

SV TEHS SIA

Scenix Development Tools

SX-TIPS

User's Guide

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SX-TIPS User's Guide

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Introduction

SX-TIPS in-circuit programmer provides low-cost programming capabilities for Scenix microcontrollers.

The SX-TIPS in-circuit programmer supports all currently available SX microcontrollers from Scenix Semiconductor, include SX18/20/28AC and SX48/52BD. It connects to the serial port of any PC and comes with all software necessary.

Programming with SX-TIPS is provided via a 6-pin emulation connector which mates with a 6-pin 0.1-inch square post header in the target system. The connector is wired for OSC1, OSC2, VDD, VSS and Reset pins, another one pin used as key. The oscillator circuit components on the target board should not be disconnected as long as the components are within recommended specifications.

Features

- Serial port interface
- Powered from the target device, less than 5 mA
- Voltage range from 3.0V till 5.6 V
- Scenix SASM, Parallax PASM/SX-KEY and Microchip MPASM assembler formats support

Package

SX-TIPS package include the following:

- SX-TIPS in-circuit programmer
- SX-TIPS software for Windows 95/98/NT
- SX-TIPS User's Guide

INTRODUCTION

Requirements

It is recommended to install SX-TIPS Programmer on the system with the following minimum requirements:

- IBM compatible 486/Pentium.computer
- One free serial port with 9-pin connector
- 4 MB Ram, 16 MB recommended for the operational system
- 4 MB of free hard disk space
- Microsoft or compatible mouse

About the User's Guide

This User's Guide organized as following:

- **Chapter 1: Introduction** – Summarizes the SX-TIPS Programmer features and requirements.
- **Chapter 2: SX-TIPS Hardware** – Describes the SX-TIPS hardware including installation, connection headers, etc.
- **Chapter 3: Software Installation** – Provides information on installing the Windows 95/98/NT software and SX-TIPS hardware.
- **Chapter 4: Programmer Window** – Describes SX-TIPS programmer window.

Software Updates

New versions of the SX-TIPS software can be obtained from the manufacturer's web site at:

<http://www.svtehs.com/sxtip.htm>

The SX-TIPS hardware

SX-TIPS small and easy to use hardware powered from the target board (<5 mA)..

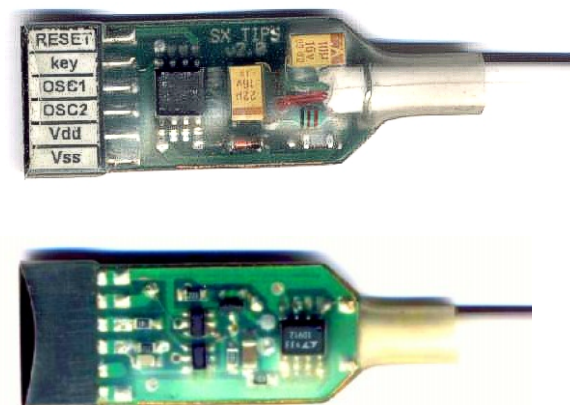
The SX-TIPS hardware powered from the target board and consume less than 5 mA. Module can work from 3.0 till 5.6 V and allow low-voltage programming.

SX-TIPS programmer connected to the free 9-pin PC serial port with standard DE9 connector, attached to the flat 1.5 m cable. It connected to the target board via a 6-pin emulation connector which mates with 6-pin 0.1-inch square post header in the target system. To implement in-circuit programming and debugging features, this connector should be included in target board. It should have 6 pins, attached to the following target microcontroller pins:

- 1 – Vss, ground
- 2 – Vdd, power pin, 3.0...5.6V
- 3 – OSC2, passive components on target board allowed
- 4 – OSC1, passive component on target board allowed
- 5 – key to prevent wrong connection, no pin on the header
- 6 – Reset, optional for external reset connection, not used by realtime module

Same connector will be used by SX-DEV in-circuit programmer/debugger.

SX-TIPS can also be attached to 4-pin header, compatible with Parallax and TransData in-circuit programmers and emulators. Only pins 1-4 should be used in this case.



Software Installation

SX-TIPS software installation is very simple.

Software installation procedure is very simple – just copy **sxtip.zip** archive to the separate directory on your hard drive and unpack it, using Winzip or Zip program. Run **sx_tips.exe** and installation procedure finished. During the first start, new file will be created – **sx_tips.ini**. This file stores all SX-TIPS environment configurations.

Configuration

After SX-TIPS software installation you need to configure serial port used for SX-TIPS programmer connection. Ensure, that you have free serial port and no any other software use this port. Connect SX-TIPS programmer to the target board and apply power to the target board, as the SX-TIPS powered from the target board. Connect SX-TIPS to the free serial port with DE9 connector on the SX-TIPS cable end. Run **sx_tips.exe** software and choose Configure option from the menu. You will get configuration menu. If you did not have other serial ports currently in use on your computer, you can use **Search** option – this option will automatically search SX-TIPS hardware on all available ports, however some conflicts may occur during the search procedure. If you know exactly, what port will be used for SX-TIPS hardware, choose the right port manually and **Save Settings**. When connection with SX-TIPS hardware established, you will get message “SX_TIPS Hardware found on COMx” at the bottom line of the Configuration window.



Programmer Window

Programmer window features and options described here.

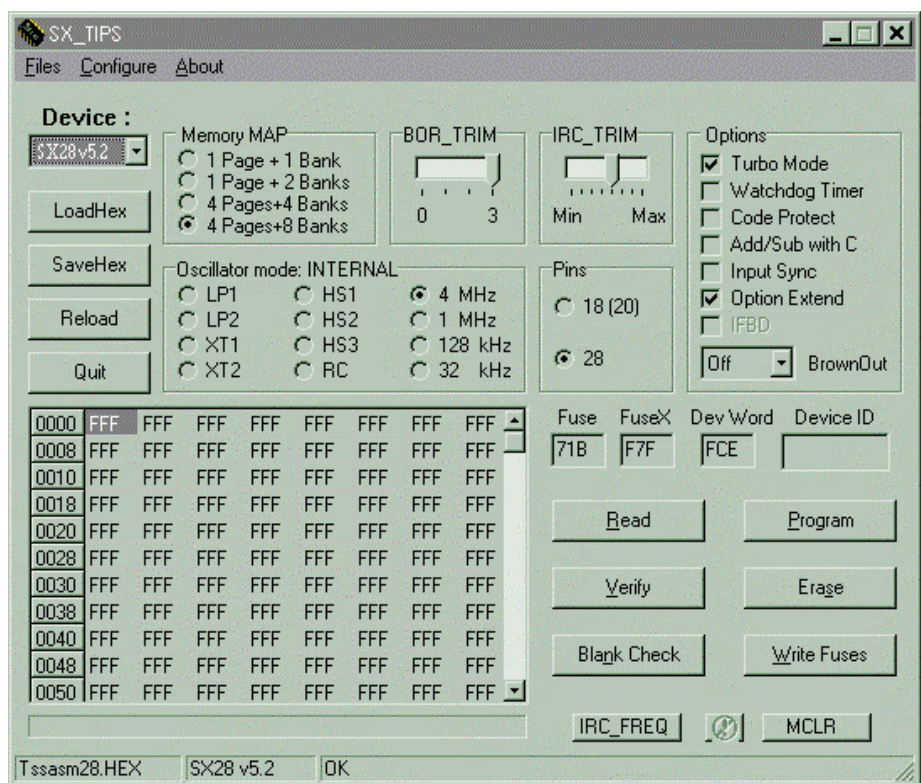
SX-TIPS in-circuit programmer supports all features of SX microcontrollers. Most options can be set in source file (see SASM manual for details). SX-TIPS programmer allows all options manual change.

Target microcontroller type can be changed in Device field. Please ensure, that you enter right microcontroller type (see **Microcontroller type** section below for details). Programmer can also detect connected microcontroller type automatically, when **Read** function is performed.

LoadHex button allow Hex file loading. INHX8M .hex file and Parallax .sxh Hex file formats supported.

SaveHex button allow save hex file, read from the target SX. File will be saved in INHX8M format.

Reload button will load the same file, as previously loaded with LoadHex button. This option is useful in debug applications.



PROGRAMMER WINDOW

Built-in **Hex editor** allow manual change of program memory before programming SX microcontroller. This can be useful for hot on-the-fly code changes or some constants changing.

Microcontroller type

To define, what is the correct microcontroller hardware revision, check the marking and date code.

SX28 v2.5 FEE 9815, 9825, 9829, 9830, 9837, 9838, 9841, 9843, 9844, 9848, 9908, 9911, 9913

This and earlier versions of SX18/20/28 did not supported with SX-DEV, all this chips should be replaced to newer silicon revisions.

SX28 v4.1 FDE 9849, 9850, 9910A4, 9912B4

V5.2 FCE All newer date codes.

SX52 v1.0 001

V2.1 002

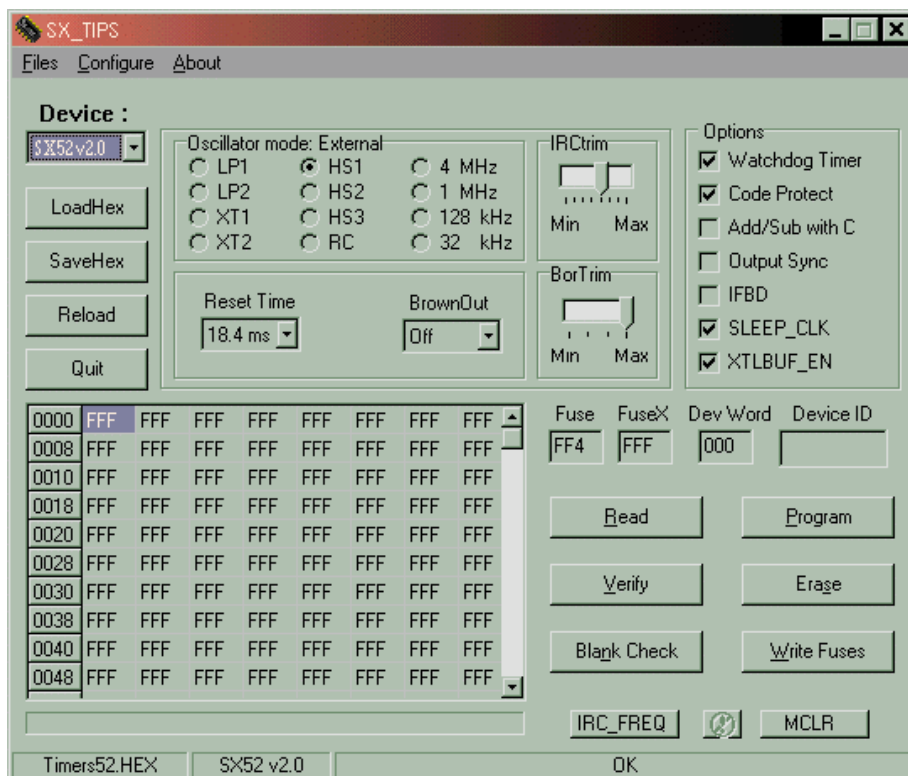
Device options

Memory Map – Configured Memory Size (SX18/28 only). These factory-configured options should not be changed unless you want to reduce the configured amount of program memory in the device.

Bor Trim – Brown Out trim bits. These bits allow fine tune of brownout level. Parts are shipped from factory untrimmed.

IRC Trim – Internal RC Oscillator trim bits. These bits adjust the operation of the internal RC oscillator to make it operate within the target frequency range of 4.0 MHz

(typical) plus or minus 8%. Parts are shipped from factory untrimmed. To measure current microcontroller frequency, press **IRC FREQ** button. Measured internal RC oscillator frequency will be displayed in the status bar. You can adjust IRC trim value, program target SX and measure resulting frequency.



PROGRAMMER WINDOW

Oscillator Mode – This combination of bits sets up the device to operate with a particular type of external oscillator or sets the divide-by factor for generating the instruction clock from the internal oscillator. Eight external oscillator options determined as follows:

LP1 – low-power crystal (32 kHz)

LP2 – low-power crystal/resonator (32 kHz to 1 MHz)

XT1 – low power crystal/resonator (32 kHz to 10 MHz)

XT2 – normal crystal/resonator (1 MHz to 24 MHz)

HS1 – normal crystal/resonator (1 MHz to 50 MHz)

HS2 – normal crystal/resonator (1 MHz to 50 MHz)

HS3 – normal crystal/resonator (1 MHz to 50 MHz)

RC – external RC, OSC2 is pulled high with a weak pullup, no CLKOUT output

Four nominal instructions rates with internal oscillator determined as 4 MHz, 1 MHz, 128 kHz and 32 kHz.

Pins – Selects the number of pins for SX18 (20)/28. Set it to the correct value, according to your target microcontroller.

Reset Time – Delay Reset Timer (DRT) timeout period (SX48/52 only). The SX18 (20)/28 devices have a fixed startup time of 18 ms when the wakeup reset occurs. The SX48/52 devices have a programmable startup time. Timeout period can be one of the following: 0.06 ms, 18 ms, 60 ms, 960 ms.

BrownOut – Set the Brown Out Reset threshold voltage. When the supply voltage to the SX device drops below a specified value but remains above zero volts, it is called as “brown-out” condition. The SX device has a brownout detection circuit that puts the device into the reset state when the brownout occurs, and allows the device to re-start when the brownout condition ends. This feature prevents the device from producing abnormal results when the supply voltage falls to unreliable levels. The brownout threshold voltage can be programmed to the following three levels – 4.2 V, 2.6 V, 2.2 V. If the supply voltage drops below this level but remains above zero, the brownout circuit holds the SX device in the reset state. When the voltage rises above this threshold, the device start operating again, starting at the reset address. Fine-tuning of the brownout threshold voltage can be done with brownout trim bits.

If the brownout detection circuit disabled, device will still operate below the brownout threshold voltage, but will produce unreliable results if the supply voltage falls too low.

Turbo mode – SX18 (20)/28 only option. If set, the instruction clock rate is equal to the oscillator clock rate. If cleared, the instruction rate operates at one-fourth the oscillator clock rate. See also Chapter 4, option 7).

Watchdog Timer – Enable Watchdog Timer. If set, a watchdog timeout occurs when the watchdog timer overflows. This feature provides an escape mechanism from an infinite loop or other abnormal program conditions. When a watchdog timeout occurs, it resets the device just like assertion of the MCLR input. The watchdog oscillator has a nominal frequency of 14 kHz; at this rate 8-bit watchdog timer overflows in 18 ms. the watchdog period can be increased under program control up to 2.34 s with OPTION register.

PROGRAMMER WINDOW

Code Protect – Code Protection. If set, the program code and configuration registers read back as scrambled data. This prevents reverse engineering of your proprietary code and configuration options.

Add/Sub with C – Carry bit Input. If set, carry bit will be add into all addition operations (ADD fr, W means $fr=fr+W+C$); and to subtract the complement of the carry bit from all subtraction operations (SUB fr, W means $fr=fr-W-/C$). If clear, carry bit will be ignored as an input for addition and subtraction operations.

Input Sync – Synchronous Input Mode. If set, input signals will be synchronized with internal clock through two internal flip-flops. If clear, input signals will go directly to the port inputs.

IFBD – Internal Feedback Disable. External oscillator mode only. If set, the crystal/oscillator can rely on the internal feedback resistor between the OSC1 and OSC2 pins. If clear, an external feedback resistor is required between the OSC1 and OSC2 pins.

Option Extend – OPTION register Extension and Stack Extension, SX18 (20)/28 only option. If set, enable programmability of bit 6 and 7 in the OPTION register, the RTW and RTE_IE bits and to extend the stack size to eight locations. If clear, disable programming of the RTW and RTE_IE bits and to limit the program stack size to two locations.

SLEEP_CLK – Sleep Clock Disable, SX48/52 only option. If set, enable clock operation during power down mode to allow fast start-up. If clear, disable clock operation during power down mode to reduce power consumption.

XTLBUF_EN – Crystal Buffer enable, SX48/52 only option. Set, if use external resonator/crystal. Clear to reduce power consumption, if use internal oscillator or external clock signal.

Fuse window – This window display all Fuse Word Register Configuration bits. It is possible to modify it content directly; however selecting options with as described above will be more easy and friendly.

FuseX window – This window display all FuseX Word Register Configuration bits. It is possible to modify it content directly; however selecting options with as described above will be more easy and friendly.

Dev Word window – This window display Device Word: hard-wired read-only Part ID. The following Part ID exist:

FEE	SX18 (20)/28 v2.5
FDE	SX28 v4.1
FCE	SX28 v5.2
001	SX48/52 v1.0
002	SX48/52 v2.1

Device ID window – This window allow to add user identification to the programmed device. This identification will be programmed into special user code ID locations, not accessible from the user program. Up to 8 ASCII symbols can be written. This ID can help identify the code-protected device, when read it.

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