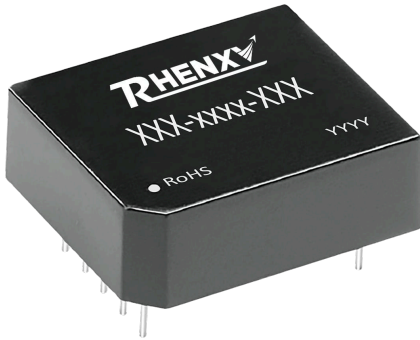


## CMx21D485H-A Series



### FEATURES

- Single input power supply
- With isolated output power pin
- Automatic data transceiving function
- Supports up to 128 nodes
- Extremely low electromagnetic interference (EMI)
- Operating temperature range: -40°C ~ +85°C
- Integrated power isolation, signal isolation and bus ESD protection
- 3 years warranty

### APPLICATIONS

- Industrial communication
- Power monitoring
- Coal mining industry
- Building automation

### MODEL NUMBERING

CM321D485H-A / CM521D485H-A converts logic levels to RS-485 protocol differential levels for signal isolation. It is an RS-485 protocol transceiver module integrating power isolation, signal isolation, RS-485 communication and bus protection using IC integration technology. The module has a built-in fixed-voltage isolated power supply and provides 2500VDC electrical isolation. It features automatic transmit/receive switching without a dedicated transmit/receive control pin, reducing design complexity. It can be easily embedded into user equipment to enable RS-485 network connectivity.

### SELECTION GUIDE

Product Model	Power Supply Voltage Range (VDC)	Quiescent Current (mA, Typ)	Max. Operating Current (mA)	Transmission Baud Rate (kbps)	Node Count (pcs)	Type
CM321D485H-A	3.3 (3.15~3.45)	35	130	500	128	High Speed
CM521D485H-A	5 (4.75~5.25)	30	90	500	128	High Speed

## RS-485 Transceiver

### INPUT CHARACTERISTICS

Parameter		Symbol	Operating Conditions	Min.	Typ.	Max.	Units
Input Voltage		V <sub>CC</sub>	CM321D485H-A	3.15	3.3	3.45	VDC
			CM521D485H-A	4.75	5	5.25	VDC
TXD Logic Level	High Level	V <sub>IH</sub>		0.7V <sub>CC</sub>	--	V <sub>CC</sub> +0.5	VDC
	Low Level	V <sub>IL</sub>		0	--	0.3V <sub>CC</sub>	VDC
RXD Logic Level	High Level	V <sub>OH</sub>	I <sub>RXD</sub> =-2mA	2.0	--	--	VDC
	Low Level	V <sub>OL</sub>	I <sub>RXD</sub> =-2mA	--	--	0.8	VDC
TXD Drive Current		I <sub>TXD</sub>		--	--	2	mA
RXD Output Current		I <sub>RXD</sub>		--	--	2	mA
TXD Pull-up Resistor		R <sub>TXD</sub>			5.1		kΩ
Serial Interface			CM321D485H-A	3.3V Standard UART Interface			
			CM521D485H-A	5V Standard UART Interface			

### OUTPUT CHARACTERISTICS

Parameter	Symbol	Operating Conditions	Min.	Typ.	Max.	Units
Built-in Isolated Output Power Voltage	V <sub>O</sub>	Nominal Input Voltage	--	--	--	VDC
Differential Output Voltage (A-B)	V <sub>OD</sub>	Nominal Input Voltage, No Load	1.5	--	V <sub>O</sub>	VDC
Differential Output Current (A-B)	I <sub>OD</sub>		28	--	--	mA
Bus Interface Protection			ESD Protection			

### ABSOLUTE MAXIMUM RATINGS

Exceeding these limits may cause permanent damage to the module

Parameter	Operating Conditions	Min.	Nom.	Max.	Units
Input Voltage Range	CM321D485H-A	-0.7	3.3	5	VDC
	CM521D485H-A	-0.7	5	7	VDC
Pin Soldering Temperature	Manual soldering @3~5s	--	370	--	°C
	Wave soldering @5~10s	--	265	--	°C
Hot Plugging	--	Not Supported			

Note: This series has no reverse polarity protection. DO NOT reverse power polarity, or irreversible damage will occur

## RS-485 Transceiver

### TRANSMISSION CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Built-in Pull-up/Pull-down Resistors		--	47	--	kΩ
Transceiver Input Impedance	$-7V \leq V_{CM} \leq +12V$	48	--	--	kΩ
Data Transmit Delay		--	1000	--	ns
Data Receive Delay		--	100	--	ns

### TRUTH TABLE

Parameter	Input		Output	
	TXD		A	B
Built-in Pull-up/Pull-down Resistors	1		1	0
	0		0	1
Receive Function	VA-VB		RXD	
	$\geq +200mV$		1	
	$\leq -200mV$		0	
	$-200mV < VA-VB < +200mV$		Indeterminate	

### GENERAL CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Electrical Isolation		Isolated between input and output			
Isolation Voltage	1min test, I<5mA, Humidity<95%	--	2.5K	--	VDC
Operating Temperature	Full Load	-40	--	+85	°C
Storage Temperature	--	-55	--	+105	°C
Storage Humidity	Non-condensing	--	--	95	%
Case Temperature Rise		--	20	--	°C
Operating Environment	Dust, strong vibration, shock or corrosive gas may damage the module				

**PHYSICAL CHARACTERISTICS**

Parameter	Operating Conditions
Housing Material	Black Flame-retardant Heat-resistant Plastic (UL94-V0)
Package Size	19.50*16.50*7.10mm
Weight	4.0g (Nominal)
Cooling Method	Natural Air Cooling

**EMC CHARACTERISTICS**

Category	Item	Parameter	
EMC	ESD Immunity	IEC/EN 61000-4-2 Contact $\pm 4KV$ /Air $\pm 8KV$ (Bare Board)	Perf.Criteria B
		IEC/EN 61000-4-2 Contact $\pm 8KV$ /Air $\pm 15KV$ (Recommended Circuit Fig.3)	Perf.Criteria B
	EFT/Burst Immunity	IEC/EN 61000-4-4 $\pm 2KV$	Perf.Criteria B
	Surge Immunity	IEC/EN 61000-4-5 Common Mode $\pm 2KV$ (Bare Board)	Perf.Criteria B
		IEC/EN 61000-4-5 Differential $\pm 2KV$ , Common Mode $\pm 4KV$ (Recommended Circuit Fig.3)	Perf.Criteria B
Conducted Immunity	IEC/EN61000-4-6 3Vr.m.s	Perf.Criteria A	

**DESIGN REFERENCE**

**TYPICAL APPLICATION**

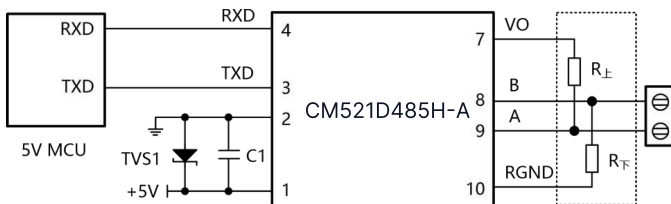


Fig.1 Application Circuit for 5V MCU

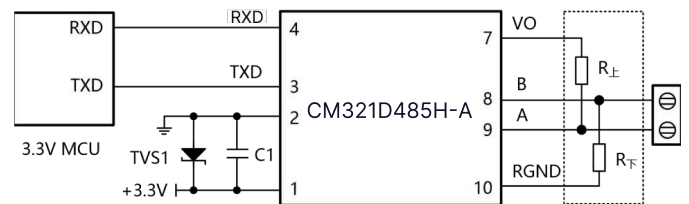


Fig.2 Application Circuit for 3.3V MCU

Fig.1 shows the connection between a 5V MCU UART and CM521D485H-A. It must be powered by 5V; TXD/RXD are 5V level, not compatible with 3.3V systems.

Fig.2 shows the connection between a 3.3V MCU UART and CM321D485H-A. It must be powered by 3.3V; TXD/RXD are 3.3V level, not compatible with 5V systems.

**TYPICAL EMC RECOMMENDED CIRCUIT**

The module has built-in pull- up/down resistors and ESD protection on A/B lines. No external ESD is needed in benign environments (as in 7.1).For harsh environments (high- voltage power, lightning), add external pull-up/down resistors, TVS, common-mode choke, surge arrester, shielded twisted pair, or single-point grounding.

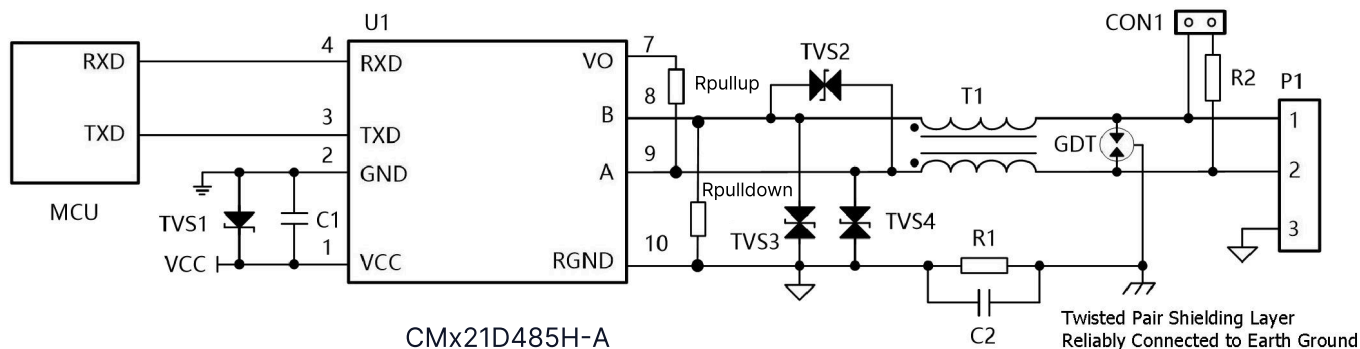


Fig.3 EMC Recommended Circuit

Table 1 lists recommended component values for surge requirements. Adjust values for your application.  
Table 1 EMC Recommended Parameters

Component	Model	Component	Model
C1	10μF, 25V	TVS1	SMBJ5.0A
C2	102, 2KV, 1206	TVS2	SMBJ12CA
GDT	3RL090M-5-S	TVS3, TVS4	SMBJ6.5CA
R1	1MΩ, 1206	T1	B82793S0513N201
R2	120Ω, 1206	U1	CMx21D485H-A

**PRODUCT USAGE NOTES**

**1. MCU IO Level Matching**

CM521D485H-A: TXD/RXD = 5V level; not for 3.3V systems ·  
CM321D485H-A: TXD/RXD = 3.3V level; not for 5V systems

**2. RS-485 A-B Bus Threshold Description**

According to the truth table characteristics, for this series of embedded isolated RS-485 transceiver modules, the module receives a high level when the differential voltage of the A/B lines is greater than or equal to +200mV;itreceives a low level when the differential voltage of the A/B lines is less than or equal to -200 mV; and the received level is in an indeterminate state when the differential voltage of the A/B lines is greater than-200mVand less than +200 mV. Ensure that the module does not enter this state during design. Therefore, when designing or applying an RS-485 network, users should decide whether to add a 120 Ω termination resistor based on actual conditions. Operating principle: The differential voltage of the A/B lines must never fall between-200mV and +200 mV, whether the RS-485 network is in a static or dynamic state; otherwise, communication errors

**3. Module Pin Notes**

Pins 5, 6 are not led out. Leave pins 7, 10 floating if unused.  
Avoid shorting VO and RGND (module damage). Use VO only for pull-up circuits, not for powering other circuits.

**4. Shielded Cable Usage**

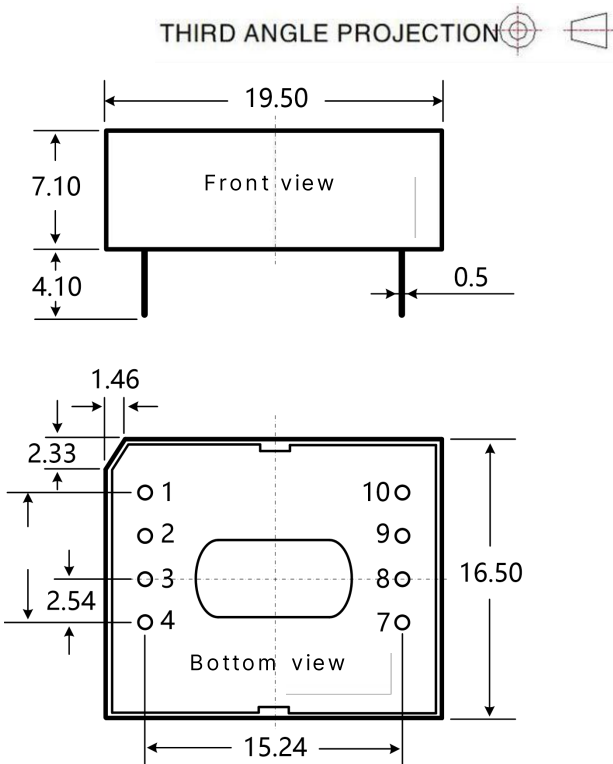
Use shielded twisted pair; single-point ground the shield for the entire network. For better immunity: use double-shielded cable. Connect RGND to inner shield; outer shield single-point to ground.

**5. External Pull-up/Pull-down Resistors**

In harsh environments (high voltage, lightning), add external ESD, pull- up/down resistors and matching ESD capacitors to improve signal quality.

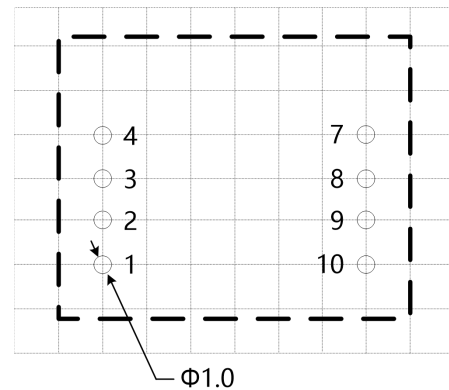
**OVERALL DIMENSIONS AND PIN FUNCTIONS**

**1. Appearance Dimension Drawing**



Note: Unit: mm  
diameter tolerance: ±0.10  
Unmarked tolerance: ±0.25

**4.2 Recommended Layout Drawing**



Note: Grid spacing 2.54x2.54mm

Table 1: Pin Function Table

Pin	Function	Description
1	VCC	Positive Power Input
2	GND	Power Input Ground
3	TXD	Transmit Data Pin
4	RXD	Receive Data Pin
7	VO	Isolated Output Power Positive
8	B	RS-485 B Line
9	A	RS-485 A Line
10	RGND	Isolated Output Power Ground

## NOTES

1. If the product works under the minimum required load, it cannot guarantee that the performance of the product complies with all the performance indicators in this manual;
2. The maximum capacitive load is tested under the input voltage range and full load condition;
3. Unless otherwise stated, all indexes in this manual are measured at  $T_a=25^{\circ}\text{C}$ , humidity  $<75\%RH$ , nominal input voltage and rated output load;
4. All index testing methods in this manual are based on the enterprise standards of the company;
5. Our company can provide product customization, specific needs can directly contact our technical staff;
6. RHENXV reserves the right to make changes to the product at any time without notice.