



XPort[®]

Device Server Integration Guide

Intellectual Property

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

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For a current list of our domestic and international sales offices go to the Lantronix web site at <https://www.lantronix.com/about-us/contact/>

Disclaimer and Revisions

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.

Note: *This product has been designed to comply with the limits for a Class B digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause harmful interference to radio communications.*

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

Note: *With the purchase of XPort, the OEM agrees to an OEM firmware license agreement that grants the OEM a non-exclusive, royalty-free firmware license to use and distribute the binary firmware image provided, only to the extent necessary to use the XPort hardware. For further details, please see the XPort OEM firmware license agreement.*

Revision History

Date	Rev.	Comments
November 2003	A	Initial Release.
April 2004	B	Firmware 1.6 features; information to support XPort-03
June 2004	C	Technical specifications updated
August 2004	D	Firmware 1.8 features; added XPort-485 information
October 2004	E	Removed out of date manual references
March 2005	F	Updated illustration
September 2009	G	Updated for release with the new demo board, and XPort-04
June 2010	H	Minor corrections; Lantronix address updated
July 2010	I	Minor corrections; updated Table 2-5 Recommended Operating Conditions to match data sheet parameters
February 2013	J	Updated part number information.
August 2015	K	Updated pin information.
August 2016	L	Updated product drawings.
October 2022	M	Added soldering recommendations. Updated Lantronix address.

For the latest revision of this product document, please check our online documentation at www.lantronix.com/support/documentation.

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1: Introduction

About the Integration Guide

This guide provides the information needed to integrate the Lantronix® XPort® device server into a customer printed circuit board. This manual is intended for engineers responsible for integrating the XPort into their product.

Note: This document covers XPort Device Server part numbers XP1001000-03R, XP1002000-03R, XP100200S-03R, XP1001000-04R, XP1002000-04R, XP100200S-04R, XP1001000-05R, XP1002000-05R, and XP100200S-05R.

Additional Documentation

Visit the Lantronix Web site at www.lantronix.com/support/documentation for the following additional documentation.

Document	Description
<i>XPort Device Server User Guide</i>	Provides information needed to configure, use, and update the XPort firmware.
<i>XPort Universal Demo Board Quick Start</i>	Provides the steps for getting the XPort up and running on the demo board.
<i>XPort Universal Demo Board User Guide</i>	Provides information needed to use the XPort on the demo board.
<i>DeviceInstaller User Guide</i>	Provides instructions for using the Windows-based utility to configure the XPort and other Lantronix device servers.
<i>Com Port Redirector User Guide</i>	Provides information on using the Windows-based utility to create a virtual com port.

2: Description and Specifications

The XPort embedded device server is a complete network-enabling solution enclosed within an RJ45 package. This miniature serial-to-Ethernet converter empowers original equipment manufacturers (OEMs) to go to market quickly and easily with networking and web page serving capabilities built into their products.

The XPort

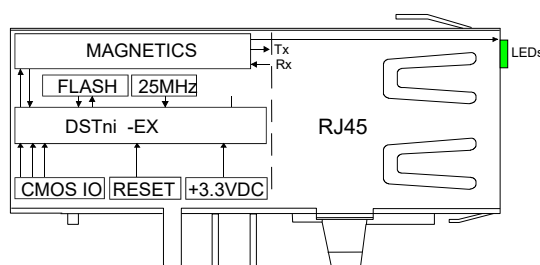
The XPort contains Lantronix's own DSTni controller, with 256 Kbytes of SRAM, 16 Kbytes of boot ROM, and integrated AMD 10/100 PHY.

The XPort also contains the following:

- ◆ 3.3-volt serial interface
- ◆ All I/O pins are 5V tolerant
- ◆ 4-Mbit flash memory
- ◆ Ethernet magnetics
- ◆ Power supply filters
- ◆ Reset circuit
- ◆ +1.8V regulator
- ◆ 25-MHz crystal and Ethernet LEDs

The XPort requires +3.3-volt power and is designed to operate in an extended temperature range (see technical data).

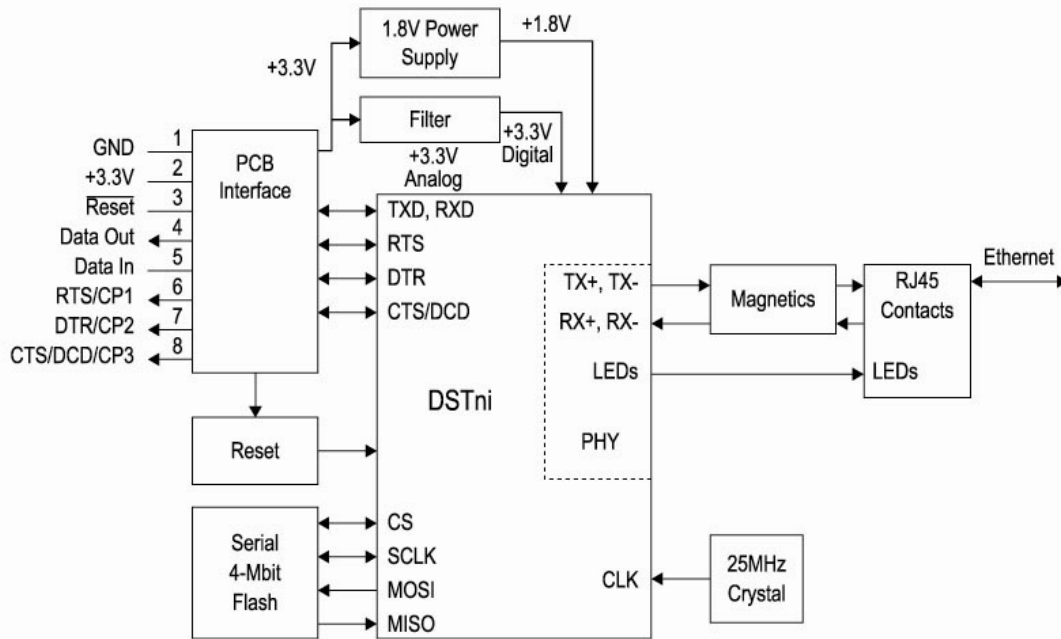
Figure 2-1 Side View of the XPort



XPort Block Diagram

The following drawing is a block diagram of the XPort showing the relationships of the components.

Figure 2-2 XPort Block Diagram



PCB Interface

The XPort has a serial port compatible with data rates up to 920 kbps (in high-performance mode). The serial signals (pins 4–8) are 3.3V CMOS logic level, and 5V tolerant. The serial interface pins include +3.3V, ground, and reset. The serial signals usually connect to an internal device, such as a UART. For applications requiring an external cable running with RS-232 or RS-422 4-wire and RS-485 2-wire voltage levels, the XPort must interface to a serial transceiver chip.

Table 2-1 PCB Interface Signals

Signal Name	XPort Pin #	Primary Function
GND	1	Circuit ground
3.3V	2	+3.3V power in
Reset	3	External reset in
Data Out	4	Serial data out (driven by DSTni's built-in UART)
Data In	5	Serial data in (read by DSTni's built-in UART)

Signal Name	XPort Pin #	Primary Function
CP1/RTS (Configurable Pin 1)	6	CP1 can be configured as follows: • Flow control: RTS (Request to Send) output driven by DSTni's built-in UART for connection to CTS of attached device. • Programmable input/output: CP1 can be driven or read through software control, independent of serial port activity.
CP2/DTR (Configurable Pin 2)	7	CP2 can be configured as follows: • Modem control: DTR (Data Terminal Ready) output driven by DSTni's built-in UART for connection to DCD of attached device. • Programmable input/output: CP2 can be driven or read through software control, independent of serial port activity.
CP3/CTS/DCD (Configurable Pin 3)	8	CP3 can be configured as follows: • Flow control: CTS (Clear to Send) input read by DSTni's built-in UART for connection to RTS of attached device. • Modem control: DCD (Data Carrier Detect) input read by DSTni's built-in UART for connection to DTR of attached device. • Programmable input/output: CP3 can be driven or read through software control, independent of serial port activity.

Ethernet Interface

The Ethernet interface magnetics, RJ45 connector, and Ethernet status LEDs are all in the device server shell.

Table 2-2 Ethernet Interface Signals (Industry Standards)

Signal Name	DIR	Contact	Primary Function
TX+	Out	1	Differential Ethernet transmit data +
TX-	Out	2	Differential Ethernet transmit data -
RX+	In	3	Differential Ethernet receive data +
RX-	In	6	Differential Ethernet receive data -
Not used		4	Terminated
Not used		5	Terminated
Not used		7	Terminated
Not Used		8	Terminated
SHIELD			Chassis ground

LEDs

The XPort contains the following LEDs:

- ◆ Link (bi-color, left LED)
- ◆ Activity (bi-color, right LED)

Figure 2-3 XPort LEDs

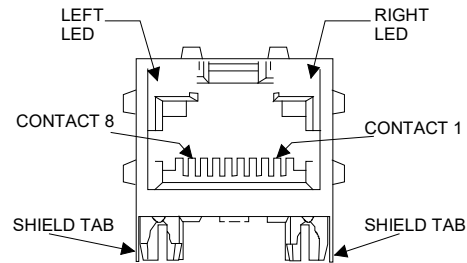


Table 2-3 XPort LED Functions

Link LED Left Side		Activity LED Right Side	
Color	Meaning	Color	Meaning
Off	No Link	Off	No Activity
Amber	10 Mbps	Amber	Half Duplex
Green	100 Mbps	Green	Full Duplex

Dimensions

The XPort dimensions are shown in the following drawings.

Figure 2-4 Front View

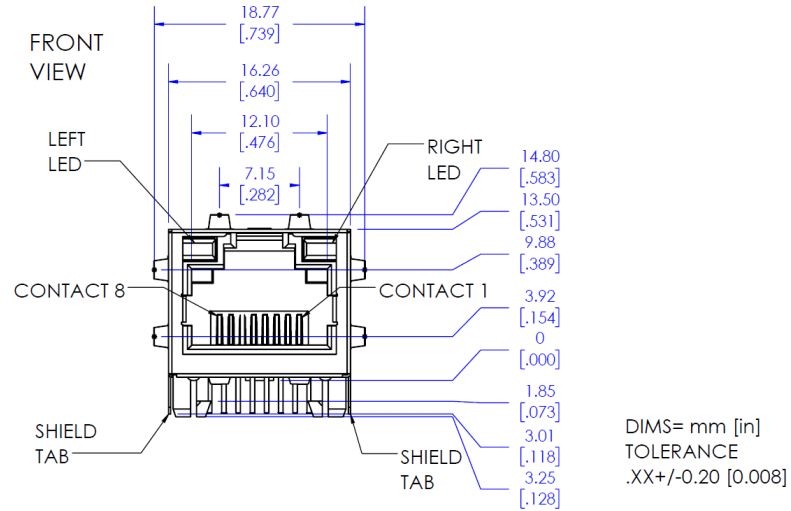


Figure 2-5 Bottom View

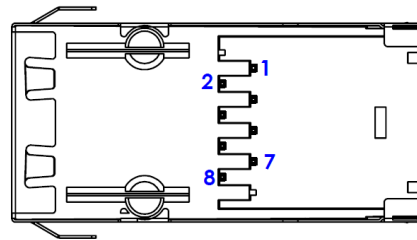
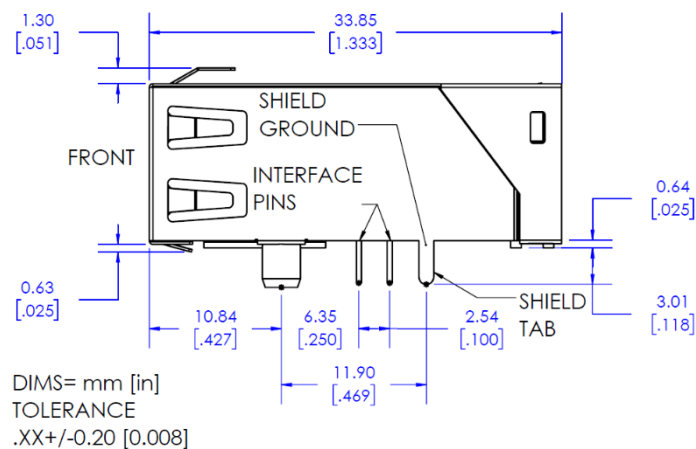


Figure 2-6 Side View



Recommended PCB Layout

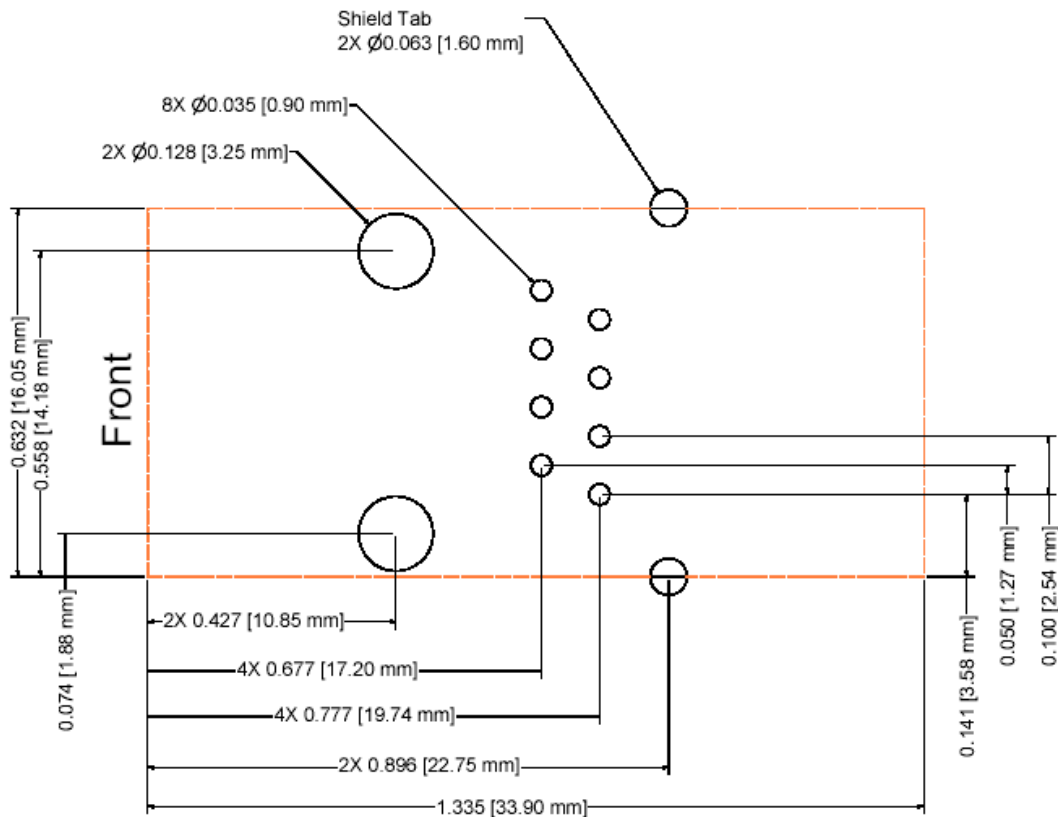
The hole pattern and mounting dimensions for the XPort device server are shown in the following drawing. For proper heat dissipation, it is recommended that the PCB have approximately 1 square inch of copper attached to the shield tabs. The shield tabs are an important source of heat sinking for the device.

The XPort shield is considered “chassis ground” and should be separate from “signal ground”. ESD near the XPort at the panel opening will likely jump to the shield.

We recommend using high voltage (~200V), low ESR, 0.01uF capacitors to connect chassis ground to both signal ground and 3.3V. This will cause any voltage spike from ESD to be imparted equally to both signal ground and 3.3V with no net voltage increase between 3.3V and signal ground. For the highest level of ESD protection of the XPort, it is recommended that the shield not be directly connected to signal GND. The metal shield fingers around the XPort's RJ45 should physically contact the product housing when the housing is metal, or metallic coated.

The shield is also a heat sink for the internal EX Processor. As in all heat sinking applications, the more copper connected to the heat sink the better. Adding 1 inch square inch of copper flood on the PCB is adequate to allow the XPort to work up to +85°C. If the application does not expect to see temperatures up to +85°C the heat sink may be smaller than 1 square inch.

Figure 2-7 PCB Layout



Soldering Recommendations

CAUTION: Do not wash the XPort module.

This is an electrostatic sensitive device. Do not open packaging and handle these devices except at a static-free workstation.

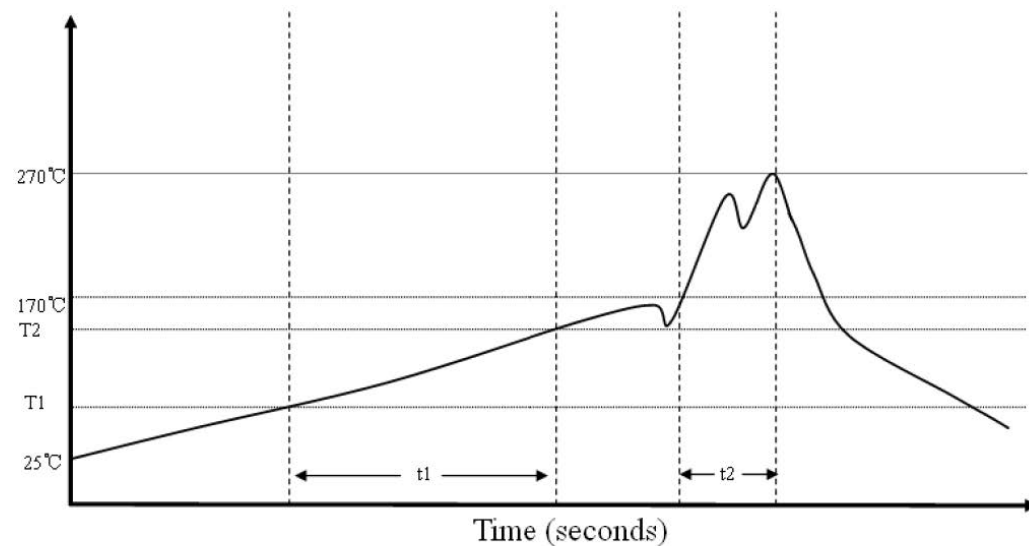
This section provides guidance in developing a manufacturing assembly process for the XPort embedded device server.

The following table summarizes compatibility to manufacturing soldering and washing processes and the profile details are described below the table.

Reflow Soldering [Profile]	Wave Soldering [Profile]	Hand Soldering [Profile]	Washing
Not compatible ¹	Compatible [WS-A]	Compatible [HS-A]	Not Compatible ²

[WS-A] Wave Soldering Compatible - Recommended Profile

Figure 2-8 [WS-A] Wave Soldering – Recommended Profile



- T1-T2: Flux activating temperature range (According to data sheet of Flux)
- t1: Flux activating time 30-60 seconds between T1 to T2.
- t2: Time of Leads immersed in solder (3-6 seconds)

Note: Profile is temperature at soldered pins.

[HS-A] Hand Soldering Compatible – Recommended Profile

60-watt soldering iron with tip temperature at 380°C +/- 30°C, a maximum duration of 10 seconds.

¹ Exposing product to reflow process can deform plastic material causing interference with RJ45 pin movement & insertion of Ethernet plug into jack. Do not use in reflow ovens, or process using paste-in-hole reflow.

² Washing is a process to remove manufacturing process contaminants, typically after soldering. Washing enclosed products can force outside contaminants to become trapped inside product and affect product function.

Product Information Label

The product information label contains important information about your specific unit, such as its product ID (name), bar code, part number, and Ethernet (MAC) address.

Figure 2-9 Product Label



Note: The Part Number* and MAC Address* on the product label will vary according the unit model (XPort-03, XPort-04 or XPort-05).

Electrical Specifications

CAUTION: Stressing the device above the rating listed in Table 2-4 may cause permanent damage to the XPort. Exposure to Absolute Maximum Rating conditions for extended periods may affect the XPort's reliability.

Table 2-4 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units
Supply Voltage	V _{CC}	0	3.6	Vdc
CPx, Data In, Data Out Voltage	V _{CP}	-0.3	6	Vdc
Operating Temperature		-40	85	°C
Storage Temperature		-40	85	°C

Table 2-5 Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Units
Supply Voltage	V _{CC}	3.14	3.3	3.46	Vdc
Supply Voltage Ripples	V _{CC_PP}			2.0	%
Supply Current(typ normal CPU speed)	I _{CC}		224		mA
Power Reset threshold		2.7			Vdc
RESET pin Input low Voltage	V _{RES_IL}			0.36	Vdc
RESET pin Input High Voltage	V _{RES_IH}	2.0		3.46	Vdc
CPx, RX Input Low Voltage	V _{CP_IL}			0.8	Vdc
CPx, RX Input High Voltage	V _{CP_IH}	2.0		5.5	Vdc
CPx, TX Output Low Voltage	V _{CP_OL}			0.4	Vdc
CPx, TX Output High Voltage	V _{CP_OH}	2.4			Vdc

Technical Specifications

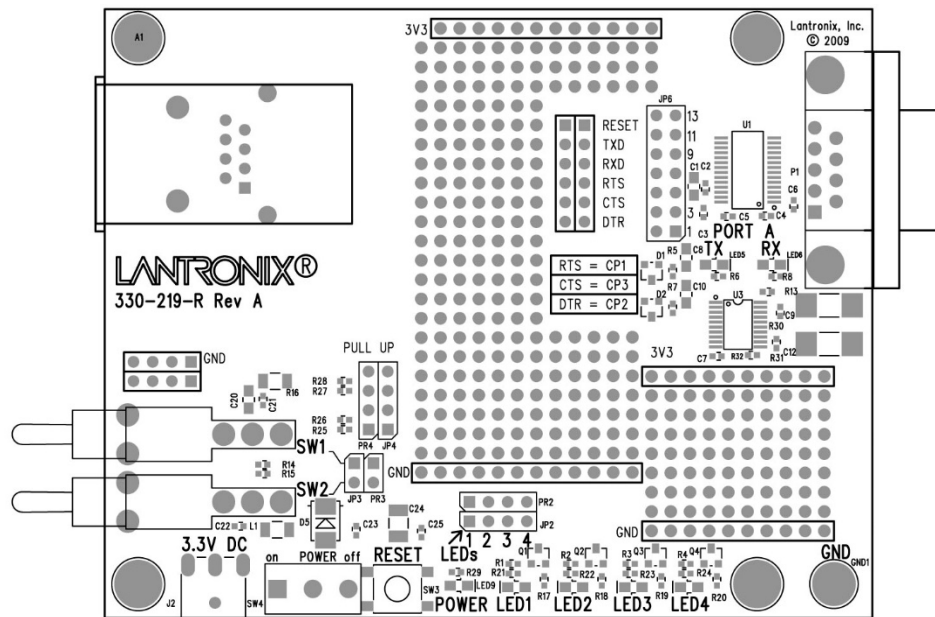
Table 2-6 Technical Specification

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
Reset Circuit	Internal 200ms power-up reset pulse. Power-drop reset triggered at 2.6V. External reset input causes an internal 200ms reset.
Serial Interface	CMOS (Asynchronous) 3.3V-level signals Rate is software selectable: 300 bps to 921600 bps
Serial Line Formats	Data bits: 7 or 8 Stop bits: 1 or 2 Parity: odd, even, none
Modem Control	DTR/DCD, CTS, RTS
Flow Control	XON/XOFF (software), CTS/RTS (hardware), None
Programmable I/O	3 PIO pins (software selectable), sink or source 4mA max.
Network Interface	RJ45 Ethernet 10Base-T or 100Base-TX (auto-sensing)
Compatibility	Ethernet: Version 2.0/IEEE 802.3 (electrical), Ethernet II frame type
Protocols Supported	ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP, and HTTP
LEDs	10Base-T and 100Base-TX Link Activity, Full/half duplex. Software generated status & diagnostic signals can optionally drive external LEDs through CP1 & CP3.
Management	Internal web server, SNMP (read only) Serial login, Telnet login
Security	Password protection, locking features, optional Rijndael 256-bit encryption
Internal Web Server	Serves static Web pages and Java applets Storage capacity: 384 Kbytes
Weight	0.34 oz (9.6 grams)
Material	Metal shell, thermoplastic case
Temperature	Operating range: -40°C to +85°C (-40°F to 185°F) normal mode, -40°C to +75°C (-40°F to 167°F) high-performance mode
Shock/Vibration	Non-operational shock: 500 g's Non-operational vibration: 20 g's
Warranty	Two year limited warranty
Included Software	Windows™ 98/NT/2000/XP-based Device Installer configuration software and Windows™-based Com Port Redirector
EMI Compliance	Radiated and conducted emissions - complies with Class B limits of EN 55022:1998 Direct & Indirect ESD - complies with EN55024:1998 RF Electromagnetic Field Immunity - complies with EN55024:1998 Electrical Fast Transient/Burst Immunity - complies with EN55024:1998 Power Frequency Magnetic Field Immunity - complies with EN55024:1998 RF Common Mode Conducted Susceptibility - complies with EN55024:1998

3: Diagrams

Demo Board Layout

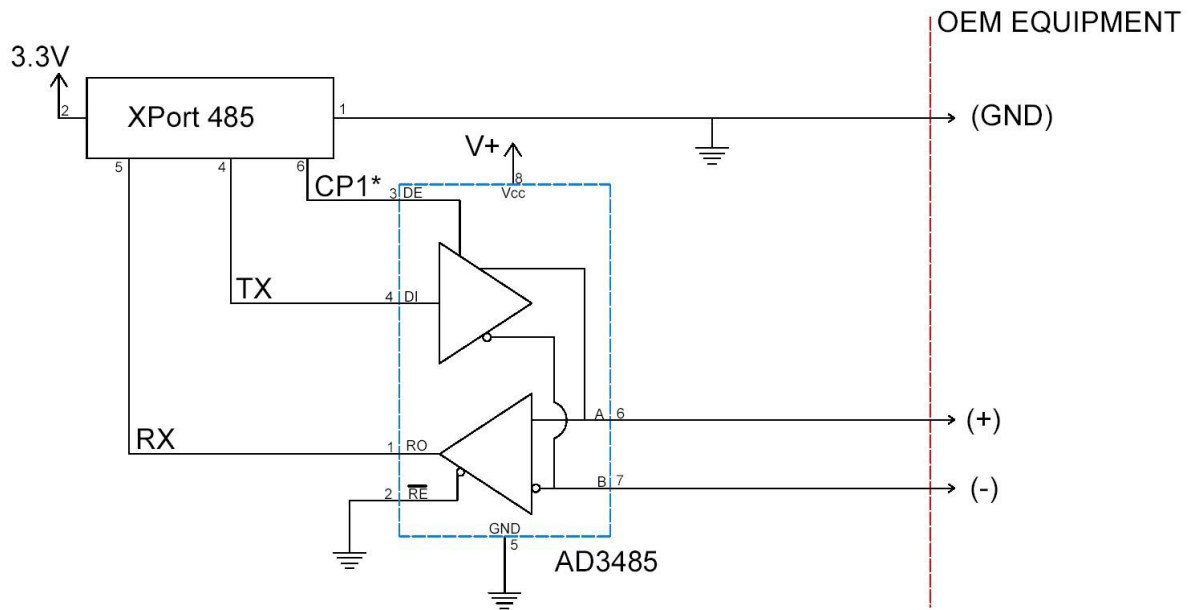
Figure 3-1 XPort Demo Board Layout



RS-422 4-Wire and RS-485 2-Wire Connection Diagram

The following example illustrates a connection between the XPort-485 to an external transceiver IC:

Figure 3-2. XPort RS-422 4-Wire and RS-485 2-Wire Connection Diagram



A: Compliance and Warranty Information

Compliance Information

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

Manufacturer's Name & Address:

Lantronix 48 Discovery, Suite 250, Irvine, CA 92618 USA

Declares that the following product:

Product Name Model: XPort Embedded Device Server

Conforms to the following standards or other normative documents:

Electromagnetic Emissions:

EN55022: 1998 (IEC/CSP122: 1993) Radiated RF emissions, 30MHz-1000MHz

Conducted RF Emissions – Telecom Lines – 150 kHz – 30 MHz

FCC Part 15, Subpart B, Class B

IEC 1000-3-2/A14: 2000

IEC 1000-3-3: 1994

Electromagnetic Immunity:

EN55024: 1998 Information Technology Equipment-Immunity Characteristics

Direct ESD, Contact Discharge

Indirect ESD

Radiated RF Electromagnetic Field Test

Electrical Fast Transient/Burst Immunity

RF Common Mode Conducted Susceptibility

Power Frequency Magnetic Field Test

Manufacturer's Contact:

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Fax: 949-453-3995

RoHS, REACH and WEEE Compliance Statement

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