



RF Exposure Evaluation

For

K4Connect

Controller 3.0

Test Model: 3.0

Prepared for : K4Connect
Address : 2121 RDU Center Drive, Suite 200, Morrisville, NC 27560

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : July 22, 2025
Number of tested samples : 2
Sample No. : A250716081-1, A250716081-2
Serial number : Prototype
Date of Test : July 22, 2025 ~ August 29, 2025
Date of Report : September 01, 2025





RF Exposure Evaluation	
Report Reference No.	LCSA07175022EF
Date of Issue	September 01, 2025
Testing Laboratory Name	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure	Full application of Harmonised standards ☒ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name	K4Connect
Address	2121 RDU Center Drive, Suite 200, Morrisville, NC 27560
Test Specification	
Standard	FCC KDB publication 447498 D01 General RF Exposure Guidance v06 FCC CFR 47 part1 1.1310 FCC CFR 47 part2 2.1091
Test Report Form No.	TRF-4-E-215 A/0
TRF Originator	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	Dated 2011-03
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Test Item Description	Controller 3.0
Trade Mark	
Test Model	3.0
Ratings	Please Refer to Page 6
Result	Pass

Compiled by:



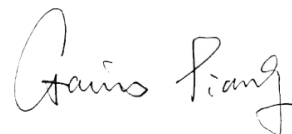
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Scan code to check authenticity



RF Exposure Evaluation

Test Report No. : LCSA07175022EF	<u>September 01, 2025</u> Date of issue
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EUT.....	: Controller 3.0
Test Model.....	: 3.0
Applicant.....	: K4Connect
Address.....	: 2121 RDU Center Drive, Suite 200, Morrisville, NC 27560
Manufacturer.....	: BLAZE AUTOMATION SERVICES PVT. LTD
Address.....	: QUADRANT 2, A1, 10TH FLOOR, CYBER TOWERS, HITECH CITY, MADHAPUR, HYDERABAD, TELANGANA, 500081, INDIA.

Test Result	Pass
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.





Revision History

Report Version	Issue Date	Revision Content	Revised By
000	September 01, 2025	Initial Issue	---





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**1. Product Information**

EUT	: Controller 3.0
Test Model	: 3.0
Ratings	: Input: 5.0V $\Rightarrow$ 3.0A For AC Adapter Input: 100-240V~, 50/60Hz, 0.4A Adapter Output: 5.0V $\Rightarrow$ 3.0A, 15.0W
Hardware Version	: V0.4A
Software Version	: WiFi: 7.45.96.194 BLE: 5.55 Zigbee: 6.7.10 Zwave: 2.15.1
Bluetooth	
Frequency Range	: 2402MHz-2480MHz
Bluetooth Channel Number	: 79 channels for Bluetooth V5.0 (DSS) 40 channels for Bluetooth V5.0 (DTS)
Bluetooth Channel Spacing	: 1MHz for Bluetooth V5.0 (DSS) 2MHz for Bluetooth V5.0 (DTS)
Bluetooth Modulation Type	: GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V5.0 (DSS) GFSK for Bluetooth V5.0 (DTS)
Bluetooth Version	: V5.0
Antenna Description	: PCB Antenna With UFL Connector and Cable, 3.0dBi (Max.)
WIFI (2.4G Band)	
Frequency Range	: 2412MHz-2462MHz
Channel Number	: 11 Channels for 20MHz bandwidth (2412~2462MHz)
Channel Spacing	: 5MHz
Modulation Type	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: PCB Antenna With UFL Connector and Cable, 3.0dBi(Max.)
Z-Wave	
Frequency Range	: 908.4MHz, 908.42MHz, 916MHz
Channel Number	: 3 Channels
Modulation Type	: (908.4MHz, 908.42MHz) FSK (916MHz) GFSK
Antenna Description	: PCB Trace Antenna, 1.19dBi (Max)
Z-Wave	
Frequency Range	: 912MHz, 920MHz
Channel Number	: 2 Channels
Modulation Type	: OQPSK
Antenna Description	: PCB Trace Antenna, 1.19dBi (Max)





ZigBee with Bluetooth	
Frequency Range	: 2402 – 2480 MHz (Bluetooth) 2405 – 2480 MHz (ZigBee)
Channel Number	: 16 Channels (ZigBee) / 40 Channels (BT LE)
Modulation Type	: O-QPSK (ZigBee) / GFSK (BT LE)
Antenna Description	: Chip Antenna, 1.86dBi (Max)
Exposure category	: General population/uncontrolled environment
EUT Type	: Production Unit
Device Type	: Mobile Device
Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer.	





2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3.1 Refer Evaluation Method

[ANSI C95.1-2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices.

3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	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





4. MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

5. Antenna Information

EUT can only use antennas certificated as follows provided by manufacturer;

Internal/ External Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Antenna 0	FPC Antenna	2400MHz ~ 2500MHz	3.00 Dbi	WLAN/BT
Antenna 1	PCB Antenna	860 – 930 MHz	1.19 dBi	Z-wave
Antenna 2	Chip Antenna	2400 – 2500 MHz	1.86 dBi	ZigBee/BT



**6. Conducted Power**

[BT]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
1-DH5	0	2402	6.61
	39	2441	7.88
	78	2480	7.41
2-DH5	0	2402	7.22
	39	2441	8.06
	78	2480	7.26
3-DH5	0	2402	7.5
	19	2441	6.97
	39	2480	7.41

[BT LE]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
BLE 1M	0	2402	6.38
	19	2440	7.78
	39	2480	7.3
BLE 2M	0	2402	6.52
	19	2440	7.99
	39	2480	7.52

[2.4G WIFI]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
IEEE 802.11b	1	2412	18.8
	6	2437	18.42
	11	2462	18.37
IEEE 802.11g	1	2412	18.83
	6	2437	18.38
	11	2462	18.44
IEEE 802.11n HT20	1	2412	17.67
	6	2437	17.37
	11	2462	17.36

[Z-wave]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
O-QPSK	1	912	12.44
	2	920	12.41

Z-wave ((908.4MHz, 908.42MHz) FSK/ (916MHz) GFSK:

TX frequency (the Worst):908.4MHz

Max. Field Strength: 84.53dBuV/m @3m

EIRP=E-104.8+20logD=84.53-104.8+20log3=-12.40dBm

Maximum Conducted Output Power: -10.73dBm

Turn-up: -10±1





7. Manufacturing Tolerance

[BT]

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	6.0	7.0	7.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
$\pi/4$ -DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	7.0	8.0	7.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
8DPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	7.0	6.0	7.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[BLE 1M]

GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	6.0	7.0	7.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[BLE 2M]

GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	6.0	7.0	7.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[2.4G WIFI]

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	18.0	18.0	18.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	18.0	18.0	18.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	17.0	17.0	17.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[Z-wave]

O-QPSK (Peak)		
Channel	Channel 1	Channel 2
Target (dBm)	12.0	12.0
Tolerance $\pm$ (dB)	1.0	1.0





8. Measurement Results

8.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[BT]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE Ratio
	dBm	mW					
GFSK	8.0	6.3096	3.0	1.9953	0.0025	1.0000	0.0025
$\pi/4$ -DQPSK	9.0	7.9433	3.0	1.9953	0.0032	1.0000	0.0032
8-DPSK	8.0	6.3096	3.0	1.9953	0.0025	1.0000	0.0025

[BLE 1M]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE Ratio
	dBm	mW					
GFSK	8.0	6.3096	3.0	1.9953	0.0025	1.0000	0.0025

[BLE 2M]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE Ratio
	dBm	mW					
GFSK	8.0	6.3096	3.0	1.9953	0.0025	1.0000	

[2.4G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE Ratio
	dBm	mW					
IEEE 802.11b	19.0	79.4328	3.0	1.9953	0.0315	1.0000	0.0315
IEEE 802.11g	19.0	79.4328	3.0	1.9953	0.0315	1.0000	0.0315
IEEE 802.11n HT20	18.0	63.0957	3.0	1.9953	0.0250	1.0000	0.0250

[Z-wave]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE Ratio
	dBm	mW					
O-QPSK	13.0	19.9526	1.19	1.3152	0.0052	1.0000	0.0052

[Z-wave]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE Ratio
	dBm	mW					
FSK	-9.0	0.1259	1.19	1.3152	0.00003	1.0000	0.00003

Device contains ZigBee/BT modular (Model: MGM210P32A, FCC ID: QOQGM210P), maximum MPE values is 0.031 from modular MPE Report No. SA190408C21.

Remark:

1. Output power including tune-up tolerance;
2. Output power was adjusted to duty cycle at 100% if measured duty cycle less than 98%;



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3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

8.2 Simultaneous Transmission MPE Evaluation

The EUT equipped with one Bluetooth/2.4GWIFI antenna, one Z-wave antenna, one Zigbee antenna. so need consider simultaneous transmission;
According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Simultaneous Transmission					
2.4GWIFI Antenna Max MPE ratios	Z-wave Antenna Max MPE ratios	Zigbee Antenna Max MPE ratios	Σ MPE ratios	Limit	Results
0.0315	0.0052	0.031	0.0677	1.0	Pass

9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

10. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

11. Measurement Uncertainty

BT/BLE/2.4GWIFI/Z-wave:

Test Item	Frequency Range	Uncertainty	Note
Output power	1GHz-40GHz	±0.57dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

-----THE END OF REPORT-----

