

Single channel high-speed small volume CANFD isolated transceiver

1 Product features:

Compliant with ISO 11898-5 standard

Unpowered nodes do not affect the bus

A single network can connect at least 110 nodes

The shell and sealing material comply with UL94-V0 standard

Has extremely low electromagnetic radiation and high resistance to electromagnetic interference

Good high and low temperature characteristics, meeting the requirements of industrial grade products

2 Product Description:

The high-speed CANFD isolation transceiver module series TD301MCANFD/TD501MCANFD is a CAN bus transceiver module that integrates isolation power supply, signal isolation chip, and CANFD transceiver chip. The main function of the product is to convert the logic level into the differential level of the CAN bus, achieving signal isolation; The product comes with a constant voltage isolation power supply,

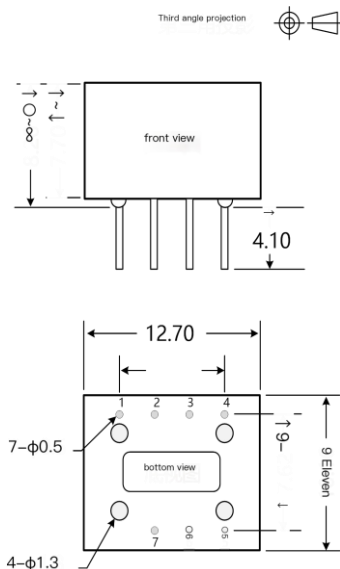
It can achieve electrical isolation of 2500VDC and has high ESD protection function. The product can be easily embedded into user devices, making it easy for the devices to connect to the CAN bus network.

3 Scope of application:

Automotive electronics, instruments, meters, railway transportation, petrochemicals, power monitoring, industrial control, smart homes..

4 Appearance dimensions and pin specifications:

4.1 Appearance dimension diagram



Note:

Dimension unit: mm

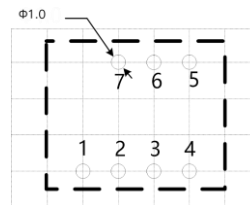
Terminal diameter

tolerance: ± 0.10

Unmarked tolerance: ± 0.25

0.25

4.2 Suggested printing image



Note: The grid spacing is 2.54 * 2.54mm

4.3 Pin Definition

Pin		describe
Serial Number	name	
1	RXD	CAN controller connection terminal receiving pin
2	TXD	CAN controller connection terminal sending pin
3	GND	Power input ground
4	VCC	Positive power input
5	CANG	Isolation power output ground
6	CANL	CAN signal connection terminal CANL pin
7	CANH	CAN signal connection terminal CANH pin

5 Product Model Table

PRODUCT MODEL	Power supply voltage range (VDC)	static current (mA,Typ)	maximum operating current (mA)	Transmission baud rate (bps)	Nodes (pcs)	type
TD301MCANFD	3.3 (3.15~3.45)	44	100	40k~5M	110	high speed
TD501MCANFD	5 (4.75~5.25)	35	90			

6 Specification parameters

6.1 Maximum limit parameter

Using beyond the following limit values may cause permanent damage to the module,

project	condition	minimum value	Nominal value	Maximum value	unit
Input Voltage	TD301MCANFD	-0.7	3.3	5	V _{dc}
	TD501MCANFD	-0.7	5	7	
Pin soldering temperature resistance	Manual welding @ 3-5 seconds	--	370	--	°C
	Wave soldering @ 5-10 seconds	--	265	--	
hot plugging	--	Not Supported			

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

6.2 Input characteristics

project	symbol	condition	minimum value	Nominal value	Maximum value	unit
INPUT VOLTAGE	V _{CC}	TD301MCANFD	3.15	3.3	3.45	V _{DC}
		TD501MCANFD	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 driving current	I _{TXD}		--	--	2	mA
RXD output current	I _{RXD}		--	--	2	
serial interface		TD301MCANFD	3.3V standard CANFD controller interface			
		TD501MCANFD	5V standard CANFD controller interface			

6.3 output characteristic

project		symbol	minimum value	Nominal value	Maximum value	unit
Explicit level (logic 0)	CANH	$V_{(OD)CANH}$	2.75	3.5	4.5	VDC
	CANL	$V_{(OD)CANL}$	0.5	1.5	2.25	
Logic level (logic 1)	CANH	$V_{(OR)CANH}$	2	2.5	3	
	CANL	$V_{(OR)CANL}$	2	2.5	3	
Differential voltage level	Explicit (Logic 0)	$V_{diff(d)}$	1.5	2	3	
	Implicit (Logic 1)	$V_{diff(r)}$	-0.05	0	0.05	
Maximum withstand voltage of bus pins		V_x	-58	--	+58	
Bus transient voltage		V_{tt}	-150	--	+100	
Bus pin leakage current		$(V_{CC}=0V, V_{CANHL}=5V)$	-5	--	+5	μA
Bus interface protection		Compliant with ISO/DIS 11898 standard, twisted pair output				

6.3 Transmission characteristics

project		symbol	minimum value	Nominal value	Maximum value	unit
Data latency	TXD transmission delay	t_T	--	55	115	ns
	RXD receiving delay	t_R	--	65	135	
	Loop Delay	$t_{PD(TXD-RXD)}$	--	120	250	
TXD explicit timeout		$T_{to(dom)TXD}$	0.3	1	12	ms

6.4 General characteristics

project	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<5mA, humidity<95%	--	2500	--	VDC
Working temperature range	Output as full load	-40	--	+105	°C
storage temperature	--	-55	--	+125	°C
Storage humidity	No condensation	--	--	95	%
Temperature rise of the casing during operation		--	20	--	°C
Usage environment	The presence of dust, strong vibrations, impacts, and gases that corrode product components in the surrounding environment may cause damage to the product				

6.5 physical property

project	condition
Housing material	Black flame retardant and heat-resistant plastic (UL94-V0)
Package Size	12.70*10.16*7.70mm
weight	2.0g (nominal)
Cooling method	Natural air cooling

6.6 EMC characteristics

classification	project	parameter	grade
EMS	Electrostatic Discharge	IEC/EN 61000-4-2 Contact $\pm 4KV$ /Air $\pm 8KV$ (bare metal)	Perf.Criteria B
		IEC/EN 61000-4-2 Contact $\pm 8KV$ /Air $\pm 15KV$ (recommended circuit shown in Figure 4)	Perf.Criteria B
	Pulse group immunity	IEC/EN 61000-4-4 $\pm 2KV$	Perf.Criteria B
	Lightning surge immunity	IEC/EN 61000-4-5 common mode $\pm 2KV$ (bare metal)	Perf.Criteria B
		IEC/EN 61000-4-5 differential mode $\pm 2KV$, common mode $\pm 4KV$ (recommended circuit shown in Figure 4)	Perf.Criteria B
Conducted disturbance immunity	IEC/EN61000-4-6 3Vr.m.s	Perf.Criteria A	

7 design reference

7.1 Typical applications

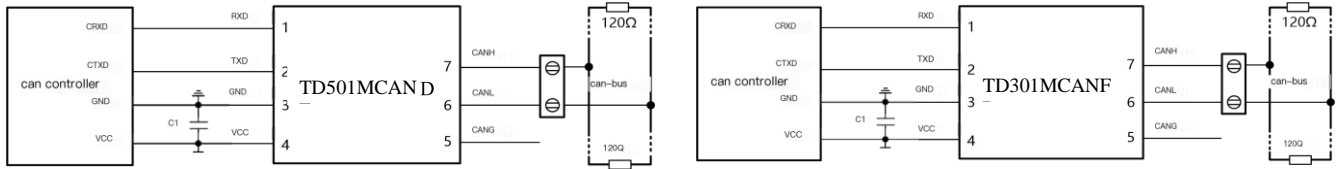


Figure 1. Circuit diagram of CAN controller 5V power supply application 2CAN controller 3.3V power supply application circuit

In general, the module is connected to the power supply, port, CAN controller, and CAN network bus, and can be used directly without the need for external components. Figure 1 shows the connection diagram between the 5V CAN controller interface and the TD501MCANFD isolated transceiver module. The module must be powered by a 5V power supply, and the TXD and RXD pin interfaces of the module are matched with a voltage level of 5V and do not support 3.3V system voltage. Figure 2 shows the connection diagram between the 3.3V CAN controller interface and the TD301MCANFD isolated transceiver module. The module must be powered by a 3.3V power supply, and the TXD and RXD pin interfaces of the module are matched with a voltage level of 3.3V and do not support 5V system voltage.

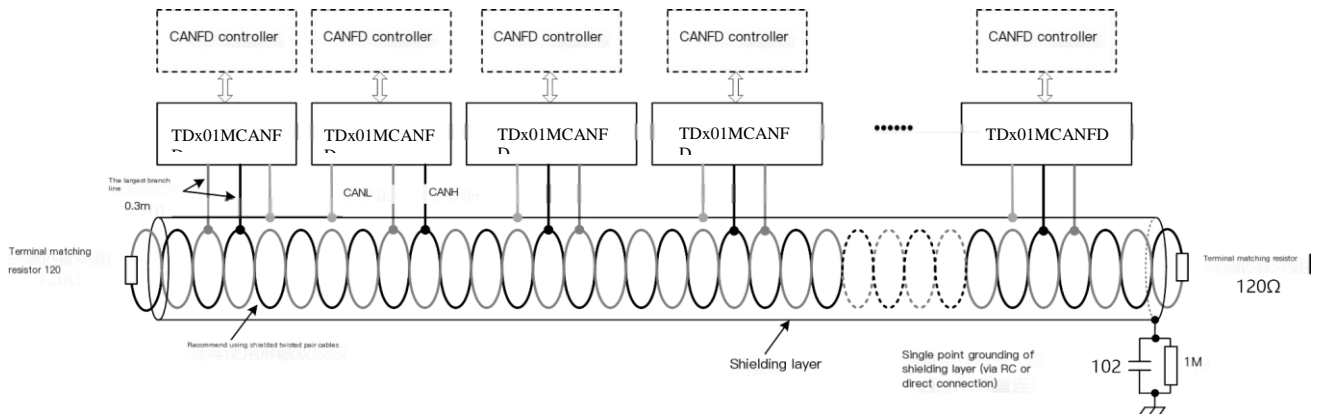


Figure 3. Schematic diagram of typical network connection for a single CANFD Bus

A typical CANFD Bus network is shown in the figure above, with each network capable of connecting 110 single CTM isolated CAN transceiver modules. The longest communication distance for general modules is 10km, while high-speed modules support a minimum baud rate of 40kbps and a longest communication distance of 1km. If more nodes or longer communication distances need to be connected, they can be extended through devices such as CAN repeaters.

Note: The bus communication distance is related to communication speed and field applications, and can be designed according to actual applications and reference to relevant standards. Communication cables should be selected as twisted pair or shielded twisted pair and kept as far away from interference sources as possible. When communicating over long distances, the terminal resistance value needs to be selected based on the communication distance, cable impedance, and number of nodes.

7.2 EMC Typical Recommended Circuit

When generally used in environments with good conditions, there is no need to add ESD protection devices, as shown in the typical connection circuit diagram in 7.1 Typical Applications. But if the application environment is relatively harsh (such as high voltage power, lightning strikes, etc.), it is recommended that users must add TVS tubes, common mode inductors, lightning protection tubes, shielded twisted pair cables, or single point grounding of the same network to the CANH/CANL terminal of the module for protection.

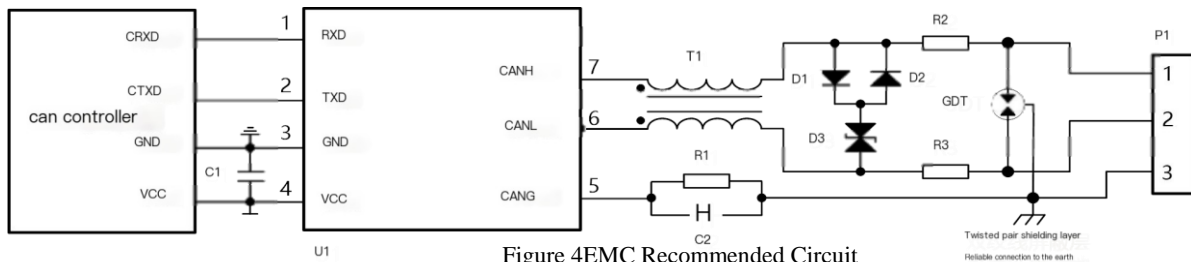


Figure 4 EMC Recommended Circuit

If specific surge level requirements need to be met, it is recommended to use the recommended protection circuit shown in Figure 4. Table 1 provides a set of recommended device parameters, and the recommended circuit diagram and parameter values are for reference only. Please determine the appropriate parameter values based on the actual situation.

Table 1. Recommended EMC Parameters

label	model	label	model
C1	10 μ F, 25V	D1, D2	1N4007
C2	102, 2KV, 1206	D3	SMBJ15CA
GDT	3RL090M-5-S	T1	B82793S0513N201
R1	1M Ω , 1206	U1	TDx01MCANFD module
R2, R3	2.7 Ω , 2W		

8 Product usage precautions

8.1 CAN controller IO port level matching

The TXD and RXD pin interfaces of TD501MCANFD match a voltage level of 5V and do not support a 3.3V system voltage level; The TXD and RXD pin interfaces of TD301MCANFD match a voltage level of 3.3V and do not support 5V system voltage.

8.2 Module Pin Description

When pin 8 of the module is not connected and pin 5 is not in use, please suspend this pin.

8.3 Bus terminal matching resistor

When forming a CAN bus network, regardless of the number of nodes, distance, or working speed, terminal resistors need to be added to the bus.

8.4 The use of shielded wires

Please use shielded twisted pair cables for data transmission, and connect the shielding layer of the same network to the ground at a single point; If better anti-interference capability is required for the CAN network, double-layer shielded twisted pair cables can be used, with each node's CANG connected to the inner shielding layer and the outer shielding layer connected to the ground at a single point.