

WiPort™ NR



WiPort NR™ Integration Guide

Part Number 900-436
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Disclaimer and Revisions



This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the 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 the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- ◆ Reorient or relocate the receiving antenna.
- ◆ Increase the separation between the equipment and receiver.
- ◆ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- ◆ Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device is intended only for OEM Integrators.

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1: Introduction

About the Integration Guide

This guide provides the information needed to integrate the WiPort NR device server within another product. The intended audiences are the engineers responsible for integrating the WiPort NR into their product.

Additional Documentation

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

***WiPort™ Evaluation Kit
Quick Start Guide***

Briefly explains the basics to get the WiPort and WiPort NR up and running.

WiPort NR™ User Guide

Provides information needed to configure, use, and update the WiPort NR firmware.

2: Description and Specifications

The WiPort NR embedded device server allows Original Equipment Manufacturers (OEMs) to add network connectivity to their products by incorporating it onto a circuit board with minimal engineering.

The WiPort NR functions independently of a PC, providing an integrated solution that combines a processor, memory, and dual high-speed serial ports into a single compact module. It includes an operating system, an embedded Web server, and a full TCP/IP protocol stack. In addition, the WiPort NR sends email alerts and supports numerous other network communication protocols, including ARP, UDP, TCP, ICMP, Telnet, AutoIP, DHCP, HTTP and SNMP.

WiPort NR Overview

The WiPort NR contains Lantronix's own DSTni controller with 256 Kbytes of internal zero wait state SRAM, 16 Kbytes of boot ROM, and integrated 10/100 PHY.

The WiPort NR also contains the following:

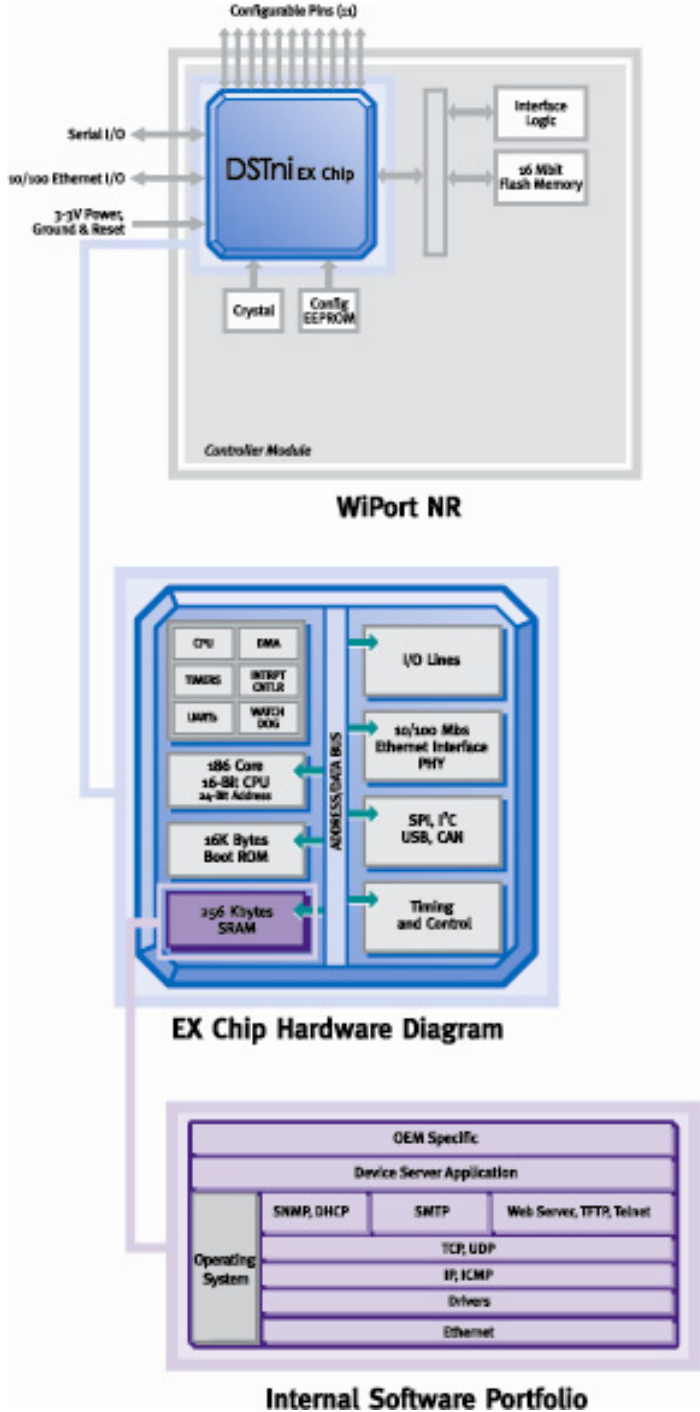
- ◆ Two 3.3-volt v24 serial interfaces (5V tolerant)
- ◆ Up to 921600 Baud
- ◆ 16 or 32Mbit flash memory (with optional additional 8Mbit SRAM)
- ◆ 48 MHz clock
- ◆ 11 configurable pins
- ◆ 10/100 Ethernet interface

The WiPort NR requires +3.3-volt power and is designed to operate within a temperature range of -30°C to +70°C.

WiPort NR Block Diagram

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

Figure 2-1. WiPort NR Block Diagram



PCB Interface

Table 2-1. PCB Interface Signals

Pin Number	WiPort NR Pin Function	Notes
1	3.3V Power	Supply input
2	3.3V Power	Supply input
3	RTS0	Request “to send” hardware flow control output (logic level), serial port 0
4	TXD0	Transmit data output (logic level), serial port 0
5	RXD0	Receive data input (logic level), serial port 0
6	CP2	Configurable pin
7	CP3	Configurable pin.
8	CTS0	Clear “to send” hardware flow control input (logic level), serial port 0
9	CP10	Configurable pin
10	CP8	Configurable pin
11	Signal Ground	
12	Signal Ground	
13	Reset In	Resets the WiPort NR unit. Reset In is low active. Minimum reset pulse width is 2ms at IIL = -500 μ A
14	CP0	Configurable pin
15	RTS1	Request “to send” hardware flow control output (logic level), serial port 1
16	TXD1	Transmit data output (logic level), serial port 1
17	RXD1	Receive data input (logic level), serial port 1
18	CP9	Configurable pin
19	CP4	Configurable pin
20	CTS1	Clear “to send” hardware flow control input (logic level), serial port 1
21	Reserved	Reserved for future use
22	Reserved	Reserved for future use
23	Signal Ground	
24	Signal Ground	
25	Reserved	Reserved for future use
26	Reserved	Reserved for future use
27	Ethernet Status LED2	Ethernet activity
28	Ethernet Status LED1	Ethernet link
29	Ethernet TX-	Output
30	Ethernet TX+	Output
31	Ethernet RX Center Tap	
32	Ethernet TX Center Tap	
33	Ethernet RX-	Input

Pin Number	WiPort NR Pin Function	Notes
34	Ethernet RX+	Input
35	CP1	Configurable pin
36	WLAN Power LED	Not applicable to WiPort NR.
37	CP6	Configurable pin
38	CP5	Configurable pin.
39	WLAN Activity LED	Not applicable to WiPort NR.
40	CP7	Configurable pin

Note: For all the configurable pins, see the WiPort NR User Guide for selectable functions.

Mating Connector

Table 2-2. Mating Connectors

Mating Connector	Description
Recommended: Samtec FTMH-120-03-F-DV-ES (shrouded header)	The mating connector is a 1mm micro header, 40 pins, 2 x 20.
Alternative: Samtec FTMH-120-03-F-DV (not shrouded)	
Alternative: Oupin 2411-2X20GDN/017 (not shrouded)	

Serial Input/Output

The unit has two serial ports compatible with V24 serial standards at data rates up to 921Kbps. The serial I/O signals are 3.3V CMOS logic level and pins are 5V tolerant. Serial signals connect to an internal device, such as a UART. For evaluation and prototype work, it is convenient to have an external RS-232 interface that can connect to the serial port on a PC. The WiPort NR Evaluation Board has one RS-232 and one RS-232/422/485 transceiver (level shifters) to implement this external interface.

If desired, use the CPs to create a DTE or DCE-style interface using any 3 available CPs. To create these interfaces, connect the signals according to [Table 2-3](#) and [Table 2-4](#).

Note: CPx, CPy, and CPz are any of the available CPs.

Table 2-3. Channel 1 Connections

WiPort NR		DCE Connector			DTE Connector		
Signal	Description	DB9	DB25	Signal	DB9	DB25	Signal
RXD0	Data In	2	3	RXD0	3	2	TXD0
TXD0	Data Out	3	2	TXD0	2	3	RXD0
RTS0	H/W Flow Control Output	7	4	RTS0	8	5	CTS0
CTS0	H/W Flow Control Input	8	5	CTS0	7	4	RTS0
CPx	Modem Control Input	1	8	DCD	4	20	DTR
CPy	Modem Control Output	4	20	DTR	1	8	DCD
CPz	LED						

Table 2-4. Channel 2 Connections

WiPort NR		DCE Connector			DTE Connector		
Signal	Description	DB9	DB25	Signal	DB9	DB25	Signal
RXD1	Data In	2	3	RXD0	3	2	TXD1
TXD1	Data Out	3	2	TXD0	2	3	RXD1
RTS1	H/W Flow Control Output	7	4	RTS0	8	5	CTS1
CTS1	H/W Flow Control Input	8	5	CTS0	7	4	RTS1
CPx	Modem Control Input	1	8	DCD	4	20	DTR
CPy	Modem Control Output	4	20	DTR	1	8	DCD
CPz	LED						

Table 2-5. RS-422/485 4-Wire Connections

WiPort NR Signal	Description	DB25 Pinout	DB9 Pinout
TX+	TX+	14	7
TX-	TX-	15	3
RX+	RX+	21	2
RX-	RX-	22	8
RTS	TX Enable		
CPx	RS-485 Select		
CPy	RS-485 2-wire		
CPz	RS-485 4-wire		

Table 2-6. RS-485 2-Wire Connections

WiPort NR Signal	Description	DB25 Pinout	DB9 Pinout
TX+/RX+	TX+/RX+	14	7
TX-/RX-	TX-/RX-	15	3
RTS	TX Enable		
CPx	RS-485 Select		
CPy	RS-485 2-wire		
CPz	RS-485 4-wire		

Sample Layouts for RS-485 Connectivity

Figure 2-2. Combined RS-232/422 Transceiver

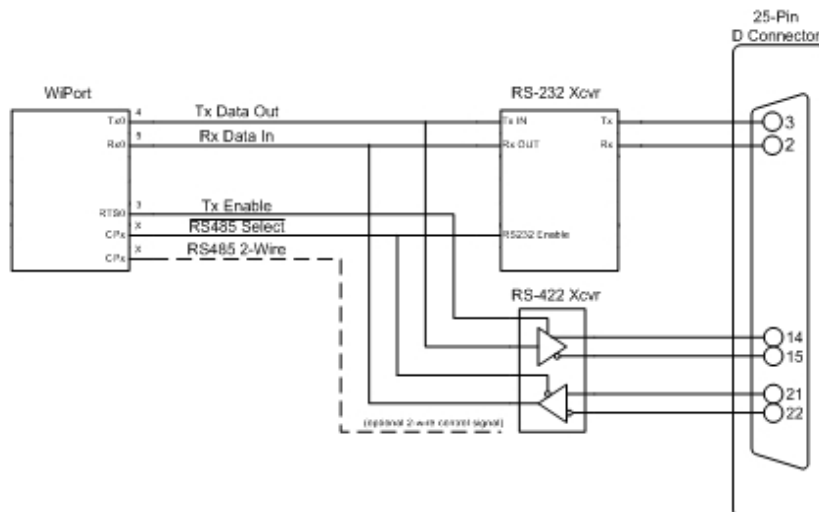


Figure 2-3. Separate RS-232/422 Transceivers

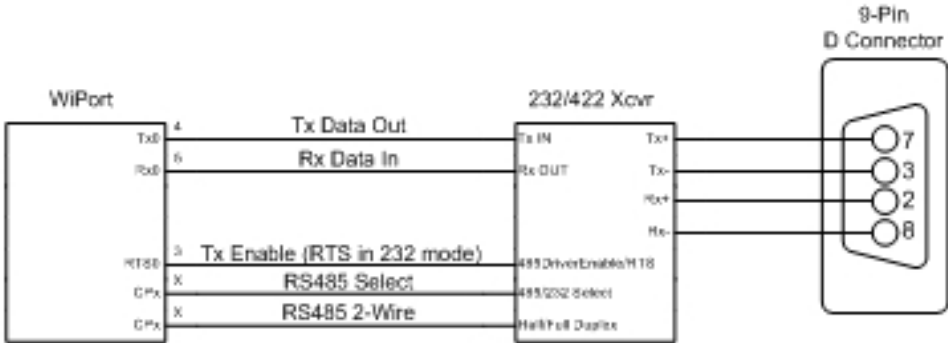
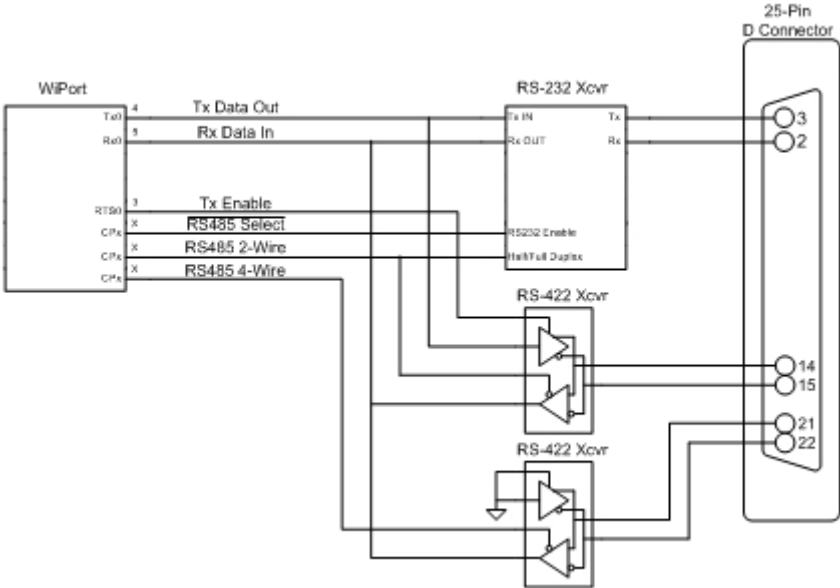


Figure 2-4. Separate RS-422 Transceivers for 2-Wire and 4-Wire Setups



Ethernet Input/Output

The following table displays the Ethernet input and output functions.

Table 2-7. Ethernet Signals

Pin Number	Pin Function
	<i>Ethernet</i>
30	TX+
29	TX-
32	TX Center Tap
34	RX+
33	RX-
31	RX Center Tap
28	Status LED1
27	Status LED2

Ethernet communication lines connect to external magnetics and an external RJ-45 jack. They are used for the creation of an Ethernet.

Ethernet Link LED 1 can be used to drive an external LED. The LED is on when a link exists.

Ethernet Activity LED 2 is also used to drive an external LED. The LED blinks when activity is present.

Power, Ground, and Reset

Table 2-8. Power, Ground, and Reset Pins

Power	Ground	Reset
Pin 1	Pin 11	Pin 13
Pin 2	Pin 12	
	Pin 23	
	Pin 24	

Driving the Reset In line low resets the WiPort NR. Minimum reset pulse width is 2ms at IIL = -500uA

Absolute Maximum Ratings

Table 2-9. Absolute Maximum Ratings

Parameter	Min	Max	Units
Supply Voltage	3.0	3.6	V
Input Voltage	-0.5	6	V
Output Voltage	-0.5	6	V
Operating Temperature	-30	70	°C
Storage Temperature	-40	85	°C

Recommended Operating Conditions

The following table illustrates the optimal and recommended operating conditions for the WiPort NR device.

Table 2-10. Operating Conditions, Serial Ports, & Configurable Pins

Parameter	Min	Typical	Max	Units
Supply Voltage	3.135	3.3	3.45	V
Voltage Ripple			2	%
VIL Input Low Voltage*	-0.3		0.8	V
VIH Input High Voltage*	2		5.5	V
II Input Leakage Current*		+/- 10 nA	+/- 1 µA	
VOL Output Low Voltage @ IOL max*			0.4	V
VOH Output High Voltage @ IOH max*	2.4			V
TXD0, RTS0, TXD1, RTS1 IOL Low Level Output Current @ VOL 0.4V	2.2	3.5	4.3	mA
CP0-CP10 Low Level Output Current @VOL 0.4V	4.4	7.1	8.5	mA
TXD0, RTS0, TXD1, RTS1 IOH High Level Output Current @ VOH 2.4V	-3.2	-6.4	-10.0	mA
CP0-CP10 IOH High Level Output Current @ VOH 2.4V	-6.4	-12.8	-20.0	mA

* For UART and CP pins

Ethernet PHY Receiver Input Characteristics (RX+, RX-)

Table 2-11. Ethernet Input Characteristics

Parameter	Specification	Units	Comments
Full Scale Input Voltage	3.0 differential pk-to-pk	V	
Input Common Mode	1.6 – 2.0	V	Gain dependent

100Base-TX Transceiver Characteristics (TX+, TX-)

The following table displays the 100Base-TX transceiver characteristics.

Table 2-12. 100Base-TX Transceiver Attributes

Parameter	Sym	Min	Typical	Max	Units
Peak Differential Output Voltage	VP	0.95		1.05	V
100M TX mid-level		-50		50	mV
Signal Amplitude Symmetry	VSS	98		102	%
Signal Rise/Fall Time	TRF	3.0		5.0	ns
Rise/Fall Time Symmetry	TRFS			0.5	ns
Duty Cycle Distortion	DCD	35	50	65	%
Overshot/Undershot	VOS			5	%
Jitter (measured differentially)				1.4	ns
Ethernet LED1, LED2 current		8.8	14.1	17.0	mA

Technical Specifications

Table 2-13. Technical Specifications

Category	
CPU, Memory	Lantronix DSTni-EX 186 CPU, 256 KB zero wait state SRAM 2048 KB Flash or 4096 KB Flash, 16 KB Boot ROM, 1024 KB SRAM
Firmware	Upgradeable via TFTP and serial port
Reset Circuit	Reset In is low active. Minimum reset pulse width is 2 ms at IIL = -500 μ A
Serial Interface	CMOS (Asynchronous) 3.3V - level signals Speed software selectable (300 bps to 921600 bps)
Serial Line Formats	7 or 8 data bits, 1-2 Stop bits, Parity: odd, even, none
Modem Control	DTR, DCD
Flow Control	XON/XOFF (software), CTS/RTS (hardware), none
Network Interface	10/100 Ethernet
Protocols Supported	ARP, UDP, TCP, Telnet, ICMP, SNMP, DHCP, BOOTP, Auto IP, HTTP, SMTP, TFTP
Management	Internal web server, SNMP (read only) Serial login, Telnet login, DeviceInstaller software
Internal Web Server	Serves web pages WEB storage capacity: 1.2 MB (or 3.2 MB)
Average Power Consumption (at 3.3V)	750 mW (Regular performance. No data transfer.)
Peak Supply Current (at 3.3V)	420 mA
Security	Password protection, locking features

Category	
Weight	29 grams
Material	Metal shell
Temperature	Operating range: -30°C to +70°C Storage range: -40°C to +85°C (-40°F to 185°F)
Warranty	2-year limited warranty
Included Software	Windows™ 98/NT/2000/XP based Device Installer configuration software and Windows™ based Comm Port Redirector, DeviceInstaller, Web-Manager.

Dimensions

The WiPort NR dimensions are shown in the following diagrams:

Figure 2-5. Side Views

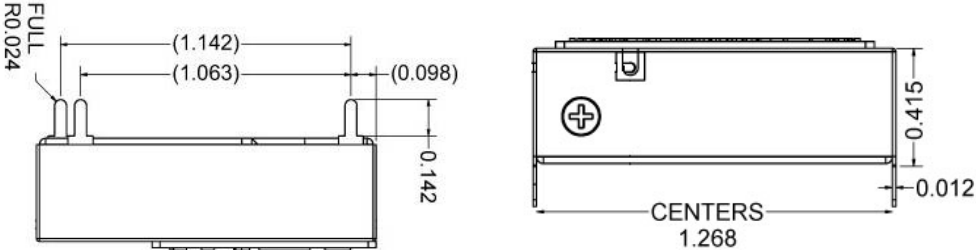
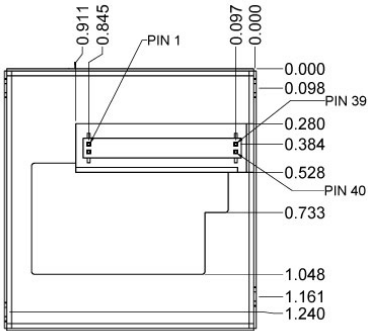


Figure 2-6. Top View



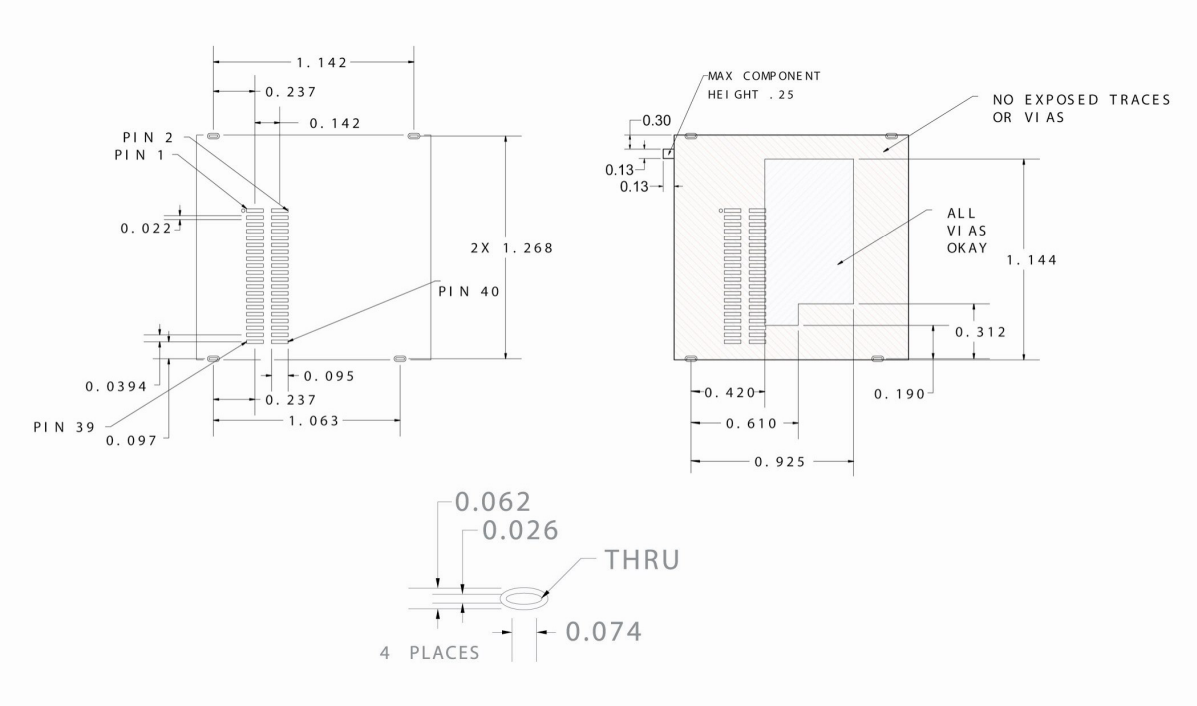
Figure 2-7. Bottom View



Recommended PCB Layout

The hole pattern and mounting dimensions for the WiPort NR device server are shown in the following drawing:

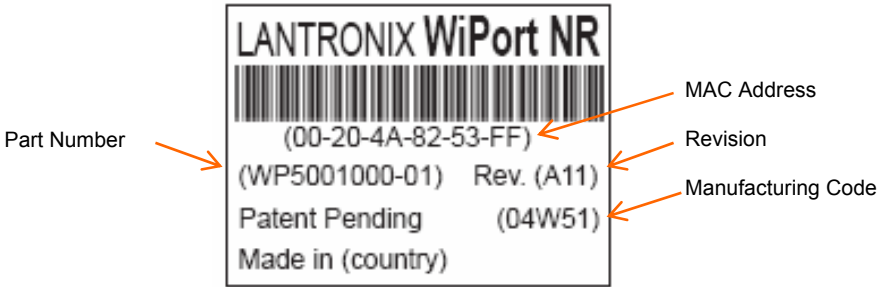
Figure 2-8. PCB Layout



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 MAC address.

Figure 2-9. Product Label



3: Development Kit

The WiPort Development Kit includes everything needed to begin to integrate the WiPort NR into a given product design.

Evaluation Board Description

The WiPort Evaluation Board provides a test platform for the Lantronix WiPort NR device server. It supplies 3.3V power. The WiPort Evaluation Board provides access to all signals to and from the WiPort NR device server. For connecting to an external device, the Evaluation Board two serial ports (DTE).

An on-board Complex Programmable Logic Device (CPLD) drives status LEDs and configures external connections.

Serial Interfaces

The WiPort NR serial interfaces are 3.3V logic level and typically connected to a Universal Asynchronous Receiver/Transmitter (UART). For connection to an external device, the evaluation board has RS-232 and RS-232/422/485 transceivers. Port 0 supports RS-232. Port 1 (channel 2) supports RS-232/485. Connect to a PC using a null-modem serial cable with 9-pin connectors (F/F).

The table below lists the RS-232 signals and corresponding pins on the WiPort NR. Note that the WiPort NR data and hardware flow control signals are actually buffered by the evaluation board CPLD. All signals are level-shifted by the RS-232 transceivers.

Table 3-1. RS-232 Signals

WiPort NR PIN FUNCTION	DB9 Pin #
UART 0	Con2
TXD0 (Data Out)	3
RXD0 (Data In)	2
CTS0 (HW Flow Control Input)	8
RTS0 (HW Flow Control Output)	7
DCD0 (Modem Control Input)	1
DTR0 (Modem Control Output)	4
UART 1	Con1
TXD1 (Data Out)	3
RXD1 (Data In)	2
CTS1 (HW Flow Control Input)	8
RTS1 (HW Flow Control Output)	7
DCD1 (Modem Control Input)	1
DTR1 (Modem Control Output)	4

Table 3-2. Channel 2 RS-485 4-Wire Connector

WiPort NR Signal	Description	DB9 Pin Number
TX+	Data Out	7
TX-	Data Out	3
RX+	Data In	2
RX-	Data In	8

Table 3-3. Channel 2 RS-485 2-Wire Connector

WiPort NR Signal	Description	DB9 Pin Number
TX+/RX+	Data Out/In	7
TX-/RX-	Data Out/In	3

Power Supply

The evaluation board uses an external 3.3V regulated supply (included with kit). The evaluation board contains additional filtering and protection.

General Control PLD

The following table denotes the configuration of the evaluation board. Configuring the jumper re-routes the signals on the evaluation board as required for a given product. This also drives the LEDs.

Configuration Switch Bank

Table 3-4. Jumper Configurations

Jumpers	Details
JP1 in and JP2 in	CP10 and CP4 connected to RS-232 transceiver; can function as DTR1 and DCD1.
JP1 in and JP2 in JP1 out and JP2 out	CP10 and CP4 not connected to RS-232 transceiver; can function as general purpose I/O pins.
JP5 in and JP6 in	CP2 and CP3 connected to RS-232 transceiver; function as DTR0 and DCD0.
JP5 out and JP6 out	CP2 and CP3 not connected to RS-232 transceiver; can function as general purpose I/O pins.
JP3 in	CP0 connected to RS232/RS485 select
JP4 in	CP1 connected to RS485 2-wire/4-wire select
JP7 out and JP8 out	WiPort NR serial ports connected to RS-232 transceivers.
JP7 (Mode 0) In JP8 (Mode 1) Out	WiPort NR serial ports not connected to RS-232 transceivers. WiPort NR serial ports 0 and 1 are connected directly to each other through the PLD. Can be used for loopback tests.

Note: Other JP7, JP8 jumper configurations are not recognized by the CPLD at this time.

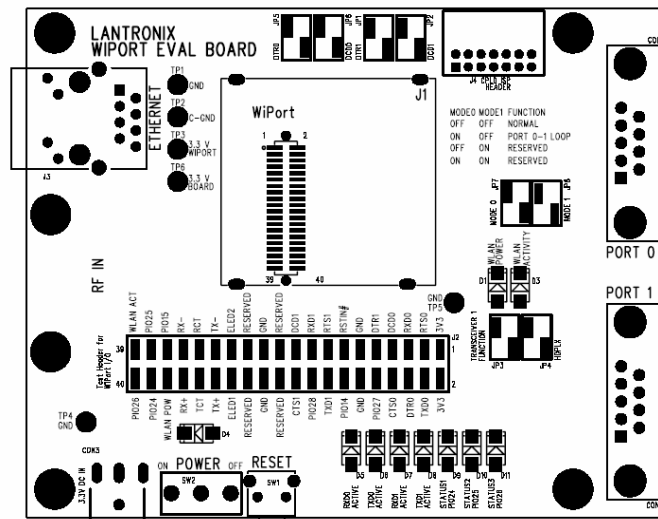
If using CPs for any combination of the above evaluation board configurations, please use the appropriate CP function selection as shown in the following table:

Table 3-5. Configurable Pin Configurations

Configurable Pin	Function
CP0	RS-485 Select
CP1	RS-485 2-Wire (Half Duplex)
CP2	Modem Ctrl Out, Channel 1
CP3	Modem Ctrl In, Channel 1
CP4	Modem Ctrl In, Channel 2
CP5	Serial Status LED Out, Channel 1
CP6	Serial Status LED Out, Channel 2
CP7	Diagnostics LED
CP8	General Purpose Input/Output (GPIO)
CP9	GPIO
CP10	Modem Ctrl Out, Channel 2

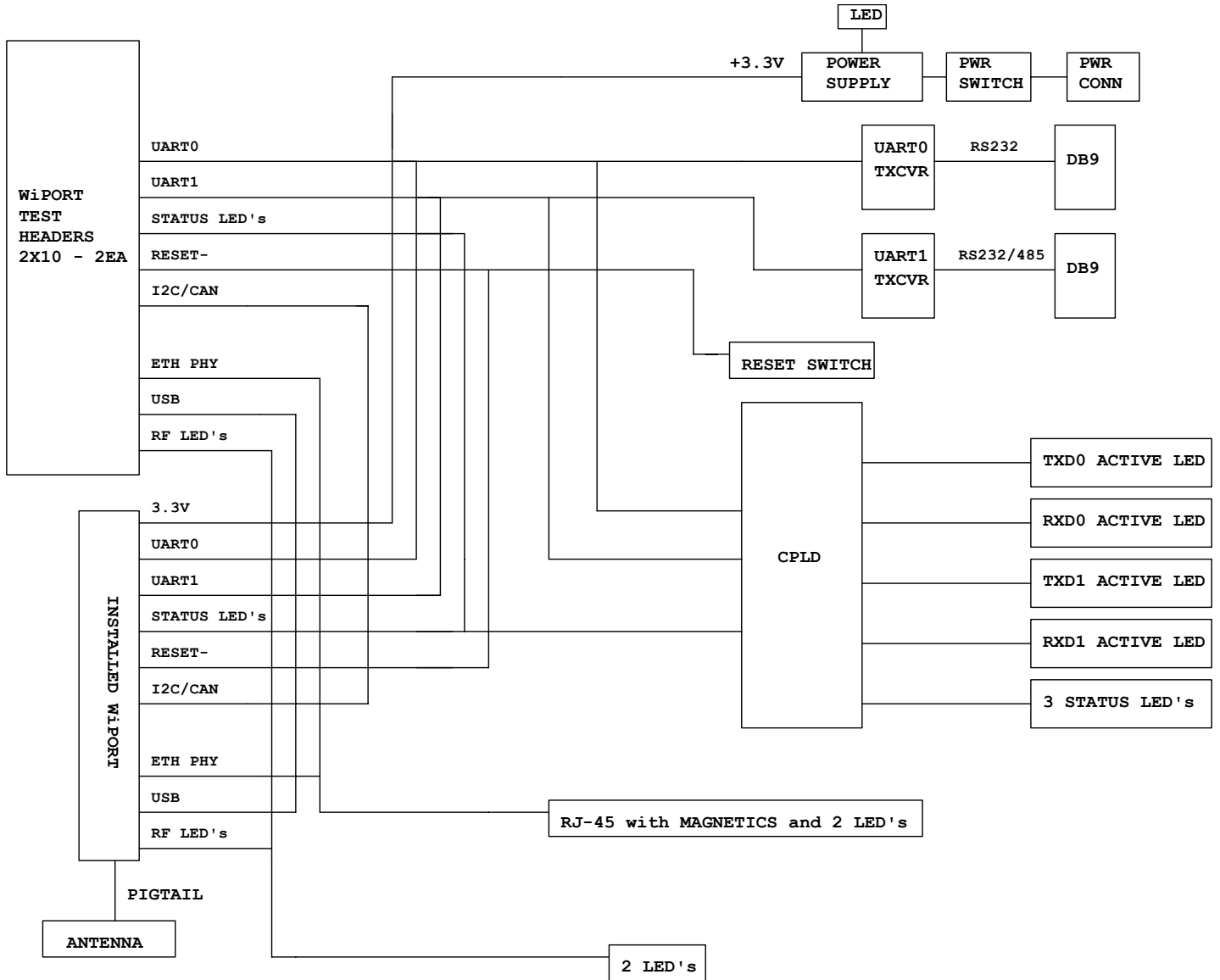
Evaluation Board Layout

Figure 3-1. WiPort Evaluation Board Layout

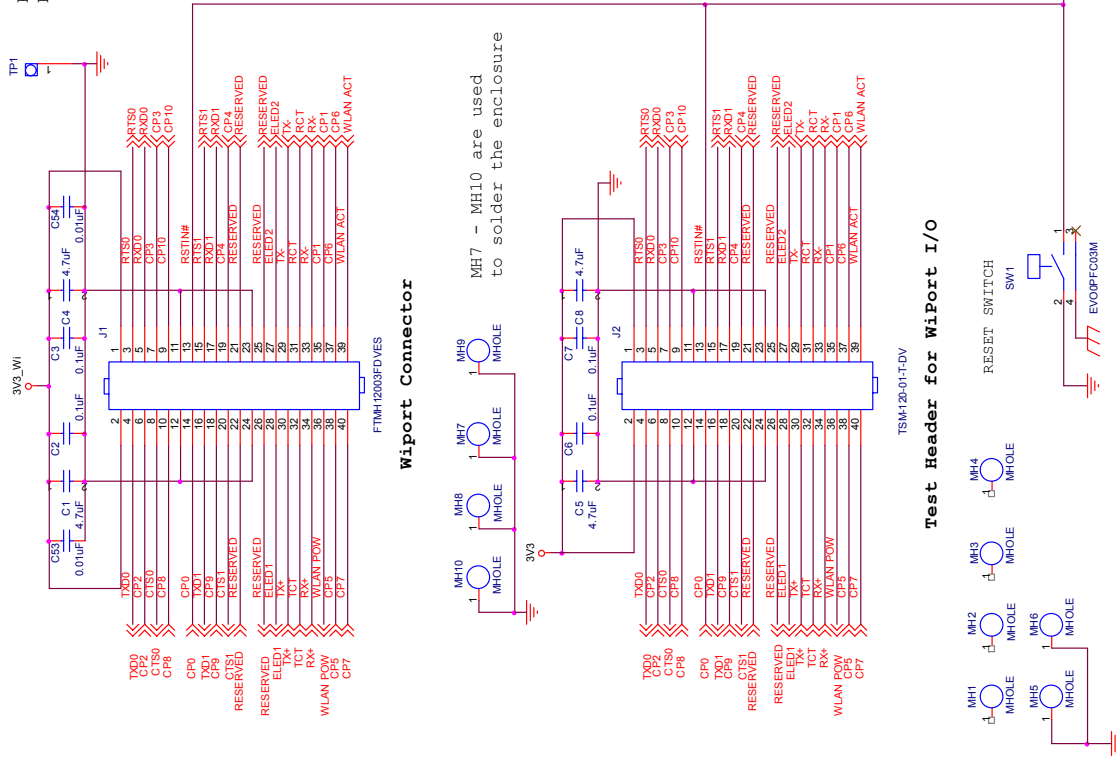


Evaluation Board Schematics

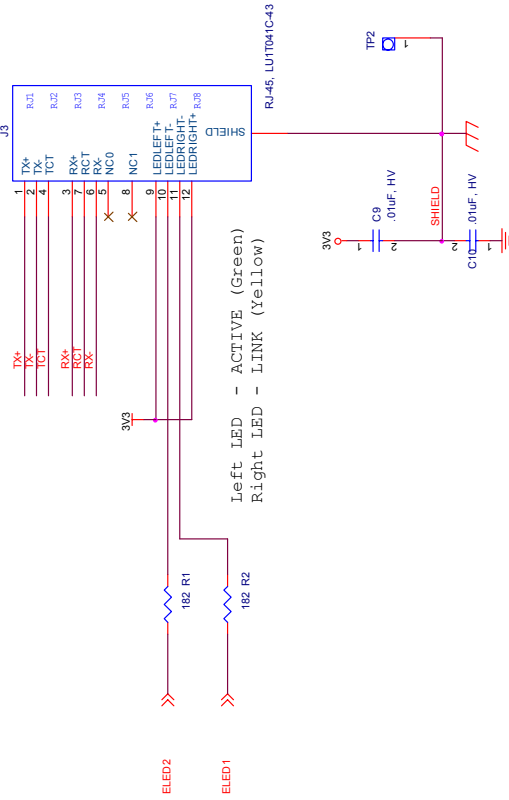
Figure 3-2. Evaluation Board Schematics

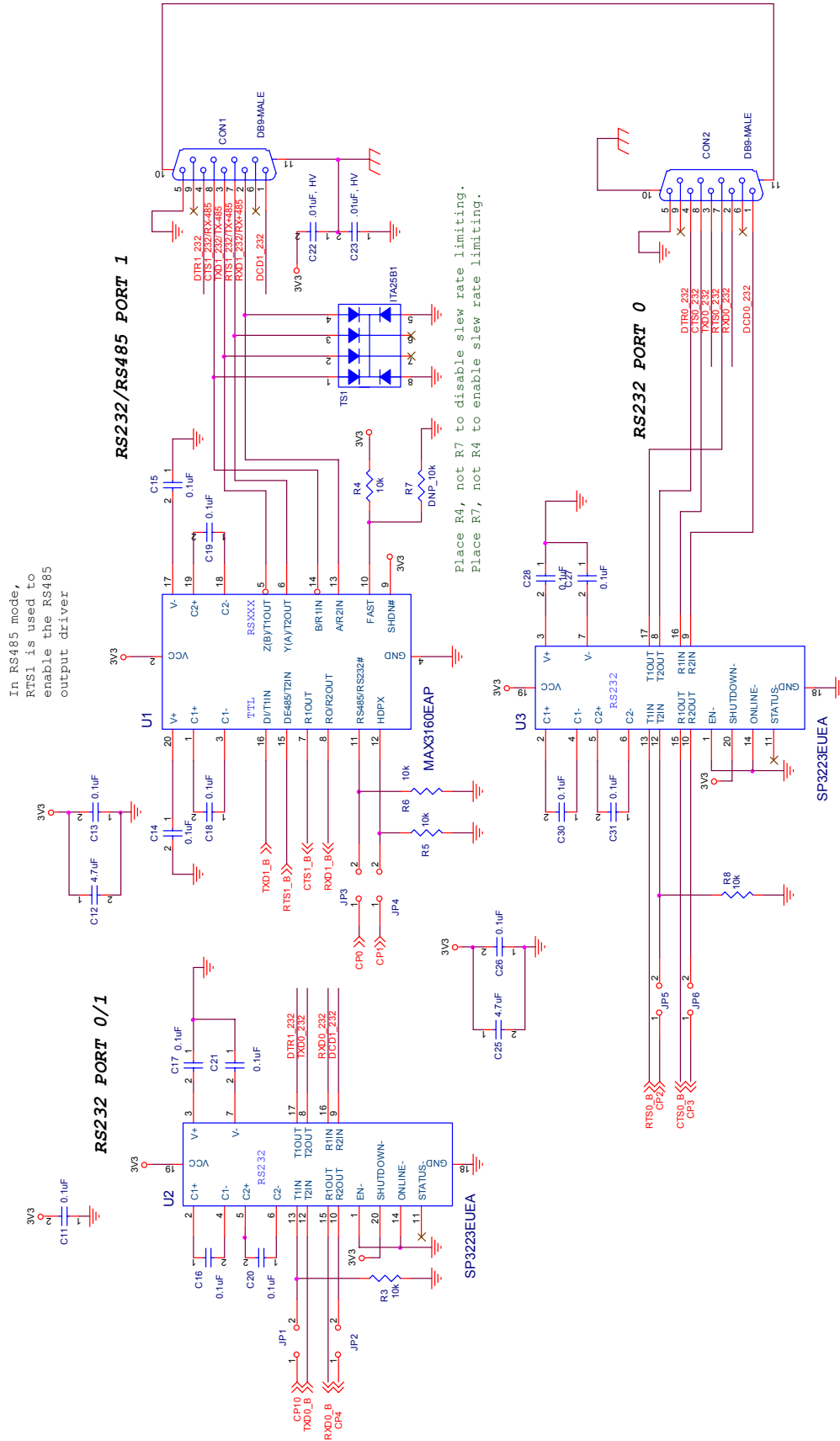


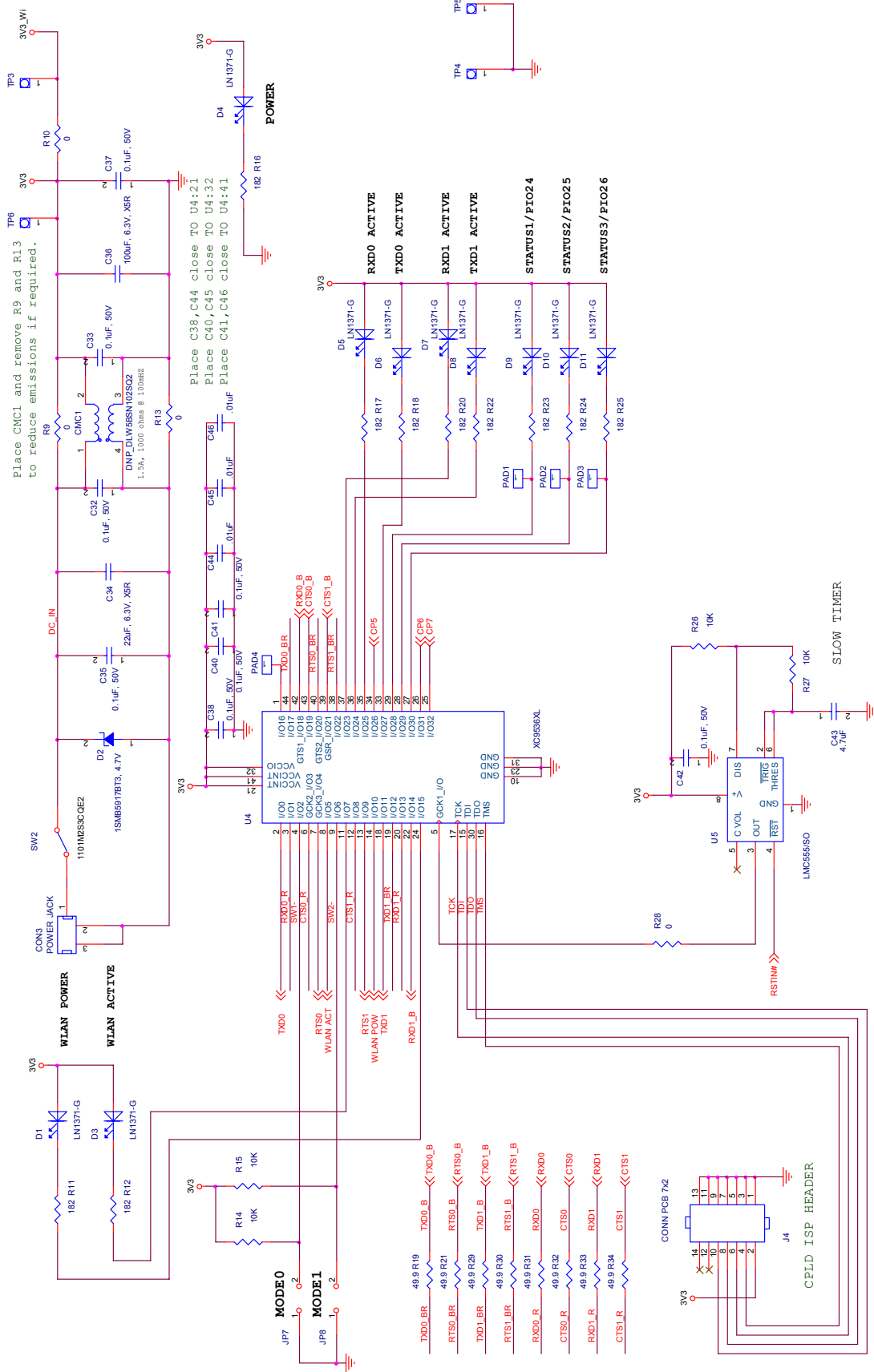
Place C1, C2, C53 close to J1 pin 1
Place C3, C4, C54 close to J1 pin 2



Ethernet RJ-45







A: Compliance and Warranty Information

Compliance Information

(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: WiPort NR Embedded Device Server

Conforms to the following standards or other normative documents:

Safety:

UL 60950:2003

CAN/CSA-C22.2 No. 60950:2003

EN 60950:2003 +A1-A4, A11 , Low Voltage Directive (73/23/EEC)

EMC:

For purposes of certification, the WiPort NR was installed in a standard box (the Lantronix WiBox™).

CFR Title 47 FCC Part 15, Subpart 15, Class B

Industry Canada ICES-003 Issue 4 (2004), Class B

EN 301 489-1 v1.4.1 (2002-08) , EMC Directive (89/336/EEC)

EN 301 489-17 v.1.2.1 (2002-08) , EMC Directive (89/336/EEC)

EN 300 328 v1.4.1 (2003-04), R&TTE Directive (1999/5/EC)

Australia / New Zealand AS/NZS CISPR 22 (2002), Class B

Australia / New Zealand AS/NZS 4771 (2000 + A1:2003)

Japan VCCI (EMC emissions)

CISPR 22 (2003)

CISPR 24 (A2:2002)

Warranty

Lantronix warrants each Lantronix product to be free from defects in material and workmanship for a period of TWO YEARS. During this period, if a customer is unable to resolve a product problem with Lantronix Technical Support, a Return Material Authorization (RMA) will be issued. Following receipt of a RMA number, the customer shall return the product to Lantronix, freight prepaid. Upon verification of warranty, Lantronix will -- at its option -- repair or replace the product and return it to the customer freight prepaid. If the product is not under warranty, the customer may have Lantronix repair the unit on a fee basis or return it. No services are handled at the customer's site under this warranty. This warranty is voided if the customer uses the product in an unauthorized or improper way, or in an environment for which it was not designed.

Lantronix warrants the media containing its software product to be free from defects and warrants that the software will operate substantially according to Lantronix specifications for a period of 60 DAYS after the date of shipment. The customer will ship defective media to Lantronix. Lantronix will ship the replacement media to the customer.

In no event will Lantronix be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss of equipment, plant or power system, cost of capital, loss of profits or revenues, cost of replacement power, additional expenses in the use of existing software, hardware, equipment or facilities, or claims against the user by its employees or customers resulting from the use of the information, recommendations, descriptions and safety notations supplied by Lantronix. Lantronix liability is limited (at its election) to:

- ◆ Refund of buyer's purchase price for such affected products (without interest).
- ◆ Repair or replacement of such products, provided that the buyer follows the above procedures.

There are no understandings, agreements, representations or warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose, other than those specifically set out above or by any existing contract between the parties. Any such contract states the entire obligation of Lantronix. The contents of this document shall not become part of or modify any prior or existing agreement, commitment or relationship.

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