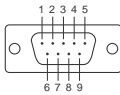
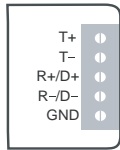


## RS-422/485 Pinouts

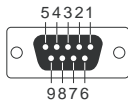
The RS-422/RS-485 port with Terminal Block Connector is shown below. Note that some for some RS-422/485 devices, “B” is used in place of “+” and “A” is used in place of “-”. That is, Data(B) Data(A) are equivalent to Data (+) and Data(-), respectively.



| PIN | RS-422/485 |
|-----|------------|
| 1   | T+         |
| 2   | T-         |
| 3   | R+/D+      |
| 4   | R-/D-      |
| 5   | GND        |

## RS-232 Pinouts

The female DB9 port for the RS-232 signal is shown in the following figure.



| PIN | RS-232 |
|-----|--------|
| 1   | DCD    |
| 2   | TxD    |
| 3   | RxD    |
| 4   | DSR    |
| 5   | GND    |
| 6   | DTR    |
| 7   | CTS    |
| 8   | RTS    |

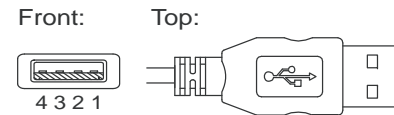
← shorted (pins 4, 6, 7, 8)

**Note:** The RTS and CTS pins are shorted, and the DTR, DSR, and DCD pins are shorted, so that users do not need to worry about the hardware flow control cable wiring problem.

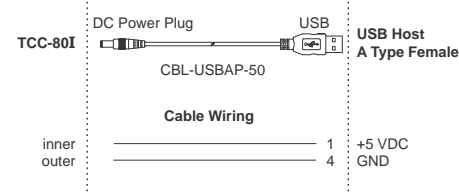
## USB Power Cord

If additional external power is required, the TCC-80I can be connected to a standard 5 to 12 VDC power supply, or the USB power cord (CBL-USBAP-50) can be used.

## USB “A” Male Connector



| TCC-80I<br>USB Connector<br>Connector Pinouts | Signals |
|---|---------|
| 1   | +5 VDC  |
| 2   | --      |
| 3   | --      |
| 4   | GND     |

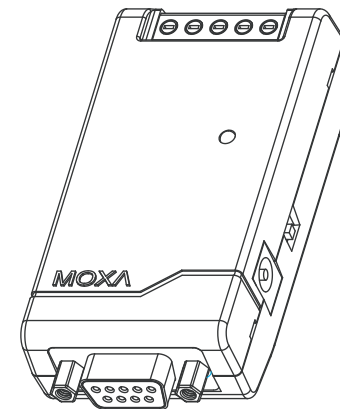


## TCC-80I / TCC-80I-DB9

First high-speed, isolated, self-powered RS-232 to RS-422, 2-wire/4-wire RS-485 bi-directional converter with 2.5 KV isolation and 15 KV ESD protection.

## Overview

The TCC-80I is the world’s first high-speed, isolated, self-powered converter. It is powered through the host’s RS-232 port and provides complete signal conversion between RS-232 and RS-422/485 devices. The TCC-80I converts back and forth between RS-232’s Tx/D and Rx/D lines to either half duplex 2-wire RS-485 or the balanced signal of full duplex 4-wire RS-422/485. In addition, the TCC-80I provides comprehensive 15 KV ESD protection for all serial lines. Perhaps the most important feature is the 2.5 KV isolation designed to prevent ground loop currents, reduce damage caused by data loss, and prevent damage to the communication interfaces. The TCC-80I is also designed to provide RS-485 auto data direction control, in which the RS-485 driver is enabled automatically when the circuitry senses the Tx/D output from the RS-232 signal. Programming effort is not required to control the transmission direction of the half duplex RS-485 signal.



## Package Checklist

- TCC-80I or TCC-80I-DB9
- USB Power Cord
- User’s Manual

## Applications

- Multipoint data acquisition
- Factory automation
- Remote serial device control
- Building security automation
- Critical industrial control

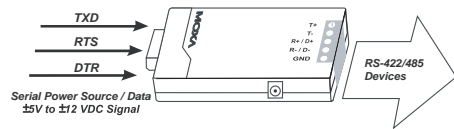
## Features and Specifications

- Signals:
  - RS-232: Tx/D, Rx/D and GND
  - RS-422: Tx/D+(B) / -(A), Rx/D+(B) / -(A), GND
  - RS-485: Data+(B) / -(A), GND
- Port types:
  - RS-232: Female DB9
  - RS-422/485: Terminal Block or Male DB9
- Auto-senses baudrates from 50bps to 921.6Kbps
- RS-232 loopback:
  - RTS to CTS; DTR to DSR and DCD
- Supports automatic RS-485 data direction control with no baudrate switch settings
- 15 KV ESD for all serial RS-232/422/485 signals
- 2.5 KV isolation
- Built-in 120 ohm termination resistors for RS-422/RS-485 (DIP switch selectable)
- Supports up to 32 units connected in an RS-485 multi-drop network
- Serial Power Source: Tx/D, RTS, or DTR (RTS/DTR ON is recommended)
- LED Port Power Indicator (switch settings)
- External Power (jack): DC +5V to +12V adaptors or USB Power cord (DC +5V)
- Operating temperature: 0 to 60°C (32 to 140°F)
- Dimensions: 42 × 80 × 22 mm
- Case: ABS + PC
- Weight: 50 ± 5 g
- CE, FCC Class B approval
- Power Consumption: 20 mA at +5 VDC (termination disabled)
- Warranty: 5 years

## Installation

### Serial (RS-232) Port Power

The RS-232 port of TCC-80I is designed with a female DB9 socket to connect directly to the host PC, with power drawn from the TXD, RTS, or DTR lines. TCC-80I is capable of taking enough power from the attached Tx line only. For those attached serial RS-232 devices which does not provide enough power on its Tx line, additional handshake lines should be connected to TCC-80I. The DC jack of TCC-80I is also provided for connecting a 5 to 12 VDC power supply via a USB power cord or external power adaptor.



### Port Power Dissipation

When installing an RS-232 port-powered TCC-80I converter, pay attention to the power consumption, RS-232 cable length, power provided by the serial port, and the RS-422 /485 transmission distance. In general, TCC-80I itself derives 70 mW from the power source; a standard COM port on a host PC can provide 70 to 90 mW of power if the TxD, RTS, and DTR lines are connected. Moreover, the RS-232 cable length should be shorter than 15 m (@ 9600 bps) to ensure that less power is lost from the host/device to the TCC-80I.

### Serial Port Power Compatibility

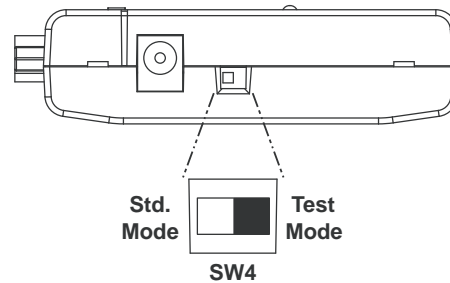
Serial ports use a diversity of interface chips, but the power provided by the different ports is not always the same. In fact, some of the ports do not provide enough power to activate the TCC-80I. The on-board COM1 and COM2 ports seldom have problems. The table shows the add-on cards and the serial-to-Ethernet device servers that have been tested as a good power source to drive the TCC-80I.

| Multiport Serial Boards   | Serial Device Servers            |
|---------------------------|----------------------------------|
| <b><u>Moxa Boards</u></b> | <b><u>Moxa NPort Servers</u></b> |
| CP-168U Series            | CN2510                           |
| CP-104U Series            | CN2610                           |
| CP-102U Series            | NPort5110                        |
| C168H Series              | NPort5210                        |
| C104H Series              | NPort5410                        |
|                           | NPort5610                        |
|                           | NPort6150                        |
|                           | NPort6250                        |
|                           | NPort6450                        |
|                           | NPort6650                        |

### LED Port Power Indicator

The best way to ensure the attached serial port provides enough electricity to the TCC-80I is to check the power indicator LED at the front panel. To do this, connect the TCC-80I to the target RS-232 port, and then turn the SW4 switch to the right side to the “Test” mode. The TCC-80I is receiving enough power if the LED lights up after activating the attached serial device. If the LED does NOT light up, you will need to attach the external power cord to the TCC-80I.

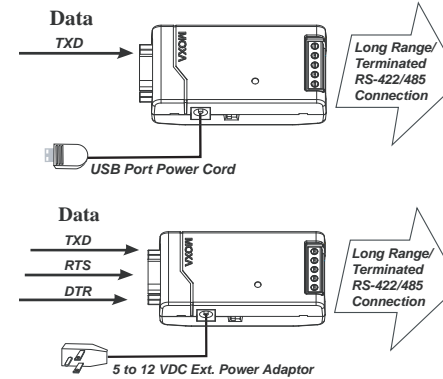
**Note:** Be sure to turn the SW4 switch back to **Std.** mode (the default) when you finish testing. When in **Test** mode, the TCC-80I **WILL NOT** transmit data.



### Optional External Power

Termination is a critical requirement for port-power devices such as the TCC-80I. In most circumstances, termination resistors are used when the RS-422/485 cable length is longer than 100 m. Regardless of how much the data signal is dissipated, the termination resistors absorb more than 75 mW of

power from the power source when TCC-80I is unable to use the limited serial power. In other words, if long distance RS-422/485 transmission or termination is required, then an external USB power cord or DC power supply should be used (in this case, DIP SW3 must be ON).



By testing the TCC-80I at different baudrates and transmission distances, we have determined the maximum transmission distance that can be achieved when using serial port power. The test results are shown in the following table.

| Baudrate (bps) | RS-422/485 Transmission Distance (m) | Embedded Terminator | External Power Required |
|----------------|--------------------------------------|---------------------|-------------------------|
| 9600           | 1200                                 | (ON) 120Ω           | NO                      |
| 19200          | 1200                                 | (ON) 120Ω           | NO                      |
| 38400          | 600                                  | (ON) 120Ω           | NO                      |
| 57600          | 300                                  | (ON) 120Ω           | NO                      |
| 115200         | 150                                  | (ON) 120Ω           | NO                      |

### Switch and Jumper Settings

To change the operation mode, check the **DIP Switch** settings on the back panel.



| DIP Switch Settings           |     |     |     |
|-------------------------------|-----|-----|-----|
| RS-422 with Terminator        | SW1 | SW2 | SW3 |
|                               | OFF | OFF | ON  |
| RS-422                        | SW1 | SW2 | SW3 |
|                               | OFF | OFF | OFF |
| 4-wire RS-485 with Terminator | SW1 | SW2 | SW3 |
|                               | ON  | OFF | ON  |
| 4-wire RS-485                 | SW1 | SW2 | SW3 |
|                               | ON  | OFF | OFF |
| 2-wire RS-485 with Terminator | SW1 | SW2 | SW3 |
|                               | ON  | ON  | ON  |
| 2-wire RS-485                 | SW1 | SW2 | SW3 |
|                               | ON  | ON  | OFF |

DIP SW1 and SW2 are used to select the operation modes (RS-422, 4W or 2W RS-485). The termination is controlled by DIP SW3.

### Ext. Power supply

If additional external power is required, TCC-80I is designed to be connected to a standard 5 to 12 VDC power adapter.