LANTRONIX

xPort® Pro
Embedded Device Server Integration Guide

Part Number 900-557
Revision J August 2017

Copyright and Trademark

Lantronix and *xPort* are registered trademarks of Lantronix, Inc. in the United States and other countries. *Evolution OS* is registered trademark of Lantronix, Inc. in the United States. *DeviceInstaller* is a trademark of Lantronix, Inc.

Windows and *Internet Explorer* are registered trademarks of Microsoft Corporation. *Mozilla* and *Firefox* are registered trademarks of the Mozilla Foundation. *Chrome* is a trademark of Google. *Opera* is a trademark of Opera Software ASA. *Freescale* is a registered trademark of Freescale Semiconductor, Inc. Broadcom is a registered trademark of Broadcom Corporation. All other trademarks and trade names are the property of their respective holders.

Warranty

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

Contacts

Lantronix, Inc. Corporate Headquarters

7535 Irvine Center Drive
Suite 100
Irvine, CA 92618, USA

Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support

Online: www.lantronix.com/support

Sales Offices

For a current list of our domestic and international sales offices, go to the Lantronix web site at www.lantronix.com/about/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 Lantronix® xPort® Pro embedded device server, 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 Pro hardware. For further details, please see the xPort Pro OEM firmware license agreement.

Revision History

Date	Rev.	Comments
September 2009	A	Initial Draft
December 2010	B	Updated Lantronix address/contact information.
March 2011	C	Updated SDRAM number information.
April 2011	D	Updated part number information.
September 2011	E	Updated compliance information.
April 2012	F	Updated Pin 4 state and part number information.
August 2012	G	Updated recommended operating condition and part number information.
June 2016	H	Updated to include the xPort Pro Lx6 part number and unit of measurement information.
August 2017	J	Updated part number SKU information.

Table of Contents

List of Figures

List of Tables

1. Introduction

About the Integration Guide

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

Note: *This document covers xPort Pro Embedded Device Server versions XPP1004000-02R, XPP1002000-01R, XPP100200S-01R, XPP1002000-02R, XPP100200S-02R, XPP1003000-01R, XPP100300S-01R, XPP1003000-04R and XPP100300S-04R.*

Additional Documentation

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

Document	Description
xPort Pro Embedded Device Server User Guide	Provides information needed to configure, use, and update the xPort Pro firmware.
xPort Pro Lx6 Embedded Device Server User Guide	Provides information needed to configure, use, and update the xPort Pro Lx6 firmware.
xPort Embedded Device Server Universal Demo Board Quick Start	Provides the steps for getting the xPort Pro up and running.
xPort Embedded Device Server Universal Demo Board User Guide	Provides information needed to use the xPort Pro on the demo board.
DeviceInstaller User Guide	Provides instructions for using the Windows-based utility to configure the xPort Pro and other Lantronix 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 xPort Pro embedded device server is Lantronix's most powerful, self-contained embedded networking module. Footprint compatible with the popular xPort product and running either Linux or the Lantronix Evolution OS® operating systems, the xPort Pro eliminates the complexity of designing network connectivity into a product and allows you to deploy advanced applications on the edge device itself. The thumb-sized xPort Pro provides everything you need in a single embedded solution. It effortlessly handles demanding applications with the power of a high-speed, advanced architecture 32-bit processor. The ample built-in memory allows virtually unlimited flexibility for customization and application enablement.

xPort Pro provides bullet-proof security by offering a variety of robust data encryption and authentication options. What's more, the option to run Linux, with IPv6 built in, enables you to deploy custom applications and take advantage of the large feature libraries available for Linux developers. Critical agency certification has already been completed by Lantronix, reducing your test time and speeding time-to-market.

The xPort Pro Features

The xPort Pro contains a 32-bit Freescale® processor, with 8/16 megabytes (MB) of SDRAM (see *Table 2-1*), 16 MB of Flash and an integrated Broadcom® 10/100 PHY.

Table 2-1 xPort Pro Part Numbers

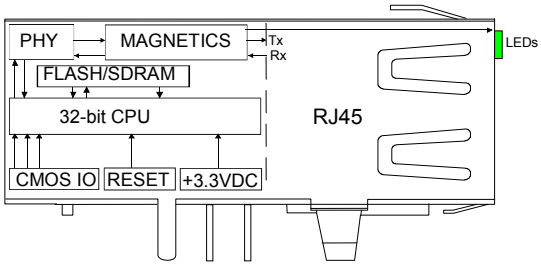
Part Numbers	SDRAM	Operating System
XPP1002000-01R	8 MB	Evolution
XPP100200S-01R	8 MB	Evolution
XPPDK1000-EVO-01	8 MB	Evolution
XPP1002000-02R	16 MB	Evolution
XPP100200S-02R	16 MB	Evolution
XPPDK1000-EVO-02	16 MB	Evolution
XPP1003000-01R	8 MB	Linux
XPP100300S-01R	8 MB	Linux
XPPDK1000-LNX-01	8 MB	Linux
XPP1003000-04R	16 MB	Linux
XPP100300S-04R	16 MB	Linux
XPPDK1000-LNX-02	16 MB	Linux
XPP1004000-02R	16 MB	Linux

The xPort Pro also contains the following:

- 3.3-volt serial interface
- All I/O pins are 3.3V tolerant
- Ethernet magnetics
- Power supply filters
- Reset circuit
- +1.5V regulator
- Crystals and Ethernet LEDs

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

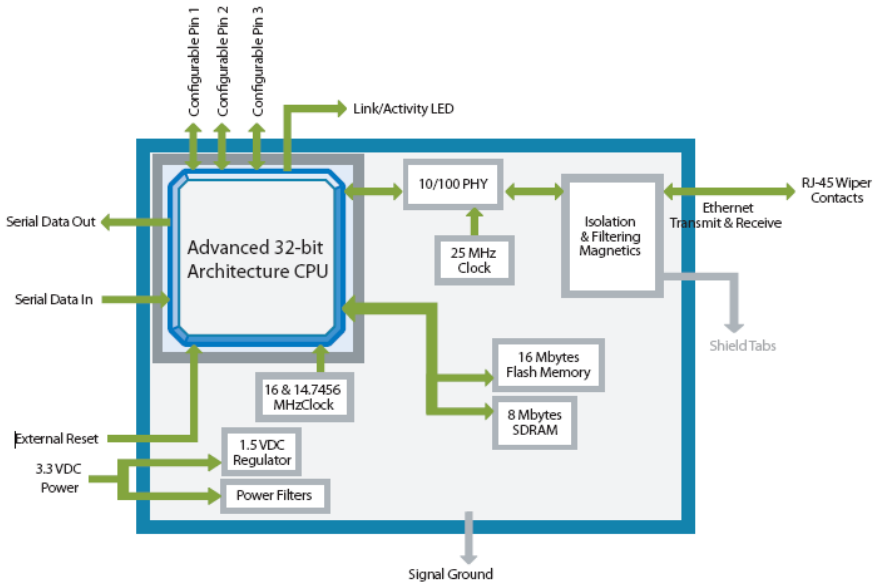
Figure 2-1. Side View of the xPort Pro



xPort Pro Block Diagram

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

Figure 2-2. xPort Pro Block Diagram



PCB Interface

The xPort Pro has a serial port compatible with data rates up to 921600 bps. The serial signals (pins 4–8) are 3.3V CMOS logic level. The serial interface pins include +3.3V, ground, and reset. The serial signals connect to an internal UART driven at 3.3V. For applications requiring an external cable running with RS-232 or RS422/485 voltage levels, the xPort Pro must interface to a serial transceiver chip. We supply an RS-232 transceiver on the xPort Universal Demo Board for this purpose.

Note: *The standard baud rate of 460800 bps is not supported.*

Table 2-2 PCB Interface Signals

Signal Name	xPort Pro Pin #	Primary Function
GND	1	Circuit ground
3.3V	2	+3.3V power in
$\overline{\text{Reset}}$	3	External reset in
Data Out[1]	4	Serial data out (driven by built-in UART)
Data In	5	Serial data in (input to built-in UART)
CP1/RTS (Configurable Pin 1)	6	CP1 can be configured as follows: • **Flow control**: RTS (Request to Send) **output** driven by the 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. • **RS485 Transmit Enable:** In RS485 mode, CP1 is driven by the built-in UART for connection to the transmit enable pin of an RS485 Transceiver.
CP2/DTR (Configurable Pin 2)	7	CP2 can be configured as follows: • **Modem control**: DTR (Data Terminal Ready) **output** driven by the 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 the built-in UART for connection to RTS of attached device. • **Modem control**: DCD (Data Carrier Detect) **input** read by the 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.

[1] Data out will float during and immediately after power up or assertion of RESET on Pin 3. Pin 4 can be pulled up to +3.3V with a 10K ohm or larger resistor to hold the pin high during reset.

Ethernet Interface

The Ethernet interface magnetics, RJ45 connector, and Ethernet status LEDs are all in the device server shell. The xPort Pro PHY is Auto MDIX capable allowing connection to either straight through or cross over Ethernet cables.

Table 2-3 Ethernet Interface Signals (Industry Standards)

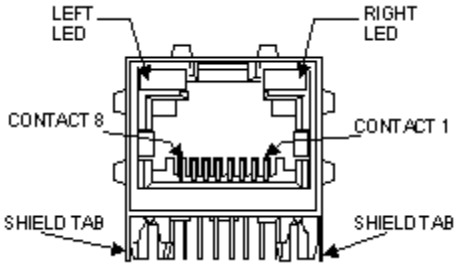
Signal Name	DIR	Contact	Primary Function
TX+	Out	1	Differential Ethernet transmit data +
TX-	Out	2	Differential Ethernet transmit data -
RX+	In	3	Differential Ethernet receive data +
RX-	In	6	Differential Ethernet receive data -
Not used		4	Terminated
Not used		5	Terminated
Not used		7	Terminated
Not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

LEDs

The xPort Pro contains the following LEDs:

- Link (solid green, left LED)
- Activity (blinking amber, right LED)

Figure 2-3. xPort Pro LEDs



Dimensions

The xPort Pro dimensions are shown in the following drawings.

Figure 2-4. Front View

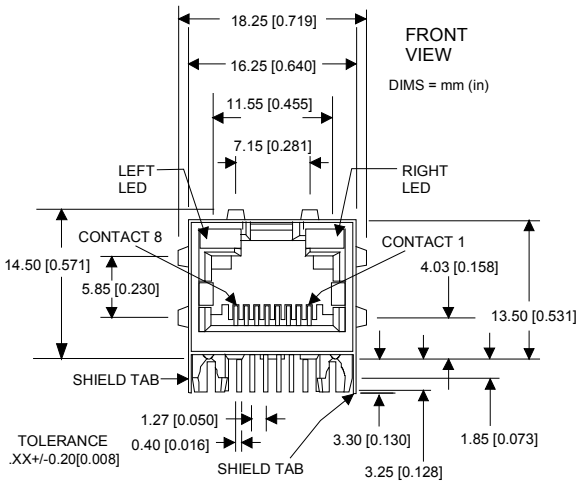


Figure 2-5. Bottom View

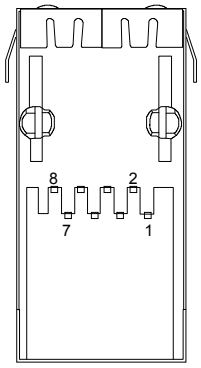
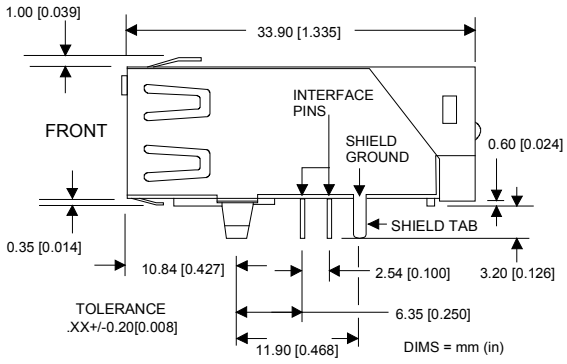


Figure 2-6. Side View



Recommended PCB Layout

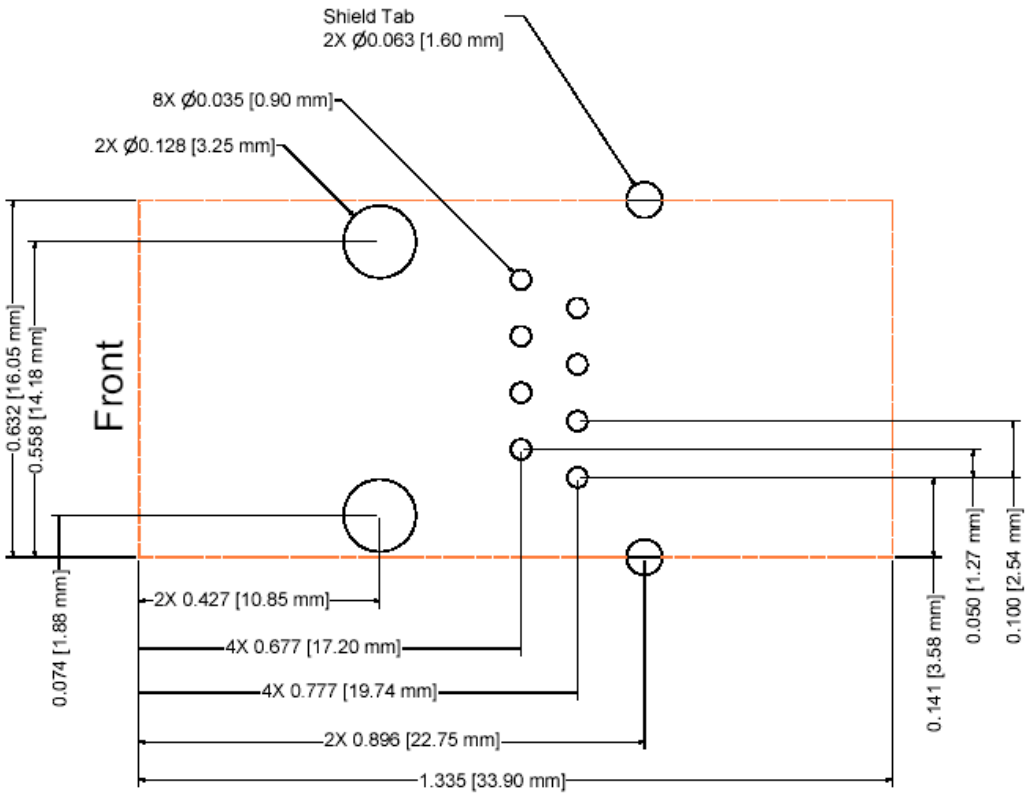
The hole pattern and mounting dimensions for the xPort Pro device server are shown in the following drawing. For proper heat dissipation, it is recommended that the PCB have approximately 1 square inch of copper attached to the shield tabs. The shield tabs are an important source of heat sinking for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

The xPort Pro shield is considered “chassis ground” and should be separate from “signal ground”. ESD near the xPort Pro 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 Pro, it is recommended that the shield not be directly connected to signal GND. The metal shield fingers around the xPort Pro’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 32-bit 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 Pro 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.

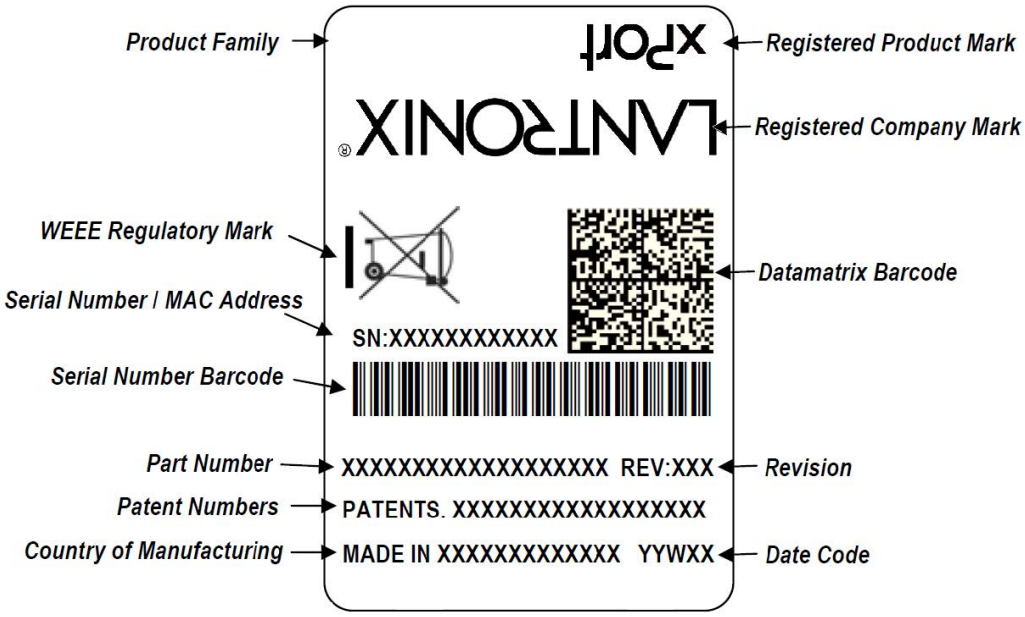
Figure 2-7. PCB Layout



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 2-8. Product Label



Electrical Specifications

***Caution:* Stressing the device above the rating listed in this table may cause permanent damage to the xPort Pro. Exposure to Absolute Maximum Rating conditions for extended periods may affect the xPort Pro's reliability.**

Table 2-4 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units
Supply Voltage	V_{CC}	0	3.6	Vdc
CPx, Reset, Data In, Data Out Voltage	V_{CP}	-0.3	V_{CC} +0.05	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}	3.15	3.3	3.46	Vdc
Supply Voltage Ripples	V_{CC_PP}			2	%
100Base-TX Active (Evolution)	I_{CC}		225	270	mA
100Base-TX Active (Linux)	I_{CC}		200	270	mA
100Base-TX Idle (Evolution)	I_{CC}		215		mA
100Base-TX Idle (Linux)	I_{CC}		175		mA
10Base-T Active (Evolution)	I_{CC}		145	250	mA
10Base-T Active (Linux)	I_{CC}		130	250	mA

Parameter	Symbol	Min	Typical	Max	Units
10Base-T Idle (Evolution)	I_{CC}		130		mA
10Base-T Idle (Linux)	I_{CC}		110		mA
Supply Reset Threshold	V_{RST}	2.85	2.93	3.00	Vdc
CP2, CP3 Pull-ups	R_{PU}		100		Kohm
CP1 Pull-up	R_{PU}		10		Kohm
CPx, RX Input Low Voltage	V_{CP_IL}			0.8	Vdc
CPx, RX Input High Voltage	V_{CP_IH}	2			Vdc
CPx, TX Output Low Voltage (I_{OL} = 4 mA)	V_{CP_OL}			0.4	Vdc
CPx, TX Output High Voltage (I_{OH} = -4 mA)	V_{CP_OH}	V_{CC} -0.4			Vdc

Note: *All pins are not 5V tolerant.*

Functional Specifications

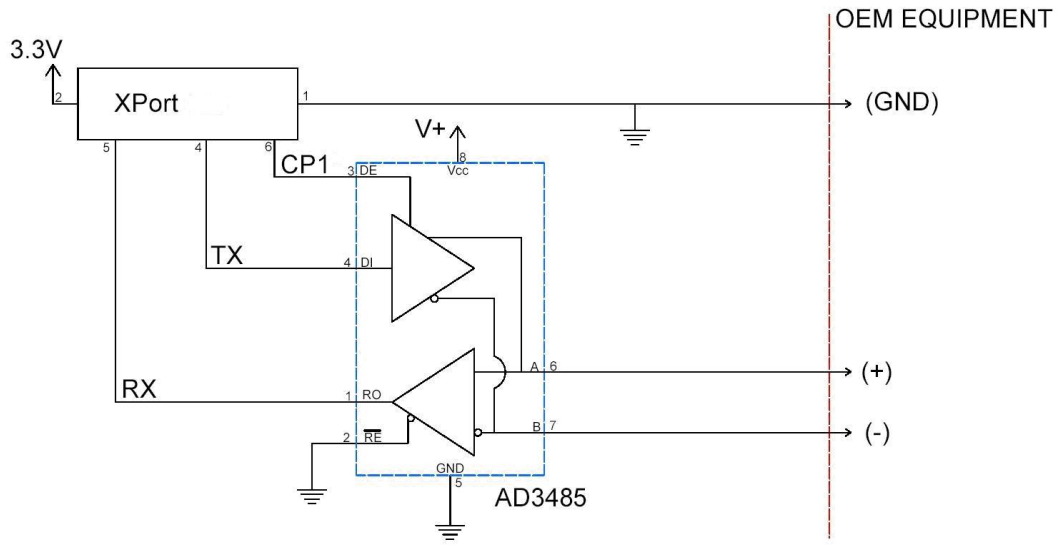
Table 2-6 Technical Specifications

Category	Description
CPU, Memory	Freescale 32-bit Coldfire, 8/16 MB SDRAM (see *Table 2-1*), 16 MB flash,
Firmware	Upgradeable via TFTP, FTP, and serial port
Reset Circuit	Internal 140ms minimum power-up reset pulse. Power-drop reset triggered at 2.95V. External reset input causes an internal 140ms minimum reset.
Serial Interface	CMOS (Asynchronous) 3.3V-level signals Rate is software selectable and customizable: 300 bps to 921600 bps **Note:** *The standard baud rate of 460800 bps is not supported.*
Serial Line Formats	Data bits: 7 or 8 Stop bits: 1 or 2 Parity: odd, even, none
Modem Control	DTR, DCD
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 802.3u
Protocols Supported	ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, FTP, Auto IP, SMTP, HTTPS, and HTTP
LEDs	10Base-T and 100Base-TX Link Activity
Management	Internal web server, SNMP (read only) Serial login, Telnet login, DeviceInstaller utility, SSH
Security	Password protection, locking features, optional Rijndael 256-bit encryption
Internal Web Server	Serves static web pages and Java applets Storage capacity: 1MB
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)
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 Lantronix® DeviceInstaller™ configuration

Category	Description
	software and Windows®-based Com Port Redirector
Compliance	**Regulatory Approvals** ♦ FCC Part 15, Subpart B, Class B ♦ ICES-003 Issue 4 (2004), Class B ♦ EN55022:2006 and EN55024:1998 + A1:2001 + A2:2003 ♦ AS/NZS CISPR22:2006 ♦ VCCI V-3/2009.04 ♦ EN61000-3-2:2006, EN 61000-3-3:1995+A1:2001+A2:2005 ♦ EN61000-4-2 (+/-4kV Contact Discharge, +/-8kV Air Discharge) ♦ EN61000-4-3 (3 V/m (Unmodulated R.M.S.), 80 MHz - 1 GHz, 80% AM (1 kHz)) ♦ EN61000-4-4 (Ethernet Port: ±0.5 kV (Peak), 5 kHz) ♦ EN61000-4-6 (Signal Port(s):3 V (Unmodulated R.M.S), 0.15 MHz - 80 MHz, 80% AM (1 kHz) ♦ EN61000-4-8 (50 Hz, 1.0 A/m (R.M.S.))

A: xPort Pro 485 Connection Diagram

The following example illustrates a connection between the xPort Pro embedded device server and an external transceiver IC:



B: Compliance Information

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

Manufacturer's Name & Contact Information:

Lantronix, Inc.
7535 Irvine Center Drive
Suite 100
Irvine, CA 92618, USA
Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Declares that the following product:

Product Name Models: xPort® Pro Embedded Device Server

xPort® Pro Lx6 Embedded Device Server

Conforms to the following standards or other normative documents:

Electromagnetic Emissions/Immunity:

- FCC Part 15, Subpart B, Class B
- ICES-003 Issue 4 (2004), Class B
- EN55022:2006 and EN55024:1998 + A1:2001 + A2:2003
- AS/NZS CISPR22:2006
- VCCI V-3/2009.04
- EN61000-3-2:2006, EN 61000-3-3:1995+A1:2001+A2:2005
- EN61000-4-2 (+/-4kV Contact Discharge, +/-8kV Air Discharge)
- EN61000-4-3 (3 V/m (Unmodulated R.M.S.), 80 MHz - 1 GHz, 80% AM (1 kHz))
- EN61000-4-4 (Ethernet Port: ±0.5 kV (Peak), 5 kHz)
- EN61000-4-6 (Signal Port(s):3 V (Unmodulated R.M.S), 0.15 MHz - 80 MHz, 80% AM (1 kHz)
- EN61000-4-8 (50 Hz, 1.0 A/m (R.M.S.)

RoHS, REACH and WEEE Compliance Statement

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