



# xPico®

## Embedded Device Server Integration Guide

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## Disclaimer

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:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. 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. The OEM integrator should be aware of the following important issues.

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### Labeling of the End Product (xPico Wi-Fi only)

The label on the end product incorporating the xPico Wi-Fi module must clearly state that it contains an FCC-approved RF module. Canada and Japan also require a similar statement.

For example, “This product contains RF transmitter ID # (put FCC, IC, and/or Japan module grant numbers here).” The label must include the ID numbers for the regions where the end product is installed. The grant numbers are below.

- ◆ xPico Wi-Fi FCC ID number: R68XPICOW
- ◆ xPico Wi-Fi IC ID number: 3867A-XPICOW
- ◆ xPico Wi-Fi Japan ID numbers: 201-135275

### RSS-GEN Sections 7.1.4 and 7.1.5 Statement for Devices with Detachable Antennas (xPico Wi-Fi only)

This device has been designed to operate with the antennas listed in the Certificate, and having a maximum gain of 2.88 dBi. Antennas not included in this list or having a gain greater than 2.88 dBi are strictly prohibited for use with this device, unless system level FCC approval is gained. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

### Integration Notes (xPico Wi-Fi):

- ◆ *This module is authorized under limited module approval specified to mobile host equipment. So, the antenna must be installed such that 20cm is maintained between the antenna and users.*
- ◆ *The transmitter module may not be co-located with any other transmitter or antenna.*
- ◆ *As long as the two conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emission, PC peripheral requirements, etc.)*
- ◆ *In the event that these conditions cannot be met (for example certain laptop configurations, general purpose PCMCIA or similar cards, or co-location with another transmitter) and obtaining a separate FCC authorization will be required, then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product (including the transmitter).*
- ◆ *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 any xPico family product, 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 xPico hardware. For further details, please see the xPico OEM firmware license agreement.*

## Warranty

For details on the Lantronix warranty policy, please go to our Web site at [www.lantronix.com/support/warranty](http://www.lantronix.com/support/warranty).

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## Revision History

| Date           | Rev. | Comments   |
|----------------|------|--|
| April 2012     | A    | Initial release.   |
| September 2012 | B    | Updated the reference schematic, mounting instructions and compliance information. |
| January 2013   | C    | Updated xPico pin-out diagram.   |
| July 2013      | D    | Updated to include xPico Wi-Fi part information.                                   |
| August 2013    | E    | Updated to include Japanese certification number.                                  |

For the latest revision of this product document, please check our online documentation at [www.lantronix.com/support/documentation](http://www.lantronix.com/support/documentation).

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# 1. Introduction

## About the Integration Guide

This guide provides the information needed to integrate the xPico® family of products into customer-printed circuit boards. This manual is intended for engineers responsible for integrating the xPico into their product.

**Note:** This document includes support for xPico embedded device server versions XPC100100B-01, XPC100100S-01, XPC100100K-02, XPC10010MB-01 and XPC10010MS-01, and xPico Wi-Fi embedded device server versions XPW100100B-01, XPW100100S-01 and XPW100100K-02.

The sections in chapter 2 provide board schematic and layout recommendations for both xPico (wired) and xPico Wi-Fi products. Some of the sections apply to xPico (wired) only or xPico Wi-Fi only. Signals that are unused for a particular product can be left floating. If the application has the potential to use both components as a stuff option it is recommended to follow the design guide for all of the sections. The table below lists which sections are applicable to the xPico (wired) and xPico Wi-Fi products.

**Note:** xPico (wired) refers to the Ethernet-only versions of xPico.

**Table 1-1 xPico and xPico Wi-Fi Features**

| Chapter 2 Section       | xPico (wired) | xPico Wi-Fi |
|-------------------------|---------------|-------------|
| PCB Interface           | X             | X           |
| Mating Connector        | X             | X           |
| Antenna Interface       |               | X           |
| Antenna Placement       |               | X           |
| Ethernet Interface      | X             |             |
| Serial Interface        | X             | X           |
| USB Device Port         |               | X           |
| LEDs                    | X             | X           |
| General Purpose IO Pins | X             | X           |
| Reset Pins              | X             | X           |
| Reference Schematic     | X             | X           |

## Additional Documentation

Visit the Lantronix Web site at [www.lantronix.com/support/documentation](http://www.lantronix.com/support/documentation) for the latest documentation and the following additional documentation.

| Document  | Description   |
|---|---|
| <b>xPico Embedded Device Server User Guide</b>                  | Provides information needed to configure, use, and update the xPico firmware.       |
| <b>xPico Wi-Fi Embedded Device Server User Guide</b>            | Provides information needed to configure, use, and update the xPico Wi-Fi firmware. |
| <b>xPico Embedded Device Server Development Kit Quick Start</b> | Provides the steps for getting the xPico up and running.                            |



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| <b>Document</b>   | <b>Description</b>   |
|---|--|
| <b><i>xPico Embedded Device Server Development Kit User Guide</i></b> | Provides a detailed description of the xPico evaluation kit hardware   |
| <b><i>APS: Modbus Protocol User Guide</i></b>                         | Provides detailed information for installing and operating the IAP device server using our Modbus firmware.          |
| <b><i>DeviceInstaller™ User Guide</i></b>                             | Provides instructions for using the Windows-based utility to configure the xPico and other Lantronix device servers. |
| <b><i>Com Port Redirector User Guide</i></b>                          | Provides information on using the Windows-based utility to create a virtual com port.                                |

## 2. Functional Description

Designed for quick integration with minimal engineering effort, the chip-sized xPico embedded device server provides simplicity and flexibility making it the easiest and fastest networking-enabling module on the market.

xPico and xPico Wi-Fi are extremely compact networking solution that enables Ethernet or Wireless connectivity on virtually any device with a serial interface. The included industry-proven Lantronix device server application and full IP stack allow seamless remote access to device data simplifying design integration while providing robust connectivity.

As one of the smallest embedded device servers in the world, xPico and xPico Wi-Fi can be utilized in designs typically intended for chip solutions. A key difference with the xPico is that there is virtually no need to write a single line of code, translating to a much lower development cost and faster time-to-market.

**Table 2-1 xPico Part Numbers**

| <b>Part Number</b>   | <b>Description</b>  |
|----------------------|---|
| <b>XPC100100B-01</b> | xPico Device Server Module, Extended Temp, AES Encryption, Bulk, RoHS             |
| <b>XPC100100S-01</b> | xPico Device Server Module, Extended Temp, AES Encryption, Sample, RoHS           |
| <b>XPC100100K-02</b> | xPico Device Server Module Development Kit w/ Module, RoHS                        |
| <b>XPW100100B-01</b> | xPico Wi-Fi — IEEE 802.11 b/g/n Device Server Module, Extended Temp, Bulk, RoHS   |
| <b>XPW100100S-01</b> | xPico Wi-Fi — IEEE 802.11 b/g/n Device Server Module, Extended Temp, Sample, RoHS |
| <b>XPW100100K-01</b> | xPico Wi-Fi — IEEE 802.11 b/g/n Device Server Development Kit w/ Module, RoHS     |
| <b>XPC10010MB-01</b> | xPico IAP Device Server Module, Extended Temperature, Modbus, RoHS, Bulk          |
| <b>XPC10010MS-01</b> | xPico IAP Device Server Module, Extended Temperature, Modbus, RoHS, Sample        |

## xPico Features

The xPico device server contains Lantronix's own DSTni® EX controller, with 256 KBytes of SRAM, 16 KBytes of boot ROM, and integrated 10/100 PHY.

The xPico also contains the following:

- ◆ 3.3-volt serial interface
- ◆ 8 Configurable I/O pins
- ◆ All logic level I/O pins are 5V input tolerant
- ◆ 4-Mbit flash memory
- ◆ Power supply filters
- ◆ Reset circuit
- ◆ +1.8V regulator

**Note:** *xPico does not contain integrated Ethernet magnetics. An external Ethernet magnetic module and RJ45 Jack is required to interface to a standard 10/100Mbps Ethernet network.*

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

## xPico Wi-Fi Features

The xPico Wi-Fi contains Cortex M3 ARM processor with 128KByte of SRAM and 1MByte of embedded Flash memory. The unit also includes an 802.11 b/g/n WLAN radio with a U.FL port for connection to an external antenna.

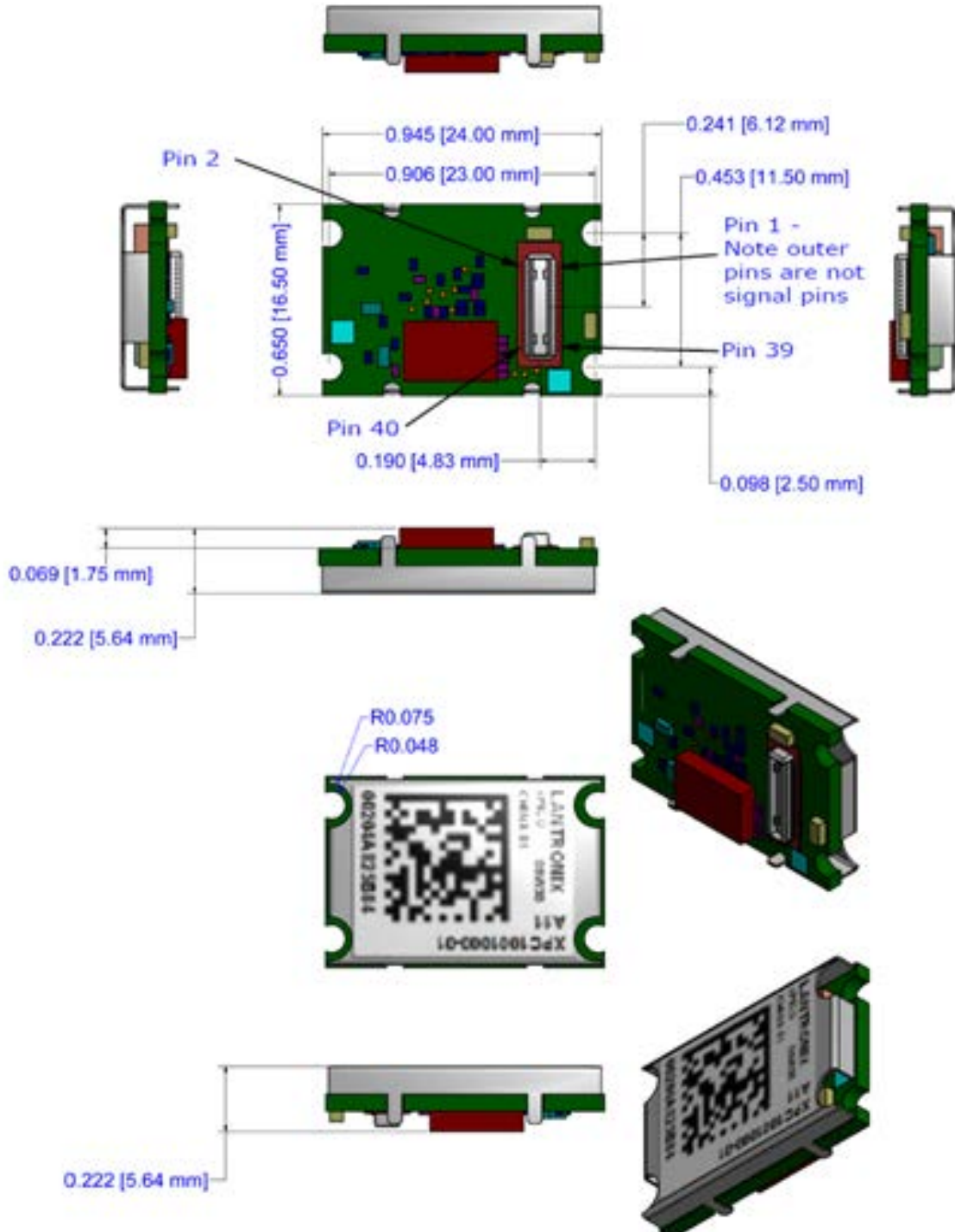
The xPico Wi-Fi also contains the following:

- ◆ 3.3-volt serial interface
- ◆ 8 Configurable I/O pins
- ◆ All logic level I/O pins are 5V input tolerant
- ◆ 8-Mbit flash memory (in addition to the 1MByte CPU embedded Flash)
- ◆ Power supply filters
- ◆ Reset circuit

**Note:** *xPico Wi-Fi does not contain an integrated antenna. An external antenna is required for connection to a WLAN network.*

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

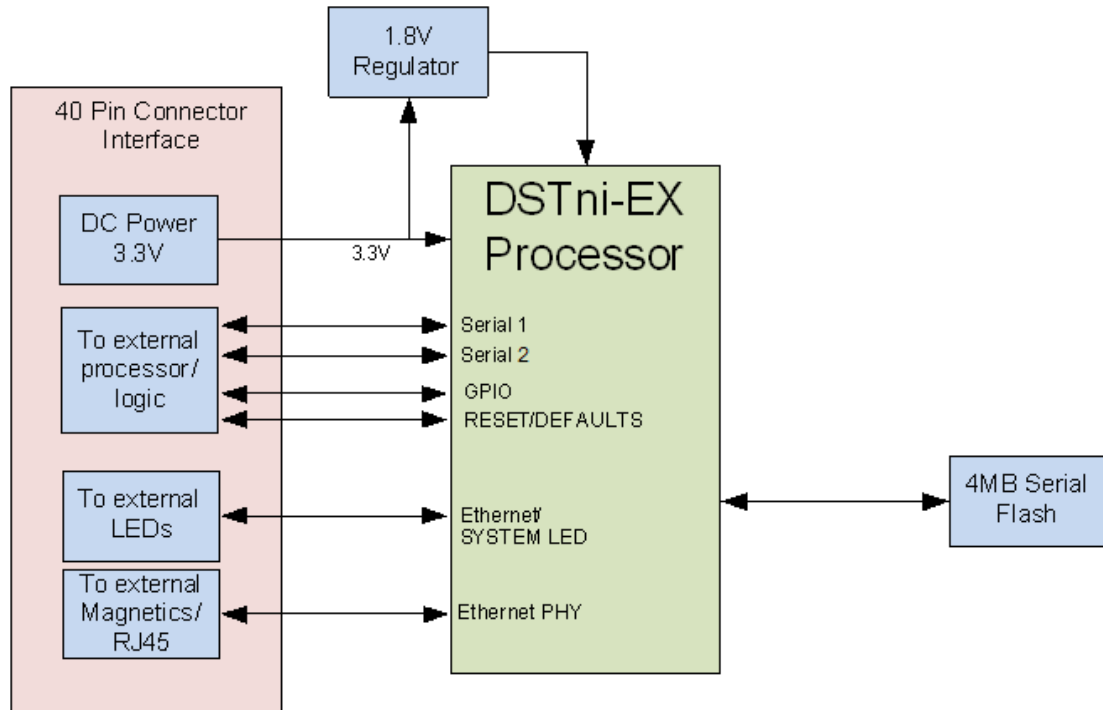
Figure 2-1 xPico and xPico Wi-Fi Dimensions and Views



## xPico Block Diagram

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

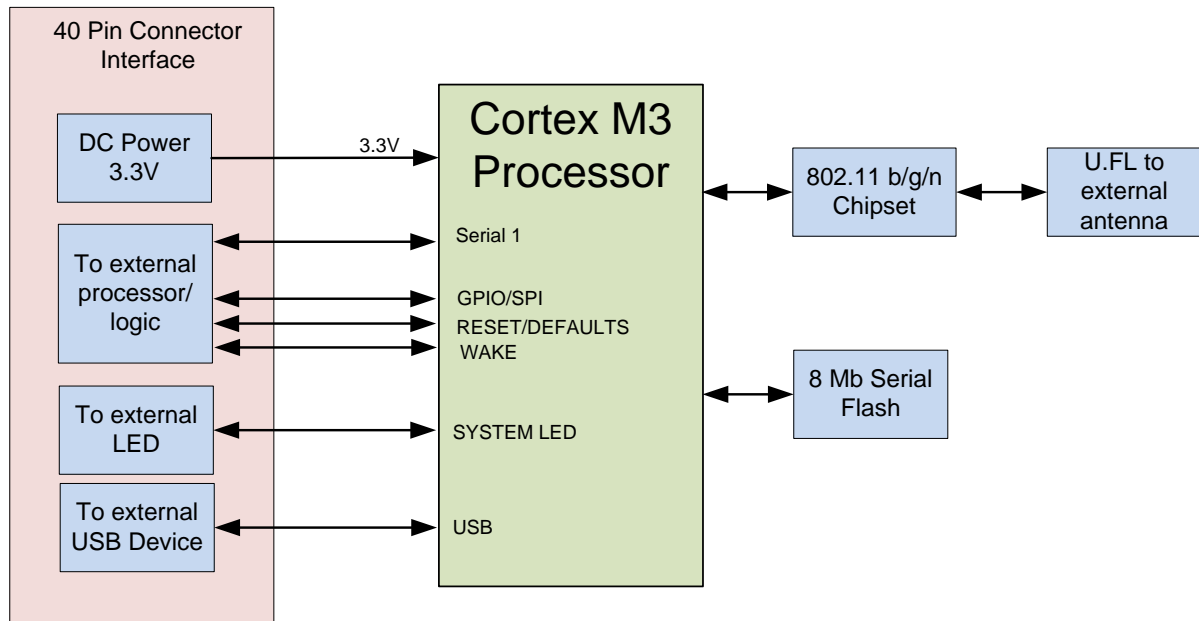
**Figure 2-2 xPico Block Diagram**



## xPico Wi-Fi Block Diagram

The following drawing is a block diagram of the xPico Wi-Fi showing the relationships of the components.

**Figure 2-3 xPico Wi-Fi Block Diagram**



## PCB Interface

The xPico has a serial interface compatible with data rates up to 921,600 bps (in high-performance mode). The serial signals (RX, TX, RTS, CTS, and all CPs) 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 xPico must interface to a serial transceiver chip. All configurable I/O pins are 3.3V CMOS logic level and 5V input tolerant. xPico requires a mating connector. Customers should layout their PCB for Hirose part number DF40C(2.0)-40DS-0.4V(51).

An external Ethernet magnetic module and RJ45 is required to interface xPico to a standard 10/100Mbps Ethernet network.

An external antenna attached to the xPico Wi-Fi U.FL connector is required to connect to an 802.11b/g/n wireless network.

Shown below is the xPico pin connection diagram highlighting the differences between the xPico and xPico Wi-Fi.

**Table 2-2 xPico and xPico Wi-Fi Pin Connections**

| Pin# | xPico Wired | xPico Wi-Fi | Pin# | xPico Wired      | xPico Wi-Fi    |
|------|-------------|-------------|------|------------------|----------------|
| 1    | GND         | GND         | 2    | GND              | GND            |
| 3    | CP8         | CP8/SPI_CS  | 4    | LED1/LINK        | LED1/WLAN_LED  |
| 5    | RTS1        | RTS1        | 6    | LED0/SPEED       | NC             |
| 7    | RXD1        | RXD1        | 8    | LED2/ACTIVITY    | NC             |
| 9    | GND         | GND         | 10   | TXD1             | TXD1           |
| 11   | ETX-        | NC          | 12   | ETCT             | NC             |
| 13   | ETX+        | NC          | 14   | LED3/DUPLEX(OUT) | WKUP (IN)      |
| 15   | GND         | GND         | 16   | CTS1             | CTS1           |
| 17   | ERX-        | NC          | 18   | ERCT             | NC             |
| 19   | ERX+        | NC          | 20   | SYS_LED          | SYS_LED        |
| 21   | GND         | GND         | 22   | Reserved         | DDP            |
| 23   | RXD2        | RXD2        | 24   | Reserved         | DDM            |
| 25   | TXD2        | TXD2        | 26   | CP2/INT          | CP2/SPI_INT    |
| 27   | CP7         | CP7/SPI_SCK | 28   | CP3              | CP3/MISO       |
| 29   | +3.3V       | +3.3V       | 30   | CP4              | CP4/MOSI       |
| 31   | +3.3V       | +3.3V       | 32   | CP5              | CP5            |
| 33   | +3.3V       | +3.3V       | 34   | CP6              | CP6            |
| 35   | CP1         | CP1         | 36   | DEFAULT#(IN)     | DEFAULT#(IN)   |
| 37   | GND         | GND         | 38   | EXT_RESET#(IN)   | EXT_RESET#(IN) |
| 39   | GND         | GND         | 40   | GND              | GND            |

Table 2-3 xPico (wired) PCB Interface Signals

| Signal Name   | xPico Pin # | Primary Function                             | Reset State | Internal Pull-up   | Driver Strength |
|---------------|-------------|--|-------------|--------------------|-----------------|
| GND           | 1           | Signal Ground                                |             |                    |                 |
| GND           | 2           | Signal Ground                                |             |                    |                 |
| CP8           | 3           | Configurable I/O                             | Input       | Active 56K to 122K | 4mA             |
| LED1/LINK     | 4           | Ethernet Link LED, active low                | Output      |                    | 8mA             |
| RTS1          | 5           | Serial ready to send/ serial transmit enable | Output      |                    | 2mA             |
| LED0/SPEED    | 6           | Ethernet speed LED, active low               | Output      |                    | 8mA             |
| RXD1          | 7           | Serial receive data input 1                  | Input       | Active 56K to 122K |                 |
| LED2/ACTIVITY | 8           | Ethernet Activity LED, active low            | Output      |                    | 8mA             |
| GND           | 9           | Signal Ground                                |             |                    |                 |
| TXD1          | 10          | Serial transmit data output 1                | Output      |                    | 2mA             |
| TX-           | 11          | Ethernet transmit differential (neg)         | Output      |                    |                 |
| TCT           | 12          | Ethernet transmit center tap                 |             |                    |                 |
| TX+           | 13          | Ethernet transmit differential (pos)         | Output      |                    |                 |
| LED3/DUPLEX   | 14          | Ethernet Duplex LED, active low              | Output      |                    | 8mA             |
| GND           | 15          | Signal Ground                                |             |                    |                 |
| CTS1          | 16          | Serial Clear to Send                         | Input       | Active 56K to 122K |                 |
| RX-           | 17          | Ethernet receive differential (neg)          | Input       |                    |                 |
| RCT           | 18          | Ethernet receive center tap                  |             |                    |                 |
| RX+           | 19          | Ethernet receive differential (pos)          | Input       |                    |                 |
| SYSTEM_LED    | 20          | System status LED, active high               | Input       | Active 56K to 122K | 4mA             |
| GND           | 21          | Signal Ground                                |             |                    |                 |
| Reserved      | 22          | Reserved for future use. Do not connect.     |             |                    |                 |
| RXD2          | 23          | Serial receive data input 2                  | Input       | Active 56K to 122K |                 |
| Reserved      | 24          | Reserved for future use. Do not connect.     |             |                    |                 |
| TXD2          | 25          | Serial transmit data output 2                | Output      |                    | 2mA             |
| CP2/INT       | 26          | Configurable I/O-External interrupt input    | Input       | Active 56K to 122K | 4mA             |



| Signal Name | xPico Pin # | Primary Function  | Reset State | Internal Pull-up   | Driver Strength |
|-------------|-------------|---|-------------|--------------------|-----------------|
| CP7         | 27          | Configurable I/O  | Input       | Active 56K to 122K | 4mA             |
| CP3         | 28          | Configurable I/O  | Input       | Active 56K to 122K | 4mA             |
| 3V3         | 29          | 3.3V Input Power  |             |                    |                 |
| CP4         | 30          | Configurable I/O  | Input       | Active 56K to 122K | 4mA             |
| 3V3         | 31          | 3.3V Input Power  |             |                    |                 |
| CP5         | 32          | Configurable I/O  | Input       | 10K                | 4mA             |
| 3V3         | 33          | 3.3V Input Power  |             |                    |                 |
| CP6         | 34          | Configurable I/O  | Input       | 10K                | 4mA             |
| CP1         | 35          | Configurable I/O  | Input       | Active 56K to 122K | 4mA             |
| DEFAULT#    | 36          | Unit reset to default, active low. Drive low to reset unit to default settings. | Input       | Active 56K to 122K |                 |
| GND         | 37          | Signal Ground   |             |                    |                 |
| EXT_RESET#  | 38          | Unit hardware reset, active low. Drive low to reboot unit.                      | Input       | 10K                |                 |
| GND         | 39          | Signal Ground   |             |                    |                 |
| GND         | 40          | Signal Ground   |             |                    |                 |

Table 2-4 xPico Wi-Fi PCB Interface Signals

| Signal Name             | xPico Pin # | Primary Function                             | Reset State     | Internal Pull-up /Pull-down | Driver Strength |
|-------------------------|-------------|--|-----------------|-----------------------------|-----------------|
| GND                     | 1           | Signal Ground                                |                 |                             |                 |
| GND                     | 2           | Signal Ground                                |                 |                             |                 |
| CP8/SPI_CS <sup>1</sup> | 3           | Configurable I/O/ SPI Chip Select            | Input, floating | 30K to 50K                  | 8mA             |
| LED1/WLAN_LED           | 4           | WLAN Link, active low                        | Input, floating | 30K to 50K                  | 8mA             |
| RTS1                    | 5           | Serial ready to send/ serial transmit enable | Input, floating | 30K to 50K                  | 8mA             |
| NC                      | 6           | No Connect                                   |                 |                             |                 |
| RXD1                    | 7           | Serial receive data input 1                  | Input, floating | 30K to 50K                  |                 |
| NC                      | 8           | No Connect                                   |                 |                             |                 |
| GND                     | 9           | Signal Ground                                |                 |                             |                 |
| TXD1                    | 10          | Serial transmit data output 1                | Input,          | 30K to 50K                  | 8mA             |

| Signal Name              | xPico Pin # | Primary Function   | Reset State     | Internal Pull-up /Pull-down | Driver Strength |
|--------------------------|-------------|--|-----------------|-----------------------------|-----------------|
|                          |             |  | floating        |                             |                 |
| NC                       | 11          | No Connect   |                 |                             |                 |
| NC                       | 12          | No Connect   |                 |                             |                 |
| NC                       | 13          | No Connect   |                 |                             |                 |
| WKUP <sup>4</sup>        | 14          | System Wake Up on Rising Edge                                    | Input, floating | 30K to 50K                  |                 |
| GND                      | 15          | Signal Ground  |                 |                             |                 |
| CTS1                     | 16          | Serial Clear to Send   | Input, floating | 30K to 50K                  |                 |
| NC                       | 17          | No Connect   |                 |                             |                 |
| NC                       | 18          | No Connect   |                 |                             |                 |
| NC                       | 19          | No Connect   |                 |                             |                 |
| SYSTEM_LED               | 20          | System status LED, active high                                   | Input, floating | 30K to 50K                  | 8mA             |
| GND                      | 21          | Signal Ground  |                 |                             |                 |
| DDP <sup>2</sup>         | 22          | USB (positive)   |                 |                             |                 |
| RXD2                     | 23          | Serial receive data input 2                                      | Input, floating | 30K to 50K                  |                 |
| DDM <sup>2</sup>         | 24          | USB Negative   |                 |                             |                 |
| TXD2                     | 25          | Serial transmit data output 2                                    | Input, floating | 30K to 50K                  | 8mA             |
| CP2/INT <sup>1</sup>     | 26          | Configurable I/O-External interrupt input                        | Input, floating | 30K to 50K                  | 8mA             |
| CP7/SPI_SCK <sup>1</sup> | 27          | Configurable I/O/ SPI Clock                                      | Input, floating | 30K to 50K                  | 8mA             |
| CP3/MISO <sup>1</sup>    | 28          | Configurable I/O/SPI Master In-Slave Out                         | Input, floating | 30K to 50K                  | 8mA             |
| 3V3                      | 29          | 3.3V Input Power   |                 |                             |                 |
| CP4/MOSI <sup>1</sup>    | 30          | Configurable I/O/ SPI Master Out-Slave In                        | Input, floating | 30K to 50K                  | 8mA             |
| 3V3                      | 31          | 3.3V Input Power   |                 |                             |                 |
| CP5                      | 32          | Configurable I/O   | Input, floating | 30K to 50K                  | 8mA             |
| 3V3                      | 33          | 3.3V Input Power   |                 |                             |                 |
| CP6                      | 34          | Configurable I/O   | Input, floating | 30K to 50K                  | 8mA             |
| CP1                      | 35          | Configurable I/O   | Input, floating | 30K to 50K                  | 8mA             |
| DEFAULT#                 | 36          | Unit reset to default, active low.<br>Drive low to reset unit to | Input, floating | 30K to 50K                  |                 |

| Signal Name | xPico Pin # | Primary Function   | Reset State | Internal Pull-up /Pull-down | Driver Strength |
|-------------|-------------|--|-------------|-----------------------------|-----------------|
|             |             | default settings.  |             |                             |                 |
| GND         | 37          | Signal Ground  |             |                             |                 |
| EXT_RESET#  | 38          | Unit hardware reset, active low. Drive low to reboot unit. | Input       | 30K to 50K                  |                 |
| GND         | 39          | Signal Ground  |             |                             |                 |
| GND         | 40          | Signal Ground  |             |                             |                 |

Note1: The xPico Wi-Fi SPI interface can be master or slave.

Note2: The xPico Wi-Fi USB interface is USB2.0 Full Speed Host/Device/OTG capable. Host/Device/OTG interface connectors and power interface must be designed into the mating board.

Note3. xPico and xPico Wi-Fi may be designed into the same socket. Signals listed as no connect on xPico Wi-Fi may be connected on an xPico base design board. For example, xPico Wi-Fi pins 11, 12, 13, 17, 18, and 19 may connect to an Ethernet magnetic module as designed for xPico (wired), however, Ethernet will not be available on those pins for xPico Wi-Fi.

Note 4. Pin 14 is the Ethernet duplex LED output on xPico (wired) and the system wakeup input on xPico Wi-Fi. For board designs supporting both xPico (wired) and xPico Wi-Fi, a zero ohm resistor stuff option should be used to disconnect any on-board logic driving pin 14 when xPico (wired) is installed.

Note 5. The CP pins can be configured as pull-up or pull-down. The WKUP pin is not configurable and is always pull-down.

Note 6. The IO pins on xPico Wi-Fi are configured as floating-input on reset until configured by firmware. For applications requiring a high signal on power up, an external pull-up may be required.

## Mating Connector

The mating connector for the xPico and xPico Wi-Fi module is Hirose part number DF40C (2.0)-40DS-0.4V (51). Special care must be taken when mating and unmating the module to the mating connector. Refer to the Hirose DF40 data sheet below for proper connector mating and unmating, along with the proper connector footprint.

Mating connector data sheet: [http://www.hirose.co.jp/cataloge\\_hp/e68440018.pdf](http://www.hirose.co.jp/cataloge_hp/e68440018.pdf)

## Antenna Interface (xPico Wi-Fi Only)

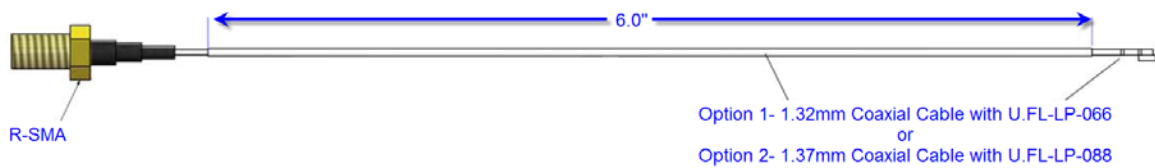
The xPico Wi-Fi module has been certified using the external antennas listed below. Per FCC guidelines, the xPico Wi-Fi certification remains valid if using an antenna of similar type to the antennas below. If using an antenna of similar type to one of the antennas below, but from a different manufacturer part number the antenna gain must be equal to or less than specified in the table. Consult with your certification lab for more details.

**Table 2-5 xPico Wi-Fi External Antenna Options**

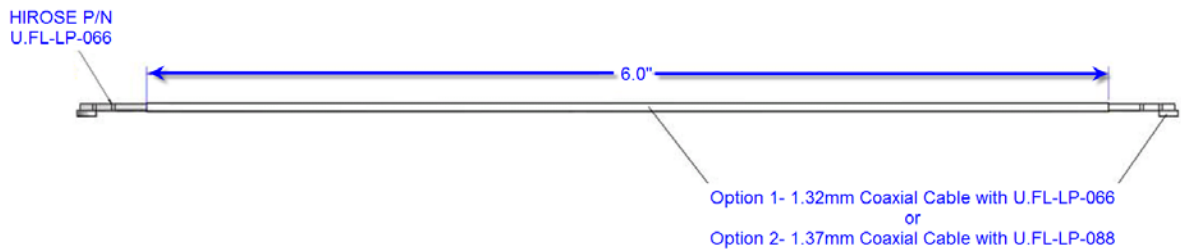
| Antenna Type                                   | Peak Gain Typical                                      | Lantronix Part Number | Vendor       | Vendor Part Number |
|--|--|-----------------------|--------------|--------------------|
| PCB Strip Antenna with cable to U.FL connector | 1.5 to 2.5dBi, 2.39 Ghz to 2.49 Ghz                    | 930-099-R             | Ethertronics | 1000668            |
| Swivel type antenna, with RP-SMA(M) connector  | 2 dBi, 2.4 Ghz to 2.5 Ghz, 2 dBi, 5.15 Ghz to 5.85 Ghz | 930-033-R             | Wanshih      | WSS002             |

Lantronix provides a U.FL to Reverse SMA antenna cable in with the evaluation board and sample kits for development work. These cables can be purchased from Lantronix for production or supplied by an RF cable manufacturer. External antennas can be purchased from the antenna vendor. Components for cable design should be selected for low loss over the entire 2.4Ghz to 5.9Ghz signal range. The cable target impedance should be 50 ohms.

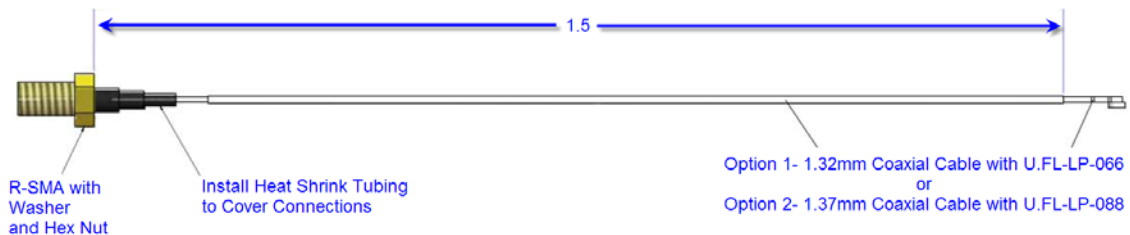
**Figure 2-4 Reverse-SMA to U.FL(long) (P/N 500-180-R)**



**Figure 2-5 U.FL to U.FL Cable (P/N 500-181-R)**



**Figure 2-6 Reverse-SMA to U.FL(short) (P/N 500-182-R)**



## Antenna Placement (xPico Wi-Fi only)

When designing the xPico Wi-Fi module to a mating board, it is important to consider the final installation of the unit and its location with respect to connecting access points. The antenna should be placed so that it has as clear as possible path to the connecting access point for maximum range. Avoid placing the antenna such that it is blocked by metal walls or ground planes of adjacent circuit boards.

## Ethernet Interface (xPico wired only)

xPico integrates an internal 10/100Mbps Ethernet MAC and PHY. An external magnetic module and RJ45 is required in order to connect to a standard 10/100Mbps Ethernet network.

**Table 2-6 Ethernet Interface Signals**

| Signal Name | DIR | Contact | Primary Function                        | Signal Requirement            |
|-------------|-----|---------|---|-------------------------------|
| TX+         | Out | 13      | Differential Ethernet transmit data +   | 100 ohm differential with TX- |
| TX-         | Out | 11      | Differential Ethernet transmit data -   | 100 ohm differential with TX+ |
| RX+         | In  | 19      | Differential Ethernet receive data +    | 100 ohm differential with RX- |
| RX-         | In  | 17      | Differential Ethernet receive data -    | 100 ohm differential with RX+ |
| TCT         |     | 12      | Ethernet transmit center tap connection | Route > 20 mil width          |
| RCT         |     | 18      | Ethernet receive center tap connection  | Route > 20 mil width          |

The xPico provides a 10/100 Mbps Ethernet interface for connection to an external network through external magnetics and an external RJ45. The table below lists several magnetic modules and combination RJ45/magnetic jacks that can be used with xPico.

**Table 2-7 Recommended Magnetic Modules and Combo RJ45/Magnetic Module Connectors**

| Type                          | Manufacturer | Part Number        |
|-------------------------------|--------------|--------------------|
| Magnetic only (requires RJ45) | BI-Tech      | HS91-011-80LFTR    |
| Magnetic only (requires RJ45) | Mingtek      | HN0013SG           |
| Combination RJ45/Magnetic     | Belfuse      | 08B0-1D1T-06-F     |
| Combination RJ45/Magnetic     | Midcom       | MIC2411D-0117T-LF3 |
| Magnetic for POE              | PULSE        | HX2019             |

The Ethernet differential pair signals, ERX-/ERX+ and ETX-/ETX+ should be routed as 100-ohm differential pairs on a layer next to the signal ground plane. The use of vias on these signals should be minimized. The center tap signal connections between the magnetic and xPico (wired) module are required. Center tap signals RCT and TCT should be routed with at least 20 mil trace thickness. The area between the magnetic module and RJ45 jack, including the area under both, should be voided of all signals and

planes, except for the signals connecting to both. The signals connecting between the RJ45 and magnetic are required to be isolated by 1500Vrms from all other signals and planes, including chassis and signal ground. The connector shield should be connected to chassis. It is recommended that 1206 resistor pads from chassis ground to signal ground be placed next to each of the shield tabs. The resistor pads allow for 0 ohm jumper, ferrite beads, or decoupling caps to be installed as needed for EMI/EMC improvement.

The Ethernet LED signals should be routed to discrete LEDs or to the LED pins on the RJ45 through 220 ohm or larger resistors. The LED signals are active low. The Ethernet LED signals should be isolated from the signals that connect between the RJ45 and magnetic module.

Also shown in the reference schematic is a recommended TVS array that can be used to improve ESD and EFT in harsh environments. The device shown is Semtec RClamp0502A. This device features route through pin assignments allowing for the Ethernet differential signal pairs to be routed without altering the trace impedance or adding vias. Due to this routing, the device could be installed or depopulated as needed.

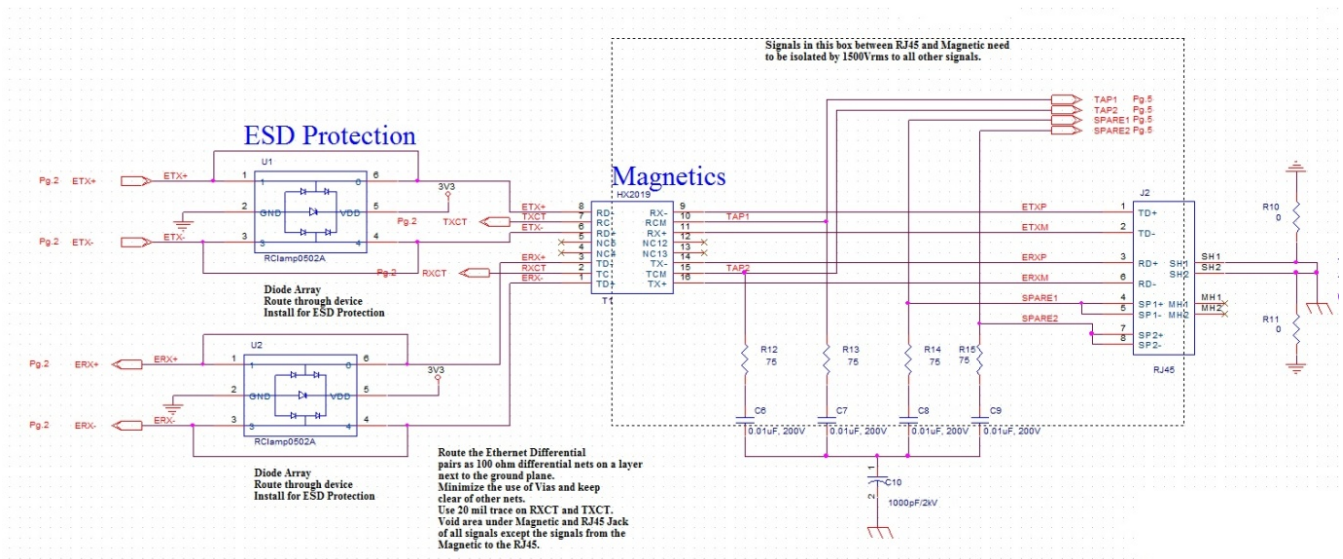
See the Lantronix app note, **How to Connect a Lantronix Embedded Module to a Wired Ethernet Port** for more details on Ethernet connection and routing, [http://www.lantronix.com/pdf/appnotes/Connect-LTRX-Embed-Module-to-Wired-Ethernet\\_AN.pdf](http://www.lantronix.com/pdf/appnotes/Connect-LTRX-Embed-Module-to-Wired-Ethernet_AN.pdf).

The xPico module can also be powered from POE using a POE magnetic and POE powered device controller. Lantronix uses the Silabs, Si3402 POE controller to power the xPico development board via POE. If using POE the Ethernet magnetic module should be changed to a POE compatible module such as Pulse HX2019.

Refer to the evaluation board schematic in the xPico-DevKit\_UG for an example circuit. [http://www.lantronix.com/pdf/xPico-DevKit\\_UG.pdf](http://www.lantronix.com/pdf/xPico-DevKit_UG.pdf).

Refer to the SiLabs data sheet for Si3402 for more information on using the SiLabs POE controller.

**Figure 2-7 Ethernet Connection Example (xPico wired only)**



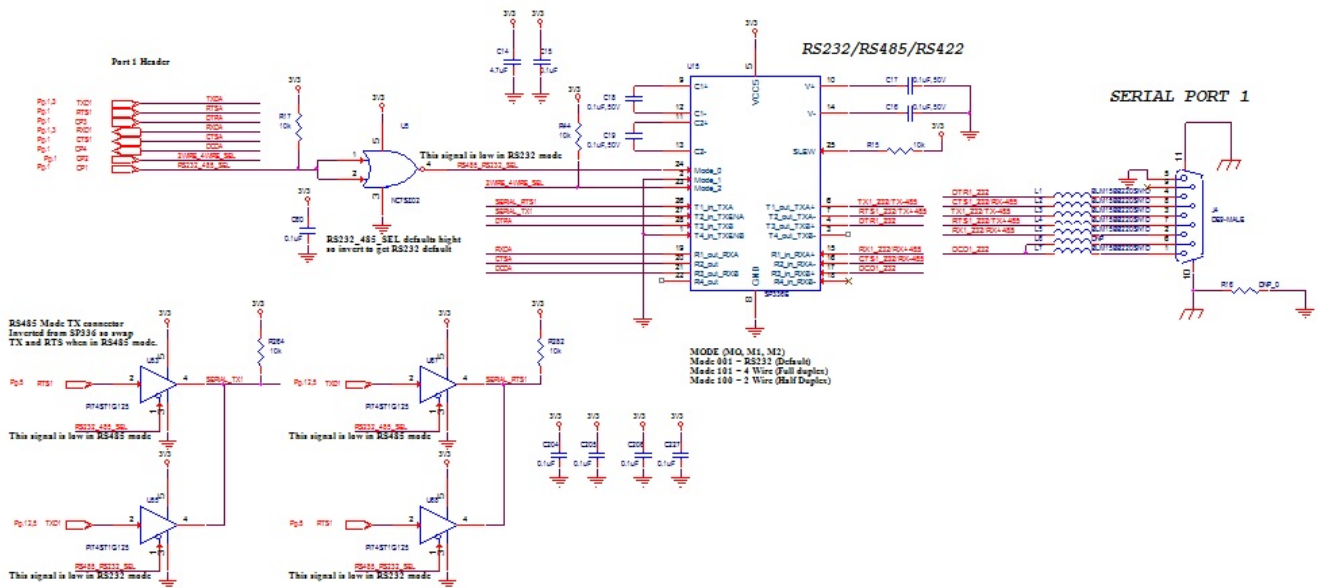
## Serial Interface

The xPico and xPico Wi-Fi have two external serial interfaces. The signal levels on the serial interface are 3.3V logic level with 5V tolerant inputs. The serial interfaces require an external transceiver in order to connect to external RS232, RS485, or RS422 networks. The signals of Serial Port 1 may be connected as shown in the reference schematic, [Figure 2-8 Serial Port Example](#), below. The transceiver shown in the reference schematic is of type Exar, part number SP336. This transceiver is a multiprotocol RS232, RS485, RS422 transceiver. Single protocol transceivers may be used as required. The xPico interface may also be directly connected to the UART interface of an external CPU. Serial Port 2 is a three wire interface only. It operates like Serial Port 1, except it does not support hardware Flow Control (i.e. no RTS/CTS) and modem control (i.e. no DTR/DCD).

**Table 2-8 xPico and xPico Wi-Fi Serial Port Signals**

| Signal | Pin | Description                                   | Reset State |
|--------|-----|---|-------------|
| TXD1   | 10  | Serial Transmit Data output                   | Output      |
| RTS1   | 5   | Serial Ready-to-Send / Serial Transmit enable | Output      |
| RXD1   | 7   | Serial Receive Data input                     | Input       |
| CTS1   | 16  | Serial Clear-to-Send                          | Input       |
| TXD2   | 25  | Serial Transmit Data output 2                 | Output      |
| RXD2   | 23  | Serial Receive Data input 2                   | Input       |

**Figure 2-8 Serial Port Example**





**Table 2-9 RS232 Connections (Serial Transceiver Required)**

| xPico Signal   |                         | DCE Connector |      |        | DTE Connector |      |        |
|----------------|-------------------------|---------------|------|--------|---------------|------|--------|
| Signal (Logic) | Description             | DB9           | DB25 | Signal | DB9           | DB25 | Signal |
| RxDx           | Data In                 | 2             | 3    | RxDx   | 3             | 2    | TxDx   |
| TxDx           | Data Out                | 3             | 2    | TxDx   | 2             | 3    | RxDx   |
| RTSx           | H/W Flow Control Output | 7             | 4    | RTSx   | 8             | 5    | CTSx   |
| CTSx           | H/W Flow Control Input  | 8             | 5    | CTSx   | 7             | 4    | RTSx   |
| CPx            | Modem Control Input     | 1             | 8    | DCDx   | 4             | 20   | DTRx   |
| CPy            | Modem Control Output    | 4             | 20   | DTRx   | 1             | 8    | DCDx   |

**Table 2-10 RS422/485 Connections (Serial Transceiver Required)**

| xPico Signal (logic) | Description  | RS485 Signal | DB25 4 Wire | DB25 2 Wire | DB9 4 wire | DB9 2 wire |
|----------------------|--------------|--------------|-------------|-------------|------------|------------|
| TxDx                 | Data Out     | TX+485       | 14          | 14          | 7          | 7          |
| TxDx                 | Data Out     | TX-485       | 15          | 15          | 3          | 3          |
| RxDx                 | Data In      | RX+485       | 21          | 14          | 2          | 7          |
| RxDx                 | Data In      | RX-485       | 22          | 15          | 8          | 3          |
| RTSx                 | TX Enable    |              |             |             |            |            |
| CPx                  | RS485 Select |              |             |             |            |            |
| CPy                  | RS485 2-wire |              |             |             |            |            |

**Note:** The IO pins for xPico Wi-Fi are set to floating input on power up until configured by unit firmware. An external 100K ohm pull-up may be required on the serial transmit signal to prevent downstream UART devices from detecting false characters on initial power up.

## USB Device Port (xPico Wi-Fi only)

The xPico Wi-Fi has one USB2.0 Full Speed Device port interfaces for connection to an upstream USB device. The port consists of a differential pair, signals DDP and DDM. These signals should be routed as a 90 ohm differential pair on a signal layer next to the signal ground plane. The use of vias should be minimized on these signals. The USB signals can be connected to a USB Mini Type B USB port (as shown in [Table 2-12](#)) directly to an IC with a USB host port. If connecting to an external port that is user accessible it is recommended to add a TVS diode array to the signal nets for ESD protection. The ESD array shown in the figure is of type Semtech RClamp0502A. This device features through pin routing to minimize trace impedance changes and simplify routing. The footprint for the TVS array can be added to the PCB and the part can be depopulated if it is not needed. It is recommended that the power drawn off the USB Mini Type B connector be limited to less than 500mA per USB requirements. If the USB device port is unused the DDP and DDM pins may be left unconnected.

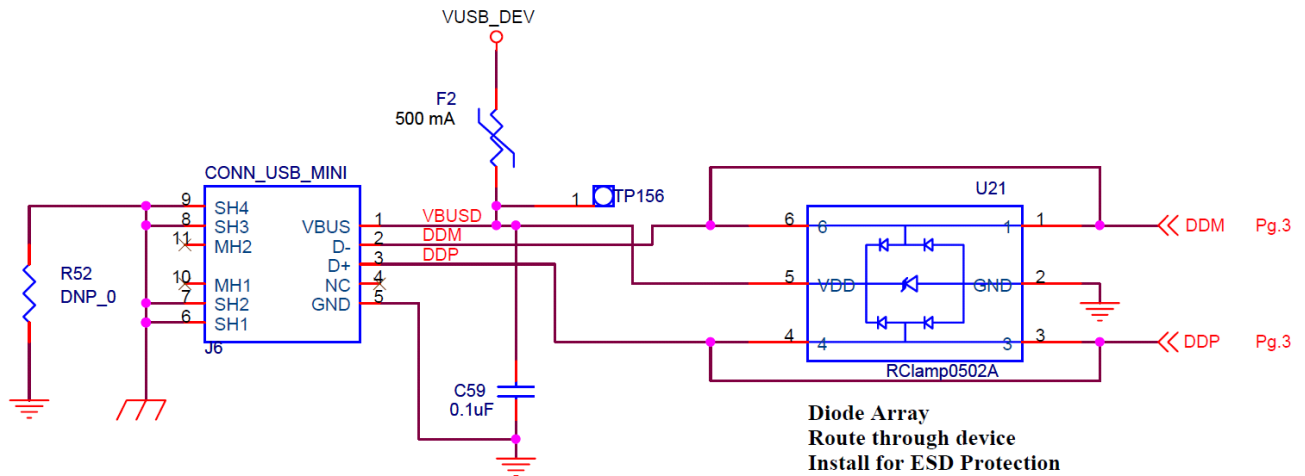
**Table 2-11 USB Host Port Signals**

| Pin Name | Description                  | Connector Pins | Signal Requirement                                | Mini Type B USB Device connector pin |
|----------|------------------------------|----------------|---|--------------------------------------|
| DDP      | USB Device Port Positive pin | 22             | Route as 90 ohm differential pair with DDM signal | 3                                    |



| Pin Name | Description                  | Connector Pins | Signal Requirement                                | Mini Type B USB Device connector pin |
|----------|------------------------------|----------------|---|--------------------------------------|
| DDM      | USB Device Port Negative pin | 24             | Route as 90 ohm differential pair with DDP signal | 2                                    |
| 5V       | 5V power from USB cable      |                | Current limit to 500 mA per port                  | 1                                    |
| Ground   | Signal Ground                | Ground         | Ground plane                                      | 5                                    |

Figure 2-9 USB Device Interface Example (xPico Wi-Fi only)



## LEDs

The xPico contains several external signals that are intended to drive external status LEDs. The LEDs are listed below. The signals may be connected as shown in the reference schematic figure below.

Table 2-12 xPico Status LED Output Signals

| Signal         | Pin | Description                    |
|----------------|-----|--------------------------------|
| LED1/WI-FI LED | 4   | WI-FI Status LED, active low   |
| SYSTEM_LED     | 20  | System status LED, active high |

Table 2-13 xPico Wi-Fi Status LED Output Signals

| Signal        | Pin | Description                       |
|---------------|-----|-----------------------------------|
| LED0/SPEED    | 6   | Ethernet speed LED, active low    |
| LED1/LINK     | 4   | Ethernet Link LED, active low     |
| LED2/ACTIVITY | 8   | Ethernet Activity LED, active low |
| LED3/DUPLEX   | 14  | Ethernet Duplex LED, active low   |
| SYSTEM_LED    | 20  | System status LED, active high    |

## General Purpose I/O Pins

xPico and xPico Wi-Fi contains eight pins which may be used as configurable inputs or outputs. Listed below are the configurable I/O pins. These pins are 3.3V CMOS logic level and 5V input tolerant.

**Table 2-14 Ethernet Interface xPico Serial Port Signals**

| Signal  | Pin | Description<br>xPico Wired                | Description<br>xPico Wi-Fi           | Reset<br>State |
|---------|-----|---|--------------------------------------|----------------|
| CP1     | 35  | Configurable I/O                          | Configurable I/O                     | Input          |
| CP2/INT | 26  | Configurable I/O-External interrupt input | Configurable I/O-SPI interrupt input | Input          |
| CP3     | 28  | Configurable I/O                          | Configurable I/O- SPI MISO           | Input          |
| CP4     | 30  | Configurable I/O                          | Configurable I/O-SPI MOSI            | Input          |
| CP5     | 32  | Configurable I/O                          | Configurable I/O                     | Input          |
| CP6     | 34  | Configurable I/O                          | Configurable I/O                     | Input          |
| CP7     | 27  | Configurable I/O                          | Configurable I/O-SPI Clock           | Input          |
| CP8     | 3   | Configurable I/O                          | Configurable I/O-SPI Chip Select     | Input          |

Note 1. For xPico Wi-Fi 5V tolerant pins, in order to sustain a voltage higher than  $V_{cc}+0.3$ , the internal pull-up/pull-down resistors must be disabled.

## Reset Pins

xPico and xPico Wi-Fi have two signals for use as reset signals. Signal EXT\_RESET# is a hardware controlled input signal that will reboot the xPico processor when asserted low. Signal DEFAULT# is polled by the xPico software. When DEFAULT# is asserted low for six seconds, the unit will reset the system to the default manufacturing settings and reboot the unit. xPico Wi-Fi has an additional signal on pin 14 that can be used to wake up the unit processor when the unit is in a sleep or power down state.

**Table 2-15 xPico Reset Signals**

| Signal                  | Pin | Description   | Reset<br>State | Internal pull-up                                   |
|-------------------------|-----|---|----------------|--|
| EXT_RESET#              | 38  | Unit hardware reset, active low. Drive low to reboot unit.                      | Input          | 10K (xPico)<br>40K (xPico Wi-Fi)                   |
| DEFAULT#                | 36  | Unit reset to default, active low. Drive low to reset unit to default settings. | Input          | Active 56K to<br>122K (xPico)<br>40K (xPico Wi-Fi) |
| WAKE (xPico Wi-Fi only) | 14  | Toggle signal from low to high to WAKE from SLEEP or Power down state           | Input          | 40K  |

# Evaluation Board Schematics

Figure 2-10 Evaluation Board Schematic, Part 1 of 5

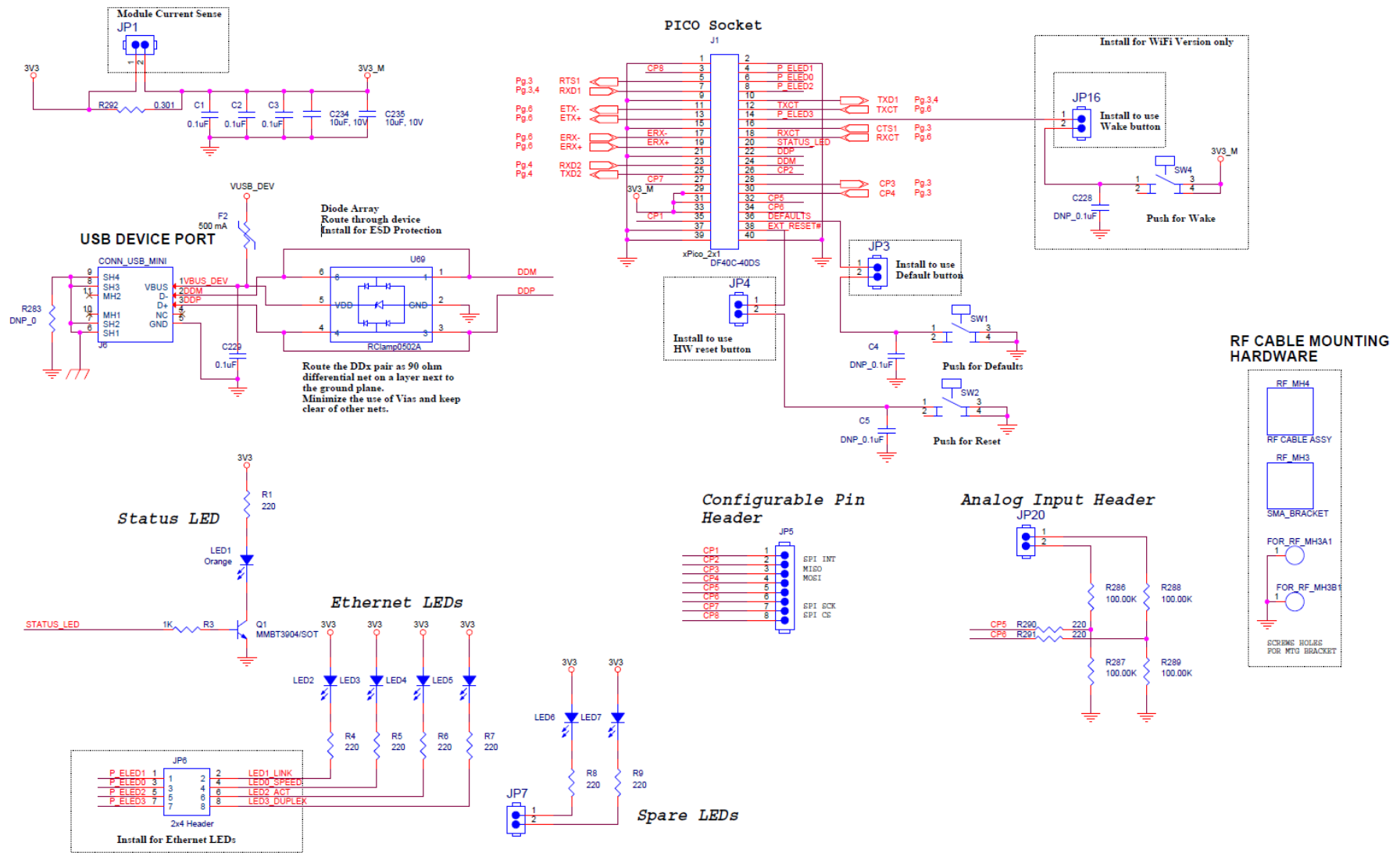




Figure 2-12 Evaluation Board Schematic, Part 3 of 5

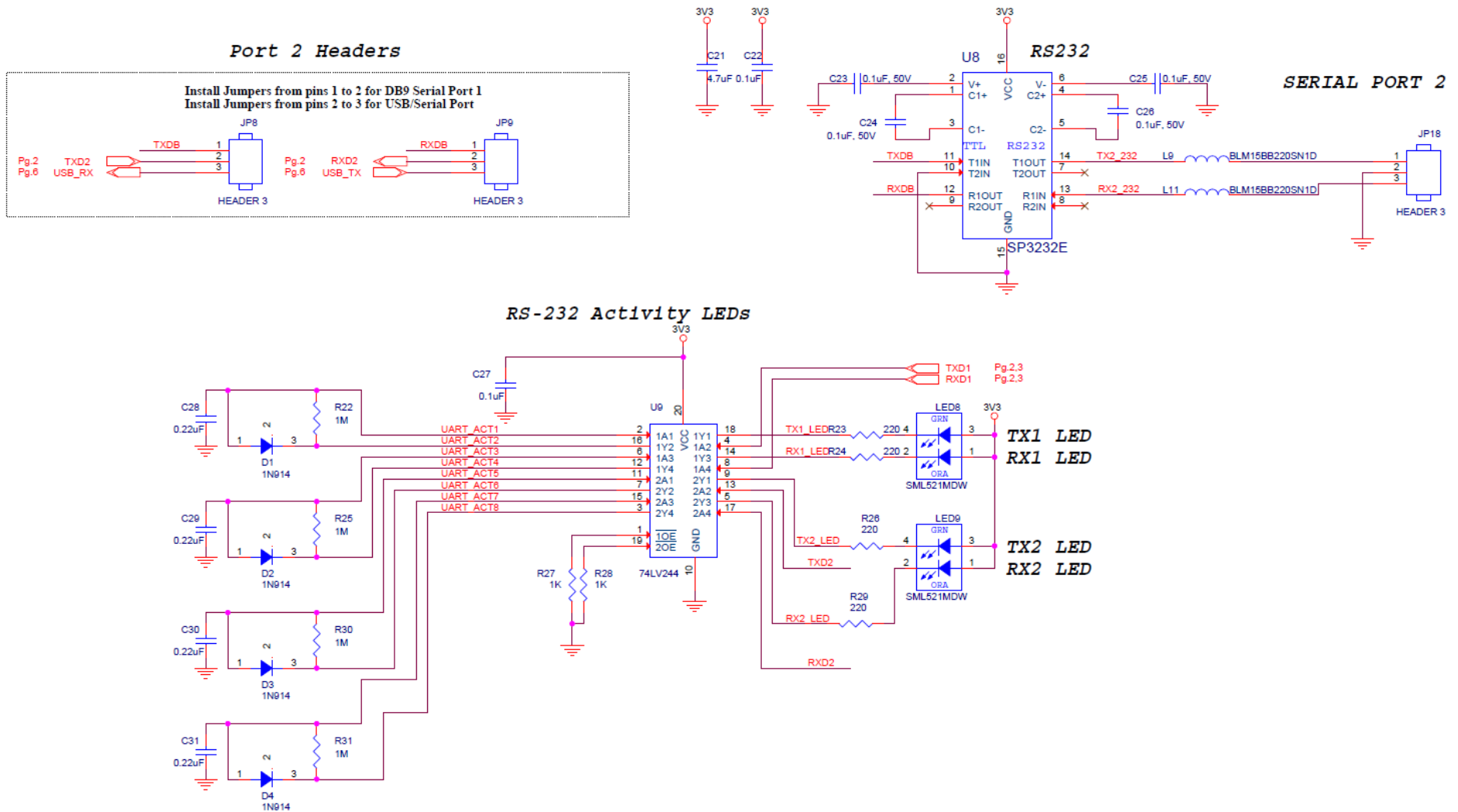


Figure 2-13 Evaluation Board Schematic, Part 4 of 5

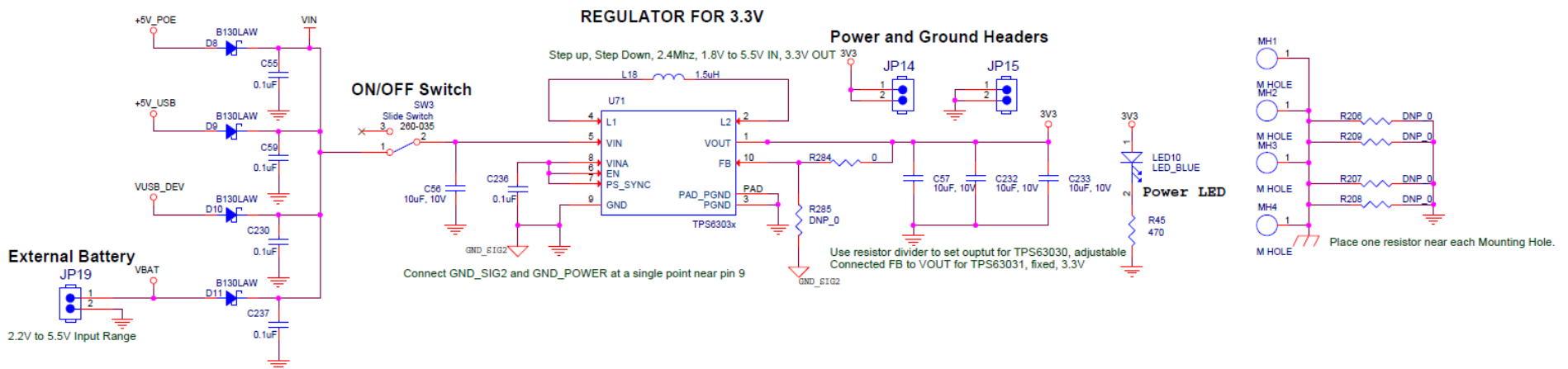
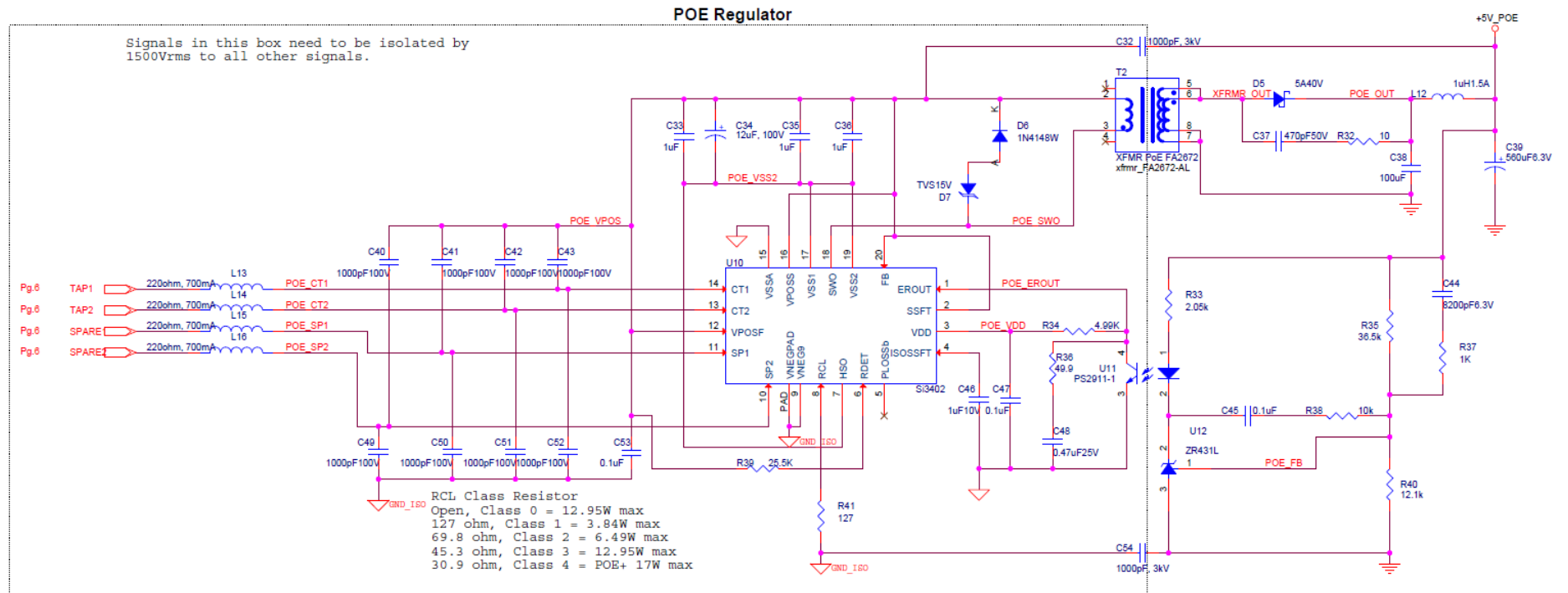
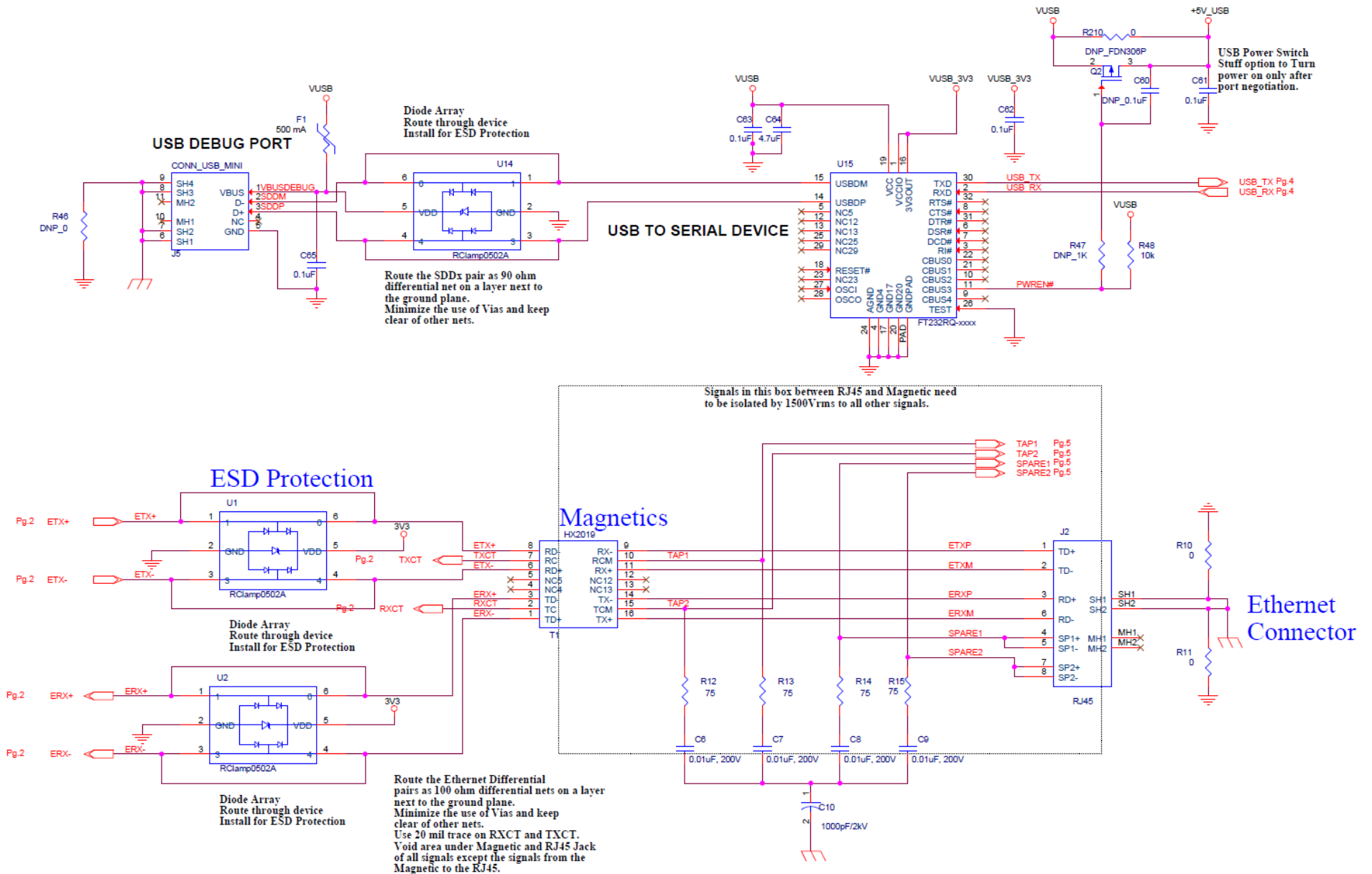


Figure 2-14 Evaluation Board Schematic, Part 5 of 5



### 3. Mounting Instructions and PCB Footprint

The xPico embedded device server dimensions and mounting instructions are shown in the following drawings below. You may also directly access the CAD files through the Lantronix website.

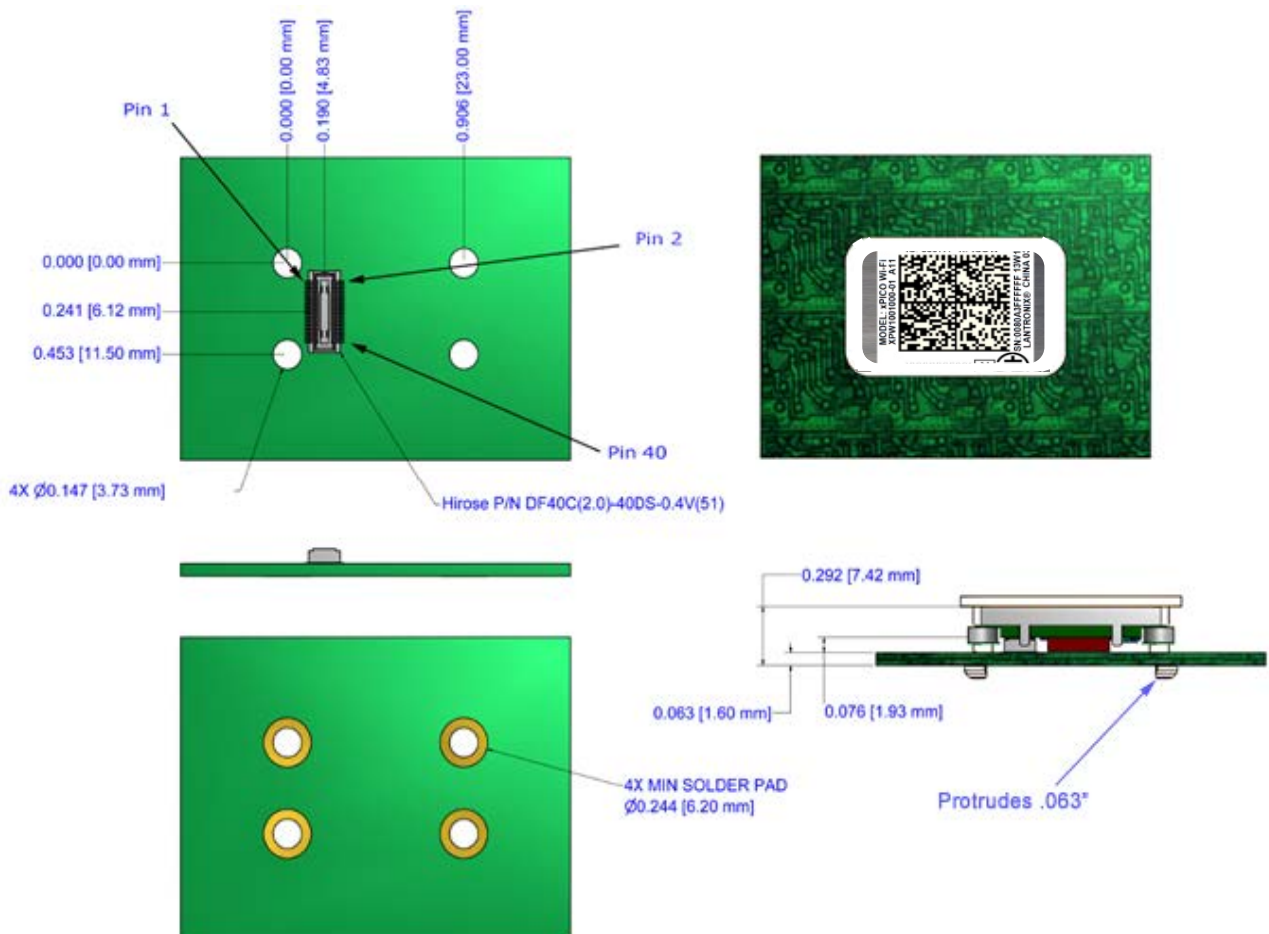
**Note:** The mounting instructions in this section are applicable to both the xPico and the xPico Wi-Fi Embedded Device Servers though the xPico pictures below are used to demonstrate installation.

For temperature environments up to +85° Celsius, it is recommended that the mating PCB have its outer layers flooded with signal ground and a heat pad be placed between the module and mating PCB. The recommended heat pad is Lantronix part number XPC100A002-01-B. The ground flooding and heat pad are only required for xPico Wi-Fi in environments above +70°C. For environments below +70°C the heat pad and ground flooding are not required.

#### To Access CAD Files

1. Go to <http://www.lantronix.com/products/cad-visio.html>.
2. Click **Download CAD files here** to access the **Registration Form**.

**Figure 3-1 White Mounting Quick Clip Dimensions**





## To Install the xPico or xPico Wi-Fi Module

In the xPico Development Kit (Part Number XPC100100K-02) and xPico Wi-Fi Development Kit (XPW100100K-01), the xPico module comes installed to the xPico Evaluation Board via the connector J1 (Hirose component). If ordered separately, you may need to install it by following the directions below. The included white Mounting Quick Clip is used to align and fasten the module to the evaluation board.

1. Place the module into the white mounting clip, lining up the clip legs and the four module grooves so that the module is seated inside the white clip. For xPico Wi-Fi connect the RF cable to the module U.FL connector prior to installing the Quick Clip.

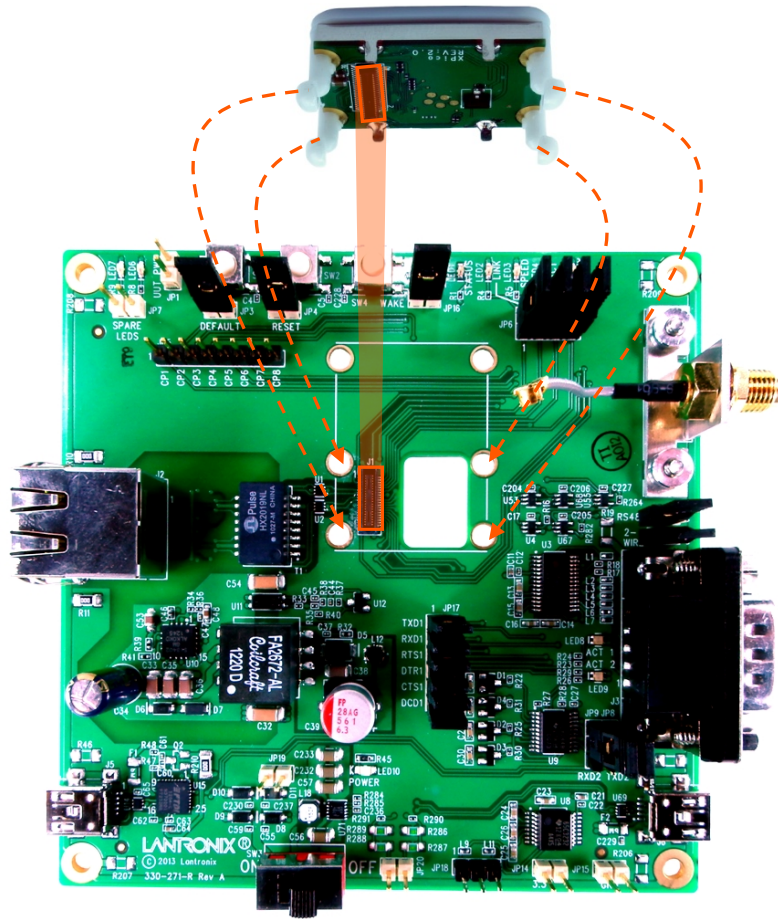


2. Push the legs of the white clip inward to secure the module to the clip.

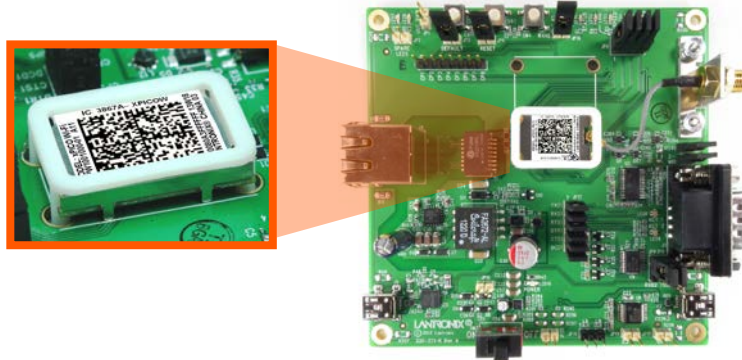


3. Flip over the module/mounting clip combination so that the product label displays on top and the white mounting clip legs are pointed downward.
4. For XPico Wi-Fi high temperature operation, above +70C, it is recommended to place a heat pad between the module and the adjacent PCB. The recommended heat pad is Lantronix part number XPC100A002-01-B (available in a 50 piece bulk pack).
5. Place the module/mounting clip combination so that the four mounting clip legs align with the four standoff holes on the board surrounding the J1 connector (see [Figure 3-2](#)). Make sure to properly orientate the module/mounting clip combination on the board, so that the J1 connector/Hirose component is properly aligned.

Figure 3-2 Aligning Mounting Clip Legs to Standoff Holes

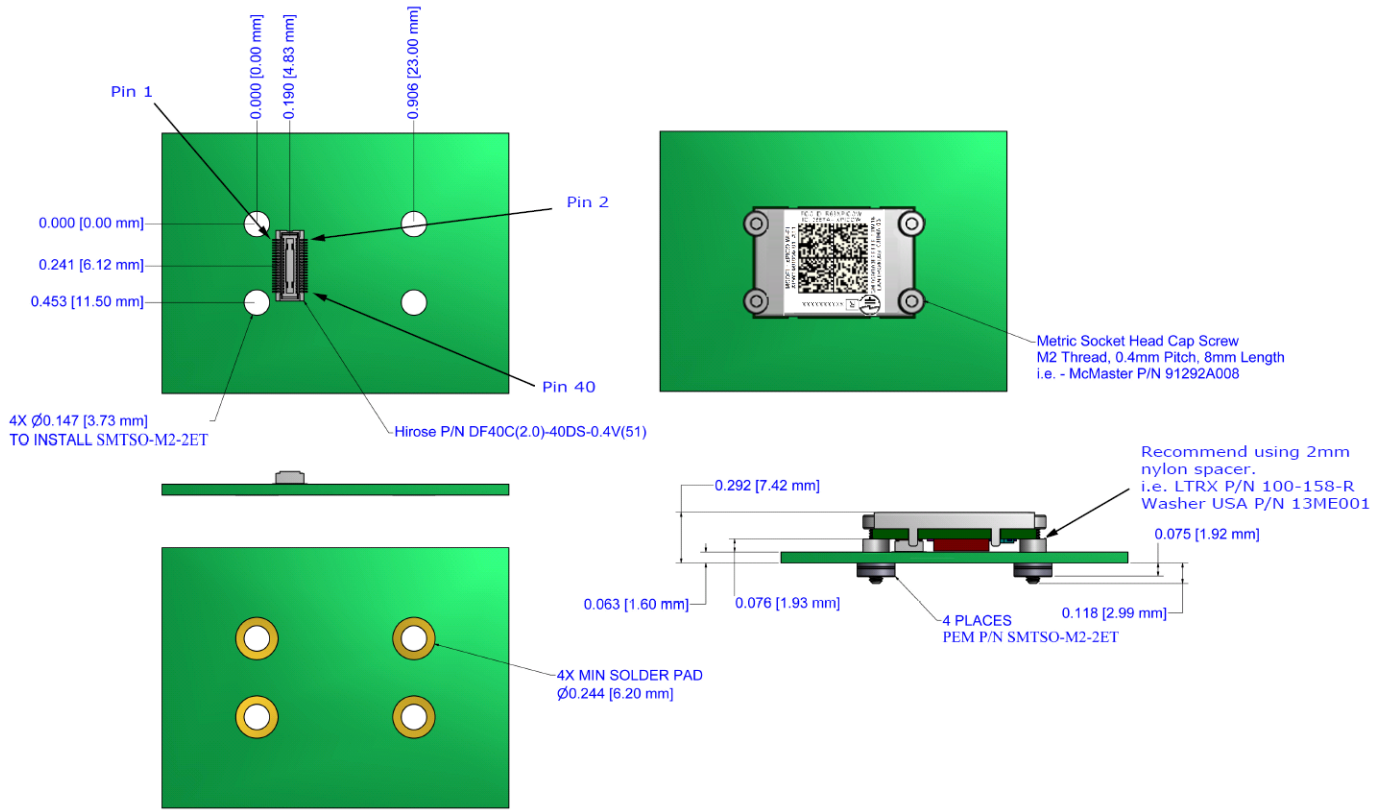


6. Insert the white clip legs furthest from the J1 connector first and gently push down on the xPico module above the J1 connector. Keep the module as level as possible during installation.



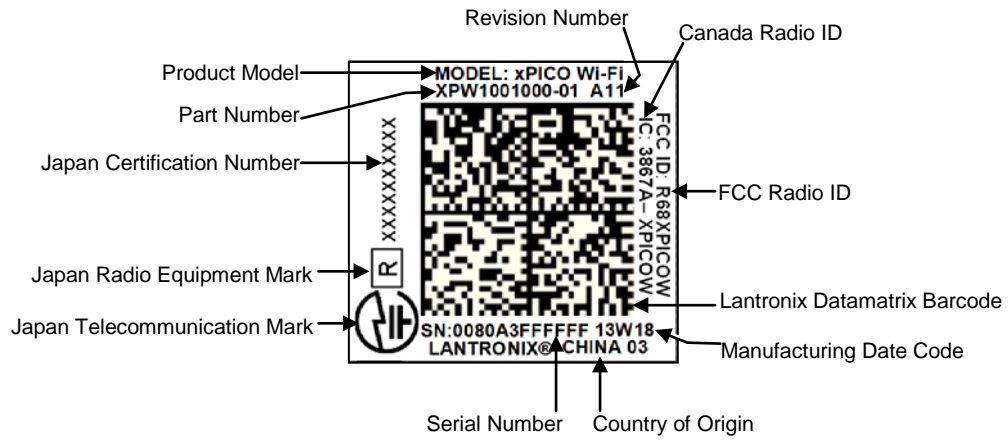
**Note:** When removing the xPico from the evaluation board, gently tug the module. Do not use excessive force or attempt to remove the xPico module by grasping and pulling the module from the short end opposite the module connector as this may cause damage to the J1 evaluation board connector.

Figure 3-3 Mounting Instructions for PEM Standoff





**Figure 3-6 xPico Wi-Fi Product Label**



## 4. Specifications

### Electrical Specifications

**Caution:** Stressing the device above the rating listed in this table may cause permanent damage to the xPico embedded device server. Exposure to Absolute Maximum Rating conditions for extended periods may affect the xPico's reliability. For xPico Wi-Fi operation above +70° Celsius, it is recommended that a heat pad be placed between the module and mating PCB.

Table 4-1 Absolute Maximum Ratings

| Parameter             | Symbol          | Min | Max | Units |
|-----------------------|-----------------|-----|-----|-------|
| Supply Voltage        | V <sub>CC</sub> | 0   | 3.6 | Vdc   |
| Operating Temperature |                 | -40 | 85  | °C    |
| Storage Temperature   |                 | -40 | 85  | °C    |

Table 4-2 xPico Wired Recommended Operating Conditions

| Parameter   | Symbol              | Min  | Typical | Max  | Units |
|---|---------------------|------|---------|------|-------|
| Supply Voltage  | V <sub>CC</sub>     | 3.15 | 3.3     | 3.46 | Vdc   |
| Supply Voltage Ripples                                | V <sub>CC_PP</sub>  |      |         | 2    | %     |
| 100 BaseTX Active (Normal CPU Speed)                  | I <sub>CC</sub>     |      | 200     |      | mA    |
| 10 BaseT Active (Normal CPU Speed)                    | I <sub>CC</sub>     |      | 220     |      | mA    |
| No Link (Normal CPU Speed)                            | I <sub>CC</sub>     |      | 150     |      | mA    |
| 100 BaseTX Active (High CPU Speed)                    | I <sub>CC</sub>     |      | 240     |      | mA    |
| 10 BaseT Active (High CPU Speed)                      | I <sub>CC</sub>     |      | 260     |      | mA    |
| No Link (High CPU Speed)                              | I <sub>CC</sub>     |      | 190     |      | mA    |
| 100 BaseTX Active (Low CPU Speed)                     | I <sub>CC</sub>     |      | 170     |      | mA    |
| 10 BaseT Active (Low CPU Speed)                       | I <sub>CC</sub>     |      | 190     |      | mA    |
| No Link (Low CPU Speed)                               | I <sub>CC</sub>     |      | 120     |      | mA    |
| Supply Reset Threshold                                | V <sub>RST</sub>    | 2.7  |         |      | Vdc   |
| CPx Pull-ups, except CP5, CP6                         | R <sub>PU</sub>     | 56   |         | 122  | Kohm  |
| CP5,CP6 Pull-up                                       | R <sub>PU</sub>     |      | 10      |      | Kohm  |
| CPx, RX Input Low Voltage                             | V <sub>CP_IL</sub>  |      |         | 0.8  | Vdc   |
| CPx, RX Input High Voltage                            | V <sub>CP_IH</sub>  | 2    |         | 5.5  | Vdc   |
| CPx, TX Output Low Voltage (I <sub>OL</sub> = 4 mA)   | V <sub>CP_OL</sub>  |      |         | 0.4  | Vdc   |
| CPx, TX Output High Voltage (I <sub>OH</sub> = -4 mA) | V <sub>CP_OH</sub>  | 2.4  |         |      | Vdc   |
| Reset Pin Low Voltage                                 | V <sub>RES_IL</sub> |      |         | 0.36 | Vdc   |
| Reset Pin High Voltage                                | V <sub>RES_IH</sub> | 2.0  |         | 3.46 | Vdc   |

Table 4-3 xPico WiFi Recommended Operating Conditions

| Parameter  | Symbol              | Min  | Typical | Max                  | Units |
|--|---------------------|------|---------|----------------------|-------|
| Supply Voltage   | V <sub>CC</sub>     | 3.15 | 3.3     | 3.46                 | Vdc   |
| Supply Voltage Ripples                                   | V <sub>CC_PP</sub>  |      |         | 2                    | %     |
| TX Power @ 16.5dBm, 802.11b, 11Mbps                      | I <sub>CC</sub>     |      | 330     | 380                  | mA    |
| TX Power @ 15dBm, 802.11g, 6Mbps                         | I <sub>CC</sub>     |      | 300     | 345                  | mA    |
| TX Power @ 13dBm, 802.11g, 54Mbps                        | I <sub>CC</sub>     |      | 255     | 295                  | mA    |
| TX Power @ 14.5dBm, 802.11n, MCS0                        | I <sub>CC</sub>     |      | 290     | 335                  | mA    |
| TX Power @ 12dBm, 802.11n, MCS7                          | I <sub>CC</sub>     |      | 230     | 265                  | mA    |
| RX Power @ 802.11b, 11Mbps                               | I <sub>CC</sub>     |      | 125     | 150                  | mA    |
| RX Power @ 802.11g, 54Mbps                               | I <sub>CC</sub>     |      | 125     | 150                  | mA    |
| RX Power @ 802.11n, MCS7                                 | I <sub>CC</sub>     |      | 125     | 150                  | mA    |
| Power Management State 1 @ 25°C                          | I <sub>CC</sub>     |      | 6       |                      | μA    |
| Power Management State 1 @ +85°C                         | I <sub>CC</sub>     |      | 12      |                      | μA    |
| Power Management State 1 @ -40°C                         | I <sub>CC</sub>     |      | 5       |                      | μA    |
| Supply Reset Threshold                                   | V <sub>RST</sub>    |      |         |                      | Vdc   |
| CPx Pull-ups/ Pull-downs                                 | R <sub>PU</sub>     | 30   | 40      | 50                   | Kohm  |
| CPx, RX<br>Input Low Voltage                             | V <sub>CP_IL</sub>  | -0.3 |         | 0.75                 | Vdc   |
| CPx, RX <sup>(1)</sup><br>Input High Voltage             | V <sub>CP_IH</sub>  | 2    |         | 5.5                  | Vdc   |
| CPx, TX Output Low Voltage<br>(I <sub>OL</sub> = 4 mA)   | V <sub>CP_OL</sub>  |      |         | 0.4                  | Vdc   |
| CPx, TX Output High Voltage<br>(I <sub>OH</sub> = -4 mA) | V <sub>CP_OH</sub>  | 2.4  |         |                      | Vdc   |
| Reset Pin Low Voltage                                    | V <sub>RES_IL</sub> | -0.3 |         | 0.8                  | Vdc   |
| Reset Pin High Voltage                                   | V <sub>RES_IL</sub> | 2    |         | V <sub>CC</sub> +0.3 | Vdc   |

Note 1. For xPico Wi-Fi 5V tolerant pins, in order to sustain a voltage higher than V<sub>CC</sub>+0.3, the internal pull-up/pull-down resistors must be disabled.



## Technical Specifications

**Table 4-4 xPico Wired 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<br>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 <- Serial 1 only   |
| Flow Control        | Serial 1: XON/XOFF (software), CTS/RTS (hardware)<br>Serial 2: XON/XOFF (software)   |
| Programmable I/O    | 8 PIO pins (software selectable), sink or source 4mA max.  |
| Network Interface   | 10/100Mbps Ethernet, requires external magnetics and RJ45  |
| 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                | Link, Activity, Link Speed, Duplex, System Status logic level outputs  |
| 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<br>Storage capacity: 384 Kbytes   |
| Weight              | 2.5 grams  |
| Material            | Metal shell  |
| Temperature         | Operating range:<br>-40°C to +85°C (-40°F to 185°F)  |
| Warranty            | For details on the Lantronix warranty policy, go to our web site at <a href="http://www.lantronix.com/support/warranty">www.lantronix.com/support/warranty</a> . |
| Included Software   | Windows™ 98/NT/2000/XP-based Device Installer configuration software and Windows™-based Com Port Redirector  |
| EMI Compliance      | See <a href="#">A:Compliance</a> .   |

**Table 4-5 xPico Wi-Fi Technical Specification**

| Category          | Description   |
|-------------------|---|
| CPU, Memory       | Cortex M3 CPU, 1MB Flash, 128KB+4KB SRAM, Additional 1MB on board Flash |
| Firmware          | Upgradeable via TFTP and serial port                                    |
| WLAN Standards    | 802.11 b/g/n Wireless LAN with external antenna                         |
| Antenna Connector | U.FL connector for external antenna                                     |
| Frequency Band    | 2.400Ghz to 2.484Ghz  |



| Category                                     | Description  |
|--|--|
| Channel Support                              | Channel 1 to Channel 14  |
| Modulation                                   | DSSS, CCK, OFDM, BPSK, QPSK, 16QAM, 64QAM  |
| Protocols Supported                          | ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP, and HTTP          |
| Data Rates 802.11b                           | 1, 2, 5.5, 11 Mbps   |
| Data Rates 802.11g                           | 6, 9, 12, 18, 24, 36, 48, 54 Mbps  |
| Data Rates 802.11n                           | HT20 MCS0 (6.5Mbps) to HT20 MCS7 (65Mbps)  |
| 802.11b, CCK Mode<br>Average Output Power    | 16.5 +/- 1.5dBm Typical @ 25C  |
| 802.11g, OFDM Mode<br>Average Output Power   | 15 +/- 1.5dBm, Typical @ 25C, 6Mbps<br>13 +/- 1.5dBm, Typical @ 25C, 54Mbps                  |
| 802.11n, OFDM Mode<br>Average Output Power   | 14.5 +/- 1.5dBm, Typical @ 25C, MCS0<br>12 +/- 1.5dBm, Typical @ 25C, MCS7                   |
| 802.11b<br>Average Output EVM                | IEEE Spec -10dBm   |
| 802.11g<br>Average Output EVM                | IEEE Spec, -5dB @ 6Mbps<br>IEEE Spec, -25dB @ 54Mbps   |
| 802.11n<br>Average Output EVM                | IEEE Spec, -5dB @ MCS0<br>IEEE Spec, -28dB @ MCS7  |
| 802.11b, PER <8%<br>RX Sensitivity @ 1Mbps   | -93dBm Typical<br>-89dBm Max   |
| 802.11b, PER <8%<br>RX Sensitivity @ 11Mbps  | -88dBm Typical<br>-84dBm Max   |
| 802.11g, PER <10%<br>RX Sensitivity @ 6Mbps  | -87dBm Typical<br>-83dBm Max   |
| 802.11g, PER <10%<br>RX Sensitivity @ 54Mbps | -74dBm Typical<br>-70dBm Max   |
| 802.11n, PER <10%<br>RX Sensitivity @ MCS0   | -87dBm Typical<br>-83dBm Max   |
| 802.11n, PER <10%<br>RX Sensitivity @ MCS7   | -71dBm Typical<br>-67dBm Max   |
| Serial Interface                             | CMOS (Asynchronous) 3.3V-level signals<br>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 <- Serial 1 only   |
| Flow Control                                 | Serial 1: XON/XOFF (software), CTS/RTS (hardware)<br>Serial 2: XON/XOFF (software)           |
| Programmable I/O                             | 8 PIO pins (software selectable), sink or source 4mA max.                                    |
| LEDs   | WLAN Status, System Status logic level outputs   |
| 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<br>Storage capacity: TBD Kbytes                     |
| Weight                                       | 2.5 grams  |
| Material                                     | Metal shell  |

| Category          | Description  |
|-------------------|--|
| Temperature       | Operating range:<br>-40°C to +85°C (-40°F to 185°F) with use of heat pad between module and mating PCB   |
| Warranty          | For details on the Lantronix warranty policy, go to our web site at <a href="http://www.lantronix.com/support/warranty">www.lantronix.com/support/warranty</a> . |
| Included Software | Windows™ 98/NT/2000/XP-based Device Installer configuration software and Windows™-based Com Port Redirector  |
| EMI Compliance    | See <a href="#">A:Compliance</a> .   |

## A: Compliance (xPico Embedded Device Server)

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

### Manufacturer's Name & Address:

Lantronix, Inc. 167 Technology Drive, Irvine, CA 92618 USA

*Declares that the following product:*

**Product Name Model:** xPico® Embedded Device Server

*Conforms to the following standards or other normative documents:*

### Electromagnetic Emissions/Immunity:

**Table A-1 Electromagnetic Emissions**

| Test Description    | Specification                               | Test Method     |
|---------------------|---|-----------------|
| Radiated Emissions  | EN 55022:2010 Class B                       | CISPR 22:2008   |
| Radiated Emissions  | FCC 15.109(g):2012<br>CISPR 22:1997 Class B | ANSI C63.4:2009 |
| Conducted Emissions | EN 55022:2010 Class B                       | CISPR 22:2008   |
| Conducted Emissions | FCC 15.109(g):2012<br>CISPR 22:1997 Class B | ANSI C63.4:2009 |

**Table A-2 Electromagnetic Immunity**

| Test Description        | Specification | Test Method                                | Performance Criteria |
|-------------------------|---------------|--|----------------------|
| ESD                     | EN 55024:2010 | IEC 61000-4-2:2008                         | 2                    |
| Radiated Immunity       | EN 55024:2010 | IEC 61000-4-3:2010                         | 1                    |
| EFT                     | EN 55024:2010 | IEC 61000-4-4:2004<br>(Amended by A1:2010) | 1                    |
| Surge                   | EN 55024:2010 | IEC 61000-4-5:2005                         | 1                    |
| Conducted Immunity      | EN 55024:2010 | IEC 61000-4-6:2008                         | 1                    |
| Magnetic Field Immunity | EN 55024:2010 | IEC 61000-4-8:2009                         | 1                    |
| Voltage Interruptions   | EN 55024:2010 | IEC 61000-4-11:2004                        | 3                    |
| Voltage Dips            | EN 55024:2010 | IEC 61000-4-11:2004                        | 1                    |

### Manufacturer's Contact:

Lantronix, Inc.  
167 Technology Drive  
Irvine, CA 92618 USA  
Tel: (800) 526-8766  
Tel: (949) 453-3990  
Fax: (949) 453-3995

## B: Compliance (xPico Wi-Fi Embedded Device Server)

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

### Manufacturer's Name & Address:

Lantronix, Inc. 167 Technology Drive, Irvine, CA 92618 USA



Declares that the following product:

**Product Name Model:** xPico® Wi-Fi® Embedded Device Server

Conforms to the following standards or other normative documents:

### Country Wireless Certifications


**Table B-1 Country Certifications**

| Country  | Specification   |
|--|---|
| USA                             | FCC Part 15, Subpart B, Class B<br>ICES-003:2012 Issue 5, Class B<br>ANSI C63.4-2009  |
| USA  | FCC Part 15, Subpart C (Section 15.247)<br>ANSI C63.10-2009<br>FCC Part 2 (Section 2.1091)<br>FCC OET Bulletin 65, Supplement C (01-01)<br>IEEE C95.1 |
| Canada   | Canada RSS-210 Issue 8 (2010-12)<br>Canada RSS-Gen Issue 3 (2010-12)<br>ANSI C63.10-2009<br>RSS-102 Issue 4 (2010-12)                                 |
| EU   | EN 300 328 V1.8.1 (2012-06)<br>EN 301 489-1 V1.9.2 (2011-09)<br>EN 301 489-17 V2.2.1 (2012-09)<br>EN 55022:2010+AC:2011, Class B<br>EN62311:2008      |
| Australia, New Zealand  11206 | AS/NZS 4268: 2012   |
| Japan  | ARIB STD-T66, MIC notice 88 Appendix 43<br>RCR STD-33, MIC notice 88 Appendix 44  |

**Table B-2 Country Transmitter IDs**

| Country      | Specification |
|--------------|---------------|
| USA FCC ID   | R68XPICOW     |
| Canada IC ID | 3867A-XPICOW  |
| Japan ID     | 201-135275    |

**Table B-3 Safety**

| Country   | Specification  |
|---|--|
| World Wide  0560 | CB<br>EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011<br>In accordance with the council directive 2006/95/EC |
| US, Canada  | UL 60950-1 (2nd Edition)   |

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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)
- Mercury (Hg)
- Cadmium (Cd)
- 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 & sPress-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                                     |
| xPort Pro              | 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                                     |
| PremierWave            | 0  | 0            | 0            | 0                             | 0                              | 0                                     |
| Micro125               | 0  | 0            | 0            | 0                             | 0                              | 0                                     |
| xPico                  | 0  | 0            | 0            | 0                             | 0                              | 0                                     |
| xPico Wi-Fi            | 0  | 0            | 0            | 0                             | 0                              | 0                                     |
| xPrintServer           | 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.