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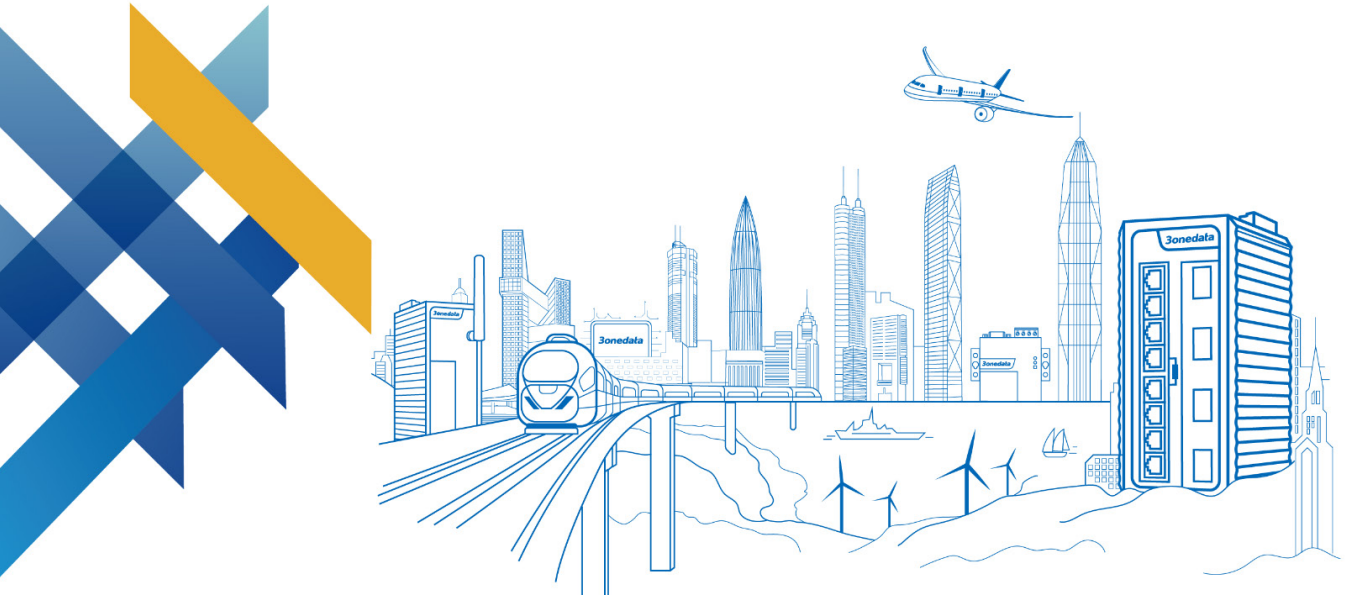

IEM7110-2G-4D-2C

Managed Industrial Ethernet Switch Module

Hardware Manual

Document Version: 02

Issue Date: 12/22/2021

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Preface

Managed industrial Ethernet switch module manual has introduced this module:

- Product Overview
- Encapsulation and size
- Pin definition
- Reference circuit

Audience

This manual applies to the following engineers:

- On-site technical support and maintenance staff
- Hardware engineers

Port Convention

The port number in this manual is only an example, and does not represent the actual port with this number on the device. In actual use, the port number existing on the device shall prevail.

Text Format Convention

Format	Description
" "	Words with “” represent the interface words. Such as: “Port No.“.
>	Multi-level path is separated by ">". Such as opening the local connection path description: Open "Control Panel> Network Connection> Local Area Connection".
Light Blue Font	It represents the words clicked to achieve hyperlink. The font color is as follows: ‘Light Blue’.
About this chapter	The section ‘about this chapter’ provide links to various sections of this chapter, as well as links to the Principles

Format	Description
	Operations Section of this chapter.

Symbols

Format	Description
 Notice	Remind the announcements in the operation, improper operation may result in data loss or equipment damage.
 Warning	Pay attention to the notes on the mark, improper operation may cause personal injury.
 Note	Make a necessary supplementary instruction for operation description.
 Key	Configuration, operation, or tips for device usage.
 Tip	Pay attention to the operation or information to ensure success device configuration or normal working.

Revision Record

Version No.	Date	Revision note
01	12/30/2013	First developed
02	12/22/2021	Data optimization

Contents

1 Product Overview

1.1 Product Introduction

IEM7110-2G-4D-2C is a layer 2 managed embedded industrial Ethernet switch module, which has the characteristics of high integration, small size, rich functions, simple and convenient operation. Including the following interface types:

- 8 100M Ethernet interfaces, which can be configured to 10/100Base-T(X) copper port or 100Base-FX fiber port.
- 2 Gigabit Ethernet interfaces, which can be configured to 1000Base-X fiber port or SGMII mode. The external Gigabit PHY chip in SGMII mode can be used as Gigabit copper port.
- 4 TTL UART interfaces, which can be extended to RS-232/485/422 serial port and provide serial-to-Ethernet serial server function.
- 2 TTL CAN ports, which support CAN server function of bidirectional transparent CAN-to-Ethernet transmission.
- 1 CONSOLE port, used for command line to coordinate and debug this module.
- 2 I/O alarm ports, which can be extended to relay alarm.

1.2 Product Specification

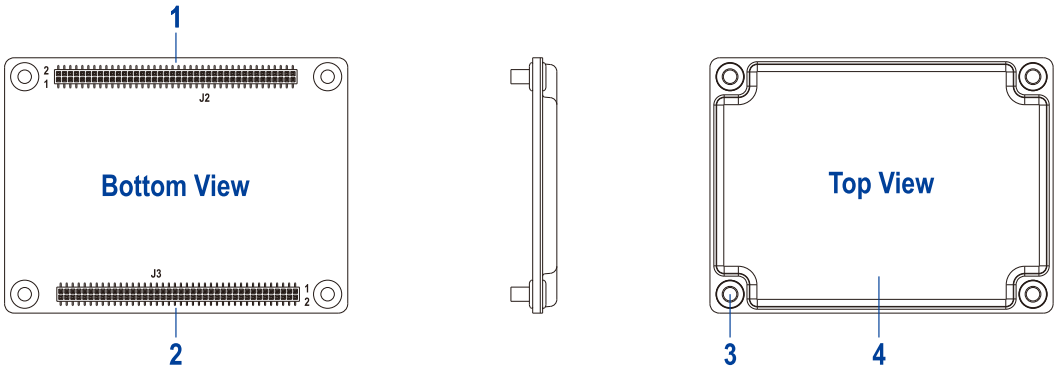
Interface	
100M copper port	10/100Base-T(X), Automatic Flow Control, Full/half Duplex Mode, MDI/MDI-X Autotunning
100M fiber port	100Base-FX
Gigabit copper port	Implemented by extending PHY chip
Gigabit fiber port	1000Base-X
CONSOLE port	CLI command management port

I/O port	Alarm input/output
TTL UART interface	Interface type: RS-232/RS-485/RS-422 (optional) Baud rate: 300bps-115200bps
TTL CAN port	Baud rate: 5kbps~1000kbps
Switch Property	
Backplane bandwidth	7.6G
Packet buffer size	1Mbit
MAC Address Table	8K
Power Supply	
Input power supply	3.3VDC（±5%）
Power Consumption	
Full load	＜3W
Working Environment	
Working temperature	-40~85℃
Storage temperature	-40~85℃
Working humidity	5%~95%
Physical Characteristic	
Mounting	Embedded installation (pin and female header type)
Dimension (W x H x D)	72.5mm×9.7mm×54mm

2 Dimension

2.1 Capsulation Design

The diagram of module structure is as follows:

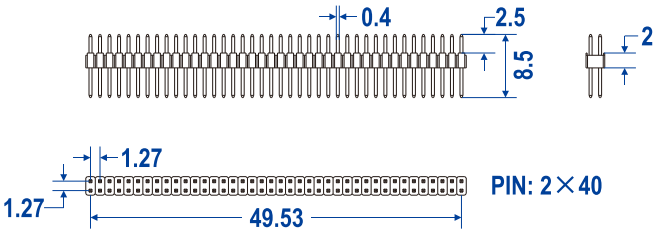


The details of each package label are shown in the following table:

Capsulation	Name	Specification	Note
1	Pin socket J2	Connector 2*40, pin spacing 1.27mm, connector height 4.6mm, square hole 0.4mm*0.4mm.	—
2	Connector J3	Connector 2*40, pin spacing 1.27mm, connector height 4.6mm, square hole 0.4mm*0.4mm.	—
3	location hole	The inner diameter is Φ2.85±0.1mm. Note: • 4 positioning holes can be planned on the bottom plate,	The four positioning holes have the same specifications

Capsulation	Name	Specification	Note
		and M3 screws are used to connect the copper column of the module through the bottom plate to fix the module; • The diameter of the positioning hole of the bottom plate should be greater than Φ3.0mm to avoid the screw being unable to pass because the diameter is too small.	
4	A blade of thermal conductivity	72.5mm*54mm	External heat sink available

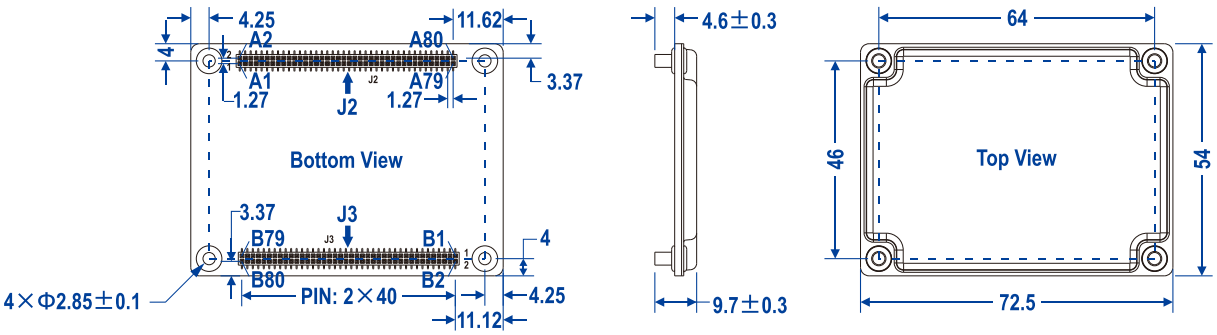
The needle specifications corresponding to J2 and J3 can refer to the following view, unit is mm:



2.2 Product Dimension

The diagram of module structure dimension is as follows:

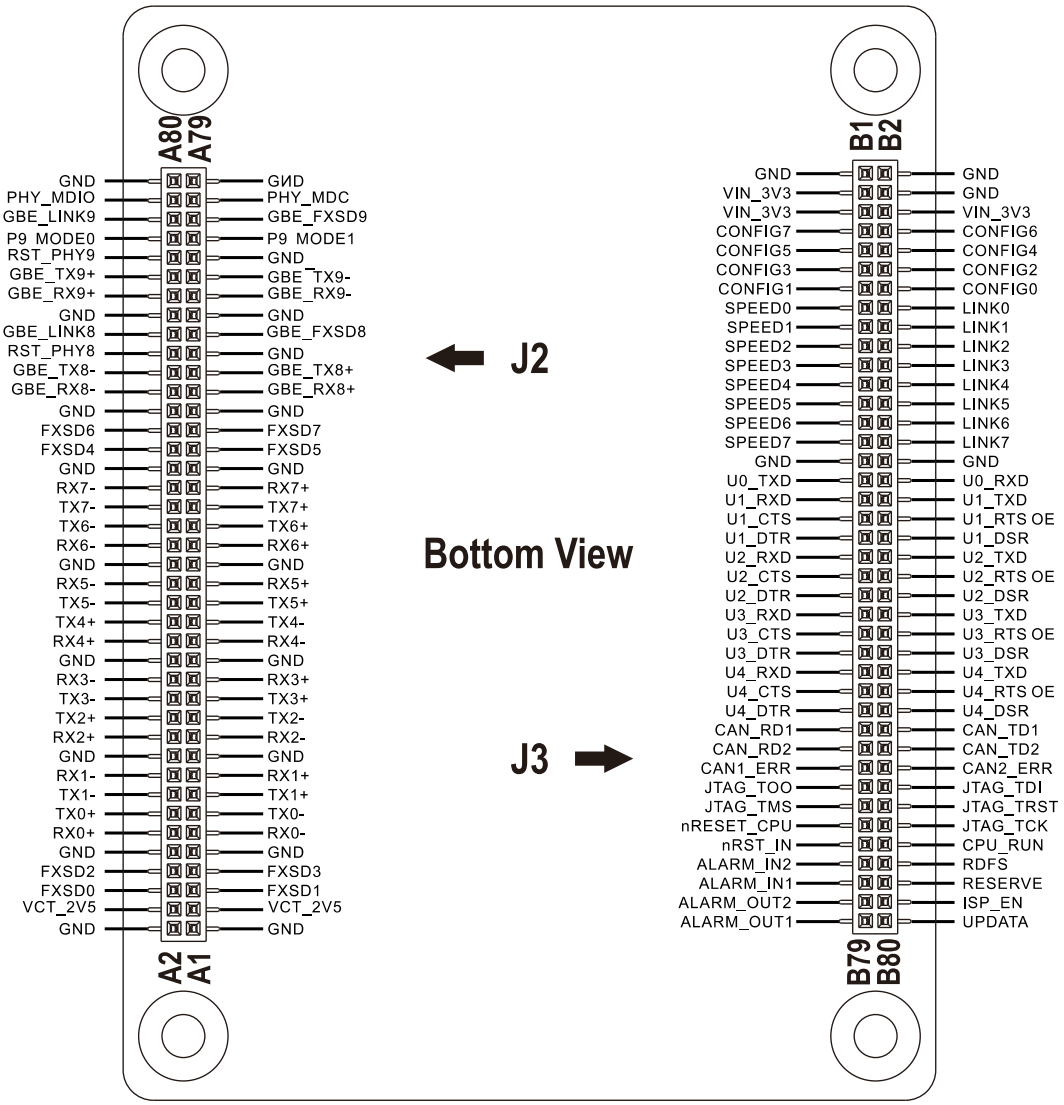
Unit: mm



3 Pin Definition Description

3.1 Pin Definition View

The module definition and bottom view are as follows:



3.2 Pin Definition Name Description

Pin Identification	Note
RX	Receive Data
TX	Transmit Data
GND	Ground
GBE	Gigabit Ethernet
FXSD	FX Signal Detection
MDC	Management Data Clock
MDIO	Management Data Input/Output
RST	Reset
OUT	Output
CONFIG	Config
RDFS	Restore Default Factory Settings
ISP	In System Program
EN	Enable
IN	Input
UPDATA	Upgrade
2V5	2.5VDC
3V3	3.3VDC
CAN	Controller LAN Network, CAN port
ERR	Error
U	UART (Universal Asynchronous Receiver/Transmitter)
VIN	Voltage Input
CTS	Clear To Send
RTS	Request To Send
DSR	Data Send Ready
DCD	Data Carrier Detect
DTR	Data Terminal Ready

3.3 Pin Definition List

Pin Definition of Connector J2 (A1-A80)

Pin No.	Pin Name	Pin No.	Pin Name

Pin No.	Pin Name	Pin No.	Pin Name
A1	GND	A2	GND
A3	VCT_2V5	A4	VCT_2V5
A5	FXSD1	A6	FXSD0
A7	FXSD3	A8	FXSD2
A9	GND	A10	GND
A11	RX0-	A12	RX0+
A13	TX0-	A14	TX0+
A15	TX1+	A16	TX1-
A17	RX1+	A18	RX1-
A19	GND	A20	GND
A21	RX2-	A22	RX2+
A23	TX2-	A24	TX2+
A25	TX3+	A26	TX3-
A27	RX3+	A28	RX3-
A29	GND	A30	GND
A31	RX4-	A32	RX4+
A33	TX4-	A34	TX4+
A35	TX5+	A36	TX5-
A37	RX5+	A38	RX5-
A39	GND	A40	GND
A41	RX6+	A42	RX6-
A43	TX6+	A44	TX6-
A45	TX7+	A46	TX7-
A47	RX7+	A48	RX7-
A49	GND	A50	GND
A51	FXSD5	A52	FXSD4
A53	FXSD7	A54	FXSD6
A55	GND	A56	GND
A57	GBE_RX8+	A58	GBE_RX8-
A59	GBE_TX8+	A60	GBE_TX8-
A61	GND	A62	RST_PHY8
A63	GBE_FXSD8	A64	GBE_LINK8
A65	GND	A66	GND
A67	GBE_RX9-	A68	GBE_RX9+
A69	GBE_TX9-	A70	GBE_TX9+

Pin No.	Pin Name	Pin No.	Pin Name
A71	GND	A72	RST_PHY9
A73	P9_MODE1	A74	P9_MODE0
A75	GBE_FXSD9	A76	GBE_LINK9
A77	PHY_MDC	A78	PHY_MDIO
A79	GND	A80	GND

Pin Definition of Connector J3 (B1-B80)

Pin No.	Pin Name	Pin No.	Pin Name
B1	GND	B2	GND
B3	VIN_3V3	B4	GND
B5	VIN_3V3	B6	VIN_3V3
B7	CONFIG7	B8	CONFIG6
B9	CONFIG5	B10	CONFIG4
B11	CONFIG3	B12	CONFIG2
B13	CONFIG1	B14	CONFIG0
B15	SPEED0	B16	LINK0
B17	SPEED1	B18	LINK1
B19	SPEED2	B20	LINK2
B21	SPEED3	B22	LINK3
B23	SPEED4	B24	LINK4
B25	SPEED5	B26	LINK5
B27	SPEED6	B28	LINK6
B29	SPEED7	B30	LINK7
B31	GND	B32	GND
B33	U0_TXD	B34	U0_RXD
B35	U1_RXD	B36	U1_TXD
B37	U1_CTS	B38	U1_RTS OE
B39	U1_DTR	B40	U1_DSR
B41	U2_RXD	B42	U2_TXD
B43	U2_CTS	B44	U2_RTS OE
B45	U2_DTR	B46	U2_DSR
B47	U3_RXD	B48	U3_TXD
B49	U3_CTS	B50	U3_RTS OE
B51	U3_DTR	B52	U3_DSR

Pin No.	Pin Name	Pin No.	Pin Name
B53	U4_RXD	B54	U4_TXD
B55	U4_CTS	B56	U4_RTS OE
B57	U4_DTR	B58	U4_DSR
B59	CAN_RD1	B60	CAN_TD1
B61	CAN_RD2	B62	CAN_TD2
B63	CAN1_ERR	B64	CAN2_ERR
B65	JTAG_TDO	B66	JTAG_TDI
B67	JTAG_TMS	B68	JTAG_TRST
B69	nRESET_CPU	B70	JTAG_TCK
B71	nRST_IN	B72	CPU_RUN
B73	ALARM_IN2	B74	RDFS
B75	ALARM_IN1	B76	RESERVE
B77	ALARM_OUT2	B78	ISP_EN
B79	ALARM_OUT1	B80	UPDATA

3.4 Detailed Pin Definition Description

3.4.1 100M Ethernet Port

Port 0-7 can be configured to 100M fiber port or 100M copper port. Description of 100M Ethernet interface pin definition:

PIN Name	Pin No.	Type	Function Description
RX0+	A12	Input	Positive end of 100M Ethernet interface data receiving • When the port is configured to 100M copper port, RXP[0:7] is directly connected to the receiving network transformer. • When the port is configured to a 100M fiber port, RXP[0:7] is directly connected to the positive output end of the fiber receiver. • Grounding is recommended when this pin is not in use.
RX1+	A17		
RX2+	A22		
RX3+	A27		
RX4+	A32		
RX5+	A37		
RX6+	A41		
RX7+	A47		
RX0-	A11	Input	Negative end of 100M Ethernet interface data receiving.
RX1-	A18		

PIN Name	Pin No.	Type	Function Description
RX2-	A21		• When the port is configured to 100M copper port, RXN[0:7] is directly connected to the receiving network transformer. • When the port is configured to 100M fiber port, RXN[0:7] is directly connected to the negative output end of the fiber receiver. • Grounding is recommended when this pin is not in use.
RX3-	A28		
RX4-	A31		
RX5-	A38		
RX6-	A42		
RX7-	A48		
TX0+	A14	Input	Positive end of 100M Ethernet interface data transmission. • When the port is configured to 100M copper port, TXP[0:7] is directly connected to the sending network transformer. • When the port is configured to a 100M fiber port, TXP[0:7] is directly connected to the positive input end of the fiber transmitter. • Grounding is recommended when this pin is not in use.
TX1+	A15		
TX2+	A24		
TX3+	A25		
TX4+	A34		
TX5+	A35		
TX6+	A43		
TX7+	A45		
TX0-	A13	Output	Negative end of 100M Ethernet interface data transmission. • When the port is configured to 100M copper port, TXN[0:7] is directly connected to the sending network transformer. • When the port is configured to a 100M fiber port, TXN[0:7] is directly connected to the negative input end of the fiber transmitter. • Grounding is recommended when this pin is not in use.
TX1-	A16		
TX2-	A23		
TX3-	A26		
TX4-	A33		
TX5-	A36		
TX6-	A44		
TX7-	A46		
FXSD0	A6	Input	100M Ethernet interface optical signal detection input. • When Port 0-7 are configured to 100M fiber ports, FXSD is used to detect whether the optical module detects a valid signal. A high level indicates that an optical signal is detected. • When Port 0-7 are configured to 100M copper ports, FXSD cannot be suspended, and it is recommended to be grounded through a 4.7K resistor.
FXSD1	A5		
FXSD2	A8		
FXSD3	A7		
FXSD4	A52		
FXSD5	A51		
FXSD6	A54		
FXSD7	A53		

PIN Name	Pin No.	Type	Function Description
CONFIG0	B14	Input	100M Ethernet interface configuration pin. • When CONFIG is grounded, Port 0-7 are configured to 100M ports. • When CONFIG is connected to +3.3V through a 4.7K resistor, Port 0-7 are configured to 100M fiber ports. • When this pin is not used, it can be left suspended.
CONFIG1	B13		
CONFIG2	B12		
CONFIG3	B11		
CONFIG4	B10		
CONFIG5	B9		
CONFIG6	B8		
CONFIG7	B7		

3.4.2 Gigabit Ethernet Port

Port 8-9 can be configured to Gigabit fiber ports or Gigabit copper ports. In the SGMII mode, the port is configured to a Gigabit copper port, and a Gigabit PHY chip needs to be connected externally, and the PHY chip is connected and managed through MDIO and MDC pins.

Pin definition description of Gigabit Ethernet port:

PIN Name	Pin No.	Type	Function Description
GBE_TX8+	A59	Output	Positive end of 1000M Ethernet interface (SGMII) data transmission • When Port 8-9 are configured to 1000M fiber ports, they are directly connected to the positive input end of the optical module. • When Port 8-9 are configured to 1000M copper ports, they are directly connected to the positive input end of SGMII interface on the external Gigabit PHY chip. • When this pin is not used, it recommended be left suspended.
GBE_TX9+	A70		
GBE_TX8-	A60	Output	Negative end of 1000M Ethernet interface (SGMII) data transmission. • When Port 8-9 are configured to 1000M fiber ports, they are directly connected to the negative input end of the optical
GBE_TX9-	A69		

PIN Name	Pin No.	Type	Function Description
			module. • When Port 8-9 are configured to 1000M copper ports, they are directly connected to the negative input end of SGMII interface on the external Gigabit PHY chip. • When this pin is not used, it recommended be left suspended.
GBE_RX8+	A57	Input	Positive end of 1000M Ethernet interface (SGMII) data receiving • When Port 8-9 are configured to 1000M fiber ports, they are directly connected to the positive output end of the optical module. • When Port 8-9 are configured to 1000M copper ports, they are directly connected to the positive output end of SGMII interface on the external Gigabit PHY chip. • When this pin is not used, it recommended be left suspended.
GBE_RX9+	A68		
GBE_RX8-	A58	Input	Negative end of 1000M Ethernet interface (SGMII) data receiving. • When Port 8-9 are configured to 1000M fiber ports, they are directly connected to the negative output end of the optical module. • When Port 8-9 are configured to 1000M copper ports, they are directly connected to the negative output end of SGMII interface on the external Gigabit PHY chip. • When this pin is not used, it recommended be left suspended.
GBE_RX9-	A67		
GBE_FXSD 8	A63	Input	1000M Ethernet interface optical signal detection input. • When Port 8-9 are configured to fiber ports, FXSD is used to detect whether the optical module detects a valid signal. A high level indicates that an optical
GBE_FXSD 9	A75		

PIN Name	Pin No.	Type	Function Description
			signal is detected. • When Port 8-9 are configured to copper ports, FXSD cannot be suspended, and it is recommended to be grounded through a 4.7K resistor.
GBE_LINK8	A64	Output	Multi-function pin of 1000M Ethernet Port 8, which can be used for working mode configuration and indicator. • When this pin is connected to the +3.3VDC power supply through a 4.7kΩ resistor, the corresponding Gigabit Ethernet Port 8 is configured to a 1000M fiber port. - When this pin outputs high level, it indicates that the port has no network connection. - When this pin outputs low level, it indicates that the port has established an effective network connection. - When this pin outputs alternating high and low levels, it indicates that the port has data transmission. • When the pin is suspended or grounded, the corresponding Gigabit Ethernet Port 8 is configured to SGMII mode, and can be used as a Gigabit port by externally connecting Gigabit PHY chip. Note: When the hardware is reset, this pin serves as the mode configuration input.
P9_MODE0	A74	Input	Work mode configuration pin P9_MODE[1:0] of Gigabit Ethernet Port 9. When the pin is suspended, it is configured to 0; When the pin is connected to the 3.3VDC power supply through a 4.7kΩ resistor, it is configured to 1. P9_MODE[1:0] is configured as follows: • 00: Reserved • 01: 1000base-x mode (fiber port) • 10: SGM II mode (1000BASE-T copper
P9_MODE1	A73		

PIN Name	Pin No.	Type	Function Description
			port, external PHY required) • 11: Reserved
PHY_MDIO	A78	Input / output	SMI (serial management interface) includes MDIO and MDC signal lines, MDIO is the external PHY chip management data input/output pin, and MDC is the external PHY chip management data clock pin.
PHY_MDC	A77	Output	
RST_PHY8	A62	Output	Software reset pin of external PHY chip, and active low level. When Gigabit Ethernet Port 8-9 are configured to copper ports, the corresponding RST_PHY[8:9] can be connected with the external PHY chip reset signal pin.
RST_PHY9	A72		

3.4.3 Power Supply Interface

Pin definition description of power supply interface :

PIN Name	Pin No.	Type	Function Description
VIN_3V3	B3, B5, B6	Input	3.3VDC voltage input, which supplies power to the module.
VCT_2V5	A3, A4	Output	2.5VDC power output, which supplies power to the center tap of 100M Ethernet interface network transformer, cannot be used for other purposes.
GND	A1, A2, A9, A10, A19, A20, A29, A30, A39, A40, A49, A50, A55, A56, A61, A65, A66, A71, A79, A80, B1, B2, B4, B31, B32	Ground	Ground signal

3.4.4 TTL UART Interface

TTL UART can be extended to RS-232/RS-485/RS-422 serial port.

TTL UART pin definition description:

PIN name	Pin No.	Type	Function description
U1_RXD	B35	Input	UART1 receive signal
U1_TXD	B36	Output	UART1 send signal
U1_CTS	B37	Input	UART1 clear to send signal
U1_RTS OE	B38	Output	UART1 request to end signal Note: When UART1 is extended to RS-485 serial port, this pin is used as RS-485 transmit enable, and the high level is active.
U1_DTR	B39	Output	UART1 data send ready signal
U1_DSR	B40	Input	UART1 data terminal ready signal
U2_RXD	B41	Input	UART2 received data signal
U2_TXD	B42	Output	UART2 transmitted data signal
U2_CTS	B43	Input	UART2 clear to send signal
U2_RTS OE	B44	Output	UART2 request to send signal Note: When UART2 is extended to RS-485 serial port, this pin is used as RS-485 transmit enable, and the high level is active.
U2_DTR	B45	Output	UART2 data send ready signal
U2_DSR	B46	Input	UART2 data terminal ready signal
U3_RXD	B47	Input	UART3 received data signal
U3_TXD	B48	Output	UART3 transmitted data signal
U3_CTS	B49	Input	UART3 clear to send signal
U3_RTS OE	B50	Output	UART3 request to send signal Note: When UART3 is extended to RS-485 serial port, this pin is used as RS-485 transmit enable, and the high level is active.
U3_DTR	B51	Output	UART3 data send ready signal
U3_DSR	B52	Input	UART3 data terminal ready signal
U4_RXD	B53	Input	UART4 received data signal
U4_TXD	B54	Output	UART4 transmitted data signal
U4_CTS	B55	Input	UART4 clear to send signal
U4_RTS OE	B56	Output	UART4 request to send signal Note:

PIN name	Pin No.	Type	Function description
			When UART4 is extended to RS-485 serial port, this pin is used as RS-485 transmit enable, and the high level is active.
U4_DTR	B57	Output	UART4 data send ready signal
U4_DSR	B58	Input	UART4 data terminal ready signal

3.4.5 TTL CAN Port

Pin definition description of 2 TTL CAN ports:

PIN Name	Pin No.	Type	Function Description
CAN_TD1	B60	Output	CAN1 transmitted data signal
CAN_RD1	B59	Input	CAN1 received data signal
CAN_TD2	B62	Output	CAN2 transmitted data signal
CAN_RD2	B61	Input	CAN2 received data signal

3.4.6 CONSOLE Port (Debugging Port)

Pin definition description of CONSOLE port:

PIN Name	Pin No.	Type	Function Description
U0_RXD	B34	Input	UART0 receiving signal, which is only used for debugging this module by CONSOLE port.
U0_TXD	B33	Output	UART0 transmitting signal, which is only used for debugging this module by CONSOLE port.

3.4.7 I/O Alarm Interface

Pin definition description of I/O alarm port:

PIN name	Pin No.	Type	Function description
ALARM_IN1	B75	Input	2 alarm signal input pins, which can configure alarm input types by yourself,
ALARM_IN2	B73		

PIN name	Pin No.	Type	Function description
			such as power alarm information detection. The default configuration is low-level alarm, and high-level alarm is not available.
ALARM_OUT1	B79	Output	ALARM_OUT1 can be extended to alarm indicator and low-level alarm.
ALARM_OUT2	B77	Output	ALARM_OUT2 can be extended to relay, and the default is high level; The high and low levels can be configured by software.

3.4.8 Indicator

Pin definition description of indicator:

PIN Name	Pin No.	Type	Function Description
LINK0	B16	Output	100M Ethernet Port 0-7 connection and data transceiving indication pin LINK[0:7]. • When this pin outputs high level, it indicates that the corresponding 100M Ethernet Port 0-7 are not connected. • When this pin outputs low level, it indicates that the corresponding 100M Ethernet Port 0-7 have established an valid connection. • When this pin outputs alternating high and low levels, it indicates that the corresponding 100M Ethernet Port 0-7 have data transmission.
LINK1	B18		
LINK2	B20		
LINK3	B22		
LINK4	B24		
LINK5	B26		
LINK6	B28		
LINK7	B30		
GBE_LINK8	A64	Output	Multi-function pin of 1000M Ethernet Port 8, which can be used for working mode configuration and status indication. • When this pin is connected to the +3.3VDC power supply through a 4.7kΩ resistor, the corresponding Gigabit Ethernet Port 8 is configured to a 1000M fiber port. - When this pin outputs high levels, it indicates that the corresponding Gigabit Ethernet Port 8 is not connected. - When this pin outputs low levels, it indicates that the corresponding Gigabit

PIN Name	Pin No.	Type	Function Description
			Ethernet port 8 has established a valid connection. - When this pin outputs alternating high and low levels, it indicates that the corresponding Gigabit Ethernet Port 8 has data transmission. • When the pin is suspended or grounded, the corresponding Gigabit Ethernet Port 8 is configured to SGMII mode, and can be used as a Gigabit port by externally connecting Gigabit PHY chip.
GBE_LINK9	A76	Output	1000M Ethernet port 9 connection status indication pin. When Gigabit Ethernet Port 9 is configured to 1000M fiber port: • When this pin outputs high levels, it indicates that the corresponding Gigabit Ethernet Port 9 is not connected. • When this pin outputs low levels, it indicates that the corresponding Gigabit Ethernet Port 9 has established a valid connection. • When this pin outputs alternating high and low levels, it indicates that there is data transmission in the corresponding Gigabit Ethernet Port 9.
SPEED0	B15	Output	100M Ethernet interface 0-7 speed indicator pin SPEED[0: 7]. • When the 100M Ethernet port is configured to 10BASE-T, that is, 10M rate, this pin outputs high levels. • When the 100M Ethernet port is configured to 100BASE-TX, that is, 100M rate, this pin outputs low levels.
SPEED1	B17		
SPEED2	B19		
SPEED3	B21		
SPEED4	B23		
SPEED5	B25		
SPEED6	B27		
SPEED7	B29		
CPU_RUN	B72	Output	Output pin of CPU running indicator, active low level. The indicator status is as follows: • Blinking, it indicates that the system is running normally; • ON, it indicates that the system is starting or the device is running abnormally;

PIN Name	Pin No.	Type	Function Description
			• OFF, it indicates that the device is powered off or the device is abnormal.
CAN1_ERR	B63	Output	CAN1 error indicator, active low level.
CAN2_ERR	B64	Output	CAN2 error indicator, active low level.

3.4.9 Other Pins

PIN Name	Pin No.	Type	Function Description
nRST_IN	B71	Input	Input pin of manual reset, active low level, and it is recommended to pull high. When the input low level of this pin lasts longer than 200ms, the system enters the reset state.
RDFS	B74	Input	Restore the factory settings. Active low level, it is recommended to pull high. When the module is powered on, it samples the pin signal. When the pin is connected to low level, the module restores the factory setting after about 1s.
ISP_EN	B78	Input	Program upgrade, active low level, it is recommended to pull high.
UPDATA	B80	Input	Program upgrade, active low level, it is recommended to pull high. When the module is powered on, it samples the pin signal. When the pin is connected to low level, the module program starts to upgrade.
nRESET_CPU	B69	Input	Unused, please suspend it.
JTAG_TDO	B65	Output	JTAG debugging. Unused, please suspend it.
JTAG_TDI	B66	Input	
JTAG_TMS	B67	Input	
JTAG_TRST	B68	Input	
JTAG_TCK	B70	Input	
RESERVE	B76	Reserv	Unused, please suspend it.

PIN Name	Pin No.	Type	Function Description
		ed	

4 Reference Circuit

Note

The ground signal in the reference circuit is identified as follows:

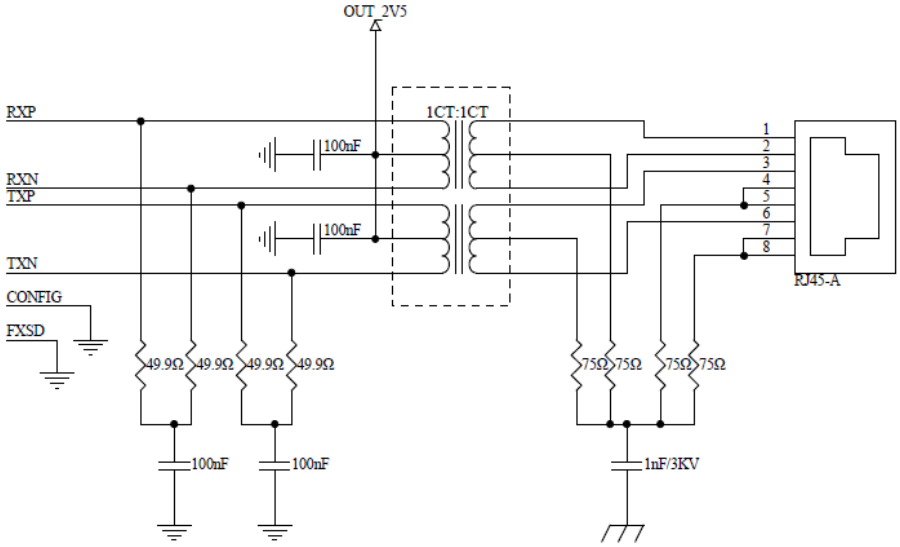
- ⏚: GND, ground signal;
- ⏥: FG, frame grounding.

4.1 100M Ethernet Port

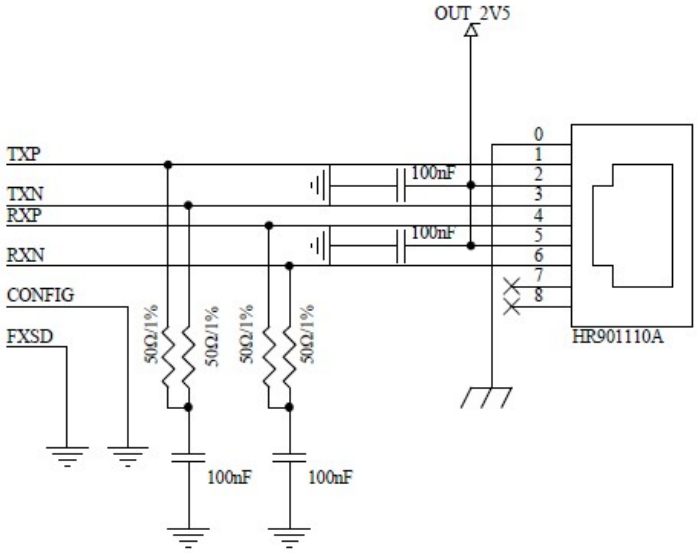
PIN Name	Type	Configuration Method
RX+[0:7]	Positive input end of data receiving	100M Ethernet interface configuration pin CONFIG[0:7]. • When CONFIG[0:7] is grounded, the corresponding 100M Ethernet Port 0-7 are configured to 100M ports. • When CONFIG[0:7] is connected to the +3.3VDC power supply through a 4.7kΩ resistor, the corresponding 100M Ethernet Port 0-7 are configured to 100M fiber ports. • Grounding is recommended when this pin is not in use.
RX-[0:7]	Negative input end of data receiving	
TX+[0:7]	Positive output end of data transmission	
TX-[0:7]	Negative output end of data transmission	
FXSD[0:7]	Detection input of optical signal	
CONFIG[0:7]	Configure port	

Reference Circuit of 100M Copper Port (with Independent Network Transformer)

The dotted line in the reference circuit diagram of the 100M copper port is a 1: 1 network transformer, and the recommended models are H1102, H1200, H1164, XFMR-H4001CG or other compatible products. The center tap of the network transformer needs to be connected to the A2 and A3 pins of the module, which provide the +2.5V level. When the port is used as a copper port, the CONFIG and FXSD pins of the module need to be grounded.

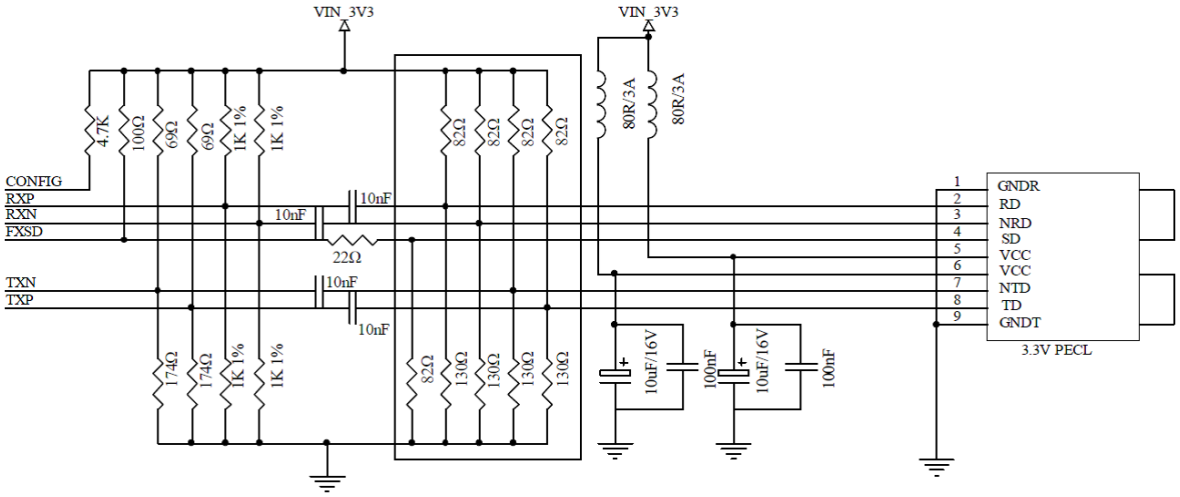


Reference Circuit of 100M Copper Port (with Built-in Network Port Transformer)



Reference Circuit of 100M Fiber Port

100M optical module is used in the reference circuit: 1X9 welding transceiver optical module, generally with a speed not higher than Gigabit, and SC interface is mostly used. The optical module adopts positive emitter coupling logic with 3.3V and 5V power supply. If a 5V optical module is used, the matching resistance in the box in the figure needs to refer to the circuit of the optical module manufacturer. CONFIG is connected to +3.3V(DC) through 4.7K resistor, and FXSD is connected to SD signal of optical module as shown in the figure.



4.2 Gigabit Ethernet Port

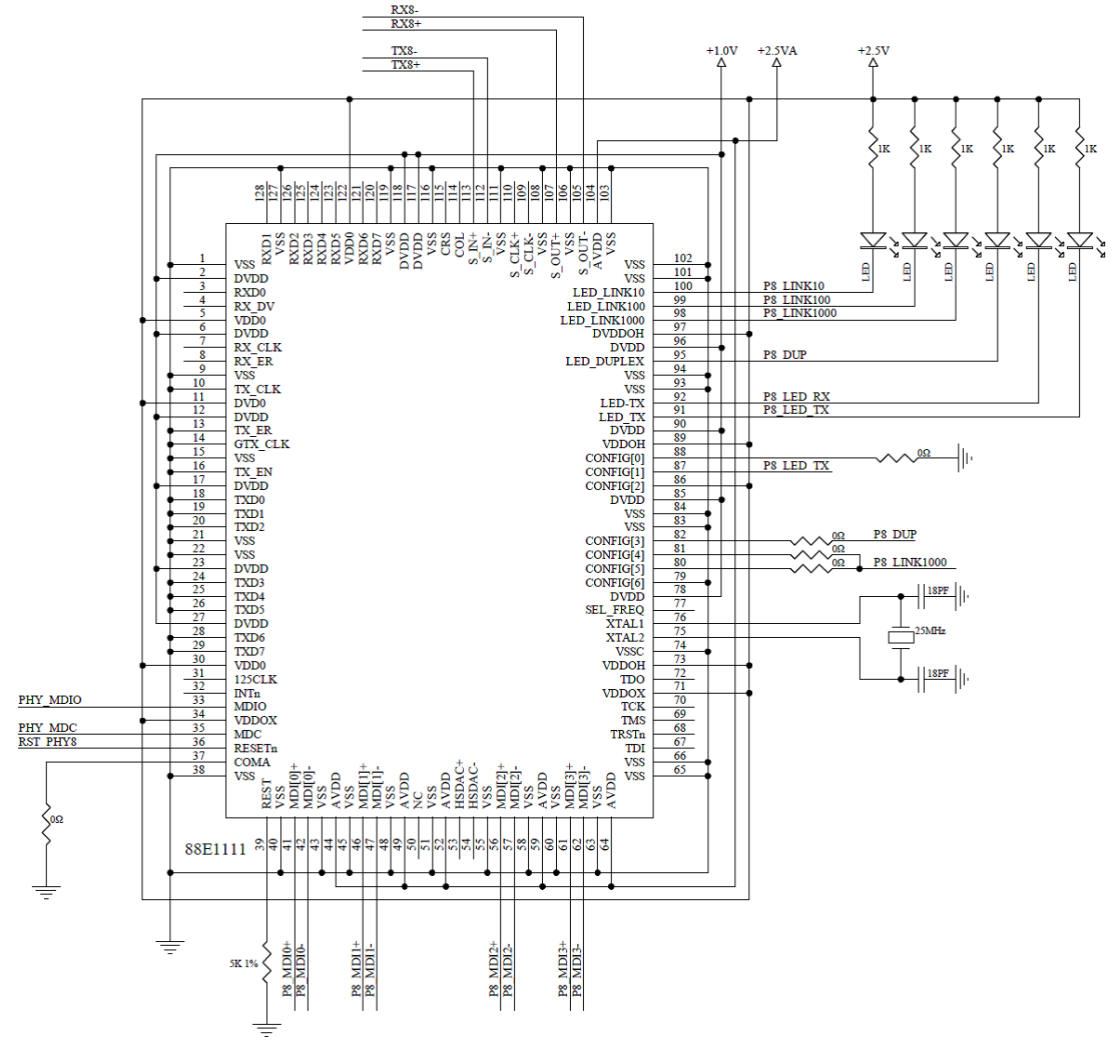
Port 8-9 can be configured to Gigabit fiber ports or Gigabit copper ports. In the SGMII mode, the port is configured to a Gigabit copper port, and a Gigabit PHY chip needs to be connected externally, and the PHY chip is connected and managed through MDIO and MDC pins.

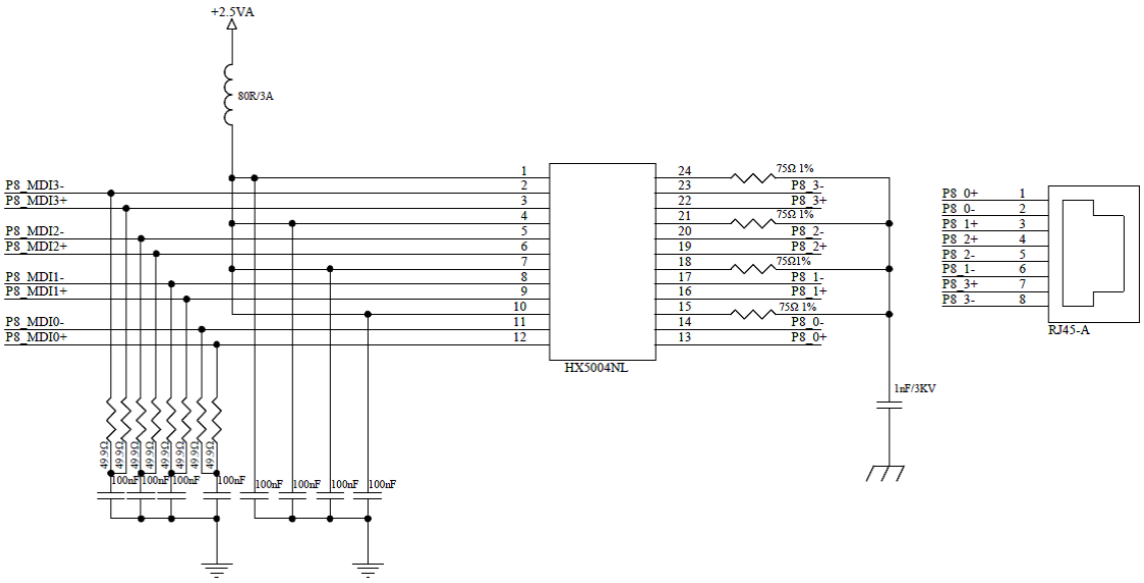
PIN name	Type	Configuration Method
GBE_TX+[8:9]	Positive output end of data transmission	The multifunction pin GBE_LINK8 of 1000M Ethernet Port 8 can be used for work mode configuration and indicator. • When this pin is connected to the +3.3VDC power supply through a 4.7kΩ resistor, the corresponding Gigabit Ethernet Port 8 is configured to a 1000M fiber port.
GBE_TX-[8:9]	Negative output end of data transmission	
GBE_RX+[8:9]	Positive input end of data receiving	
GBE_RX-[8:9]	Negative input end of data receiving	

<table>
<tr><th>PIN name</th><th>Type</th><th>Configuration Method</th></tr>
<tr><td>GBE_FXSD[8:9]</td><td>Detection input of optical signal</td><td rowspan="6">• When the pin is suspended or grounded, the corresponding Gigabit Ethernet Port 8 is configured to SGMII mode, and can be used as a Gigabit port by externally connecting Gigabit PHY chip.

Work mode configuration pin P9_MODE[1:0] of Gigabit Ethernet Port 9. When the pin is suspended, it is configured to 0; When the pin is connected to the 3.3VDC power supply through a 4.7kΩ resistor, it is configured to 1. MODE1:MODE0 is configured as follows:
• 00: Reserved
• 01: 1000base-x mode (fiber port)
• 10: SGM II mode (1000BASE-T copper port, external PHY required)
• 11: Reserved</td></tr>
<tr><td>GBE_LINK8</td><td>Configure Port 8</td></tr>
<tr><td>P9_MODE0</td><td rowspan="2">Configure Port 9</td></tr>
<tr><td>P9_MODE1</td></tr>
<tr><td>PHY_MDIO</td><td rowspan="2">SMI Interface</td></tr>
<tr><td>PHY_MDC</td></tr>
<tr><td>RST_PHY[8:9]</td><td>External PHY chip reset</td></tr>
</table>

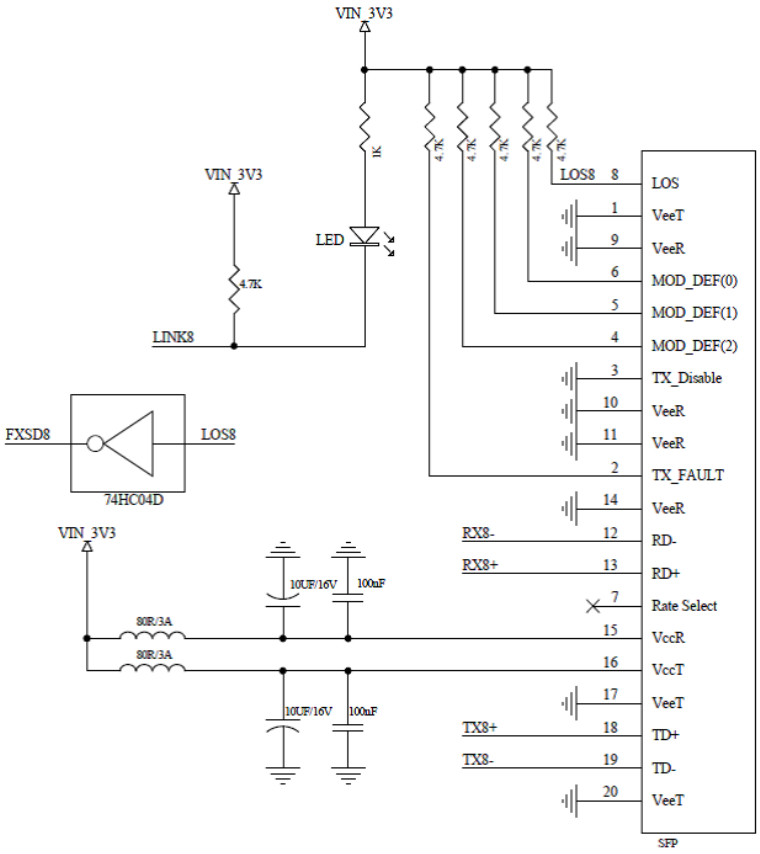
Gigabit Copper Port Reference Circuit of Port 8





Gigabit Fiber Port Reference Circuit of Port 8

The 1000M fiber port adopts SFP optical module (SFP-encapsulated-hot-plug small encapsulated module, currently the highest speed can reach 10G, and LC interface is mostly used), and the connection line is shown in the above figure. VccT and VccR are the transmitting and receiving part power supplies, respectively, which require 3.3V±5% and the maximum power supply current is over 300mA. The LOS valid signal of SFP optical module is low level, which needs to be changed to high level through an inverter, and the high level of FXSD8 indicates that the valid signal is detected.

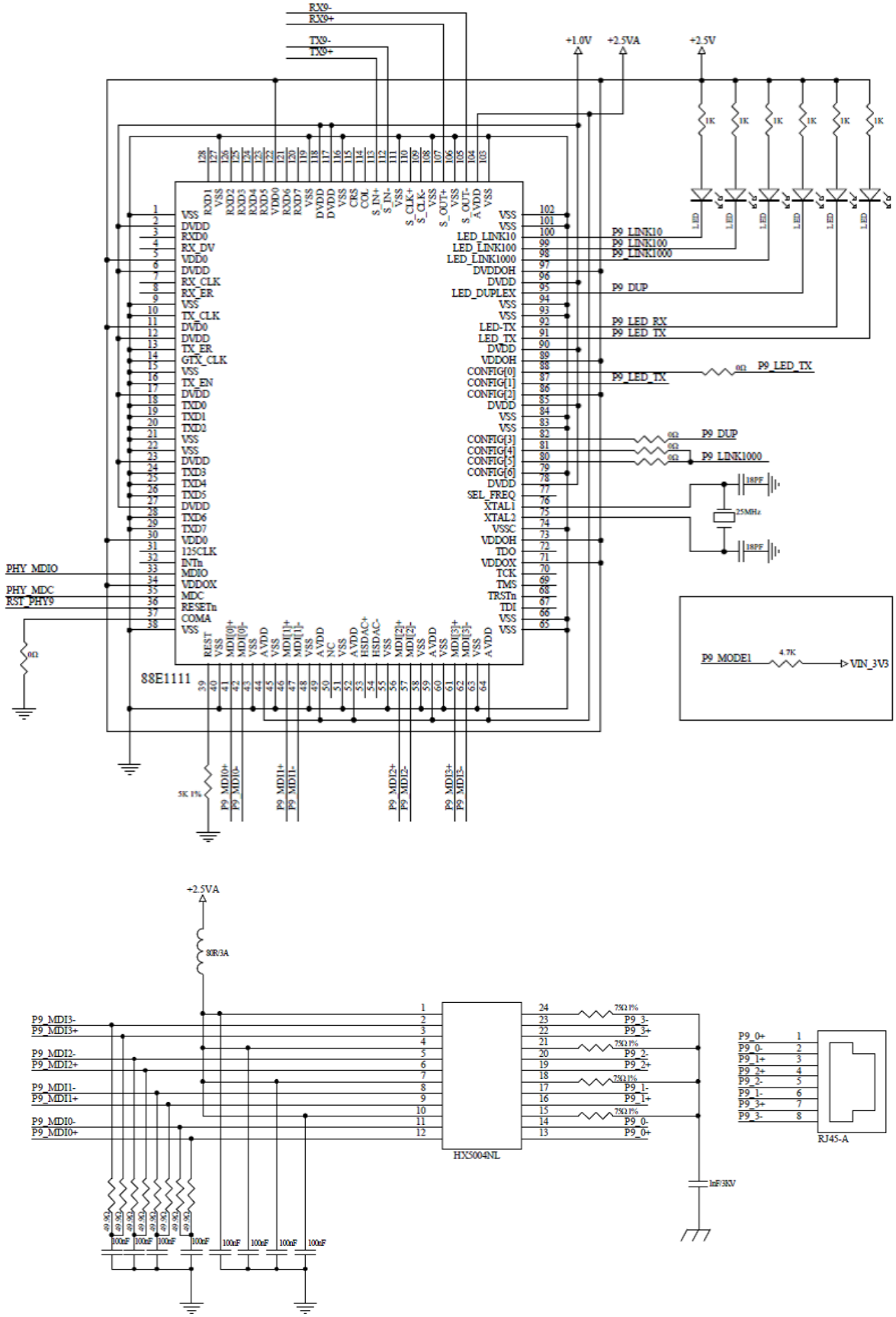


Pin definition list of SFP.

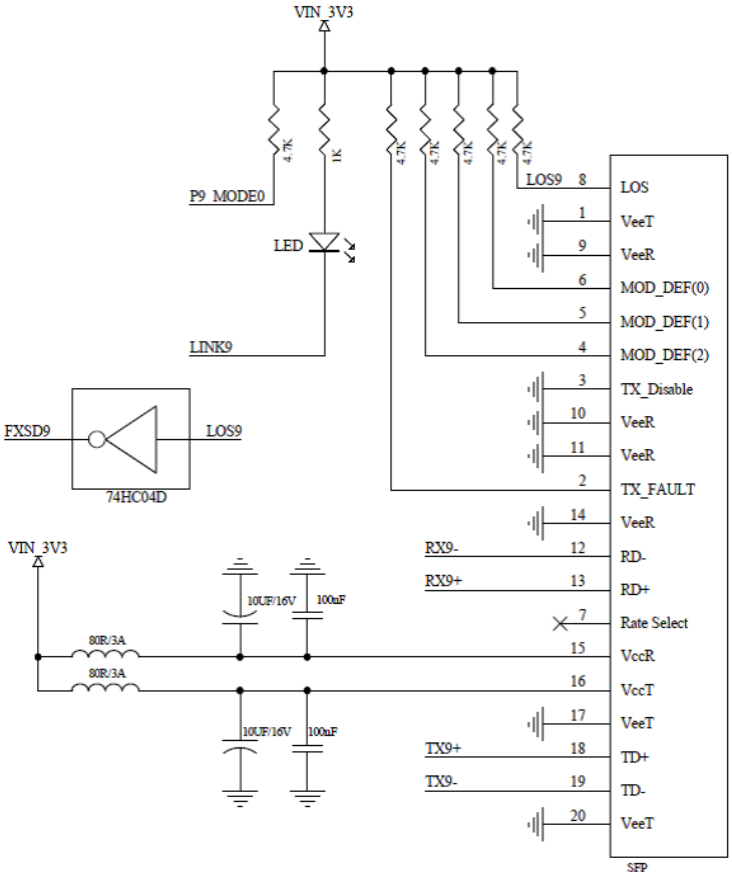
Pin No.	PIN name	Function description
1	VeeT	Send part ground
2	TX_FAULT	Send part error
3	TX_Disable	Disable emission, high level or suspending is effective.
4	MOD_DEF(2)	Module definition pin, data line for I2C

Pin No.	PIN name	Function description
		communication.
5	MOD_DEF(1)	Module definition pin, clock line for I2C communication
6	MOD_DEF(0)	Module definition pin, grounding
7	Rate Select	Rate Select
8	LOS	LOS alarm
9	VeeR	Receive part ground
10	VeeR	Receive partial ground
11	VeeR	Receive partial ground
12	RD-	Receive partial data inverted output
13	RD+	Receive partial data output
14	VeeR	Receive partial ground
15	VccR	Receive partial power
16	VccT	Send partial power
17	VeeT	Send partial ground
18	TD+	Send partial data input
19	TD-	Send partial inverted data input
20	VeeT	Send partial ground

Gigabit Copper Port Reference Circuit of Port 9

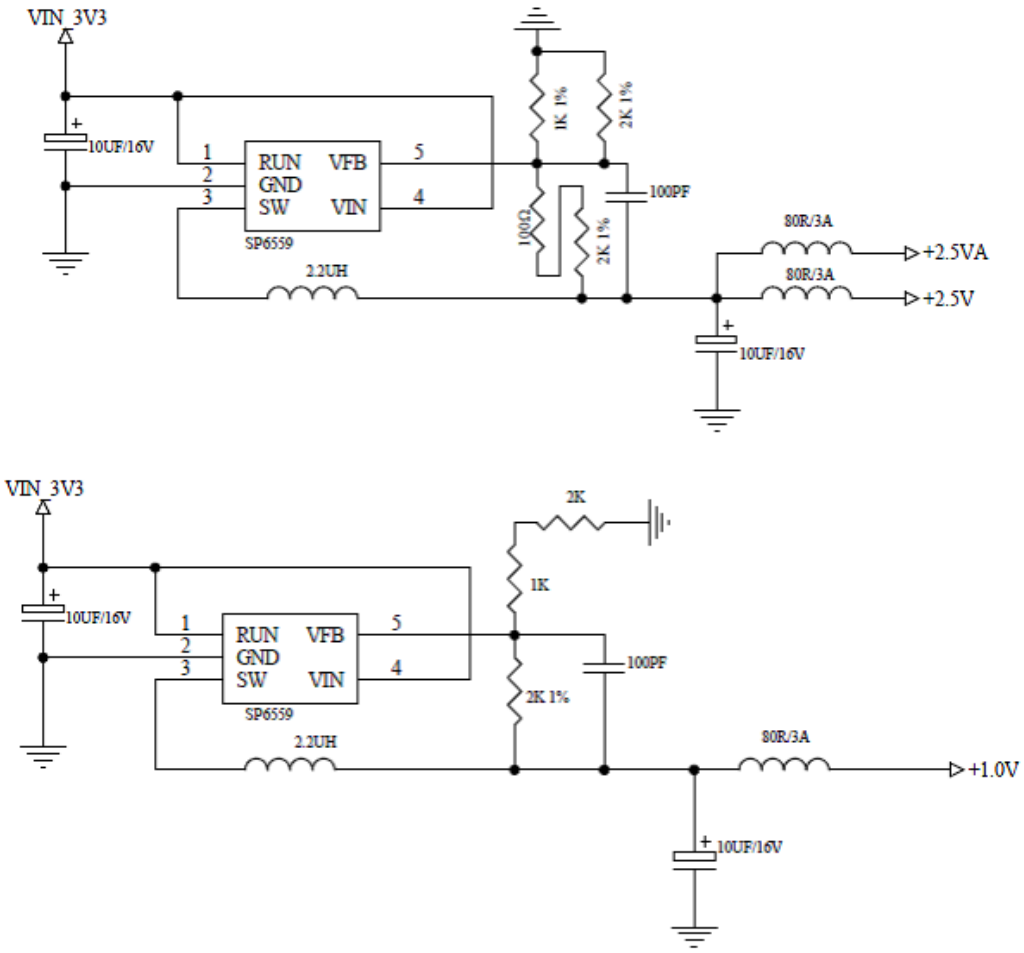


Gigabit Fiber Port Reference Circuit of Port 9



Power Reference Circuit of Port 8-9

Stable DC voltages of 1.1V, 2.5V and 2.5VA supply power to the PHY chip of 1000M copper port of Port 8 and Port 9. In order to make the PHY chip work stably, it is recommended to add 100nF filter capacitance to each power supply pin of the PHY chip.

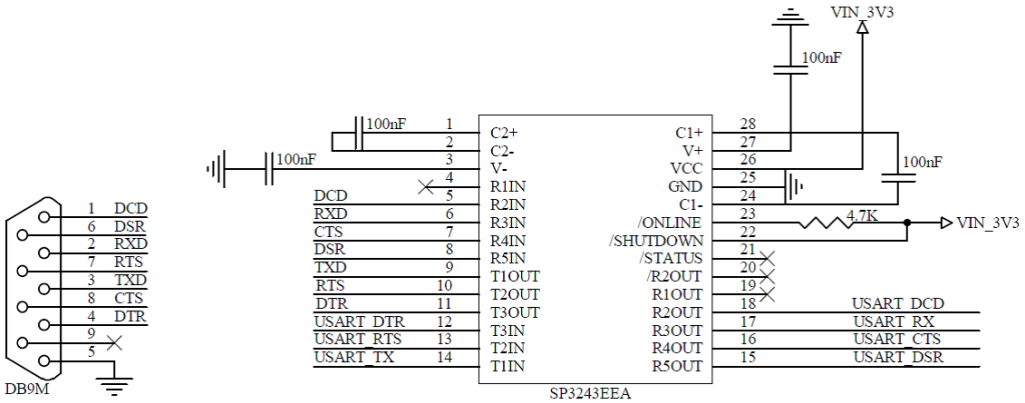


4.3 TTL UART Interface

The module has 4 TTL UART interfaces, which can be configured into RS-232 and RS-485/422 communication modes. Each communication mode has reference circuit and description information, and the user can configure the communication mode according to the requirements.

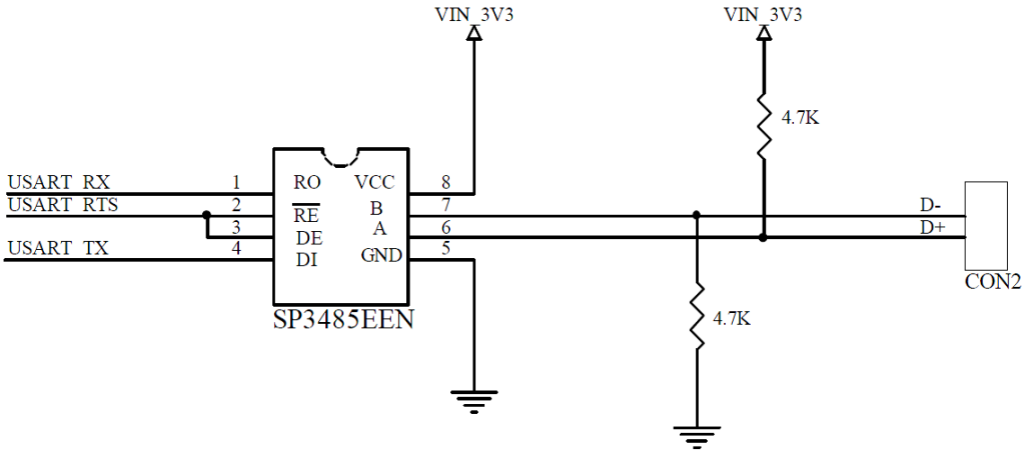
PIN name	Type	Configuration Method
U_RXD[1:4]	Input	UART[1:4] received data signal
U_TXD[1:4]	Output	UART[1:4] transmitted data signal
U_CTS[1:4]	Input	UART[1:4] clear to send signal
U_RTS[1:4]	Output	UART[1:4] request to send signal Note: When UART is extended to RS-485 serial port, this pin is used as RS-485 transmit enable, and the high level is active.
U_DSR[1:4]	Input	UART[1:4] data send ready signal
U_DTR[1:4]	Output	UART[1:4] data terminal ready signal

RS-232 Reference Circuit



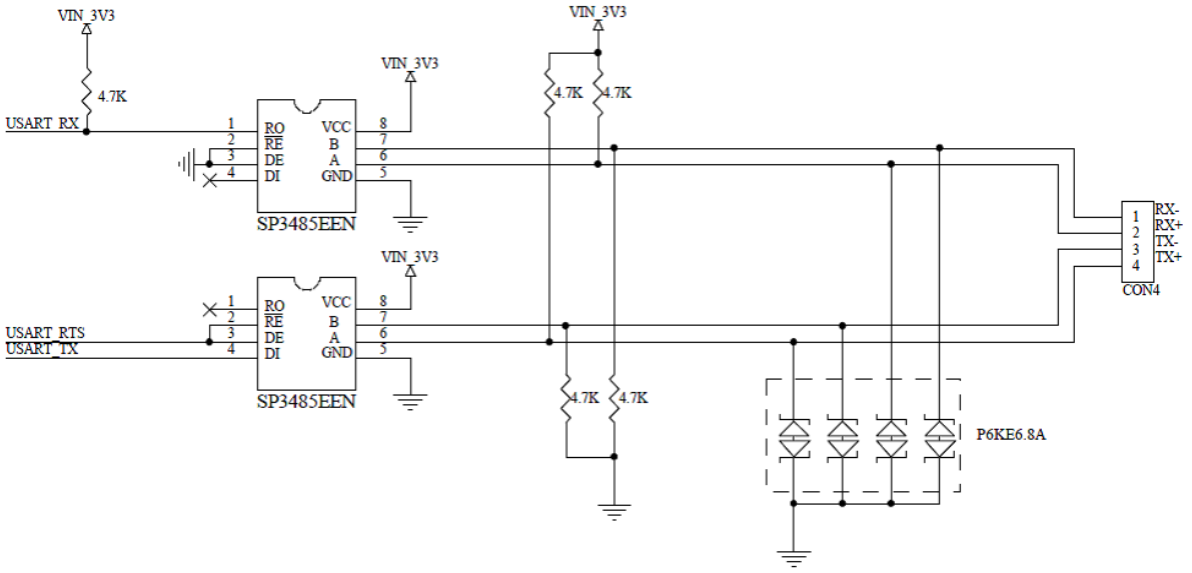
RS-485 (Two-wire) Reference Circuit

RS-485 two-wire connection method adopts half-duplex communication mode; This connection mode is a bus topology structure, and up to 32 nodes can be connected on the same bus. Master-slave communication is generally adopted in RS-485 communication network, that is, one master has multiple slaves. RS-485 sends and receives in differential mode.



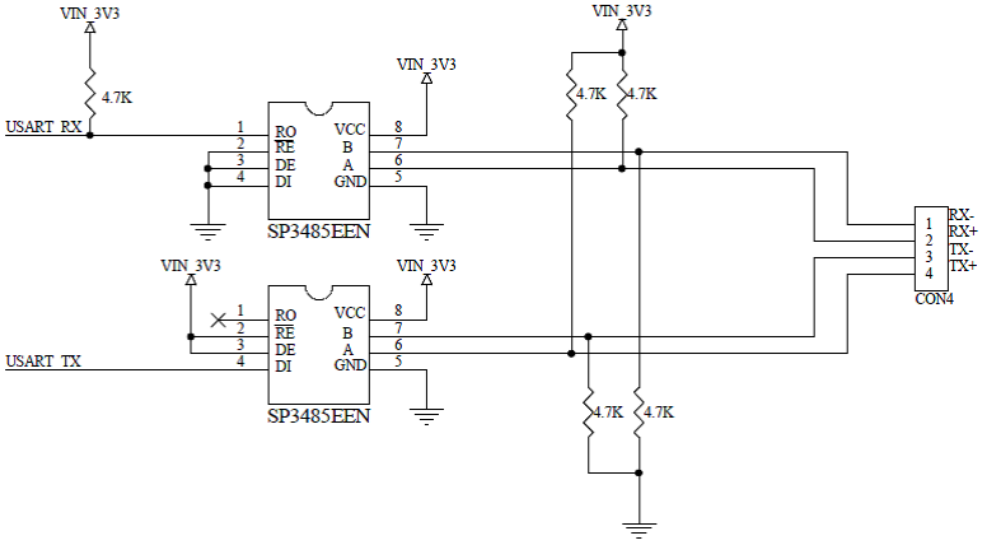
RS-485 (Four-wire)Reference Circuit

RS-485 four-wire connection mode adopts full-duplex communication mode, which can realize point-to-multipoint communication and is rarely used now, now it mostly adopts two-wire connection mode.



RS-422 Reference Circuit

RS-422 adopts full-duplex communication mode has four signal lines: two transmission lines (TX+, TX-), two receiving lines (RX+, RX-), and point-to-point connection mode.



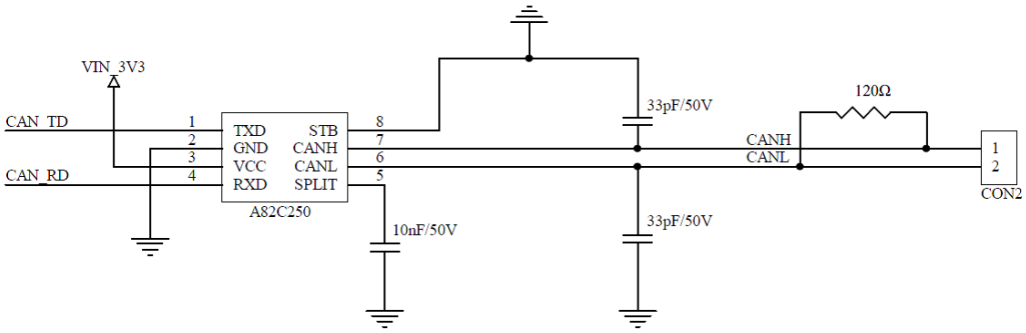
4.4 TTL CAN Interface

The module has two CAN bus interfaces, and 128 contacts can be hooked on the bus.

PIN name	Type	Configuration Method
CAN_TD[1:2]	Output	CAN transmitted data signal
CAN_RD[1:2]	Input	CAN received data signal

CAN Reference Circuit

The CAN bus is connected to the physical bus through the two output terminals CANH and CANL of the CAN transceiver interface chip A82C250. The state of the CANH terminal can only be high level or suspending state, and that of the CANL terminal can only be low level or suspending state. Because of its different level properties, a terminal resistor should be added to the terminal of the CAN.

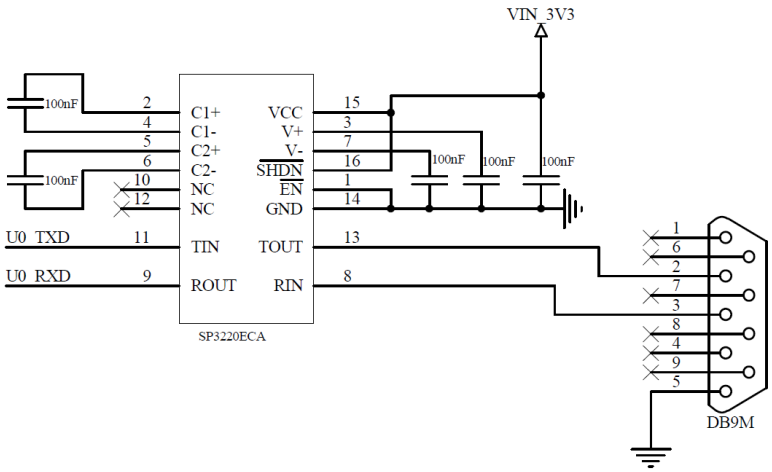


4.5 CONSOLE Port (Debugging Port)

UART0 debugging interface serves as the CONSOLE port of this module, mainly used for building CLI management platform.

PIN name	Type	Configuration Method
U0_TXD	Output	UART0 transmitted data pin.
U0_RXD	Input	UART0 received data pin.

Reference Circuit of CONSOLE Port

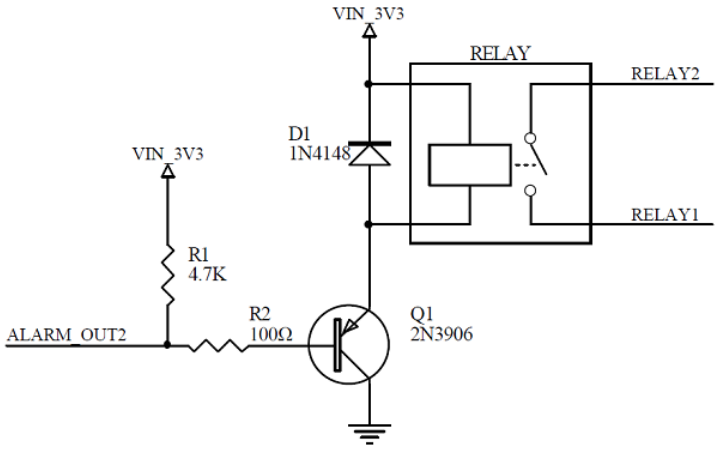


4.6 I/O Alarm Interface

The module has two alarm signal inputs, and the alarm input type can be self-configured. There are two alarm signals outputs for relay alarm output, which is active-low.

PIN name	Type	Configuration Method
ALARM_IN1	Input	2 alarm signal input pins, which can configure alarm input types by yourself, such as power alarm information detection. The default configuration is low-level alarm, and high-level alarm is not available.
ALARM_IN2		
ALARM_OUT1	Output	ALARM_OUT1 can be extended to alarm indicator and low-level alarm.
ALARM_OUT2	Output	ALARM_OUT2 can be extended to relay, and the default is high level; The high and low levels can be configured by software.

Reference Circuit of Relay Alarm

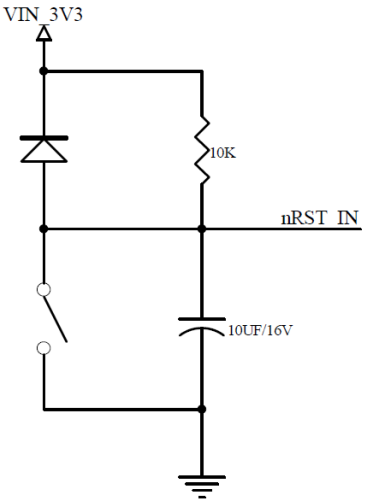


4.7 Reset Interface

The watchdog reset circuit is used in the module to monitor the normal operation of the program in real time, so as to prevent the program from entering an infinite loop or external interference. The module provides an external manual reset input pin, and an external hardware reset circuit can be designed for manual reset.

PIN name	Type	Configuration Method
nRST_IN	Input	Module reset pin, when the duration of inputing low level of this pin is greater than 200ms, the system enters the reset state. Active low level, it is recommended to pull high.

Reset Reference Circuit



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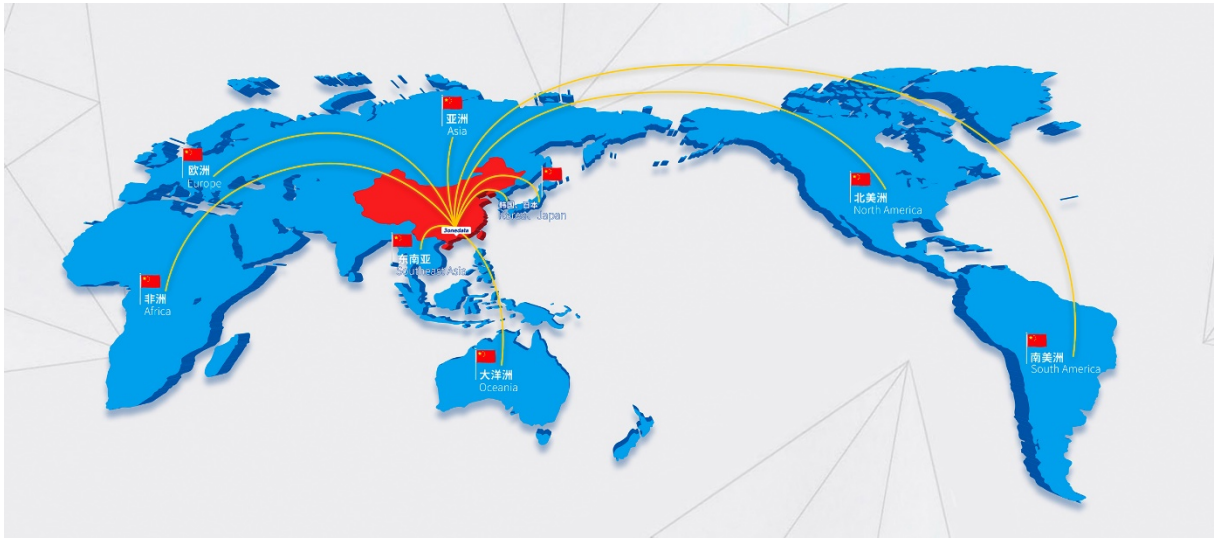

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