RHENXV
Your Vision, Our Solutions

RS-485 Transceiver

CMx21D485H-E Series

FEATURES

- Single input power supply
- No isolated output power pin
- Up to 256 nodes can be connected
- Extremely low electromagnetic radiation (EMI)
- Operating temperature range: -40°C ~ +85°C
- Integrated isolation, signal isolation, and bus ESD protection
- 3 years warranty

APPLICATIONS

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

MODEL NUMBERING

CM321D485H-E / CM521D485H-E modules primarily convert logic levels to RS-485 protocol differential levels while providing signal isolation. These are RS-485 protocol transceiver modules that integrate power isolation, signal isolation, RS-485 communication, and bus protection using IC integration technology. The product includes a built-in regulated isolated power supply, achieving 2500VDC electrical isolation. The module can be easily embedded into user equipment, enabling easy connection to an RS-485 protocol network.

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-E	3.3 (3.15~3.45)	36	130	500	256	High Speed
CM521D485H-E	5 (4.75~5.25)	32	100	500	256	High Speed

INPUT CHARACTERISTICS

Parameter		Symbol	Operating Conditions	Min.	Typ.	Max.	Units
Input Voltage		V_{CC}	CM321D485H-E	3.15	3.3	3.45	VDC
			CM521D485H-E	4.75	5	5.25	VDC
TXD Logic Level	High Level	V_{IH}		0.7V_{CC}	--	V_{CC}+0.5	VDC
	Low Level	V_{IL}		0	--	0.3V_{CC}	VDC
RXD Logic Level	High Level	V_{OH}	I_{RXD}=-2mA	2.0	--	--	VDC
	Low Level	V_{OL}	I_{RXD}=-2mA	--	--	0.8	VDC
CON Control Level	High Level	V_{CON_H}	CM321D485H-E	2.3	--	V_{CC}+0.5	VDC
			CM521D485H-E	3.8	--	V_{CC}+0.5	VDC
	Low Level	V_{CON_L}		0	--	0.3V_{CC}	VDC
TXD Drive Current		I_{TXD}		--	--	2	mA
CON drive current		I_{CON}		--	5	--	mA
RXD Output Current		I_{RXD}		--	--	2	mA
TXD Pull-up Resistor		R_{TXD}		--	5.1	--	kΩ
Serial Interface			CM321D485H-E	3.3V Standard UART Interface			
			CM521D485H-E	5V Standard UART Interface			

OUTPUT CHARACTERISTICS

Parameter	Symbol	Operating Conditions	Min.	Typ.	Max.	Units
Built-in Isolated Output Power Voltage	V_O	Nominal Input Voltage	--	--	--	mA
Differential Output Voltage (A-B)	V_{OD}	Nominal input voltage, differential load 54Ω	1.5	--	VO	mA
Differential Output Current (A-B)	I_{OD}		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-E	-0.7	3.3	5	VDC
	CM521D485H-E	-0.7	5	7	VDC

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Parameter	Operating Conditions	Min.	Nom.	Max.	Units
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

TRANSMISSION CHARACTERISTICS

Built-in Pull-up/Pull-down Resistors		--	120	--	kΩ
Transceiver Input Impedance	-7V≤VCM≤+12V	96	--	--	kΩ
Data Transmit Delay		--	400	--	ns
Data Receive Delay		--	150	--	ns
Transceiver state delay	--	--	25	--	μs

TRUTH TABLE

Parameter	Input		Output	
Transmit Function	**CON**	**TXD**	**A**	**B**
	0	1	1	0
	0	0	0	1
Receive Function	**CON**	**V_A-V_B**	**RXD**	
	1	≥-10mV	1	
	1	≤-200mV	0	
	1	-200mV＜VA-VB＜+10mV	Indeterminate	

GENERAL CHARACTERISTICS

Parameter	Operating Conditions	Min.	Typ.	Max.	Units
Electrical Isolation		Isolated between input and output			
Isolation Voltage	Test time 1 minute, leakage<5mA, humidity <95%	--	2.5K	--	VDC
Operating Temperature	Output at 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	
EMS	ESD Immunity	IEC/EN 61000-4-2 Contact ±4KV/Air ±8KV(bare module)	Perf.Criteria B
		IEC/EN 61000-4-2 Contact ±8KV/Air ±15KV (with recommended circuit Figure 5)	Perf.Criteria B
	EFT	IEC/EN 61000-4-4 ±2KV	Perf.Criteria B
	Surge Immunity	IEC/EN 61000-4-5 Common mode ±2KV (bare module)	Perf.Criteria B
		IEC/EN 61000-4-5 Differential ±2KV, Common mode ±4KV (with recommended circuit Figure 5)	Perf.Criteria B
	Conducted Immunity	IEC/EN61000-4-6 3Vr.m.s	Perf.Criteria A

PRODUCT CHARACTERISTIC CURVES

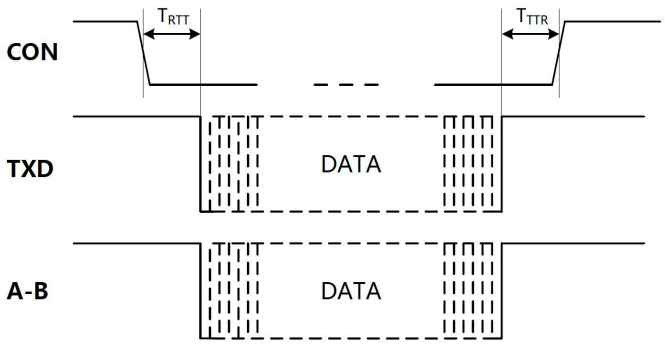


Fig1. CMx01D485H-E Module Data Transmit Timing Diagram

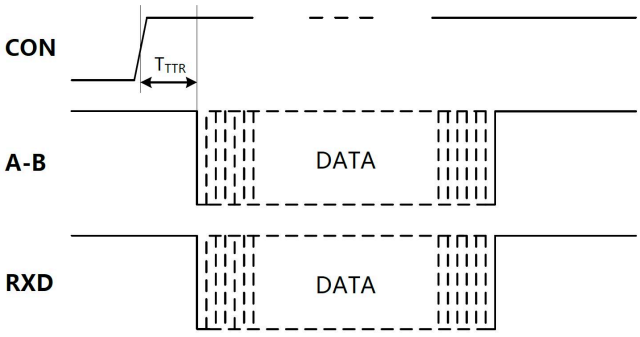


Fig2. CMx01D485H-E Module Data Receive Timing Diagram

TYPICAL APPLICATION

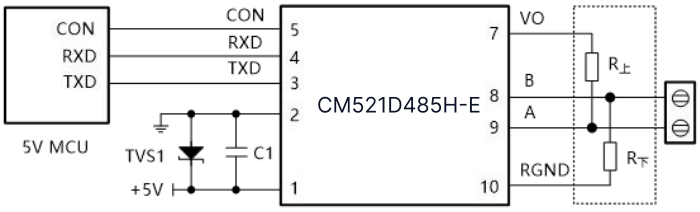


Fig 3. MCU 5V Power Supply Application Circuit

Fig 4. MCU 3.3V Power Supply Application Circuit

Fig.3 shows the connection diagram for a 5V MCU system UART interface with the CM521D485H-E isolated transceiver module. The module must be powered by a 5V supply. The TXD, RXD, and CON pin interface levels are 5V and do not support 3.3V system logic.

Fig.4 shows the connection diagram for a 3.3V MCU system UART interface with the CM321D485H-E isolated transceiver module. The module must be powered by a 3.3V supply. The TXD, RXD, and CON pin interface levels are 3.3V and do not support 5V system logic.

EMC TYPICAL RECOMMENDED CIRCUIT

Since the module has built-in pull-up/pull-down resistors and ESD protection devices on the A/B lines, additional ESD protection devices are generally not required in benign environments, as shown in the typical connection circuit diagrams in Section 8.1. However, if the application environment is harsh (e.g., high voltage power, lightning, etc.), it is recommended to add external protection measures such as TVS tubes, common mode chokes, surge arresters, shielded twisted pair cables, or single-point earth grounding for the same network at the module's A/B line terminals.

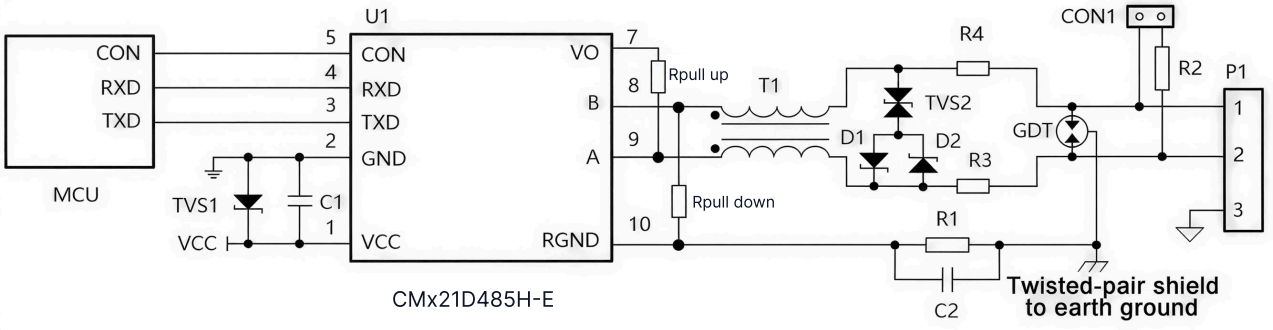


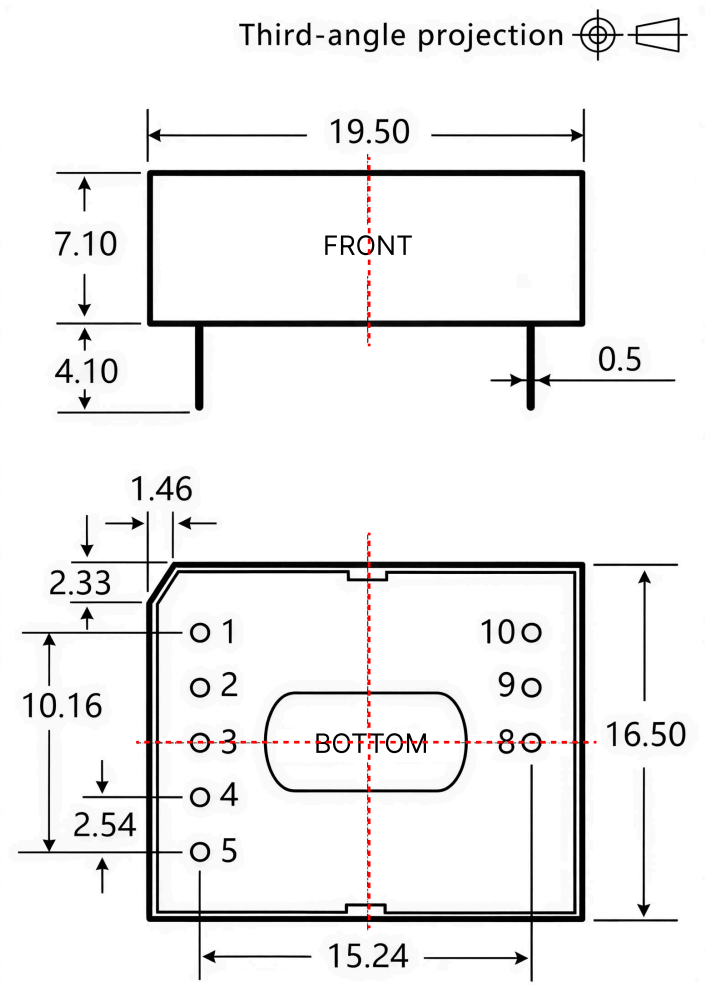
Fig.5 EMC Recommended Circuit

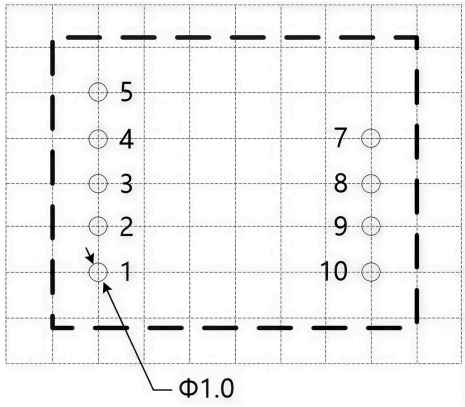
To meet specific surge immunity levels, the recommended protection circuit shown in Figure 5 is suggested. Table 1 provides a set of recommended component parameters. The recommended circuit and parameter values are for reference only; appropriate values should be determined based on actual conditions.

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-E

Table 1. EMC Recommended Parameters

OVERALL DIMENSIONS AND PIN FUNCTIONS





Pin	Function	Description
1	VCC	Power input positive
2	GND	Power input ground
3	TXD	Data transmit pin
4	RXD	Data receive pin
5	CON	Transceiver control pin
7	VO	Isolated output power positive
8	B	RS-485 B pin
9	A	RS-485 A pin
10	RGND	Isolated output power ground

Note:
Unit: mm[inch]
Terminal diameter tolerance: ±0.10
Unspecified tolerance: ±0.25

PRODUCT USAGE PRECAUTIONS

1. MCU IO Level Matching

The TXD, RXD, and CON pin interface levels of the CM521D485H-E are 5V and do not support 3.3V system logic. The TXD, RXD, and CON pin interface levels of the CM321D485H-E are 3.3V and do not support 5V system logic.

2. RS485 A-B Bus Level Threshold Description

From the truth table characteristics, when the A/B line differential voltage is ≥ -10mV, the module receive level is high; when the A/B line differential voltage is ≤ -200mV, the module receive level is low; when the A/B line differential voltage is between -200mV and -10mV, the module receive level is indeterminate. Design must ensure the module does not operate in this indeterminate state. Therefore, when designing or applying an RS-485 network, users must decide whether to add a 120Ω termination resistor based on actual conditions. The principle is: regardless of whether the RS-485 network is static or dynamic, the A/B line differential voltage must not fall between -200mV and -10mV; otherwise, communication errors may occur.

3. Module RS485 Transmit/Receive Data Control Pin CON Level Description

From the truth table characteristics, this series of embedded isolated RS-485 transceiver modules transmits data when the CON pin is low and receives data when the CON pin is high, which is the opposite of standard RS-485 transceiver chip control logic. Therefore, if the user wishes to use the same control logic as standard RS-485 transceiver chips, it is recommended to add an inverting circuit between the MCU and the module's CON pin.

4. Module Pin Description

Pins 6 and 7 are not brought out. If pin 10 is not used, leave it floating.

5. Use of Shielded Cable

For data transmission lines, use shielded twisted pair cables. The shield of the same network should be single-point grounded to earth. For better noise immunity of the RS-485 network, double-shielded twisted pair cable can be used. Connect the RGND of each node to the inner shield, and single-point ground the outer shield to earth.