



苏州蓝石新动力有限公司
Suzhou BLUE STONE New Power Co., Ltd
江苏省苏州市工业园区唯新路 69 号
69 Weixin Road, SIP, 215 000 Suzhou – PRC
www.bluestone-ev.com

Product Specification

Description:

T-BOX

Part Number:

3004006-003

Revision:

0.4

Confidential and proprietary
information owned by Blue stone new
power (suzhou) Co. Ltd.
Do not disclose, in whole or part, without the
prior written consent of Blue stone new power
(suzhou) Co. Ltd.

	Name	Title	Signature	Date
Author	Wu Chao	Head of VCU and TBOX Software		
Validation	Wu Shengfang	R&d manager		
	Xu Wenlong	R&d director		
Customer Approval				

All rights reserved by Blue stone new power (suzhou)
Co. Ltd. also in case of property rights.
Any disposal, such as copying and passing on
to third parties is forbidden.

Revision History

Revision	Date	Description	Author	Validatio
V0.1	2023-11-23	Initial release	Wu Chao	Wu Chao
V0.2	2023-12-18	Increase the baud rate of CAN communication; No termination resistors are marked	Li Rui	Li Rui
V0.3	2024-10-11	1. Increase the working voltage of AG35 series 2. Added addendum, AG35 series frequency bands and GNSS functionality	Li Rui	Li Rui
V0.4	2025-02-18	1.The operating temperature range is modified to: -40°C ~ 85°C 2.Installation location temperature is changed to: avoid installing the TBOX in or near locations where the temperature of the enclosure itself is likely to exceed 85°C 3.Temperature adaptation is changed to such that the TBOX should be installed in such a way that its enclosure does not exceed the maximum temperature limit (85°C) at all times	Li Rui	Li Rui

1. Directory

1. INTRODUCTION.....	4
1.1 OVERVIEW.....	4
1.2 CATEGORY.....	4
1.3 HARDWARE OVERVIEW.....	4
1.4 TERMS/ABBREVIATIONS	5
2. INTELLIGENT CENTRAL CONTROL TBOX STRUCTURE.....	6
2.1 STRUCTURAL CHARACTERISTICS.....	6
3. HARDWARE METRICS	6
3.1 HARDWARE INDICATORS & RELATED TESTS	6
4. FUNCTION OVERVIEW	9
4.1 DATA UPLOAD	9
4.2 INSTRUCTION DELIVERY.....	10
4.3 DRIVING INCIDENT.....	10
4.4 VEHICLE ANTI-THEFT.....	10
4.5 VEHICLE DIAGNOSIS.....	10
4.6 OTA UPGRADE.....	10
5. PIN DEFINITION & INTERFACE INFORMATION.....	10
5.1 PIN DEFINITION	10
5.2 INTERFACE INFORMATION.....	11
6. INSTALLATION POSITION.....	11
6.1 ELECTRICAL CONNECTION REQUIREMENTS.....	11
6.2 TEMPERATURE ADAPTABILITY.....	12
6.3 VIBRATION AND SHOCK.....	12
6.4 WATERPROOF REQUIREMENT.....	12
6.5 DISTANCE FROM OTHER SOURCES OF ELECTRONIC NOISE	12
7. TRANSPORTATION, STORAGE AND ACCEPTANCE	12
7.1 PACKING AND SHIPPING	12
7.2 PRODUCT LABEL.....	ERROR! BOOKMARK NOT DEFINED.
7.3 STORAGE CONDITIONS AND PRECAUTIONS.....	13
7.4 ACCEPTANCE AND INSPECTION.....	13
7.5 MATTERS NEEDING ATTENTION	13
8. AFTER-SALES SERVICE AND GUARANTEE.....	13
9. APPENDIX	13

1. Introduction

1.1 Overview

The intelligent central control TBOX, whose full name is Telematics BOX, is actually the gateway of the vehicle. On the one hand, TBOX communicates with the ECU on the bus through CAN or KLINE. On the other hand, TBOX uploads the basic data and fault data of the in-vehicle network to the cloud platform in accordance with the protocol through 2G/3G/4G communication. In addition, the TBOX is integrated with Bluetooth, which can be connected to the mobile phone's Bluetooth to achieve short-range control of the vehicle.

OTA is the most prominent feature of the TBOX. As vehicles evolve towards electrification and intelligence, it also drives the rapid development of OTA technology. Through OTA technology, the software of the TBOX itself and the ECU can be upgraded, enabling continuous iterative upgrades of the vehicle and providing users with a unique driving experience.

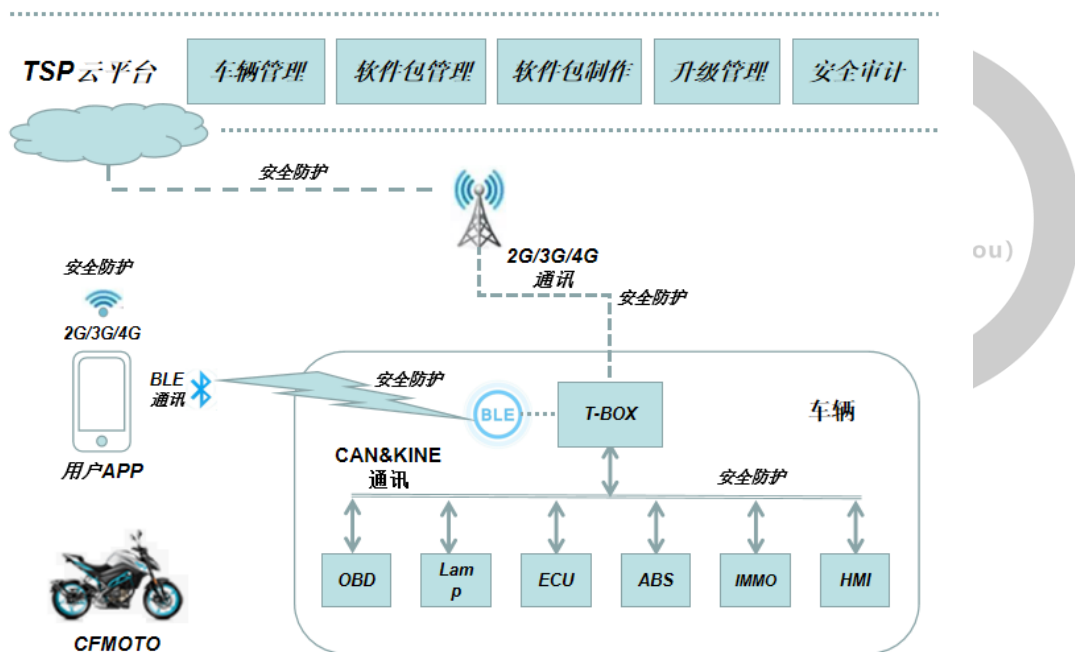


Figure1-1 TBOX system block diagram

1.2 Category

This document is about the technical description of the general intelligent central control TBOX.

1.3 Hardware overview

- Chip selection
The main chips are car gauge chips
- Electrical characteristic

Operating voltage: 8-18VDC

Sleep current: [0.65mA@13.5V](#)

Normal current: 150-300mA

- Operating temperature

Temperature range: -40℃ ~ 85℃

- Methods of Communication

2G/3G/4G communication (AG35 series module VBAT supply voltage: 3.3-

4.3V Typical value: 3.8V)

BLE Bluetooth 5.1 communication

1 channel CAN communication (CAN2.0 baud rate 500kbps without termination resistance)

1 channel KLINE (Reserved)

- Positioning system

Support GPS/BeiDou/GLONASS and other mainstream positioning systems

- Sensor

Six-axis attitude sensing is integrated inside

- Spare battery (reserved)

3.6V/500mAh

Confidential and proprietary

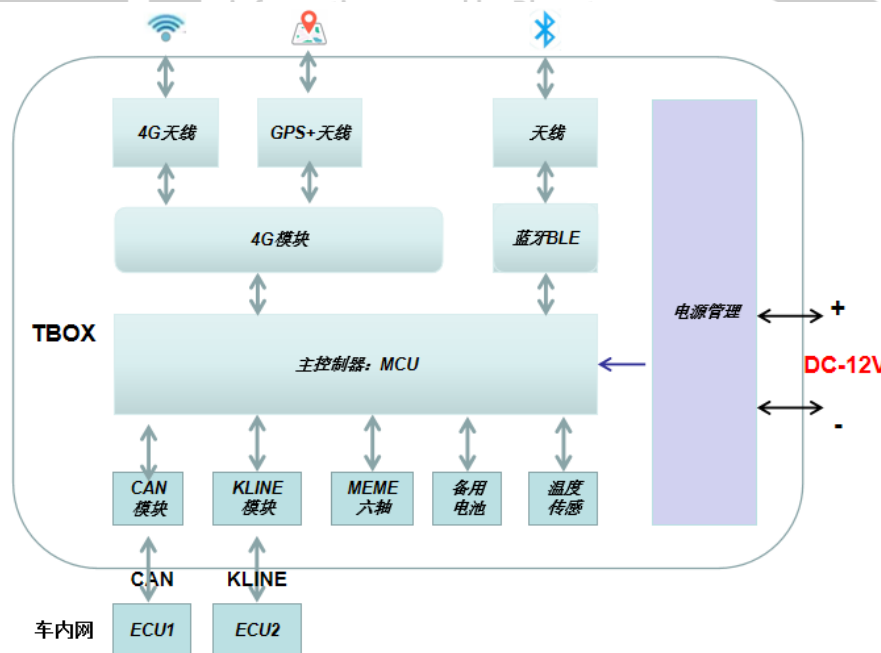


Figure 1-2 TBOX schematic diagram

1.4 Terms/abbreviations

abbreviations	Descriptions	
TBOX	Telematics BOX	智能中控
ISO	International Organization for Standardization	国际标准化组织

GB	--	国标
GPS	Global Positioning System	全球定位系统
BeiDou	--	北斗
GLONASS	GLOBAL NAVIGATION SATELLITE SYSTEM	格洛纳斯
OTA	Over-the-Air Technology	空中下载技术
FOTA	Firmware Over-The-Air	固件升级
BLE	Bluetooth Low Energy	蓝牙低功耗

2. Intelligent central control TBOX structure

2.1 Structural characteristics

Exterior dimensions: 90mm*70mm*36.6mm (PCB 80mm*60mm) , Wiring harness not included

Weight: Approximately 180 g $\pm$ 18 g

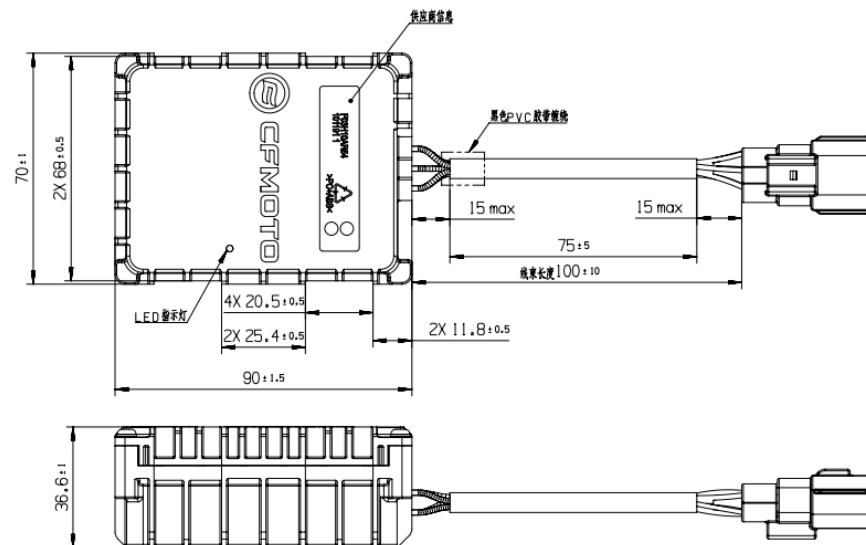


Figure 2-1 Intelligent central control TBOX structure diagram

3. Hardware metrics

3.1 Hardware Indicators & Related Tests

The TBOX base hardware has been rigorously tested to meet some of the industry's accepted specifications. The basic hardware technical parameters and related specifications are as follows.

- Electrical testing

Voltage test: over and under voltage test, power supply voltage slow rise slow fall, reverse voltage and other tests.

Specification: GB/T 28046.2-2011

- Electromagnetic interference test

Power transient conduction immunity: GB/T 21437.2-2008

Coupled electrical transient emission immunity: GB/T 21437.3-2012

Radiated emissions and conducted emissions performance: GB/T 18655-

2010

EMC performance: ECE R10-05

- Insulation

Insulation resistance: GB/T 28046.2-2011

- Dustproof and waterproof rating

Sealing level: IP66

Specification: IP66 requirements in GB/T4208-2017

- Mechanical testing

Vibration, shock and drop tests: GB/T 28046.3-2011

- Climatic and environmental tests

Temperature test: GB/T 28046.4-2011

- Shell flame retardant

Shell flame retardant

Table 1 List of test items

Items	Conformity index
Operating voltage(Nominal: 13.5V)	+8 to +18V meets requirements B of Table 1 4.2.2 in GB/T28046.2-2011
Sleep state current	Less than 0.65mA@13.5V
Waterproof class	Meet the IP66 requirements in GB/T4208-2017, function grade A after test
Overvoltage performance	Meet the requirements of 4.3 in GB/T 28046.2-2011, function level A/B after test
Power supply voltage slow drop and slow rise performance	Meet the requirements of 4.5 in GB/T 28046.2-2011, function grade A after test
Reverse voltage performance	Meet the requirements of 4.7 in GB/T 28046.2-2011, function grade B after test
Insulation	Meet the requirements of 4.12.2 in GB/T 28046.2-2011, function grade A after test
Resistance to mechanical vibration	Meet the requirements of 4.1.2.1.2.1 in GB/T 28046.3-2011, function grade A after test
Resistance to mechanical impact	Meet the requirements of 4.2.2 in GB/T 28046.3-2011, function grade A after test
Low temperature performance	Meet the requirements of 5.1.1 in GB/T 28046.4-2011, function grade A after test
High temperature performance	Meet the requirements of 5.1.2 in GB/T 28046.4-2011, function grade A after test
Temperature gradient performance	Meet the requirements of 5.2 in GB/T 28046.4-2011, function grade A after test

Hygrothermal cycle performance	Meet the requirements of 5.6 in GB/T 28046.4-2011, function grade A after test
Temperature shock	Meet the requirements of 5.3.2 in GB/T 28046.4-2011, function grade A after test
EMC performance	Meet ECE R10-05 10m field requirements, function grade A after test
Power supply transient conduction immunity	Meet the requirements of Table A.1 in GB/T 21437.2-2008, function level A after test
Coupled electrical transient emission immunity	Meet the requirements of Table B.1 in GB/T 21437.3-2012, function level A after test
Radiative emission and conducted emission properties	Meet Level 3 requirements of Table 6 in GB/T 18655-2010
Service life	Not less than 3 years, using temperature alternating endurance life test method
Failure rate	Not higher than 0.5%
Shell flame retardant	HB grade materials shall meet one of the following criteria: After removing the ignition source, there is no visible flame burning of the material; After the ignition source is removed, the sample appears continuous flame-burning, but the flame front end does not exceed the 100mm mark; If the front end of the flame exceeds the 100mm mark, but the thickness is 3.0mm~13.0mm, the linear burning rate does not exceed 40mm/min, or the thickness is less than 3.0mm does not exceed 75mm/min; If the linear burning rate of the test specimen with a thickness of $3.0\text{mm} \pm 0.2\text{mm}$ does not exceed 40mm/min, then the reduction to the minimum thickness of 1.5mm should automatically be accepted as that grade. HB40 material shall meet one of the following criteria: After removing the ignition source, there is no visible flame burning; After the ignition source is removed, the sample continues to flame, but the flame front end does not reach the 100mm mark; If the front end of the flame exceeds the 100mm mark, the linear burning rate does not exceed 40mm/min. HB75: If the front end of the flame exceeds the 100mm mark, the linear burning rate should not exceed 75mm/min

ESD electrostatic discharge	Reference EN/IEC 61000-4-2 and other standards to simulate electrostatic discharge pulse interference, output voltage 8KV for 1Hz contact discharge, holding time 5S, output voltage 15KV for 1Hz air discharge, holding time 5S;
Insulation withstand voltage	Test voltage 500V, holding time 1min, leakage current less than 1mA;
Low temperature operating durability	Test conditions: -40℃, power on for 10min, power off for 50min, a total of 8h.
Repeated action durability	Test conditions: Power on 10s, power off 5s for 1 cycle, a total of 10,000 times.
Chemical resistance	Test conditions: 1、 use alcohol, milk tea, coffee on the surface of the instrument, with cotton yarn gently wipe; 2、 Observe the appearance after 48 hours. Each component has no harmful defects such as deformation, discoloration, crack or spalling.
Salt spray test	Test conditions: 1. 5% saline spray 8h, stand for 16h, three cycles total 72h. Metal parts are free from rust, corrosion and discoloration.
Environmental hazardous substances test	ROHS 2.0 prohibited substances and content requirements meet the relevant labels and provisions of ROHS 2.0 environmental regulations.
Weather resistance	Xenon lamp irradiation 300h. Prohibit harmful damage, such as resin coating discoloration, rust, cracking, peeling, etc.
Tensile strength characteristics of connectors	Connector tensile strength characteristics 1. >30N. Connectors, welds and circuit boards without damage, fracture;

4. Function overview

4.1 Data upload

TBOX's own data upload: location information, speed information, mileage and other information upload.

Vehicle internal network information upload: body controller basic information upload, power parameter information upload, etc.

4.2 Instruction delivery

The command is mainly issued to realize the control of the vehicle, such as unlocking the car, setting the instrument, etc., which can be divided into:

Remote control: The cloud platform sends instructions to control TBOX to achieve vehicle control.

Short-range control: Bluetooth connection TBOX for vehicle control.

4.3 Driving incident

Acceleration and deceleration event: Determine that the vehicle is in the acceleration and deceleration state.

Bending event: Judging that the vehicle is bending.

Tipping event: Determine that the vehicle is in a tipping state.

Collision event: Determine whether the vehicle has a collision accident.

4.4 Vehicle anti-theft

TBOX and the ECU in the car linkage, combined with TBOX return location information to achieve vehicle anti-theft function and stolen vehicle recovery.

4.5 Vehicle diagnosis

TBOX fault self-test, vehicle ECU diagnosis, support UDS protocol, read vehicle fault information.

4.6 OTA upgrade

OTA self-upgrade: The TBOX program can be downloaded and self-upgraded over the air.

Vehicle FOTA: OTA upgrades other controllers on the vehicle network.

5. Pin definition & interface information

5.1 Pin definition

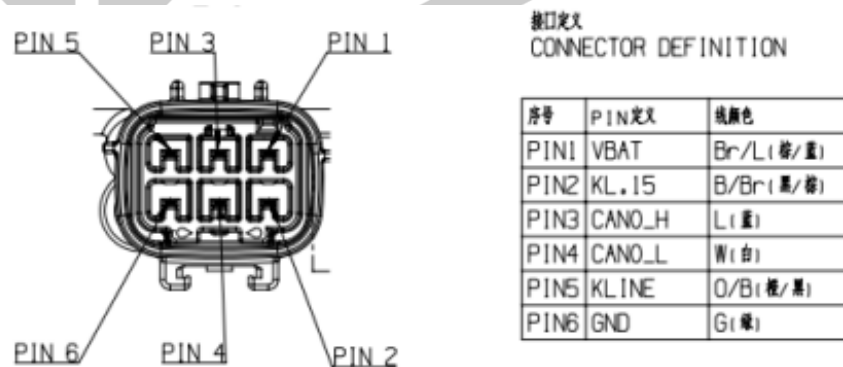


图 5-1 TBOX 基础硬件的引脚定义

5.2 Interface information

TBOX interface information is as follows:

Table 2 Interface information

Interface	Type	source
Output	LED (Red)	1
Communication	CAN	1
	KLINE (Reserve)	1
ANT	4G antenna	1
	GPS antenna	1
Others	BLE	GAW integration
	Spare battery (reserved)	3.6V/500mAh
	Six-axis sensor	1

6. Installation position

To ensure the high reliability of TBOX, the hardware assembly layout of TBOX must comply with the following principles:

- Do not place metal products directly above or around the TBOX installation position.
- The assembly position should prevent the heat released by the surrounding parts from being transmitted to the TBOX;
- The assembly position shall be such that the electromagnetic and RF interference induced by other electronic components in the TBOX shall be minimal;
- TBOX assembly should be firm and reliable, no loosening phenomenon;
- Avoid exposing TBOX to dust, moisture and water;
- The wiring harness connected to the TBOX must be arranged so that all wires do not overheat or wear;
- TBOX installation location is not less than 20cm away from known electromagnetic fields and RF interference sources;
- Avoid installing the TBOX in or near a location where the temperature of the housing itself is likely to exceed 85°C;
- Avoid TBOX installation position and assembly method to expose itself to additional mechanical vibration or external impact;
- Avoid assembling TBOX in or near a location where batteries or other acid and alkaline solutions are easy to seep out, or where corrosion is easy to occur;

6.1 Electrical connection requirements

- TBOX terminals must be well connected as defined;

- Check that the TBOX connector is securely inserted and locked by checking the status of the connector locking device.

6.2 Temperature adaptability

The TBOX shall be installed so that its housing does not exceed the maximum temperature limit (85°C) at any time. The installation location design must take into account all factors, including the vehicle installation environment of the TBOX (ambient temperature, air flow, surrounding thermal radiation sources, etc.) and the heat generated by the internal circuit of the TBOX.

6.3 Vibration and shock

The mechanical parts used to mount the TBOX, such as assembly brackets or assembly mounting holes, must be able to withstand the maximum vibration and impact strength that can be generated by the installation location.

6.4 Waterproof requirement

To avoid liquid accumulation in the TBOX connector accessories, the TBOX should be installed so that water does not enter the connector along the harness, causing a short circuit between the connector terminals.

It is important to eliminate all factors that may cause the liquid to leak or soak into the TBOX to prevent the liquid from flowing into the TBOX.

6.5 Distance from other sources of electronic noise

Be sure to carefully install the TBOX (including the harness) away from known electrical noise sources such as electric motors, ignition coils, and high voltage ignition wires.

7. Transportation, storage and acceptance

7.1 Packing and shipping

- The Tboxes in each packing box should be isolated from each other and avoid contact with each other (the packing box must be firm and reliable);
- The packing box shall contain the certificate of TBOX and packing list;
- Handle with care during transportation;
- Avoid excessive packing in the transportation process, the product is damaged by external extrusion;
- Any form of drop of the box is prohibited during TBOX transportation;
- Care should be taken to avoid damage or contamination when transporting Tboxes inside the factory.

7.3 Storage conditions and precautions

- TBOX should be stored in a ventilated, dry and dust-free environment;
- TBOX should not be exposed to liquid and dirty conditions for long-term storage.

7.4 Acceptance and inspection

- The recipient shall carefully check each packing case, check the label and part number;
- If the packing box is seriously deformed or damaged, please notify Suzhou Blue Stone New Power Co., Ltd. immediately. If conditions permit, please take photos of the damaged packing box and return it.

7.5 Matters needing attention

- When opening the box for inspection, handle it gently to avoid squeezing, which may cause damage to the TBOX;
- When opening the box, be careful and do not use violence to avoid scratching the TBOX;
- Check the label of TBOX for compliance;
- Check the TBOX shell for physical damage;
- Check the plastic connector of TBOX for physical damage;
- Check TBOX plastic connector terminals for deformation or damage.

8. After-sales service and guarantee

After the product is sold, customers can directly contact Suzhou Blue Stone New Power Co., LTD., if they encounter any problems related to this product. For the software and hardware systems that may have problems, according to the relevant provisions of the product quality assurance agreement formally signed by the two parties or the contract between the two parties, the customer's product return and exchange processing or free upgrade.

9. Appendix

A35 series frequency band and GNSS capabilities

Network standard	AG35-CER	AG35-E	AG35-NA	AG35-LA	AG35-J
LTE-FDD	B1/B3/B5/B8	B1/B3/B5/B7/B8/B20/B28	B2/B4/B5/B7/B12 (B17) /B13	B1/B2/B3/B4/B5/B7/B8/B28	B1/B3/B5/B8/B9/B19/B21/B28
LTE-TDD	B34/B38/B39/B40/B41	B38/B40	/	/	B41
WCDMA	B1/B8	B1/B5/B8	B2/B4/B5	B1/B2/B3/B4/B5/B8	B1/B3/B5/B6/B8/B19
TD-	B34/B39	/	/	/	/

SCDM A					
EVDO /CDM A	BC0 (selectable)	/	/	/	/
GSM/ EDGE	900/1800 MHz	900/1800 MHz	850/1900 MHz	850/900/1800 /1900 MHz	/

10. Warning

FCC 15.19 Labelling requirements (All other devices) This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC 15.21 Information to user Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC 15.105 Information to the user (Class B) Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: —Reorient or relocate the receiving antenna. —Increase the separation between the equipment and receiver. —Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. —Consult the dealer or an experienced radio/TV technician for help.

RF exposure statement This equipment complies with radio frequency exposure limits set forth by the FCC for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the device and the user or bystanders. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

IC RSS-Gen 8.4 User Manual Notice for Licence-Exempt Radio Apparatus This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: (1) This device may not cause interference; and (2) This device must accept any interference, including interference that may cause undesired operation of the device. L' émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d' Innovation, Sciences et

Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) L'appareil ne doit pas produire de brouillage; (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RSS-102 2.6 User Manual Requirements This equipment complies with radio frequency exposure limits set forth by the Innovation, Science and Economic Development Canada for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the device and the user or bystanders. This device must not be co-located or operating in conjunction with any other antenna or transmitter. Cet équipement est conforme aux limites d'exposition aux radiofréquences définies par la Innovation, Sciences et Développement économique Canada pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre le dispositif et l'utilisateur ou des tiers. Ce dispositif ne doit pas être utilisé à proximité d'une autre antenne ou d'un autre émetteur.

Confidential and proprietary
information owned by Blue stone new
power (suzhou) Co. Ltd.
Do not disclose, in whole or part, without the
prior written consent of Blue stone new power
(suzhou) Co. Ltd.

All rights reserved by Blue stone new power (suzhou)
Co. Ltd. also in case of property rights.
Any disposal such as copying and passing on
to third parties is forbidden.