

TEST REPORT

Applicant: Jiangsu Niu Electric Technology Co., Ltd.
Address: No.387.ChangtingRd,WEZ,Wujin,Changzhou,Jiang
su Province.China
Equipment Type: Smart Central Controller
Model Name: V51A
Brand Name: NIU
FCC ID: 2AZ6G-V51A
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Test Date: Dec. 04, 2024
Date of Issue: Jan. 13, 2025

ISSUED BY:

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Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Jan. 13, 2025</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	☐ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☒ 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	Jiangsu Niu Electric Technology Co., Ltd.
Address	No.387.ChangtingRd,WEZ,Wujin,Changzhou,Jiangsu Province.China

2.2 Manufacturer Information

Manufacturer	Jiangsu Niu Electric Technology Co., Ltd.
Address	No.387.ChangtingRd,WEZ,Wujin,Changzhou,Jiangsu Province.China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Smart Central Controller
Model Name Under Test	V51A
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	V0.2
Software Version	V5A01A29+V1Q02V01
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Technical Information

Network and Wireless connectivity	3G Network WCDMA/HSDPA/HSUPA Band 2/4/5 4G Network LTE FDD Band 2/4/12 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		
Frequency Range	WCDMA B2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	WCDMA B4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	WCDMA B5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE B2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE B4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	LTE B12	TX: 699 ~ 716 MHz	RX: 729 ~ 746 MHz
Exposure Category	General Population/Uncontrolled Exposure		
Product 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 Devices:

CFR Title 47 §2.1091(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

According with FCC KDB 447498 D04, Appendix A, Per § 1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

When maximum available power each individual transmitting antenna within the same time averaging period is ≤ 1 mW, and the nearest parts of the antenna structures of the simultaneously operating transmitters are separated by at least 2 cm.

When the aggregate maximum available power of all transmitting antennas is ≤ 1 mW in the same time-averaging period.

5 ASSESSMENT RESULT

5.1 Output Power

WCDMA			
Mode	Band 2	Band 4	Band 5
Conducted Power (dBm)	23.17	23.44	23.13
Antenna Gain (dBi)	1.00	1.00	2.00
ERP/EIRP (dBm)	24.17	24.44	22.98
Note: This report listed the worst case conducted power value, please refer to RF test report No.BL-SH24B0860-501 for more details.			

LTE			
Mode	Band 2	Band 4	Band 5
Conducted Power (dBm)	23.47	23.35	23.34
Antenna Gain (dBi)	1.00	1.00	0.50
ERP/EIRP (dBm)	24.47	24.35	21.69
Note: This report listed the worst case conducted power value, please refer to RF test report No.BL-SH24B0860-501 for more details.			

5.2 Tune-up power

Mode		Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
WCDMA	Band 2	【22.00,24.00】	【23.00,25.00】	【20.85,22.85】
	Band 4	【22.50,24.50】	【23.50,25.50】	【21.35,23.35】
	Band 5	【22.00,24.00】	/	【21.85,23.85】
LTE	Band 2	【22.50,24.50】	【23.50,25.50】	【21.35,23.35】
	Band 4	【22.50,24.50】	【23.50,25.50】	【21.35,23.35】
	Band 12	【22.50,24.50】	/	【20.85,22.85】
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		f(MHz)	Distance (cm)	Maximum power (dBm)	Maximum power (mw)	Threshold Power (mW)	Verdict
WCDMA	Band 2	1850	20	24.00	251.19	3060.00	Pass
	Band 4	1710	20	24.50	281.84	3060.00	Pass
	Band 5	824	20	24.00	251.19	1680.96	Pass
LTE	Band 2	1850	20	24.50	281.84	3060.00	Pass
	Band 4	1710	20	24.50	281.84	3060.00	Pass
	Band 12	699	20	24.50	281.84	1425.96	Pass

5.4 Conclusion

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

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
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5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

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