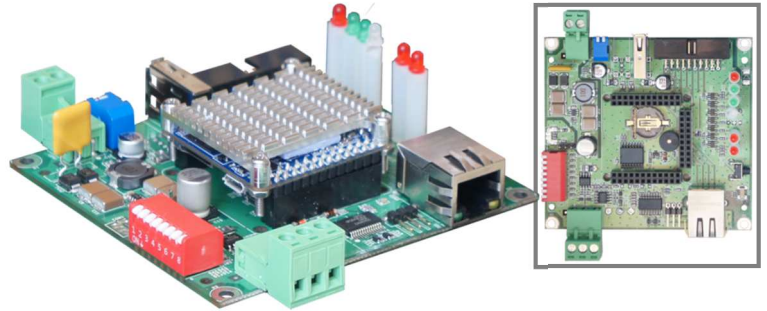


- ✓ **Specific Cape for Industrial communication and control application**
- ✓ **9~24VDC Input Working Power**
- ✓ **1-Channel 100/1000Mbps Ethernet communication interface**
- ✓ **1-Channel RS-485 serial equipment data transmission communication**
- ✓ **12 Digital Control Points (GPIO)**
- ✓ **With RTC Chip and battery holder**
- ✓ **With simple & easy human machine interface**
- ✓ **Embedded Linux Operating System**



Product Features

☒ **Specific cape for NanoPi NEO Core/Core2**

LLD-AIO-003 is a tailor-made cape for NanoPi NEO Core/Core2 design by LLD technology. Through the signal conversion function on LLD-AIO-003, NanoPi developers can connect all kinds of target device easily. Complete the development and testing of industrial automation, common data communication monitoring and state control application.

☒ **Stable DC power conversion and protection function**

LLD-AIO-003 has direct current (DC) 9~24V working voltage input function. Not only let developer can use the power easily, but also match with the actual application of the power supply.

☒ **Terminal block for easy connection**

LLD-AIO-003 provides standard RJ45 connector as 10/100Mbps network interface and USB Type-A connector as USB extension interface.

The power input, RS-485 interface use industrial pluggable terminal block and digital I/O uses a needle type simple block header. Besides convenient for testing, it's easy to make cable and connect with other I/O signal conversion modules.

☒ **Simple and Easy Demo Program**

The RS-485 and GPIO interface of the LLD-AIO-003 has a corresponding Demo program. The developer can easily get started to achieve the purpose of familiar with the product and executive function. Then accelerate the development of the system or program for corresponding application

☒ **Serial transmission interface**

RS-485 is still the main communication interface of card reader, thermometer, power meter and other small equipment or instrument. LLD-AIO-003 converted NanoPi's high speed serial port (UART) signals into half duplex RS-485 allowing users to connect to the target device for development and testing.

For RS-232 interface, we provide another customization model for optional.

☒ **Digital I/O Control Interface**

LLD-AIO-003 extended the NanoPi's 12 GPIO points to the 20-pin simple box header, the Digital Input and Output can be controlled through the program. Can also match with LLD-M13 Digital I/O control module (4 sets of Relay control and 4-point dry contact and 1-point wet contact input) to develop switches or sensors for physical connections. Reach the goal of monitoring application development and testing.

☒ **Simple and easy human machine interface**

LLD-AIO-003 extended and converted part of the NanoPi's GPIO to human-computer interface. 2 points of DIP Switch can be used as input judgment of manual switching for application operation mode. A number of LED lights and 1 set of buzzer can be used as LLD-AIO-003 machine status display or alert function. The judgment or control of these status can be compared to the control of GPIO software development.

☒ **on-board Real-Time Clock**

LLD-AIO-003 has Real-Time Clock (RTC) function, with battery holder to maintain the RTC operation during power outage.

Product Specification

Hardware

Core

- ▶ NanoPi NEO Core/Core2 Module
(LLD-AIO-003 Cape 不含 Module)

Network Interface

- ▶ Quantity : 1
- ▶ Type : 10/100BaseT Ethernet
- ▶ Connector : RJ45

RS-485 Serial port interface

- ▶ Quantity : 1 (chip : MAX13487E)
- ▶ RS-485 Signal : Data+, Data-, GND
- ▶ Multi-Drop Nodes : 128 (1/4 Load)
- ▶ Built-in Terminal Resistor : 120/600 Ω · By DIP Switch
- ▶ Pull High/Low resistor : 1K/10K Ω · By DIP Switch
- ▶ Protection : 2KV ESD Static, 400W Surge protection
- ▶ Connector : 5.00mm 3-pin pluggable terminal block

RS-232 serial port interface (Optional Customization)

- ▶ Quantity : 1 (chip: SP3243)
- ▶ Signal : TxD, RxD, GND (Shared with 2nd RS-485 port)
- ▶ Protection : 15KV ESD Static, 400W Surge protection
- ▶ Connector : 5.00mm 3-pin pluggable terminal block

RS-232 Console

- ▶ Quantity : 1
- ▶ Signal : RS-232 (TxD, RxD, GND)
- ▶ Connector : 3-pin 2.54 mm pin contact;

USB

- ▶ Quantity : 1
- ▶ Spec. : USB 2.0
- ▶ Connector : USB Host Type A x 1

Ordering Info

- ▶ **LLD-AIO-003** NanoPi NEO Core Industrial-Application Module, RS-485 Interface
Content : NanoPi NEO Core x 1 · LLD-AIO-003 Cape x 1 · QIG x1 · 10mm pillar x4 · 3mm screw x4
- ▶ **LLD-AIO-003 Plus** NanoPi NEO Core2 Industrial-Application Module, RS-485 Interface
Content : NanoPi NEO Core2 x 1 · LLD-AIO-003 Cape x 1 · QIG x1 · 10mm pillar x4 · 3mm screw x4
- ▶ **LLD-AIO-003 Cape** NanoPi NEO Core/Core2 Industrial-Application Cape, RS-485 Interface
Content : LLD-AIO-003 Cape x 1 · QIG x1 · 10mm pillar x4 · 3mm screw x4

Non-standard Customization Model no.

- ▶ **LLD-AIO-003(232)** NanoPi NEO Core Industrial-Application Module, RS-485+RS-232 Interface
- ▶ **LLD-AIO-003 Plus(232)** NanoPi NEO Core2 Industrial-Application Module, RS-485+RS-232 Interface
- ▶ **LLD-AIO-003(232) Cape** NanoPi NEO Core/Core2 Industrial-Application Cape, RS-485+RS-232 Interface

Optional accessories

- ▶ **LLD-M13** 4-ch DO, 5-ch DI Digital Signal Control Module with optical isolation protection in GPIO
- ▶ **CD12V** 100~240V AC to 12VDC Power Adapter (US Type)

GPIO

- ▶ Quantity : 19 points
- ▶ Signal Type : 3.3V CMOS
- ▶ 2x10 2.54mm simple box header x 12 GPIO
- ▶ DIP Switch x 2 GPIO
- ▶ Tack Button x 1 GPIO
- ▶ LED x 3 GPIO
- ▶ Beeper x 1 GPIO

Power

- ▶ Working Voltage : DC 9-24VDC
- ▶ Power Connector : 5.00mm pluggable terminal block
- ▶ Power Consumption : <10W (not include USB device)
- ▶ DC Output for RS-Pi3 : 5V (3A max.)
- ▶ DC Output for FAN : 5V (0.1A max.) 2.54 mm 3-pin contact

Others

- ▶ Real Time Clock (RTC) : 1 (chip: DS3231)
- ▶ Real Time Clock battery holder : CR1220
- ▶ Buzzer : 1
- ▶ LED indicator : power, network, serial port, user defined
- ▶ PCB Size : 92 x 86 mm
- ▶ PCB Fixing hole : Φ 3.50mm x 4 · Φ 2.50mm x 4
- ▶ NanoPi Module Fixing hole : Φ 2.50mm x 4
- ▶ Applicable temperature : -20~70°C
- ▶ Applicable humidity : 20%~80% RHG

Connect with NanoPi NEO Core/Core2

- ▶ 2x12 2.54 Pin header *2 set
- ▶ 2x10 2.54 Pin header *1 set

NanoPi Module built-in connector

- ▶ SD : MicroSD socket x 1

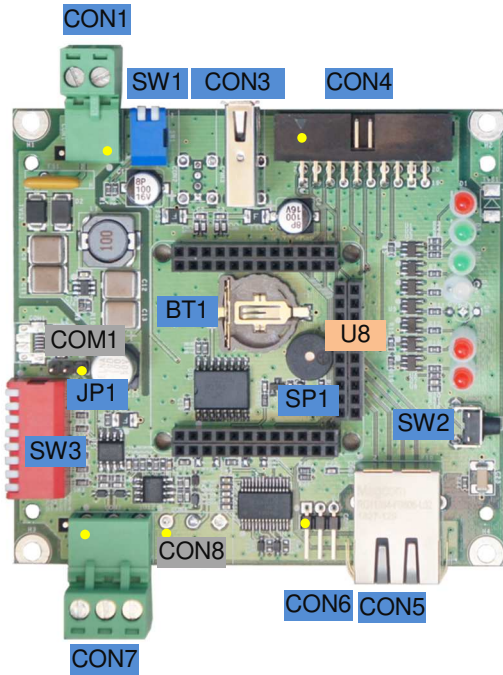


LLD-M13

Product exterior and PIN definition

LLD-AIO-003 Cape

● : 1st pin of contact



Pin assignment explanation:

Function	Pin no.	Definition
Power Input CON1	01	GND
	02	V+ (9-24VDC)
DC5V for Fan JP1	01	5V+
	02	GND
	03	X
RS-485 CON7	01	Data+
	02	Data -
	03	GND
Console(RS-232) CON6	01	TxD
	02	RxD
	03	GND
RS-232(optional) CON8	01	RxD
	02	TxD
	03	GND

GPIO / CON4

Pin no.	Function definition	Function definition	Pin no.
01	GPIO-01	GPIO-02	02
03	GPIO-03	GPIO-04	04
05	GPIO-05	GPIO-06	06
07	GPIO-07	GPIO-08	08
09	GPIO-09	GPIO-10	10
11	GPIO-11	GPIO-12	12
13	I2S	I2S	14
15	I2S	I2S	16
17	GND	GND	18
19	X	X	20

Contact

Function	Part No.
NanoPi NEO Core/Core2 connecting Pin header	U8
LLD-AIO-003 Power Input terminal block	CON1
USB2.0 Host	CON3
20-pin simple box header corresponding to GPIO x 12	CON4
10/100/1000M bps Ethernet RJ45	CON5
RS-232 / UART0 Console	CON6
RS-485(1) / UART1 5.00mm terminal block	CON7
(optional) RS-232 / UART2 5.00mm terminal block	CON8
(optional) 5V DC Power Input MicroUSB	COM1

LED legend (from top to bottom)

Color	Legend	Part No.
Red	Power *	D1
Green	SYS_LED	D3
Green	Ethernet Link LED *	D4
Dual Color	RS-485(1) / UART1 Tx/Rx Status *	D5
Dual Color (Optional)	(Optional) RS-232 / UART2 Tx/RxStatus *	D6
Red	User Def 1	D7
Red	User Def 2	D8

* Couldn't be controlled by Software

Others

Function	Part No.
Beeper corresponding to NanoPi GPIO x 1	SP1
RTC Battery holder	BT1
DIP Switch corresponding to NanoPi GPIO x 2	SW1
Tack Button	SW2
RS-485 120Ω Terminal & Fail/False resistor	SW3
5V DC-Out for FAN	JP1

LLD-AIO-003 Signal conversion and extensive function corresponding to NanoPi NEO Core/Core2 Definition

Communication and Control function

Function	Drive Component Part No. (Spec.)	External Contact			U8 (NanoPi Core2/Core Connector)		
		Part No.	Pin No.	Signal	Signal	NanoPi Definition	Pin No.
Console	U13 (SP3243EUCA)	CON6	01	RS-232 Tx	UART	UART0_Tx	pin-8A-20
			02	RS-232 Rx		UART0_Rx	pin-8A-18
RS-485	U11 (MAX13487E)	CON7	01	RS-485 D1+	UART	UART1_Tx	pin-8B-08
			02	RS-485 D1-		UART1_Rx	pin-8B-10
RS-232 (optional)	U13 (SP3243EUCA)	CON8	01	RS-232 Tx	UART	UART2_Tx	pin-8B-11
			02	RS-232 Rx		UART2_Rx	pin-8B-22
GPIO	X	CON4	01	GPIO01	GPIO	PIO_G08	pin-8B-16
			02	GPIO02		PIO_G09	pin-8B-18
			03	GPIO03		PIO_A12	pin-8B-03
			04	GPIO04		PIO_A11	pin-8B-05
			05	GPIO05		PIO_C03	pin-8B-24
			06	GPIO06		PIO_A17	pin-8A-13
			07	GPIO07		PIO_A07	pin-8C-14
			08	GPIO08		PIO_L11	pin-8A-11
			09	GPIO09		PIO_A16	pin-8A-04
			10	GPIO10		PIO_A15	pin-8A-02
			11	GPIO11		PIO_A14	pin-8A-06
			12	GPIO12		PIO_A13	pin-8A-08
Ethernet	X	CON5	100/1000Mbps Ethernet NEO Core : 100Mbps max. NEO Core2 : 1000Mbps max.		Ethernet	Link_LED	pin-8C-01
						Speed_LED	pin-8C-02
						E_D1+ / E_Tx+	pin-8C-03
						E_D1- / E_Tx-	pin-8C-04
						E_D2+ / E_Rx+	pin-8C-05
						E_D2- / E_Rx-	pin-8C-06
						E_D3+	pin-8C-07
						E_D3-	pin-8C-08
						E_D4+	pin-8C-09
						E_D4-	pin-8C-10
USB	X	CON2	USB A		USB	USB-DP1	pin-8A-03
						USB-DM1	pin-8A-05
	X	CON3	USB B		USB	USB-DP2	pin-8A-07
						USB-DM2	pin-8A-09

Simple human machine interface

Function	Main Function in Cape		U8 (NanoPi Core2/Core Connector)		
	Part No.		Signal	NanoPi Definition	Pin No.
RTC	U10 (DS3231)		I2C	I2C2_SCL	pin-8C-16
				I2C2_SDA	pin-8C-18
Beeper	SP1		GPIO	PIO_G11	pin-8B-07
Dip Switch	SW1-1		GPIO	PIO_A02	pin-8B-13
	SW1-2		GPIO	PIO_A03	pin-8B-15
Tack Button	SW2		GPIO	PIO_C02	pin-8B-23
SYS-LED	D3		GPIO	PIO_A06	pin-8B-12
Udef1-LED	D7		GPIO	PIO_C00	pin-8B-19
Udef2-LED	D8		GPIO	PIO_C01	pin-8B-21

Expansion

Function	Drive Component Part No. (Spec.)	External Contact		U8 (NanoPi Core2/Core Connector)		
		Part No.	Pin No.	Signal	NanoPi Definition	Pin No.
I2S	X	CON4	13	I2S0	LRCK	pin-8A-15
			14		BCK	pin-8A-17
			15		DOUT	pin-8A-19
			16		DON	pin-8A-21