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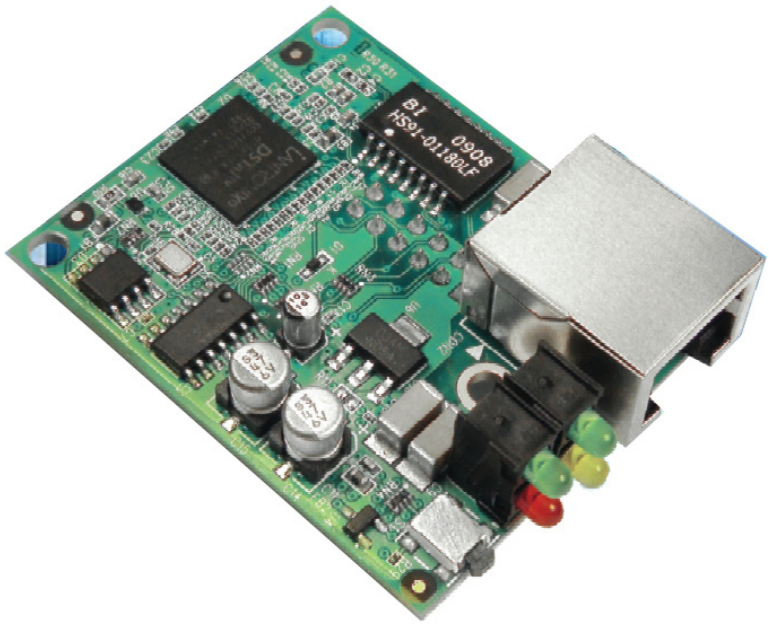
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LANTRONIX



Micro125

Embedded Device Server Integration Guide

Part Number 900-587
Revision D September 2017

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Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

Changes or modifications to this device not explicitly approved by Lantronix will void the user's authority to operate this device.

The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors which may appear in this guide.

Date	Rev.	Comments
March 2011	A	Initial Release
April 2011	B	Updated serial interface information.
December 2015	C	Updated reset input tolerance information.
September 2017	D	Updated part number information.

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1: Introduction

Embedded Integration Kits

The embedded integration kit provides a simple method of evaluating our Micro125 embedded device server. This product allows software engineers to test our device servers with their products prior to the hardware development of those products.

Each kit contains an embedded device server, board carrier unit, and all the connectors needed to interface our product with your serial device.

The Embedded Integration Kits include the following:

- An embedded device server: Micro125
- Board carrier unit with serial (DB9) interface. (Some carriers also have RJ45 Ethernet)
- Power supply
- CAT5 Ethernet cable, RJ45M/M, 10-foot
- 10-foot serial cable, DB9 (cable end depends on kit)
- DB9 to DB-25 converter

About the Integration Guide

This guide provides the information needed to install and test the Micro125 embedded device server on the evaluation board. The intended audience is the engineer responsible for integrating the device server into your product.

This document covers the following Micro125 Device Server part numbers:

Table 1-1 Micro125 Part Numbers

Part Number	Description
MO22AA0M3-01R	Micro125 Embedded Device Server, Modbus, Pin Header for Ethernet, Pin Header for LED, TTL Pin Header, RoHS
MO00AA003-01R	Micro125, No RJ45 connector, No LEDS, with TTL pin header, RoHS
MO00AA0E3-01R	AES Encrypted Micro125, No RJ45 connector, No LEDS, with TTL pin header, RoHS
MO11AA003-01R	Micro125 with RJ45 connector, LEDS, with TTL pin header, RoHS
MO11AA0E3-01R	AES Encrypted Micro125 with RJ45 connector, LEDS, with TTL pin header, RoHS
MO22AA003-01R	Micro125, Pin header for Ethernet, Pin header for LED connection, with TTL pin header, RoHS
MO22AA0E3-01R	AES Encrypted Micro125, Pin header for Ethernet, Pin header for LED connection, with TTL pin header, RoHS

Chapter Summaries

The remaining chapters in this guide include:

Chapter	Description
2: Description and Specifications	Describes and provides information about the Micro125 device server.
3: Integration Guidelines	Provides general guidelines to help you integrate the Micro125 board into your design.
4: Test Bed	Describes the board layout and connectors of the test bed.
A: Compliance and Warranty Information	Describes the compliance and warranty information.

Additional Documentation

Visit the Lantronix website at www.lantronix.com/support/documentation for the latest documentation and the following additional documentation.

Document	Description
Micro125 User Guide	Provides information needed to configure, use, and update the Micro125 firmware.
Device Installer User Guide	Provides instructions on using the Windows-based utility used to configure Lantronix embedded device servers.
Com Port Redirector User Guide	Provides information on using the Windows-based utility to create a virtual com port.

2: Description and Specifications

The Micro125 embedded device server provides an integrated solution to add proven Ethernet connectivity to an existing design quickly and economically, and with a high level of flexibility.

The Micro125

The Micro125 contains Lantronix's own DSTni controller, with 256 Kbytes of SRAM, 16 Kbytes of boot ROM, and an integrated 10/100 PHY.

The Micro125 also contains the following:

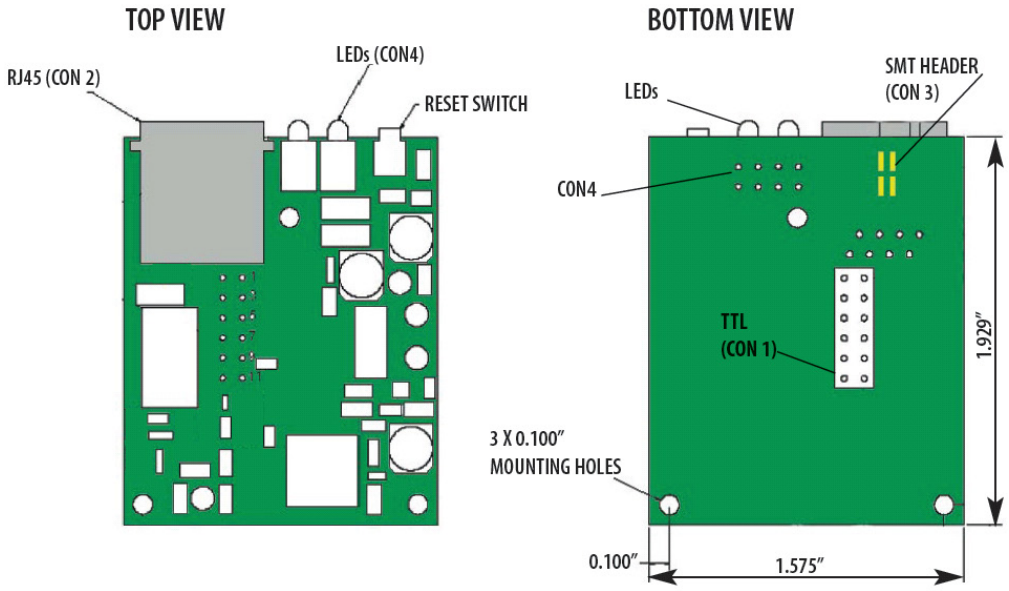
- RJ45 (10/100Base-T) ethernet network interface
- TTL level (asynchronous) serial interface
- Two serial ports
- Accepts 5 VDC regulated Input power
- Flash ROM for easy software upgrades
- Serial channel status, Ethernet link status, and diagnostic LEDs

The Micro125 requires 5 VDC ±5% at ~ 210mA power and is designed to operate in an extended temperature range (see *Technical Specifications* on page **Error! Bookmark not defined.**).

Layout and Dimensions

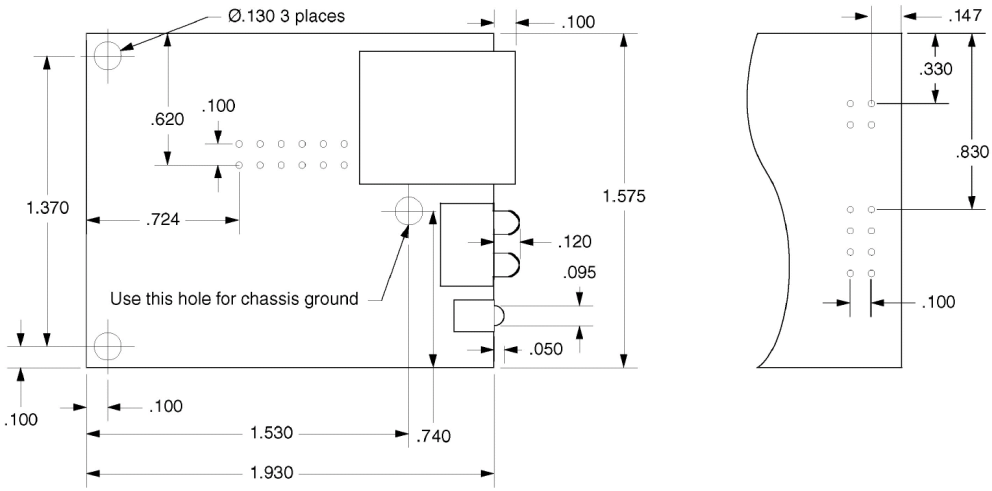
The Micro125 integrates into products quickly and easily. Serial interfacing is accomplished via a TTL connector, and for Ethernet access, an optional RJ45 (10/100Base-T) connector is available. The orientation of its interface pins can be specified to fit your product. It requires 5 volts DC of regulated power with maximum current of 210mA.

Figure 2-1 Micro125 Board Layout



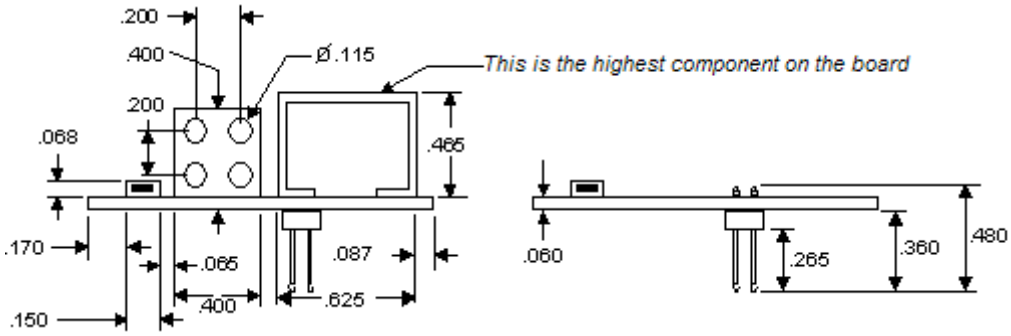
The following drawing is a top view of the Micro125.

Figure 2-2 Micro125 Top View



The following drawing shows the connector end view of the board with the LEDs and RJ45 connector installed. The drawing on the right shows the dimensions for CON1 (DIL 2 x 6).

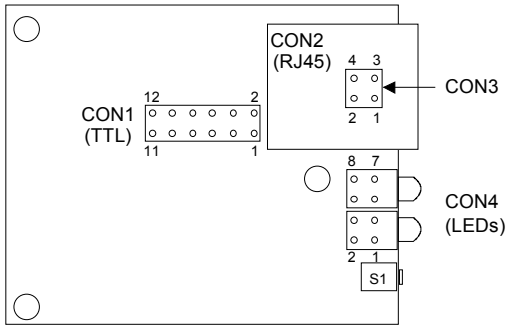
Figure 2-3 Micro125 Connector End View



Connectors

The Micro125 has four connectors: a TTL serial port (CON1), a 10/100Base-T RJ45 Connector (CON2), and/or pins instead of the RJ45 connector (CON3) and LEDs (CON4).

Figure 2-4 Micro125 Connectors



The Micro125 that comes with the integration kit is factory configured. When ordering the Micro125 for production use, each connector can be specified as follows:

- Pins on/off the board and top/bottom (*Figure 2-2* and *Figure 2-3*)
- LEDs on/off the board
- RJ45 on/off the board

Contact Lantronix for information about ordering the Micro125 with customized connector configurations.

The embedded integration kit(part number Micro-Kit) includes the Micro125 embedded device server. Refer to the following table for a listing of its pinouts.

Table 2-1 Micro125 Connector Pinouts

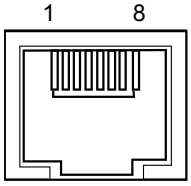
CON1 TTL Serial Port (DIL 2 x 6 Pins)		CON2 10/100Base-T (RJ45) Connector		CON3 (2 x 2 Pins in place of RJ45)		CON4 (2 x 4 Pins in place of LEDs)	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	+5VDC	1	Tx+	1	Tx+	1	+3.3 VDC
2	GND	2	Tx-	2	Tx-	2	+3.3 VDC
3	RxA (input)	3	Rx+	3	Rx+	3	LED3 (Diagnostics)1
4	TxA (output)	4	None [2] (tied to Pin 5)	4	Rx-	4	LED1 (Channel 1) [1]
5	RTSA (output)	5	None (tied to Pin 4)			5	+3.3 VDC
6	DTRA (output)	6	Rx-			6	+3.3 VDC
7	CTSA (input)	7	None (tied to Pin 8)			7	LED2 (Channel 2) [1]
8	DCDA (input)	8	None (tied to Pin 7)			8	LED4 (Link) [1]
9	Reserved						
10	RESET (pull low to reset) ***Note:*** *the reset input is 3.3V tolerant.*						
11	RxB (input)						
12	TxB (output)						

[1] Current limiting resistor on board is 220 Ohms.
[2] 150 Ohms exist between the Pin 4/5 node and the Pin 7/8 node.
A = Port (Channel) 1 B = Port (Channel) 2

Ethernet Interface

The standard Micro125 ships with an RJ45 10/100Base-T Ethernet connector (CON2). At the time of ordering, you can specify whether to include this RJ45 connector. You can use CON3 as an alternative.

Figure 2-5 RJ45 Ethernet Connector



1 - TX+
2 - TX-
3 - RX+
6 - RX-

Status LEDs

The Micro125 carrier board has four status LEDs: serial port (Channel) 1 status, serial port (Channel) 2 status, diagnostics, and network link status. See the following table for a complete description of LED functions and pinout locations.

Figure 2-6 Micro125 Status LEDs

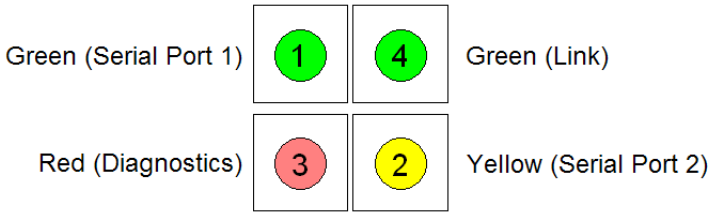


Table 2-2 Micro125 Status LEDs

LED	Description	Location	LED Functions
1	SerialPort (Channel) 1 Status	CON 4, Pin 4	Lights solid green to indicate Channel 1 is idle. Blinks green to indicate Channel 1 is connected to the network and active.
2	SerialPort (Channel) 2 Status	CON 4, Pin 7	Lights solid yellow to indicate Channel 2 is idle. Blinks yellow to indicate Channel 2 is connected to the network and active.
3	Diagnostics	CON 4, Pin 3	Blinks or lights solid red in combination with the green (Channel 1) LED to indicate diagnostics and error detection. Red solid, green (Channel 1) blinking: 1x: EPROM checksum error 2x: RAM error 3x: Network controller error 4x: EEPROM checksum error 5x: Duplicated IP address on the network* 6x: Software does not match hardware* Red blinking, green (Channel 1) blinking: 4x: Faulty network connection* 5x: No DHCP response received*
4	Network Link Status	CON 4, Pin 8	Lights solid green to indicate network port is connected to the network.
*non-fatal error			

Product Information Label

The product information label contains important information about your specific unit, such as its product number, revision number, manufacturing date and mac address.

Figure 2-7 Product Label



Technical Specifications

Table 2-3 Micro125 Technical Specifications

Category	Description
CPU, Memory	Lantronix DSTni-EX 186 CPU, 256-Kbyte zero wait state SRAM, 512-Kbyte flash, 16-Kbyte boot ROM
Firmware	Upgradeable via TFTP and serial port
Serial Interface	2 TTL serial interfaces (Asynchronous). 5V-level input signals. 3.3 V-level output signals. Through-hole plated pins, DIL. ***Note:*** *the reset input is 3.3V tolerant.*
Serial Line Formats	Data bits: 7 or 8 Stop bits: 1 or 2 Parity: odd, even, none
Board Dimensions	Height: 1.575in (40.00 mm) Width: 1.935in (49.15 mm) (See Drawing)
Weight	0.7 ounces
Modem Control	DTR, RTS, CTS, DCD
Flow Control	XON/XOFF (software), CTS/RTS (hardware), None
Network Interface	RJ45 (10/100Base-T) Ethernet
Compatibility	Ethernet: Version 2.0/IEEE 802.3
Power Requirements	5VDC (±5%) regulated @ 210mA
Protocols Supported	ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, and HTTP
LEDs	Channel 1 (solid Green = idle, blink = active) Channel 2 (solid Yellow = idle, blink = active) Diagnostics (Red, in combination with Channel 1) Network Link (Green)
Management	Internal web server, SNMP (read only) Serial login, Telnet login
Security	Password protection, optional Rijndael 256-bit encryption
Internal Web Server	Serves static Web pages and Java applets Storage capacity: 384 Kbytes
Temperature	Standard Temperature Operating Range: 0° to 70°C (32° to 158°F)

Category	Description
	Storage Temperature Range: -40° to 85°C (-40° to 185°F)
Emissions Compliance	FCC Part 15 Subpart B Industry Canada ICES-003 Issue 4 February 2004 CISPR 22: 2005 Information Technology Equipment VCCI V-3/2010.04 AS/NZS CISPR 22: 2009 EN 55022: 2006 + A1:2007 EN 61000-3-2: 2006 EN 61000-3-3: 2008 EN 61000-6-3: 2001
Immunity	EN 55024: 1998 +A1: 2001 +A2: 2003 EN 61000-4-2: 1995 + A2: 2001 EN 61000-4-3: 2006 + A1: 2008 EN 61000-4-4: 2004 EN 61000-4-5: 2006 EN 61000-4-6: 2007 EN 61000-4-8: 1994 + A1: 2001 EN 61000-4-11: 2004 EN 61000-6-2: 2001

3: Integration Guidelines

This chapter provides general guidelines to integrate the Micro125 board into your design, and help you reach the necessary standards for your applications.

Power Supply

The Micro125 runs at 5 VDC nominal, ±5%. The current consumption varies for the different products and depends upon their operating conditions. Refer to the current requirements listed in the product specification to design an appropriate power supply.

To maintain the necessary voltage, provide ground to the appropriate connector header with a low inductance and low DC resistance path. The best solution is a solid ground plane.

Place a de-coupling capacitor pair as close as possible to the connector headers of the board's power supply. We recommend a ceramic (X7R material or equivalent, value 0.022 µF to 0.1 µF) and a low DC resistance (electrolytic or tantalum value 10 µF to 100 µF) capacitor.

Network Connector

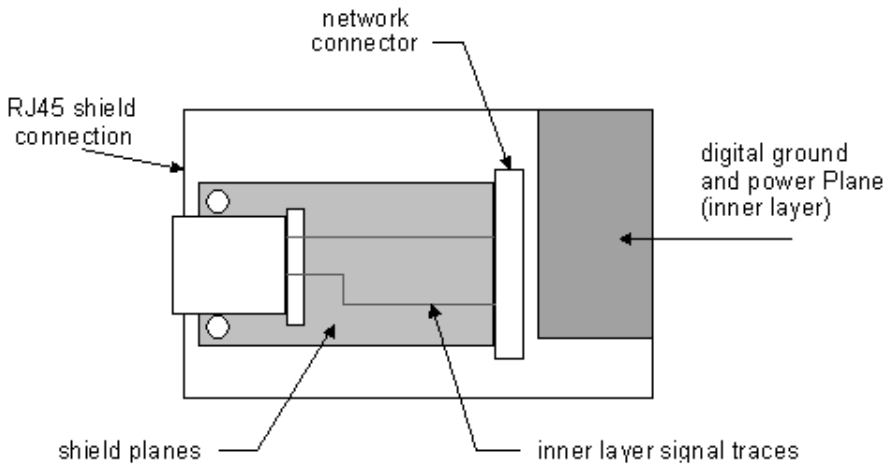
If you use the on-board RJ45 connector, we suggest that you provide ground level to the plated mounting hole near the RJ45. That shielded cable will be tied to the appropriate level, however the virtual ground is also provided there.

If you want to add an RJ45 connector, we recommend that it be at least partially shielded in case it will be used in a noisy environment. (Please refer to the product-specific section.)

Take care regarding the trace length and routing for the two differential pairs, TX and RX. Neither of them may cross or run in parallel with any digital signal nor run through a digital ground or power plane. The trace length inside of the unit running from the device server to the RJ45 should be as short as possible. The trace length may have an impact on signal quality (link length), especially if internal ambient noise is a factor.

If trace length cannot be shortened, or the internal noise frequencies are hitting the carrier frequency or the multiples of these (depending on the product and operating mode either 10MHz or 100MHz and up to the 11th overtone), we suggest a different strategy. Use a multi-layer board and a separated shield layer on the solder and assembly sides of the board, which are routed in the inner layers. (Refer to the following figure.) These shield layers can either be connected to the RJ45s shield or to a virtual ground signal provided by the device server.

Figure 3-1 Multi-Layer Board Strategy



Virtual Ground

The device server provides a virtual ground at a (plated) mounting hole. It is a ground imitation. It uses the tap of two capacitors (ceramic 0.1 µF) conducted symmetrically to ground and VCC. In the absence of a solid ground (earth), this virtual ground can be used for shielding or balancing metal parts of the case.

Serial Signals

Device server TTL-level serial input and output signals are protected by 220-Ohm resistors. These resistors provide a simple output shortage protection for infinite duration (by limiting the current). They also reduce conducted interferences at higher frequencies to the base board.

Additional Emission Improvements

Depending on the voltage regulator used and base board design, the power supply cord may sometimes emit conducted interferences. If the voltage level there is low, common mode chokes are the appropriate barrier to avoid these frequencies being emitted via the power cord as an antenna.

Common mode chokes help pass the conducted emission requirements of the EN55022 for frequencies below 30 MHz. Metal cases or partial metal shielding inside the unit can also help to reduce emission levels so that even more stringent standards can be passed.

4: Test Bed

The Micro125 Embedded Integration Kit includes a test bed (carrier board) that provides serial connections to the device server. The Micro125 device server provides a network 10/100Base-T RJ45. The test bed contains a power LED, TTL to RS-232 and RS-232 to TTL conversion hardware, a 3-pin connector for the second serial port, and mounting hardware for the Micro125.

The test bed allows software engineers to immediately begin developing and testing software applications for the device server, rather than delaying the process until the hardware interface for their product is complete.

Board Layout

Install the Micro125 onto the carrier board as shown below.

Figure 4-1 Carrier Board

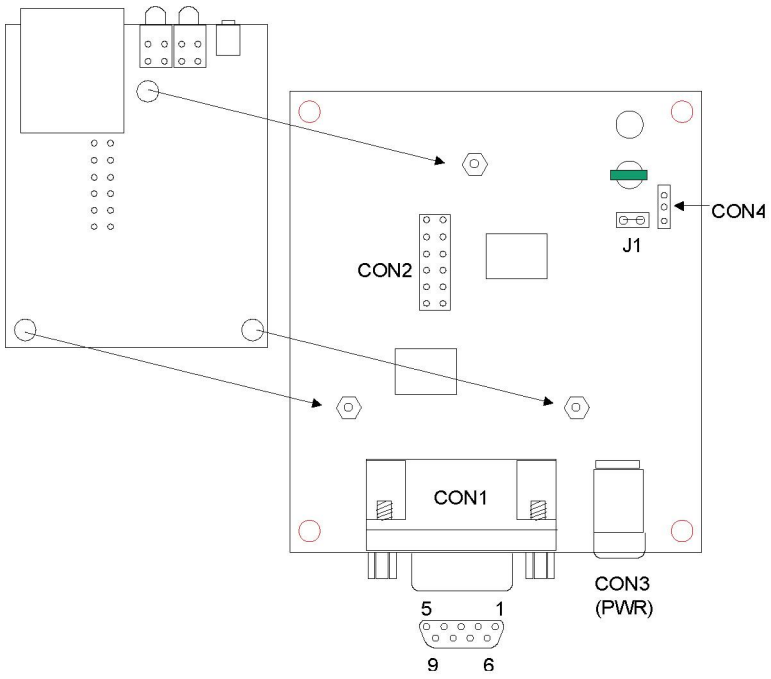
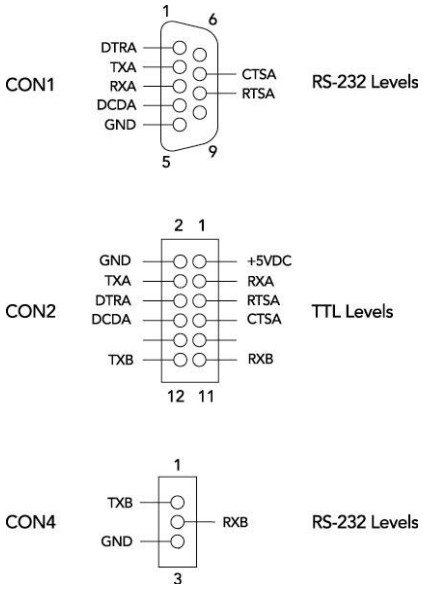


Figure 4-2 Pin Configurations



Test Bed Connectors

The Micro125 test bed has four connectors: CON1 (Serial Port 1 or Channel 1), CON2 (TTL Interface), CON4 (Serial Port 2 or Channel 2), and CON3, which is a 5VDC power supply connector.

This RS-232 level serial interface is implemented with a DB9F connector. The Micro125 converts the RS-232 serial transmit and receive data of this interface to Ethernet protocol transmit and receive data. The DB9 connector was selected for compatibility with most PC serial interface ports using a straight through cable.

Table 4-1 Micro125 Test Bed Connectors

CON1 Serial Port (Channel) 1a		CON2 TTL Interface		CON4 Serial Port (Channel) 2b	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	DTRA (output)	1	+5 VDC	1	TxB (output)
2	TxA (output)	2	GND	2	RxB (input)
3	RxA (input)	3	TxA (output)	3	GND
4	DCDA (input)	4	RxA (input)		
5	GND	5	CTSA (input)		
6	None	6	DCDA (input)		
7	CTSA (input)	7	RTSA (output)		
8	RTSA (output)	8	DTRA (output)		
9	None	9	None		
		10	None		
		11	TxB (output)		
		12	RxB (input)		

a. CON1 Serial Port (Channel) 1 is also designated as A.
b. CON4 Serial Port (Channel) 2 is also designated as B.

A: Compliance and Warranty Information

Compliance Information

(According to ISO/IEC Guide 22 and EN 45014)

Manufacturer's Name & Address

Lantronix 167 Technology Drive, Irvine, CA 92618 USA

Declares that the following product:

Product Name Model: Micro125 Embedded Device Server

Conforms to the following standards or other normative documents:

Emissions

FCC Part 15 Subpart B, Class B

Industry Canada ICES-003 Issue 4 February 2004

CISPR 22: 2005 Information Technology Equipment

VCCI V-3/2010.04

AS/NZS CISPR 22: 2009

EN 55022: 2006 + A1:2007

EN 61000-3-2: 2006

EN 61000-3-3: 2008

EN 61000-6-3: 2001

Immunity

EN 55024: 1998 +A1: 2001 +A2: 2003

EN 61000-4-2: 1995 + A2: 2001

EN 61000-4-3: 2006 + A1: 2008

EN 61000-4-4: 2004

EN 61000-4-5: 2006

EN 61000-4-6: 2007

EN 61000-4-8: 1994 + A1: 2001

EN 61000-4-11: 2004

EN 61000-6-2: 2001

RoHS, REACH and WEEE Compliance Statement

Please visit http://www.lantronix.com/legal/rohs/ for Lantronix's statement about RoHS, REACH and WEEE compliance.

Warranty

For details on the Lantronix warranty replacement policy, please go to our Web site at www.lantronix.com/support/warranty.

Manufacturer's Contact

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Phone: 949-453-3990
Fax: 949-453-3995

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