



XPort™ Integration Guide

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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.*

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

| Date | Rev. | Comments |
|-------|------|-----------------------------------------------------------|
| 11/03 | A | Initial Release |
| 4/04 | B | Firmware 1.6 features; information to support XPort-03 |
| 6/04 | C | Technical specifications updated |
| 8/04 | D | Firmware 1.8 features; added XPort-485 information |
| 10/04 | E | Removed out of date manual references |
| 3/05 | F | Updated illustration |
| 9/09 | G | Updated for release with the new demo board, and XPort-04 |

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1. Introduction

About the Integration Guide

This guide provides the information needed to test the XPort™ device server on the XPort Evaluation 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, XP1001001-03R, XP1001000M-03R, XP1002000-03R, XP1002001-03R, XP100200S-03R, XP1001000-04R, XP1001001-04R, XP1001000M-04R, XP1002000-04R, XP1002001-04R, and XP100200S-04R.

Additional Documentation

The following guides are available on the product CD and the Lantronix Web site (www.lantronix.com)

| | |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <i>XPort™ 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. |

In addition to this documentation, the supplied CD contains a configurable pins control web applet that lets you view the state of the configurable GPIO pins. This applet is provided in the `Sample Code` and `Solutions` folder.

For firmware versions 1.3 and earlier, the corresponding applet file is `xptcpctl1102.cob`. For later firmware versions (greater than version 1.3), the corresponding applet file is `xpt_gpioctl_154.cob`.

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 quickly and easily go to market with networking and web page serving capabilities built into their products.

The XPort

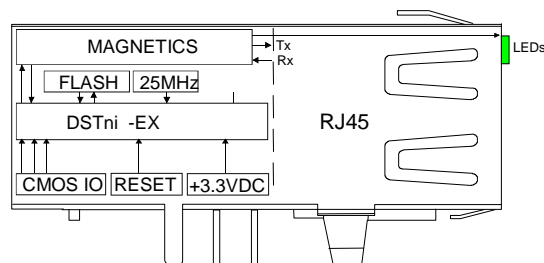
The XPort contains Lantronix's own DSTni controller, with 256 Kbytes of SRAM, 16 Kbytes of boot ROM, and integrated AMD 10/100 PHY.

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).

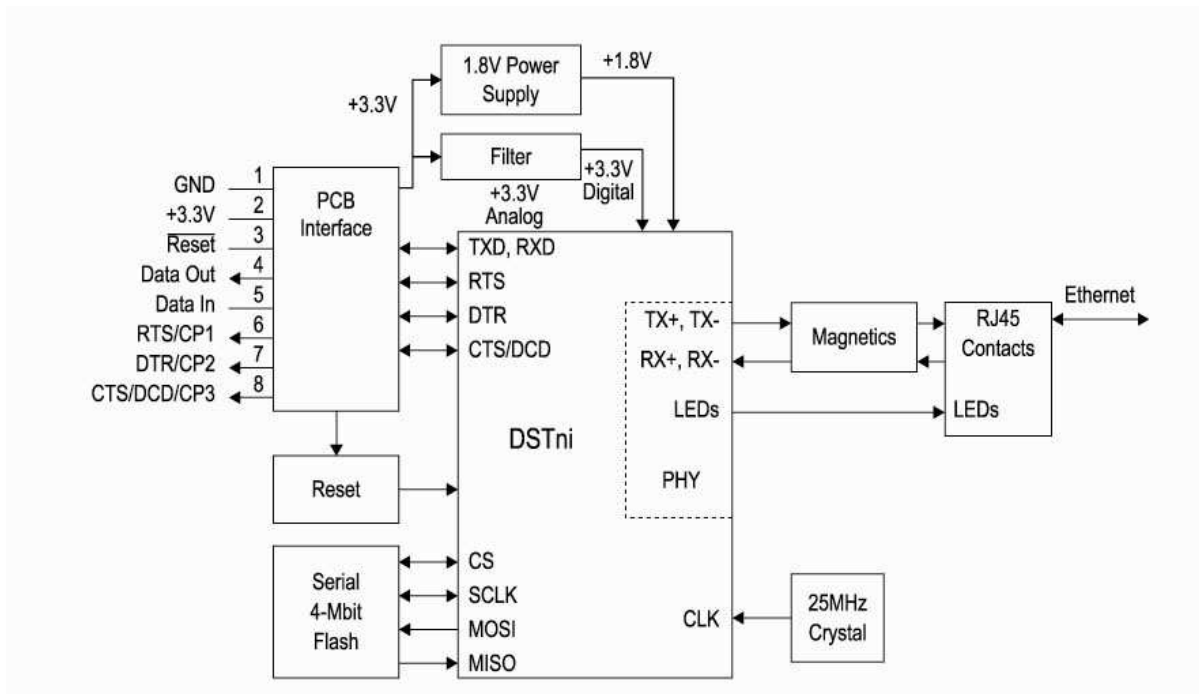
Figure 2-1 Side View of the XPort



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 RS422/485 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) |
| CP1/RTS (Configurable Pin 1) | 6 | CP1 can be configured as follows: <ul style="list-style-type: none"> • 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. |

| Signal Name | XPort Pin # | Primary Function |
|-------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CP2/DTR (Configurable Pin 2) | 7 | CP2 can be configured as follows: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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

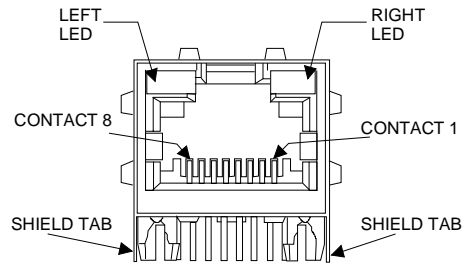


Table 2-3 XPort LED Functions

| Link LED Left Side | |
|-------------------------------|----------------|
| Color | Meaning |
| Off | No Link |
| Amber | 10 Mbps |
| Green | 100 Mbps |

| Activity LED Right Side | |
|------------------------------------|----------------|
| Color | Meaning |
| Off | No Activity |
| Amber | Half Duplex |
| Green | Full Duplex |

Dimensions

The XPort dimensions are shown in the following drawings.

Figure 2-4 Front View

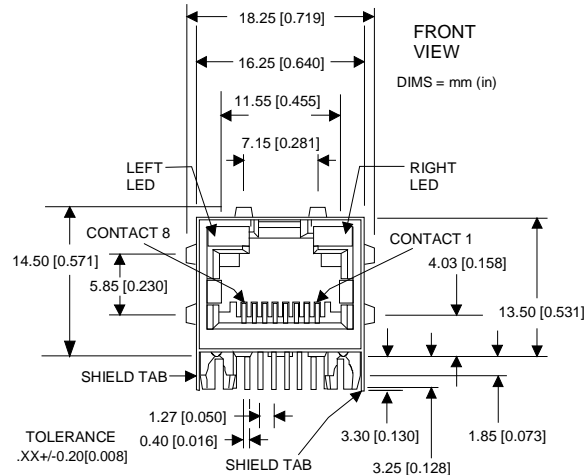


Figure 2-5 Bottom View

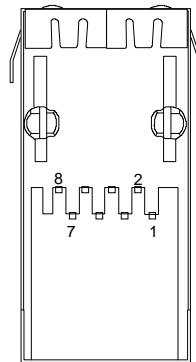
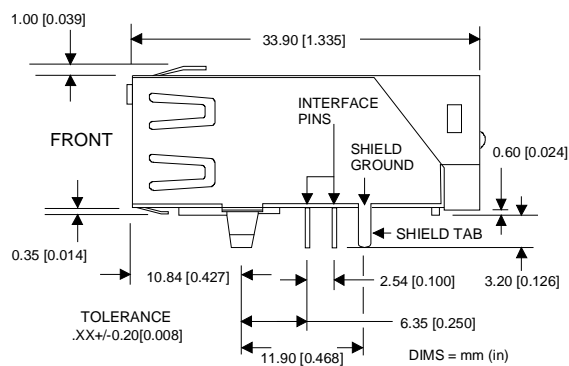


Figure 2-6 Side View



Recommended PCB Layout

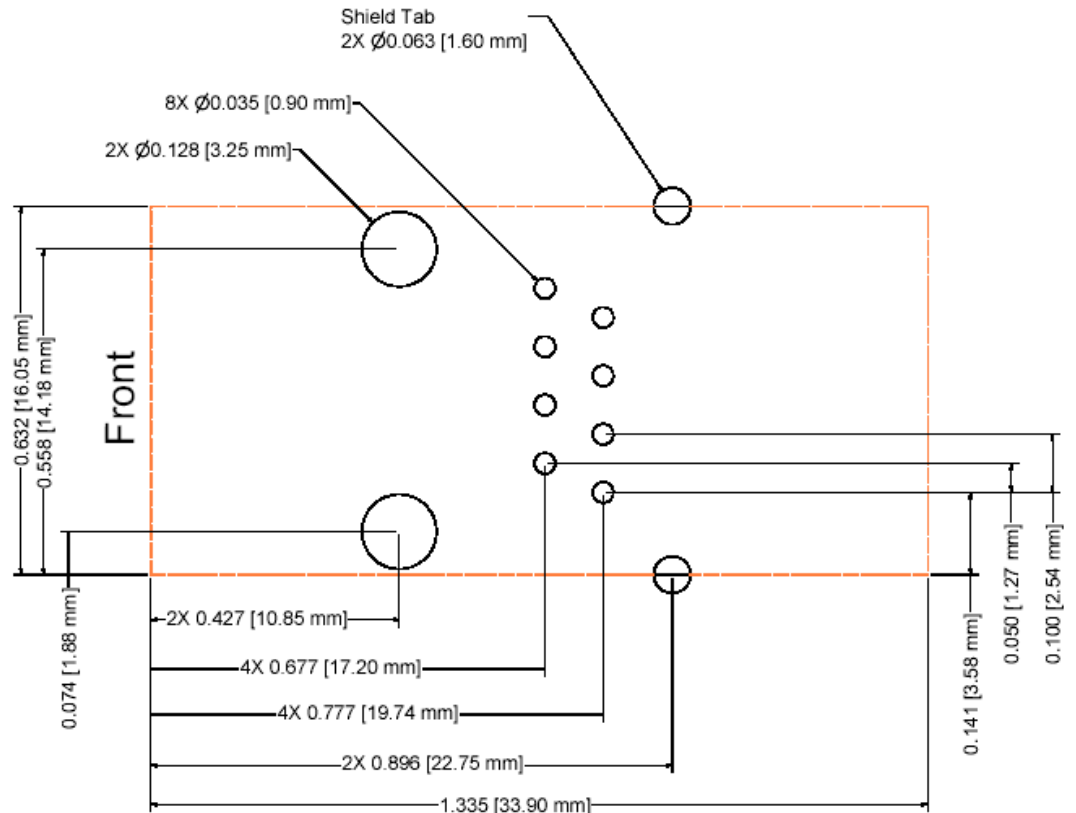
The hole pattern and mounting dimensions for the XPort device server are shown in the following drawing. For proper heat dissipation, it is recommended that the PCB have approximately 1 square inch of copper attached to the shield tabs. The shield tabs are an important source of heat sinking for the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



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 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} | 3.15 | 3.3 | 3.46 | Vdc |
| Supply Voltage Ripples | V_{CC_PP} | | | 2 | % |
| 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} | 1.4 | | 3.6 | Vdc |
| CPx, RX Input Low Voltage | V_{CP_IL} | | | 0.8 | Vdc |
| CPx, RX Input High Voltage | V_{CP_IH} | 2 | | 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 |

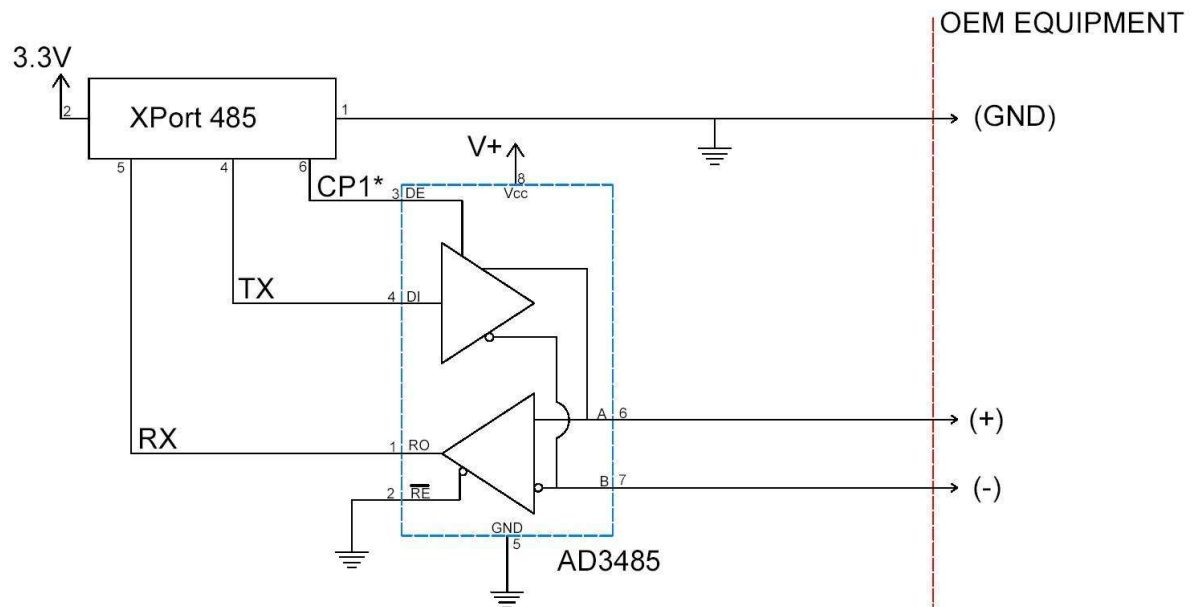
Technical Specifications

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 |

A: RS422/485 Connection Diagram

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



* Any one of CP1, CP2 or CP3 can be used to control the TX enable.

B: Compliance

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

Manufacturer's Name & Address:

Lantronix 15353 Barranca Parkway, 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/CSP1R22: 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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RoHS Notice:

All Lantronix products in the following families are China RoHS-compliant and free of the following hazardous substances and elements:

- Lead (Pb)
- Cadmium (Cd)
- Mercury (Hg)
- Hexavalent Chromium (Cr (VI))
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)

| Product Family Name | Toxic or hazardous Substances and Elements | | | | | |
|------------------------|--------------------------------------------|--------------|--------------|-------------------------------|--------------------------------|---------------------------------------|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Hexavalent Chromium (Cr (VI)) | Polybrominated biphenyls (PBB) | Polybrominated diphenyl ethers (PBDE) |
| UDS1100 and 2100 | 0 | 0 | 0 | 0 | 0 | 0 |
| EDS | 0 | 0 | 0 | 0 | 0 | 0 |
| MSS100 | 0 | 0 | 0 | 0 | 0 | 0 |
| IntelliBox | 0 | 0 | 0 | 0 | 0 | 0 |
| XPress DR & XPress-DR+ | 0 | 0 | 0 | 0 | 0 | 0 |
| SecureBox 1101 & 2101 | 0 | 0 | 0 | 0 | 0 | 0 |
| WiBox | 0 | 0 | 0 | 0 | 0 | 0 |
| UBox | 0 | 0 | 0 | 0 | 0 | 0 |
| MatchPort | 0 | 0 | 0 | 0 | 0 | 0 |
| SLC | 0 | 0 | 0 | 0 | 0 | 0 |
| XPort | 0 | 0 | 0 | 0 | 0 | 0 |
| WiPort | 0 | 0 | 0 | 0 | 0 | 0 |
| SLB | 0 | 0 | 0 | 0 | 0 | 0 |
| SLP | 0 | 0 | 0 | 0 | 0 | 0 |
| SCS | 0 | 0 | 0 | 0 | 0 | 0 |
| SLS | 0 | 0 | 0 | 0 | 0 | 0 |
| DSC | 0 | 0 | 0 | 0 | 0 | 0 |

O: toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

C: Warranty

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