

# Z508

# User Manual

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## Revision History

Revision	Date	Reason for change	Applicable hardware version	Modified by
V1.0	2020.2	Initial release	V1.0	
V1.1	2020-06	Add notes	V1.0	
V1.2	2020-09	Add line package configuration	V1.0	144
V1.3	2021-06	Remove the AGX Xavier 8G/16G version	V1.0	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 Z508). 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;
- Starting time: the core module is subject to the original factory delivery time, and the loading plate is subject to the express delivery receipt date;

3) Contact information

Official website: [www.realtimesai.com](http://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 84280996

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](mailto: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):

<https://www.realtimesai.com/cn/download.html>    [techsupport@realtimes.cn](mailto: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](mailto: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](mailto: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](http://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

RTSS - Z508 to one based on NVIDIA Jetson™ AGX Xavier series™ module design of your new feiyun box, built-in integration 512 nuclear Volta™ architecture of GPU AGX Xavier module, Ubuntu 18.04 operating system, with 32 tflops floating point arithmetic AI processing capacity, super strong light aluminum alloy material design, cooling fan type, have excellent heat dissipation capacity, the overall size is small and light, good structure of human body engineering, obligate has easy the wing structure of installation, It has the stable operation capability of 7x24 ultra-long MTBF on site, which can be applied to autonomous machines such as robots, unmanned delivery vehicles, intelligent gate machines and intelligent sales containers, etc. It is an ideal carrier for deploying AI computing power for deep learning at the edge.

External interface resources provided by Z508 include: 2 x USB 3.0, 2 x USB3.1, 2 x HDMI, 2 x GbE, 1x Micro SD, 3 X 3.3V UART/6 X 3.3V GPIO, 1 X 3.3V SPI / 4 X 3.3V GPIO, 1 X 3.3V I2C, 1 X 3.3V I2S / 4 X 3.3V GPIO, 2 X CAN2.0b, 4 X 3.3V GPIO, WIFI&BT, 2 X M.2 KEY M, 1 X M.2 KEY E, 4G LTE(optional), the product has passed CCC and CE certification of the European Union.

## 1.1 Feature

- Compatible with nvidia Jetson™ AGX XAVIER module
  - ◆ GPU: NVIDIA Jetson™ AGX XAVIER 521 core with NVIDIA Volta™ architecture and 64 Tensor Cores (32 trillion floating-point operations per second)
  - ◆ CPU: ARMv8.2 (octal-core)
  - ◆ Operating system: Linux pre-installed
  - ◆ Memory: 32GB LPDDR4
  - ◆ Storage: Built-in 32GB or expandable TF card slot
- 2x USB3.1 (TYPE-A and TYPE-C (1A max output current))
- 2x USB3.0 (TYPE A and TYPE-C (support usb2.0andusb3.0 signal, 1A max output current))
  - 1x USB 2.0 Micro Type-B, Used as slave interface, connect Xavier debugging port or a common serial port
- 2x Gigabit Ethernet
- 1x Micro SD/UFS card slot
- 1x Micro SIM card slot
- 2x HDMI TYPE A interface
- Size: 130mm×114mm ×66mm
- 1x Mini-PCIE interface
- 1x Camera interface
- 1x fan interface
- 2x M.2 key M interface
- 1x M.2 key E interface
- 4x GPIO compliance with 3.3V voltage level
- 3x 3.3V UART interface
- 2xCAN interface
- 1xSPI interface
- 1x3.3V I2C interface
- 1xI2S interface
- Size:130x114x66mm
- Thermal:Active(fan inside)
- Power input: 9~20V
- Temperature: -20℃~+50℃
- Weight:1735g



## 1.2 Ordering Information

Model Options	Functional Description
Z508-1	Xavier Cloud intelligence box air-cooled version, built-in Xavier 32GB module, pre-installed Ubuntu 18.04, built-in 32GB eMMC; 2 x USB 3.0, 2 x HDMI, 2 x GbE, 1X Micro SD, 1X MinipCie, 2 x USB3.1, 3 x 3.3V UART/6 x 3.3V GPIO, 1 x 3.3V SPI / 4 x 3.3V GPIO, 1 x 3.3V I2C, 1 x 3.3V I2S / 4 x 3.3V GPIO, 4 x 3.3V GPIO, WIFI and Bluetooth, 2 x m. 2 KEY M interface, 1 x M.2 KEY E interface, 4G module /mSATA(optional); Power indicator light, power switch button, -20 -- +65°C; Including wire package (Type-C revolution type-a female); Includes power adapter, provides RtSO-1001 Linux4Tegra software support package, has passed THE 3C and CE certification
RTS-Xavier-AC/DC	Power Adaptor for Z508-1/-2, 100-240VAC/12V/6A,72W
Mini-pcie Video Capture Card (optional)	RTSV-6911i (8-channel D1 NTSC/PAL video input), RTSV-6901 (single-channel SDI video input), RTSV-6941 (single-channel HDMI Video Input)
M.2 transfer card (optional acquisition card for M.2 interface)	mini-PCIe To M.2 interface card
M.2 Video capture card (optional)	RTSV-6902 (dual-channel SDI video input), RTSV-6904 (four-channel SDI Video input)
Mini-pcie 4G Module (optional)	mini-PCIe Full netcom 4G module.

### Order online:

<https://shop340963258.taobao.com>

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

## 1.3 Cable Kits and Accessories

Component	Number	Functional Description
USB connector	1	Convert USB TYPE-C interface to USB TYPE-C interface
Multi-function wiring	1	Convert the multi-function needle discharge interface to the cable lead, which includes the following interface cables: 4 GPIO, 2 CAN, 1 Debug serial port, 1 serial port, button button lead.

## 2 External interface function and location



Z508 FRONT



Z508 BACK

## 3 Installation and use

### 3.1 How to use Smart Box

- a) Ensure that the voltage of all external systems is turned off
- b) Install necessary external cables. (Such as: the display cable connected to the HDMI display, the power input cable to power the system, the USB cable connecting the keyboard and mouse ...)
- c) Connect the power cord to a power source.
- d) Z508 adopts auto power-on design. Turn on the power and the system starts to work.

### 3.2 Recovery mode


Jetson NANO/Xavier NX core module can work in normal mode and Recovery mode, under which file system update, kernel update, Boot Loader update, BCT update and other operations can be carried out.

The steps to enter the Recovery mode are as follows:


- a) Turn off the power supply to the system.
- b) Use a USB cable connection Z508's Type-c USB (P10) port with Jetson develop host USB port.
- C) Short connect 15 and 19 pins of Button connector and supply power to the system. The power supply shall be maintained for more than 3 seconds, and then disconnect 15 and 19 pin short wiring of Button connector. The system enters the Recovery mode, and subsequent operations can be carried out at this point.

## 4 Connectors Description

### 4.1 HDMI connector

<b>Function</b>	HDMI output interface	
<b>marking</b>	HDMI	
<b>Type</b>	HDMI connector	


### 4.2 Ethernet connector

<b>Function</b>	Gigabit Ethernet connector	
<b>marking</b>	Ethernet1 Ethernet2	
<b>Type</b>	RJ45	


### 4.3 USB3.0 connector

<b>Function</b>	USB3.0 connectors	
<b>marking</b>	USB3.0	
<b>Type</b>	USB3.0 Type-A	

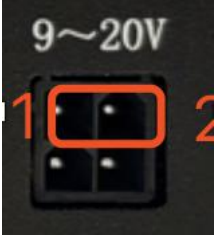
### 4.4 SD card connector

<b>Function</b>	SD card interface	
<b>marking</b>	TF CARD (top)	
<b>Type</b>	Micro SD (TF)	


### 4.5 SIM card connector

<b>Function</b>	SIM card interface	
<b>marking</b>	TF CARD (below)	
<b>Type</b>	Micro SIM	


#### 4.6 Power input port

<b>Function</b>	Power input port				
<b>marking</b>	9~20V				
<b>Type</b>	4 Pin interface				
<b>Pin define</b>	<b>Pin</b>	<b>Signal</b>	<b>Pin</b>	<b>Signal</b>	
	1	GND	2	GND	
	3	VCC	4	VCC	
Input voltage: +9~+20V					

#### 4.7 OTG-USB2.0 connector

<b>Function</b>	USB2.0 connectors or two serial port	
<b>marking</b>	Debug	
<b>Type</b>	USB2.0 Micro Type-B	

#### 4.8 USB3.0 connector

<b>Function</b>	USB3.0 connectors	
<b>marking</b>	USB3.0/DP	
<b>Type</b>	USB Type-C	
<b>Pin define</b>	Top interface can be used for system programming.it's USB3.1 Type-C.	

## 4.9 Function pin

<b>Function</b>	Function pin insertion			
<b>LoGo</b>	Multi-port			
<b>Type</b>	2.0mm pitch 2x17Pin Dip			
<b>Pin define</b>	<b>Pin</b>	<b>Signal</b>	<b>Pin</b>	<b>Signal</b>
	1	VDD3V3_OUT	2	VDD3V3_OUT
	3	UART3_TX_DEBUG_CON	4	UART3_RX_DEBUG_CON
	5	UART1_TX_CON	6	UART1_RX_CON
	7	UART2_TX_CON	8	UART2_RX_CON
	9	SPI2_CLK/UART7_TX_CON	10	SPI2_MISO/UART7_RX_CON
	11	SPI2_MOSI/UART7_RTS_CON	12	SPI2_CS0/UART7_CTS_CON
	13	I2C_GP3_CLK_CON	14	I2C_GP3_DAT_CON
	15	GND	16	GND
	17	POWER_BTN_CON	18	RESET_BTN_CON
	19	RECOVERY_BTN_CON	20	RTC_EXT
	21	I2S3_DIN	22	GPIO04
	23	I2S3_DOUT	24	GPIO05
	25	I2S3_FS	26	GPIO20
	27	I2S3_SCLK	28	GPIO21
	29	GND	30	GND
	31	CAN1H	32	CAN1L
33	CAN0H	34	CAN0L	
<p>In the right picture, red is pin "1" and green is pin "2".</p> <p>The serial port level is 3.3V TTL logic level.</p> <p>GPIO high level is 3.3V and GPIO is directly derived from Xavier</p> <p>CAN has a transceiver.</p> <p>The mapping file in the /dev directory corresponding to UART1 and UART2 is ttyTHS0, ttyTHS1, and UART3 is the debugging port.</p> <p>The mapping Numbers of GPIO04, GPIO05, GPIO20 and GPIO21 in the system are respectively: 288, 289, 290, 291</p>				

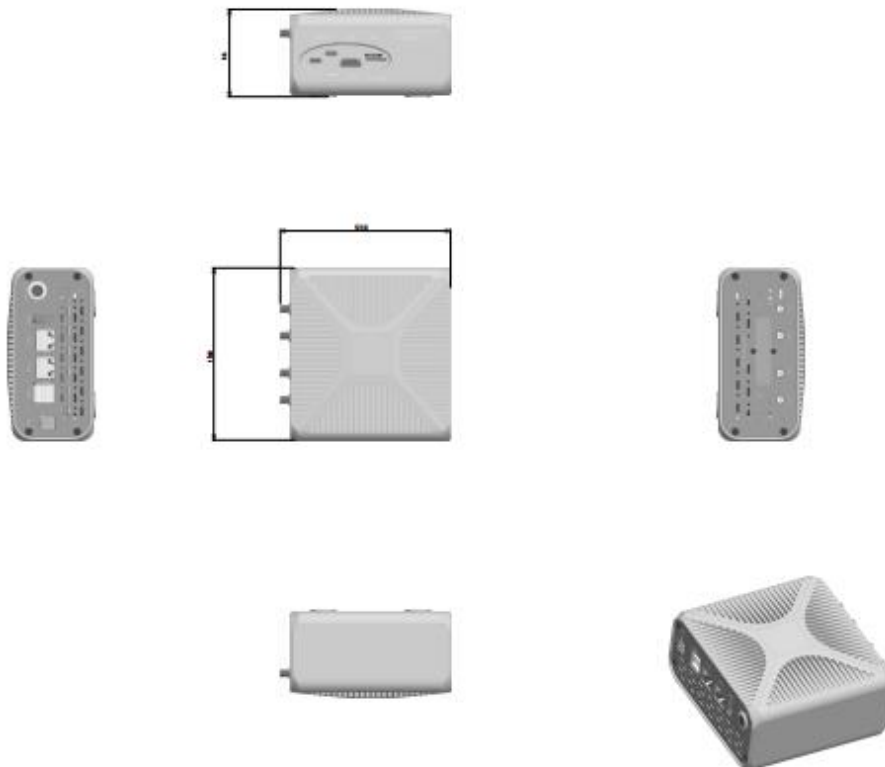


## 5 Hardware update history

### Z508 hardware update history

edition	Updata description
V1.0	Initial release

## 6 Product size diagram



## 7 Software/BSP Details

The Z508 board works on systems that burn using the official original NVIDIA Linux For Tegra (L4T) ,HDMI, gigabit Ethernet, USB2.0, serial port, GPIO, SD card, I2C bus, fan interface, can be supported. But Mini-PCIe, USB3.0, M.2,etc,can't work normally.

The full support of Z508 rugged machine interface needs to load supporting driver patches.

NVIDIA LT4 package can be downloaded from the following link

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

Z508 patch support package download

<https://www.realtimesai.com>



## 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**