

## FT 6050 EVK

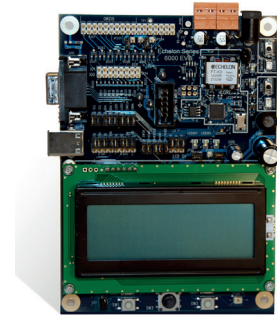



Figure 1. FT 6050 Evaluation Board (kit includes two boards)

### Product Description

The FT 6050 EVK is a complete hardware and software platform for creating or evaluating IoT devices based on an Adesto smart transceiver or Neuron® chip.

You can use the FT 6050 EVK to create devices such as VAV controllers, thermostats, card-access readers, lighting ballasts, motor controls and many other devices. These devices can be used in a variety of systems including building and lighting controls, factory automation, energy management, and transportation systems. Whether you're building large or small control network devices, IP-enabled LON® or BACnet devices, the FT 6050 EVK makes your project development faster, easier, and more affordable.

### Development Kit for the IzoT Control Platform

Creating control devices and networking them has a unique set of challenges that are quite different from traditional data or computer networking and also quite different from the consumer internet of things (IoT). Most high-value assets, such as electro-mechanical systems within buildings, machines on factory floors, public transportation, infrastructure for the delivery of public utilities and many others, require controlling and monitoring by special devices that are attached at key control and monitoring points and these devices together from the industrial internet of things (IIoT). The control and communication of these devices requires:

- Autonomous control — without the need for human involvement
- Industrial-strength reliability

### Features

- Supports the development of LON, LON / IP, BACnet/IP or BACnet MS/TP devices on a common platform
- Includes two FT 6050 EVB hardware platforms for initial application development and testing
- Includes sample I/O hardware with a 4x20 character LCD display for easy I/O prototyping and testing
- Includes the IzoT® NodeBuilder® software for application development and IzoT Commissioning Tool for easy installation and testing of control networks
- Includes one U10 USB FT Network Interface and a set of five FT 6050 Smart Transceiver chips
- Open source Wireshark network protocol analyzer can be used to capture, analyze, characterize, and display network packets so you can pinpoint network or device faults and identify potential solutions

# PRODUCT DESCRIPTION

- Co-existence with legacy control protocols and evolution to new IP-based addressing
- Hardened security

The FT 6050 EVK is the easiest way for developers to create control devices and connect them with control networks. The FT 6050 EVK facilitates:

- Creation of autonomous communities of devices
- The ability discover each other
- A rich set of standard and inter-operable device profiles
- Creation of meaningful and functional bindings between devices
- Secure group messaging between devices
- IP addressing down to the device level
- An easy-to-use programming environment

## IzoT NodeBuilder Software

The IzoT NodeBuilder software lets you create, debug, test, and maintain applications for LON or IzoT devices based on an Adesto Neuron chip or smart transceiver. Using the IzoT NodeBuilder software, you write your device applications using the Neuron C programming language, a high-level language based on ANSI C with extensions to simplify network communication, hardware I/O, and event-driven processing. The Neuron C language supports up to 254 address table entries, 254 static network variables and 127 network variable aliases per device for devices based on a Series 6000 chip with Neuron Firmware version 21 or newer, subject to available memory.

The IzoT NodeBuilder software supports 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.

The IzoT NodeBuilder software includes the following tools:

### IzoT Resource Editor

View standard types and functional profiles, and create user-defined types and profiles if the standard resource files don't include the resources you need.

### IzoT NodeBuilder Code Wizard

Use a drag-and-drop interface to create your device's interface, and then automatically generate Neuron C source code that implements the device interface and creates the framework for your device application. The code wizard saves days of development for every new device.

### IzoT NodeBuilder Editor

Edit the Neuron C source code generated by the code wizard to create your device's application.

### IzoT NodeBuilder Debugger

Debug your application with a source-level view of your application code as it executes.

### IzoT NodeBuilder Project Manager

Build and download your application image to your development platform or to your own device hardware.

### ISI Developer's Kit

Develop ISI devices that use the Interoperable Self-Installation (ISI) protocol to install and organize themselves into networks

automatically or at the push of a button, all without the use of a separate installation tool.

## IzoT Commissioning Tool

An integral part of the IzoT NodeBuilder software, the IzoT Commissioning tool is a software package for designing, installing, and maintaining LON and IzoT control networks. This single tool manages all phases of a network's life cycle, from the initial design and commissioning to the ongoing operation. Based on Adesto's IzoT Network Services Server, the IzoT Commissioning Tool combines a powerful client-server architecture with an easy-to-use Microsoft Visio user interface. It is compatible with a number of IzoT and LNS® plug-ins, including the IzoT NodeBuilder Project Manager.

## FT 6050 Evaluation Board (EVB)

Two FT 6050 EVB Evaluation Boards are included with the FT 6050 EVK. The FT 6050 EVB is a complete LON and IzoT device that you can use to evaluate and create LON and IzoT devices. The FT 6050 EVB includes an FT 6050 Smart Transceiver with an external 10MHz crystal (you can adjust the internal system clock speed from 5MHz to 80MHz), an FT-X3 communication transformer, 512KB external serial flash memory device, and a 3.3V power source.

## FT 6050 EVB Evaluation Board

The FT 6050 EVB's compact design includes the following I/O devices, which you can use to develop prototype and production devices, and to test the FT 6050 EVB example applications:

- 4-line x 20-character LCD display
- 4-way joystick with center push button

# PRODUCT DESCRIPTION

- Two push-button inputs
- Two LED outputs
- Light-level sensor
- Temperature sensor

An FT 6050 EVB I/O library, included with the IzoT NodeBuilder software, provides easy-to-use high-level functions for accessing the display, light-level sensor, and temperature sensor.

The FT 6050 EVB Evaluation Board also includes an EIA-232/TIA-232/

RS-232 interface and a USB interface that you can use to connect the board to your development computer and perform application-level debugging (only one of the two serial interfaces can be used at a time).

Each FT 6050 EVB also features a connector for optional in-circuit programming of the external non-volatile memory of the FT 6050 Smart Transceiver on the board. This allows fast application downloads to the external flash memory.

## U10 USB FT Network Interface

One U10 USB FT Network Interface is included with the FT 6050 EVK. The U10 is a low-cost, high-performance LON interface for USB-enabled PCs. It connects to a free topology (FT) twisted pair LON channel through a removable connector, and is fully compatible with link powered channels.

## SPECIFICATIONS

### Operating System

Microsoft Windows 10 (64-bit and 32-bit) or Windows 8.1 (64-bit and 32-bit), Windows Server 2016 (64-bit), or Windows Server 2012 (64-bit).

### Minimum Hardware

1 gigahertz (GHz) or faster x86-bit or x64-bit processor with SSE2 instruction set; 2 GB RAM; 1280 x 800 screen resolution display.

### 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<sub>2</sub>C 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  
Triggeredcount output  
Wiegand input

### Neuron C Network Communication

#### Extensions

Functional blocks  
Network variables  
Configuration properties  
Application and foreign-frame messages

### Supported BACnet Object Types

Analog Input  
Analog Output  
Binary Input  
Binary Output  
Device Object

### Supported BACnet Services

Change of Value (COV)  
Read Property  
Read Property Multiple  
Write Property

Application Image Download  
Out of Service

### Hardware (FT 6050 EVB)

#### Processor

FT 6050 Smart Transceiver

#### Processor Input Clock

10MHz (5MHz to 80MHz system clock)

#### Processor Memory

64KB on-chip RAM, 16KB on-chip ROM, 512KB external serial flash memory, mapped to 64KB Neuron memory space based on IzoT NodeBuilder 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

# DOCUMENTATION

## **FT 6050 EVK User's Guide**

078-0503-01A

Describes how to use the FT 6050 EVK to develop control applications and networks using the IzoT platform.

## **FT 6050 EVB Hardware Guide**

078-0504-01A

Describes how to connect the FT 6050 EVB boards, and it describes the Neuron core, I/O devices, service pin, reset buttons, LEDs, and jumper settings on the FT 6050 EVB hardware.

## **FT 6050 Examples Guide**

078-0505-01A

Describes how to run the example applications included with the Evaluation Kit on an FT 6050 EVB.

## **Series 6000 Chip Data Book**

005-0230-01A

Provides detailed specifications on the electrical interfaces, mechanical interfaces, and operating environment characteristics for the FT 6050 Smart Transceiver and Neuron 6050 Processor.

## **IzoT BACnet Developer's Guide**

078-0507-01

Describes how to use the BACNet library and run the BACnet examples for the FT 6050 EVK.

## **IzoT Resource Editor's Guide**

078-0508-01A

Describes resource files and how to use the IzoT Resource Editor to view, create, and modify them.

## **IzoT Commissioning Tool User's Guide**

078-0509-01A

Describes how to use the this tool to design, install, operate, and maintain IzoT networks.

## **IzoT Network XML Programmer's Guide**

078-0510-01A

This guide describes how to create and modify an IzoT network using the XML Plug-in.

## **IzoT Plug-in Guide for Wireshark**

078-0511-01A

How to plug into the Wireshark packet analyzer to monitor, analyze, and troubleshoot network protocol problems.

## **I/O Model Reference for Smart Transceivers and Neuron Chips**

078-0392-01C

Describes the many different I/O models that are available for use with Smart Transceivers and Neuron Chips. An I/O model provides programmable access to one or more I/O pins.

## **Neuron Assembly Language Reference Guide**

078-0399-01B

Describes the Neuron Assembly Language and how to write assembly language functions.

## **Neuron C Programmer's Guide**

078-0002-02I

Describes how to write programs using the Neuron C programming language.

## **Neuron C Reference Guide**

078-0140-02G

Provides reference info for writing programs using the Neuron C programming language.

## **Neuron Tools Errors Guide**

078-0402-01D

Documents and explains the various warning and error messages that can occur in the Adesto development tools.

## **LON USB Network Interface User's Guide**

078-0296-01

Documentation for U10 USB FT Network Interface.

Model #	Product Name	Product Description
10070R-43-54	FT 6050 EVK	Hardware and software evaluation and development kit for Adesto smart transceivers and Neuron chips

## IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01 Jan 2024)

### Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,  
Koto-ku, Tokyo 135-0061, Japan  
[www.renesas.com](http://www.renesas.com)

### Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

### Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit [www.renesas.com/contact-us/](http://www.renesas.com/contact-us/).