EVAL Kit GUI Software and TI Firmware Readme

What this Application Note Covers

In order to design EnerChip™ Energy Harvesting and Power Backup applications, Cymbet has created several evaluation kits. These eval kits utilize PC-based graphical user interface software and microcontroller firmware to demonstrate various EnerChip capabilities. There are three software/firmware distributions available as of this document revision:

- Cymbet Energy Harvesting EVAL Kit Graphical User Interface and TI eZ430-RF2500 kit firmware
- TI LaunchPad MSP430 demonstration kit Data Logger application firmware
- Cymbet EVAL-06 EnerChip Real Time Clock Backup PC-based Graphical User Interface

The latest version of these software/firmware distributions are available on Cymbet.com on the Products/ Resources and Documents page: **http://www.cymbet.com/products/datasheets-downloads.php. Download the .zip file into a folder on your PC local disk (e.g. /C:) and extract the files into this folder. Once extracted, the folder and files can be moved to another folder on the PC or network.**

The Energy Harvesting EVAL Kit GUI and eZ430-RF2500 software and the EVAL-06 GUI software are also in folders on the Cymbet evaluation kit CD-ROM. **Always check for the latest versions on Cymbet.com.**

Cymbet Energy Harvesting EVAL Kit GUI

The Cymbet EnerChip™ Energy Harvesting Evaluation kits - EVAL-08, EVAL-09, EVAL-10 and EVAL-11 are all designed to support connectivity and power to the Texas Instruments eZ430-RF2500 MSP430 wireless development kit. This TI kit can be purchased separately from any of Cymbet's distributors. One TI kit is required for each Cymbet EVAL kit to be used. For example, if a three node Energy Harvesting based wireless network is to be created, you must have three eZ430-RF2500 kits to go along with three Cymbet EH Eval kits. The link for more information on the TI kit can be found at: https://estore.ti.com/EZ430-RF2500-MSP430-Wireless-Development-Tool-P1148.aspx. Please read the information on the TI site before proceeding with this firmware download procedure.

### TI Access Point and End Device Firmware upgrades

In order to use the eZ430-RF2500 kit with the Cymbet Energy Harvesting kits, new firmware must be downloaded into the eZ430-RF5200 Access point and wireless endpoint device. Cymbet has created hex files which are contained in a folder on the Cymbet EVAL Kit CD-ROM disk. You will need to access this disk directly from your PC. The folder containing these files is "GUI and TI eZ430 code. Inside this folder, open "TI Access Point End Device" and then open "Access Point - End Device HEX file". The file "SimpliciTI Access Point.d43 is the HEX code file for the TI Wireless Access Point and "SimpliciTI End Device d.43" is for the wireless end device that connects to the Cymbet Eval Kit 6 pin right angle connector on the board edge.

In order to download these files into the TI devices, you must first download the programming tool from Elprotronic at www.elprotronic.com. When you reach this home page, you will see: Flash Programmers for Texas Instruments' devices. The programming tool is the FET-Pro430 Lite version that uses TI's FET adapters and is free. Go to http://www.elprotronic.com/download.html. Locate the Table entry for the FET-Pro430 Lite Software and download the Zip file to your PC. Open the Zip and following the programming instructions. Open Lite FET-Pro4, on top tool bar select Setup, then Connection/Device Reset. On pop-up select Spy Bi Wire, and for COM Port select USB, then click OK. On main page, select Group=430F2xx and MSP430F2274. Read the User's Manual under About/Help for specific tool instructions. Once the firmware is downloaded into the USB-based TI devices, they are ready to be used with the Cymbet EH Eval Kits.

Modifying the Access Point and End Device Firmware

The Access Point and End Device firmware is presented as unlicensed open source code and is not supported or warranted by either Cymbet or Texas Instruments. Many developers find this open source code useful for experimentation and educational purposes. The actual C code is stored on the EVAL Kit CD-ROM in: GUI and TI ez430 code\TI Access Point End Device\SimpliciTI-1.0.6\Projects\ Examples\Peer applications\eZ430RF\ AP as data hub\Release. In order to alter this code, a compiler is needed. TI recommends the IAR Embedded Workbench® for TI MSP430 which can be found at http://www.iarsystems.com/ website1/1.0.1.0/220/1/. Please contact IAR Systems for additional information.
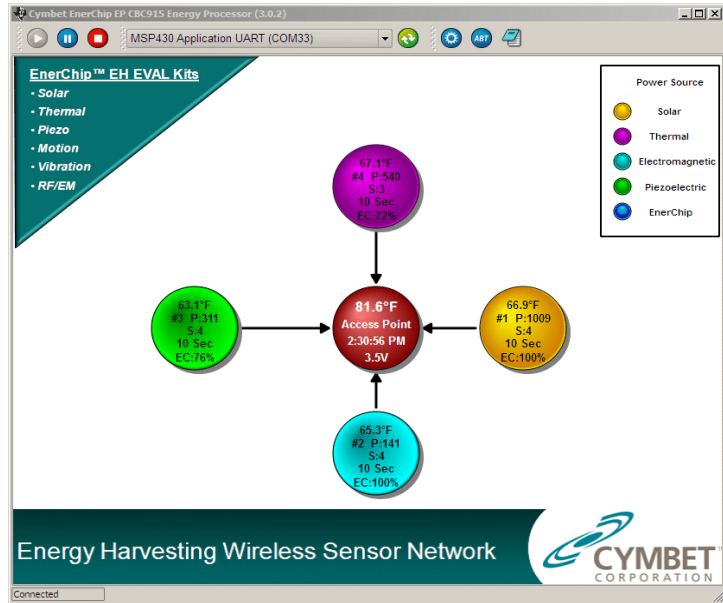
Cymbet EH EVAL Kit GUI with Access point in Red and 4 end device nodes

Preparing the PC for the USB Drivers and GUI

The Eval kit CD-ROM folder for the GUI and TI eZ430 code is GUI and TI ez430 code with two subfolders Cymbet GUI and TI Access Point End Device. Prior to installing the Cymbet GUI, install the TI Sensor Monitor Visualizer GUI that comes with the TI kit CD. This must be done in order to install the USB driver needed by the Cymbet GUI to communicate with the TI access point. The TI GUI may be removed after the Cymbet GUI is installed. Install the Cymbet GUI by opening the Cymbet GUI folder, then opening the Release folder. Click on the setup file in this folder and follow the instructions for installing the GUI on your Windows PC with XP or Windows 7. No Mac version is supplied. If you are using Windows 7, make sure you download the correct Elprotronic eZ430 download code, then follow the instructions in the Readme document.

Cymbet PC-based Graphical User Interface for EH EVAL Kits

The CD-ROM contains PC software for a wireless network graphical user interface. This GUI software communicates with the TI USB-based Access point that is wirelessly connected to the TI wireless endpoints attached to Cymbet Eval kits. The software installation is accomplished by going to the GUI and TI ez430 code folder and opening the Release folder. Click on the setup file and follow the installation instructions. Before opening the GUI, it is usually best to insert the TI USB-based access point into the PC and wait for the PC to recognize and register this USB device. Then open the GUI software. A flashing red ball should appear representing the wireless access point. Figure 3 shows an illustration of the GUI. After the Access Point is initialized, plug the TI wireless end device into the Cymbet Eval Kit right angle 6-pin connector. Depending on the type of EVAL kit and type of Energy Harvesting transducer, a colored ball will appear for the End Point. EVAL-08, EVAL-10, and EVAL-11 will come up in a yellow color when harvesting energy. If the transducer (solar or RF) is not active, the ball will be a dark blue representing the Eval Kit is being powered by the EnerChip solid state batteries.

In the case of the EVAL-09, the color of the end device ball is dictated by the transducer. Yellow is Solar; purple is Thermoelectric; light blue is Electromagnetic; and green is Piezoelectric. Should any transducer be inactive, the ball will show dark blue as the EnerChips are being powered by the wireless node. The values in the balls indicate the following conditions of the wireless end device: Temperature; number id of the wireless node; the power supplied by the energy harvesting transducer in microwatts (EVAL-09 only); the energy harvesting state of the EH EVAL board (EVAL-09 only); the wireless node reporting interval in seconds; and the EnerChip state of charge on the EVAL kit. EnerChip ball values are: temperature; node id; transmission count down (starts at 400); reporting

interval; and EnerChip charge voltage.

TI LaunchPad MSP430 Data Logger Firmware

The Cymbet EVAL-09, EVAL-10 and EVAL-11 can be used to power the Texas Instruments LaunchPad demo kit. An open-source, unsupported Data Logger application has been posted on Cymbet.com to provide a basis for experimentation. This code can be found in the TI LaunchPad Data Logger Application folder on cymbet.com:

http://www.cymbet.com/products/datasheets-downloads.php

A video demonstrating the data logger application is on the Cymbet YouTube channel: http://www.youtube.com/watch?v=-qzMVhPGWCU

EVAL-06 EnerChip Real-Time Clock Backup Evaluation Kit PC GUI

In order to interface and program the EVAL-06 EnerChip RTC USB stick, Cymbet has provided a Windows XP/Windows 7 Graphical User Interface. The details of this GUI can be found in the EVAL-06 Datasheet DS-72-22 that is located at http://www.cymbet.com/content/products-resource-docs.asp. The folder containing the EVAL-06 GUI is on cymbet.com:

http://www.cymbet.com/products/datasheets-downloads.php

A video demonstrating the EVAL-06 is on the Cymbet YouTube channel: http://www.youtube.com/watch?v=8iZXQ7KDFLU

Additional Application Support Information

Should you need additional technical support designing EnerChip Solid State Batteries or the EnerChip Energy Processor into your next design, please contact Cymbet at the number below or via our Application Support form found at http://www.cymbet.com/content/applications-support.asp or call us at the number below.

Ordering Information

EnerChip Part Number	Description	Notes
CBC-EVAL-06	EnerChip Real Time Clock Power Backup Eval Kit	USB Stick with EnerChip CBC3112 and Micro Crystal 2132 RTC
CBC-EVAL-08	EnerChip EH Solar Energy Harvesting Eval Kit	Contains Solar Cell and CBC5300 Module
CBC-EVAL-09	EnerChip EP Universal Energy Harvesting Eval Kit	Contains Solar Cell and CBC51100 Module
CBC-EVAL-10	EnerChip CC Solar Energy Harvesting Eval Kit	Contains Solar Cell and CBC51100 Module
CBC-EVAL-11	EnerChip CC RF Induction Charging Eval Kit	Contains RF Charging pad and EnerChip CC Charger