



AI Computing Platform

# 8F4E1

## Datasheet



Issue: V2.1

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# Change History

## 8F4E1

Version	Date	Description of Change	Hardware Version
V 1.0	2022-3-8	Initial Release	V 1.0
V 2.0	2023-8-14	<ol style="list-style-type: none"> <li>1. Change the datasheet template;</li> <li>2. Change Product description;</li> <li>3. Remove support for the RTX A6000 graphics card;</li> <li>4. Add the function description of the AGX Xavier module with the RTX 6000 graphics card;</li> <li>5. Added the description of interface function test.</li> </ol>	V 1.0
V 2.1	2025-1-9	Modify font	V 1.0

## Hardware Update History

Version	Date	Description of Change
V 1.0	2022-3-28	Initial Version

Electronic components and circuits are very sensitive to electrostatic discharge, although the company will design the main interface on the board card to do anti-static protection design, but it is difficult to do anti-static safety protection for all components and circuits. Therefore, it is recommended that you take ESD safety measures when handling any circuit board component.



**ESD safety measures include but are not limited to the following:**

1. Put the card in an ESD bag during transportation or storage. Do not take out the card until installation and deployment.
2. Before touching the board, release the static electricity stored in the body: Wear a grounding wrist strap.
3. Operate circuit boards only in electrostatic discharge safe areas.
4. Avoid moving circuit boards in carpeted areas.
5. Avoid direct contact with electronic components on the board through edge contact.

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# 1 Description

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The 8F4E1 AI Computing platform(8F4E1 for short) can be based on the NVIDIA Jetson AGX Orin / AGX Xavier core modules. It is up to 275 TOPS of AI performance and can be used in education, industrial automation, smart cities and other scenarios. It has abundant external interfaces, and the internal interface devices all adopt wide-temperature models.

When the 8F4E1 is equipped with the AGX Xavier module, it can be adapted to the NVIDIA RTX 6000 GPU and uses the NVIDIA Clara AGX development kit. The NVIDIA Clara AGX development kit comes with end-to-end reference applications for sensor processing, image reconstruction, AI, and visualization, which can help developers get started quickly and reduce overall development time. All necessary libraries and components have been pre-selected to enable an out-of-the-box software development environment. Each reference application utilizes the necessary IO components and drivers to move data and feed it into the processing pipeline on the RTX 6000 GPU, providing a data path setup for functional testing.

# 2 Specifications

	Feature
Y-C8	Carrier Board/Development Board/Baseboard
Module	NVIDIA Jetson AGX Orin / AGX Xavier Core module
Temperature	-20 ~ +65°C
Dimensions (W×H×D)	335mm*257mm*146mm (Including I/O ports and mounting holes)
Weight	5500 g

## Power

Power Supply	Spec
Input Type	AC
Input Voltage	+220V

## I/O Port

Interface	Quantity	Interface	Quantity
USB 3.0 Type-A	2	Micro USB	1
RJ45	2	HDMI	1
RS232(DB9)	2	Micro SD Card Slot	1
CAN	2	GPIO	4

\*When used with the Jetson AGX Xavier module, only one USB 3.1 is available and the rest is USB 2.0. One RJ45 network port is non-standard.

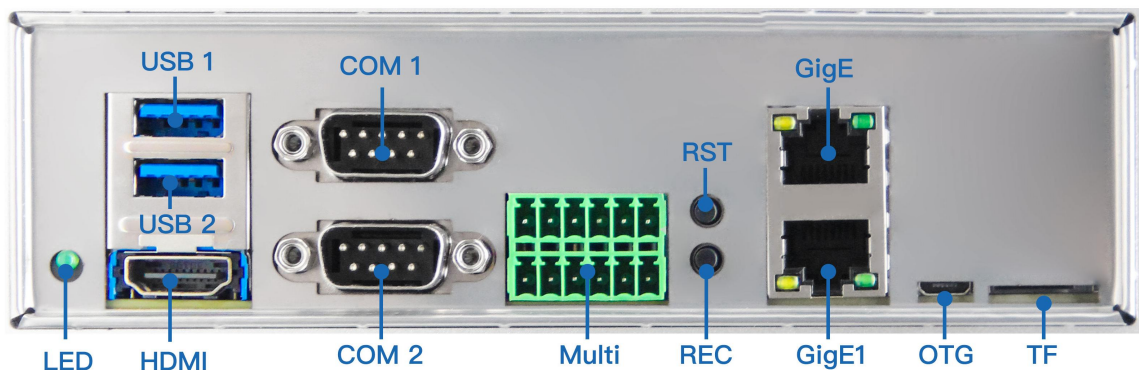
# NVIDIA Jetson Series Module

## Technical Specifications

Module	Jetson AGX Xavier 32GB	Jetson AGX Xavier 64GB	Jetson AGX Orin 32GB	Jetson AGX Orin 64GB
AI Performance	32 TOPS		200 TOPS	275 TOPS
GPU	512-core NVIDIA Ampere architecture GPU with 64 Tensor Cores		1792-core NVIDIA Ampere architecture GPU with 56 Tensor Cores	2048-core NVIDIA Ampere architecture GPU with 64 Tensor Cores
CPU	8-core NVIDIA Carmel Arm® v8.2 64-bit CPU 8MB L2 + 4MB L3		8-core Arm® Cortex®-A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3	12-core Arm® Cortex®-A78AE v8.2 64-bit CPU 3MB L2 + 6MB L3
Memory	32GB 256-bit LPDDR4x 136.5GB/s	64GB 256-bit LPDDR4x 136.5GB/s	32GB 256-bit LPDDR5 204.8 GB/s	64GB 256-bit LPDDR5 204.8 GB/s
Storage	32GB eMMC 5.1		64GB eMMC 5.1	
Video Encode	4x 4K60 (H.265) 8x 4K30 (H.265) 16x 1080p60 (H.265) 32x 1080p30 (H.265)		1x 4K60 (H.265) 3x 4K30 (H.265) 6x 1080p60 (H.265) 12x 1080p30 (H.265)	2x 4K60 (H.265) 4x 4K30 (H.265) 8x 1080p60 (H.265) 16x 1080p30 (H.265)
Video Decode	2x 8K30 (H.265) 6x 4K60 (H.265) 12x 4K30 (H.265) 26x 1080p60 (H.265) 52x 1080p30 (H.265)		1x 8K30 (H.265) 2x 4K60 (H.265) 4x 4K30 (H.265) 9x 1080p60 (H.265) 18x 1080p30 (H.265)	1x 8K30 (H.265) 3x 4K60 (H.265) 7x 4K30 (H.265) 11x 1080p60 (H.265) 22x 1080p30 (H.265)
Power	10W - 30W		15W - 40W	15W - 60W



# 3 Interface Display



**8F4E1 Connector**

Sign	Function	Sign	Function
TF	Micro SD Card Slot	HDMI	Type-A HDMI Connector
GigE	1000BASE-T Ports (Non-standard configuration)	GigE1	1000BASE-T Ports (RJ45 Connector)
LED	Power led	Multi	Multifunctional IO interface
COM1/ COM2	RS232 serial port (DB9 Connector)	USB1/ USB2	Type A USB 3.0 Connector
RST	Reset button	REC	Recovery button
OTG	Type-B Micro USB Connector(only use to flash system)		

# 4 All-Round Display



The Front View



The Rear View



The Left/Right View



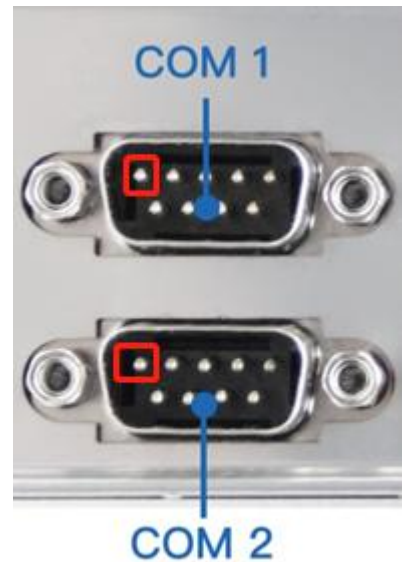
The Top View

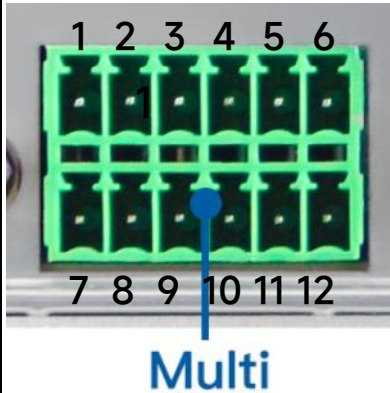


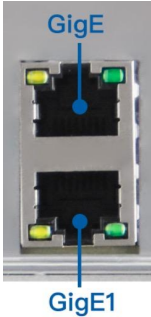
The Bottom View

# 5 Connector Description

DB9 Connector (COM1/COM2)				
Function	RS232 serial port			
Sign	COM1/COM2			
Type	DB9 Connector			
Pin definition	pin1: Red frame on the right picture			
	Pin	Signal	Pin	Signal
	1	NC	2	RX_RS232
	3	TX_RS232	4	NC
	5	GND	6	NC
	7	NC	8	NC
	9	NC	10	NC
Device Name	模组	AGX ORIN		AGX Xavier
		Jetpack 5.*	Jetpack 6.*	
	COM1	/dev/ttyTHS4	/dev/ttyTHS2	/dev/ttyTHS1
	COM2	/dev/ttyTHS0	/dev/ttyTHS0	/dev/ttyTHS0



Multifunctional I/O interface																																
Function	CAN\GPIO																															
Sign	Multi																															
Pin definition	<table><tr><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th></tr><tr><td>1</td><td>CAN1_H</td><td>2</td><td>3.3V</td></tr><tr><td>3</td><td>CAN1_L</td><td>4</td><td>GND</td></tr><tr><td>5</td><td>GND</td><td>6</td><td>GPIO08</td></tr><tr><td>7</td><td>CAN0_H</td><td>8</td><td>GPIO09</td></tr><tr><td>9</td><td>CAN0_L</td><td>10</td><td>GPIO17</td></tr><tr><td>11</td><td>GND</td><td>13</td><td>GPIO27(PWM)</td></tr></table>				Pin	Signal	Pin	Signal	1	CAN1_H	2	3.3V	3	CAN1_L	4	GND	5	GND	6	GPIO08	7	CAN0_H	8	GPIO09	9	CAN0_L	10	GPIO17	11	GND	13	GPIO27(PWM)
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	7	CAN0_H	8	GPIO09																												
	9	CAN0_L	10	GPIO17																												
	11	GND	13	GPIO27(PWM)																												
The sequence of signal pins is shown on the right.																																
																																
GPIO	<table><tr><th>Module</th><th colspan="2">AGX Xavier</th><th>AGX ORIN</th></tr><tr><th>Jetpack Version</th><th>&lt;Jetpack5.0</th><th>&gt;=Jetpack5.0</th><th></th></tr><tr><td>GPIO08</td><td>256</td><td>313</td><td>325</td></tr><tr><td>GPIO09</td><td>257</td><td>314</td><td>324</td></tr><tr><td>GPIO17</td><td>417</td><td>436</td><td>444</td></tr><tr><td>GPIO27</td><td>393</td><td>419</td><td>433</td></tr></table>				Module	AGX Xavier		AGX ORIN	Jetpack Version	<Jetpack5.0	>=Jetpack5.0		GPIO08	256	313	325	GPIO09	257	314	324	GPIO17	417	436	444	GPIO27	393	419	433				
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	GPIO09	257	314	324																												
	GPIO17	417	436	444																												
	GPIO27	393	419	433																												

Networking (GigE/GigE1)		
Function	10/100/1000M BASE-T Ethernet	
Sign	GigE/GigE1	
Type	Standard RJ45 network connector	
Notice	The Network port(GigE) is optional. By default, only GigE1 is available.	

## 6 Ordering Information

Order type	Description
8F4E1	Ai computing platform for NVIDIA® Jetson™ ORIN NX/ORIN Nano series core modules
If you need to add other functional modules, please confirm the plan with the company's sales and technical personnel in advance.	

## 7 Recovery Mode

Jetson core module can work in normal mode and Recovery mode. In Recovery mode, it can perform file system update, kernel update, Bootloader/UEFI update, BCT update and other operations.

**To enter the Recovery mode, perform the following steps:**

- Power off the system.
- Use a Micro-USB cable to connect the Micro-USB port (OTG) of the 8F4E1 to the Jetson development host USB port.
- The Jetson development host should be Ubuntu18.04 or Ubuntu20.04 based on X86 architecture.
- Press the Recovery key (REC) to power the system. Hold down the Recovery key (REC) for more than 3 seconds, and then release the Recovery key (REC).
- When the system enters Recovery mode, you can perform subsequent operations.

# 8 Method of Application

- Make sure all external system voltages are off.
- Install necessary external cables. (such as: the display line connected to the HDMI display, the power input line for the system power supply, the USB cable connecting the keyboard and mouse...)
- Connect the power cord to the power supply.
- 8F4E1 The system powers on automatically by default. It can also be set as a switch start, for specific methods, please consult the company's sales and technical personnel.

# 9 GPIO Test

The 8F4E1 comes with four programmable GPIOs as standard. Programmable output voltage 3.3V, please note that the input voltage does not exceed 3.3V. Take AGX Xavier module, GPIO08 when the system is higher than Jetpack5.0 as an example:

The content after the # in the following command is a comment and does not need to be added when executing the command.

- `sudo su`
- `echo 313 > /sys/class/gpio/export`      #Enable GPIO
- `echo out > /sys/class/gpio/PBB.00/direction`      #Set GPIO direction ,out or in.
- `echo 1 > /sys/class/gpio/PBB.00/value`      #Set GPIO out value ,0 or 1

# Note The preceding absolute path name is based on the actual path name generated after GPIO is enabled.

#When set to the input state, you can only read values. When set to the output state, you can read and write values.

`cat /sys/class/gpio/PBB.00/value`

# The output state can be measured using a multimeter to measure the voltage between the specific lead heel GND.

# 10 CAN Test

The 8F4E1 is equipped with two CAN channels. If you want to connect an external CAN device to test, connect the CAN\_H of the device to the CAN\_H of the device under test and the CAN\_L to the CAN\_L of the device under test. Two CAN buses can also be tested. During the test, connect the CAN0\_H of the device to CAN1\_H and the CAN0\_L to CAN1\_L. The test command is as follows :

- `sudo apt-get install busybox can-utils`
- # Writes the specified value to a register
- `sudo busybox devmem 0x0c303018 w 0xc458`
- `sudo busybox devmem 0x0c303010 w 0xc400`
- `sudo busybox devmem 0x0c303008 w 0xc458`
- `sudo busybox devmem 0x0c303000 w 0xc400`
- `sudo modprobe can` # Load the CAN bus subsystem support module.
- `sudo modprobe can_raw` # Load the original CAN protocol module.
- `sudo modprobe mttcan` #Load CAN interface support.
- `sudo ip link set can0 type can bitrate 500000`  
# Set the CAN0 bit rate to 500k bps
- `sudo ip link set can1 type can bitrate 500000`  
# Set the CAN1 bit rate to 500k bps
- `sudo ip link set up can0` #Open CAN0
- `sudo ip link set up can1` #Open CAN1
- `candump can0` # Set CAN0 to receive
- `cansend can1 1F223344#1122334455667788`  
# Open another terminal and send data through CAN1. After sending, there will be data echo on the receiving end of CAN0.

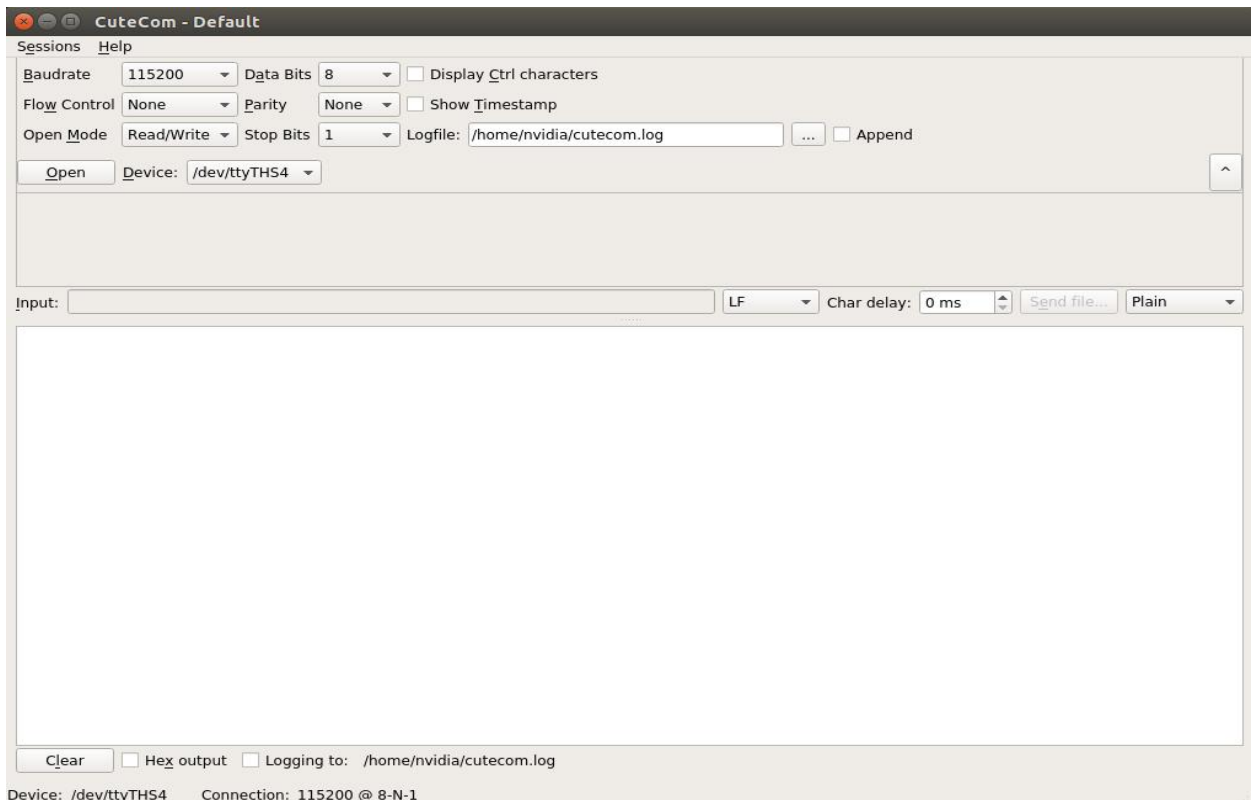
# 11 RS232 Test

The 8F4E1 is equipped with two RS232 serial ports as standard, which can be used for self-receiving test of a single serial port, and connection of two RS232 serial ports for docking test. Take AGX ORIN as an example. The command is as follows:

- `sudo apt-get install cutecom` #Install the serial port test tool
- `sudo cutecom`

When testing a single serial port, connect the RX of a single serial port to the TX. When two serial ports are connected, the RX of COM1 is connected to the TX of COM2, and the TX of COM1 is connected to the RX of COM2.

The interface of the serial port test tool cutecom is as follows:





# 12 Special Instructions

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- Initial system user name: nvidia, password: nvidia, no password su. If root permissions are required, use sudo to grant permissions, or use sudo su to access the root user.
- The pre-installed system is pure by default and does not contain Jetpack software. You can use the following command to install the software. Do not replace or modify the default software source before installation:
  - `sudo apt-get update`
  - `sudo apt-get install nvidia-jetpack`
- It can also be installed over the network using SDKmanager software.
- For more information please refer to: Jetson wiki ([plink-ai.com](http://plink-ai.com))