Descriptions

Industrial Bus



RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Small size、SMD package
- Integrated high efficient isolated DC-DC converter
- High baud rate up to 150kbps
- Two-port isolation test voltage (2.5kVDC)
- Operating ambient temperature range: -40℃ to +85℃
- The bus supports maximum 128 nodes
- Set isolation and ESD bus protection in one

Applications

- Industrial control
- Power
- Communication

Selection Guide

Certification	Part No.	Power input (VDC)	Baud rate (kbps)	Static Current (mA)	Max. Operating Current (mA)	Isolated Power Output (typ.) (VDC)	Number of Nodes
EN/BS EN	T485L331M	3.15-3.45	150	28	140	5	128
	T485L531M	4.75-5.25	150	38	140	5	128

Specifications

Product feature	Item		Operating Conditions	Min.	Typ.	Max.	Unit
Absolute Limits	Input Surge Voltage (1sec.max.)		3.3V series	-0.7	--	5	VDC
			5.0V series	-0.7	--	7	
	Reflow Soldering Temperature		Peak temp. ≤245℃, duration ≤60s max.at 217℃. For details, please refer to IPC/JEDEC J-STD-020D.1.				
3.3V Input Specifications	Power Supply Input Voltage		VCC	3.15	3.3	3.45	VDC
	TXD Logic Level	High-level	VIH	0.7VCC	--	3.6	
		Low-level	VIL	0	--	0.8	
	RXD Logic Level	High-level	VOH	VCC - 0.4	3.1	--	
		Low-level	VOL	0	0.2	0.4	
	TXD Drive Current		IT	2	--	--	mA
	CON Drive Current		ICON	--	--	5	
	RXD Output Current		IR	--	--	3.5	
	Serial Interface		Compatible with + 3.3 V UART interface only				
5.0V Input Specifications	Power Supply Input Voltage		VCC	4.75	5	5.25	VDC
	TXD Logic Level	High-level	VIH	0.7VCC	--	5.5	
		Low-level	VIL	0	--	0.8	
	RXD Logic Level	High-level	VOH	VCC - 0.4	4.8	--	
		Low-level	VOL	0	0.2	0.4	
	TXD Drive Current		IT	2	--	--	mA
	CON Drive Current		ICON	--	--	5	
	RXD Output Current		IR	--	--	3.5	
	Serial Interface		Compatible with + 5 V UART interface only				
Transmission Specifications	Data Delay	TXD Transmitter Delay	tT	--	--	5	us
		RXD Receiver Delay	tR	--	--	5	
	Transceiver switching delay time		Switch from receiving data to sending data	--	5	18	
			Switch from sending data to receiving data	--	30	100	
Output Specifications	Difference Level		Vdiff(d), RL=54Ω	1.5	2	--	VDC
	Difference Load Resistance			54	--	--	Ω
	Difference Input Impedance		-7V≤VCM≤+12V	96	--	--	kΩ
	Built-in Pull-down Resistor			--	47	--	
	Isolation Power Output Voltage①		Nominal input voltage	4.9	5	5.5	VDC
	Bus Interface Protection		ESD Protection				

Truth Table Specifications					
Send status	CON	TXD	A	B	RXD
	0	1	1	0	1
	0	0	0	1	1
Receive status②	CON	VA-VB	RXD		
	1	≥-20mV	1		

		1	≤-220mV	0
		1	-220mV < VA-VB < -20mV	Undefined state
General Specifications	Isolation Test	Electric strength test for 1 minute, leakage current <1mA		2500VDC
	Insulation Resistance	At 500VDC		1000MΩ (input-output)
	Operating Temperature			-40℃ to +85℃
	Transportation and Storage Temperature			-50℃ to +105℃
	Operating Humidity	Non-condensing		10% - 90%
	Safety Class			CLASS III
Mechanical Specifications	Case Material	WH9100-F (UL94 V-0)		
	Dimensions	SMD12; Dimension 17.00 x 12.14 x 9.45mm		
	Weight	2.8g (Typ.)		
	Cooling Method	Free air convection		

Note:

①Isolated output power pins are for external pull-up, pull-down resistors only (recommended maximum current <25mA) and are not meant for any other purpose.

②Receiving threshold varies with Vcc will produce subtle error.

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (see Fig. 3)	
Immunity	ESD	IEC/EN 61000-4-2	Contact ±4kV / Air ± 8kV (A, B port, without external components)	Perf. Criteria B
	EFT	IEC/EN 61000-4-4	±2kV (A, B port, without external components)	Perf. Criteria B
	Surge	IEC/EN 61000-4-5	±2kV (line to ground) (A,B port, see Figure 2)	Perf. Criteria B
	CS	IEC/EN 61000-4-6	3Vr.m.s (without external components)	Perf. Criteria A

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.use only DC power supply source for this product. 220V AC power supply is prohibited;

4.It is strictly forbidden to disassemble the product privately in order to avoid product failure or malfunction;

5.Hot-swap is not supported;

6.If the external input of TXD is insufficient, the pull-up resistor should be added according to the situation.

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

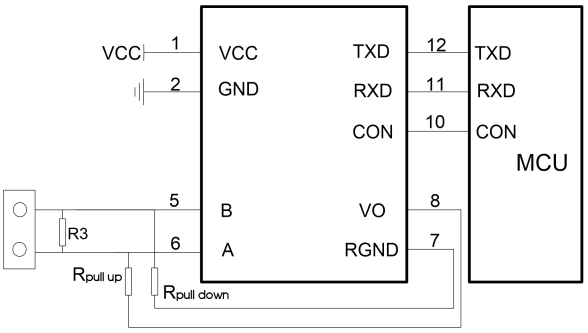


Fig. 1

Figure 1 shows a typical connection circuit for the isolated transceiver module T485L331M and T485L531M. The T485L531M module's power supply must be 5V and match the module's TXD, RXD and CON pin interface level of 5V (not supporting any 3.3V system levels). Accordingly, T485L331M module's power supply must be 3.3V and match the module's TXD, RXD and CON pin interface level of 3.3V (not supporting any 5V system levels).

The module has a built-in 24kΩ pull-down resistor, which under normal circumstances meets the demand for the use of internal pull-up and pull-down resistors. Depending on the actual circuit, the use of additional external R pull-up and R pull-down resistor may be chosen.

2. Recommended port protection circuit

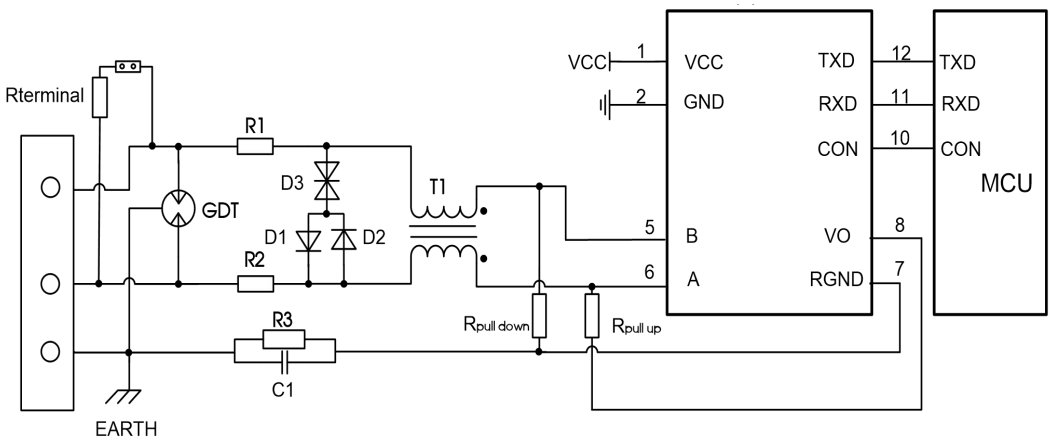


Fig.2: Port protection circuit for harsh environments

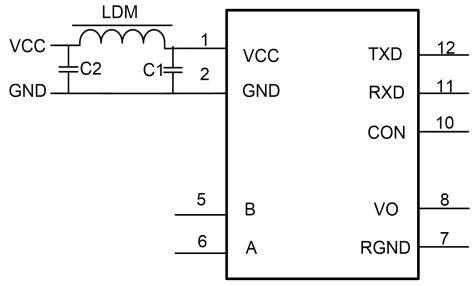
Note: Ground shield of twisted wire pair reliably.

Recommended components and values:

Component	Recommended part, value	Component	Recommended part, value
R3	1MΩ	R1、R2	2.7Ω/2W
C1	1nF, 2kV	D1、D2	1N4007
T1	ACM2520-301-2P	D3	SMBJ8.5CA
GDT	B3D090L	$R_{terminal}$	120Ω

As the modules internal A / B lines come with its own ESD protection, which generally satisfy most application environments without the need for additional ESD protection devices, as shown in the typical circuit in Figure 1. For harsh and noisy application environments such as

motors, high voltage/current switches, lightning and similar however, we recommended that the user protects the module's A / B lines with additional measures and external components such as TVS, common mode inductors, gas discharge tube, shielded twisted pair of wires with the same single network Earth point. Figure 2 shows our recommended circuit diagram for such type of applications with components and values given in the table above. This recommendation is for reference only and may have to be adapted accordingly with appropriate component values in order to match the actual situation and application.



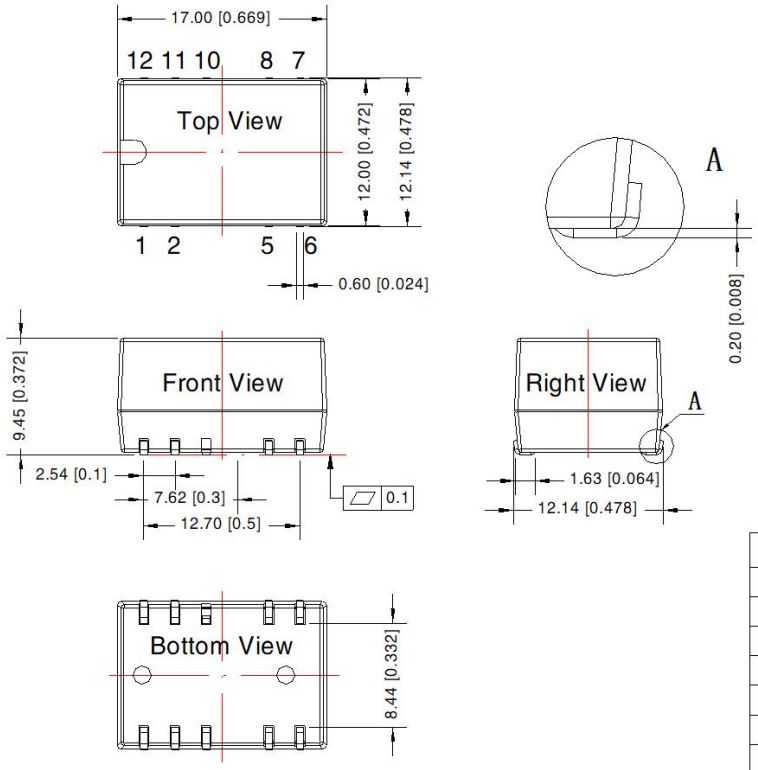
Component	Recommended part, value
C1, C2	1uF/16V
LDM	CD43-12uH

Fig.3

3.Precautions

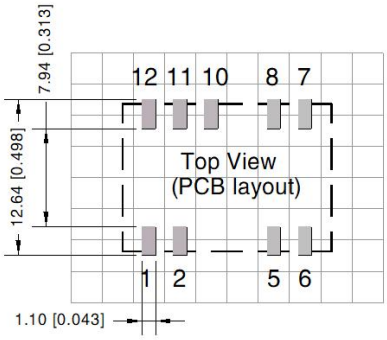
1. T485L531M is for 5V TTL level only (not compatible with 3.3V); T485L331M is for 3.3V TTL level only (not compatible with 5V).
2. Pin3, Pin4 and Pin9 are not drawn. Please leave pin7 open if unused.
3. We recommend using a shielded twisted pair of wires for the Data transmission line and using same single point earth connection for each of the networks.
4. From the truth table characteristics, it can be derived that the isolated RS-485 transceiver module's CON pin is low to send data and high when receiving data. Note that the general 485 transceiver chip control level is exactly the opposite, therefore, if the customer desires to change the level to the ordinary 485 transceiver chip control level, we recommend using a transistor circuit between the MCU and the CON feed to reverse this signal.
5. Reference the truth table characteristics: When the A / B line differential voltage of the series of embedded isolated RS-485 transceiver module is ≥ -20mV, the modules receiving level is high and when the A / B line differential voltage is ≤ -220mV the modules receiving level is low; the modules receiving level is undefined when the A / B line differential voltage is greater than -220mV but less than -20mV, so the design is to ensure that the module will not be receiving this state. Depending on the actual situation, it is up to the user of the RS-485 network design or application to decide whether to add a 120Ω termination resistor. Avoiding data communication errors: Regardless if the RS-485 network is static or dynamic, it is essential to avoid that the differential voltage of A / B line ever comes between -220mV and -20mV.

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]

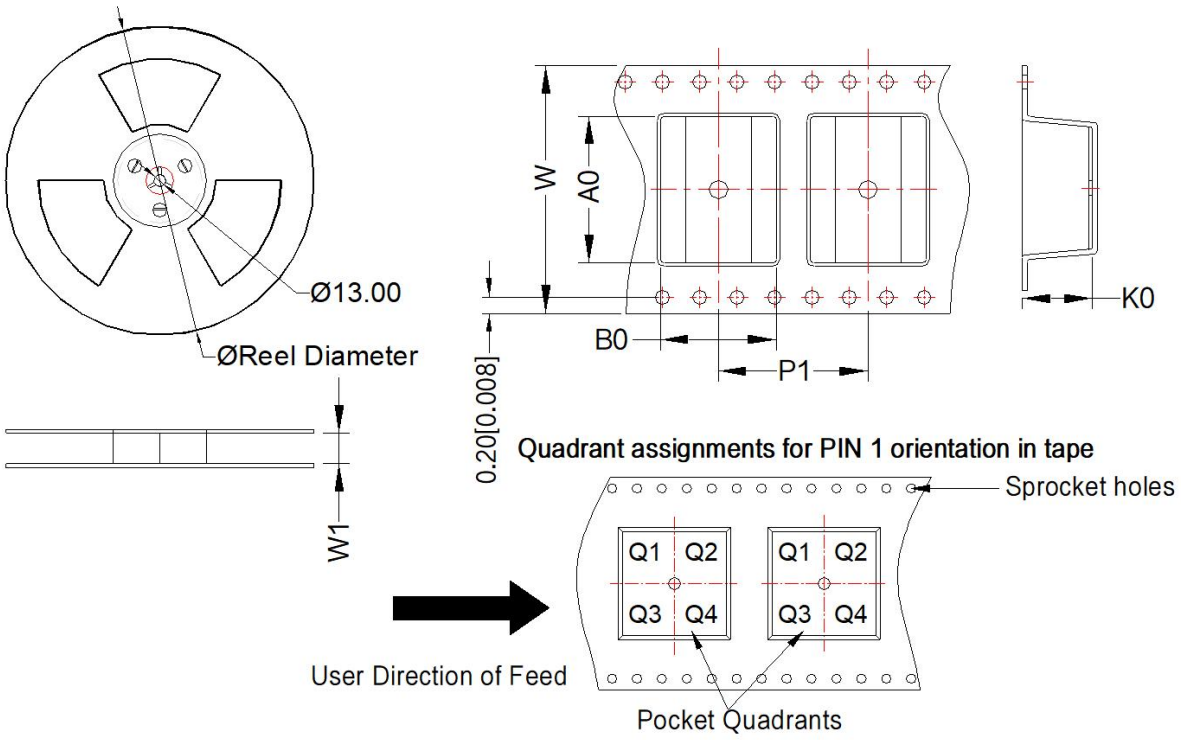
THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

Pin–Out		
Pin	Designation	Function
1	VCC	Input Power+
2	GND	Input Power Ground
5	B	B Pin
6	A	A Pin
7	RGND	Isolation Power Output Ground
8	VO	Isolation Power Output+
10	CON	Sending/Receiving Control Pin
11	RXD	Receiving Pin
12	TXD	Sending Pin

Package diagram:



Package Type	Pin	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SMD	9	300	330.0	32.5	17.72	12.92	10.5	20.0	32.0	Q1

Notes:

1.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;

2.All index testing methods in this datasheet are based on company corporate standards;

3.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;

4.Products are related to laws and regulations: see "Features" and "EMC";

5.Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.