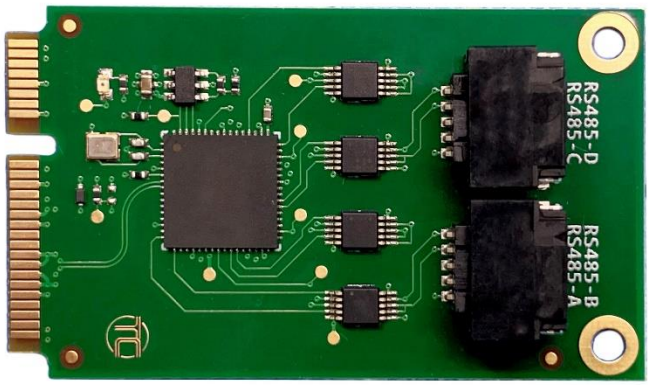
4-Port RS-485 PCIe Mini Card

Features

- 4 Independent RS-485 Serial Ports
- 2-Wire Half Duplex Operation
- Local Echo Enabled for Collision Detection
- Automatic Transceiver Turn Around (ATTA)
- USB 2.0 High Speed Upstream Interface
- Positive-Locking Serial Port Connector
- Baud Rates up to 12 Mbit/s
- 2 kB FIFO Transmit Buffer per Channel
- 2 kB FIFO Receive Buffer per Channel
- FTDI Chipset with Royalty Free Drivers
- Onboard 120Ω Bus Termination Resistors
- 1/8 Unit Load on RS-485 Bus
- Open, Short, and Idle Bus Failsafe Receivers
- ESD Protection ±30 kV on all RS-485 Bus Signals
- Extended Common Mode Voltage Range: ±15 V
- Supports Low Power USB Suspend Mode
- -40°C to 85°C Operating Temperature
- Lead-Free and RoHS Compliant
- Made in the USA



Description

TC-003-01 is a rugged, high performance full size PCIe Mini Card which adds 4 independent half-duplex RS-485 serial ports to any embedded system or computer. Supporting baud rates up to 12Mbit/s and large 2 kilobyte transmit and receive buffers on each channel, this card is designed for reliable, high speed serial communication. Each channel includes a termination resistor for use with long cables or high speed communication busses, to ensure proper cable termination. Local echo provides bus collision detection during data transmission, and automatic transceiver turn around (ATTA) automatically enables/disables the bus drivers without the need for flow control.

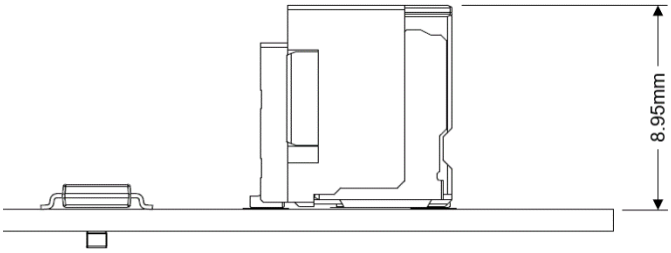
TC-003-01 exceeds TIA/EIA-485 electrical specifications, utilizing one of the highest performance differential transceivers on the market. Robust ESD protection on all communication signals and extended common mode voltage range of ±15V ensures operation in harsh electrical environments. The Molex Micro-Lock Plus connector provides the highest reliability in cable retention and sets the TC-003-01 apart from other products in its class. An audible positive-locking connector and large metal solder tabs ensure a solid, reliable connection in high vibration and industrial temperature environments.

Designed with a high performance USB bridge from FTDI, the TC-003-01 can integrate into any embedded system with minimal software or firmware effort. Plug-and-Play drivers for both Windows and Linux are available and supported by FTDI, the proven industry standard for USB-Serial bridge chipsets.

PCIe Mini Card Height

TC-003-01 is a standard 30.00mm x 50.95mm full size PCIe Mini Card. It is designed with bottom-side clearance of less than 1.35mm to ensure compatibility with any full size PCIe Mini Card slot. The top-side of the card features a Molex Micro-Lock Plus connector. This connector has a height of 8.95mm and should be accounted for in the mechanical system design.

Contact Tracer Circuits for product customization information, including single-row connector and low-profile connector options.



Specifications

General

PARAMETER	VALUE
Upstream Interface	USB 2.0 High Speed (480 Mbit/s)
Supported Serial Baud Rates	183 bit/s - 12 Mbit/s
TX FIFO Buffer	2 kB
RX FIFO Buffer	2 kB
RX Open, Short, or Idle Serial Bus	Failsafe-High Logic
Flow Control	Software (Xon/Xoff)
Data Bits	7,8
Stop Bits	1,2
Parity	Odd/Even/Mark/Space/None
USB Silicon Chipset	FTDI FT4232H

Electrical

PARAMETER	MIN	TYP	MAX	UNIT
Power				
PCIe Mini Card Input Voltage		3.3		V
Operating Power: USB Suspend Mode		2		mW
Operating Power: 4 Channels Receiving		260		mW
Operating Power: 4 Channels Transmitting, 60 Ω Loaded		800		mW
Receivers				
RX Common Mode Operating Voltage	-15		15	V
RX Input Hysteresis		30		mV
Load Impedance		96		kΩ
Drivers				
TX Driver Output Current	-45		45	mA
TX Differential Voltage	±1.5	±2.4	±3.3	V

Note: Typical operating power measured at 25°C

Mechanical

PARAMETER	VALUE	UNIT
Dimensions	30.00 x 50.95	mm
Weight	0.21	oz
Board Connector	Molex 5054482071	
Mating Connector Housing	Molex 5054322001	
Mating Crimp Terminals (Tin-Bismuth Plating)	Molex 5054311000	

Environmental

PARAMETER	MIN	TYP	MAX	UNIT
Operating Temperature	-40		85	°C
Relative Humidity (non-condensing)	5		95	%
Electrostatic Discharge Rating (Human Body Model)		±30		kV
Electrostatic Discharge Rating (IEC 61000-4-2 Contact Discharge)		±18		kV
Electrostatic Discharge Rating (IEC 61000-4-2 Air-Gap Discharge)		±25		kV

Pin Configuration and Functions

CONNECTOR	CHANNEL	PIN	I/O	SIGNAL DESCRIPTION
J1	D	1	Bidirectional	RS-485 Channel-D Negative Data (D-)
		2	GND	Ground
		3	Bidirectional	RS-485 Channel-D Positive Data (D+)
		4	GND	Ground
		5	GND	Ground
	C	6	GND	Ground
		7	Bidirectional	RS-485 Channel-C Negative Data (D-)
		8	GND	Ground
		9	Bidirectional	RS-485 Channel-C Positive Data (D+)
		10	GND	Ground
	B	11	Bidirectional	RS-485 Channel-B Negative Data (D-)
		12	GND	Ground
		13	Bidirectional	RS-485 Channel-B Positive Data (D+)
		14	GND	Ground
		15	GND	Ground
	A	16	GND	Ground
		17	Bidirectional	RS-485 Channel-A Negative Data (D-)
		18	GND	Ground
		19	Bidirectional	RS-485 Channel-A Positive Data (D+)
		20	GND	Ground

RS-485 Half Duplex Control

To support half-duplex operation on the RS-485 data bus, the bus driver circuitry is automatically enabled when data is transmitted and disabled when the transmission is complete. This is referred to as Automatic Transceiver Turn Around (ATTA) and it eliminates the need for flow control. In a half-duplex configuration the transmit signals are directly connected to the receive signals. The receivers remain enabled during transmission, which generates a hardware local echo to support collision detection on the data bus.

Termination Resistor Configuration

Each differential receiver channel is designed with an onboard termination resistor of 120 Ω. Each resistor is size 0603 surface mount and clearly labeled "TERM-A…TERM-D" on the bottom side of the board, to allow for easy removal or modification. For high data rates or a very long RS-485 transmission length, a twisted-pair cable and a matching termination resistor on the two bus endpoints are recommended. Typical RS-485 cable impedance and termination resistance ranges from 90 Ω to 120 Ω.

Contact Tracer Circuits for product customization information, including factory loaded resistor options.

Hardware Reset Configuration

Following PCIe Electrical Specifications, the TC-003-01 uses the PERST# signal to hold all card functions in reset until the PCIe power rails have reached their nominal voltage levels. This signal can be pulled low at any time to reset all card functions and registers. Because the TC-003-01 uses a USB 2.0 upstream interface and does not use a PCIe link, the PERST# can be electrically disconnected with a resistor modification, if required.