X501N
Product Manual

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## Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Reason for change</th>
<th>Applicable hardware version</th>
<th>Modified by</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.0</td>
<td>2020.2</td>
<td>Initial release</td>
<td>V1.0</td>
<td></td>
</tr>
<tr>
<td>V2.0</td>
<td>2020.6</td>
<td>Add notes and indicators</td>
<td>V2.0</td>
<td></td>
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<tr>
<td>V2.1</td>
<td>2020.9</td>
<td>Add line package configuration</td>
<td>V2.0</td>
<td>RT0086</td>
</tr>
<tr>
<td>V2.2</td>
<td>2022.1.5</td>
<td>Add software version supporting instructions</td>
<td>V2.0</td>
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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 X501N). 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;
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
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 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 Product 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.
Product presentation

1 Introduction

X501N is a cloud intelligence box designed based on NVIDIA Jetson™ TX2. It integrates NVIDIA Jetson™ TX2 modules based on the brand new Pascal™ architecture. It is equipped with 256 NVIDIA CUDA cores and 64-bit ARM CPUs with a powerful data processing capability of over 1 teraflop per second.

X501N is equipped with 8GB LPDDR4 memory, 32GB eMMC storage, WiFi, Bluetooth, USB3.0, USB2.0, HDMI, serial port, gigabit network port, CAN, GPIO, Micro SD card socket, the system is an excellent platform for deep learning, computer vision, image processing and GPU computing. X501N is made of strong aluminum alloy shell with conductive heat dissipation design. The operating temperature is -25 ~ +60°C.

1.1 Features

- Compatible with nvidia Jetson TX2/TX2i/TX2-4GB module.
- Linux operating system software pre-installed.
- 8GB LPDDR4 memory
- Built-in 32 GB eMMC, TF card slot can be extended maximum 1 TB (SSD)
- Built-in RTC battery.
- Optional mSATA storage.(built-in interface)
- Optional 4G communication module.(built-in interface)
- Optional Mini PCIe video capture card.(built-in interface)
- One Mini HDMI 2.0 (6Gbps, 24bpp, 4096x2160@60Hz)
- 2 x Gigabit Ethernet （10/100/1000 BASE-T）
- 2 x USB3.0(5Gbps,1A max output current )
- Audio input and output interface
- 1 x Micro SD card slot
- 1 x Micro SIM card slot(built-in interface)
- 2 x CAN2.0
- 2 x Serial prot(one RS232 debug serial port,one RS232 serial port)
- 4 x GPIO compliance with 3.3V voltage level
- 1 x Mini-PCIe (expandable: PAL / HD-SDI video capture, GPS / Beidou module, AD / DA module, 4G module, storage module, etc.)(built-in interface)
- 1 x mSATA.(built-in interface)
- 2 x Wifi IEEE 802.11 ac/Bluetooth Bluetooth 4.0 (24 MBLS) integrated antenna interface.
- No fan, structural cooling design.
- Size: 132mm×147.5mm×60.4mm
- Power input: +7V~+19V
- Temperature: -25°C~+60°C.
- Weight:645.5g
### 1.2 Ordering Information

<table>
<thead>
<tr>
<th>Model Options</th>
<th>Functional Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTSS-X501N</td>
<td>TX2 Cloud Intelligence box, built-in Jetson TX2 module, pre-installed Ubuntu 18.04, built-in 32GB eMMC; 2 x GbE, 2 x USB3.0, 2 x CAN, 1 x HDMI, 4 x GPIO, 1 x Mini PCIe, 1 x mSATA, 2 x RS-232(422/485 configurable), 1 x Micro SD, 1 x Micro SIM, 1 x Audio, WIFI and Bluetooth, 4G modules optional; Power indicator light, power switch button, -25 -- +60°C; Including cable package (network<em>2, HDMI</em>1, DB9 button<em>1, Microusb to USB TYPE-A male system flash cable</em>1); Includes power adapter, provides rtSO-9001 Linux4Tegra software support package, has passed THE 3C and CE certification</td>
</tr>
<tr>
<td>RTS-TXX-AC/DC-PS</td>
<td>TX2 cloud Intelligence Box special power adapter, 100-240VAC/12VDC, 36W</td>
</tr>
<tr>
<td>RTS-TXX-AT01(optional)</td>
<td>2.4GHz/5GHz Dual-band antenna of BT&amp;WIFI</td>
</tr>
<tr>
<td>ME909S-821 (optional)</td>
<td>miniPCIe LTE 4G module</td>
</tr>
<tr>
<td>RTSV-6911i (optional ) Pro Capture Mini SDI (optional ) Pro Capture Mini HDMI (optional )</td>
<td>Mini-pcie Video Capture Card ,RTSV-6911i (8-channel D1 NTSC/PAL video input), Pro Capture Mini SDI (single-channel SDI video input),Pro Capture Mini HDMI (single-channel HDMI Video Input)</td>
</tr>
</tbody>
</table>

**Order online:**
- [https://shop340963258.taobao.com](https://shop340963258.taobao.com)
- [https://mall.jd.com/index-824786.html](https://mall.jd.com/index-824786.html)

### 1.3 Cable Kits and Accessories

X501N's matching cable order model is: X501N-Cable. Contains the following components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Number</th>
<th>Functional Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network cable</td>
<td>2</td>
<td>Convert Ethernet DB9 interface to standard RJ45 interface</td>
</tr>
<tr>
<td>HDMI adapter cable</td>
<td>1</td>
<td>Convert Mini HDMI to HDMI</td>
</tr>
<tr>
<td>DB9 button cable</td>
<td>1</td>
<td>DB9 button</td>
</tr>
<tr>
<td>System flash cable</td>
<td>1</td>
<td>Micro USB to USB TYPE-A male system flash cable</td>
</tr>
</tbody>
</table>
Product specifications

1 External interface function and location

X501N FRONT

X501N BACK
2 Connectors Description

2.1 Mini HDMI connector

<table>
<thead>
<tr>
<th>Function</th>
<th>HDMI output interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>HDMI</td>
</tr>
<tr>
<td>Type</td>
<td>Mini HDMI connector</td>
</tr>
</tbody>
</table>

2.2 Ethernet connector

<table>
<thead>
<tr>
<th>Function</th>
<th>Gigabit Ethernet connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>Ethernet1, Ethernet2</td>
</tr>
<tr>
<td>Type</td>
<td>DB9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MDI1+</td>
<td>2</td>
<td>MDI2+</td>
</tr>
<tr>
<td>3</td>
<td>MDI0+</td>
<td>4</td>
<td>MDI3+</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>6</td>
<td>MDI1-</td>
</tr>
<tr>
<td>7</td>
<td>MDI2-</td>
<td>8</td>
<td>MDI0-</td>
</tr>
<tr>
<td>9</td>
<td>MDI3-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pin 1 location: The green frame on the right.

2.3 USB3.0 connector

<table>
<thead>
<tr>
<th>Function</th>
<th>USB3.0 connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>USB3.0</td>
</tr>
<tr>
<td>Type</td>
<td>UBS3.0 Type-A</td>
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</tbody>
</table>

OTG programming interface location: the green frame on the right.

2.4 SD card connector

<table>
<thead>
<tr>
<th>Function</th>
<th>SD card interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>TF CARD</td>
</tr>
<tr>
<td>Type</td>
<td>Micro SD (TF)</td>
</tr>
</tbody>
</table>
2.5 WiFi antenna connector

<table>
<thead>
<tr>
<th>Function</th>
<th>WiFi antenna interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>AT1 AT2</td>
</tr>
<tr>
<td>Type</td>
<td>ipex to sma female</td>
</tr>
</tbody>
</table>

2.6 4G antenna connector

<table>
<thead>
<tr>
<th>Function</th>
<th>4G antenna interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>AT3 AT4</td>
</tr>
<tr>
<td>Type</td>
<td>ipex to sma female</td>
</tr>
</tbody>
</table>

2.7 Power input port

<table>
<thead>
<tr>
<th>Function</th>
<th>Power input port</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>Power Input</td>
</tr>
<tr>
<td>Type</td>
<td>SF1213/S3</td>
</tr>
<tr>
<td>Pin define</td>
<td></td>
</tr>
<tr>
<td>Pin</td>
<td>Signal</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
</tr>
<tr>
<td>1</td>
<td>VIN+</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
</tr>
</tbody>
</table>

Input voltage range: +7V to +19V.

2.8 LED

<table>
<thead>
<tr>
<th>Mandatory Sign</th>
<th>Functional Description</th>
<th>Status description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Power indicator</td>
<td>Normally on - Power on</td>
</tr>
</tbody>
</table>

2.9 Power switch button

<table>
<thead>
<tr>
<th>Function</th>
<th>Power switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>On/Off</td>
</tr>
</tbody>
</table>
## 2.10 CAN/Audio connector

<table>
<thead>
<tr>
<th>Function</th>
<th>CAN /Audio I/O connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>CAN/Audio</td>
</tr>
<tr>
<td>Type</td>
<td>DB9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin define</th>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>CAN0H</td>
<td>3</td>
<td>CAN1H</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>CAN1L</td>
<td>6</td>
<td>AUDIO_GND</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>MIC_IN</td>
<td>9</td>
<td>AUDIO_HR_R</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUDIO_HR_L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pin 1 location: The green frame on the right.
CAN bus interface function is not available when used with Jetson TX1 module.

## 2.11 Serial connector

<table>
<thead>
<tr>
<th>Function</th>
<th>Serial port</th>
</tr>
</thead>
<tbody>
<tr>
<td>marking</td>
<td>COM1 COM2</td>
</tr>
<tr>
<td>Type</td>
<td>DB9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin define</th>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>RXD1</td>
<td>3</td>
<td>TXD1</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>GND</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin define</th>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>RXD2</td>
<td>3</td>
<td>TXD2</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>GND</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pin 1 location: The green frame on the right.
The COM1 ~ 2 serial ports are RS232 signals. The mapping files in the Linux system are ttyS0 and ttyTHS2 in the /dev directory.
TXD1 / RXD1 defaults to the kernel debug serial port, which is used to output C-BOOT, U-BOOT, and Linux kernel information. After the Linux kernel is started, it is used as the serial port of the display terminal. TX1 / TX2 default serial port settings are: 115200bps, 8N1.
## 2.12 GPIO and function button connector

<table>
<thead>
<tr>
<th>Function marking</th>
<th>Type</th>
<th>GPIO and function button connectors</th>
<th>DB9</th>
</tr>
</thead>
</table>

### Pin define

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RESET</td>
<td>2</td>
<td>POWER BUTTON</td>
</tr>
<tr>
<td>3</td>
<td>RECOVERY</td>
<td>4</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>6</td>
<td>GPIO8(GPO)</td>
</tr>
<tr>
<td>7</td>
<td>GPIO9(GPO)</td>
<td>8</td>
<td>GPIO_EXP0_INT(GPI)</td>
</tr>
<tr>
<td>9</td>
<td>GPIO_EXP1_INT(GPI)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pin 1 location: The green frame on the right.

The sysfs mapping numbers of the GPIO8, GPIO9, GPIO_EXP0_INT, and GPIO_EXP1_INT in the TX1 system are: 187, 186, 89, 202. The sysfs mapping numbers in the TX2 system are: 388, 298, 480, 486.
3 Product size diagram

4 Hardware update history

<table>
<thead>
<tr>
<th>edition</th>
<th>Update description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.0</td>
<td>Initial release</td>
</tr>
</tbody>
</table>
Software version supporting instructions

X501N is a complete product with Jetson TX2 module as the core. Provide developers with one-stop terminal equipment to assist developers in application development.

X501N Feiyun Smart Box supporting software includes:
- L4T (Linux for Tegra): L4T provides "OS" for your Feiyun Smart Box, including Linux kernel, boot loader, board support package (BSP) and sample file system. (By default, the pure system has been installed for the device, Jetpack needs to be installed by itself)
- Jetpack: Jetpack sdk is the most comprehensive solution for building AI applications. It includes software libraries and apis, examples, developer tools and documentation for the latest and previous versions of Jetson products.

1 use

1.1 Smart box power on and start
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) X501N adopts manual power-on design. Turn on the power and the system starts to work.

1.2 Recovery Mode
Jetson TX2 core modules can work in normal mode and Recovery mode. In Recovery mode, you can perform file system update, kernel update, boot loader update, BCT update and other operations.
To enter Recovery mode:
a) Turn off the system power supply.
b) Use a USB cable to connect the USB port(under of USB3.0 port) of the X501N and the USB port of the Host(PC) development host.
c) Short-circuit the 3 and 5 pins of the GPIO connector to power the system. Keep the power supply for more than 3 seconds, and then disconnect the 3 and 5 pins of the GPIO connector.
d) The system enters Recovery mode, and you can perform subsequent operations at this time.

2 L4T（Linux for Tegra Abbreviation“L4T”）
L4T provides "OS" for your Feiyun Smart Box, including Linux kernel, boot loader, board support package (BSP) and sample file system.
X501N Smart Box 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, SD card, I2C bus can all be supported. But Mini-PCIe, M.2, USB3.0, fan interface, etc. cannot work normally.
For all support of X501N smart box interface, the supporting driver patch (BSP: Board Support Package) needs to be loaded. Use the flash method to program the system. SDK Manager to install all other JetPack components except L4T to make your Feiyun Smart Box up and running quickly.
For system programming documentation, please refer to "TX2 system programming instruction manual"
L4T and BSP can be downloaded from Ruitai Cloud Space, and L4T can also be downloaded directly from the L4T main page on the Jetson developer site.
Please contact sales for the user and password of Ruitai Cloud Space.

3 Jetpack

Nvidia jetpack sdk is the most comprehensive solution for building AI applications. It includes software libraries and apis, examples, developer tools and documentation for the latest and previous versions of Jetson products.

3.1 Jetpack Component summary

This section briefly introduces each component of JetPack. For more detailed information about these components, please refer to JetPack's online documentation.

OS Image

JetPack includes a reference file system derived from Ubuntu. (Development kit system, no need to install)

Libraries and APIs

JetPack library and API include:
• TensorRT and cuDNN for high-performance deep learning applications
• CUDA for multi-domain GPU accelerated applications
• NVIDIA Container Runtime for containerized GPU accelerated applications
• Multimedia API package for camera application and sensor driver development
• VisionWorks, OpenCV and VPI for visual computing applications
• Sample application

3.2 How to install Jetpack

Overview of process steps

Installing JetPack to your Jetson device requires you to perform the following steps:
1. Download and install the NVIDIA SDK Manager on the Linux host.
2. Connect your jetson device to the Linux host(PC) (USB or network (same network segment)).
3. Test your device can connect via ssh.
4. Use SDK Manager to select and install the required components.

Download and install the NVIDIA SDK Manager on the Linux host.

You must have a Linux host with internet access to run SDK Manager and refresh the developer kit. The supported host operating systems are:

Ubuntu Linux x64 Version 18.04 or 16.04

Download and install NVIDIA SDK Manager.

sdkmanager Installation package:  sdkmanager-[version],[build#].deb
The current version is:  sdkmanager_1.2.0
**sdkmanager install**

```bash
$ sudo apt install ./sdkmanager-[version].[build#].deb
```

**Connect your jetson device to the Linux host**

Prepare your Jetson device for the following settings. (If the equipment system is not initialized, the system user needs to initialize after power-on)

- Connect the monitor, keyboard and mouse to the Jetson Feiyun smart box device (please refer to the interface description above).
- Use USB cable to connect Linux host and Jetson Feiyun Smart Box (or network (same network segment))
- During the setup process, SDK Manager will provide Internet connection for your jetson Feiyun Smart Box via USB or network connection.
- Connect the supplied power adapter to the DC jack of the Feiyun Smart Box, and plug the AC interface into an AC power outlet.

**Test that your device can connect via ssh.**

If connected via USB, enter lsusb under the Linux host terminal to see the nvidia crop

The device can be accessed through ping or ssh commands

```bash
$ ping 192.168.55.1
```

or

```bash
$ ssh <jetson_user>@192.168.55.1
```

If connected via a network, check whether the device ip address is in the same network segment as the Linux host on the Feiyun Smart Box, and the Feiyun Smart Box device can be accessed through the ping or ssh command.

```bash
$ ping <jetson_ip>
```

or

```bash
$ ssh <jetson_user>@<jetson_device_ip>
```

**Use SDK Manager to select and install the required components**

NVIDIA SDK Manager supports installing software to Jetson core (Flying Cloud Smart Box). For complete instructions, please refer to Chapter 5 of "TX2 System Programming Manual".

### 3.3 Sample application

JetPack includes several examples that demonstrate the use of JetPack components. They are stored in the reference file system and can be compiled in the developer toolkit.
## 3.4 Developer tools

JetPack includes the following development tools. Some are used directly on the Jetson system, and some run on a Linux host connected to the Jetson system.

- **Application development and debugging tools**
  - **NSight Eclipse** version for GPU accelerated application development: runs on a Linux host. Support all Jetson products.
    - **CUDA-GDB** for application debugging: Run on Jetson system or Linux host. Support all Jetson products.
    - **CUDA-MEMCHECK** debug application memory error: run on Jetson system. Support all Jetson products.

- **Application analysis and optimization tools**
  - **NSight Systems** for application multi-core CPU evaluation: run on a Linux host. Helps you improve application performance by identifying the slower parts of the code. Support all Jetson products.
  - **NVIDIA®Nsight™ compute** Kernel Analyzer: An interactive analysis tool for CUDA applications. It provides detailed performance indicators and API debugging through user interface and command line tools.
  - **NSight Graphics** for graphics application debugging and evaluation: a consolegrade tool for debugging and optimizing OpenGL and OpenGL ES programs. Run on the Linux host. Support all Jetson products.

### Component Location

<table>
<thead>
<tr>
<th>Component</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>TensorRT</td>
<td>/usr/src/tensorrt/samples/</td>
</tr>
<tr>
<td>cuDNN</td>
<td>/usr/src/cudnn_samples_/</td>
</tr>
<tr>
<td>CUDA</td>
<td>/usr/local/cuda-/samples/</td>
</tr>
<tr>
<td>Multimedia API</td>
<td>/usr/src/tegra_multimedia_api/</td>
</tr>
<tr>
<td>VisionWorks</td>
<td>/usr/share/visionworks/sources/samples/</td>
</tr>
<tr>
<td>OpenCV</td>
<td>/usr/share/OpenCV/samples/</td>
</tr>
<tr>
<td>VPI</td>
<td>/opt/nvidia/vpi/vpi-/samples</td>
</tr>
</tbody>
</table>
3.5 Documentation

Documents related to developers using JetPack include:

- JetPack Documentation
- VisionWorks Documentation
- Nsight Eclipse Edition Documentation
- CUDA-GDB Documentation
- CUDA-MEMCHECK Documentation
- TensorRT Documentation
- cuDNN Documentation
- CUDA Toolkit
- NVIDIA Container Runtime
- OpenCV Documentation
- Jetson Linux Multimedia API Reference
- Nsight Systems
- nvprof
- Visual Profiler
- Nsight Graphics
- Nsight Compute CLI
- VPI–Vision Programming Interface
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.

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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 reparments will be charged accordingly.

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