

Medical
electric
equipmentPower
Factor
Correction

World wide

Safety
Approvals

EMI

Inrush
current
limiting

OCP

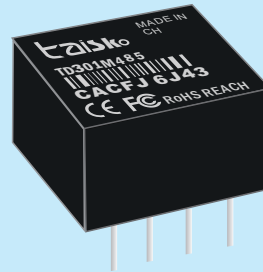
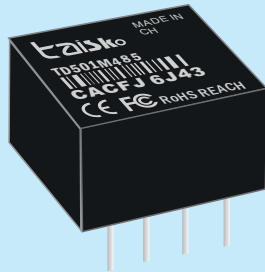


OVP

Remote
ON/OFFParallel
Operation

1U

TD-series



Feature

CAN isolated transceiver module
It is an integrated transceiver chip
Isolation chip and DC/DC
Interface integrating isolated power supply
Isolation transceiver module
Can be completely replaced
Traditional optocoupler isolation scheme
In the past, we needed to send and receive chips
Isolation chip/optocoupler
Only by isolating the power supply can it be achieved
The entire isolation and transmission plan
Now only one needs to be adopted
CAN isolated transceiver module
It can be easily achieved
Greatly simplified the customer's design

Safety agency approval

ENI 55032:2015/A1:2020
EN IEC 62368-1:2020+A11:2020
IEC 62321-1:2013 IEC 62321-2:2021 IEC 62321-3-1:2013,

Up to 5-year warranty (Refer to Instruction Manual)

CE FCC marking

Low Voltage Directive
RoHS Directive

ROHS REACH marking

Electrical Equipment Safety Regulations
RoHS Regulations

EMI

- PCA300F, PCA600F
Complies with FCC-B, CISPR32-B, EN55011-B, EN55032-B, VCCI-B
- PCA1000F, PCA1500F
Complies with FCC-A, CISPR32-A, EN55011-A, EN55032-A, VCCI-A

EMS Compliance : EN61204-3, EN61000-6-2

IEC60601-1-2 (2014), EN60601-1-2 (2015)

EN61000-4-2
EN61000-4-3
EN61000-4-4
EN61000-4-5
EN61000-4-6
EN61000-4-8
EN61000-4-11

Single high speed small size RS-485 isolated transceiver

1 Product Features:

- Single input power supply
- With isolated output power supply pin
- Automatic send and receive data function
- Up to 64 nodes can be connected
- Extremely low electromagnetic radiation EMI
- Operating temperature range: $-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$
- Integrated power isolation, signal isolation and bus ESD protection function

2 Product Description:

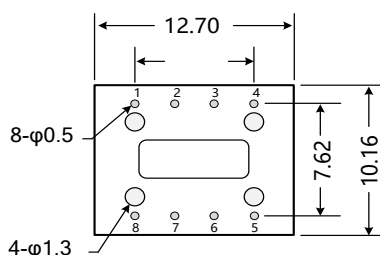
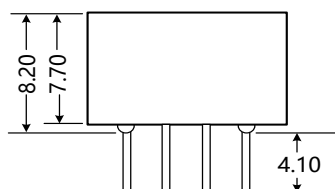
TD301M485/ TD501M485, the main function will be logic level conversion to RS-485 protocol differential level, signal isolation; is an IC integration technology, power isolation, signal isolation, RS-485 communication and bus protection in one RS-485 protocol transceiver module. The product comes with fixed-voltage isolation power supply, which can realize 2500VDC electrical isolation. The product has automatic switching transceiver function, no longer need to send and receive control through the transceiver control pin, to a certain extent, reduce the complexity of the design. The product can be easily embedded in the user's equipment, so that the equipment can easily realize the RS485 protocol network connection function.

3 Scope of application:

Industrial communication, coal mining industry, power monitoring, building automation...

4 Appearance Dimension and Pin Description:

4.1 Appearance Dimension



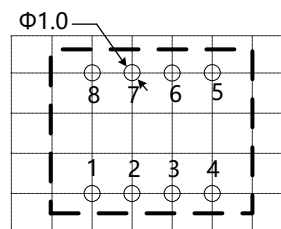
Note: Dimensions in mm:

Size unit: mm

Tolerance of terminal diameter: ± 0.10

Tolerance of unmarked: ± 0.25

4.2 Suggested Printing Diagram



Note: Grid spacing is 2.54*2.54mm

4.3 Pin Definition

Pin		Description
Serial Number	Name	
1	RXD	Data receiving pin
2	TXD	Data transmit pin
3	GND	Power input ground
4	VCC	Power input positive
5	RGND	Isolated output power supply ground
6	A	RS-485 A pin
7	B	RS-485 B pin
8	VO	Isolated output power supply positive

5 Model Number Table

Model Number	Power Supply Voltage Range (VDC)	Quiescent Current (mA, Typ)	Maximum Operating Current (mA)	Transmission Baud Rate (kbps)	Number of nodes (pcs)	Type
TD301M485	3.3 (3.15~3.45)	22	90	500	64	High Speed
TD501M485	5 (4.75~5.25)	18	70	500	64	High speed

6 Specifications

6.1 Maximum Limit Parameters

Use beyond the following limits may result in permanent damage to the module.

Item	Condition	Minimum value	Nominal value	Maximum value	Unit
Input Voltage Range	TD301M485	-0.7	3.3	5	V dc
	TD501M485	-0.7	5	7	

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Item	Condition	Minimum value	Nominal value	Maximum value	Unit
Pin Soldering Temperature	Manual soldering @ 3~5 sec	--	370	--	°C
	Wave soldering @5~10 sec	--	265	--	
Thermal Unplugging	--	Not support			

Note: This series of modules do not have input anti-reverse connection function, it is strictly prohibited to reverse the positive and negative inputs, otherwise it will cause irreversible damage to the module.

6.2 Input Characteristics

Item		Symbol	Condition	Minimum value	Nominal value	Maximum value	Unit
Input Voltage		V _{CC}	TD301M485	3.15	3.3	3.45	V _{DC}
			TD501M485	4.75	5	5.25	
TXD Logic Level	High Level	V _{IH}		0.7V _{CC}	--	V _{CC} +0.5	
	Low Level	V _{IL}		0	--	0.3V _{CC}	
RXD Logic Level	High Level	V _{OH}	I _{RXD} = -2mA	2.0	--	--	
	Low level	V _{OL}	I _{RXD} = 2mA	-----	--	0.8	

TXD drive current		I _{TXD}		--	--	2	mA
RXD output current		I _{RXD}		---	--	2	
Serial Interface			TD301M485	3.3V Standard UART Interface			
			TD501M485	5V standard UART interface			

6.3 Output Characteristics

Item	Symbol	Condition	Minimum value	Nominal value	Maximum value	Unit
Built-in isolated output supply voltage	V_O	Nominal Input Voltage	----- ----- -----	--	--	VDC
Differential Output Voltage (A-B)	V_{OD}	Nominal input voltage with differential load of 54 Ω	1.5	--	VO	
Differential output current (A-B)	I_{OD}		28	--	--	mA
Bus Interface Protection		ESD static protection				

6.4 Transmission characteristics

Item	Symbol	Condition	Minimum value	Nominal value	Maximum value	Unit
Built-in pull-up and pull-down resistors			--	24	--	k Ω
Transceiver Input Impedance		$-7V \leq V_{CM} \leq +12V$	96	--	--	
Data transmission delay			--	180	--	ns

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Item	Symbol	Condition	Minimum value	Nominal value	Maximum value	Unit
Data reception delay			--	120	----- ----- -----	

6.5 Truth Table Characteristics

Item	Input	Output	
Transmit Function	TXD	A	TXD A
	1	1	0
	1 1 0	1 1 0 0	1
Receive Function	$V_A - V_B$	RXD	
	$\geq -10\text{mV}$	1	
	$\leq -200\text{mV}$	$0 \leq -200\text{mV}$	
	$-200\text{mV} < V_A - V_B < -10\text{mV}$	Uncertain state	

6.6 General Characteristics

Item	Condition	Minimum value	Nominal value	Maximum value	Unit
Electrical isolation		Isolation at both ends (input and output are isolated from each other)			
Isolation voltage	Test time 1 minute, Leakage current $< 5\text{mA}$, Humidity $< 95\%$	--	2.5K	--	VDC
Operating Temperature Range	Output is full load	-40	--	+85	$^{\circ}\text{C}$
Storage temperature	--	-55	--	+105	$^{\circ}\text{C}$
Storage humidity	Non-condensing	--	--	95	%
Temperature rise of the housing during operation		--	20	----- ----- -----	$^{\circ}\text{C}$
Operating environment	The product may be damaged by the presence of dust, strong vibrations, shocks, and gases that corrode the components of the product.				

6.7 Physical Characteristics

Item	Conditions of use
Enclosure Material	Black flame retardant heat resistant plastic (UL94-V0)
Package size	12.70*10.16*7.70mm
Weight	2.0g (nominal)
Cooling Method	Natural air cooling

6.8 EMC Characteristics

Classification	Item	Parameter	Class
EMS	Electrostatic discharge immunity	IEC/EN 61000-4-2 Contact $\pm 4\text{KV}$ /Air $\pm 8\text{KV}$ (bare metal)	Perf.Criteria B
		IEC/EN 61000-4-2 Contact $\pm 8\text{KV}$ /Air $\pm 15\text{KV}$ (see Figure 3 for recommended circuit)	Perf.Criteria B
	Pulse group immunity	IEC/EN 61000-4-4 $\pm 2\text{KV}$	Perf.Criteria B
	Lightning surge immunity	IEC/EN 61000-4-5 Common mode $\pm 2\text{KV}$ (bare metal)	Perf.
		IEC/EN 61000-4-5 Differential mode $\pm 2\text{KV}$, common mode $\pm 4\text{KV}$ (see Figure 3 for recommended circuit)	Perf.Criteria B
	Conducted Nuisance Immunity	IEC/EN 61000-4-6 3Vr.m.s	Perf.

7 Design Reference

7.1 Typical Application

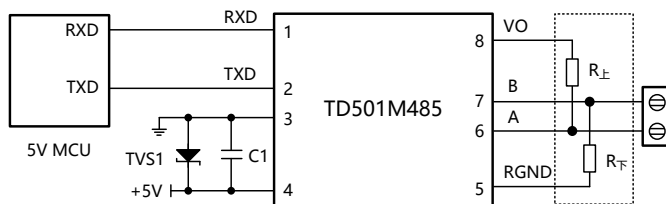


Figure 1. MCU 5V Power Supply Application Circuitry

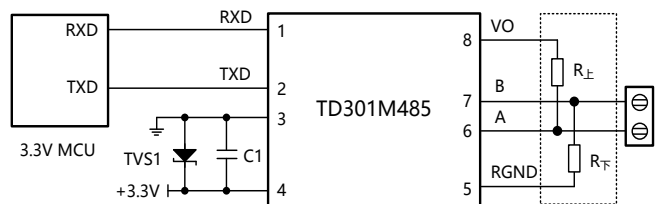


Figure 2. MCU 3.3V Power Supply Application Circuitry

Figure 1 shows the connection diagram between the 5V MCU system UART interface and the TD501M485 isolated transceiver module. The module must be powered by a 5V power supply, and the module's TXD and RXD pin interfaces match the level of 5V, and do not support the 3.3V system level. Figure 2 shows the connection diagram of the 3.3V MCU system UART interface with the TD301M485 isolated transceiver module, the module must be powered by a 3.3V power supply, the module's TXD, RXD pin interface matching level is 3.3V, does not support 5V system level.

7.2 EMC Typical Recommended Circuit

As the module internal A/B line with pull-up and down resistors and ESD protection devices, so generally used in good environmental conditions without the need to add ESD protection devices, such as 7.1 typical applications shown in the typical connection circuit diagram. However, if the application environment is more severe (such as high-voltage power, lightning and other environments), it is recommended that the user must be in the module at the A/B line end of the external pull-up and down resistors, TVS tubes, common-mode inductors, lightning tubes, shielded twisted-pair cables, or the same network of

single-point connection to the earth and other protective measures.

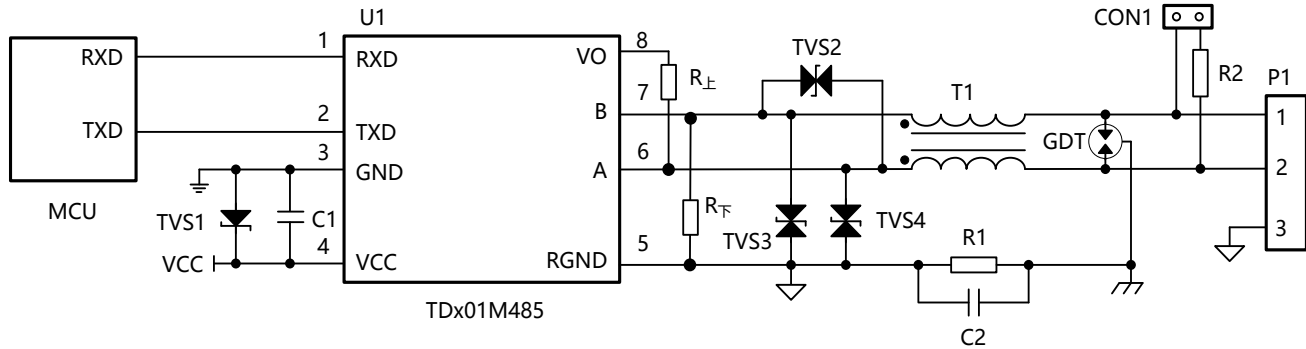


Figure 3. EMC Recommended Circuitry

If you need to meet the specific surge level requirements, it is recommended to use the recommended protection circuit shown in Figure 3, Table 1 gives a set of recommended device parameters, the recommended circuit diagram and parameter values are for reference only, please determine the appropriate parameter values according to the actual situation.

Table 1. EMC Recommended Parameters

Label	Model	Marker	Model No.
C1	10 μ F, 25V	TVS1	SMBJ5.0A
C2	102, 2KV, 1206	TVS2	SMBJ12CA
GDT	3RL090M-5-S	TVS3, TVS4	SMBJ6.5CA
R1	1M Ω , 1206	T1	B82793S0513N201
R2	120 Ω , 1206	U1	TDx01D485H-A Module

8 Precautions for Product Use

8.1 MCU IO Port Level Matching

The interface matching level of TXD and RXD pins of TD501M485 is 5V, 3.3V system level is not supported; the interface matching level of TXD and RXD pins of TD301M485 is 3.3V, 5V system level is not supported.

8.2 Module RS485 A-B bus level threshold description

From the truth table characteristics can be seen, the series of embedded isolated RS-485 transceiver module when the A/B line differential voltage is greater than or equal to +200mV, the module receives a high level; when the A/B line differential voltage is less than or equal to -200mV, the module receives a low level; when the A/B line differential voltage is greater than -200mV and less than +200mV, the module receives the level of uncertainty, the design should ensure that the module receives is not in the -200mV and less than +200mV. The design should ensure that the module reception is not in this state. So users in the design or application of RS-485 network, according to the actual situation to decide whether to add 120 Ω termination resistor. Principle of use: Regardless of whether the RS-485 network is in a static or dynamic situation, it must be ensured that the differential voltage of A/B line is not between -200mV and +200mV, or communication errors will occur.

8.3 Module Pin Description

If the module does not use pins 5 and 8, please leave these pins empty;

Users must avoid short-circuiting between VO pin and RGND pin, otherwise the module will be damaged. In addition, it is better to use VO pin only for pull-up resistor circuit, and do not use it for other circuits to supply power.

8.4 The use of shielded wires

Please use shielded twisted-pair cable for data transmission line, and connect the shielding layer of the same network to the earth at a single point; if you require RS-485 network to have better anti-jamming ability, you can use double shielded twisted-pair cable, and RGND of each node should be connected to the inner shielding layer, and the outer shielding layer should be connected to the earth at a single point.

8.5 External pull-up/down resistor

If the application environment is relatively harsh (such as high-voltage power, lightning and other environments) need to be added to the ESD protection device, you need to connect the appropriate external pull-up and pull-down resistors to match the equivalent capacitance of the ESD protection device, used to improve the quality of the communication signal waveform.