TEST REPORT

Application No.:	SZCR2406002101MO
Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Address of Applicant:	Room 505,No.388,Song Hu Road,Yang Pu District,Shanghai,China
Manufacturer:	Shanghai Sunmi Technology Co.,Ltd.
Address of Manufacturer:	Room 505,No.388,Song Hu Road,Yang Pu District,Shanghai,China
EUT Description:	Smart Module
Model No.:	QLB12-21
Trade Mark:	SUNMI
FCC ID:	2AH2524QLB1221
Standards:	FCC 47 CFR Part 2.1091 FCC KDB 447498 D01 v06
Date of Receipt:	2024-06-04
Date of Issue:	2024-07-16
Test Result:	**PASS***

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

Keny Xu
EMC Laboratory Manager

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1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2024-07-16		Original

Authorized for issue by:		
		Donjon Huang **Donjon Huang/Project Engineer**
		Eric Fu **Eric Fu/Reviewer**

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2 General Information

2.1 Client Information

Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Address of Applicant:	Room 505,No.388,Song Hu Road,Yang Pu District,Shanghai,China
Manufacturer:	Shanghai Sunmi Technology Co.,Ltd.
Address of Manufacturer:	Room 505,No.388,Song Hu Road,Yang Pu District,Shanghai,China

2.2 Test Facility

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

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI (Member No. 1937)**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1336**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

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2.3 General Description of EUT

EUT Description:	Smart Module			
Model No.:	QLB12-21			
Trade Mark:	SUNMI			
Hardware Version:	R1.0			
Software Version:	SG656VGLNUR01A04			
Power Supply:	DC 4V			
Antenna Type:	☒ External, ☐ Integrated			
Antenna Gain:	GSM850:	2.53dBi (Ant4)	GSM1900:	1.59dBi (Ant4)
	WCDMA Band II:	1.59dBi (Ant4)	WCDMA Band IV:	2dBi (Ant4)
	WCDMA Band V:	2.29dBi (Ant4)		
	LTE Band 2:	1.59dBi (Ant4)	LTE Band 4:	2dBi (Ant4)
	LTE Band 5:	2.53dBi (Ant4)	LTE Band 7:	3dBi (Ant4)
	LTE Band 12:	3.26dBi (Ant4)	LTE Band 13:	4.45dBi (Ant4)
	LTE Band 14:	3.47dBi (Ant4)	LTE Band 17:	3.26dBi (Ant4)
	LTE Band 25:	1.59dBi (Ant4)	LTE Band 26:	2.53dBi (Ant4)
	LTE Band 30:	1.49dBi (Ant4)	LTE Band 38:	2.06dBi (Ant4)
	LTE Band 41:	3dBi (Ant4)	LTE Band 66:	2dBi (Ant4)
	LTE Band 71:	1.32dBi (Ant4)	LTE Band 40:	1.88dBi (Ant4)
	Bluetooth:	2dBi;		
	WIFI 2.4G:	2dBi;		
	5G WIFI(U-NII-1):	3dBi;		
	5G WIFI(U-NII-2A):	3dBi;		
	5G WIFI(U-NII-2C):	3dBi;		
	5G WIFI(U-NII-3):	3dBi;		
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.			
Remark: As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.				

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3 RF Exposure Evaluation

3.1 RF Exposure Compliance Requirement

3.1.1 Limits

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6
(B) 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

F=frequency in MHz
*=Plane-wave equivalent power density
RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

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3.1.2 Test Procedure

Software provided by client enabled the EUT to transmit data at lowest, middle and highest channel individually

3.1.3 EUT RF Exposure Evaluation

Output Power Into Antenna & RF Exposure Evaluation Distance:
This confirmed that the device comply with MPE limit.

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Power (dBm)	EIRP(ERP) (dBm)	EIRP(ERP) Limit (dBm)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Gain according to EIRP(ERP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
GSM850	824.2	2.53	35.00	35.38	38.45	0.1357	0.5495	5.60	8.60	5.60	Pass
GSM1900	1850.2	1.59	31.00	32.59	33.00	0.0435	1.0000	2.00	15.20	2.00	Pass
WCDMA Band II	1852.4	1.59	25.00	26.59	33.00	0.0907	1.0000	8.00	12.01	8.00	Pass
WCDMA Band IV	1712.4	2.00	25.00	27.00	30.00	0.0997	1.0000	5.00	12.01	5.00	Pass
WCDMA Band V	826.4	2.29	25.00	25.14	38.45	0.1066	0.5509	15.60	9.42	9.42	Pass
LTE Band 2	1850.7	1.59	25.00	26.59	33.00	0.0907	1.0000	8.00	12.01	8.00	Pass
LTE Band 4	1710.7	2.00	25.00	27.00	30.00	0.0997	1.0000	5.00	12.01	5.00	Pass
LTE Band 5	824.7	2.53	25.00	25.38	38.45	0.1126	0.5498	15.60	9.41	9.41	Pass
LTE Band 7	2502.5	3.00	25.00	28.00	33.00	0.1255	1.0000	8.00	12.01	8.00	Pass
LTE Band 12	699.7	3.26	25.00	26.11	34.77	0.1333	0.4665	11.92	8.70	8.70	Pass
LTE Band 13	779.5	4.45	25.00	27.30	34.77	0.1753	0.5197	11.92	9.16	9.16	Pass
LTE Band 14	790.5	3.47	25.00	26.32	34.77	0.1399	0.5270	11.92	9.23	9.23	Pass
LTE Band 17	706.5	3.26	25.00	26.11	34.77	0.1333	0.4710	11.92	8.74	8.74	Pass
LTE Band 25	1850.7	1.59	25.00	26.59	33.00	0.0907	1.0000	8.00	12.01	8.00	Pass
LTE Band 26(814-824)	814.7	2.53	25.00	25.38	NA	0.1126	0.5431	NA	9.36	9.36	Pass
LTE Band 26(824-849)	824.7	2.53	25.00	25.38	38.45	0.1126	0.5498	15.60	9.41	9.41	Pass
LTE Band 30	2307.5	1.49	22.47	23.96	23.98	0.0495	1.0000	1.51	14.54	1.51	Pass
LTE Band 38	2572.5	2.06	25.00	27.06	33.00	0.1011	1.0000	8.00	12.01	8.00	Pass
LTE Band 40(2305-2315)	2307.5	1.88	21.00	22.88	23.98	0.0386	1.0000	2.98	16.01	2.98	Pass
LTE Band 40(2350-2360)	2352.5	1.88	21.00	22.88	23.98	0.0386	1.0000	2.98	16.01	2.98	Pass
LTE Band 41	2498.5	3.00	25.00	28.00	33.00	0.1255	1.0000	8.00	12.01	8.00	Pass
LTE Band 66	1710.7	2.00	25.00	27.00	30.00	0.0997	1.0000	5.00	12.01	5.00	Pass
LTE Band 71	665.5	1.32	25.00	24.17	34.77	0.0853	0.4437	11.92	8.48	8.48	Pass
Bluetooth	2402.0	2.00	11.00	13.00	30.00	0.0040	1.0000	NA			Pass
2.4G WiFi	2412.0	2.00	19.00	21.00	30.00	0.0250	1.0000				Pass
5G WiFi	5180.0	3.00	20.00	23.00	30.00	0.0397	1.0000				Pass

Remark: Frame-average power=Burst power+ Division Factors (-9.19)

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3.1.4 Exposure calculations for multiple sources

In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^{n} \frac{S_i}{MPE_i} \leq 1$$

The product also has multiple transmitters The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	WWAN + WLAN 5GHz + BT
2	WWAN + WLAN 2.4GHz + WLAN 5GHz

No.	Mode	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	Result Ratio	Total Ratio	Limit	Result
1	LTE Band 13*	0.1753	0.5197	0.3373	0.3810	1.0000	Pass
	WLAN 5GHz	0.0397	1.0000	0.0397			
	BT	0.0040	1.0000	0.0040			
2	LTE Band 13*	0.1753	0.5197	0.3373	0.4020	1.0000	Pass
	WLAN 2.4GHz	0.0250	1.0000	0.0250			
	WLAN 5GHz	0.0397	1.0000	0.0397			

Remark*: This WWAN Band was recalculated on worst Band.

---End of Report---