

# DSP Shield Standalone Mode Setup

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## Application Note DSP-02

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### Background

The DSP Shield can be used in either 'Shield' mode, where it shares the USB port on a stacked Arduino UNO, or it can be used in 'Standalone' mode, wherein it uses its own XDS-USB Port to communicate with Energia and receive uploaded user code.

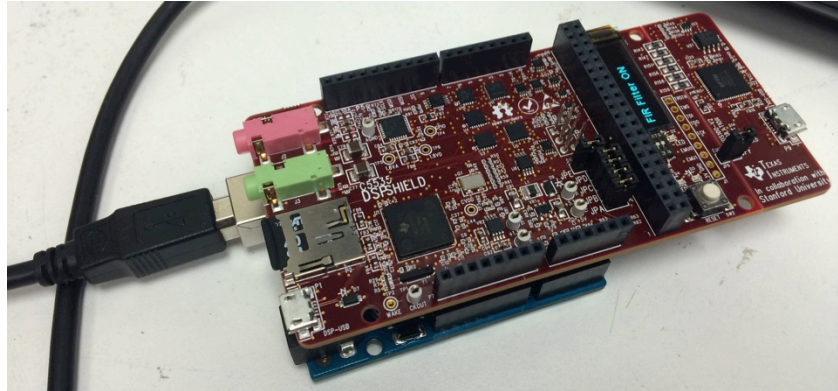


Figure 1: DSP Shield stacked with an Arduino UNO, in 'Shield' mode.

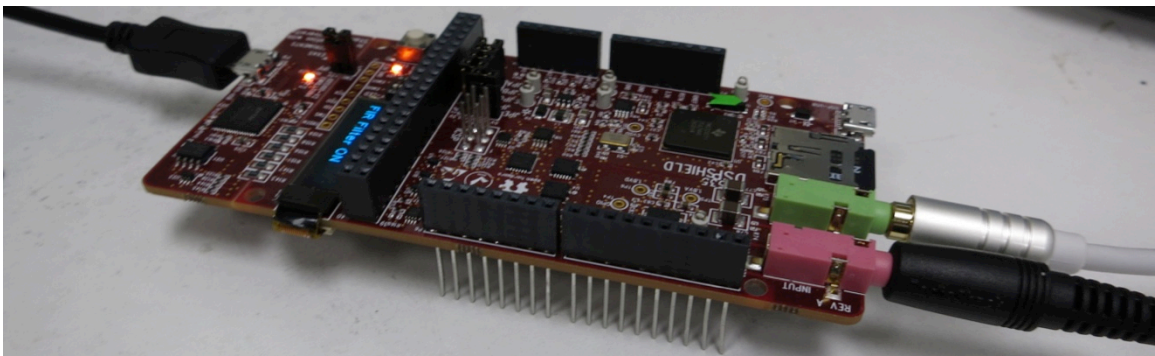


Figure 2: DSP Shield with micro-USB connected for standalone mode.

In order to switch between these two modes, the user must compile a binary program that is configured for the desired mode and then get that program onto the DSP, either by uploading code using the method for the pre-existing binary or by copying the new binary directly onto the microSD card using a PC.

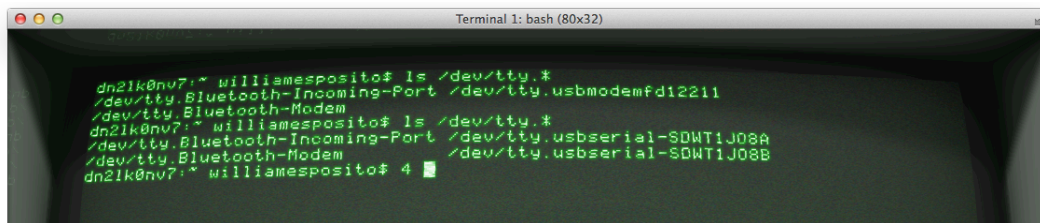
For example, to convert from Shield to Standalone mode, the user would select Standalone mode in Energia but upload to the DSP Shield using the Arduino's USB port. Conversely, to convert from Standalone to Shield mode, the user would upload using the FTDI "XDS100V2" bridge. After the upload is complete and the reboot occurs, the DSP Shield would accept the next upload via the Arduino USB port.

## DSP Shield Standalone Mode Setup

### Driver Installation

Before beginning the switch to Standalone mode, the computer should have drivers for the DSP Shield's onboard JTAG / USB-Serial bridge. This micro-USB port is found on the opposite end of the DSP shield from the MicroSD Card holder and headphone jacks, and is labeled 'XDS-USB', next to a chip stamped 'FTDI'. The XDS100 V2 chip used as a USB-serial bridge on the DSP Shield itself is based on the FTDI 2232H chip.

Under Windows, these drivers are currently only available as a part of the code composer studio (CCS) install. Download Code Composer from [http://processors.wiki.ti.com/index.php/Download\\_CCS](http://processors.wiki.ti.com/index.php/Download_CCS) and run the full installer. Under OSX, the XDS100V2 is not officially supported, so some more obscure drivers. The install package found at <http://beagleboard.org/static/beaglebone/latest/README.htm> will be used. Select the file for OSX-Serial. Once these drivers are installed, connecting a cable to the XDS-USB connector should make two new serial port instances (labeled A and B) appear. Selecting the 'B' port will allow uploads to the DSP Shield in standalone mode.

A terminal window titled "Terminal 1: bash (80x32)" showing the output of the 'ls /dev/tty.\*' command. The output lists several serial ports, including two new ones: /dev/tty.usbserial-SDWT1J08A and /dev/tty.usbserial-SDWT1J08B. The user's prompt is dn21k0nv7:~ williamesposito\$ and the terminal shows the command being executed and the resulting list of ports.

```
Terminal 1: bash (80x32)
dn21k0nv7:~ williamesposito$ ls /dev/tty.*
/dev/tty.Bluetooth-Incoming-Port /dev/tty.usbmodemfd12211
/dev/tty.Bluetooth-Modem
dn21k0nv7:~ williamesposito$ ls /dev/tty.*
/dev/tty.Bluetooth-Incoming-Port /dev/tty.usbserial-SDWT1J08A
/dev/tty.Bluetooth-Modem /dev/tty.usbserial-SDWT1J08B
dn21k0nv7:~ williamesposito$
```

Figure 3: Screenshot of the additional serial ports seen when the USB drivers are installed and the DSP Shield connected via its XDS-USB port under OSX.

### Switching Modes

In order to switch from Shield Mode to Standalone mode, or vice versa, one must follow a few fairly straightforward steps.

**Before you begin, go to the Preferences Menu in Energia and select 'Compile DSP Shield Core Library'. This option will slow down compilation but is critical. Once you have successfully uploaded code in the new mode, you can uncheck this box.**

## DSP Shield Standalone Mode Setup

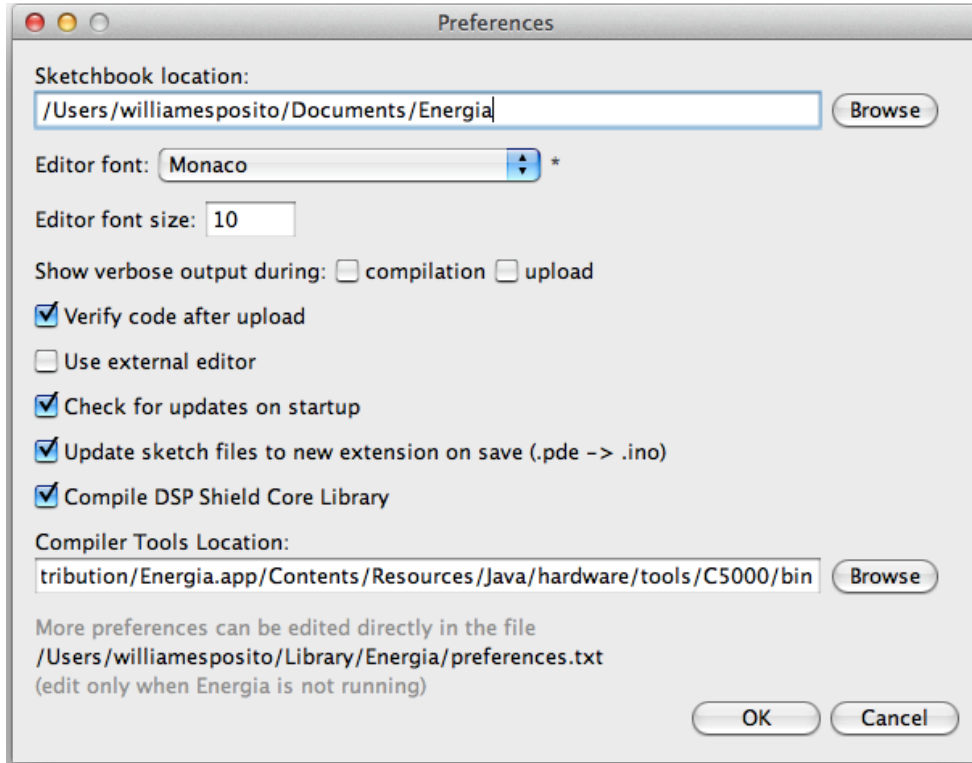


Figure 4: Energia Preferences

### Method 1

To switch to Standalone mode from Shield mode, perform the following steps, code must be uploaded to the DSP shield that will instruct it to switch to a new mode. This must be done from the mode it is already configured to use.

1. Select 'C5535 - Standalone Mode' from the Tools→Board menu in Energia.

## DSP Shield Standalone Mode Setup

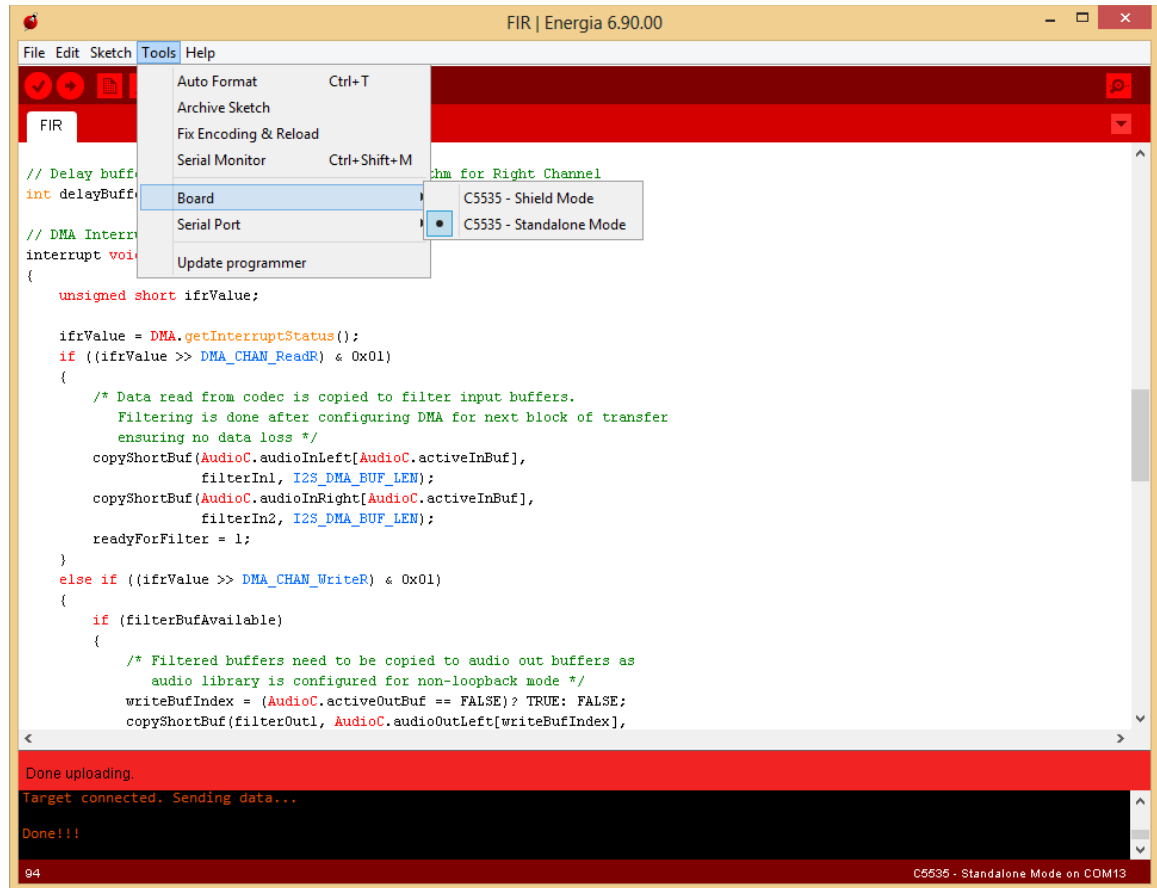


Figure 5: Selecting Standalone Mode on the DSP Shield

2. Stack the DSP Shield with an Arduino Uno and connect to the Arduino Uno as normal for Shield Mode, as in **Figure 1**, above.
3. Upload any program normally to the DSP Shield. The following code will work, but any successfully compiled program should be equivalent.

```
void setup()
{
  // put your setup code here, to run once:
}
void loop()
{
  // put your main code here, to run repeatedly:
}
```

4. Switch the USB connection to the PC from the Arduino to the XDS-USB port on the DSP Shield and remove the Arduino UNO from the stack, as in **Figure 2**.
5. Select the new USB port for the DSP-Shield from the Tools→ Serial Port menu in Energia.
6. Upload code normally using Energia.

## DSP Shield Standalone Mode Setup

To switch back to shield mode, reverse the process, selecting 'C5535 – Shield Mode' from the dropdown and upload via the XDS-USB port, thereafter stacking with the Arduino and then switching USB ports.

### Method 2

As an alternative to uploading via USB, to switch to Standalone mode from Shield mode, one can perform the following steps. For this mode, no Arduino Uno is needed.

1. Create a new sketch and save it in the Energia folder.
2. Select 'C5535 - Standalone Mode' from the Tools→Board menu in Energia.
3. Compile but do not upload this sketch using the '✓' button at the top left corner of the Energia window.
4. Navigate to the sketch in the Energia folder.
5. Remove the MicroSD card from the DSP Shield and insert it in the PC .

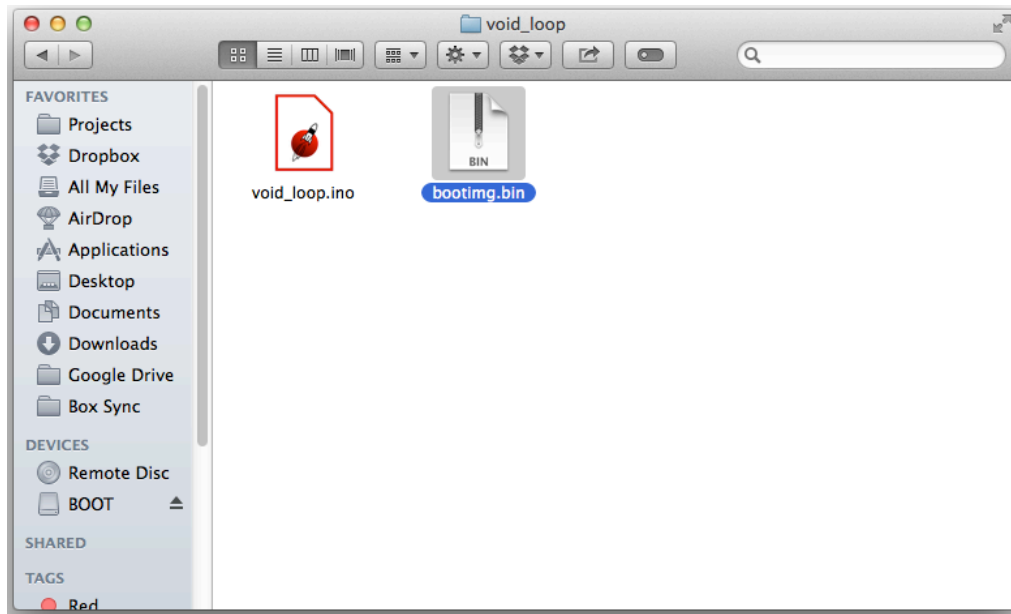


Figure 6: File to copy to MicroSD card

6. Copy the file 'bootimg.bin' from the sketch folder to the root of the MicroSD Card. Overwrite the existing bootimg.bin file if present.
7. Replace the MicroSD card in the DSP Shield and reset it.
8. Connect the PC to the XDS-USB port on the DSP Shield as in **Figure 2**.
9. Select the new USB port for the DSP-Shield from the Tools→ Serial Port menu in Energia.
10. Upload code normally using Energia.

To switch back to Shield mode, reverse the process, compiling a file after selecting 'C5535 – Shield Mode' and copying to the MicroSD card.