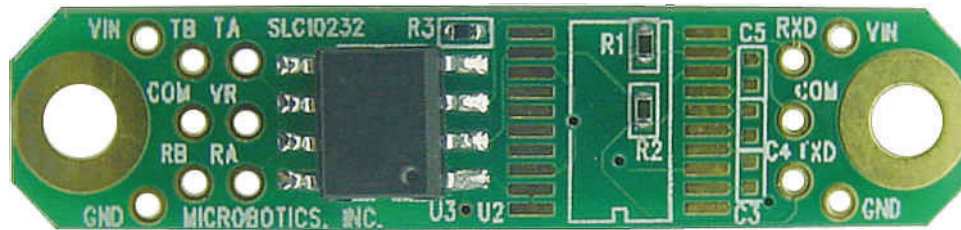


SLC10422-TTL

SINGLE-CHANNEL SERIAL VOLTAGE LEVEL CONVERTERS



USER MANUAL (October 2008)

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1 Introduction. The Microbotics SLC10422-TTL is a single-channel full-duplex serial voltage converter supporting RS-422 ↔ TTL voltage level conversions. The board's small size allows it to be mounted directly in the user wiring harness, and the SLC10422-TTL can be powered by any convenient DC source of 4 to 40 VDC, thus reducing the real estate needed to effect these voltage level conversions. Each board has a TTL-compatible receiver connected to an RS-422 output driver, and an RS-422 receiver connected to a TTL-compatible output driver. Each receiver-driver set is independent except for common ground and power connections. **NOTE THAT THE SLC10422-TTL IS STRICTLY A VOLTAGE LEVEL CONVERTER – THE BOARD DOES NOT PERFORM ANY DATA RECLOCKING OR DATA FORMAT CONVERSIONS.**

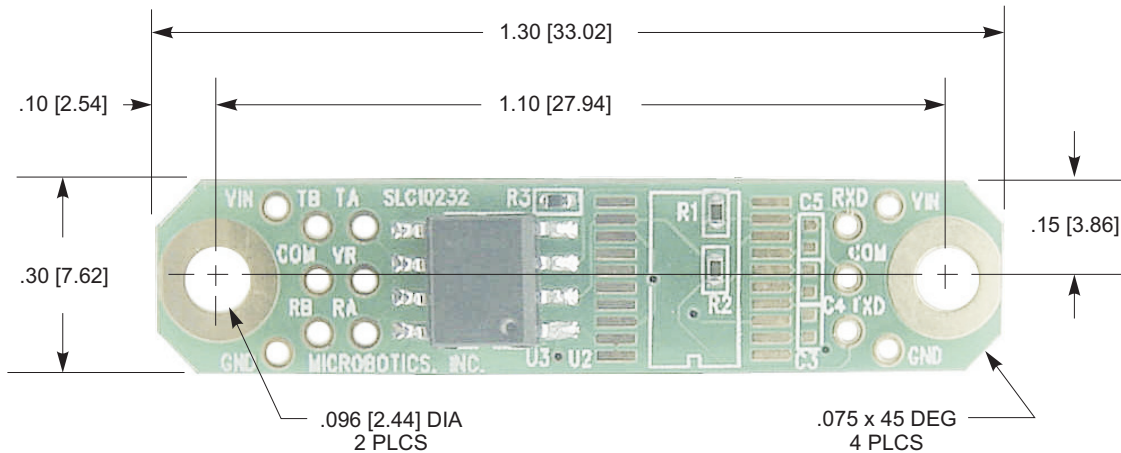


Figure 1. SLC10422-TTL Physical Dimensions.

2 Wiring the SLC10422-TTL to the User System. Connections to the SLC10422-TTL are normally made via direct wiring to the holes on the board. *Extreme care should be taken when soldering to the board to prevent damage to the pads or adjacent components.* The RS-422 signals are grouped at one end of the board (Figure 2), while the TTL signals are grouped at the other end (Figure 3). Power input and return lines are available at both groups of signals. The signal pads for the SLC10422-TTL are:

- VIN** Board Power (4V to 40V Input) (Two pads provided)
- GND** Power Ground (negative side) (Two pads provided)
- RA** RS-422 negative data **receipt into SLC10422-TTL** (MARK Low) – data passed to **TXD**
- RB** RS-422 positive data **receipt into SLC10422-TTL** (MARK High) – data passed to **TXD**
- TA** RS-422 negative data **transmit from SLC10422-TTL** (MARK Low) – data passed from **RXD**
- TB** RS-422 positive data **transmit from SLC10422-TTL** (MARK High) – data passed from **RXD**
- RXD** TTL data **receipt into SLC10422-TTL** (MARK High) – data passed to **TA/TB**
- TXD** TTL data **transmit from SLC10422-TTL** (MARK High) – data passed from **RA/RB**
- COM** Ground returns for the RS-422 and TTL signals – Tie to Ground of User TTL and RS-422 Ports (Two pads provided)
- VR** (1.65 VDC supplied by SLC10422-TTL – not used in this application)

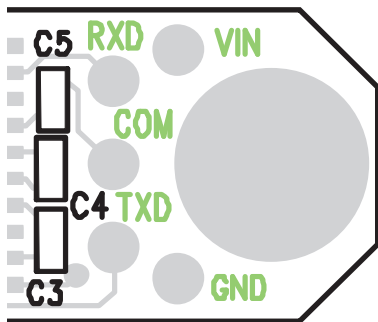


Figure 2. TTL Signals.

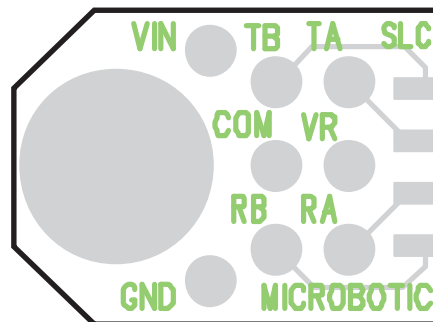


Figure 3. RS-422 Signals.

2.1 Power Connections. Any voltage between 4VDC and 40VDC may be used to power the SLC10422-TTL. The positive side of the power source is connected to either of the **VIN** pads, while the negative side of the power source is connected to either of the **GND** pads. While all **GND** and **COM** signals are electrically connected to the board Ground, the **COM** lines are not designed nor sized for returning the power supply current. **DO NOT USE THE COM LINES FOR POWER RETURN.**

There are two pads each for **VIN** and **GND**, one set near the TTL signal pads, and one set near the RS-422 signal pads. Either pad may be used for its associated power connection. The **VIN** and **GND** pad pairs can also be used to pass power from one side of the board to the other in order to improve cable wiring (this would eliminate one pair of wires in the cable). If the **VIN** and **GND** pad pairs are used to pass power through the board, the current must be limited to less than 100 milliamps. **FAILURE TO LIMIT THE CURRENT TO LESS THAN 100 MILLIAMPS WHEN USING THE SLC10422-TTL TO PASS THE POWER RAILS (VIN AND GND) MAY CAUSE ELECTRICAL FAILURE OF THE SLC10422-TTL BOARD AND VOIDS THE BOARD WARRANTY.**

2.2 TTL Connections. Three signal lines are used for TTL connections (Figure 2). The **RXD** line is the TTL signal *received by the SLC10422-TTL* from the user system, which is then passed to the **TA** and **TB** outputs. The **TXD** line is the TTL signal *transmitted by the SLC10422-TTL* to the user system, having been passed from the **RA** and **RB** inputs. The **COM** line is a signal Ground return for the TTL signals, and *must* be connected to the Ground of the user TTL Port. Figure 4 shows a typical connection for the TTL signals. **FAILURE TO CONNECT THE COM LINE TO THE USER PORT GROUND MAY CAUSE ELECTRICAL FAILURE OF THE SLC10422-TTL AND VOIDS THE BOARD WARRANTY.**

It is important to note the TTL signals of the SLC10422-TTL meet the Industry standard **TTL** levels: a '1' or *High* is **2.0V minimum**, while a '0' or *Low* is **0.8V maximum**. The SLC10422-TTL output driver sources up to 3.3V as a *High*. This output will properly drive TTL-compatible inputs – however, while this voltage is usually sufficient to drive a 5V-CMOS input to a *High* level, as the 5V-CMOS *High* is specified at 3.6V, **the SLC10422-TTL output is not guaranteed to properly drive 5V-CMOS inputs to a High level.**

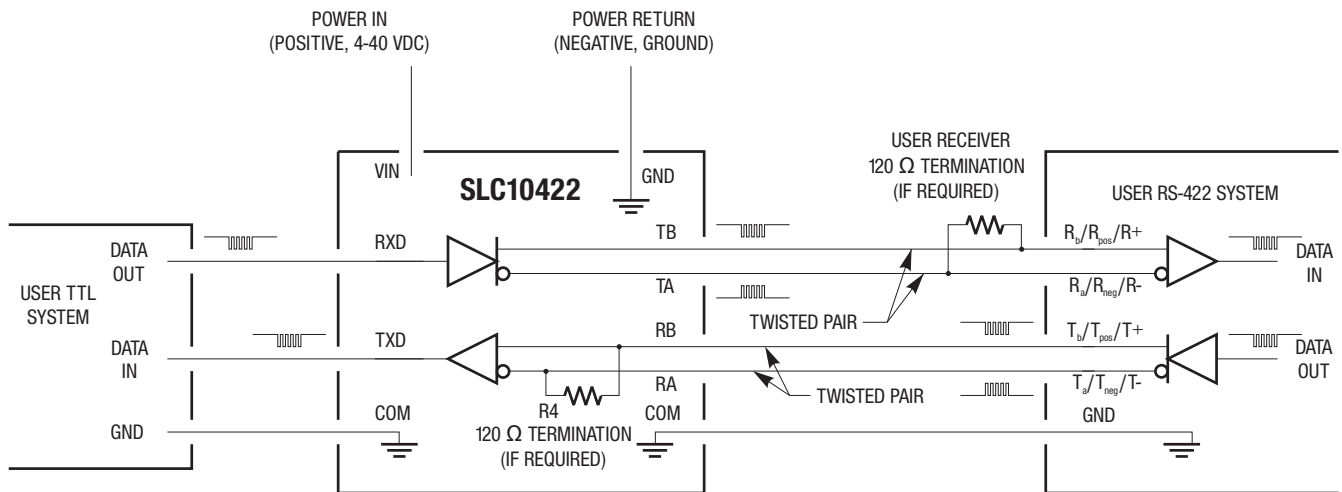


Figure 4. Typical User Connections to the SLC10422-TTL Board.

2.3 RS-422 Connections. Five signal lines are used for RS-422 connections (Figure 3). The **TA** and **TB** pair is the differential signal *transmitted from the SLC10422-TTL* to the user system, having been passed from the **RXD** input. The **RA** and **RB** pair is the differential signal *received by the SLC10422-TTL* from the user system, which is then passed to the **TXD** output. Note that, in both transmitter and receiver signals, the 'A' references the *negative* signals, while the 'B' references the *positive* signal. The **COM** line is a signal Ground return for the RS-422 signals, and *must* be connected to the Ground of the user RS-422 port. Figure 4 shows a typical connection for the RS-422 signals. **FAILURE TO CONNECT THE COM LINE TO THE USER PORT GROUND MAY CAUSE ELECTRICAL FAILURE OF THE SLC10422-TTL AND VOIDS THE BOARD WARRANTY.**

RS-422 differential transmissions, when using twisted pair cabling, drastically reduces electrical noise generated by the transmitted signals while rejecting electrical noise induced into the receiving signals. When data rates are high or the cable lengths are long, signal reflection can become an issue in transmissions. In these cases, a 120Ω termination resistor is placed across the twisted pair lines as close to the RS-422 receiver as possible. The SLC10422-TTL board provides a location for installing a 0402-sized termination resistor across the **RA** and **RB** lines (Figure 5).

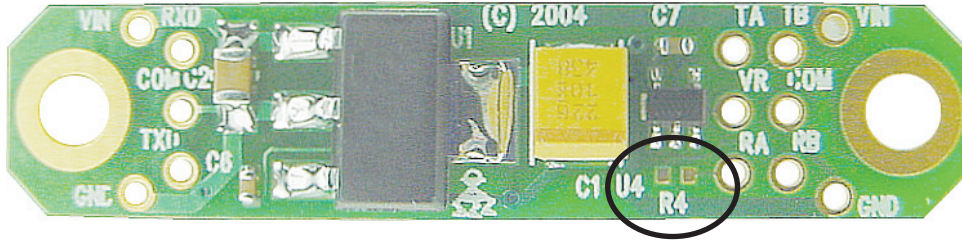


Figure 5. Location of On-Board Receive Line Termination Resistor.

GENERAL SPECIFICATIONS, SLC10422-TTL

(August 2008)

All specifications subject to change without notice

	Max	Typ	Min	
Power				
Input Voltage	40		4	V
Input Current	3.5	2		ma
Signal Rate				
Baud Rate, RS-422 0 to 40', Terminated	10		DC	MBaud
Baud Rate, RS-422 4000' max, Terminated	100		DC	KBaud
RS-422 Signals				
Differential Driver Output (No Termination)		3.3		V
Differential Driver Output (120Ω Termination)			2.0	V
Receiver Input Voltage	12.0		-7.0	V
Receiver Differential Threshold	200		-200	mV
Receiver Input Hysteresis		50		mV
Input Resistance			12	KΩ
TTL Signals				
V _{IH} (<i>RXD</i>)	5.5		2.0	V
V _{IL} (<i>RXD</i>)	.8		0	V
V _{OH} (<i>TXD</i>)	3.3		2.0	V
V _{OL} (<i>TXD</i>)	.4		0	V
I _{OH} (<i>TXD</i>)	1.5			ma
I _{OL} (<i>TXD</i>)	-2.5			ma
Physical				
Size	1.3" [33.02 mm] L x .3" [7.62 mm] W x .22" [5.59 mm] T			
Weight	1.2 g [.042 oz]			
Environment				
Operating Temperature	-40 to +85 °C			
Storage Temperature	-55 to +125 °C			
Vibration	6 g _{rms}			
Shock	100 g, 8 ms, ½ sine			



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