

Z603L/LE

User Manual

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Revision History

Revision	Date	Reason for change	Revision	Modifier
V1.0	2021-6-24	Initial release	V1.1	144



Electronic components and circuits are very sensitive to electrostatic discharge. Although our company designs anti-static protection for the main interfaces on the card when designing circuit board products, it is difficult to achieve anti-static safety protection for all components and circuits. Therefore, it is recommended to observe anti-static safety precautions when handling any circuit board component (including Z603L/LE). Anti-static safety protection measures include, but are not limited to the following:

- a) The smart box should be placed in an anti-static bag during transportation and storage, and then the board should not be taken out during installation and deployment.
- b) Before touching the smart box, discharge the static electricity stored in the body: wear a discharge grounding wrist strap.
- c) Operate the smart box only within the safe area of the electrostatic discharge point.
- d) Avoid moving smart boxes in carpeted areas.

Precautions and after-sales maintenance

matters needing attention

Before using the product, please read this manual carefully and keep it for future reference;

- Please pay attention to and follow all warning and guidance information marked on the product;
- Please use matching power adapter to ensure the stability of voltage and current;
- Please use this product in a cool, dry and clean place;
- Do not use this product in cold and hot alternate environment to avoid condensation damage components;
- Do not splash any liquid on the product. Do not use organic solvent or corrosive liquid to clean the product;
- Do not use the product in dusty and messy environment. If it is not used for a long time, please pack the product;
- Do not use in the environment with excessive vibration, any dropping or knocking may damage the circuit and components;
- Do not plug and unplug the core board and peripheral modules when power is on;
- Please do not repair or disassemble the product by yourself. In case of any fault, please contact our company in time for maintenance;



- Do not modify or use unauthorized accessories by yourself, and the damage caused will not be warranted;

After sales maintenance

1) Warranty period

- Base plate, core plate : 3 year (non-human damage)
- Other peripherals sold by the company: 1 year (non-human damage)

2) Warranty description

- Within 7 days: the product (base plate, core module) is not damaged by human, our company will replace / repair it free of charge, and bear the return freight; (because the core module needs NVIDIA to confirm that it can meet the requirements of repair, it will take a long time, we will coordinate as soon as possible, please forgive for the inconvenience)

- From 7 days to 36 months: the product (base plate, core module) is not damaged by human, our company will repair it free of charge, and bear the return freight; (because the core module needs NVIDIA to confirm that it can meet the requirements of repair, it will take a long time, we will coordinate as soon as possible, please forgive for the inconvenience)

- Artificial damage in more than 3 year or 3 year: the product (carrier plate) shall be tested after it is sent to the customer, and the customer shall be informed of whether it can be repaired and the maintenance cost in detail. After reaching an agreement, the product shall be repaired and returned to the customer, and the company shall bear the return freight;

- The starting time shall be subject to the date of express delivery receipt;

3) Contact information

Official website: www.realtimesai.com

Taobao website: <https://shop340963258.taobao.com/>

Address: 11, block B, Heping Xiyuan, Heping West Street, Chaoyang District, Beijing

Attention: RMA

Tel: 010-84284669

Mailing notice: contact with the company's sales department in advance, arrange technical support personnel to check and eliminate errors caused by misoperation as soon as possible, fill in the product after-sale return to factory maintenance form after verification, and send it to rma@realtimes.cn Mail box, please attach the list of items to facilitate verification, so as to avoid loss and loss in the process of express delivery. The company does not receive any delivery

Technical support and development customization

1. Scope of technical support

- 1) The company releases the electrical characteristics and use of industrial carrier boards and modules;
- 2) Physical dimension of hardware, relevant structure diagram and line sequence definition of specific interface;
- 3) Burn in verification of all BSP support packages provided by the company;
- 4) The company released burn environment construction, entry-level use. ;
- 5) Various peripheral module drivers released by the company;
- 6) The company's product fault diagnosis and after-sales maintenance services;

2. Scope of technical discussion

Due to the wide range of embedded system knowledge and various types of involvement, we can not guarantee that all kinds of questions can be answered one by one. The following content is not

available for technical support, only suggestions can be provided.

- 1) Knowledge beyond the course published by our company;
- 2) Specific software program design;
- 3) Technical support for industrial carrier not issued by the company;
- 4) All kinds of driving support for industrial carrier board not issued by the company;
- 5) Hardware principle and drive design of peripheral module not issued by our company;

3. Technical support mode

- 1) Official website or email questions (recommended): <http://www.realtimesai.com/cn/download.html>
techsupport@realtimes.cn
- 2) Official Taobao through Alibaba Wangwang consultation: <https://shop340963258.taobao.com/>
- 3) Wechat group consultation (wechat Group No. consults Taobao customer service or sales, and Taobao purchase order No. needs to be provided for verification);
- 4) Technical support email: techsupport@realtimes.cn
- 5) Tel:010-84284669

4. Technical support time

Monday to Friday; 8:30-12:00 am; 1:00-17:30 PM;

The company arranges the rest according to the national legal holidays, during which it may not be able to provide technical support, please send the problem to the technical support email. We will reply to you as soon as possible on weekdays.

5. Complaints and suggestions

If you are not satisfied with us or have suggestions, you can send an email to [yu.qin @ realtimes.cn](mailto:yu.qin@realtimes.cn)
For feedback, please call 010-84284669 for further improvement.

6. Customized development services

The company provides the embedded operating system driver based on NVIDIA Jetson series and the paid customized development service of hardware carrier board to shorten your product development cycle.

Please email the request to info@realtimes.cn

Data acquisition and subsequent update

1. Access to information

Download on our website

The company's website contains supporting information of its products, including product user manual, NVIDIA Jetson series module data manual, BSP driver support package for carrier board, supporting peripheral driver files, interface test verification method, FAQ, system burning guide, etc. get into www.realtimesai.com , select "data download" in the navigation bar, find the data you need, and click download.

2. . Subsequent updates

Updates of subsequent documents, BSP, driver files and other official account will be updated in time. We will pay close attention to our developments in order to ensure that your information is up to date. We will push through WeChat public.



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1 Product introduction

Z603L/LE is a new Feiyun Smart Box™ based on the NVIDIA Jetson™ Xavier NX series module design. It has a built-in Xavier_NX module integrated with a 384-core Volta™ architecture GPU, pre-installed with the Ubuntu 18.04 operating system, and has 21TFLOPS of AI processing capabilities for floating-point operations. It adopts super strong and lightweight aluminum alloy material design, conductive heat dissipation, excellent heat dissipation capacity, small and light overall size, excellent engineering structure, reserved side wing structure for easy on-site installation, and has the ability to operate 7x24 hours on-site super long MTBF. It can be applied to autonomous machines such as robots, unmanned delivery vehicles, smart gates, and smart vending cabinets. It is an ideal carrier for deploying AI computing power at the edge for deep learning.

1.1 Features

- Arithmetic unit: Jetson Nano/Xavier NX/TX2 NX (Default core Xavier NX)
- 1 x USB3.0 Type-A interface, Support USB3.0 signal, provide 1A output current
- 1 x Micro USB2.0 OTG interface, Support USB host and USB device mode, provide 1A output current
- 1 x GbE (10/100/1000Mbps adaptive; native to Xavier NX interface)
- 4 x GbE
- 1 x HDMI 2.0 interface
- 1 x Mini HDMI 2.0 interface
- 1 x EMMC(128GB)(Z603LE)
- 1 x TF Card slot(Z603L)
- 1 x Isolated communication port (485, CAN, 4 x I/O)
- Size: 170mm×93.54mm×37.5mm
- Power input: +12V
- Temperature: -20℃—+60℃
- Weight: 626g

1.2 Ordering Information

Model Options	Functional Description
Z603L	Support Jetson Nano/Xavier NX/TX2 NX module, Pre-installed Ubuntu 18.04, built-in 16GB eMMC; 5 x GbE, 4 x GPIO (2 X isolated input, 2 X isolated output), 1 x RS-485 (isolated), 1 x CAN (isolated), 1 x USB3.0, 1 x USB OTG, 1 x HDMI, 1 x Mini HDMI, 1 x microSD, 1 x M.2 KEY M, 1 x M.2 KEY E, SSD optional, WIFI and Bluetooth optional; 2 WIFI/ Bluetooth antenna interface, power indicator, -20——+60°C; including power adapter, providing RTS-Linux4Tegra software support package for the new era of Ruitai
Z603LE	Support Jetson Nano/Xavier NX/TX2 NX module, Pre-installed Ubuntu 18.04, built-in 16GB eMMC; 5 x GbE, 4 x GPIO (2 X isolated input, 2 X isolated output), 1 x RS-485 (isolated), 1 x CAN (isolated), 1 x USB3.0, 1 x USB OTG, 1 x HDMI, 1 x Mini HDMI, 1 x microSD, 1 x eMMC(128GB), 1 x M.2 KEY M, 1 x M.2 KEY E, SSD optional, WIFI and Bluetooth available Optional; 2 WIFI/Bluetooth antenna ports, power indicator light, -20——+60°C; including power adapter, providing RTS-Linux4Tegra software support package for the new era of Ruitai

Order online:

<https://shop340963258.taobao.com>

<https://mall.jd.com/index-824786.html>

2 External interface function and location



Z603L/LE FRONT



Z603L/LE BACK

3 Installation and use

3.1 System installation renderings



3.2 How to use Smart Box

- a) Make sure that the voltage of all external systems is turned off
- b) Install the Jetson Nano/Xavier NX/TX2 NX core module to the 260-pin SO-DIMM connector. Please pay attention to the alignment between the connectors during the installation process, and install the fixing screws at the same time.
- c) Install necessary external cables. (Such as: the display cable connected to the HDMI monitor, the power input cable to power the system, the USB cable connected to the keyboard and mouse...)
- d) Connect the power cord to the power source.
- e) Z603L/LE adopts automatic/manual power-on design, turn on the power and the system starts to work.
- f) For a system without a protective enclosure, after the system is powered on, please avoid moving the entire system, and it is strictly forbidden to touch the circuit board and its electronic components with your body.

3.3 Recovery mode

Jetson Nano/Xavier NX/TX2 NX core module can work in normal mode and Recovery mode. File system update, kernel update, boot loader update, BCT update and other operations can be performed in Recovery mode.

The steps to enter the Recovery mode are as follows:


- a) Turn off the power supply to the system.
- b) Use a USB cable to connect the OTG-USB port of the Z603L/LE and the USB port of the Jetson development host.
- c) Press the RECOVERY button without releasing it to supply power to the system, keep the power supply for more than 3 seconds, then release the RECOVERY button.




- d) The system enters Recovery mode, and subsequent operations can be performed at this time. .

4 Connectors Description


4.1 Micro SD Card solt

Function	Micro SD (TF) Card solt				
Marking	Micro SD				
Type	Micro SD (TF)				
Pin define	Pin	Signal	Pin	Signal	
	1	SD_D2	2	SD_D3/CD	
	3	SD_CMD	4	SD_VDD	
	5	SD_CLK	6	GND	
	7	SD_D0	8	SD_D1	
	9	CD			

4.2 HDMI2.0 interface


Function	HDMI2.0 interface				
Marking	HDMI				
Type	HDMI2.0				
Pin define	Pin	Signal	Pin	Signal	
	1	TMDS Data2+	2	TMDS Data2 shield	
	3	TMDS Data2-	4	TMDS Data1+	
	5	TMDS Data1 shield	6	TMDS Data1-	
	7	TMDS Data0+	8	TMDS Data0 shield	
	9	TMDS Data0-	10	TMDS Clock+	
	11	TMDS Clock shield	12	TMDS Clock-	
	13	CEC	14	Reserved	
	15	SCL	16	SDA	
	17	DDC/CEC_GND	18	+5V Power	
	19	Hot Plug Detect			

4.3 Mini HDMI interface


Function	HDMI interface				
Marking	HDMI				
Type	Mini HDMI				
Pin define	Pin	Signal	Pin	Signal	
	1	TMDS Data2 shield	2	TMDS Data2+	
	3	TMDS Data2-	4	TMDS Data1 shield	
	5	TMDS Data1+	6	TMDS Data1-	
	7	TMDS Data0 shield	8	TMDS Data0+	

	9	TMDS Data0-	10	TMDS Clock shield
	11	TMDS Clock+	12	TMDS Clock-
	13	DDC/CEC Ground	14	CEC
	15	SCL	16	SDA
	17	Reserved	18	+5V Power
	19	Hot Plug Detect		

4.4 Power input interface 1


Function	Power input terminal				 <p>DC12V (8~12V)</p>												
Marking	DC12V(8~12V)																
Type	Needle Connector-Through Hole-4-Position-0.165" (4.20mm) 39281043																
Pin define	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>2</td> <td>GND</td> </tr> <tr> <td>3</td> <td>POWER_IN</td> <td>4</td> <td>POWER_IN</td> </tr> </tbody> </table>					Pin	Signal	Pin	Signal	1	GND	2	GND	3	POWER_IN	4	POWER_IN
Pin	Signal	Pin	Signal														
1	GND	2	GND														
3	POWER_IN	4	POWER_IN														
	Pin1: the place marked by the green box on the right Pin2: the place marked by the red box on the right																

4.5 Network port

Function	Gigabit Ethernet connector				 <p>GbE5</p>																				
Marking	GbE5																								
Type	RJ45																								
Pin define	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>TP0+</td> <td>2</td> <td>TP0-</td> </tr> <tr> <td>3</td> <td>TP1+</td> <td>4</td> <td>TP2+</td> </tr> <tr> <td>5</td> <td>TP2-</td> <td>6</td> <td>TP1-</td> </tr> <tr> <td>7</td> <td>TP3+</td> <td>8</td> <td>TP3-</td> </tr> </tbody> </table>					Pin	Signal	Pin	Signal	1	TP0+	2	TP0-	3	TP1+	4	TP2+	5	TP2-	6	TP1-	7	TP3+	8	TP3-
Pin	Signal	Pin	Signal																						
1	TP0+	2	TP0-																						
3	TP1+	4	TP2+																						
5	TP2-	6	TP1-																						
7	TP3+	8	TP3-																						


4.6 4 Integrated Network Port(POE)

Function	4 Gigabit Ethernet connectors (POE)			
Marking	GbE1、GbE2、GbE3、GbE4			
Type	HR931474CE			
Pin define	Pin	Signal	Pin	Signal
	1	TP0+	2	TP0-
	3	TP1+	4	TP2+
	5	TP2-	6	TP1-
	7	TP3+	8	TP3-
	<p>Note: When you need to use POE power supply, you need to connect the PSE power supply.</p>			




4.7 USB3.0 Interface

Function	USB3.0 Connector			
Marking	USB			
Type	USB Type-A interface			
Pin define	Pin	Signal	Pin	Signal
	1	VBUS	2	D-
	3	D+	4	GND
	5	SSRX-	6	SSRX+
	7	GND	8	SSTX-
	9	SSTX+		



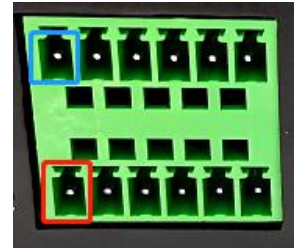
4.8 USB2.0 OTG

Function	Micro USB Connector			
Marking	OTG			
Type	USB 2.0 MicroType-B interface			
Pin define	Pin	Signal	Pin	Signal
	1	VBUS	2	DN
	3	DP	4	ID
	5	GND		



4.9 Isolated communication port

Function	Isolated communication port (485, CAN, 4 optocoupler isolated I/O ports)			
Type	Board end double-row curved needle 3.81mm			
Pin define	Pin	Signal	Pin	Signal
	1	RS485_A	2	IN1+
	3	RS485_B	4	IN1-
	5	CANH	6	IN2+
	7	CANL	8	IN2-
	9	OUT1+	10	OUT2+
	11	OUT1-	12	OUT2-
<p>Pin1: The place marked by the blue box on the right.</p> <p>Pin2: The place marked by the red box on the right.</p>				



5 Hardware update history

Z603L/LE Board card hardware update history

Revision	Reason for change
V1.0	Initial release
V1.1	Change board

6 Product size diagram





7 Drive

When Z603L/LE is working on a system burned with the official original version of NVIDIA Linux For Tegra (L4T). HDMI, Gigabit Ethernet, USB2.0, serial port, GPIO, I2C bus, fan interface, and upper USB3.0 are all supported. But with SD card, the USB3.0 below does not work properly.

All Z603L/LE onboard interfaces are supported, and the supporting driver patch needs to be loaded.

The NVIDIA Original LT4 package can be downloaded from the following link:

<https://developer.nvidia.com/embedded/linux-tegra>

Z603L/LE Driver Patch Support Package Download address:

[http:// www.realtimesai.com](http://www.realtimesai.com)

8 Copyright notice

Realtimes Beijing Technology Co.,LTD

Realtimes Beijing Technology Co.,LTD all rights reserved.And reserves all rights to this manual and declaration.

Without the written permission of the Company, no entity or individual shall copy, extract, backup, modify, disseminate, translate, or use in whole or in part any part of this Manual in any manner or form for commercial purposes.

Terms of Warranty

Important note

Each embedded product provided by Realtimes Technology is free from any defects in material and process,fully in line with the specifications officially issued by the original factory.

Realtimes Technology warranty covers the original products,If the parts configured by the dealer are out of order, please consult with the dealer to solve the problem. All the baseplate and core modules provided by Ruitai New Era (Beijing) Technology Co., Ltd. are guaranteed for 3 years, while the other peripherals are guaranteed for 1 year (life-long maintenance service is provided if the warranty period is beyond the warranty period).The warranty period starts from the date of delivery, for the products repaired within the warranty period, the repair parts shall be extended for 12 months.Unless notified by Realtimes Technology, the date of your original invoice shall be the date of shipment.

How do I get warranty services

If the product does not work properly, Please contact Realtimes Technology or dealer for warranty service, please show invoice when product warranty(this is the proof for you getting warranty service).

Warranty solution

When you ask for warranty service, please follow Realtimes Technology warranty process,You will need to receive your first diagnosis from a technical engineer by phone or by email,at that time,we need you to cooperate with us to fill in all the questions on the RMA form provided by us. Once we accurately determine the cause of the fault and the location of the damage ,we will provide the charge list for the out of warranty products,which needs your confirmation.Realtimes Technology keep the right to repair or replace the products. If the product is replaced or repaired, the replaced faulty product or the repaired and replaced faulty parts will be returned to Realtimes Technology.

For products under warranty,the customer shall bear the freight when the product is returned to the manufacturer,Realtimes Technology will bear the ship cost of the products after maintenance.

The following conditions are not covered by the warranty terms

- a) Improper installation, improper use, misuse and abuse of products(Overloading, for example).
- b) Improper maintenance and storage (Such as fire, explosion, etc) or natural disasters (such as lightning



stroke,earthquake,typhoon,etc)

- c) Personal unauthorized changing the product(such as changing circuit characteristics, mechanical characteristics, software characteristics,Conformal coating).
- d) Other failures which are clearly due to misuse(such as overvoltage,polarity reversal, the pin bent or broken,the wrong connection,drop damage,transportation damage,damage due to over operating temperature and so on).
- e) The logo and part number on the product have been deleted or removed.
- f) The product is out of warranty.

Special concerns

If the same fault multiple occurrence for the products,in order to find out the reason causing the problem,we will request the users to provide the specific documents or information of peripheral equipment,such as monitor,I/O boards,cables,power supply, diagram and structure of the system,etc.If such documents or information are not available,we have the right to refuse to perform the warranty, the repairs will be charged accordingly.

Rev.C 6/2020