

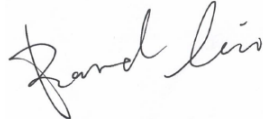
FCC PART 15.247 TEST REPORT

For

Shanghai Sunmi Technology Co.,Ltd.

Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China

FCC ID: 2AH25T5940

Report Type: CIIPC Report	Product Type: Wireless data POS System
Report Number:	<u>RKSA240109002-00C</u>
Report Date:	<u>2024-09-25</u>
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Kunshan). This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, or any agency of the U.S.Government.

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DOCUMENT HISTORY

Revision	Release Date	Description of Revision	Report Number
R1V1	2021-06-04	Original Report	RKSA210422002-00B
R1V2	2024-09-25	CIIPC Report	RKSA240109002-00C

FILING DESCRIPTION

Report Number	Information about Changes
RKSA210422002-00B	First Release
RKSA240109002-00C	Adapter, LCD, Stepping Motor, Scan Engine, Modify part of the circuit

Note:

This is a CIIPC report application based on RKSA210422002-00B, grant date: 7/20/2021, the details as below:

For version B-B:

1. Delete an adapter: UC13US.
2. Add an LCD, its model is HS55ET16T6F, the supplier is Huashi Opto-Electronic Co., Ltd. and the specification is 5.45inch.
3. Add a stepping motor, its model is 15BY25-098, the supplier is SHENZHEN YOFON ELECTRONIC CO., LTD and the specification is 5Vdc.
4. Add a scan engine, its model is NG004, the supplier is shanghai Sunmi Technology Co.,Ltd. and the specification is 3.3Vdc.
5. Modify part of the circuit which not affect RF performance

For above differences, we tested “Conducted Output Power”, “Conducted Emissions” and “Radiated Emissions below 1GHz”, updated relate photos, other data and photos should be referred to the original report RKSA210422002-00B that issued on 2021-06-04 by BACL (Kunshan).

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Product Type:	Wireless data POS System
Tested Model:	T5940
Power Supply:	DC 7.7V from battery and DC 5.0V from adapter
Maximum Peak Output Power:	GFSK: 9.78 dBm $\pi/4$ -DQPSK: 9.35 dBm 8DPSK: 9.40 dBm
RF Function:	Classic BT
Operating Band/Frequency:	2402-2480 MHz
Channel Number:	79
Channel Separation:	1 MHz
Modulation Type:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna Type:	FPC Antenna
★Maximum Antenna Gain:	2.0 dBi

Adapter-1 Information:

Model: TPA-23A050200UU01

Input: AC100-240V 50/60Hz 0.3A

Output: DC5.0V, 2000mA

Note: The Maximum Antenna Gain was declared by the manufacturer.

All measurement and test data in this report was gathered from production sample serial number: RKSA240109002-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-01-09.)

Objective

This test report is prepared for *Shanghai Sunmi Technology Co.,Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

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

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 558074 D01 15.247 Meas Guidance v05r02.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	9 kHz~150 kHz	3.8dB
	150 kHz~30 MHz	3.4dB
	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	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) is accredited in accordance with ISO/IEC 17025:2017 by NVLAP (Lab code: 600338-0), and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No. : CN5055.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	40	2442
1	2403	...	...
...	...	...	...
...	...	78	2480
39	2441	/	/

EUT was tested with Channel 0, 39 and 78.

EUT Exercise Software

RF Test Tool: The EUT tested in engineering mode.

★Power level: Default

Note: The power level setting was declared by the applicant.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

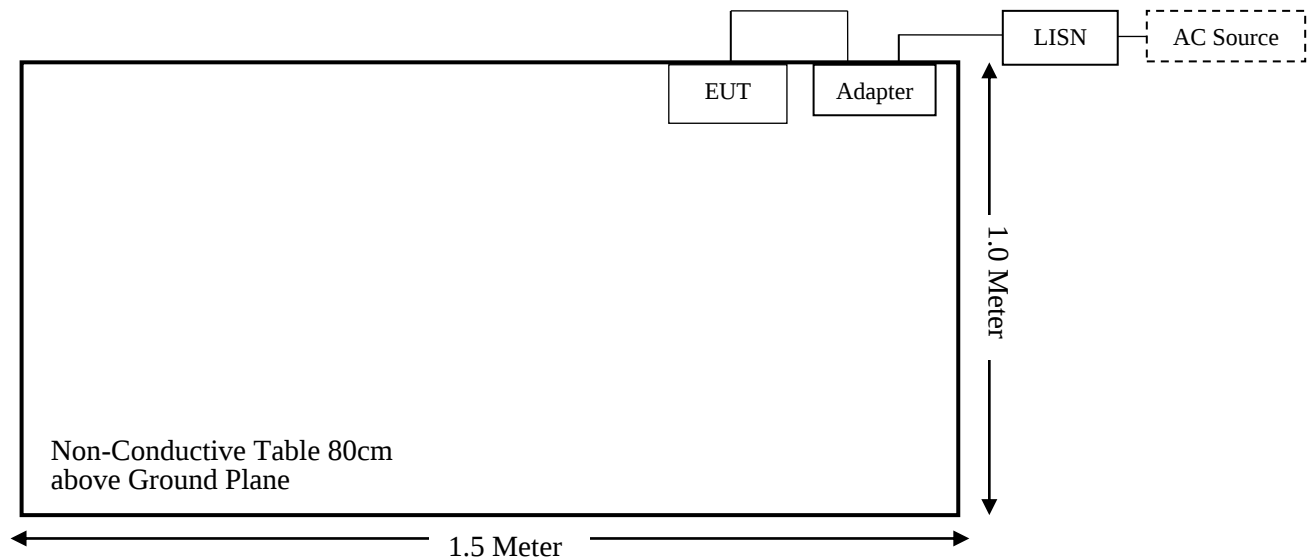
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To
Power cable1	1.0	EUT	Adapter
Power cable2	1.0	Adapter	LISN/AC Source

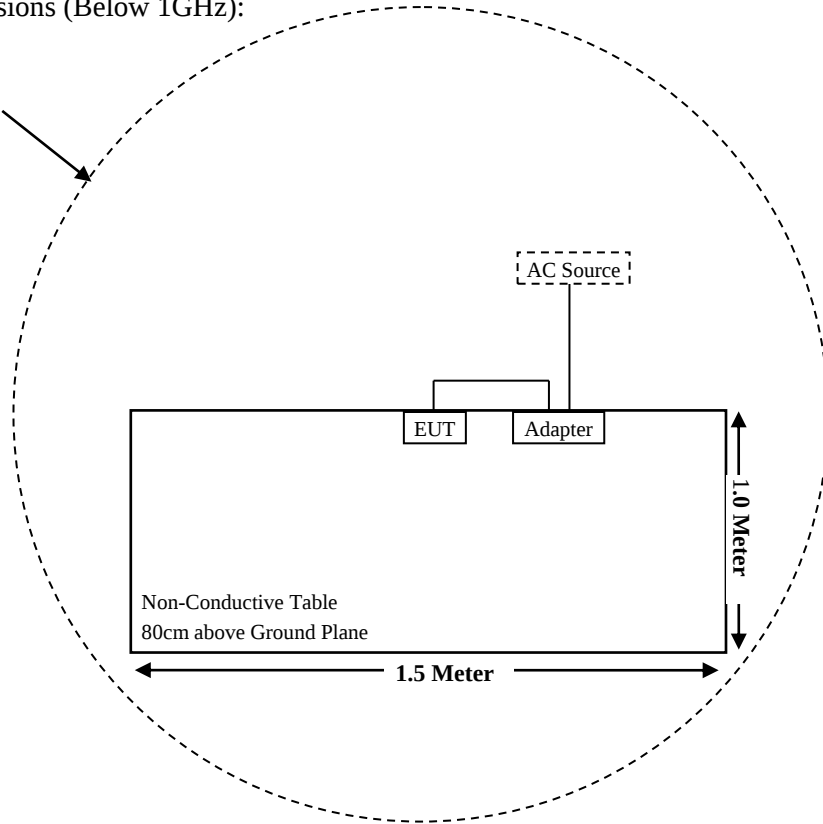
Block Diagram of Test Setup

For Conducted Emissions:



For Radiated Emissions (Below 1GHz):

Turntable
2m Diameter



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307(b)(1) & §2.1093	RF Exposure Information	Compliant
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions below 1GHz	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions above 1GHz	Compliant*
§15.247(a)(1)	20 dB Emission Bandwidth	Compliant*
§15.247(a)(1)	Channel Separation Test	Compliant*
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant*
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant*
§15.247(b)(1)	Peak Output Power Measurement	Reporting
§15.247(d)	Band edges	Compliant*

Compliant*: The changes will not affect test data, the data refer to the original report RKSA210422002-00B that issued on 2021-06-04 by BACL (Kunshan).

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber #1)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2023-05-23	2024-05-22
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2023-11-11	2024-11-10
Narda	6dB Attenuator	773-6	10690812-2-1	2023-11-11	2024-11-10
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Sonoma Instrument	Pre-amplifier	310N	171205	2023-05-23	2024-05-22
Rohde & Schwarz	Auto Test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-8	008	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-9	009	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-10	010	2023-05-23	2024-05-22
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2023-07-28	2024-07-27
Rohde & Schwarz	LISN	ENV216	101115	2023-05-23	2024-05-22
Audix	Test Software	e3	V9	N/A	N/A
Rohde & Schwarz	Pulse limiter	ESH3-Z2	100552	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-15	015	2023-05-23	2024-05-22
RF Conducted Test					
Anritsu	Power Sensor	MA24418A	12621	2024-04-23	2025-04-22
Narda	Attenuator	10dB	010	2024-04-23	2025-04-22
Unknown	RF Cable	RF Cable C01	C01	Each Time	N/A

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 §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC §1.1307, §2.1093.

Test Result

Compliance, please refer to the SAR report: RKSA240109002-20B.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has an FPC antenna for Bluetooth which the antenna gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

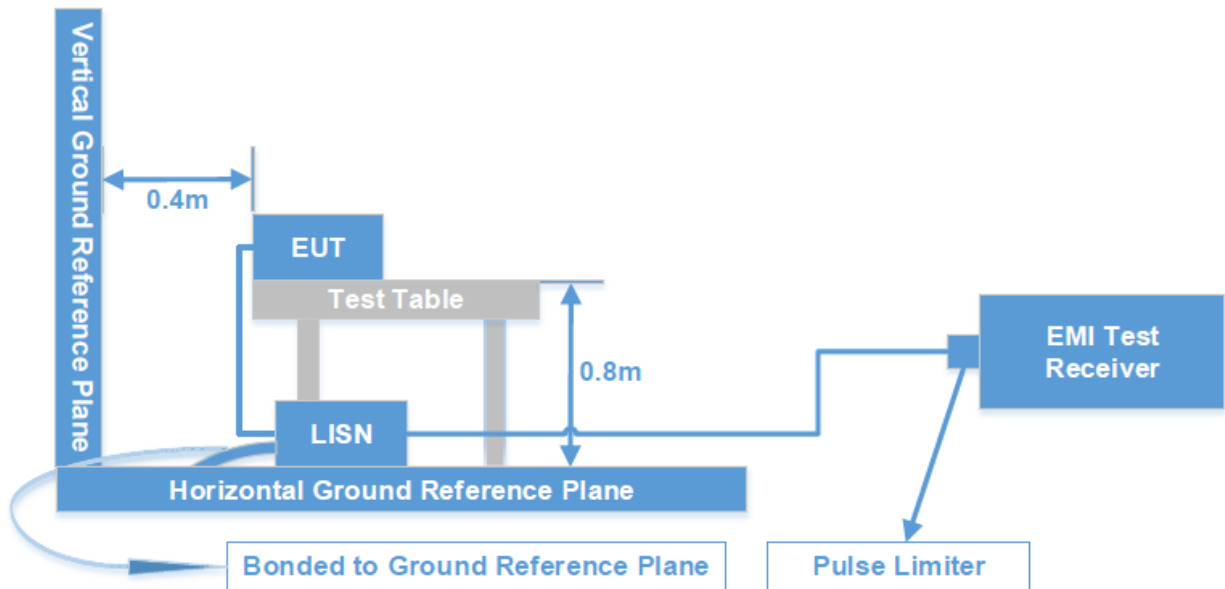
Result: Compliant.

FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

Test System Setup



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

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	RBW	VBW
150 kHz - 30 MHz	9 kHz	30 kHz

Test Procedure

ANSI C63.10-2013 clause 6.2

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

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

If the maximum peak value of the emissions is below the average limit, the QP value and average value measurement will not need to be performed and only record the maximum peak measured value to meet the requirements.

Level & Over Limit Calculation

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

$$\begin{aligned}\text{Factor (dB)} &= \text{LISN VDF (dB)} + \text{Cable Loss (dB)} + \text{Transient Limiter Attenuation (dB)} \\ \text{Level (dB}\mu\text{V)} &= \text{Read level (dB}\mu\text{V)} + \text{Factor (dB)}\end{aligned}$$

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:

$$\text{Over Limit (dB)} = \text{Level (dB}\mu\text{V)} - \text{Limit (dB}\mu\text{V)}$$

Test Results Summary

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

Test Data: See Appendix

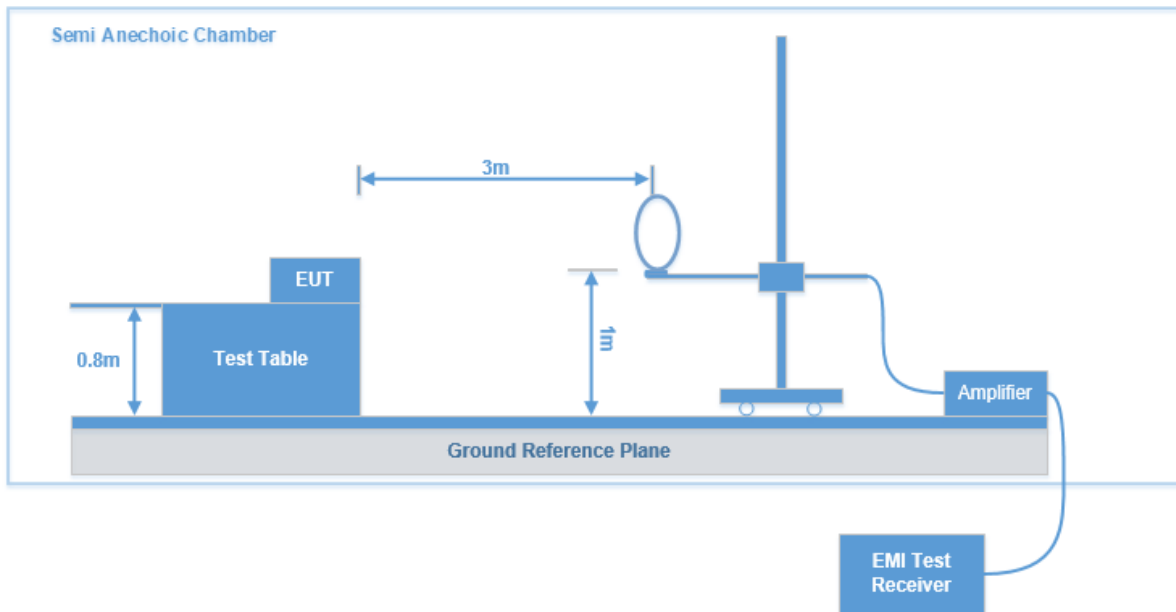
FCC §15.205, §15.209 & §15.247(d) - RADIATED EMISSIONS

Applicable Standard

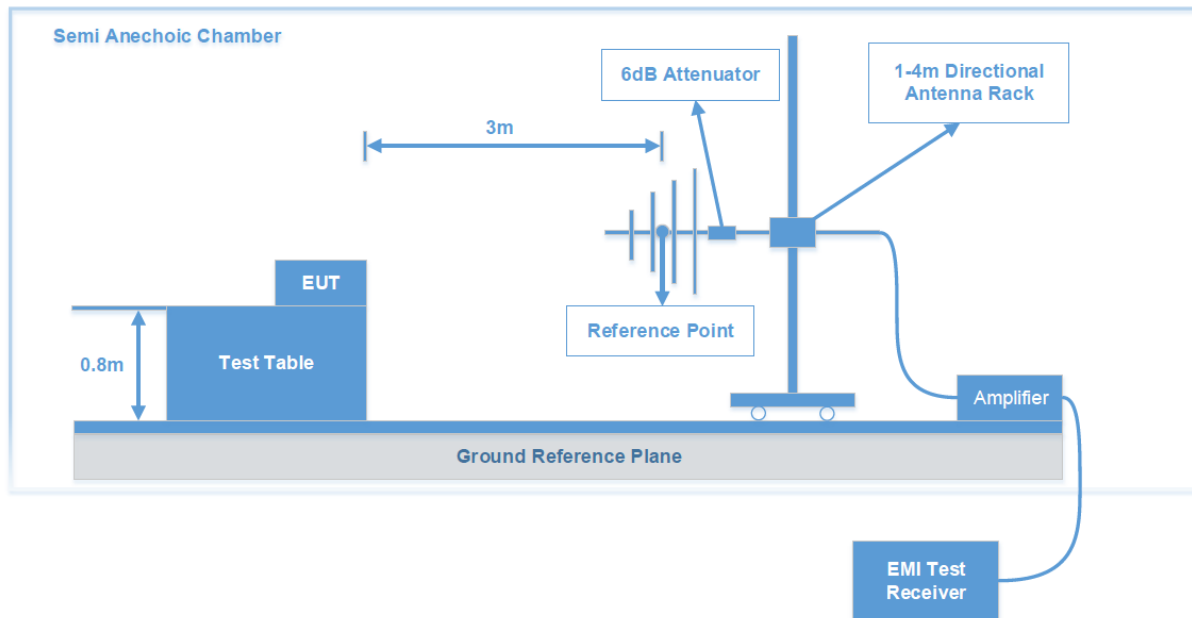
FCC §15.205; §15.209; §15.247(d)

Test System Setup

9 kHz-30MHz:



30MHz-1GHz:



The radiated emission tests were performed in the 3 meters, 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 9 kHz to 1 GHz.

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

Frequency Range	RBW	VBW	IF B/W	Measurement
9 kHz - 150 kHz	200 Hz	1 kHz	200 Hz	QP/Average
150 kHz - 30 MHz	9 kHz	30 kHz	9 kHz	QP/ Average
30 MHz - 1000 MHz	100 kHz	300 kHz	/	Peak
	/	/	120 kHz	QP

Test Procedure

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

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 6 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

For 9 kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

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 (dBμV/m) = Meter Reading (dBμV) + 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 (dBμV/m) – Corrected Amplitude (dBμV/m)

Note: The QuasiPeak (dBμV/m), MaxPeak (dBμV/m), Average (dBμV/m) which shown in the data table are all Corrected Amplitude.

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: See Appendix

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

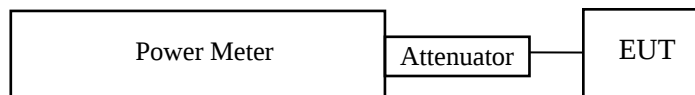
Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

According to ANSI C63.10-2013 sub-clause 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the occupied bandwidth and shall use a fast-responding diode detector.



Test Data: See Appendix

EUT PHOTOGRAPHS

Please refer to the attachment EXHIBIT B - EUT EXTERNAL PHOTOGRAPHS and EXHIBIT C - EUT INTERNAL PHOTOGRAPHS.

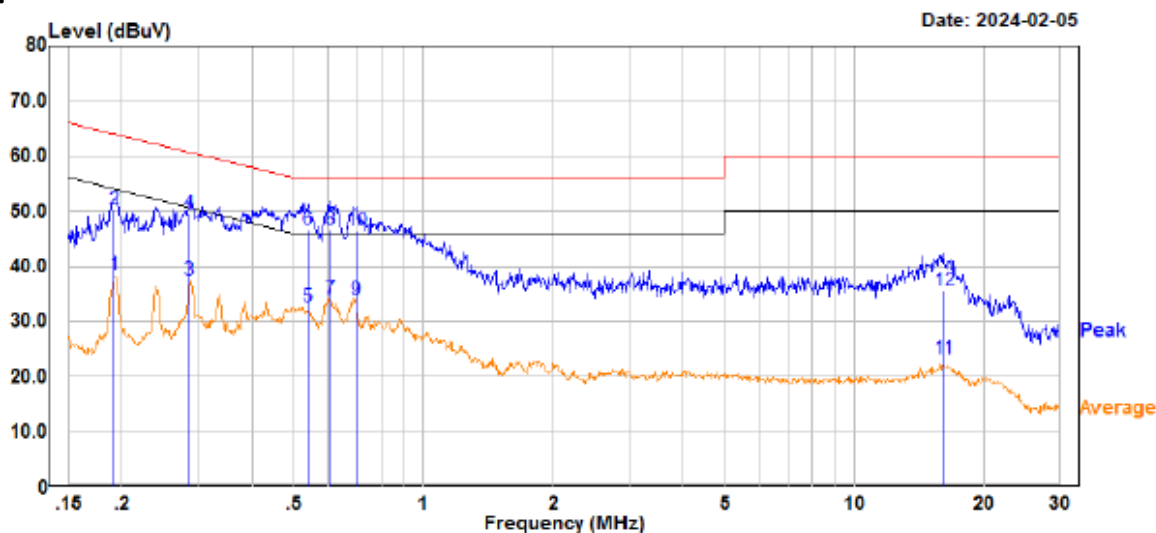
TEST SETUP PHOTOGRAPHS

Please refer to the attachment EXHIBIT D - TEST SETUP PHOTOGRAPHS.

Appendix - TEST DATA

Environmental Conditions & Test Information

Test Item:	AC LINE CONDUCTED EMISSIONS	RADIATED EMISSIONS 9kHz - 1GHz	Maximum Conducted Output Power
Test Date:	2024-02-05	2024-04-13	2024-09-25
Temperature:	23.1 °C	19.8 °C	21.8 °C
Relative Humidity:	33 %	61 %	51 %
ATM Pressure:	102.1kPa	101.5kPa	101.8kPa
Test Result:	Pass	Pass	Pass
Test Engineer:	Aaron Sun	Leah Li	Bard Liu

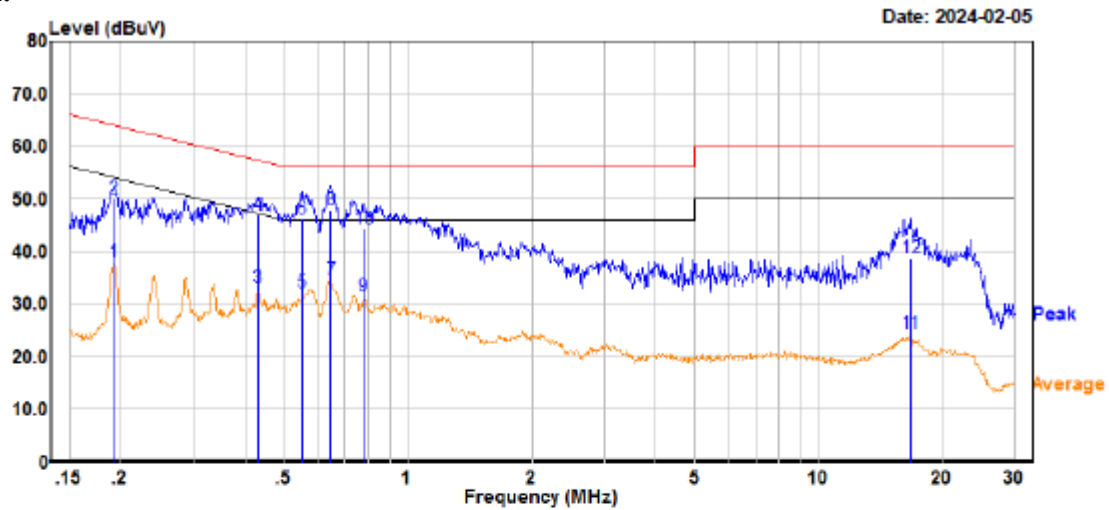
AC LINE CONDUCTED EMISSIONS*EUT operation mode: Transmitting in maximum output power mode GFSK middle channel***Line:**

Trace: 1

Site : CE
Condition : FCC part 15.207
: DET:Peak
Project No : RKSA240109002
Phase : L
Voltage : 120V/60Hz
Mode : BT
Test Equipment : ENV216,ESR
Temperature : 23.1℃
Humidity : 33%
Atmospheric pressure: 102.1kPa
Test Engineer : Aaron

		Read			Limit	Over	
	Freq	Level	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.192	18.40	19.94	38.34	53.97	-15.63	Average
2	0.192	30.40	19.94	50.34	63.97	-13.63	QP
3	0.287	17.40	20.01	37.41	50.62	-13.21	Average
4	0.287	29.60	20.01	49.61	60.62	-11.01	QP
5	0.540	12.50	20.10	32.60	46.00	-13.40	Average
6	0.540	26.60	20.10	46.70	56.00	-9.30	QP
7	0.609	14.00	20.08	34.08	46.00	-11.92	Average
8	0.609	26.60	20.08	46.68	56.00	-9.32	QP
9	0.696	13.70	20.07	33.77	46.00	-12.23	Average
10	0.696	26.30	20.07	46.37	56.00	-9.63	QP
11	16.089	3.50	19.81	23.31	50.00	-26.69	Average
12	16.089	15.70	19.81	35.51	60.00	-24.49	QP

Neutral:



Trace: 1

Site : CE
Condition : FCC part 15.207
DET:Peak
Project No : RKSA240109002
Phase : N
Voltage : 120V/60Hz
Mode : BT
Test Equipment : ENV216,ESR
Temperature : 23.1℃
Humidity : 33%
Atmospheric pressure: 102.1kPa
Test Engineer : Aaron

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV		dB	dBuV	dB	
1	0.192	17.90	19.94	37.84	53.97	-16.13	Average
2	0.192	30.00	19.94	49.94	63.97	-14.03	QP
3	0.429	13.00	20.08	33.08	47.26	-14.18	Average
4	0.429	26.90	20.08	46.98	57.26	-10.28	QP
5	0.551	12.01	20.09	32.10	46.00	-13.90	Average
6	0.551	26.01	20.09	46.10	56.00	-9.90	QP
7	0.646	14.51	20.07	34.58	46.00	-11.42	Average
8	0.646	27.71	20.07	47.78	56.00	-8.22	QP
9	0.777	11.40	19.97	31.37	46.00	-14.63	Average
10	0.777	24.30	19.97	44.27	56.00	-11.73	QP
11	16.661	4.70	19.81	24.51	50.00	-25.49	Average
12	16.661	18.80	19.81	38.61	60.00	-21.39	QP

SPURIOUS EMISSIONS

Test Result: Compliant

EUT operation mode: Transmitting

After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

9 kHz-30MHz: (Transmitting in maximum output power mode and channel)

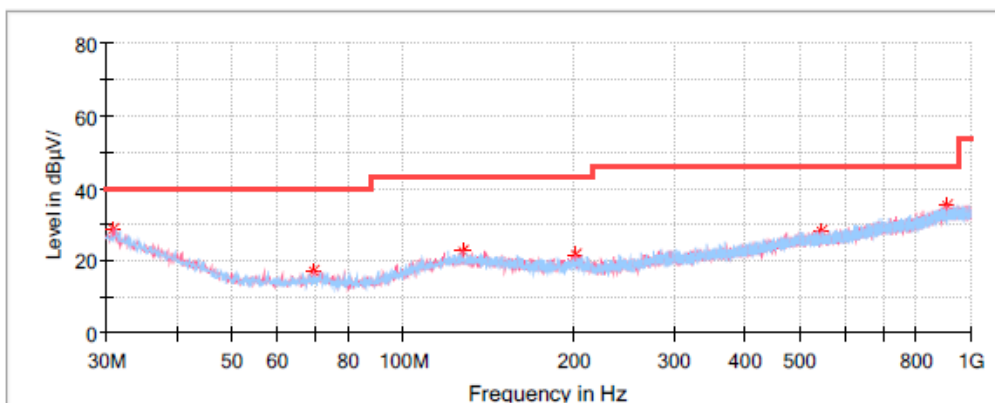
The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

30MHz-1GHz(Transmitting in maximum output power mode GFSK middle channel)

Middle channel: 2441MHz

Common Information

Project No:	RKSA240109002
EUT Model:	T5940
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment:	ESCI, JB3, 310N
Temperature:	19.8℃
Humidity:	61%
Barometric Pressure:	101.5kPa
Test Engineer:	Leah Li
Test Date:	2024/4/13



Critical Freqs

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
30.970000	28.54	40.00	11.46	V	-5.1
69.527500	16.86	40.00	23.14	V	-16.8
127.727500	22.54	43.50	20.96	V	-11.3
201.326250	21.67	43.50	21.83	V	-12.6
546.767500	28.18	46.00	17.82	V	-5.3
911.608750	35.06	46.00	10.94	V	1.4

Spot Check With Maximum Conducted Peak Output Power

Mode	Frequency (MHz)	Output Power		Limit (mW)
		(dBm)	(mW)	
BDR (GFSK)	2402	8.82	7.62	1000
	2441	9.78	9.51	1000
	2480	9.25	8.41	1000
EDR ($\pi/4$-DQPSK)	2402	8.51	7.1	125
	2441	9.01	7.96	125
	2480	9.35	8.61	125
EDR (8DPSK)	2402	8.86	7.69	125
	2441	9.15	8.22	125
	2480	9.4	8.71	125

Declarations

1. The laboratory is not responsible for the authenticity of any information provided by the applicant. Information from the applicant that may affect test results is marked with “★”.
2. The test data was only valid for the test sample(s).
3. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor $k=2$ with the 95.45% confidence interval.

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