reComputer Rugged J401 Datasheet

Introduction

reComputer Rugged J401 is a ruggedized edge box powered by NVIDIA Jetson Orin NX/Nano. It is equipped with M12 and sealed connectors, providing IOs such as USB, Ethernet (including PSE), CAN, RS-232/422/485 and DI/DO. It has M.2 Key B slot for 5G modules, making it ideal to be used in ruggedized applications, such as AMR, robotics, agriculture, industrial and maritime applications. It can be directly used in 48V systems and has interfaces for most common sensors.

Part list

- reComputer Rugged J301/J401 x1
- M12 A-code 4-pin connector to 4-pin cable x1
- 2-Pin terminal to DC power connector x1
- Waterproof USB Type-A to Type-A cable x1
- M12 X-code Ethernet Cable x1
- M12 A-code connector to 8-pin cable x 1
- User Manual x1

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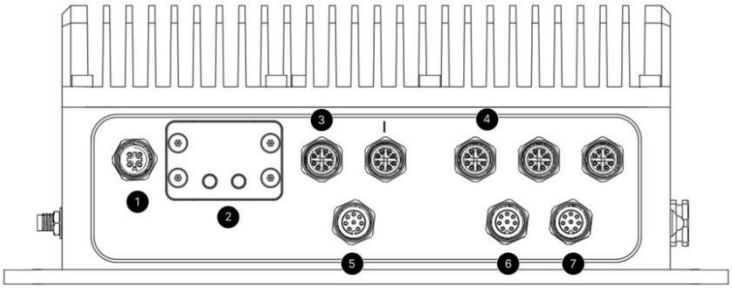
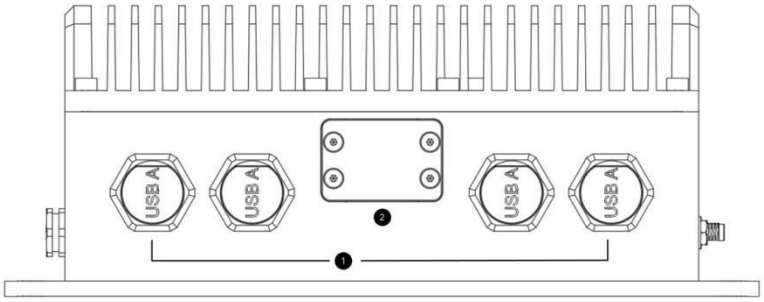
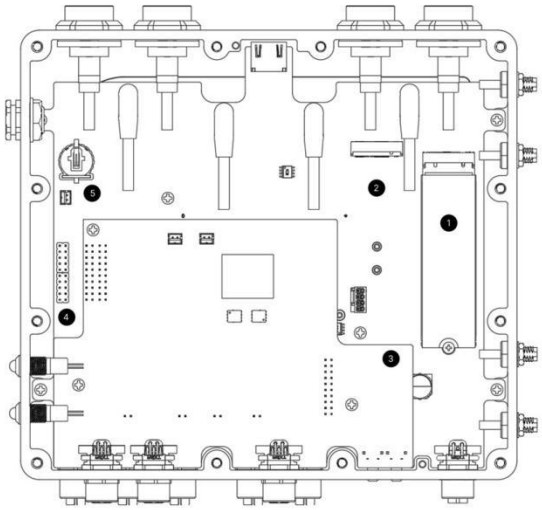
reComputer Rugged J401



1. DC 19 ~ 48 V
2. Reset and Recovery Button
   USB Type-C x 2 (Debug+Recovery)
3. 1 GbE x 1
4. 1 GbE PSE x 4
5. CAN x 2
6. RS-232/422/485 × 1
7. DI x 2 DO x 2



1. USB 3.1 × 4
2. Display



1. M.2 Key M Slot x 1 (128G NVMe SSD x 1 included)
   M.2 Key E Slot
2. M.2 Key B Slot
3. Serial Mode Switch
   Nano SIM Slot
4. I2C x 1 UART x 1 SPI x 1
5. RTC Coin Cell Socket

Jetson Orin Module Specifications

Product	reComputer Rugged J3011	reComputer Rugged J4012
Module	Jetson Orin Nano 8GB	Jetson Orin NX 16GB
AI Performance	40 TOPS (INT8)	100 TOPS (INT8)
GPU	1024-core NVIDIA CUDA® cores with 32 Tensor cores	
CPU	6-core Arm® Cortex-A78AE v8.2 64-bit CPU	8-core Arm® Cortex-A78AE v8.2 64-bit CPU
DL Accelerator	-	2x NVDLA v2.0
Vision Accelerator	-	PVA v2.0
Memory	8GB 128-bit LPDDR5 68GB/s	16GB 128-bit LPDDR5 102.4GB/s
Video Encode	1080p30 supported by 1-2 CPU cores	1x 4K60 (H.265) | 3x 4K30 (H.265) | 6x 1080p60 (H.265) |12x 1080p30 (H.265)
Video Decode	1x 4K60 (H.265) | 2x 4K30 (H.265) | 5x 1080p60 (H.265) | 11x 1080p30 (H.265)	1x 8K30 (H.265) | 2x 4K60 (H.265) | 4x 4K30 (H.265) | 9x 1080p60 (H.265) | 18x 1080p30 (H.265)
Power	7W-15W-25W	10W-15W-25W-40W

Carrrier Board Specifications

Module Compatibility	Jetson Orin™ Nano 8GB / NX 16GB
Box Dimension	210mm*190mm*95mm (Bottom Panel is 250mm * 210mm)
Display	1x HDMI 2.1
USB	4x USB 3.0 Type-A (Waterproof Connectors) 1x USB 2.0 Type C (Debug) 1x USB 3.0 Type C (Device)
Ethernet	1x M12 GbE 4x M12 GbE PSE (PSE 802.3 af 15 W 10/100/1000Mbps)
M.2 Key M	1x M.2 Key M, for NVMe 2280 SSD (128G SSD Included)
M.2 Key E	1x M.2 Key E, for M.2 2230 WIFI Module (WiFi6 module included)
M.2 Key B	1x M.2 Key B, for 5G Module
SIM Card	1x Nano-SIM Card Slot
CAN	2x CAN (M12 A-code)
DI/DO	2x DI 2x DO (M12 A-code)
Serial	1x RS-232/422/485 (M12 A-code)
Other	1x SPI 1x I2C (pinheader inside the box)
RTC	RTC Socket, 2-pin connector
LED	1x PWR LED, Green 1x SSD LED, Green

Button	1x Recovery Button 1x RST Button
Temperature	-20℃~60℃
Power supply	M12 A-code DC 19-48V
Jetpack	Jetpack 5.1.3

Pin Connector Descriptions

USB Ports

The carrier board supports several USB Connectors. One of them is a USB 2.0 Type-C connector for debug. The other USB Type-C connector is for recovery mode. There are three USB 3.0 Type A connectors with 5Gbps speed for Host mode only.

USB Port List

4 x	USB 3.0 Type-A	Host Mode	J43,J44,J45,J46
1 x	USB 3.0 Type-C	Recovery, For Flashing	J31
1 x	USB 2.0 Type-C	Debug	J18
Note: The USB Type-A connectors share 5Gbps bandwidth, and only support USB Host mode.			

USB 3.0 Type-A Connector Pin Description- J43

Pin #	Module Pin Name	Module Pin #	Net Name	Usage/Description	Type/Dir
1	-	-	-	VBUS Supply	Power
2	USB1_D_N	115	HUB_HSD1_N	USB 2.0 Port 1 Data	Bidir
3	USB1_D_P	117	HUB_HSD1_P		
4	-	-	-	Ground	Ground
5	USBSS_RX_N	161	HUB_SSRX1_N	USB 3.2 Receive (Port #0)	Input
6	USBSS_RX_P	163	HUB_SSRX1_P		
7	-	-	-	Ground	Ground
8	USBSS_TX_N	166	HUB_SSTX1_N	USB 3.2 Transmit (Port #0)	Output
9	USBSS_TX_P	168	HUB_SSTX1_P		

USB 3.0 Type-A Connector Pin Description- J44

Pin #	Module Pin Name	Module Pin #	Net Name	Usage/Description	Type/Dir
1	-	-	-	VBUS Supply	Power
2	USB1_D_N	115	HUB_HSD2_N	USB 2.0 Port 1 Data	Bidir
3	USB1_D_P	117	HUB_HSD2_P		
4	-	-	-	Ground	Ground
5	USBSS_RX_N	161	HUB_SSRX2_N	USB 3.2 Receive (Port #0)	Input
6	USBSS_RX_P	163	HUB_SSRX2_P		
7	-	-	-	Ground	Ground
8	USBSS_TX_N	166	HUB_SSTX2_N	USB 3.2 Transmit (Port #0)	Output
9	USBSS_TX_P	168	HUB_SSTX2_P		

USB 3.0 Type-A Connector Pin Description- J45

Pin #	Module Pin Name	Module Pin #	Net Name	Usage/Description	Type/Dir
1	-	-	-	VBUS Supply	Power
2	USB1_D_N	115	HUB_HSD3_N	USB 2.0 Port 1 Data	Bidir
3	USB1_D_P	117	HUB_HSD3_P		
4	-	-	-	Ground	Ground
5	USBSS_RX_N	161	HUB_SSRX3_N	USB 3.2 Receive (Port #0)	Input
6	USBSS_RX_P	163	HUB_SSRX3_P		
7	-	-	-	Ground	Ground
8	USBSS_TX_N	166	HUB_SSTX3_N	USB 3.2 Transmit (Port #0)	Output
9	USBSS_TX_P	168	HUB_SSTX3_P		

USB 3.0 Type-A Connector Pin Description- J46

Pin #	Module Pin Name	Module Pin #	Net Name	Usage/Description	Type/Dir
1	-	-	-	VBUS Supply	Power
2	USB1_D_N	115	HUB_HSD4_N	USB 2.0 Port 1 Data	Bidir
3	USB1_D_P	117	HUB_HSD4_P		
4	-	-	-	Ground	Ground
5	USBSS_RX_N	161	HUB_SSRX4_N	USB 3.2 Receive (Port #0)	Input
6	USBSS_RX_P	163	HUB_SSRX4_P		
7	-	-	-	Ground	Ground
8	USBSS_TX_N	166	HUB_SSTX4_N	USB 3.2 Transmit (Port #0)	Output
9	USBSS_TX_P	168	HUB_SSTX4_P		

USB 3.0 Type-C Connector Pin Description - J31

Pin #	Module Pin Name	Module Pin #	Net Name	Usage/Description	Type/Dir Default
A4/A9 B4/B9				VBUS Supply	Power
A5	-	-	CC1	USB Type-C Configuration Channel	-
B5	-	-	CC2		
B10	DP0_TXD0_N	39	USBSS1_RX_P	USB 3.2 Receive (Port #1)	Input
B11	DP0_TXD0_P	41	USBSS1_RX_N		
A3	DP0_TXD1_N	45	UPHY_TX1_N	USB 3.2 Transmit (Port #1)	Output
A2	DP0_TXD1_P	47	UPHY_TX1_P		
A10	DP0_TXD0_N	39	USBSS1_RX_P	USB 3.2 Receive (Port #1)	Input
A11	DP0_TXD0_P	41	USBSS1_RX_N		
B3	DP0_TXD1_N	45	UPHY_TX1_N	USB 3.2 Transmit (Port #1)	Output
B2	DP0_TXD1_P	47	UPHY_TX1_P		
A7/B7	USB0_D_N	109	USB0_AP_N	USB 2.0 Port 0 Data	Bidir
A6/B6	USB0_D_P	111	USB0_AP_P		

A1/B1 A12/B12	-	-	-	Ground	Ground

USB 2.0 Type-C - J18

Pin #	Module Pin Name	Module Pin #	Net Name	Usage/Description	Type/Dir Default
B9/B4	-	-	-	VBUS Supply	Power
A5	-	-	CC1_2	-	-
B5	-	-	CC2_2	-	-
A7/B7	-	-	UART_USB_DN	-	Bidir
A6/B6	-	-	UART_USB_DP	-	
B1/B12	-	-	-	Ground	Ground

Ethernet

Ethernet Port List

1 x	1 GbE	J24
4 x	1 GbE PSE	J25

Gigabit Ethernet - J35

Pin #	Module Pin Name	Module Pin #	Net Name	Usage/Description	Type/ Dir
1	GBE_MDI0_P	186	ETH_A+	GbE Transformer Data 0	Bidir
2	GBE_MDI0_N	184	ETH_A-		
3	GBE_MDI1_P	192	ETH_B+	GbE Transformer Data 1	Bidir
4	GBE_MDI1_N	190	ETH_B-		
5	GBE_MDI3_P	204	ETH_D+	GbE Transformer Data 3	Bidir
6	GBE_MDI3_N	202	ETH_D-		
7	GBE_MDI2_P	198	ETH_C+	GbE Transformer Data 2	Bidir
8	GBE_MDI2_N	196	ETH_C-		
9	-	-	GND	Ground	Ground

Gigabit Ethernet (PSE) - J36/J37/J38/J39

Pin #	Module Pin Name	Module Pin #	Net Name	Usage/Description	Type/ Dir
1	MXA_P	-	-	-	Bidir
2	MXA_N	-	-	-	Bidir
3	MXB_P	-	-	-	Bidir
4	MXC_P	-	-	-	Bidir
5	MXC_N	-	-	-	Bidir
6	MXB_N	-	-	-	Bidir
7	MXD_P	-	-	-	Bidir
8	MXD_N	-	-	-	Bidir
A9	GRNA	-	-	-	Input

Note:

1. Gigabit Ethernet (10/100/1000M) PSE

2. Derived from PCIe

M.2 Key M Slot - J21

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
1	-	-	Ground	Ground
3				
5	PCIE0_RX3_N	155	PCIe #0 Receive 3	Input
7	PCIE0_RX3_P	A26		
9	-	-	Ground	Ground
11	PCIE0_TX3_N	154	PCIe #0 Transmit 3	Output
13	PCIE0_TX3_P	156		
15	-	-	Ground	Ground
17	PCIE0_RX2_N	149	PCIe #0 Receive 2	Input
19	PCIE0_RX2_P	151		
21	-	-	Ground	Ground
23	PCIE0_TX2_N	148	PCIe #0 Transmit 2	Output
25	PCIE0_TX2_P	150		
27	-	-	Ground	Ground
29	PCIE0_RX1_N	137	PCIe #0 Receive 1	Input

31	PCIE0_RX1_P	139		
33	-	-	Ground	Ground
35	PCIE0_TX1_N	140	PCIe #0 Transmit 1	Output
37	PCIE0_TX1_P	142		
39	-	-	Ground	Ground
41	PCIE0_RX0_N	131	PCIe #0 Receive 0	Input
43	PCIE0_RX0_P	133		
45	-	-	Ground	Ground
47	PCIE0_TX0_N	134	PCIe #0 Transmit 0	Output
49	PCIE0_TX0_P	136		
51	-	-	Ground	Ground
53	PCIE0_CLK_N	160	PCIe #0 Reference Clock	Bidir
55	PCIE0_CLK_P	162		
57	-	-	Ground	Ground
59	-	-	Unused (Key)	Unused
61				
63				
65				

67 69	-	-	Unused	Unused
71 73 75	-	-	Ground	Ground

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
2 4	-	-	Main 3.3V Supply	Power
6 8 10	-	-	Unused	Unused
12 14 16 18	-	-	Main 3.3V Supply	Power
20	-	-	Unused	Unused

22				
24				
26				
28				
30				
32				
34				
36				
38				
40	I2C2_SCL	232	General I2C 2 Clock	Open Drain, 1.8V
42	I2C2_SDA	234	General I2C 2 Data	
44	GPIO06	130	M.2 Key M Alert	Input, 1.8V
46	-	-	Unused	Unused
48				
50	PCIE0_RST	181	PCIe #0 Reset	Bidir/OD, 3.3V
52	PCIE0_CLKREQ	180	PCIe #0 Clock Request	Bidir/OD,3.3V
54	PCIE_WAKE	179	PCIe Wake	Input/OD, 3.3V
56	-	-	Unused	Unused

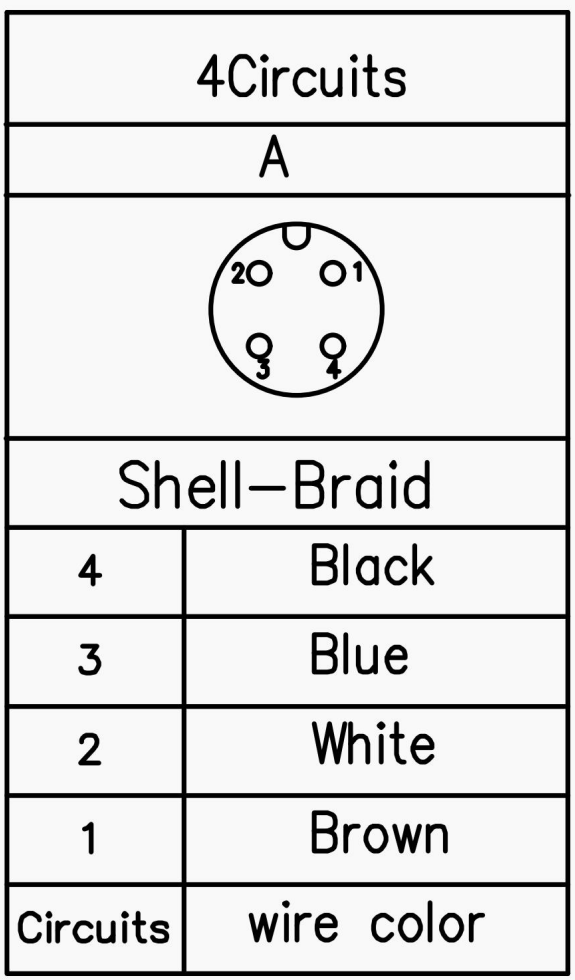
58				
60	-	-	Unused (Key)	Unused (Key)
62				
64				
66				
68	-	-	32KHz Suspend Clock	Output, 3.3V
70	-	-	Main 3.3V Supply	Power
72				
74				

Note:

For NVMe SSD, 2280.

Supports PCIe Gen4.0.

Power - J34



Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default	Wire Color
2	-	-	DC Power In	Power	Brown
4					White
3	-	-	Ground	Ground	Blue
4					Black

M.2 Key E Slot - J32

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
1	-	-	Ground	Ground
3			USB 2.0 #3 Data from hub	Bidir
5				
7	-	-	Ground	Ground
9	-	-	Unused	Unused
11				
13				
15				
17				
19				
21				
23				
25	-	-	Unused (Key)	Unused (Key)
27				
29				

31				
33	-	-	Ground	Ground
35	PCIE1_TX0_P	174	PCIe #1 Transmit 0	Output
37	PCIE1_TX0_N	172		
39	-		Ground	Ground
41	PCIE1_RX0_P	169	PCIe #1 Receive 0	Input
43	PCIE1_RX0_N	167		
45	-		Ground	Ground
47	PCIE1_CLK_P	173	PCIe #1 Reference Clock	Output
49	PCIE1_CLK_N	175		
51	-		Ground	Ground
53	PCIE1_CLKREQ	182	PCIE #1 Clock Request	Bidir/OD, 3.3V
55	PCIE_WAKE	179	PCIe Wake	Input/OD, 3.3V
57	-	-	Ground	Ground
59	-	-	Unused	Unused
61				
63	-	-	Ground	Ground
65	-	-	Unused	Unused

67				
69	-	-	Ground	Ground
71 73	-	-	Unused	Unused
75	-	-	Ground	Ground

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
2 4	-	-	Main 3.3V Supply	Power
6	-	-	Unused	
8	I2S0_SCLK	199	Audio I2S Port 0 Clock	Bidir
10	I2S0_FS	197	I2S Audio Port 0 Left/Right Clock	Bidir
12	I2S0_DIN	195	Audio I2S #0 Data in	Input
14	I2S0_DOUT	193	Audio I2S #0 Data Out	Output
16	-	-	Unused	
18	-	-	Ground	
20	GPIO07	206	M2E_BT_WAKE	Input

22	UART0_RXD	101	UART 0 Receive	Input
24	-	-	Unused (Key)	
26				
28				
30				
32	UART0_TXD	99	UART 0 Transmit	Output
34	UART0_CTS	105	UART 0 Clear to Send	Input
36	UART0_RTS	103	UART 0 Request to Send	Output
38	-	-	-	-
40				
42				
44				
46				
48				
50	-	-	SUSCLK_32KHZ_M2E	
52	PCIE1_RST	183	PCIe #1 Reset	Output
54	-	-	M2E_BT_DISABLE_N	Output
56	-	-	M2E_WIFI_DISABLE_N	Output

58	I2C2_SDA	234	General I2C 2 Clock/Data	Bidir
60	I2C2_SCL	232		
62	GPIO06	130	M2E_ALERT_N	Input
64	-	-	Unused	-
66				
68				
70				
72	-	-	Main 3.3V Supply	Power
74				Power
Note: For 2230 WiFi Module.				

M.2 Key B Slot - J6

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
1	-	-	Unused	-
3	-	-	Ground	Ground
5				
7	-	-	USB_HUB_D1_P	Bidir
9	-	-	USB_HUB_D1_N	Bidir
11	-	-	Ground	Ground
21	-	-	Unused	-
23	-	-	M2B_WOWWAN	Bidir
25	-	-	Unused	-
27	-	-	Ground	Ground
29	DP0_TXD2_N	51	USBSS2_RX_N	Input
31	DP0_TXD2_P	53	USBSS2_RX_P	Input
33	-	-	Ground	Ground
35	DP0_TXD3_N	57	USBSS2_TX_N	Output
37	DP0_TXD3_P	59	USBSS2_TX_P	Output

39	-	-	Ground	Ground
41/43	-	-	Unused	-
45	-	-	Ground	Ground
47/49	-	-	Unused	-
51	-	-	Ground	Ground
53/55	-	-	Unused	-
57	-	-	Ground	Ground
59/61 63/65	-	-	Unused	-
67	-	-	M2B_PCIe_RST	Input
69	-	-	Unused	-
71/73	-	-	Ground	Ground
75	-	-	Unused	-
76/77	-	-	Ground	Ground

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
2/4	-	-	VDD_3V3_SYS	Power

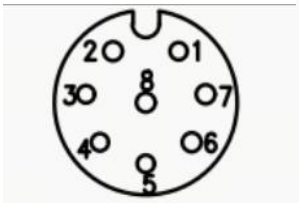
6	GPIO10	212	M2B_POWER_OFF	Output
8	GPIO5	128	M2B_W_DISABLE1	Output
10	-	-	M2B_STATUS_LED	-
20	I2S1_SCLK	226	I2S1_SCLK	Output
22	I2S1_SDOUT	220	I2S1_SDOUT	Output
24	I2S1_SDIN	222	I2S1_SDIN	Input
26	GPIO3	126	W_DISABLE2	Output
28	I2S1_FS	224	I2S1_LRCK	Input
30	-	-	M2B_USIM_RST	-
32	-	-	M2B_USIM_CLK	-
34	-	-	M2B_USIM_DATA	-
36	-	-	M2B_USIM_PWR	-
38	-	-	Unused	-
40/42	-	-	Unused	-
44/46				
48/50				
52/54				
56/58				

60	-	-	Unused	-
62/64	-	-	Unused	-
66	-	-	SIM_DETECT	-
68	-	-	Unused	-
70/72/74	-	-	VDD_3V3_SYS	Power

RTC 2-Pin Header - J12

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
1	-	-	Ground	Ground
2	PMIC_BBAT	235	Real-Time-Clock back-up	Input
Note: **RTC socket also available (J22)**				

Serial M12 Connectors - J56 (Expansion)



Shell–Braid	
8	Red
7	Blue
6	Pink
5	Gray
4	Yellow
3	Green
2	Brown
1	White
Circuits	wire color

RS-232

Pin #	Usage/Description	Type/Dir Default	Wire Color
1	RXD	Input	White
2	-	Unused	Brown
3	TXD	Output	Green
4	-	Unused	Yellow
5	Ground	Ground	Gray
6	-	Unused	Pink
7	RTS	Output	Blue
8	CTS	Input	Red

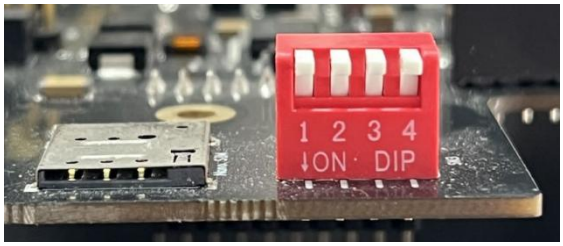
RS-422

Pin #	Usage/Description	Type/Dir Default	Wire Color
1	TXD+	Output	White
2	TXD-	Output	Brown
3	RXD+	Input	Green
4	RXD-	Input	Yellow
5	Ground	Ground	Gray
6/7/8/9	-	Unused	-

RS-485

Pin #	Usage/Description	Type/Dir Default	Wire Color
1	Data +	Bidir, RS485 A	White
2	Data -	Bidir, RS485 B	Brown
3	-	Unused	-
4	-	Unused	-
5	Ground	Ground	Gray
6/7/8/9	-	Unused	-

Serial M12 Mode Switch



SW3 - Mode Switch

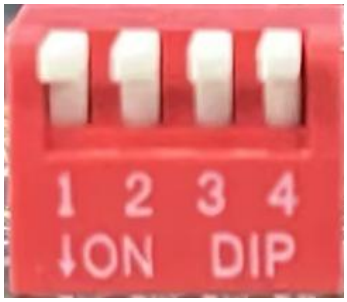
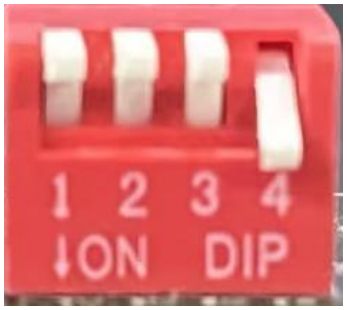
Pin #	Usage/Description
1	Mode_0
2	Mode_1
3	Mode_2
4	Slew

Mode Select Configuration

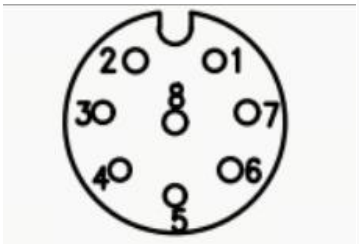
Note: When the switch is pressed down (ON), the bit is 0; When not pressed, the bit is 1

Mode_0	Mode_1	Mode_2	Mode	Status
0	0	0	RS-422 Full Duplex	1T/1R RS-422
0	0	1	Pure RS-232	3T/5R RS-232
0	1	0	RS-485 Half Duplex	1T/1R RS-485, TX ENABLE Low Active
0	1	1	RS-485 Half Duplex	1T/1R RS-485, TX ENABLE High Active
1	0	0	RS-422 Full Duplex	RS-422 with termination resistor
1	0	1	RS-232	1T/1R RS-232 co-exists with RS485 application without the need for the bus switch bus (for special usage)
1	1	0	RS-485	1T/1R RS-485 with termination resistor, TX ENABLE Low Active
1	1	1	Shutdown	All I/O pins are high impedance

Slew pin configuration

Slew		Mode
1		RS-232: Max data rate 1 Mbps RS-485: Max data rate 10 Mbps
0		RS-232: Max data rate 250 Kbps RS-485/RS-422: Max data rate 250 Kbps

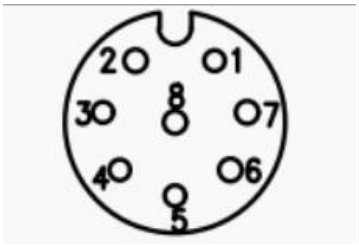
DI/DO - J8 (Expansion)



Shell—Braid	
8	Red
7	Blue
6	Pink
5	Gray
4	Yellow
3	Green
2	Brown
1	White
Circuits	wire color

Pin #	Usage/Description	Type/Dir Default	Wire Color
1	DI_12V_1	DI1	White
2	DI_12V_2	DI2	Brown
3	DO_30V_1	DO1	Green
4	DO_30V_2	DO2	Yellow
5	GND_DI	Ground DI	Gray
6			Pink
7	GND_DO	Ground DO	Blue
8			Red

CAN - J55 (Expansion)



Shell—Braid	
8	Red
7	Blue
6	Pink
5	Gray
4	Yellow
3	Green
2	Brown
1	White
Circuits	wire color

Pin #	Usage/Description	Type/Dir Default	Wire Color
1	Unused	-	White
2			Brown
3	CAN0_H_ISO	Bidir	Green
4	CAN0_L_ISO	Bidir	Yellow
6	CAN1_H_ISO	Bidir	Gray
7	CAN1_L_ISO	Bidir	Pink
5	Ground	Ground	Blue
8			Red

Pin header - J8(I2C/SPI/UART)

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
2	SPI0_SCK	91	SPI0_SCK_LS	Bidir
4	SPI0_MISO	93	SPI0_MISO_LS	Bidir
6	SPI0_MOSI	89	SPI0_MOSI_LS	Bidir
8	SPI_CS0	95	SPI0_CS0_LS	Bidir
10	-	-	BMCU_ACOK	-
12	-	-	PWR_BTN	-
14	I2C0_SCL	185	I2C0_SCL	Bidir
16	I2C0_SDA	187	I2C0_SDA	Bidir
18	UART2_TXD	236	UART2_TXD_3V3	Output
20	UART2_RXD	238	UART2_RXD_3V3	Input

Pin #	Module Pin Name	Module Pin #	Usage/Description	Type/Dir Default
1/3/5/ 7/ 11/13/ 15/17	-	-	Ground	Ground
9	-	-	AUTO_ON_DIS	-
19	-	-	VDD_3V3_SYS	Power