TCC-80I/TCC-80I-DB9 Series
Quick Installation Guide

**Isolated High-Speed Serial Port Powered
Serial Media Conversion Solution**

Version 4.1, January 2021

**Technical Support Contact Information
www.moxa.com/support**

MOXA®

*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 coverts back and forth between RS-232's TxD and RxD 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 TxD output from the RS-232 signal. Programming effort is not required to control the transmission direction of the half duplex RS-485 signal.
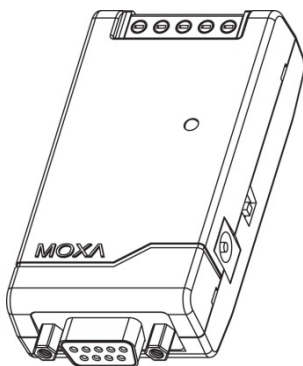
Package Checklist

- 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:   TxD, RxD and GND
  RS-422:   TxD+(B) / -(A),
             RxD+(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 115.2Kbps
- 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: TxD, 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 x 80 x 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.

TXD
RTS
DTR
Serial Power Source/Data
±5 to ±12 VDC Signal

RS-422/485 Devices
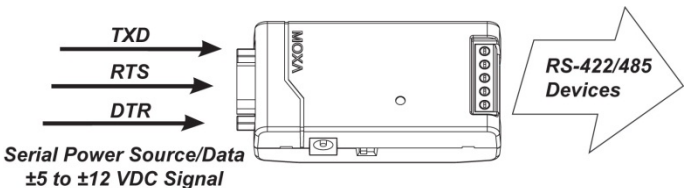
Port Power Dissipation

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
Moxa Boards	**Moxa NPort Servers**
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.
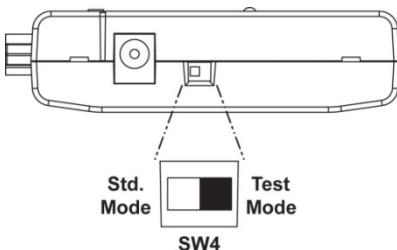
Optional External Power

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).

USB Port Power Cord

5 to 12 VDC Ext. Power Adaptor
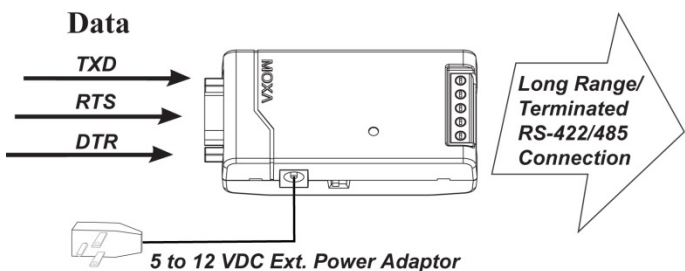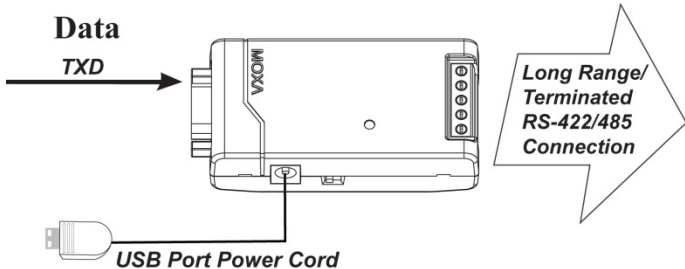
By testing the TCC-80I at different baudrates and transmission distances, we have determined the maximum transmission distance that can be achieved when using serial port power. The test results are shown in the following table.

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	SW1	SW2	SW3
Terminator	OFF	OFF	ON
RS-422	SW1	SW2	SW3
	OFF	OFF	OFF
4-wire RS-485 with	SW1	SW2	SW3
Terminator	ON	OFF	ON
4-wire RS-485	SW1	SW2	SW3
	ON	OFF	OFF
2-wire RS-485 with	SW1	SW2	SW3
Terminator	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.
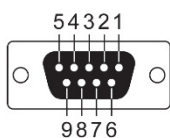
RS-422/485 Pinouts

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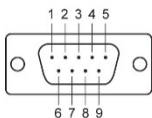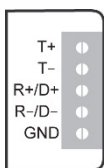
PIN	RS-422/485
1	T+
2	T-
3	R+/D+
4	R-/D-
5	GND

RS-232 Pinouts

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

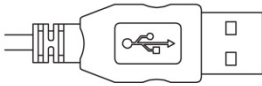| PIN	RS-232	
1	DCD	
2	TxD	
3	RxD	
4	DSR	shorted
5	GND	
6	DTR	
7	CTS	shorted
8	RTS	

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

Front: Top:

4 3 2 1
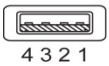
TCC-80I USB Connector Connector Pinouts

PIN	Signals
1	+5 VDC
2	–
3	–
4	GND

TCC-80I   DC Power Plug   USB   **USB Host A Type Female**

CBL-USBAP-50

Cable Wiring

inner ——————————— 1 +5 VDC
outer ——————————— 4 GND

Ø5.1±0.1
Ø2.1±0.1

5-12 VDC
20 mA (max.)