

# ***Using the TPS2384 Reference Design***

## *Reference Guide*

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The TPS2384 reference design is available from Texas Instruments for evaluation and prototyping of the manual mode PoE application. The reference design has the following functionality:

- RS-232 serial or I<sup>2</sup>C host interface to be used with host PC or host controller
- MSP430F169 microcontroller to execute firmware for manual mode operation of the TPS2384 devices
- 1 2x6 (12-port) PoE module containing 3 TPS2384 devices
- Jumpers and switches to control functions such as power supply status, auto mode select, etc.
- JTAG, Power and other expansion ports

The reference design can be used with the GUI that Texas Instruments provides, or can be used to interface to a customer's host system through the host interface, to allow development of host drivers before the hardware is available.

There are several ways in which firmware can be loaded into flash memory of the MSP430 controller on the reference design:

- MSP430 Flash Emulation Tool
- MSP430 GANG programmer
- Software boot loader
- Hardware BSL

## 1 MSP430 Flash Emulation Tool

The MSP430 flash emulation tool (FET) allows the MSP430's flash memory to be updated over the JTAG port on the reference board. The FET is a device that connects to JTAG on the board and adapts that to a parallel port to the PC with the development tools.

The development tool is from IAR systems (<http://www.iar.com>), and is used to load the binary images from your PC into the MSP430's flash memory through the FET. The name of the tool is *IAR Embedded Workbench* and a free version is available from Texas Instruments for loading images of less than 4K onto the MSP430. A full licensed version is also available from IAR systems.

The FET requires that the image is built for the MSP430 in the \*.d43 file format, which generates the JTAG headers for use with the IAR tools and the FET. The filename ends in \*.d43. To load this file in the MSP430, follow the steps below:

1. Create a new workspace by going to the File->New menu.
2. Add the MSP430 binary text file to the project by going to the Project->Add Files... menu
3. Make sure that the FET is connected to both the PC's parallel port and the JTAG port on the reference board.
4. Download the image by opening the Project->Debug menu. You should see some status messages during this process.
5. When complete, start the application by opening the Debug toolbar and pressing the 'go' button. After this point, your application should be loaded into flash memory and every time you reset the board, the new image will execute on the MSP430.

The MSP430 FET is available on the Texas Instruments web site at <http://focus.ti.com/docs/toolsw/folders/print/msp-fet430p140.html>

## 2 MSP430 GANG Programmer

The MSP430 GANG programmer is another tool that allows you to load new code images into flash memory on the MSP430 on the reference design through the JTAG port.

The GANG programmer connects to your PC and comes with a simple GUI that allows you to load an image onto your GANG programmer from your PC. To load the image onto the MSP430, you simply need to press the button on the GANG programmer each time you want to load the installed image.

The GANG programmer requires the image format to be MSP430 binary format (.txt). When loading the image, ensure that the one you select is in this format by making sure the extension is .txt.

You can load the image onto the GANG programmer either through the same steps above as described for the FET, or through the GUI provided with the GANG programmer.

The GANG programmer is available through Texas Instruments from the following URL:  
<http://focus.ti.com/docs/toolsw/folders/print/msp-gang430.html>

### 3 Software Boot Loader

The software boot loader (sometimes referred to as software BSL) is a different mechanism available for loading code into flash memory of the MSP430.

The difference with this method is that this allows an image to be loaded over the same communication interface (RS-232) as the rest of the communication with the device. This is more popular in production environments than in prototype environments. The software boot loader is instantiated through the same *Host Interface Protocol* that the host or GUI uses for communication with the firmware on the MSP430.

To use the software boot loader, first make sure that the software BSL image is previously installed in the MSP430. If you have previously loaded the image through either of the two methods above, or if you have a MSP430 device with the PoE image burned in, this should already be true.

To load a new image, you must select the PoE application image that ends in \*.s99. This file is in Motorola S-Record format, which is what the download function in the Host Interface Protocol requires.

Either launch this function through the GUI that is provided to load the \*.s99 file into the MSP430, or implement your system host to support the download protocol as specified earlier in this document.

For more information on the software boot loader and download process, refer to the *Host Interface Protocol* and Software download sections of the TPS2383 PoE Firmware User's Guide (Texas Instruments Literature Number SLVU195).

### 4 BSL

The BSL (Bootstrap Loader) on the MSP430 is a fail-safe mechanism by which you can update the image in flash memory on the MSP430. This is used primarily in production and not in prototype systems.

The difference between this mechanism and the software boot loader is that this uses dedicated pins on the MSP430 to start the download procedure.

For more information on the hardware BSL, refer to the application notes for the MSP430.

### 5 GUI

To use the GUI with the reference design on a new machine, you simply need to copy the executable (.exe) file to your machine.

In some cases, new machines will need some Microsoft Active-X communication controls installed on those machines. If this is the case, you will see pop-up messages stating errors referring to MSCOMM32.OCX or something similar.

If this happens, contact your Texas Instruments support representative.

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