ECHELON

Mini FX Evaluation Kit

A Low-Cost Tool for Evaluating and Developing LONWORKS® Devices for Control Networks

Designed for control system developers, integrators, specifying engineers, educators, and students, Mini FX combines a flexible hardware platform with sample Neuron® C applications and a Neuron C compiler.

In just a matter of minutes, you can easily set up and demonstrate twisted pair or power line control networks, as well as write, compile, and load new applications of your own design.

FEATURES

- Introduces developers to LONWORKS control networking using ISO/IEC 14908-1 with a simple evaluation and programming environment.
- Includes example applications for device networking.
- Can be used without any separate network installation tools for running self-installed examples or creating self-installed devices.
- Can be used with the LonMaker® Integration Tool (Standard or Professional Edition) to develop and test devices for managed networks.
- Speeds development of control networks with the powerful Neuron C programming language and a compiler that supports up to 32 network variables.
- Downloads compiled Neuron C applications to target hardware over the control network.
- Provides easy resource and hardware definition and editing with built-in resource and hardware template editors.
- Includes two evaluation boards, I/O hardware, and USB interface for fast plug-and-play setup.
- Provides easy migration to the powerful NodeBuilder® Development Tool.
- Available in free topology twisted pair (FT) and power line (PL) versions.

DESCRIPTION

Mini FX makes it affordable for anyone to understand and harness the power of the popular LONWORKS platform, and to develop new devices for the rapidly growing, price-sensitive sensor/actuator mass market. Use Mini FX standalone to create devices that install themselves, or use Mini FX with a network installation tool such as the LonMaker Integration Tool to create devices that are installed in managed networks. If you need a more full-featured development environment, upgrade to the NodeBuilder FX Development Tool, which uses the same Neuron C programming language, includes the LonMaker Integration Tool, and also includes many productivity enhancements such as a debugger, project manager, integrated development environment, code editor, code wizard, plug-in framework, and network management API.

FT 5000 EVB

There are two versions of Mini FX: Mini FX/FT for developing devices that communicate using twisted pair cable, and Mini FX/PL for developing devices that communicate over existing power lines. Both versions include two evaluation boards with example I/O hardware, a USB network interface for attaching a Windows PC to the LONWORKS network, and power supplies. The USB network interfaces are low-cost, high-performance LONWORKS interfaces for USB-enabled computers and controllers.

Mini FX/FT includes two FT 5000 EVB Evaluation Boards. The FT 5000 EVB is a complete Series 5000 LONWORKS device that you can use to evaluate the LONWORKS 2.0 platform and create LONWORKS 2.0 devices. The FT 5000 EVB includes an FT 5000 Smart Transceiver with an integrated free topology twisted pair transceiver, an external 10 MHz crystal (you can adjust the internal system clock speed from 5MHz to 80MHz), an FT-X3 communication transformer, 64KB external serial EEPROM and flash memory devices, and a 3.3V power source. The free topology twisted pair transceivers implement the ISO/IEC 14908-2 communication standard for TP/FT-10 channels and eliminate wiring topology restrictions for twisted pair communication, a severe limitation of older technologies such as RS-485.

The FT 5000 EVB features a compact design that includes the following I/O components, which you can use to develop prototype and production devices and test the FT 5000 EVB example applications:

- 4-line x 20-character LCD display
- 4-way joystick with center push button
- Two push-button inputs
- Two LED outputs
- Light-level sensor
- Temperature sensor

PL 3150 EVB and MiniGizmo

Mini FX/PL includes one PL 3150 EVB Evaluation Board, one PL 3170 EVB Evaluation Board, and two MiniGizmo I/O Boards for use with the two EVBs. The PL 3150 EVB includes a PL 3150 Smart Transceiver with an integrated power line transceiver, an external 10 MHz crystal (with an internal system clock speed of 5MHz), 64KB external flash memory, and a 5V power source. The PL 3170 EVB includes a PL 3170 Smart Transceiver with an integrated power line transceiver, on-chip ROM with Neuron firmware and self-installation support, an external 10MHz crystal (for an internal system clock speed of 5MHz), and a 5V power source. The power line transceivers implement the ISO/IEC 14908-3 communication standard for PL-20 C-Band channels and provide network communication by signaling over any AC or DC power circuit, eliminating the need for any new wires for communication. The plug-in power supplies provided with the power line evaluation boards pass the network signals directly into the AC power lines over the same two wires that power the evaluation boards. The power line version of the Mini FX allows a control network to be created by simply plugging the evaluation boards into electrical outlets.

Mini FX PL includes two MiniGizmo I/O boards that provide I/O components that you can use to develop prototype and production devices and test the PL EVB example applications. The MiniGizmo I/O boards include eight push buttons, eight LEDs, a temperature sensor, and a piezo transducer.

The FT 5000 EVB Evaluation Board and PL Evaluation Boards also include an EIA-232/TIA-232/RS-232 interface that you can use to connect the board to your development computer and perform application-level debugging. The FT 5000 EVB also includes a USB interface that you can use instead of the RS-232 interface for a serial interface to your development computer.

Mini FX/FT also includes a U10 USB Network Interface. This connects directly to a TP/FT-10 free topology twisted pair LonWorks channel through a compact removable connector.

Mini FX/PL also includes a U20 USB Network Interface. This connects to a PL-20 C-Band power line LonWorks channel through an included power supply with integrated power line coupler. The U20 USB Network Interface can also be connected directly to 10.8-18VDC power systems (such as those in automobiles, trucks, and buses) without a coupling circuit, or to virtually any powered line through a customer-supplied coupler/power supply.

Simplify Your Development

Mini FX includes software for Windows that lets you create and test applications for LonWorks devices based on an Echelon Series 5000 or 3100 Neuron Processor or an Echelon Series 5000 or 3100 Smart Transceiver. Using the Mini FX software, you write your device applications using the Neuron C Version 2.2 programming language, a high-level language based on ANSI C with extensions to simplify network communication, hardware I/O, and event-driven processing. For Series 5000 applications, Neuron C Version 2.2 also introduces support for application-specific interrupt handlers and a hardware semaphore that can be used for interrupt task synchronization. Interrupt sources include signals on any of the 12 I/O pins (rising edge, falling edge, either edge, positive or negative level), the high-performance on-chip timer and counter units, and a dedicated, configurable, high-performance, periodic system timer.

You can use the Neuron C compiler included with Mini FX to compile applications with up to 32 network variables, and that require up to 12K compiled instructions (resulting in approximately 32KB of compiled application code). To develop larger applications or to develop applications that require more network variables, you can upgrade to the NodeBuilder FX software, which includes support for up to 254 static network variables, up to 127 network variable aliases, and no code limit other than available memory.

If the standard resource files do not include the resources you need, a powerful resource editor lets you view standard types and functional profiles, and create user-defined types and profiles.

Built-in Examples Shorten Design Time

Mini FX includes working example applications that let you evaluate the benefits of the LonWorks platform without writing any code. These applications demonstrate how control devices can interact with I/O hardware and exchange data over a control network. They also demonstrate how control networks can be created without the use of any installation tools through a simple process called self-installation. The applications are compatible with standard LonWorks installation tools such as the LonMaker® Integration Tool, letting you evaluate the capability of devices to be used in control networks with or without network installation tools.

All examples are provided in both executable images and source code.

An example application is pre-loaded into each Mini EVB Evaluation Board, allowing new users to get a control network up and running within minutes.

You can use the Mini FX software to modify the Neuron C examples, create new applications based on the Mini FX examples, or create new examples from scratch. You can use the powerful self-installation library (included with the examples) in custom applications that do not require the use of any installation tools, and yet are fully compatible with standard LonWorks installation tools such as the LonMaker Integration Tool.

SPECIFICATIONS

Operating System
Microsoft Windows Vista or Windows XP.

Minimum Hardware
Intel Pentium® III 600MHz processor; 2GB RAM for Windows Vista, 512MB RAM for Windows XP; CD-ROM drive; 1024 x 768 display with at least 256 colors; mouse or other Windows-compatible pointing device; 120 to 350MB free hard-disk space.

Compatible LNS Network Interfaces and IP-852 Routers

OpenLDV-compatible local and remote network interface or IP-852 router. Compatible local network interfaces include the U10/U20 USB network interface (a U10 is included with Mini FX/FT and a U20 is included with Mini FX/PL); PCC-10, PCLTA-20, or PCLTA-21 network interfaces; and the SLTA-10 Serial LonTalk Adapter. Compatible remote network interfaces include the i.LON® SmartServer and i.LON 600 LonWorks IP Server. Compatible IP-852 routers include the i.LON SmartServer with IP-852 routing and the i.LON 600 LonWorks IP Server. If you are using an IP-852 router, your computer must have an IP network interface such as an Ethernet card or modem with PPP software. In addition, the i.LON software must be installed on your computer, and the IP-852 channel must be configured using the LonWorks-IP Configuration Server application software.

Neuron C Version 2.2
Neuron C I/O Objects
Bit, byte, nibble input/output
Bitshift input/output
Dallas Touch input/output
Dual slope input (for low-cost A/D)
Edge divide output
Edgelog input.
Frequency output.
Infrared input
Infrared pattern output
I_2C input/output
Level detect input
Magcard bitstream input
Magcard track 1 and 2 input (for ISO 7811 input)
Muxbus input/output (multiplexed address/data)
Neurowire input/output (National Semiconductor Microwire and Motorola SPI compatible)
Oneshot output, ontime input, period input, pulsewidth output
Parallel input/output
Pulsecount input/output
Quadrature input
SCI (UART) serial input/output*
SPI serial input/output*
Serial input/output
Total count input
Touch input/output (Maxim/Dallas 1-Wire® protocol-compatible)
Triac and stretched triac** output
Triggered count output
Wiegand input

Neuron C Network Communication Extensions
Functional blocks
Network variables
Configuration properties
Application and foreign-frame messages

** For Series 5000 and 3100 Smart Transceivers and Neuron Chips with hardware SCI and SPI support only*

*** For Series 5000 Smart Transceivers and Neuron Chips with stretched triac support only*

FT 5000 EVB

Processor
FT 5000 Smart Transceiver.

Processor Input Clock
10MHz (5MHz to 80MHz internal system clock).

Processor Memory
64KB on-chip RAM, 16KB on-chip ROM, 64KB external serial flash memory, and 64KB external serial EEPROM mapped to 64KB Neuron memory space based on hardware template definition.

Operating Input Voltage
+9 to 12VDC unregulated.

External I/O Power
Combined +5V and +3.3V current not to exceed 100mA.

External Power Supply
100 to 240VAC; 50 or 60Hz.

Operating Temperature
0 to +45°C

Non-operating Temperature
-20 to +70°C

Dimensions
140mm x 105mm x 30mm

EMC Compliance
EN 55022 Class A.

PL 3150 AND PL 3170 EVB

Processor
PL 3150 EVB: PL 3150 Smart Transceiver.
PL 3170 EVB: PL 3170 Smart Transceiver.

Processor Input Clock
10MHz (5MHz internal system clock).

Processor Memory
PL 3150 EVB: 56KB flash memory and 2KB on-chip RAM.
PL 3170 EVB: 4KB on-chip flash memory and 2KB on-chip RAM.

Operating Input Voltage
+11 to 17.8VDC unregulated.

Operating Input Current
250mA max, not including external I/O.

External I/O Power
+5V current not to exceed 100mA.

External Power Supply
100 to 240VAC; 50 or 60Hz with power line coupler.

Operating Temperature
0 to +40°C

Non-operating Temperature
-20 to +65°C

Dimensions
114mm x 70mm x 32mm (excluding connectors)

EMC Compliance
EN 55022 Class A.

DOCUMENTATION

FT 5000 EVB Examples Guide
078-0389-01

FT 5000 EVB Hardware Guide
078-0390-01

I/O Model Reference for Smart Transceivers and Neuron Chips
078-0392-01

Introduction to the LonWorks Platform
078-0183-01

ISI Programmer's Guide
078-0299-01

ISI Protocol Specification
078-0300-01

LonWorks USB Interfaces User's Guide
078-0296-01

Mini FX/FT Quick Start Guide
078-0418-01

Mini FX/PL Examples Guide
078-0394-01

Mini FX/PL Hardware Guide
078-0395-01

Mini FX/PL Quick Start Guide
078-0419-01

Mini FX User's Guide
078-0398-01

Neuron Assembly Language Reference
078-0399-01

Neuron C Programmer's Guide
078-0002-02

Neuron C Reference Guide
078-0140-02

Neuron Tools Error Guide
078-0402-01

NodeBuilder Resource Editor User's Guide
078-0194-01

NodeBuilder Resource Report Generator User's Guide
078-0260-01

PL 3120/PL 3150/PL 3170 Smart Transceiver Data Book
005-0193-01

Series 5000 Chip Data Book
005-0199-01

ORDERING INFORMATION

Mini FX/FT Evaluation Kit
10000R-40-24

Mini FX/PL Evaluation Kit
10000R-40-27

Both kits include 100-240VAC 50/60Hz power supplies with both US/Japan and Europlugs (CEE 7/16).

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