

## SX-Key<sup>®</sup> USB (#45214)

### Programming and Debugging Tool for the SX Microcontroller

The SX-Key USB is the hardware bridge between the SX-Key Editor software running on a personal computer, and the SX microcontroller installed in a target system. The communication between a Windows PC and the SX-Key USB is performed via the Universal Serial Bus, and the communication between the SX-Key USB and the target SX is performed via the target's OSC1 and OSC2 pins.

Together with the SX-Key Editor software, the SX-Key USB allows you to:

- Program target SX microcontrollers
- Read back the contents of the target's program and fuse registers
- Provide a clock signal to the target while it is running
- Run targets in debug mode, where the SX-Key IDE allows single-stepping through programs, full speed option with interrupts at a pre-defined breakpoint, and a display of the contents of all registers



### Features

- Create clock frequencies from 2.75 MHz to 100 MHz
- Run from USB power independent of the target system's operating voltage
- Connect to the computer through a full speed USB port
- Connect to a Parallax SX Tech Board, Parallax Professional Development board, or any other board with a 4-pin male SX-Key header
- Perform in-system programming and debugging
- Use with the SX-Key Editor Software version 3.2.92h BETA or higher, on a Windows 2K/XP/Vista OS.

### Key Specifications

- Power supply: +5V supplied via the USB connection
- Communication: USB (v 1.1 and 2.0 supported)
- PLL frequency range: 2.75 MHz to 100 MHz
- Operating temperature: 32 to 158 °F (0 to 70 °C)
- Size: 2.5 x 0.63 x 0.25 in (63.5 x 16 x 6.5 mm)
- Weight: 0.2 oz (5.6 g)

## Installing the USB Driver

**Note: Please do not connect the SX-Key USB to any USB port before installing the required software drivers, as described below. Otherwise, Windows may automatically install an incorrect driver which may not work for the SX-Key USB.**

The SX-Key USB uses an FT232R USB interface chip from FTDI. To allow the SX-Key Editor to communicate with the SX-Key USB, it is necessary to have FTDI's Virtual COM Port driver installed on your computer. With this driver installed, the SX-Key USB appears as a serial COM port to the SX-Key Editor.

The easiest way to install this driver, or to make sure that the most recent driver version is installed, is to let the setup routine for the new SX-Key Editor handle this for you, as described in the next paragraph.

## Installing the newest SX-Key Editor

In order to correctly operate the new SX-Key USB, the SX-Key Editor Software Version 3.2.92h BETA or higher is required. If you do not already have this version installed on your PC, please download it from the Parallax web site:

- Navigate to [www.parallax.com/SX](http://www.parallax.com/SX) and click on the SX Software and Documentation Downloads link.
- Download the latest version of the SX-Key Software
- Unzip and run the executable file.
- When the install dialog opens, follow the instructions and enter the requested information.
- When it asks to select the Setup Type,
  - o You may select "Complete" to have the SX-Key Editor and all components installed into a new sub-folder. This makes sure that any previously installed SX-Key Editor versions will not be overwritten.
  - o Or, you may select "Custom" instead to have the option to select the installation folder. If you specify the folder of an earlier SX-Key Editor setup, the older version will be replaced by the new version. The new version will still support previous versions of the SX-Key and the SX-Blitz modules.
- The installer will ask if it should "Automatically install/update driver" for the SX-Key/Blitz USB products. Please make sure that this option is checked to ensure that the most recent virtual COM port driver for the FTDI USB devices is installed.

**Note: Former versions of the SX-Key Editor software do not support the SX-Key USB. When you try to use an old version with the SX-Key USB, an "SX-Key not found" error will be reported when the Editor tries to establish communication with the SX-Key.**

## Connecting the SX-Key USB to the PC

Use a standard USB cable with a Type A USB connector for the PC on one end, and a 5-pin Mini-B connector for the SX-Key USB on the other end. (Sold separately; #805-00006). When the SX-Key USB is connected to the PC, it will be automatically detected, and a virtual COM port will be assigned.

When you connect the SX-Key USB the first time, you will need to know the assigned port number in order to correctly configure the SX-Key Editor. Here is a simple method to find out which Com port the SX-Key USB is connected to:

1. While the SX-Key USB is disconnected, select "Configure" from the "Run" menu, or press Ctrl-U.
2. Write down the COM ports shown (if any) in the "Serial Port" section of the Configuration dialog
3. Connect the SX-Key USB to the PC.
4. Close the Configuration dialog, then after a short while (5-10 seconds), reopen it
5. In the "Serial Port" section, there will be a COM port that was not shown in step 2. Select the newly created COM port.
6. Close the Configuration dialog.

The SX-Key Editor will automatically save this selection for later sessions.

## Connecting the SX-Key USB to the Target System

The SX-Key USB comes with a four-pin connector that needs be connected to the matching OSC1, OSC2, and Vss pins of the target system, as shown in the picture above. As the SX-Key USB is powered from the USB port, feeding Vdd to the target's pin-header is optional and only necessary when you also want to use former (serial) versions of the SX-Key, or any version of the SX-Blitz together with the target system. Take care to connect the SX-Key USB in the correct orientation because the connector is not keyed. The picture shows the minimum connections required to program and debug an SX chip. Please note that the /MCLR pin is tied to Vdd. This is necessary to make sure that the SX chip goes out of reset state after power-up. For better protection of the /MCLR input, a resistor (4.7 to 10 kΩ) can be added between pin 28 and Vdd.

**Note:** Any external resonators or crystals connected to the target's OSC1 and OSC2 pins may remain in place during programming. For debugging, you will need to remove these components. External clock generators connected to the OSC1 pin need to be disconnected for programming, as well as for debugging.

**Note:** When setting the clock frequency in The SX-Key Editor Version 3.2.92h BETA via the Run > Clock menu, the setting range on the control is 400 kHz – 110 MHz; however, the SX-Key USB will not output a clock signal unless a valid frequency is selected, in the range of 2.75 MHz – 100 MHz. Because the SX-Key USB generates the clock signal during debug, debug capabilities are only available when the 'FREQ' directive is set within the same 2.75 to 80 MHz range.

