



# Bend Sensor<sup>®</sup> USB kit User Guide





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## **Introduction**

The Flexpoint Bend Sensor<sup>®</sup> is a unique sensor that changes in resistance when it is bent. Integrating it into your application is not necessarily trivial, therefore Flexpoint developed the Bend Sensor<sup>®</sup> USB kit as an easy to use demonstration on how to integrate it into a system whether it be analog, digital, firmware or software driven. The kit digitizes the analog signals of the Bend Sensor to a graphical view on a PC. All the schematics, firmware and software are provided for use in your own project. Below are the steps to install and use the kit.

## **Kit Contents**

Your kit includes the following:

1. Micro USB cable
2. USB kit PCB board
3. 2" Bi-directional Bend Sensor<sup>®</sup>
4. Information card



## **Installation instructions**

The USB kit evaluation software can be installed from the web links located on the information card.

### **USB Serial Port Driver**

If you are using Windows 10 or newer your USB kit should automatically enumerate and not need to install the Cypress USB Driver. If you are using another version of Windows please follow these steps:

1. Point your browser to [www.flexpoint.com/sdk](http://www.flexpoint.com/sdk)
2. Click on the “CypressDriverInstaller” link.
3. Follow the on-screen instructions to complete the installation.
4. Plug the USB kit into a USB port on your PC

### **USB kit Source Code**

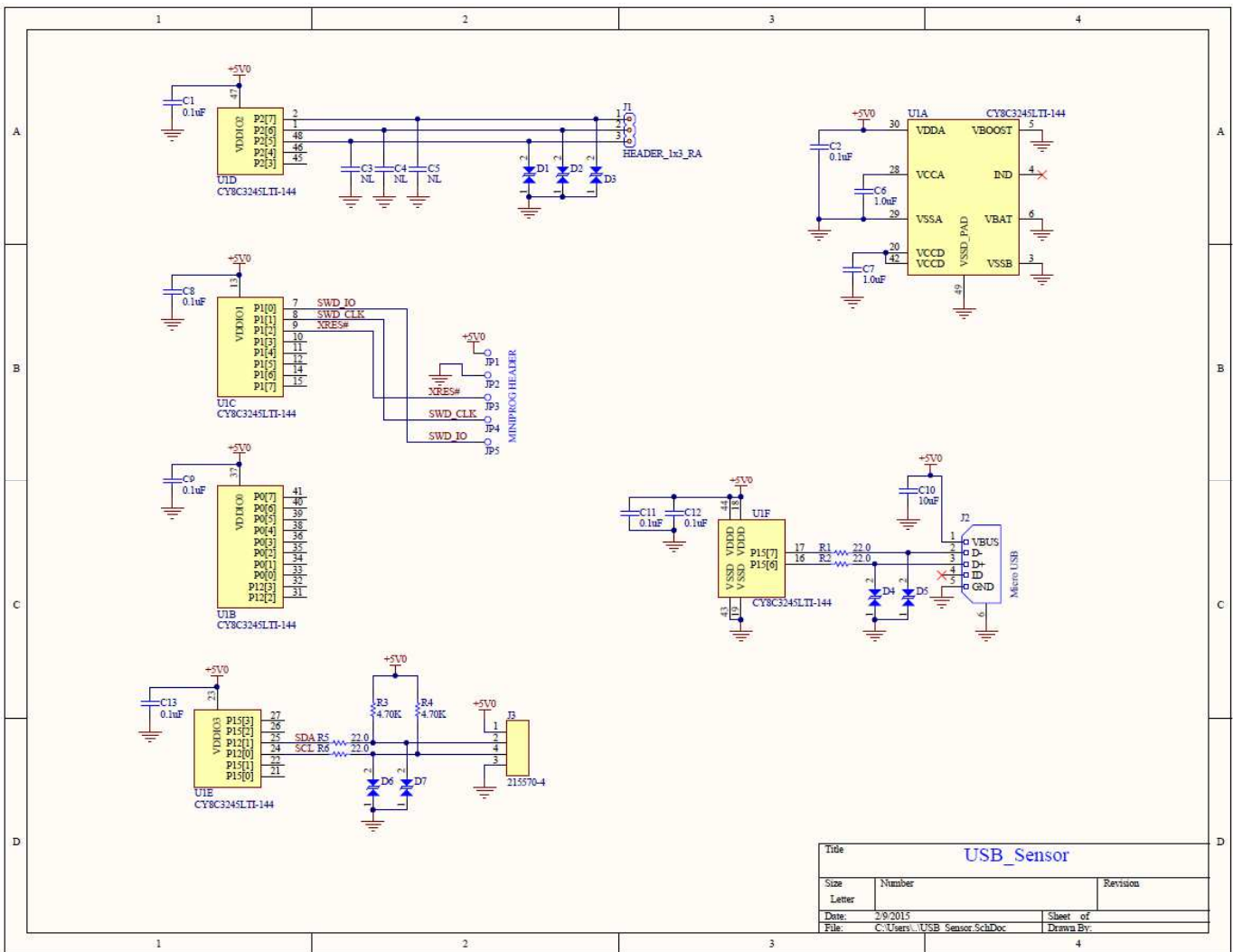
1. Point your browser to [www.flexpoint.com/sdk](http://www.flexpoint.com/sdk)
2. Click on the “USBkit Source Code” link.
3. Download PSoC Creator IDE from [www.cypress.com](http://www.cypress.com)
4. Navigate the project file on your PC called “USBkit.cywrk”

### **Serial Oscilloscope**

1. Point your browser to <http://x-io.co.uk/serial-oscilloscope/>
2. Download “Serial-Ocilloscope.zip”
3. Unzip “Serial-Oscilloscope.zip”
4. Run Serial-Oscilloscope.exe
5. Click on the “Serial Port” Menu
6. Choose the appropriate serial port
7. Ascii Data should be flowing.
8. Click on the “Oscilloscope” Menu
9. Choose “Channel 1, 2 and 3”
10. Click on the “Vertical scale control” to zoom the Y axis out to see the full range.

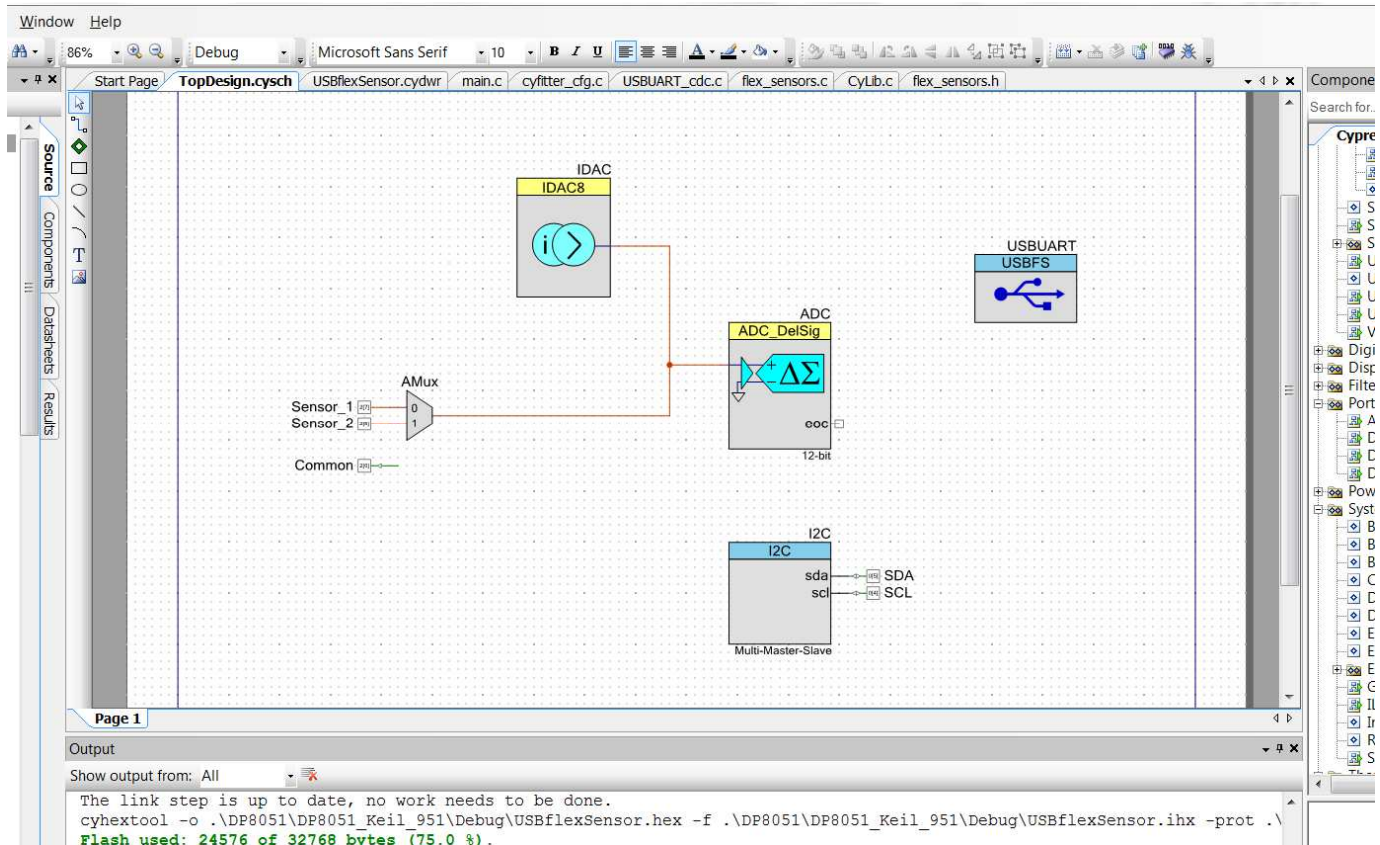


## USB kit schematic



The heart of the USB kit is the Cypress PSoC CY8C3245LTI-144. The Cypress PSoC is a great part to use with Flexpoint Bend Sensors since they have an integrated current DAC. This allows the Bend Sensor<sup>®</sup> to be interfaced with the ADC directly without the need of any external components like voltage divider resistors or op-amps.





The schematic capture tool inside PSoC Creator is used to configure the PSoC. The USB kit uses the IDAC to source a current to ground through either Sensor 1 or Sensor 2. The ADC measures the voltage across the sensor. The voltage that the ADC measures is determined by ohms law:

$$V_{ADC} = I_{IDAC} \times R_{sensor}$$

This gives a nice linear relationship between the resistance of the sensor and the voltage measured across it. Also the current DAC acts like a variable gain amplifier allowing you to improve your signal to noise ratio or to reduce signal in case of clipping.





The PSoC on the USB kit can be re-programmed. You can attach a minipro3 programmer from Cypress on the header 5-pin jumper header to debug and program the PSoC.

Source code to the project can be found at [www.flexpoint.com/sdk](http://www.flexpoint.com/sdk).

Please go to [cypress.com](http://cypress.com) to download the latest PSoC Creator tools.

