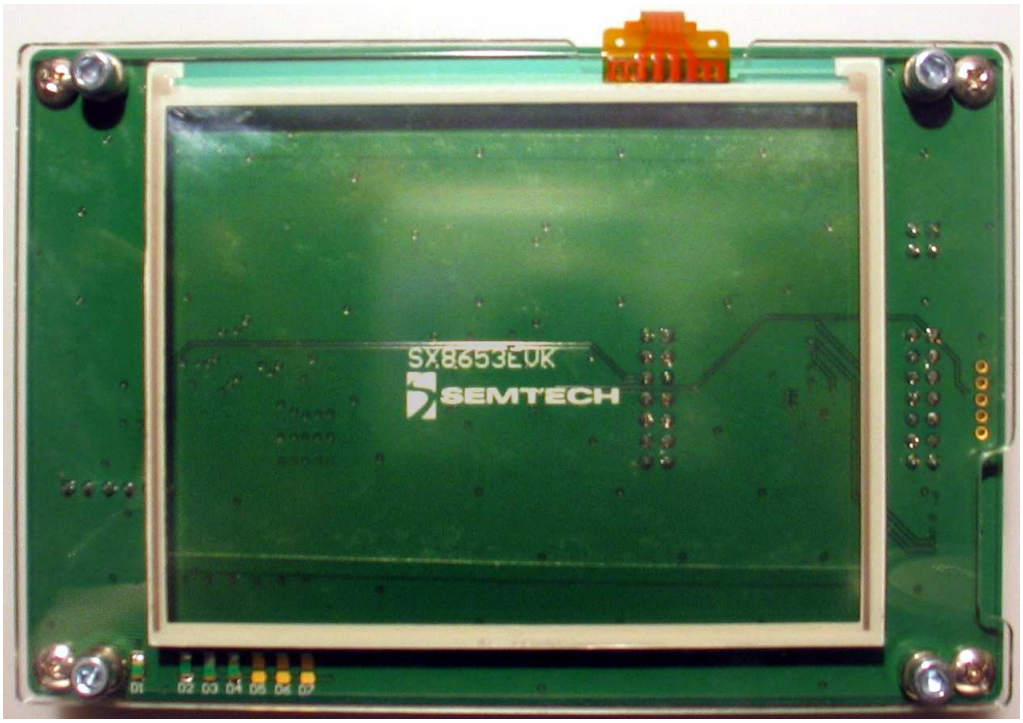

User Guide

SX8653EVK Evaluation kit for SX8653 multitouch controller

GENERAL DESCRIPTION

The SX8653 is a touch controller for 4 or 5 wire resistive touchscreen. With 4-wire touchscreen, the multitouch feature enables a completely different user interaction. It enables detection of 2 fingers on the touchscreen and several gestures like rotation and pinch/ stretch.

It features a wide input supply range from 1.65V to 3.7V and low power modes to preserve current when the screen is unintentionally touched.

To compute touch screen X-Y coordinates and touch pressure with precision, a low power 12-bit analog-digital converter is activated with the possibility to enable on-chip data averaging processing algorithms to reduce host activity and suppress system noise.

The touch screen controller inputs have been specially designed to provide robust on-chip ESD protection of up to ±15kV in both HBM and Contact Discharge, and eliminates the need for external protection devices. The SX8653 is controlled by a high speed SPI™ serial interface.

The SX8653 is available in a 4.0 mm x 3.0 mm 14-DFN package and a 1.5 mm x 2.0 mm wafer level chip scale package (WLCSP) for space conscience applications.

EVK CONTENT

- The evaluation board
- A USB cable to connect the board to the PC
- A CDROM with the installation files and the user guide

MINIMAL CONFIGURATION

- PC with MS windows 2000/XP
- USB interface

RECOMMENDED READING

- SX8653 Datasheet

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Table of contents

Section **Page**

1. Evaluation Board Overview 3
1.1. Top layer description 3
1.2. Bottom Layer Description 4
2. Getting started 4
2.1. Software installation 4
2.2. Connecting the board for the first time 5
2.3. Running the GUI 5
3. GUI overview 5
3.1. Main menu 6
3.2. Configuration 6
3.3. Supported gesture 7
3.3.1. Zoom 7
3.3.2. Rotate 7
3.3.3. Panning 8
3.4. Drawing pad 8
3.5. Picture Edit 9
3.6. Picture View 9
3.6.1. Firmware update 10
4. Troubleshooting 12
4.1. The SX8653EVK is disconnected 12
4.2. The touchscreen doesn't work 12
5. Appendix: 13
6. EVK schematics 13

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1. Evaluation Board Overview

The evaluation board connects to a Windows based computer via the USB cable in the box. The Graphics User Interface (GUI) running on the PC demonstrates the SX8653 performances in single touch and double touch.

The user can experiment double touch features through photography rotation and zoom.

1.1. Top layer description

The top layer of the evaluation board is dedicated to the touch screen interface while the electronics circuitry is on the bottom layer.

The evaluation board is shown on Figure 1. It is connected to the PC via a USB cable.

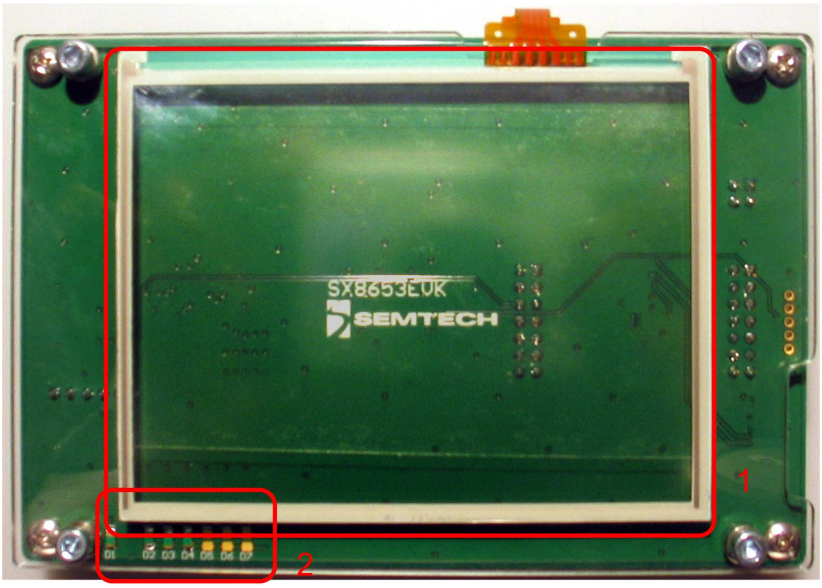

Figure 1. Top of Evaluation Board

The touchscreen ***1*** stuck on a plexiglas layer is the human interface device.

The touchscreen used on this evaluation kit has the following reference:

Brand	Reference
Fujitsu	N010-0554-T703

The control LEDs ***2*** display the applied operation:

LED	Operation
D1	Power on
D2	Single touch
D3	Double touch

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1.2. Bottom Layer Description

The electronics circuitry on the bottom layer seen on Figure 2 is needed to interface the SX8653 to the computer.

The USB connector ***1*** is connected to the host computer. The Microchip controller ***2*** is used as a gateway to generate SPI signals. U1 is the integrated circuit which generates the 3.0V supply. It is possible to bypass it by removing P9 jumper and connecting on P2 and P3 ***3*** an external power supply in the range 1.65V to 3.7V. U9 ***10*** makes the level shifting between the 5V control signals from the PIC and the SX8653 ***4***.

The connectors ***5*** and ***6*** allows the user an access to every SX8653 pins. It is then possible to connect a scope, observe the SPI communication and the controls signals NIRQ and NRST.

The main touchscreen connector P5 ***8*** allows the connection of a standard 4-wire resistive touchscreen but it is possible to connect a 5-wire resistive touchscreen on connector P6 ***7*.**

The switch S2 ***9*** enables a firmware update (see previous section).

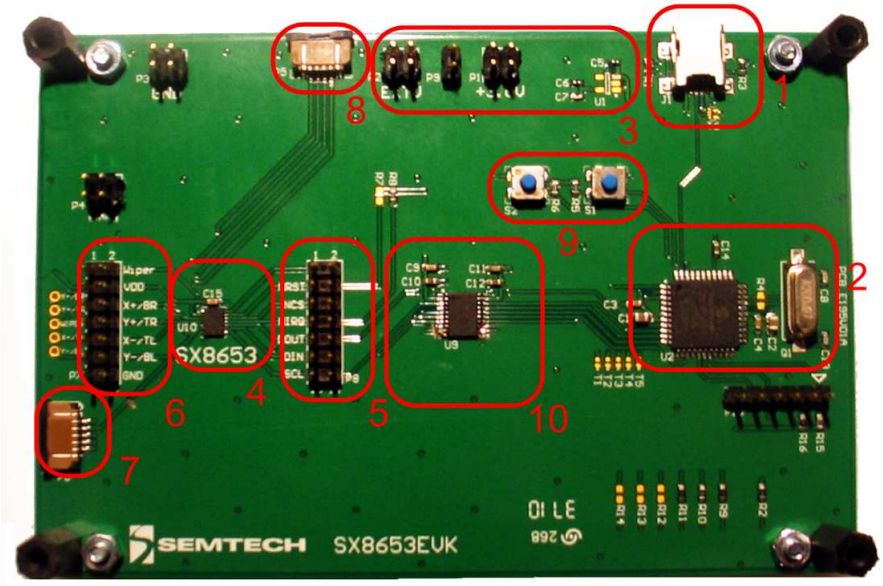

Figure 2. Bottom of evaluation board

2. Getting started

2.1. Software installation

If an internet connection is available, check the Semtech web site to download the latest version.

Otherwise, insert the CD into the CD-ROM drive of your computer. The installation should start automatically. If the installation does not start launch the file “SX8651-53EvaluationKit Setup vx.x.exe“located at your CD ROM root directory.

This executable includes the Microsoft.NET Framework 2.0 which is installed if it is not detected on your system.

After selection of the installation directory, the GUI will launch.

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Figure 3. Installation of the GUI

2.2. Connecting the board for the first time

Connect the board to your USB port.

The USB drivers needed by the Microchip - USB to SPI converter are installed at the first kit connection to the USB port.

Wait until the drivers installations are finished.

2.3. Running the GUI

The GUI can be launch from Windows “Start Menu->Programs->Semtech->SX8653Evaluation->SX8653”.

The GUI automatically detects the board. If not, you may have to click the “Connect” button.

3. GUI overview

The Graphical User Interface can be used to evaluate easily the SX8653. The subsections below describes the various demonstrations available.

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3.1. Main menu

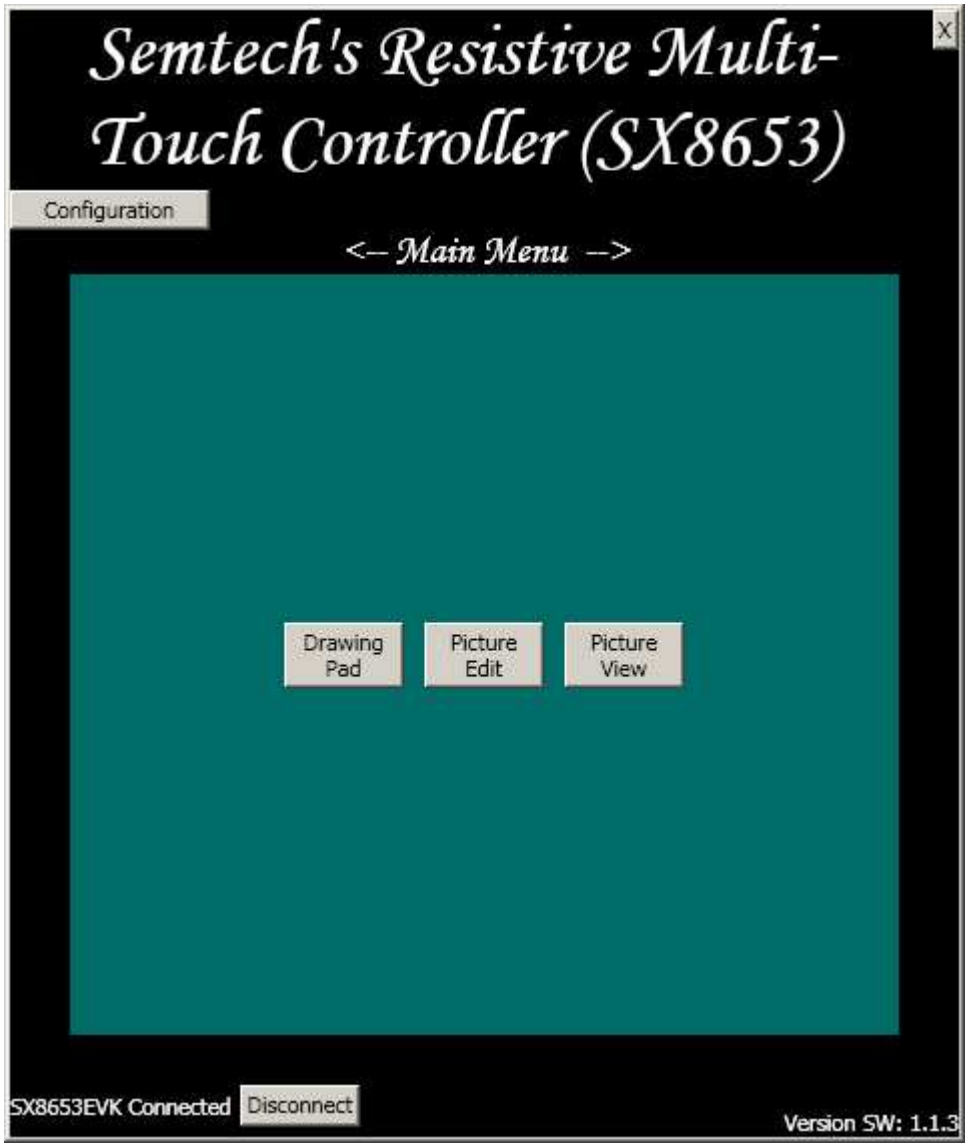

Figure 4. Main menu

When the GUI first starts up, the Main Menu will show up. The GUI bottom left area describes if the board is connected or not. The bottom right indicates the version number.

The three buttons in In the middle, are the available demonstrations.

3.2. Configuration

Click the configuration button to display the configuration windows.

A custom selection of the gesture reporting is possible. Click in front of the gesture (zoom, rotation, panning) to enable it.

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All of them can be selected at the same time. By default, rotation has been disabled.

If the drawing on the GUI need to be flip or rotated, the user can adjust the screen layout by using the “Readjust Screen Layout” button.

The configuration view allows also the selection of the 4-wire or 5-wire touchscreen according to the touchscreen mounted on the board.

3.3. Supported gesture

3.3.1. Zoom

Pinch and stretch with the finger and thumb on the touchscreen to zoom in and out a picture. It works also with two fingers from both hands can also be used.

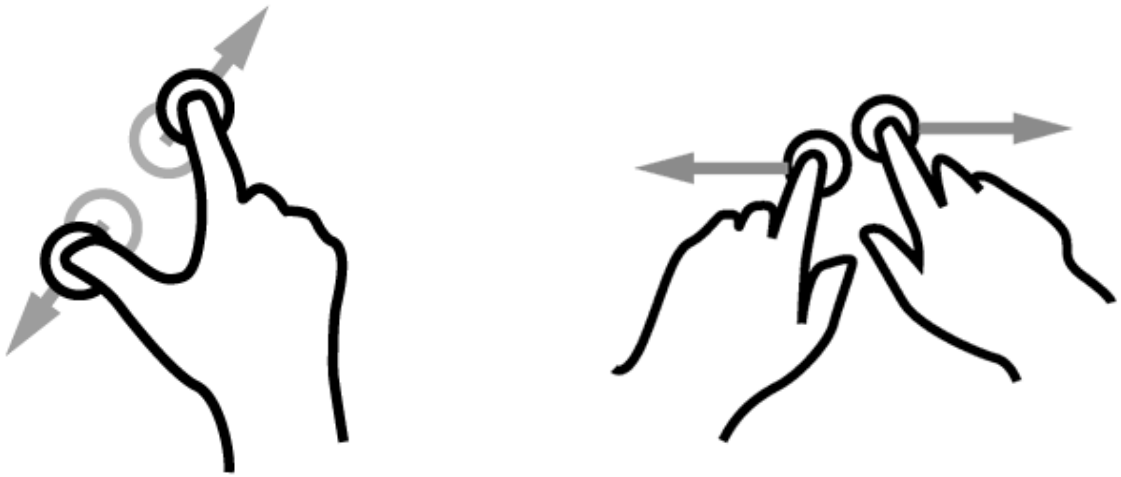

Figure 5. Stretch on the touchscreen to zoom in

3.3.2. Rotate

Picture rotation is done with one finger being fixed on the touchscreen and an other doing the rotation around as described in Figure 6.

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Figure 6. Rotate

3.3.3. Panning

This option can be enabled in the configuration windows when multiples pictures are available.

Only one picture is displayed but user can add pictures by copying JPG files in the installation directory.

If pictures are added in the installation folder and the corresponding option is selected in the configuration option it is possible to pan through the pictures with one finger going from the left to the right or vice-versa.

Figure 7. Panning

3.4. Drawing pad

The drawing pad demonstrates single touch operations on the device. The clear button (upper left) will clear out any drawings that were done. The EVK touchscreen allows the user to hand-draw images with the stylus, the finger or any sharp object.

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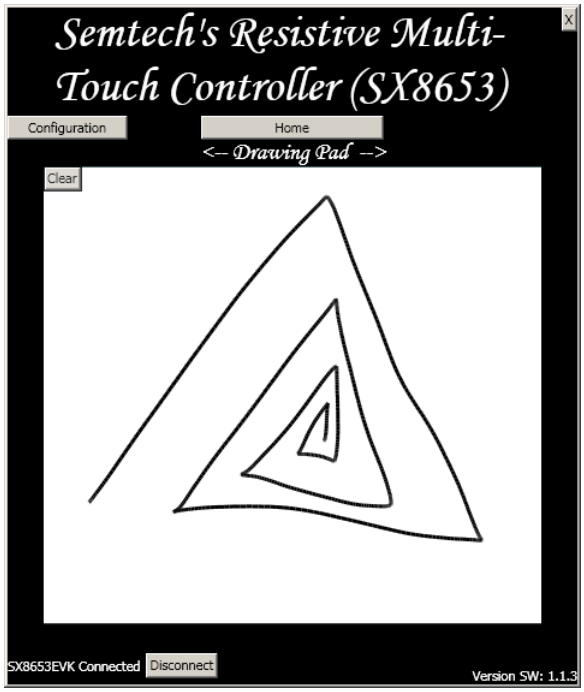

Figure 8. Drawing pad

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3.5. Picture Edit

Figure 9. Picture Edit

Picture Edit is the drawing pad with a picture in the background to demonstrate multi touch operation. Single touch operations will draw on the screen. If the user performs a zoom operation, the picture along with the drawing will be zoomed in/out. The configuration, discussed later, allows disabling the zoom feature.
NOTE: Rotation does not occur in Picture Edit regardless of the setting.

3.6. Picture View

The Picture View is the more advanced demonstration. This allows zoom and rotation multi-touch gestures along with single touch panning when the picture is zoomed in. Similar to Picture Edit, zoom and rotate can be disabled through the Configuration button (upper left).

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Figure 10. Picture View when a zoom is done

3.6.1. Firmware update

Firmware update is a ".hex" file which can be available on Semtech web site. To update the firmware, follow the steps:

i) With the USB cable disconnected, press S2 switch
ii) Connect the evaluation board to the computer through USB while holding S2 low.
iii) Release S2 switch, the LEDs D1 and D2 should toggle (if not, it is not possible to upgrade the firmware)
iv) Run the software Microchip USB HID Bootloader. If the SX8653EVK is detected, the information "Device attached." is displayed as shown in Figure 11.

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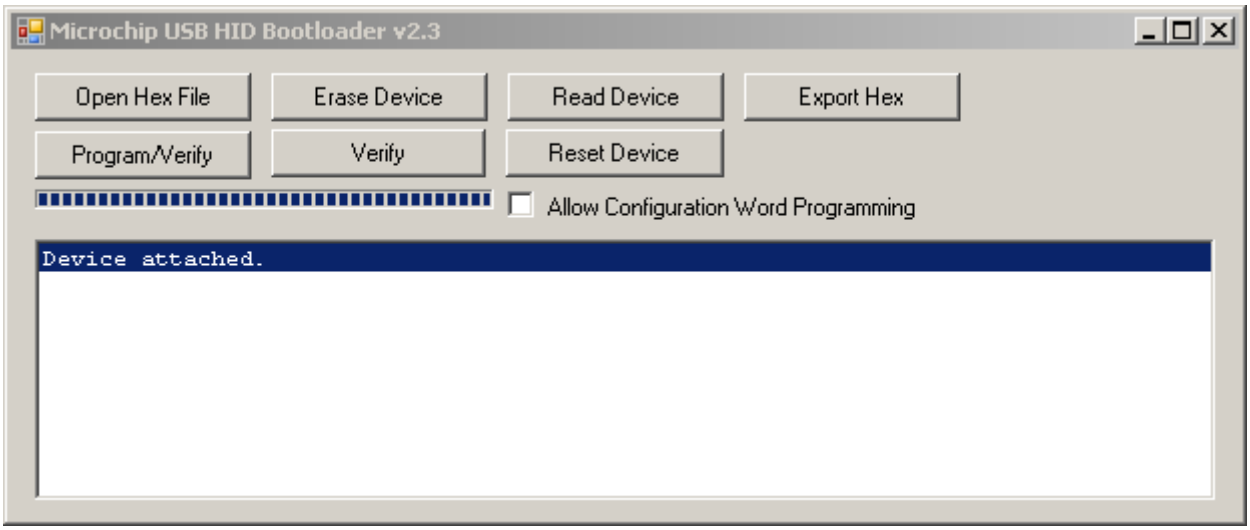

Figure 11. Microchip S/W interface

v) Press the button “Open Hex File” on the interface and choose the file: SX8653_MTG_vxxx.hex

vi) Press the button “Program/Verify” on the interface to program the board.

vii) The Microchip software displays “Erase/Program/Verify Completed Successfully” as in Figure 12 when the operation is finished

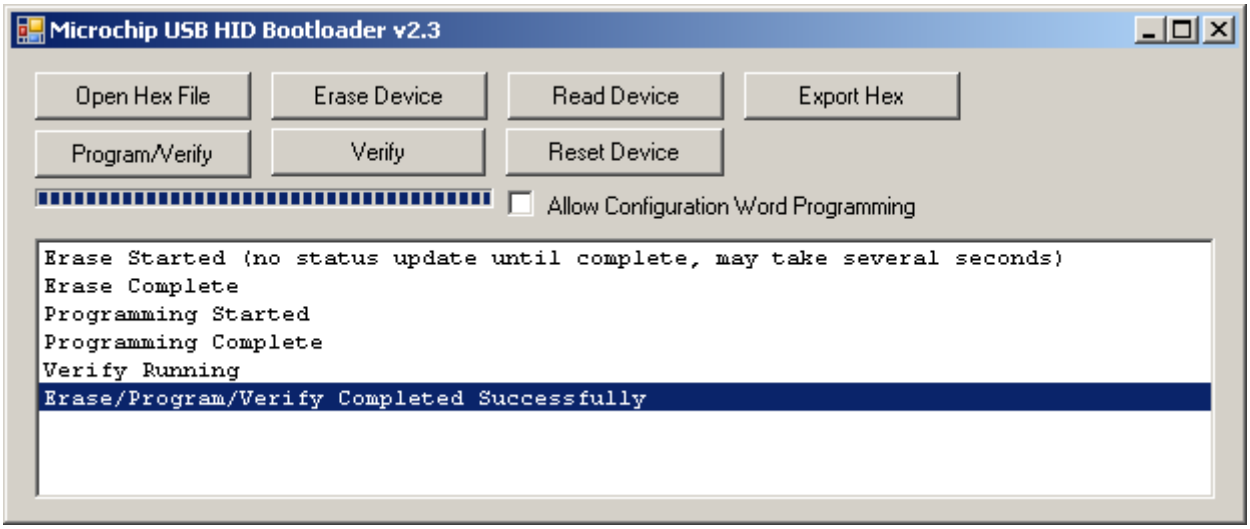

Figure 12. Programming successful

viii) Now launch SX8653Evaluation GUI

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4. Troubleshooting

4.1. The SX8653EVK is disconnected

If the GUI shows that the SX8653EVK is disconnected, check the following points:

- The USB cable connect the board to the computer
- The diode D1 is lighted
- Click the Connect button
- Try an other USB port and restart the GUI

4.2. The touchscreen doesn’t work

If the SX8653EVK is connected but the touchscreen seems not to work, check the following points:

- The touchscreen is well connected to the connector P5
- When a finger press the screen, the LED D2 is lighted
- When two fingers press the screen, the LED D2 and D3 are lighted
- Restart the GUI and reconnect the board

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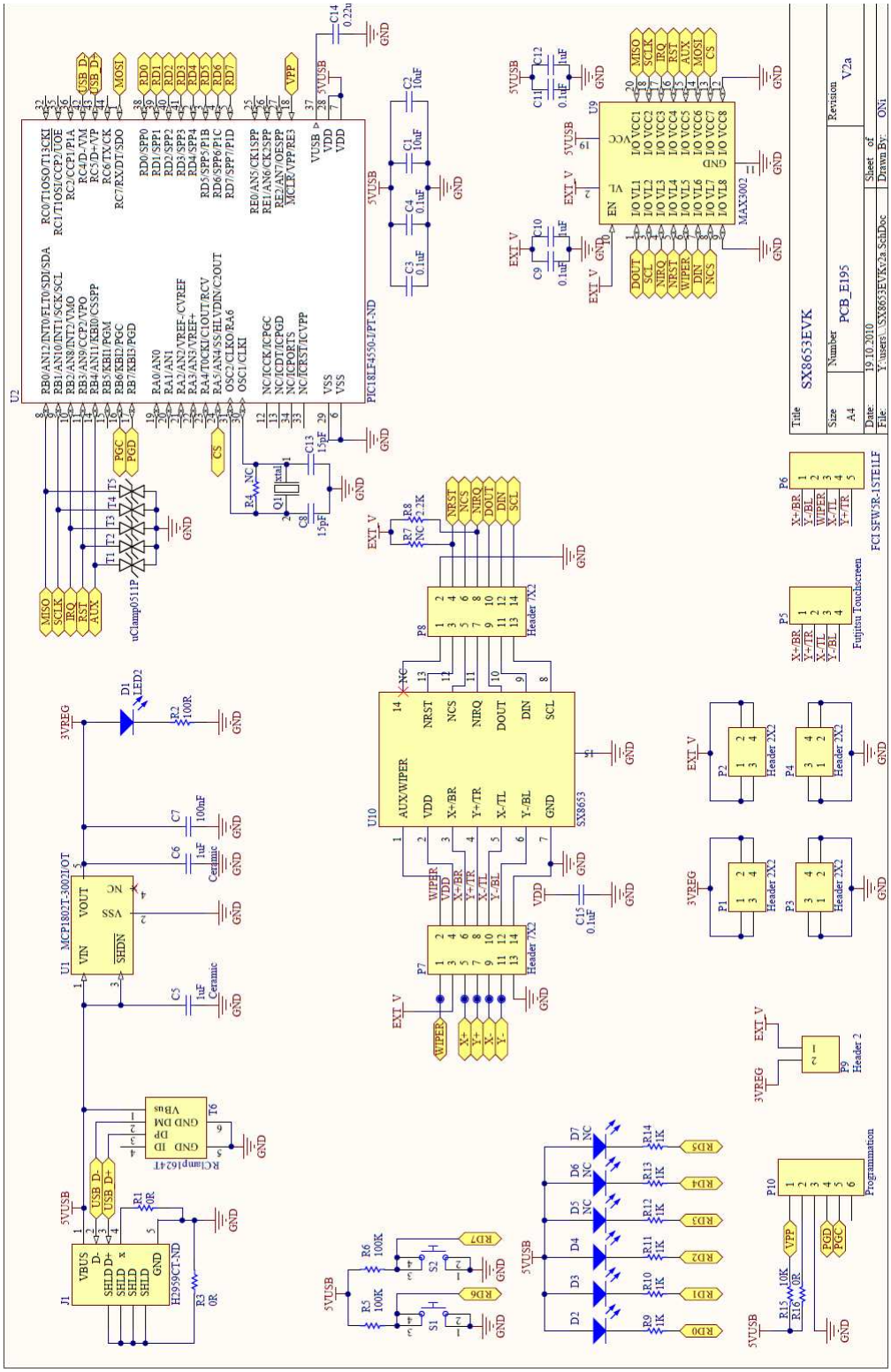
5. Appendix:

5.1. EVK schematics



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Contact information

Semtech Corporation Advanced Communications & Sensing Products

E-mail: sales@semtech.comacsupport@semtech.comInternet: http://www.semtech.com

USA 200 Flynn Road, Camarillo, CA 93012-8790.
Tel: +1 805 498 2111 Fax: +1 805 498 3804

FAR EAST 12F, No. 89 Sec. 5, Nanking E. Road, Taipei, 105, TWN, R.O.C.
Tel: +886 2 2748 3380 Fax: +886 2 2748 3390

EUROPE Semtech Ltd., Units 2 & 3, Park Court, Premier Way, Abbey Park Industrial Estate, Romsey, Hampshire, SO51 9DN.
Tel: +44 (0)1794 527 600 Fax: +44 (0)1794 527 601

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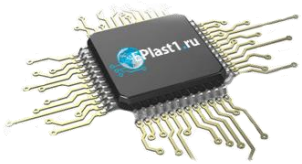

Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.