

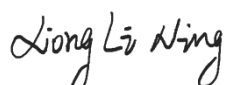
TEST REPORT

Applicant: SIMCom Wireless Solutions Limited
Address: Building 3, No. 289, Linhong Road, Changning District, Shanghai, P.R.China
Equipment Type: LTE Wireless Data Module
Model Name: SIM8971NA
Brand Name: SIMCom
FCC ID: 2AJYU-8XK0001
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Sample Arrival Date: May 04, 2023
Test Date: May 06, 2023 - Jun. 03, 2023
Date of Issue: Aug. 23, 2023

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Lining



Checked by: Xu Rui



Approved by: Tolan Tu
(Testing Director)



Revision History		
Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Aug. 23, 2023</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	<input checked="" type="checkbox"/> Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	<input type="checkbox"/> 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	SIMCom Wireless Solutions Limited
Address	Building 3, No. 289, Linhong Road, Changning District, Shanghai, P.R.China

2.2 Manufacturer Information

Manufacturer	SIMCom Wireless Solutions Limited
Address	Building 3, No. 289, Linhong Road, Changning District, Shanghai, P.R.China

2.3 General Description for Equipment under Test (EUT)

EUT Name	LTE Wireless Data Module
Model Name Under Test	SIM8971NA
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	SIM8971EA_V1.02
Software Version	SIM8971B01V08
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Ancillary Equipment

Note: Not applicable.

2.5 Technical Information

Network and Wireless connectivity	3G Network WCDMA/HSDPA/HSUPA Band 2/4/5 4G Network LTE FDD Band 2/4/5/7/12/13/17/25/26 LTE TDD Band 41 Bluetooth (BR+EDR+BLE) 2.4G WIFI 802.11b, 802.11g, 802.11n(HT20/40) 5G WIFI 802.11a, 802.11n(HT20/40), 802.11ac(VHT20/40/80) U-NII-1/2A/2C/3, BDS, GPS, GLONASS
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	WCDMA, LTE, Bluetooth, 2.4G WLAN, 5G WLAN		
Frequency Range	WCDMA Band 2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	WCDMA Band 4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	WCDMA Band 5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE Band 2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE Band 4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	LTE Band 5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE Band 7	TX: 2500 ~ 2570 MHz	RX: 2620 ~ 2690 MHz
	LTE Band 12	TX: 699 ~ 716 MHz	RX: 729 ~ 746 MHz
	LTE Band 13	TX: 777 ~ 787 MHz	RX: 746 ~ 756 MHz
	LTE Band 17	TX: 704 ~ 716 MHz	RX: 734 ~ 746 MHz
	LTE B25	TX: 1850 ~ 1915 MHz	RX: 1930 ~ 1995 MHz
	LTE B26	TX: 814 ~ 824 MHz &824 ~ 849 MHz	RX: 859 ~ 869 MHz &869 ~ 894 MHz
	LTE B41	TX: 2496 ~ 2690 MHz	RX: 2496 ~ 2690 MHz
	802.11 b/g/n(HT20/40)	2412 MHz ~ 2472 MHz	
	802.11 a/n(HT20/HT40) /ac(VHT20/VHT40/VHT80)	5150 MHz ~ 5250 MHz	
5250 MHz ~ 5350 MHz			
5470 MHz ~ 5725 MHz			
Bluetooth	2402 MHz ~ 2480 MHz		
Antenna Type	WWAN: Dipole Antenna WLAN: Dipole Antenna Bluetooth: Dipole Antenna		
Exposure Category	General Population/Uncontrolled Exposure		
EUT Type	Mobile Device		

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices
2	KDB 447498 D04 v01	447498 D04 Interim General RF Exposure Guidance v01

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Device:

CFR Title 47 §2.1091(b)

(b) For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

FCC KDB 447498 D04 General RF Exposure Guidance v01 Limit

Evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i. e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad \text{(B. 2)}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1). The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

5 ASSESSMENT RESULT

5.1 Output Power

WCDMA			
Mode	Band 2	Band 4	Band 5
Conducted Power (dBm)	23.21	22.93	23.29
Antenna Gain (dBi)	2.45	2.44	-0.16
EIRP/ERP (dBm)	25.66	25.37	20.98

Note: This table listed the worst case power value, please refer to BL-SZ2350133-501 report for more details.

LTE					
Mode	Band 2	Band 4	Band 5	Band 7	Band 12
Conducted Power (dBm)	22.94	22.59	22.87	22.59	22.97
Antenna Gain (dBi)	2.45	2.44	-0.16	1.88	-0.48
EIRP/ERP (dBm)	25.39	25.03	20.56	24.47	20.34
Mode	Band 13	Band 17	Band 25	Band 26	Band 41
Conducted Power (dBm)	22.99	22.88	22.95	22.98	25.32
Antenna Gain (dBi)	0.55	-0.48	2.45	-0.16	2.16
EIRP/ERP (dBm)	21.39	20.25	25.4	20.67	27.48

Note: This table listed the worst case power value, please refer to BL-SZ2350133-501 report for more details.

Bluetooth	
Mode	GFSK/ π /4-DQPSK/8-DPSK/GFSK(BLE)
Conducted Power (dBm)	10.70
Antenna Gain (dBi)	2.98
EIRP (dBm)	13.68

Note: This table listed the worst case power value, please refer to BL-SZ2350133-601&602 report for more details.

WLAN 2.4G				
Mode	802.11b	802.11g	802.11n20	802.11n40
Conducted Power (dBm)	17.67	16.79	16.67	16.84
Antenna Gain (dBi)	2.98			
EIRP (dBm)	20.65	19.77	19.65	19.82

Note: This table listed the worst case power value, please refer to BL-SZ2350133-603 report for more details.

WLAN 5G				
Mode	WLAN 5G Band I	WLAN 5G Band II	WLAN 5G Band III	WLAN 5G Band IV
Conducted Power (dBm)	17.91	17.88	17.92	17.74
Antenna Gain (dBi)	2.65	2.33	3.2	4.32
EIRP (dBm)	20.56	20.21	21.12	22.06

Note: This table listed the worst case power value, please refer to BL-SZ2350133-604 report for more details.

5.2 Tune-up power

Mode		Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
WCDMA	Band 2	[21.50,23.50]	[24.00,26.00]	[21.85,23.85]
	Band 4	[21.50,23.50]	[24.00,26.00]	[21.85,23.85]
	Band 5	[21.50,23.50]	[19.00,21.00]	[16.85,18.85]
LTE	Band 2	[21.00,23.00]	[24.00,26.00]	[21.85,23.85]
	Band 4	[21.00,23.00]	[24.00,26.00]	[21.85,23.85]
	Band 5	[21.00,23.00]	[19.00,21.00]	[16.85,18.85]
	Band 7	[21.00,23.00]	[23.00,25.00]	[20.85,22.85]
	Band 12	[21.00,23.00]	[19.00,21.00]	[16.85,18.85]
	Band 13	[21.00,23.00]	[20.00,22.00]	[17.85,19.85]
	Band 17	[21.00,23.00]	[19.00,21.00]	[16.85,18.85]
	Band 25	[21.00,23.00]	[24.00,26.00]	[21.85,23.85]
	Band 26	[21.00,23.00]	[19.00,21.00]	[16.85,18.85]
Band 41	[23.50,25.50]	[25.50,27.50]	[23.35,25.35]	
Bluetooth		[9.00,11.00]	[12.00,14.00]	[9.85,11.85]
WLAN 2.4G		[16.00,18.00]	[19.00,21.00]	[16.85,18.85]
WLAN 5G Band I		[16.00,18.00]	[19.00,21.00]	[16.85,18.85]
WLAN 5G Band II		[16.00,18.00]	[18.50,20.50]	[16.35,18.35]
WLAN 5G Band III		[16.00,18.00]	[19.50,21.50]	[17.35,19.35]
WLAN 5G Band IV		[16.00,18.00]	[20.50,22.50]	[18.35,20.35]

Note1: ERP= EIRP -2.15dB.
Note2: According KDB 447498 D04, used the greater of maximum conducted power and ERP to compare with the threshold value Pth.

5.3 RF Exposure Evaluation Result

Evolution mode	Frequency (MHz)	Maximum power (dBm)	Maximum power (mw)	Distance (mm)	Threshold Power (mW)	Power / Limit	Verdict
WCDMA Band 2	1.850	23.85	242.66	200	3060.00	0.08	Pass
WCDMA Band 4	1.700	23.85	242.66	200	3060.00	0.08	Pass
WCDMA Band 5	0.824	23.50	223.87	200	1680.96	0.13	Pass
LTE Band 2	1.850	23.85	242.66	200	3060.00	0.08	Pass
LTE Band 4	1.700	23.85	242.66	200	3060.00	0.08	Pass
LTE Band 5	0.824	23.00	199.53	200	1680.96	0.12	Pass
LTE Band 7	2.500	23.00	199.53	200	3060.00	0.07	Pass
LTE Band 12	0.699	23.00	199.53	200	1425.96	0.14	Pass
LTE Band 13	0.777	23.00	199.53	200	1585.08	0.13	Pass
LTE Band 17	0.704	23.00	199.53	200	1436.16	0.14	Pass
LTE Band 25	1.850	23.85	242.66	200	3060.00	0.08	Pass
LTE Band 26	0.814	23.00	199.53	200	1660.56	0.12	Pass
LTE Band 41	2.496	25.50	354.81	200	3060.00	0.12	Pass
Bluetooth	2.402	11.85	15.31	200	3060.00	0.01	Pass
WLAN 2.4G	2.412	18.85	76.74	200	3060.00	0.03	Pass
WLAN 5G Band I	5.150	18.85	76.74	200	3060.00	0.03	Pass
WLAN 5G Band II	5.250	18.35	68.39	200	3060.00	0.02	Pass
WLAN 5G Band III	5.470	19.35	86.10	200	3060.00	0.03	Pass
WLAN 5G Band IV	5.750	20.35	108.39	200	3060.00	0.04	Pass

5.4 Collocated Power Calculation

Evolution mode	Frequency(MHz)	Power /Limit	Σ (Power / Limit) of WWAN + WLAN + Bluetooth	Verdict
MAX.WWAN	0.699	0.140	0.21	Pass
WLAN 2.4G	2.412	0.030		
MAX.WLAN 5G	5.750	0.040		
MAX.WWAN	0.699	0.140	0.19	Pass
Bluetooth	2.402	0.010		
MAX.WLAN 5G	5.750	0.040		

Note:

- Σ (Power / Limit): This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for WWAN+WLAN 2.4GHz+WLAN 5GHz and WWAN+Bluetooth+WLAN 5GHz.
- Both of the WWAN/2.4GHz and WWAN/Bluetooth/5GHz can transmit simultaneously, the formula of calculated the Power is

$CP1 / LP1 + CP2 / LP2 + \dots \text{etc.} < 1$

CP = Calculation power

LP = Limit of power

3. Both of the 2.4GHz WIFI and Bluetooth can't transmit simultaneously at same time.
4. The worst-case situation is 0.21, which is less than "1". This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
5. More power list please refer to BL-SZ2350133-501& BL-SZ2350133-601~604 test report.

5.5 Conclusion

This EUT is deemed to comply with the reference level limits, therefore the basic restrictions are compliant with human exposure limits.

Statement

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--END OF REPORT--