

# **Mini EVK Hardware Guide**

## **Revision 3**



Echelon, LONWORKS, Neuron, 3120, 3150 and the Echelon logo are trademarks of Echelon Corporation registered in the United States and other countries. *i*.LON and ShortStack are trademarks of Echelon Corporation.

Other brand and product names are trademarks or registered trademarks of their respective holders.

Neuron Chips and other OEM Products were not designed for use in equipment or systems which involve danger to human health or safety or a risk of property damage and Echelon assumes no responsibility or liability for use of the Neuron Chips in such applications.

Parts manufactured by vendors other than Echelon and referenced in this document have been described for illustrative purposes only, and may not have been tested by Echelon. It is the responsibility of the customer to determine the suitability of these parts for each application.

ECHELON MAKES AND YOU RECEIVE NO WARRANTIES OR CONDITIONS, EXPRESS, IMPLIED, STATUTORY OR IN ANY COMMUNICATION WITH YOU, AND ECHELON SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Echelon Corporation.

Copyright © 2006 Echelon Corporation.

Echelon Corporation  
[www.echelon.com](http://www.echelon.com)



# DECLARATION OF CONFORMITY

## Mini Evaluation Kit

---

Application of Council Directive: 89/336/EEC, Electromagnetic Compatibility Directive (EMC)

Manufacturer's Name: Echelon Corporation

Manufacturer's Address: 550 Meridian Avenue  
San Jose, CA 95126  
USA

Manufacturer's Address:  
in Europe Echelon BV  
Printerweg 3  
3821 AP Amersfoort  
The Netherlands

Product Model Number: 10000R-32-241, 10000R-32-242, 10000R-32-243, 10000R-32-244,  
10000R-32-27

Type of Equipment: Information Technology Equipment

Standards to which:  
Conformity is  
Declared

EN 55022:1998	EN 61000-4-2
EN 55024:1998	EN 61000-4-4
EN 61000-4-3	EN 61000-4-6
EN 61000-4-5	EN 61000-4-11
EN 50065-1:1999*	

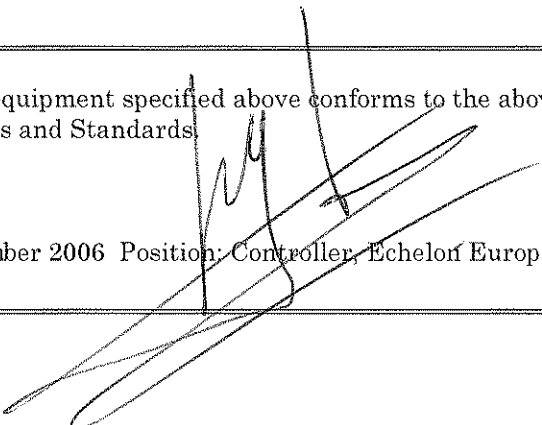
\*applies to model 10000R-32-27 only

---

I, Wim Meijer, hereby declare that the equipment specified above conforms to the above Directives and Standards

Place: Amersfoort, The Netherlands Date: December 2006 Position: Controller, Echelon Europe

---





---

# Welcome

Echelon’s Mini EVK Evaluation Kit is a tool for evaluating the development of control network applications with the ANSI/CEA-709.1 (EN14908) Control Network Protocol. You can use the Mini EVK to develop a prototype or production control system that requires networking, particularly in the rapidly growing, price-sensitive mass markets of smart light switches, thermostats, and other simple devices and sensors. You can also use the Mini EVK to evaluate the development of applications for such control networks using the LONWORKS® platform.

This document describes the hardware included with the Mini EVK, including assembly instructions and other information you will need when using the Mini EVK.

---

## Related Documentation

The *Introduction to the LONWORKS System* document provides an introduction to the ANSI/CEA-709.1 (EN14908) Control Network Protocol. The *Mini EVK User’s Guide* describes how to use the example applications included with the Mini EVK, and how to develop your own applications with the Mini EVK. The *LONWORKS USB Network Interface User’s Guide* describes how to install and configure the USB Network Interface included with the EVK.

You can view these documents by clicking the Windows **Start** menu, opening the **Echelon Mini EVK** program folder, and then opening the **Mini EVK Documentation** folder and clicking **Introduction to LONWORKS**, **Mini EVK User’s Guide**, or **LONWORKS USB Network Interface User’s Guide**

---

## Table of Contents

<b>Mini EVK Hardware Overview .....</b>	<b>1</b>
Mini EVK Hardware Contents.....	2
Assembling the PL EVB Evaluation Boards.....	2
Assembling the FT EVB Evaluation Boards.....	5
Using the USB Network Interface .....	8
Other Network Interfaces .....	8
<b>Hardware Details.....</b>	<b>11</b>
FT and PL EVB Evaluation Boards.....	12
Service Pin and Reset Buttons .....	12
Jumper Settings.....	14
Stand-alone Power Line Coupler Connector.....	17
I/O Connector .....	19
MiniGizmo I/O Board.....	19
MiniGizmo Push Buttons and LEDs.....	20
MiniGizmo Temperature Sensor .....	20
MiniGizmo Piezo Buzzer .....	20
Design and Test for Electromagnetic Compatibility .....	20



# 1

## Mini EVK Hardware Overview

This chapter introduces the hardware components included with the Mini EVK, and describes how to assemble the PL and FT EVB Evaluation Boards.

---

## Mini EVK Hardware Contents

The Mini EVK includes the following hardware:

- A PL 3120® and a PL 3150® EVB Evaluation Board if you are using the PL-20C or PL-20N version of the Mini EVK, or an FT 3120 and FT 3150 EVB Evaluation Board if you are using the TP/FT-10 version of the Mini EVK.
- Two MiniGizmo I/O Boards that can be attached to each EVB.
- A U10 or U20 USB Network Interface you can use to attach the computer running the Mini EVK software to a TP/FT-10 or PL-20 channel for communicating with your target hardware devices.
- A cable for wiring your devices together (TP/FT-10 version only).

You will need to assemble the evaluation boards and connect them to a network channel before you can use the Mini EVK software. You will also need to attach the computer running the Mini EVK software to the network channel with the USB Network Interface (or any other layer 5 LONWORKS network interface). These tasks are described in the following sections:

- *Assembling the PL EVB Evaluation Boards.* This section describes how to assemble the PL EVB Evaluation Boards and connect them to a power line channel.
- *Assembling the FT EVB Evaluation Boards.* This section describes how to assemble the FT EVB Evaluation Boards and connect them to a free topology twisted pair channel.
- *Using the USB Network Interface.* This section describes how to use the USB Network Interface to attach the computer running the Mini EVK software with the network channel to which the evaluation boards are attached. It also includes instructions to follow when using other LONWORKS network interfaces with the Mini EVK.

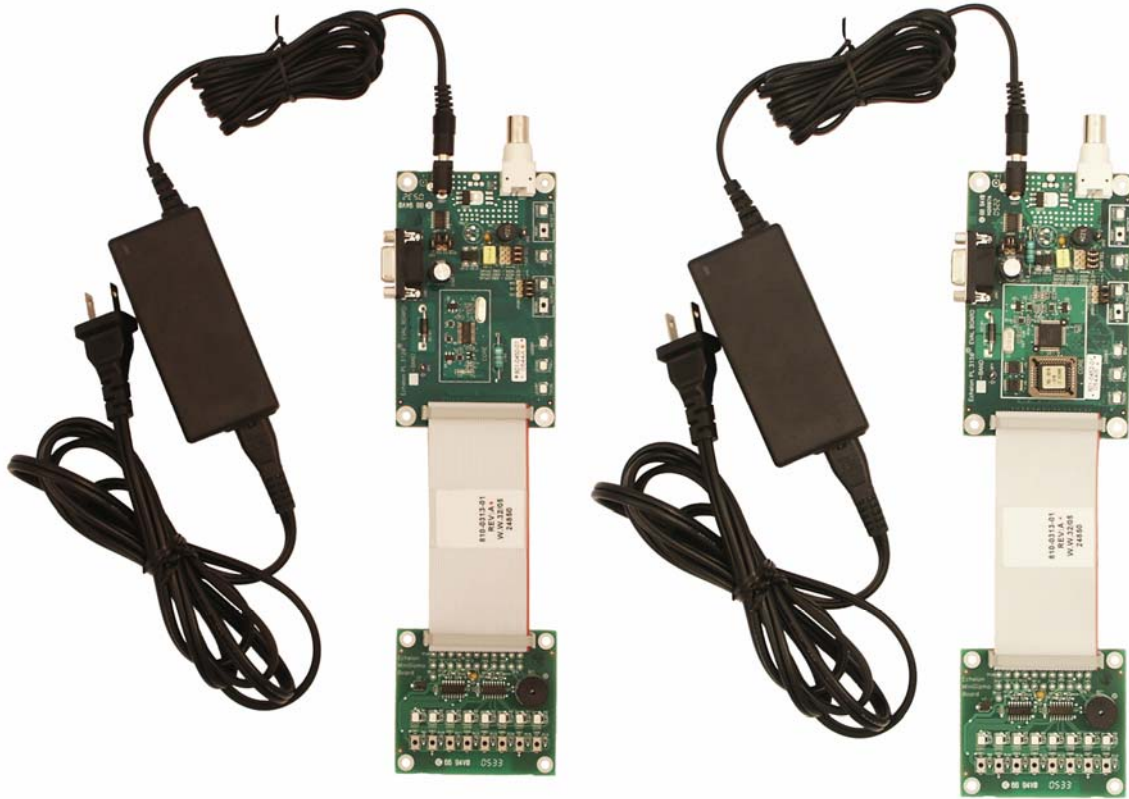
---

## Assembling the PL EVB Evaluation Boards

The PL EVB Evaluation Boards utilize Echelon's Power Line Smart Transceivers to signal over any AC or DC power circuit, eliminating any need for additional wiring. The Mini EVK power supplies included with the PL EVB Evaluation Boards pass the network signals directly into the AC power lines over the same two wires that power the evaluation boards. With the PL EVB Evaluation Boards, you can begin building a control network by simply plugging the evaluation boards into an electrical outlet.

Figure 1.1 shows the PL 3120 and PL 3150 EVB Evaluation Boards, as they will appear when assembled.





**Figure 1.1** PL 3150 and PL 3120 EVB Evaluation Boards

To assemble the PL EVB Evaluation Boards, follow these steps:

1. Unpack the equipment from the shipping carton. Refer to Table 1.1 to verify that all hardware items are present. Avoid touching areas of integrated circuitry, as static discharge can damage circuits.

**NOTE:** The PL Evaluation Boards are shipped in protective anti-static packaging. When assembling the PL EVB Evaluation Boards, the boards must not be subjected to high electrostatic potentials. You should wear a grounding strap or similar protective device when handling the boards. Avoid touching the component pins, or any other metallic equipment on the evaluation boards.

**Table 1.1** Mini EVK Contents – Power Line Version

Item Description	Quantity
PL 3120 EVB Evaluation Board	1
PL 3150 EVB Evaluation Board	1
110VAC or 230VAC Mini EVK Power Supplies, depending on the Mini EVK model ordered	3
MiniGizmo	2

Item Description	Quantity
MiniGizmo Cables	2
U20 USB Network Interface	1
Mini EVK CD	1
LonScanner™ Trial Edition CD	1
LNS® DDE Server Trial Edition CD	1
Echelon Technical Documentation CD	1

- Use the MiniGizmo cables to connect each of the evaluation boards to a MiniGizmo, as shown in Figure 1.1. You will use the MiniGizmo for I/O when you run the example applications included with the Mini EVK on the evaluation boards.

For more information on the MiniGizmo, including descriptions of the LEDs and push buttons on the MiniGizmo, see Chapter 2, *Hardware Details*. For more information on the Mini EVK example applications, see the *Mini EVK User's Guide*.

- Connect each of the evaluation boards to a Mini EVK power supply, as shown in Figure 1.1. Then, insert the power supplies into a power source. The power LED on each evaluation board will activate when it is powered on.

This connects the evaluation board to the power line channel. The Mini EVK power supplies include internal coupling to enable the evaluation boards to communicate through the power supply. You cannot substitute another power supply for the Mini EVK power supply, unless your alternative power supply provides equivalent coupling.

- After you initially connect power to a PL Evaluation Board, **LED1** will begin flashing, indicating that the PL Evaluation Board has entered CENELEC configuration mode. If **LED8** is on, then the CENELEC access protocol is enabled. If **LED8** is off, CENELEC is disabled. By default, CENELEC is enabled.

If you want to change the current setting, you can press the **SW8** button to disable CENELEC. When you have made a selection, press the **SW1** button to confirm your selection and exit CENELEC configuration mode. Remember to make sure that **LED8** is on before pressing **SW1** if you want CENELEC enabled, or off if you want CENELEC disabled. You will not be able to perform any network operations with the PL Evaluation Board until you have made a selection and exited CENELEC configuration mode.

The CENELEC setting affects the Hardware Template and Channel Type selections you will make when using the Mini Application with the PL EVB Evaluation Boards. See Chapter 2 of the *Mini EVK User's Guide* for more information on these settings.

The CENELEC EN 50065-1 standard specifies an access protocol for C-band channels to allow multiple power line signaling devices from different manufacturers to operate on a common AC-mains circuit. See Chapter 8 of the *PL 3120 / PL 3150 Smart Transceiver Data Book* for more information on the CENELEC protocol. You can download the *PL 3120 / PL 3150 Smart Transceiver Data Book* from Echelon's Web site at [www.echelon.com](http://www.echelon.com).

5. Attach the computer running the Mini Application to the power line channel with the U20 USB Network Interface (or any other layer 5 LONWORKS network interface). See the *Using the USB Network Interface* section on page 8 for more information on this.
6. Use the Mini EVK Application (*Mini Application*), the Mini EVK Monitoring & Control Application, and the Mini EVK Neuron® C example applications with the evaluation boards as described in the *Mini EVK User's Guide*.

**NOTE:** Echelon power line technology provides virtual plug and play communication in a single-family home environment. Mini EVK users are encouraged to explore the communication capabilities of these evaluation units in a variety of home environments.

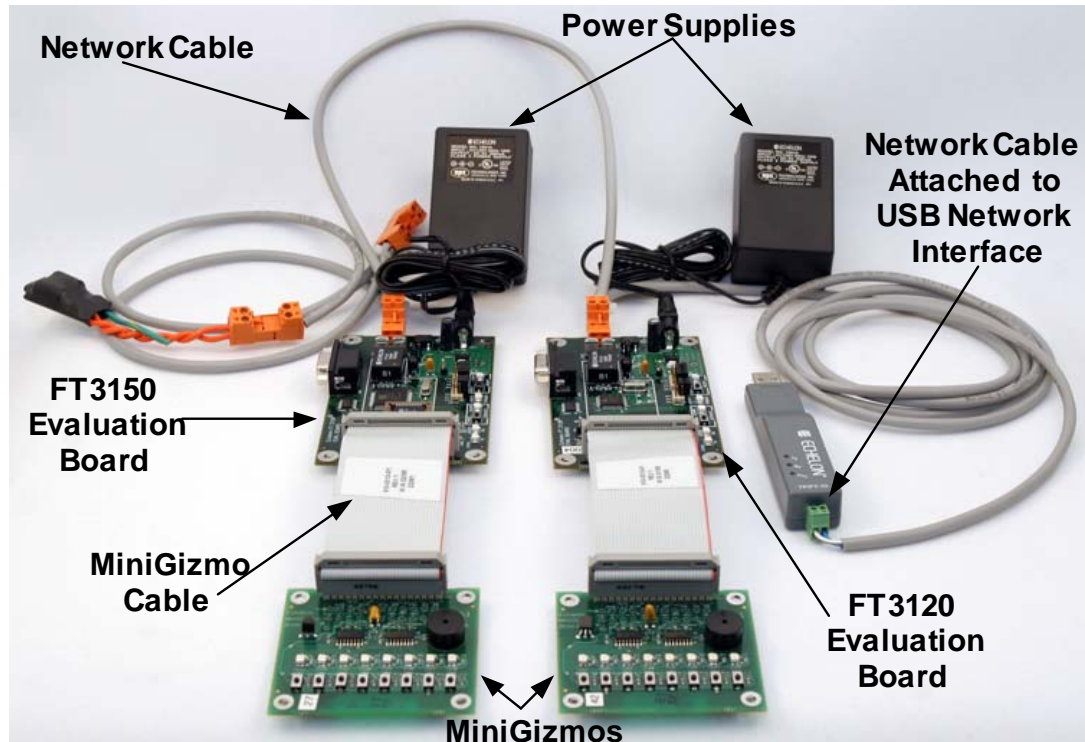
Reliable power line communication in a commercial environment — where nearby outlets may be serviced from different distribution transformers with very long branch circuits — is possible with the addition of routers, as described in the *Centralized Commercial Building Applications with the PLT-21 Power Line Transceiver Engineering Bulletin* (005-0056-01). Communication in a commercial environment without the additional routers described in this engineering bulletin may not be reliable.

For best results, do not attempt to communicate through mains power bars or power strips that contain EMC filters. This can be accomplished by plugging the Mini EVK supply into a plug on the input side of a filtered power bar.

---

## Assembling the FT EVB Evaluation Boards

The FT 3120 and FT 3150 EVB Evaluation Boards utilize Echelon's FT Smart Transceiver technology to communicate over TP/FT-10 channels. Figure 1.2 shows the FT 3120 and FT 3150 EVB Evaluation Boards, as they will appear when assembled.



**Figure 1.2** FT 3150 and FT 3120 EVB Evaluation Boards

To assemble the FT EVB Evaluation Boards, follow these steps:

1. Unpack the equipment from the shipping carton. Refer to Table 1.2 to verify that all hardware items are present. Avoid touching areas of integrated circuitry, as static discharge could damage circuits.

**NOTE:** The FT Evaluation Boards are shipped in protective anti-static packaging. When assembling the FT EVB Evaluation Boards, the boards must not be subjected to high electrostatic potentials. You should wear a grounding strap or similar protective device when handling the boards. Avoid touching the component pins, or any other metallic equipment on the evaluation boards.

**Table 1.2** Mini EVK Contents – Free Topology Version

Item Description	Quantity
FT 3120 EVB Evaluation Board	1
FT 3150 EVB Evaluation Board	1
100VAC, 120VAC, or 230VAC Echelon Power Supplies, depending on the Mini EVK model ordered*	2
MiniGizmo	2

Item Description	Quantity
MiniGizmo Cables	2
U10 USB Network Interface	1
Network Cable	1
Mini EVK CD	1
LonScanner Trial Edition CD	1
LNS DDE Server Trial Edition CD	1
Echelon Technical Documentation CD	1

\*There are four Mini EVK free topology models available, one for US power supplies (120VAC), one for Continental Europe power supplies (230VAC), one for the UK (230VAC) and one for Japan (100VAC). Consult the *Mini EVK Evaluation Kit* data sheet at [www.echelon.com](http://www.echelon.com) for more information on these models.

- Use the MiniGizmo cables to connect each of the evaluation boards to a MiniGizmo, as shown in Figure 1.2. You will use the MiniGizmo for I/O when you run the example applications included with the Mini EVK on the evaluation boards.

For more information on the MiniGizmo, including descriptions of the LEDs and push buttons on the MiniGizmo, see Chapter 2, *Hardware Details*. For more information on the Mini EVK example applications, see the *Mini EVK User's Guide*.

- Connect each of the evaluation boards to an Echelon power supply, as shown in Figure 1.2. Then, insert the power supplies into a power source. The power LED on each evaluation board will activate when it is powered on.

Depending on the model, your power supply might look slightly different than the power supplies in Figure 1.2.

- Connect the orange network connector on each evaluation board to the network cable included with your Mini EVK.
- Attach the computer running the Mini Application to the TP/FT-10 channel with the U10 USB Network Interface (or any other layer 5 LONWORKS network interface). See the *Using the USB Network Interface* section below for more information on this.
- Use the Mini EVK Application (*Mini Application*), the Mini EVK Monitoring & Control Application, and the Mini EVK Neuron C example applications with the evaluation boards as described in the *Mini EVK User's Guide*.

---

## Using the USB Network Interface

You can use the U10 or U20 USB Network Interface included with the Mini EVK to enable your computer to communicate with your evaluation boards, or with other LONWORKS devices that you purchase or develop.

To use a U10 USB Network Interface, insert the USB Network Interface into a USB port on your computer and then attach the USB Network Interface to the TP/FT-10 channel. To use a U20 USB Network Interface, connect a Mini EVK Power Supply to the network interface, plug in the power supply, and then insert the USB Network Interface into a USB port on your computer.

If the USB Network Interface is the only network interface installed on your computer, it will use the name **LON1** by default. You will need to know the name when using the Mini Application with the USB Network Interface.

For more detailed instructions to follow when using the USB Network Interface, see the *LONWORKS USB Network Interface User's Guide*.

---

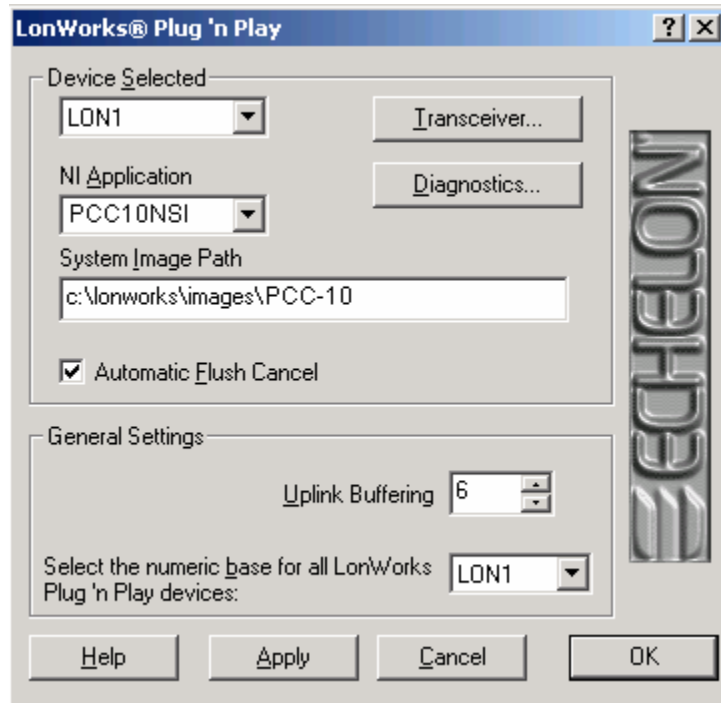
## Other Network Interfaces

You can use a LONWORKS network interface other than the USB Network Interface with the Mini EVK, as long as it is configured to operate as a layer 5 network interface. The U10 and U20 USB Network Interfaces included with the Mini EVK automatically select a layer 5 interface when used with the Mini Application, the Monitoring & Control Example Application, or other OpenLDV applications. Some LONWORKS network interfaces, such as the SLTA-10 and the *i.LON*<sup>™</sup> 100 Internet Server, operate as layer 5 network interfaces by default and do not require any additional configuration to meet this requirement.

If you are using a PCC-10, a PCLTA-20, or a PCLTA-21 as your network interface, you will need to configure it to operate as a layer 5 network interface before using it with the Mini EVK. You can do so with the LONWORKS Plug 'n Play application.

To configure a PCC-10, PCLTA-20, or PCLTA-21 as a layer 5 network interface, follow these steps:

1. Open the Windows Control Panel, and then double-click the **LONWORKS Plug 'n Play** icon. The dialog shown in Figure 1.3 opens.



**Figure 1.3** LONWORKS Plug 'n Play Application

2. Select your network interface in the **Device Selected** box.
3. If you are using a PCC-10, set **NI Application** to **PCC10NSI**. If you are using a PCLTA-20 or a PCLTA-21, set **NI Application** to **NSIPCLTA**.
4. Click **OK** to save your changes and close the LONWORKS Plug 'n Play application. You can now use your PCC-10, PCLTA-20, or PCLTA-21 with the Mini Application, or any other OpenLDV application.





# 2

## Hardware Details

This chapter provides additional details about the hardware included with the Mini EVK, including descriptions of the LEDs and push buttons on the MiniGizmos and evaluation boards. It also provides information you will need when using custom applications and I/O devices with the evaluation boards. It includes the following major sections:

- *FT and PL EVB Evaluation Boards.* Provides details on the Reset and Service buttons and LEDs on the PL and FT Evaluation Boards, and describes different jumper settings you can use with the PL and FT Evaluation Boards.
- *MiniGizmo I/O Board.* Describes the push buttons, LEDs temperature sensor and piezo buzzer included on the MiniGizmo.

---

## FT and PL EVB Evaluation Boards

This section provides additional details on PL and FT EVB Evaluation Boards, including descriptions of the Service and Reset buttons, LEDs, jumper settings, and Stand-alone Power Line Coupler connector.

The Mini EVK includes schematics for the peripheral circuitry for the EVB evaluation boards. The peripheral circuitry is the section of the evaluation board external to the core circuit (i.e. the part of the evaluation board labeled CORE, that contains the PL or FT Smart Transceiver). For details on the PL core circuit, see the Echelon PL DSK Power Line Smart Transceiver Development Support Kit. For details on the FT core circuit, see the *FT 3120 & FT 3150 Smart Transceiver Data Book*.

To view the Mini EVK schematics, click **Start**, point to **All Programs > Echelon Mini EVK > Board Schematics**, and then click one of the four EVB schematics. The *FT 3120 & FT 3150 Smart Transceiver Data Book* is also located in the Echelon Mini EVK program folder. You will need Adobe Acrobat Reader (which can be installed with the Mini EVK software) to view the schematics or data book.

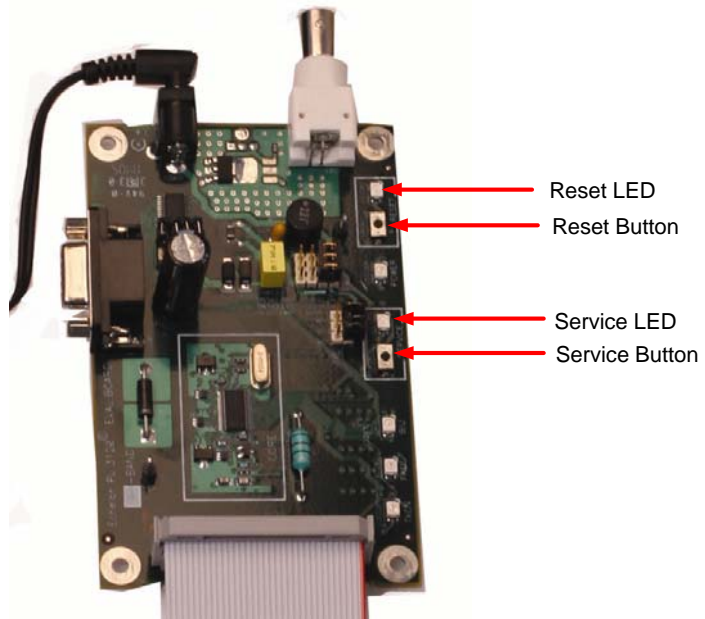
---

## Service Pin and Reset Buttons

Each PL and FT EVB Evaluation Board includes a Service button and a Reset button. You can use the Service button to send a service pin message from an evaluation board. You will use this feature when you register the device with the Mini Application or the Monitoring & Control Application, as described in the *Mini EVK User's Guide*. You can use the Reset button to reset an evaluation board when an application connected to the evaluation board appears to lock up, or to test the reset behavior of an application loaded in the evaluation board.

Each evaluation board also has a Service LED that illuminates when you press the Service button, and a Reset LED that illuminates when you press the Reset button.

Figure 2.1 shows the location of the Service and Reset buttons and LEDs on a PL 3120 EVB Evaluation Board. The buttons are located in similar locations on the PL 3150, FT 3120, and FT 3150 EVB Evaluation Boards.

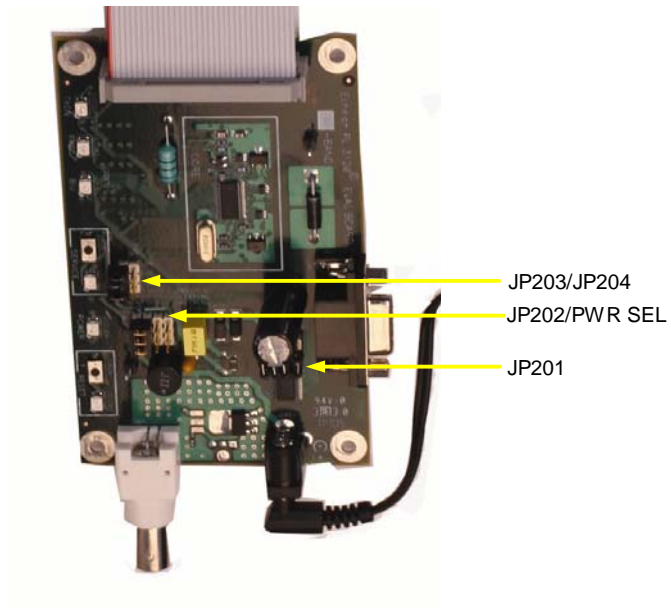


**Figure 2.1** Service and Reset Buttons

---

## Jumper Settings

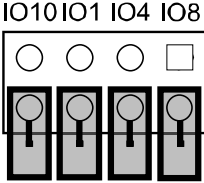
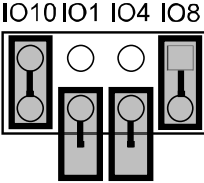
Each Evaluation Board contains 3 sets of jumpers, as shown in Figure 2.2.

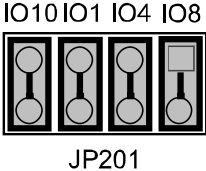
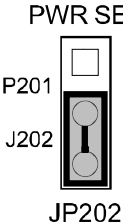
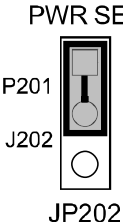
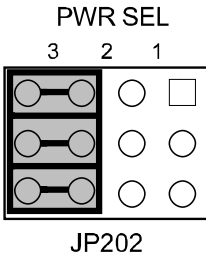


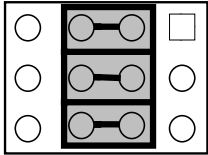
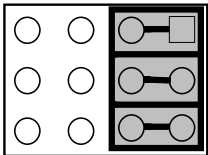
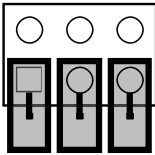
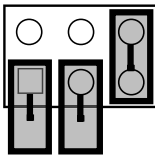
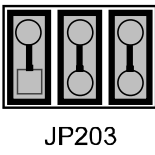
**Figure 2.2** Evaluation Board Jumper Settings

Table 2.1 describes the evaluation board jumpers.

**Table 2.1** Mini EVB Jumpers

Function	Jumper	Description
<b>RS-232 Enable (JP201)</b>	 <p style="text-align: center;">JP201</p>	<p>Disables the Maxim MAX3387E EIA/TIA-232 communications interface. This is the default setting.</p>
	 <p style="text-align: center;">JP201</p>	<p>Connects the Smart Transceiver <b>IO8</b> and <b>IO10</b> pins to a Maxim MAX3387E EIA/TIA-232 communications interface to enable serial communication without handshake lines. <b>IO10</b> is connected to pin 2 as a serial data output on the RS-232 connector, and <b>IO8</b> is connected to pin 3 as a serial data input.</p> <p>This is useful for connecting the evaluation board to your development computer so that you can send debug information from your evaluation board to a terminal emulation program on your computer such as Windows HyperTerminal. To do this, set the jumpers as shown to the left, connect the evaluation board to your development computer with a user-supplied serial cable, and then run Windows HyperTerminal on your computer to monitor the serial output. Configure HyperTerminal for direct connection to your serial port (typically COM1 or COM2), 4800 bps, 8 data bits, no parity, one stop bit, and no flow control.</p> <p>For information on implementing serial I/O, see the <i>EIA Serial Interfacing with the Neuron Chip</i> engineering bulletin (005-0008-01D).</p>

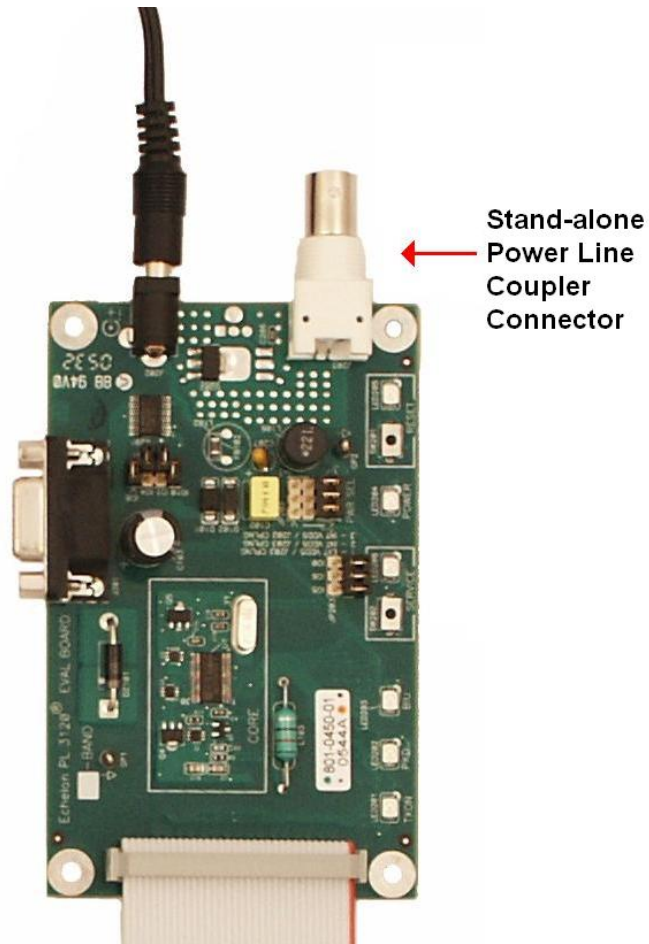
Function	Jumper	Description
<b>RS-232 Enable</b> <b>(JP201)</b>		<p>Connects the Smart Transceiver <b>IO1</b>, <b>IO4</b>, <b>IO8</b>, and <b>IO10</b> pins to a Maxim MAX3387E EIA/TIA-232 communications interface to enable serial communication with handshake lines. <b>IO10</b> is connected to pin 2 on the RS-232 connector as a serial data output, <b>IO8</b> is connected to pin 3 as a serial data input, <b>IO1</b> is connected to pin 4 as a host ready input, and <b>IO4</b> is connected to pin 7 as a request to send input. This can be used in conjunction with the ShortStack Enable jumper to interface with other microcontrollers, using the ShortStack Micro Server running on the EVB. Echelon's ShortStack Micro Server enables any product that contains a microcontroller or microprocessor to quickly and inexpensively become a networked, Internet-accessible device. The ShortStack Micro Server provides a simple way to add LONWORKS networking to new or existing smart devices. For more information on the ShortStack Micro Server, see the <i>ShortStack User's Guide</i>. The ShortStack Micro Server and user's guide is available as a free download from <a href="http://www.echelon.com/shortstack">www.echelon.com/shortstack</a>.</p>
<b>Power Source Select</b> <b>(JP202)</b> (TP/FT-10 EVBs only)		<p>Selects the power supply input from the J202 Power connector. This is used to connect to the Mini EVK power supply, and is the default setting.</p>
(PL-20 EVBs only)		<p>Selects the power supply input from pin 25 <b>VDD5_EXT</b> and pin 23 <b>GND</b> on the P201 I/O connector. You can use this setting to connect to a custom power supply.</p>
<b>Power and Coupling Source Select</b> <b>(JP202)</b> (PL-20 EVBs only)		<p>Selects the power supply and power line carrier signal input from the J202 Power connector. This is used to connect to the Mini EVK power supply, and is the default setting.</p>

Function	Jumper	Description
<b>Power and Coupling Source Select</b> <b>(JP202)</b> (PL-20 EVBs only)	<p>PWR SEL</p> <p>3 2 1</p>  <p>JP202</p>	Selects the power supply input from the J202 Power connector, and the power line carrier signal input from the J203 Stand-alone Power Line Coupler input.
	<p>PWR SEL</p> <p>3 2 1</p>  <p>JP202</p>	Selects the power supply input from pin 25 <b>VDD5_EXT</b> , pin 24 <b>VA</b> , and pin 23 <b>GND</b> on the P201 I/O connector, and the power line carrier signal input from the J203 Stand-alone Power Line Coupler input. You can use this setting to connect to a custom power supply and a custom power line coupler.
<b>ShortStack Enable</b> <b>(JP203)</b>	<p>IO5 IO6 IO0</p>  <p>JP203</p>	Disconnects the <b>IO0</b> , <b>IO5</b> , and <b>IO6</b> ShortStack connections. This is the default setting
	<p>IO5 IO6 IO0</p>  <p>JP203</p>	Configures the <b>IO0</b> , <b>IO5</b> , and <b>IO6</b> pins for use with a ShortStack Micro Server, with a 9600bps serial bit rate. <b>IO0</b> is connected to pin 8 on the RS-232 connector through the Maxim MAX3387E EIA/TIA-232 communications interface as a clear to send output.
	<p>IO5 IO6 IO0</p>  <p>JP203</p>	Configures the <b>IO0</b> , <b>IO5</b> , and <b>IO6</b> pins for use with a ShortStack Micro Server, with a 76,800bps serial bit rate. <b>IO0</b> is connected to pin 8 on the RS-232 connector through the Maxim MAX3387E EIA/TIA-232 communications interface as a clear to send output.

## Stand-alone Power Line Coupler Connector

If you have a PL-20C or PL-20N Mini EVK, you can connect the PL EVB to a stand-alone power line coupler. The PL EVBs are typically connected to a combined power supply and power line coupler using the JP202 Power connector. A stand-alone power line coupler is useful for connecting to power lines with AC or DC voltage levels not supported by the Mini EVK power supply, or for connecting to unpowered power lines. To use a stand-alone power line coupler, set the JP202 jumper to position 1 or 2 and then connect your stand-alone power

line coupler to the J203 Stand-alone Power Line Coupler connector. This connector is compatible with the Echelon Model 78200-211, 78200-220, and 78200-221 PL-20 Power Line Couplers. For more information on power line couplers, see the *PL 3120 /PL 3150 Smart Transceiver Data Book*.



**Figure 2.3** Standalone Power Line Coupler Connector



## I/O Connector

Figure 2.4 shows the I/O connector pinout for the evaluation boards. You can use this connector to attach custom I/O devices to an evaluation board.

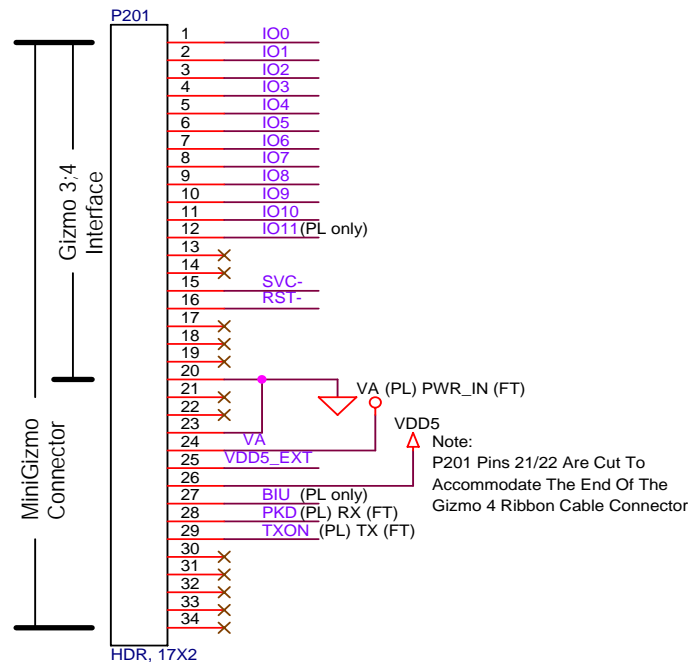


Figure 2.4 I/O Connector

## MiniGizmo I/O Board

Each MiniGizmo includes 8 push buttons, 8 LEDs, a temperature sensor, and a piezo buzzer, as shown in Figure 2.5. This section describes the I/O components on the MiniGizmo board. See the *Input/Output* section in Chapter 4 of the *Mini EVK User's Guide* for example code for interfacing with the MiniGizmo board. The Mini EVK examples described in Chapter 3 of the *Mini EVK User's Guide* provide more detailed examples of how to use the MiniGizmo I/O.

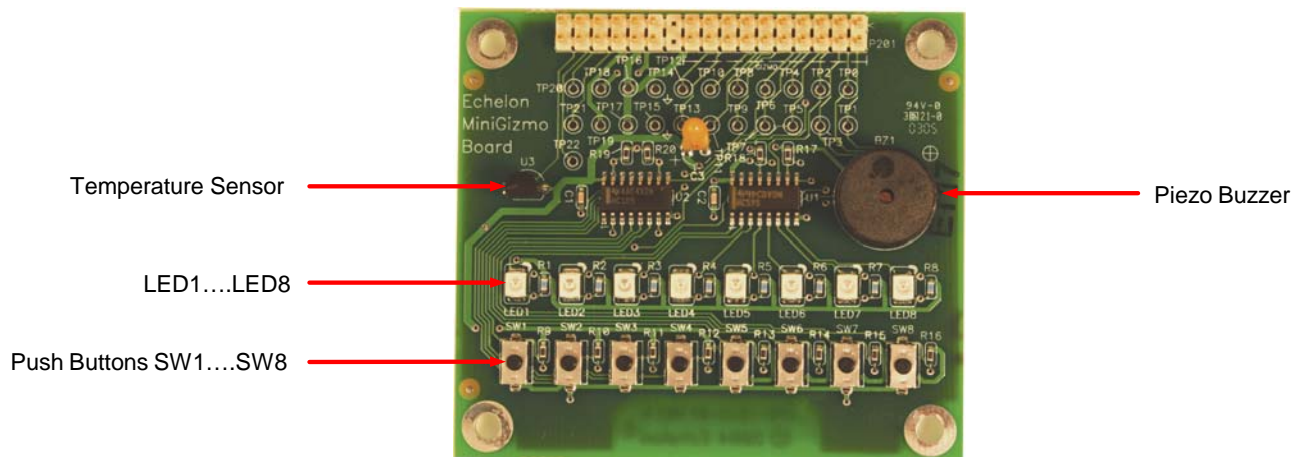


Figure 2.5 MiniGizmo

The Mini EVK includes a schematic for the MiniGizmo I/O Board. To view the MiniGizmo schematic, click **Start**, point to **All Programs > Echelon Mini EVK > Board Schematics**, and then click **MiniGizmo Board Schematic**. You will need Adobe Acrobat Reader (which can be installed with the Mini EVK software) to view the schematics.

---

## *MiniGizmo Push Buttons and LEDs*

The MiniGizmo I/O Board includes eight push buttons and eight LEDs. The push buttons are labeled **SW1 – SW8**, and the LEDs are labeled **LED1 – LED8**.

The push buttons are connected to a 74HC165 8-bit parallel-in/serial-out shift register. Data is shifted on the Smart Transceiver **IO4** (clock) and **IO5** (data) pins, with a latch strobe on **IO6** (active low to capture). The button readings must be debounced under application control.

The LEDs are connected to a 74HC595 8-bit serial-in/parallel-out shift register. Data is shifted on **IO2** (clock) and **IO3** (data), a rising edge on **IO1** strobes data into the latch. LEDs are driven active-low.

---

## *MiniGizmo Temperature Sensor*

The MiniGizmo I/O Board includes a temperature sensor based on a 1-Wire (“Touch I/O”) Dallas DS18S20 digital thermometer. The Touch I/O interface is connected to the Smart Transceiver **IO7** pin.

---

## *MiniGizmo Piezo Buzzer*

The MiniGizmo I/O Board includes a simple piezo buzzer to provide audible feedback. The input of the piezo buzzer is connected to the Smart Transceiver **IO0** pin. You can generate a tone on the buzzer using the Neuron C **Frequency** output model. The piezo buzzer has a resonance frequency of approximately 4000Hz, so the output will sound best at frequencies near 4000Hz.

---

## **Design and Test for Electromagnetic Compatibility**

Echelon's power line and free topology twisted pair technologies support the creation of products that meet a wide variety of regulatory requirements. Chapter 6 of the *PL 3120 / PL 3150 Smart Transceiver Data Book* describes how to create products using Echelon's power line technology that meet various electromagnetic compatibility regulations. Chapter 4 of the *FT 3120 / FT 3150 Smart Transceiver Data Book* describes how to create products with Echelon's free topology twisted pair technology that meet electromagnetic compatibility regulations.

The EVB Evaluation Boards are designed to facilitate testing of Echelon's power line and free topology twisted pair technologies. As such, they have no enclosure, providing open access to the IO connectors, buttons, LEDs, and other I/O components. They have been developed to allow consumer and commercial device OEM suppliers to evaluate the technology quickly, and have not been designed to be installed permanently in homes or commercial buildings. If you work with the EVB Evaluation Boards in a home environment, operation of other electronic

equipment that is sensitive to RF radiated emissions, such as televisions or radios, might be temporarily impaired during the evaluation period.

The standards for RF emissions vary by geographic region. To determine which standards apply in your region, consult the appropriate regulatory agencies. In the European Union, CISPR 22 (or equivalently, EN 55022) applies. In the North American market, the FCC regulates emissions from unintentional radiators under 47CFR15.109, Subpart B, which allows for substitution of CISPR 22. The EVB Evaluation Boards comply with CISPR 22 Level A, but not Level B (which is required for deployment in home and commercial environments).



[www.echelon.com](http://www.echelon.com)