 36.62 56.00 -19.38 0.150 34.80 19.82 33.53 54.24 -20.71 0.185 13.71 19.82 33.06 46.00 -12.94 0.185 29.81 19.82 49.63 64.24 -14.61 0.518 13.30 19.76 33.06 46.00 -12.94 0.518 20.30 19.76 30.06 56.00 -20.02 0.953 6.20 19.78 25.98 46.00 -20.02 0.953 13.20 19.78 32.98 56.00 -23.02 1.433 7.81 19.83 27.64 46.00 -18.36 1.433 13.81 19.83 20.13 46.00 -25.87 1.959 0.30 19.83 27.23

Note:

1) Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)

2) Over Limit (dB) = Read level (dB μ V) + Factor (dB) - Limit (dB μ V)

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 1 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

Test Procedure

According to ANSI C63.10-2013 clause 6.5, 6.6 and 6.7.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude ($dB\mu V/m$) = Meter Reading ($dB\mu V$) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

The "**Margin**" column of the following data tables indicates the degree of Compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V/m)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data

Environmental Conditions

Temperature:	23.1 °C		
Relative Humidity:	48 %		
ATM Pressure:	101.1kPa		

The testing was performed by Carry Cai on 2020-04-14.

Test Result: Compliant.

EUT operation mode: Transmitting

For Wi-Fi Mode:

Spurious Emission Test:

30MHz-1GHz:

Pre-scan with 802.11b, 802.11g and 802.11n-HT20 modes of operation in the X,Y and Z axes of orientation, the worst case low channel of 802.11g mode in Z-axis of orientation was recorded



Frequency	Corrected Amplitude	Rx Antenna		Turntable	Corrected	Limit	Margin
(MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polar (H/V)	Degree	ractor (dB/m)	(dBµV/m)	(dB)
32.63	27.98	100	V	300	-5.7	40.00	12.02
99.95	27.22	100	V	107	-14.9	43.50	16.28
122.21	31.11	100	Н	66	-11.3	43.50	12.39
300.02	37.22	100	Н	258	-10.5	46.00	8.78
437.45	36.98	100	V	357	-7.6	46.00	9.02
600.00	41.74	100	Н	46	-5.2	46.00	4.26

For BLE Mode:

Spurious Emission Test:

30MHz-1GHz

(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **high** channel of operation in the Z axis of orientation was recorded)



Frequency	Corrected Amplitude	Rx A	ntenna	Turntable	Corrected	Limit	Margin
(MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polar (H/V)	Degree	ractor (dB/m)	(dBµV/m)	(dB)
32.63	28.23	100	V	294	-5.7	40.00	11.77
100.02	30.02	100	V	160	-14.9	43.50	13.48
124.27	30.02	100	Н	62	-11.4	43.50	13.48
300.02	37.54	100	Н	285	-10.5	46.00	8.46
437.46	37.39	100	V	0	-7.6	46.00	8.61
600.01	41.80	100	Н	47	-5.2	46.00	4.20

Declarations

1: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

5: This report cannot be reproduced except in full, without prior written approval of the Company.

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

FCC Part 15.247

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