

Four-channel RS485 isolated repeater/converter



RoHS



FEATURES

- With 4-channel RS485 interface, isolation between two pairs of 2500VDC
- The adaptive baud rate is 300 - 115200bps, which can be widely adapted
- Transparent conversion between RS232 channel and four RS485 channels
- Regeneration and retiming of signal at bit level
- Fast data forwarding speed, delay less than 5us
- RS485 half-duplex network with automatically change direction
- Working voltage: 9V - 36VDC (automatically change direction)
- Operating ambient temperature range: -40°C to +85°C
- The bus supports maximum 256 nodes
- Set isolation and ESD bus protection in one
- RS485 ports are equipped with shielded wire ground interface
- Preset 120Ω terminal matching resistance
- With indicator lights for power supply, RS485 and RS232 receiving status

TB24U485-4 with 4 fully electrically isolated RS485 channels, each channel with an independent ESD enhanced RS485 transceiver, which can realize multiple RS485 network transparent transmission, multiplying the number of nodes, and lifting the maximum number of nodes driving restrictions on the RS485 transceiver on the system bus.

Realize the multi-point connection of complex structure at the bus level, so that the backbone network without limit on the length of branch lines, and users can use flexible wiring methods.

All 485/232 channels of TB24U485-4 meet the adaptive baud rate of 300 - 115200bps, and the transmission delay is short. It conforms to the RS485 standard and supports transparent and protocol-independent RS485 message transmission, making it suitable for a variety of applications, such as the Modbus protocol. In order to facilitate users' long-distance communication, each RS485 interface also reserves 120Ω resistance, users can easily configure the terminal resistance.

If you want to connect PC and other monitoring equipment to the network, TB24U485-4 comes with an RS232 port, so you don't need to install additional equipment for RS485 and RS232 level conversion. TB24U485-4 is equipped with indicator lights to detect the reception of each RS485 port, and users can easily observe the working status of the RS485 bus network. The isolation voltage of each channel of TB24U485-4 is as high as 2.5kV, so that when one RS485 bus is damaged, the devices on other RS485 buses can be protected. Each RS485 port, RS232 port and power port are equipped with ESD protection capabilities.

Selection Guide

Certification	Part No.	Power input (VDC)	Baud rate (bps)	Static power consumption(W)	Dynamic power consumption(W)	Number of Nodes
--	TB24U485-4	9-36	300-115200	0.8	2.5	256

Power Supply Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Power Supply Input Voltage		9	24	36	VDC
Consumption	Static power consumption	--	0.4	0.8	W
	Dynamic power consumption	--	2.0	2.5	W
Protection characteristics	40V overvoltage protection; automatic power reversal; built-in overcurrent protection (1A)				

Note: *Both JP2 and JP3 are power connectors, only connect one of them.

Transmission Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Transmission delay	RS232-RS485	--	1	5	us
	RS485-RS232	--	1	5	
	RS485-RS485	--	1	5	

RS485 state switching delay	Receive to Send	The time when the data is received by a channel and the data is forwarded by other channels	--	1	5	
	Send to Receive	The time from when a channel finishes sending data to automatically switch to receiving state	--	10	100	
RS485 channel LED status indication		When the channel receives data, the green LED flashes; when no data is received, the LED is off				
RS232 channel LED status indication		When the channel receives data, the green LED flashes; when no data is received, the LED is off				

232 Interface Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Driver Output Voltage	High-level	$R_L=3k\Omega$ to GND	5	--	--	VDC
	Low-level	$R_L=3k\Omega$ to GND	--	--	-5	
Receiver Input Level	High-level		2.4	--	--	
	Low-level		--	--	0.8	
Receiver Input Voltage			-15	--	15	
Baud Rate			300	--	115200	
Bus Interface Protection		ESD protection				

485 Interface Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Receiver Input Level	High-level	V_{IH}	-0.01	--	--	VDC
	Low-level	V_{IL}	--	--	-0.2	VDC
Difference Level		$V_{diff(\Delta)}$	1.5	--	--	VDC
Difference Input Impedance		$-7V \leq V_{CM} \leq +12V$	96	--	--	$k\Omega$
Receiver Input Voltage			-7	--	+12	VDC
Built-in Pull-down Resistor			--	24	--	$k\Omega$
Built-in Terminal Resistor			--	120	--	Ω
Number of Nodes			--	--	256	--
Baud Rate			300	--	115200	bps
Bus Interface Protection		ESD protection				

General Specifications

Item	Operating Conditions	Value
Isolation Test	Electric Strength Test for 1 minute, leakage current $<1mA$	2500VDC (Between the one RS485 interface and the other)
Insulation Resistance	At 500VDC	1000M Ω (Between the one RS485 interface and the other)
Operating Temperature		-40 $^{\circ}C$ to +85 $^{\circ}C$
Transportation and Storage Temperature		-40 $^{\circ}C$ to +105 $^{\circ}C$
Operating Humidity	Non-condensing	10% - 90%
Safety Class		--

Mechanical Specifications

Case Material	Metal (SPCC, surface paint process)
Dimensions	118 x 72.0 x 23mm
Weight	300g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Immunity	ESD	IEC/EN 61000-4-2 Contact $\pm 4kV$ (A, B port, FG pin is not connected to the ground)	Perf. Criteria A
		IEC/EN 61000-4-2 Contact $\pm 8kV$ (A, B port, FG pin is connected to the ground)	Perf. Criteria A
	EFT	IEC/EN 61000-4-4 $\pm 2kV$ (A, B port)	Perf. Criteria B

	Surge	IEC/EN 61000-4-5 ±2kV (Line to line) (A, B port, without external components)	Perf. Criteria B
		IEC/EN 61000-4-5 ±2kV (Line to line) (Power port, without external components)	Perf. Criteria B

Application Precautions

1. Carefully read and follow the instructions before use; contact our technical support if you have any question;
2. Do not use the product in hazardous areas;
3. It is strictly forbidden to disassemble the product privately in order to avoid product failure or malfunction.

After-sales service

1. Factory inspection and quality control are strictly enforced before shipping any product; please contact your local representative or our technical support if you experience any abnormal operation or possible failure of the module;
2. The products have a 3-year warranty period, from the date of shipment. The product will be repaired or exchanged free of charge within the warranty period for any quality problem that occurs under normal use.

Design Reference

1. Typical application circuit

The typical application of TB24U485-4 is shown in Figure 1. There are 4 RS485 channels in total, and each RS485 channel can be connected to an RS485 network or a device with RS485 interface.

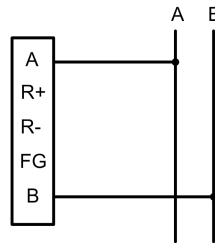


Figure 1. Typical application circuit

The pin functions of the terminal block are as follows:

Table 1.485 bus terminal function description

Port name	Function Description
A	RS485 differential bus A line
R+	Terminal resistance (short-circuit with R- to obtain 120Ω terminal matching resistance)
R-	Terminal resistance (short-circuit with R+ to obtain 120Ω terminal matching resistance)
FG	Shield ground wire (not necessarily connected)
B	RS485 differential bus B line

According to the ISO 11898 specification, in order to reduce the signal reflection on the RS485 bus and enhance the reliability of communication, terminal matching resistors are usually added to the two end points of the bus. The resistance value of the terminal matching resistance is determined by the characteristic impedance of the transmission cable. For example, the characteristic impedance of a twisted pair is 120Ω, and the two terminals on the bus should also be connected to a 120Ω terminal resistance.

The TB24U485-4 converter itself comes with a 120Ω terminal resistor, and each port provides terminals R+ and R- for connecting the terminal resistor. When TB24U485-4 is at the end of the bus, you can use a wire to short-circuit the "R-" and "R+" pins, which is equivalent to connecting a 120Ω terminal resistor, as shown in Figure 2:

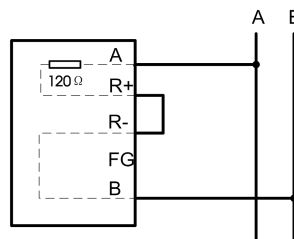


Figure 2. Built in 120Ω terminal resistor

If users use cables with impedance characteristics other than 120 Ω, they can choose appropriate terminal resistance to connect to ports A and B, as shown in Figure 3:

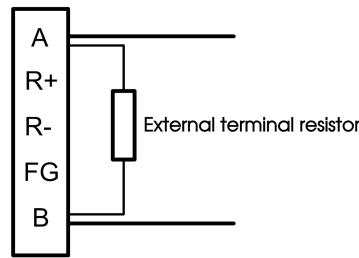


Figure 3. External terminal resistor

TB24U485-4 is connected with PC or monitoring equipment through RS232 interface. This port uses a DB-9 female connector. Before connecting with the PC, use an RS232 extension cable to connect the TB24U485-4 to the serial port of the PC. If you use a crossover cable, you cannot communicate. The RS232 interface on TB24U485-4 is shown in Figure 4.

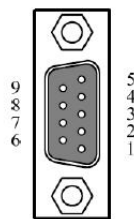


Figure 4. RS232 interface

Table 2. 232 Terminal function description

Port number	Function Description	Function description
2	TXD	Send data
3	RXD	Receive data
5	GND	Ground
1,4,6,7,8,9	NC	Invalid

TB24U485-4 has four RS485 channels and one RS232 channel. Each channel can be used as data input port. When the one channel is used as data input port, the other channels are converted to data output ports with the same baud rate and transparent conversion. This also shows that TB24U485-4 cannot have two channels as data input ports, otherwise the data will be wrong.

For the same data, the level states presented by the RS232 and RS485 bus ports are always opposite. This is consistent with the requirements of the TIA/EIA-485-A and EIA/TIA-232-F standard.

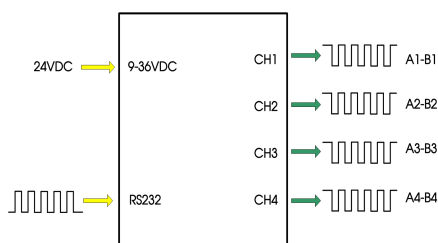


Figure 5. RS232 data input

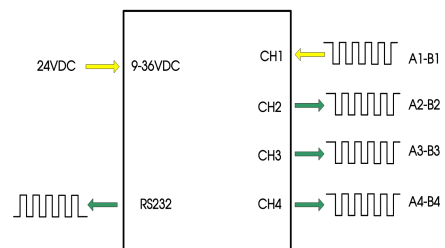


Figure 6. RS485 data input

2. Indicator light

There are 6 LED indicators on the top panel of TB24U485-4. When the RS485 bus or RS232 interface is connected, when the port has no data reception, the RS485 status indicator and RS232 status indicator should be off. When there is data receiving, the status indicator corresponding to the receiving data port flashes. The detailed function description is shown in Table 3:

Table 3. LED instructions

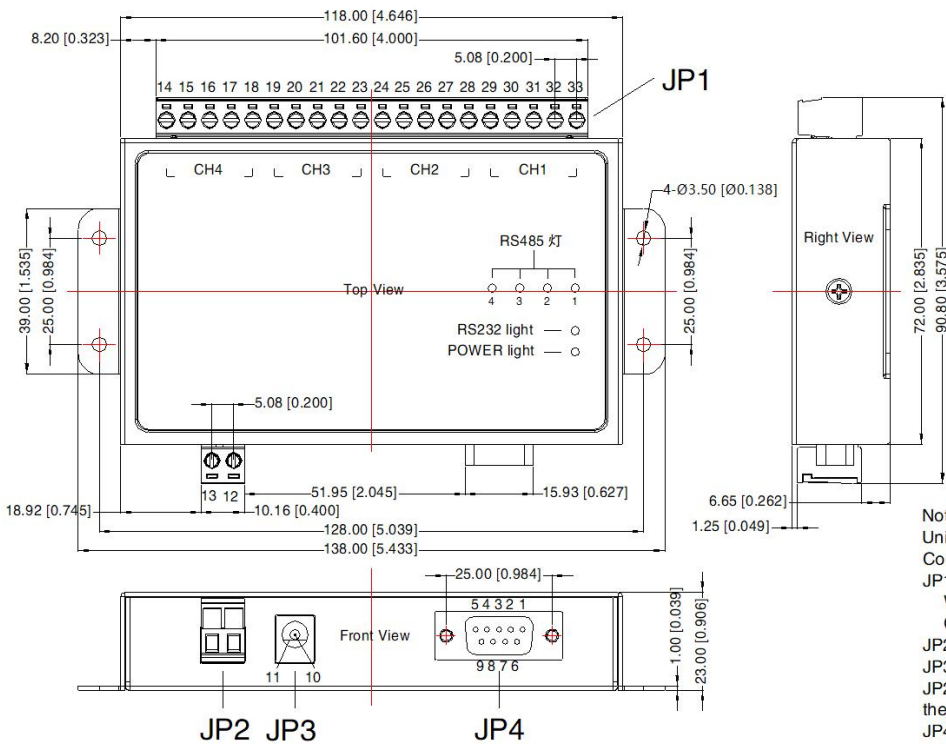
Name	Color	Status	Meaning
POWER	Red	Light up	Power status OK
		Light off	The power is not connected or the power supply is abnormal
RS232	Green	Light up/Flashing	With data receiving, and the four RS485 channels all transmit data at the same baud rate
		Light off	Without data receiving
RS485(1-4)	Green	Light up/Flashing	With data receiving, and the other three RS485 channels and RS232 are all forwarding data at the same baud rate
		Light off	Without data receiving

3. Precautions

- 1)When the product is used at low baud rate, it is not recommended to connect the terminal matching resistor to the bus.
- 2)When a RS485 channel is short-circuited or the differential line is connected reversely, the system will automatically cut off this channel to ensure the normal operation of other channels.
- 3)The sequence of operations for correctly connecting to the network is: first stop the communication of other devices on the network, connect the signal line of this hub, power on, and then initiate communication.

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Connector: JP1		
Mark	Port	Function
14	CH4	B
15		FG
16		R-
17		R+
18	CH3	A
19		B
20		FG
21		R-
22	R+	
23	CH2	A
24		B
25		FG
26		R-
27	R+	
28	CH1	A
29		B
30		FG
31		R-
32	R+	
33	A	

Connector: JP2	
Mark	Function
12	VCC-
13	VCC+

Connector: JP3	
Mark	Function
10	VCC+
11	VCC-

Connector: JP4	
Mark	Function
1	NC
2	TXD
3	RXD
4	NC
5	GND
6	
7	NC
8	
9	

Note:
Unit: mm[inch]
Connector:
JP1/JP2: Wire range: 28-12AWG
Connector tightening torque: Max 0.4N · m
JP2: Power interface
JP3: Type: DC JACK
JP2/JP3: Built-in rectifier bridge, still work properly after the power pins are reversed.
JP4:
Type: RS232
Connector tightening torque: M3, Max 0.4N·m
General tolerances: ± 1.00[± 0.039]

Notes:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58240027;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on company corporate standards;
- The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technician for specific information;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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