

## User Guide

### SX8651EVK Evaluation kit for SX8651 multitouch controller

#### GENERAL DESCRIPTION

The SX8651EVK is an evaluation tool for the SX8651 multitouch controller.

The SX8651 is a multitouch controller that enables a completely different user interaction with 4-wire resistive touchscreen. It enables the detection of 2 fingers on the touchscreen and several gestures like the rotation and the pinch/ stretch.

This ultra low power touchscreen controller has been optimized for portable equipment where power and board-space are at a premium.

It incorporates a highly accurate 12-bit ADC for data conversion and operates from a single 1.65 to 3.7V supply voltage.

The SX8651 features a built-in preprocessing algorithm for data measurements, which greatly reduces the host processing overhead and bus activity. This complete touchscreen solution includes four user-selectable operation modes which offer programmability on different configurations such as conversion rate and settling time, thus enable optimization in throughput and power

consumption for a wide range of touch sensing applications.

The touch screen inputs have been specially designed to provide robust on-chip ESD protection of up to  $\pm 15\text{kV}$  in both HBM and Contact Discharge, and eliminates the need for external protection devices.

The SX8651 is offered in two tiny packages: 3.0 mm x 3.0 mm DFN and a 1.5 mm x 2.0 mm wafer-level chip-scale package (WLCSP).

#### 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

- ◆ SX8651 Datasheet

**Table of contents**

<b>Section</b>	<b>Page</b>
1. Evaluation Board Overview .....	3
1.1. Top layer description .....	3
1.1.1. Connector for main touchscreen (P9) .....	3
1.1.2. Connector for auxiliary touchscreen (P10).....	3
1.1.3. Switch to allows firmware update.....	3
1.1.4. Controls DEL.....	4
1.1.5. Main touchscreen.....	5
1.2. Bottom Layer Description .....	5
2. Getting started.....	6
2.1. Software installation .....	6
2.2. Connecting the board for the first time .....	6
2.3. Running the GUI.....	6
3. GUI overview.....	7
3.1. Main menu.....	7
3.2. Configuration .....	8
3.3. Supported gesture .....	8
3.3.1. Zoom.....	8
3.3.2. Rotate .....	8
3.3.3. Panning.....	9
3.4. Drawing pad .....	9
3.5. Picture Edit .....	11
3.6. Picture View.....	11
4. Troubleshooting.....	12
4.1. The SX8651EVK is disconnected.....	12
4.2. The touchscreen doesn't work.....	12
5. Appendix: .....	13
5.1. EVK schematics p1/2 .....	13
5.2. EVK schematics p2/2 .....	14

### 1. Evaluation Board Overview

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

#### 1.1. Top layer description

The evaluation board is shown on Figure 1 and each zone is described in the corresponding subsection.

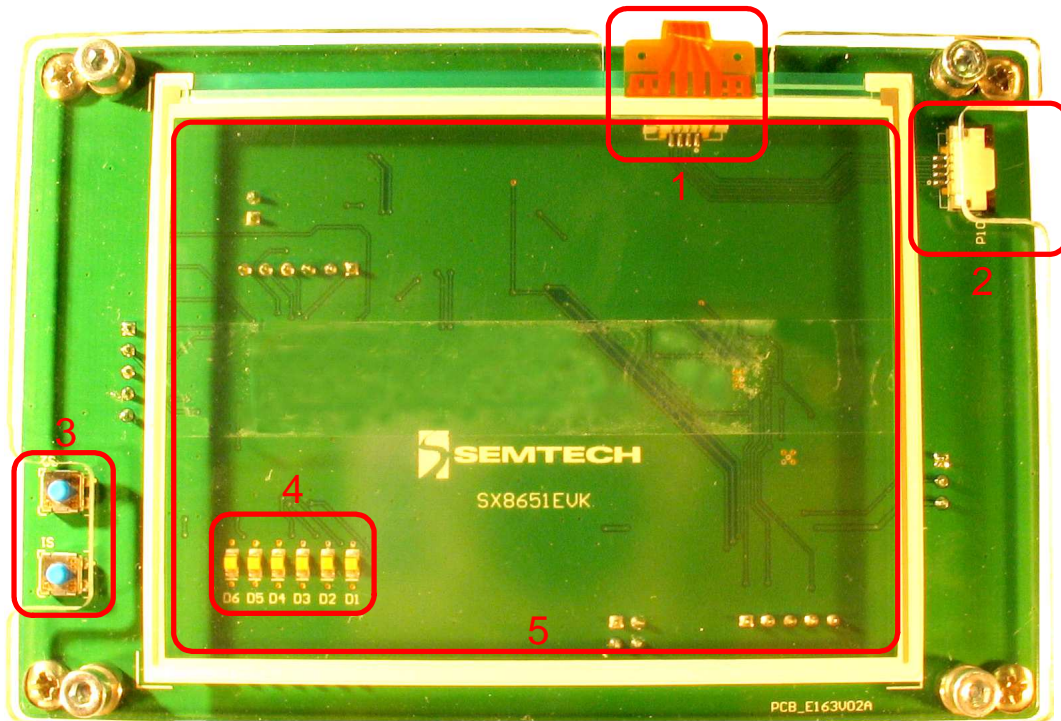


Figure 1. Top of Evaluation Board

##### 1.1.1. Connector for main touchscreen (P9)

P9 is the main touchscreen connector. It has 4 upper contacts with a pitch of 1mm. The touchscreen used on this evaluation kit has the following reference:

Brand	Reference
Fujitsu	N010-0554-T703

##### 1.1.2. Connector for auxiliary touchscreen (P10)

P10 is an auxiliary touchscreen connector. It has 4 upper contacts with a pitch of 1mm. An auxiliary touchscreen can be connected as the one with the reference below:

Brand	Reference
Bergquist	400425

### 1.1.3. Switch to allows 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 SX8651EVK is detected, the information “Device attached.” is displayed as shown in Figure 2.

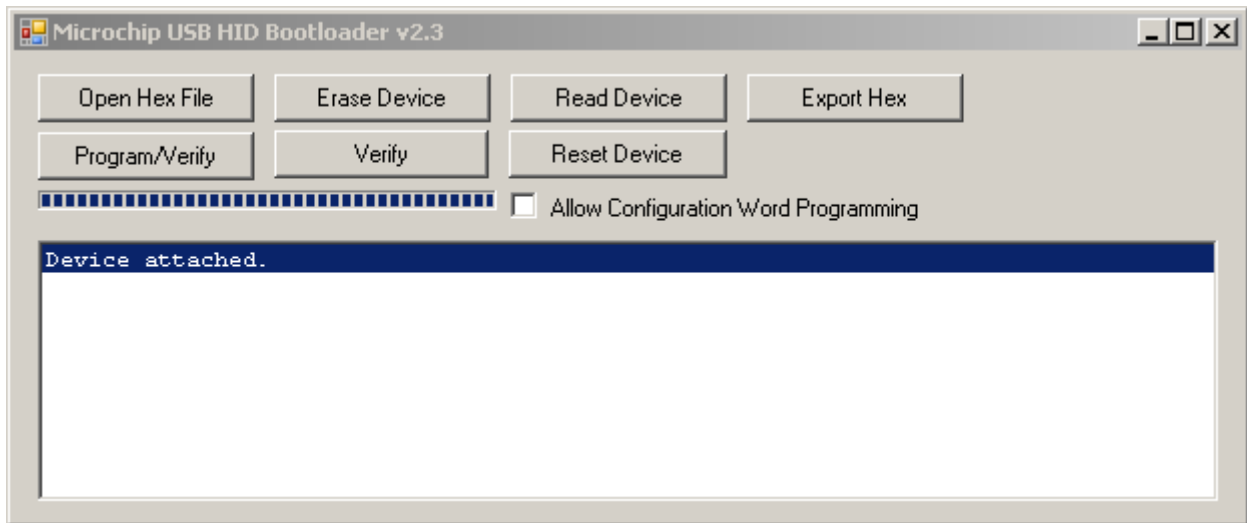


Figure 2. Microchip S/W interface

- v) Press the button “Open Hex File” on the interface and choose the file: sx8651\_MTG\_SX8651EVK\_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 3 when the operation is finished

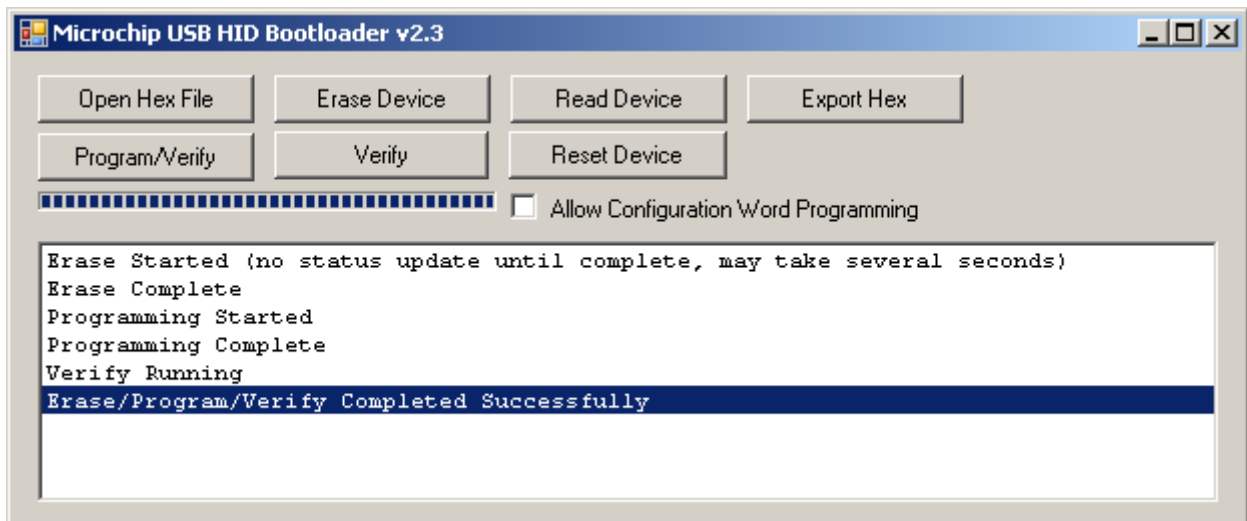


Figure 3. Programming successful

viii) Now launch SX8651 Evaluation GUI

### 1.1.4. Controls DEL

The controls LEDs allows the user to check the operation:

LED	Operation
D7	Power on
D1	Single touch
D2	Double touch

### 1.1.5. Main touchscreen

The touchscreen is the human interface to test the double touch and single touch operation of SX8651.

## 1.2. Bottom Layer Description

The electronics circuitry on the bottom layer seen on Figure 4 is needed to interface the SX8651 to the computer.

The USB connector **1** is connected to the host computer. The Microchip controller **2** is used as a gateway to generate I2C signals. The NCN4555 **3** makes the level shifting and also supply the SX8651. According to the jumper P7, a supply voltage of 3V or 1.8V can be used for the SX8651 **4**. The connector **5** allows the user to connect a scope and observe the I2C communication and the controls signals NIRQ and NRST.

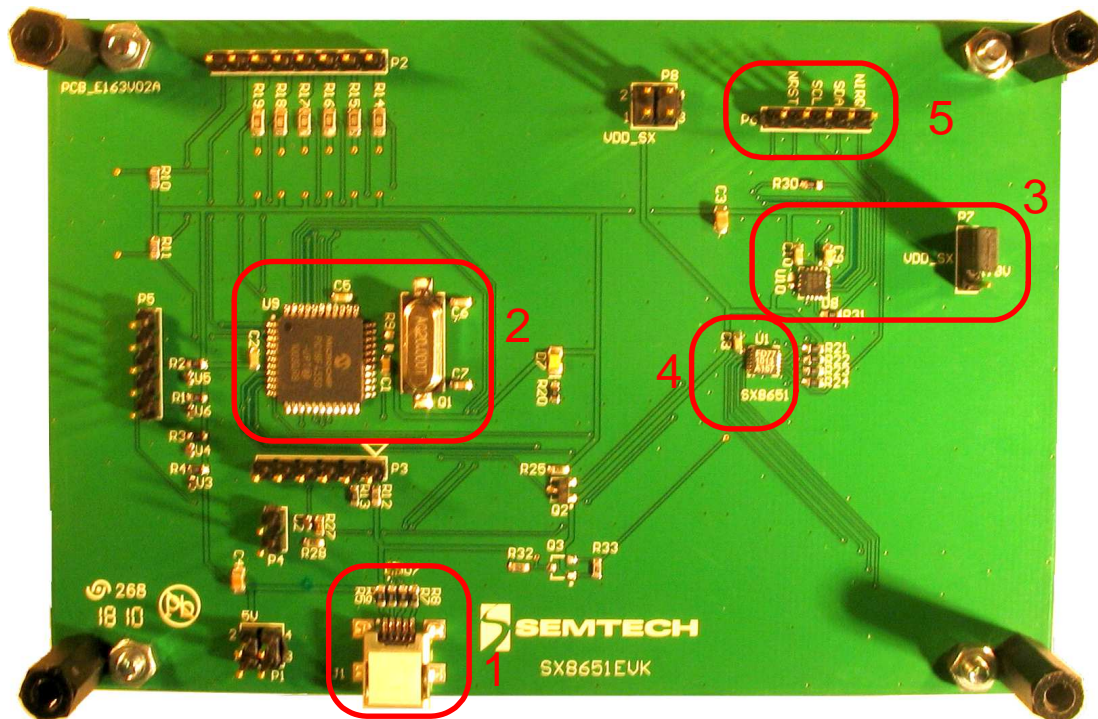


Figure 4. Bottom of evaluation board

## 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 "SX8651EvaluationKit 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.



*Figure 5. 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 I2C 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->SX8651Evaluation->SX8651".

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 SX8651. The subsections below describes the various demonstrations available.

#### 3.1. Main menu

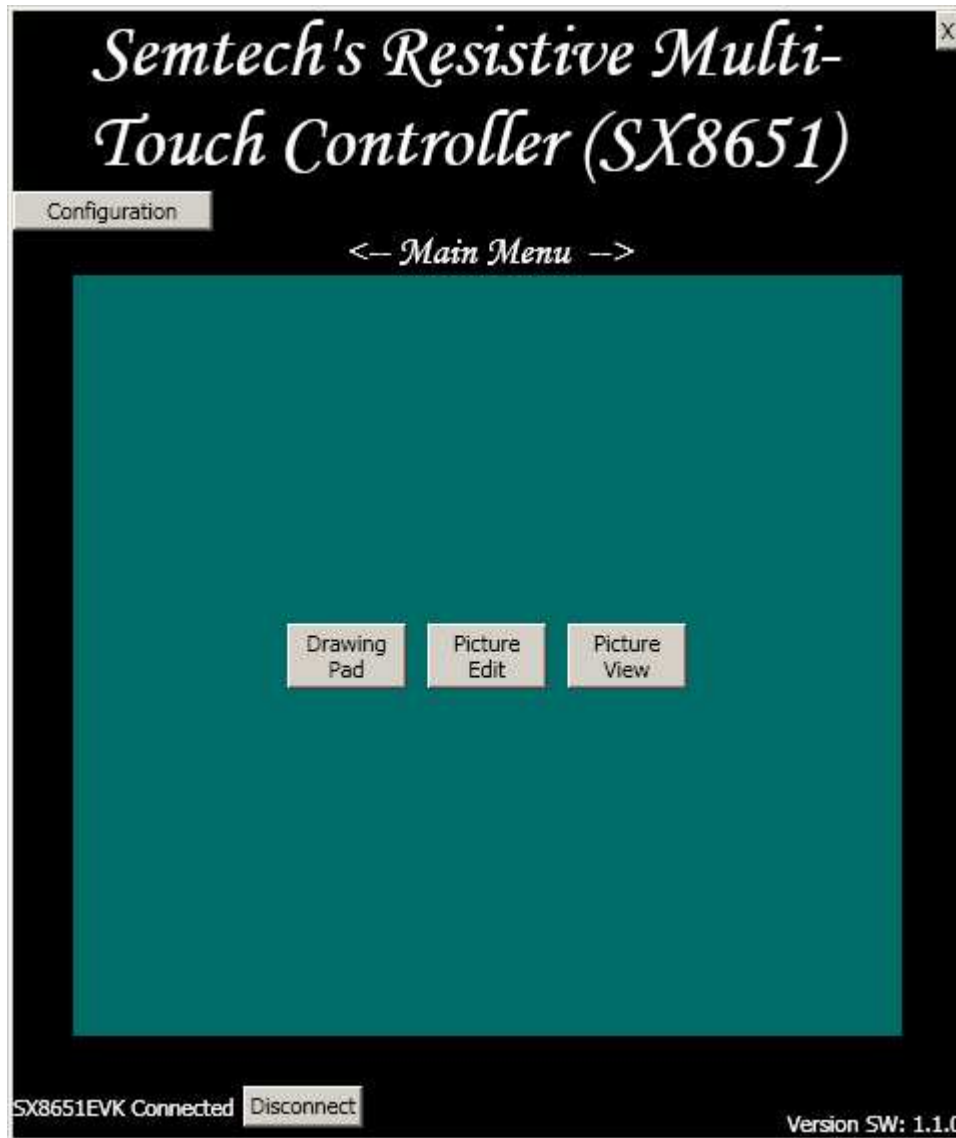


Figure 6. Main menu

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 the middle, are the available demonstrations.

### 3.2. Configuration

Configuration is performed by pressing the Configuration button.

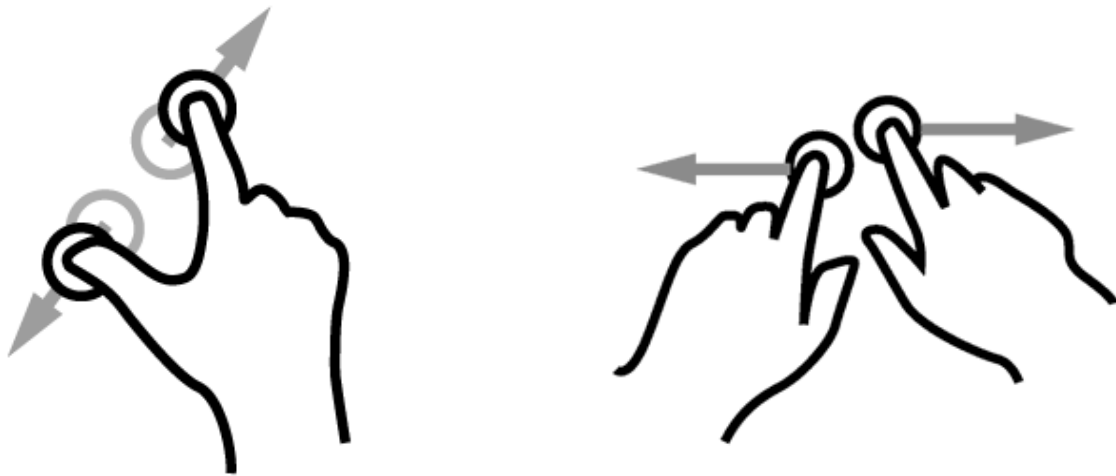
If the drawing on the GUI need to be flip or rotated, the user can adjust the screen layout by using the “Readjust Screen Layout” button.

The gesture reporting allows the user to configure the gesture used: zoom, rotation, panning. All of them can be selected at the same time. By default, rotation has been disabled.

### 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 7. 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 8.





*Figure 8. 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 9. 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.

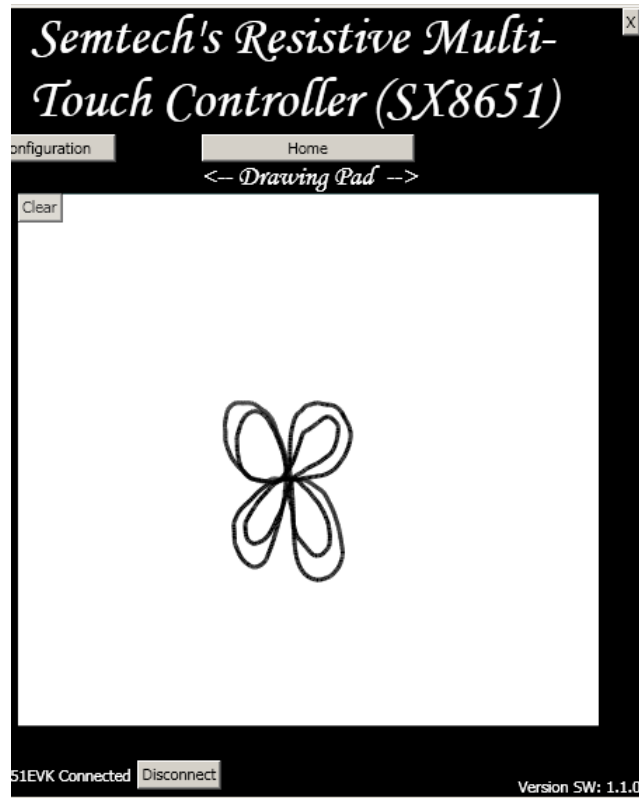


Figure 10. Drawing pad

### 3.5. Picture Edit



*Figure 11. 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).



Figure 12. Picture View when a zoom is done

## 4. Troubleshooting

### 4.1. The SX8651EVK is disconnected

If the GUI shows that the SX8651EVK is disconnected, check the following points:

- ◆ The USB cable connect the board to the computer
- ◆ The diode D7 is lighted
- ◆ Click the Connect button
- ◆ Try an other USB port and restart the GUI

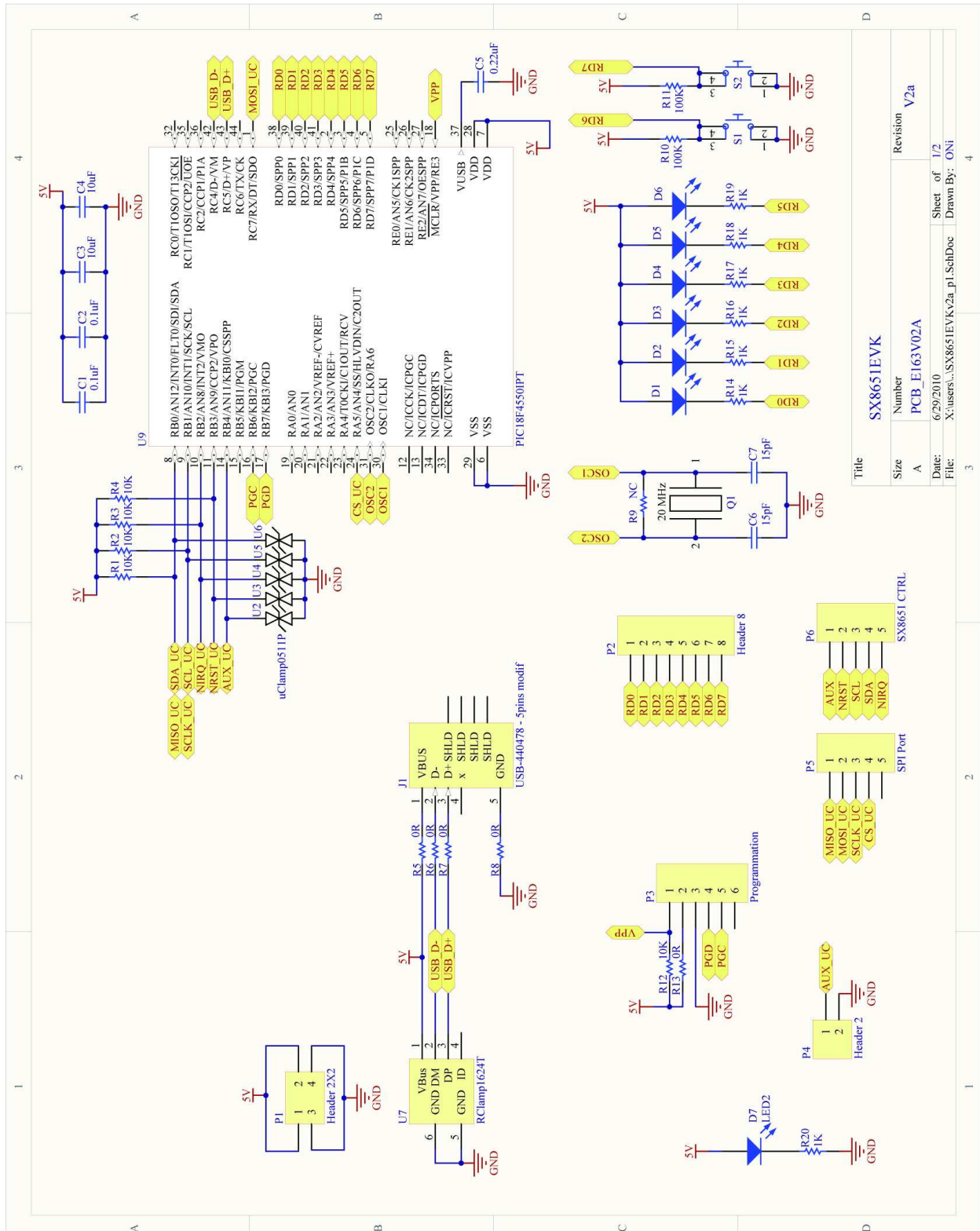
### 4.2. The touchscreen doesn't work

If the SX8651EVK is connected but the touchscreen seems not to work, check the following points:

- ◆ The touchscreen is well connected to the connector P9
- ◆ When a finger press the screen, the LED D1 is lighted
- ◆ When two fingers press the screen, the LED D1 and D2 are lighted
- ◆ Restart the GUI and reconnect the board

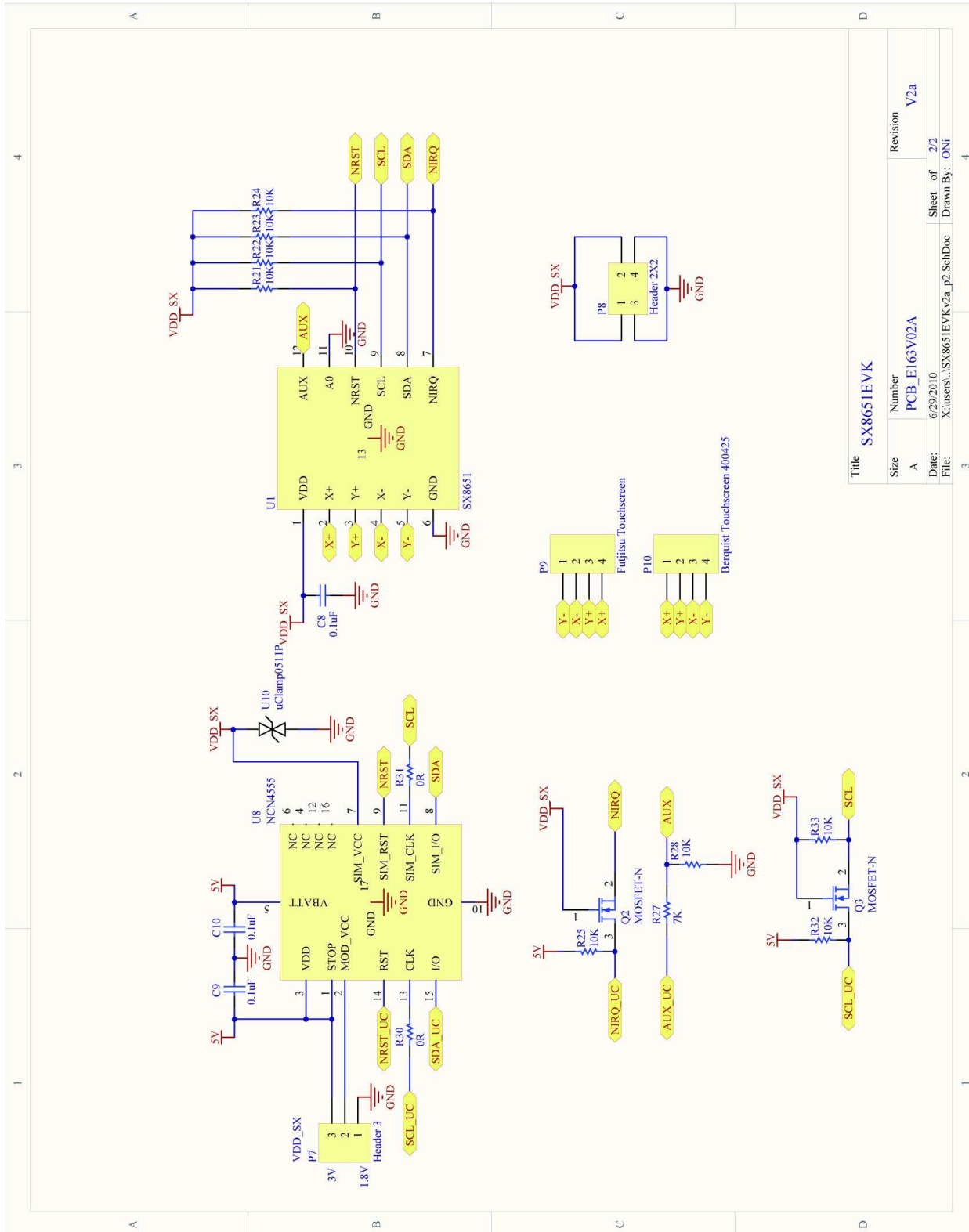
### 5. Appendix:

#### 5.1. EVK schematics p1/2



Title		Revision	
SX8651EVK		V2a	
Size	Number		
A	PCB_EI63V002A		
Date:	6/29/2010	Sheet of 1/2	
File:	X:\users\...SX8651EVK.v2a_p1.SchDoc	Drawn By: ONI	

### 5.2. EVK schematics p2/2



Title		Revision	
Size	Number	Revision	
A	PCB_E163V02A	V2a	
Date:	6/29/2010	Sheet of	2/2
File:	X:\users\...SX8651EVK\2a_p2.SchDoc	Drawn By:	ONI

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