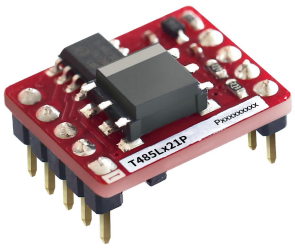
## Descriptions

Single high-speed RS485 isolated transceiver module




RoHS

3 Years Warranty

CE Report EN62368-1

UKCA Report BS EN62368-1

## Features

- Integrated highly efficient isolated DC-DC converter
- High baud rate of up to 200kbps
- Two-port isolation test voltage(3.0kVDC)
- Operating ambient temperature range: -40℃ to +85℃
- The bus supports maximum 64 nodes
- Set isolation and ESD bus protection in one

## Applications

- 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 | T485L321P | 3.15-3.45 | 200 | 28 | 140 | 5 | 64 |
| | T485L521P | 4.75-5.25 | 200 | 38 | 140 | 5 | 64 |

Notes:*Product images are for reference only; the actual product shall prevail.

## Specifications

| Product feature | Item | | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Absolute Limitsts | Input impulse voltage (1sec. max) | | 3.3V series | -0.7 | -- | 5 | VDC |
| | | | 5.0V series | -0.7 | -- | 7 | |
| | Pin Welding Resistance Temperature | | Soldering time 10s max. | -- | -- | 300 | ℃ |
| 3.3V Input Specifications | Power Supply Input Voltage | | $V_{CC}$ | 3.15 | 3.3 | 3.45 | VDC |
| | TXD Logic Level | High-level | $V_{IH}$ | $0.7V_{CC}$ | 3.3 | 3.6 | |
| | | Low-level | $V_{IL}$ | 0 | -- | 0.8 | |
| | RXD Logic Level | High-level | $V_{OH}$ | $V_{CC}$-0.4 | 3.1 | -- | |
| | | Low-level | $V_{OL}$ | 0 | 0.2 | 0.4 | |
| | TXD Drive Current | | $I_T$ | 2 | -- | -- | mA |
| | CON Drive Current | | $I_{CON}$ | -- | -- | 5 | |
| | RXD Output Current | | $I_R$ | -- | -- | 2 | |
| | Serial Interface | | Compatible with + 3.3 V UART interface only | | | | |
| 5.0V Input Specifications | Power Supply Input Voltage | | $V_{CC}$ | 4.75 | 5 | 5.25 | VDC |
| | TXD Logic Level | High-level | $V_{IH}$ | $0.7V_{CC}$ | 5 | 5.5 | |
| | | Low-level | $V_{IL}$ | 0 | -- | 0.8 | |
| | RXD Logic Level | High-level | $V_{OH}$ | $V_{CC}$-0.4 | 4.8 | -- | |
| | | Low-level | $V_{OL}$ | -- | 0.2 | 0.4 | |
| | TXD Drive Current | | $I_T$ | 2 | -- | -- | mA |
| | CON Drive Current | | $I_{CON}$ | -- | -- | 5 | |
| | RXD Output Current | | $I_R$ | -- | -- | 2 | |
| | Serial Interface | | Compatible with + 5 V UART interface only | | | | |
| Transmission Specifications | Data Delay | TXD Transmitter Delay | $t_T$ | -- | -- | 110 | ns |
| | | RXD Receiver Delay | $t_R$ | -- | -- | 110 | |
| | Transceiver switching delay time | | Switch from receiving data to sending data | -- | 5 | 18 | us |
| | | | Switch from sending data to receiving data | -- | 30 | 100 | |
| Output Specifications | Difference Level | | $V_{diff(d)}$, $R_L$=54Ω | 1.5 | 2 | -- | VDC |
| | Difference load resistance | | | 54 | -- | -- | Ω |
| | Difference Input Impedance | | -7V≤$V_{CM}$≤+12V | 96 | -- | -- | kΩ |
| | Built-in pull-down resistor | | | -- | 24 | -- | |
| | Isolated power output voltage① | | Nominal input voltage | 4.9 | 5 | 5.3 | VDC |
| | Bus Interface Protection | | ESD protection | | | | |
| General Specifications | Isolation Test | | Electric Strength Test for 1 min., leakage current <1mA | 3000VDC | | | |
| | 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 | Dimensions | DIP10 | | | | |
| | Weight | 1.9g (Typ.) | | | | |
| | Cooling Method | Free air convection | | | | |
| Truth Table Specifications | Transceiver Control | Input | | Output | | |
| | Send status | CON | TXD | A | B | RXD |
| | | 0 | 1 | 1 | 0 | 1 |
| | | 0 | 0 | 0 | 1 | 1 |
| | Receive status② | CON | $V_A$-$V_B$ | RXD | | |
| | | 1 | ≥-20mV | 1 | | |
| | | 1 | ≤-220mV | 0 | | |
| | | 1 | -220mV < VA-VB < -20mV | Undefined state | | |

Note:
① Isolated 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 (A, B port) | Perf. Criteria B |
| | | IEC/EN 61000-4-2 Contact ±8kV (see Fig.2, A, B port) | Perf. Criteria B |
| | EFT | IEC/EN 61000-4-4 ±2kV (see Fig.2, A, B port) | Perf. Criteria B |
| | Surge | IEC/EN 61000-4-5 ±2kV (line to ground) (without external components, A, B port) | Perf. Criteria B |
| | | IEC/EN 61000-4-5 ±4kV (line to ground) (see Fig.2, A, B port) | Perf. Criteria B |
| | CS | IEC/EN 61000-4-6 3Vr.m.s | 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.I t 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;
7. The various components of the product may have inconsistent screens due to different production batches, it does not affect the product performance .

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

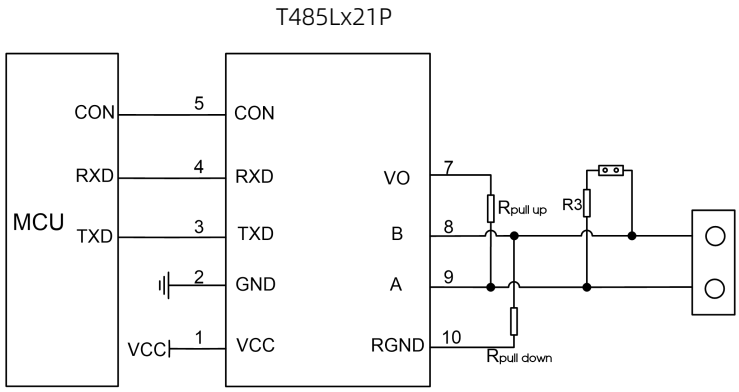



Fig. 1

Figure 1 shows a typical connection circuit for the isolated transceiver module T485L321P and T485L521P. The T485L521P 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, T485L321P 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

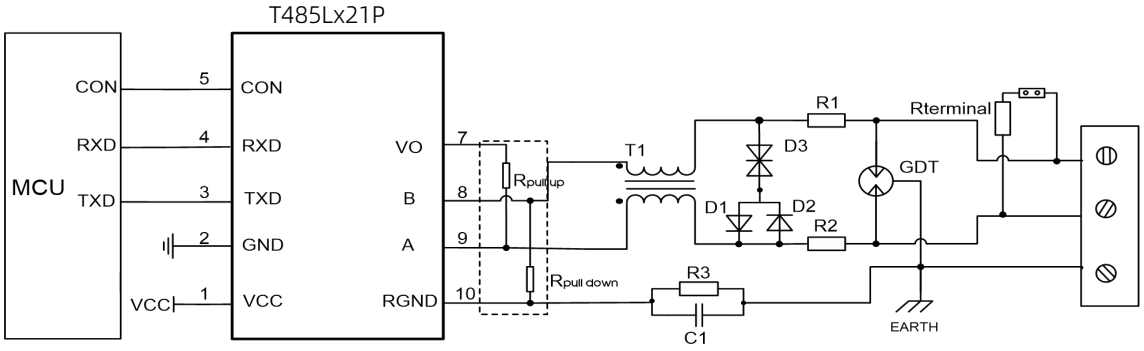


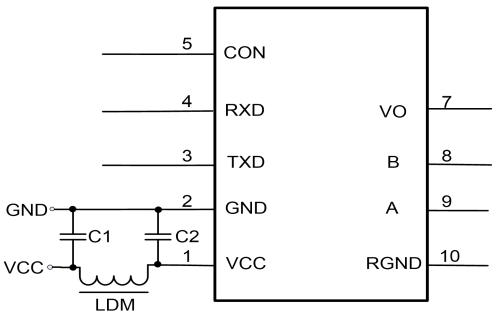

Fig.2

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 | Rterminal | 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.



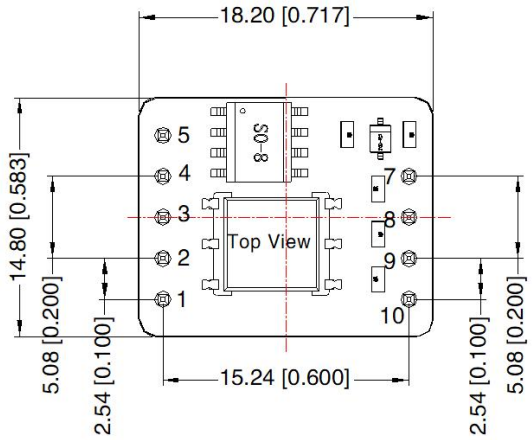

| Component | Recommended part, value |
|---|---|
| C1, C2 | 1uF/16V |
| LDM | CD43-12uH |

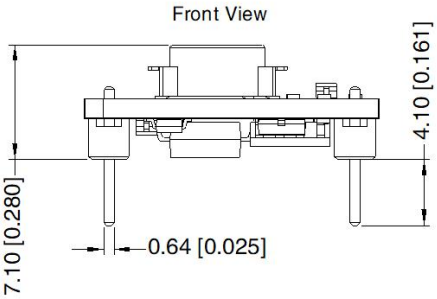
Fig.3

## 3. Precautions

1. T485L521P is for 5V TTL level only (not compatible with 3.3V); T485L321P is for 3.3V TTL level only (not compatible with 5V).
2. Pin6 are not drawn. Please leave pin 10 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.

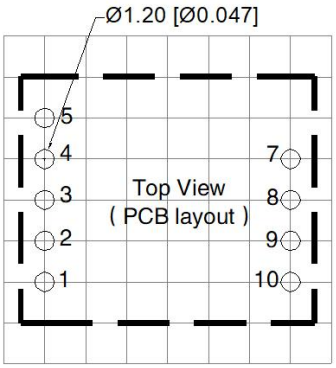
## Dimensions and Recommended Layout




Note:
Unit :mm[inch]
Pin diameter tolerances : ± 0.10[ ± 0.004]
General tolerances: ± 1.0[ ± 0.039]

THIRD ANGLE PROJECTION




Note: Grid 2.54*2.54mm

| Pin–Out | | |
|---|---|---|
| Pin | Name | Function |
| 1 | VCC | Input Power+ |
| 2 | GND | GND |
| 3 | TXD | Send Pin |
| 4 | RXD | Receiving Pin |
| 5 | CON | Send&Receiving Control Pin |
| 7 | Vo | Isolation Power Output +5V |
| 8 | B | B Pin |
| 9 | A | A Pin |
| 10 | RGND | Isolation Power Output RGND |

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. There may be slight colour difference on the surface of the PCB, which is normal and does not affect product use;
3. All index testing methods in this datasheet are based on company corporate standards;
4. The above are the performance indicators of the product models listed in this datasheet. Some indicators of non-standard models will exceed the above requirements;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
7. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.