19-5601; Rev 0; 10/10

MAXIM

MAX11800/MAX11801 Touch Evaluation Systems (TEVS)

Evaluate: MAX11800–MAX11803

General Description

The MAX11800/MAX11801 touch evaluation systems (TEVSs) demonstrate the rich feature set of the MAX11800–MAX11803 family of touch-screen controllers (TSCs) and allow for their evaluation. Each TEVS consists of a USB interface board (UTIB+), a MAX11800/MAX11801 evaluation kit (EV kit) daughter board, and a 4-wire touch sensor (USB cable included). **Note:** The MAX11802 and MAX11803 are subsets of the MAX11800 and MAX11801, respectively.

Order the MAX11800 TEVS for a comprehensive evaluation of the SPI™-compatible TSCs using a PC. Order the MAX11801 TEVS for a comprehensive evaluation of the I²C-compatible TSCs.

The TSCs provide a complete resistive touch-screen controller solution that targets touch-enabled devices with small- to medium-size displays. The TSCs enable miniaturization of consumer products due to their ultra-small size. Their low power consumption makes them attractive for portable devices.

Each TEVS operates directly from the USB power. Windows XP®- or Windows® 7-compatible software running on a PC interfaces to the TEVS board through the computer's USB communications port. See the *Quick Start* section for setup and operating instructions.

The EV kit provides a proven PCB to facilitate evaluation of the TSCs directly by the user. It must be interfaced to the appropriate SPI/I²C timing signals for proper operation. See Figures 12a, 12b, and 13 for connections and appropriate voltage levels. Refer to the MAX11800–MAX11803 IC data sheet for timing requirements and register addresses.

Features

Hardware

- **Complete Evaluation System Including a USB-to-Serial Interface (I²C or SPI) Board**
- **Convenient Test Points Provided On-Board for Digital Interface and Analog Signals**
- **Interfaces to Common 4-Wire Resistive Touch Sensors through Standard FPC/FFC Connectors**
  - **1mm Pitch**
  - **0.5mm Pitch**
- **Built-In LDOs and Level Translators for Operation with 1.8V, 3.0V, and 3.6V**

Software

- **User-Friendly GUI Interface (Microsoft Windows XP- and Windows 7-Compatible USB Interface)**
- **Easy Access to TSC Configuration Registers and Status Registers**
- **Direct Conversion Mode Demonstration Capability**
- **Autonomous Conversion Mode Demonstration Capability (Only Available in the MAX11800 and MAX11801)**
- **Ability to Capture Raw Data and Display the Data in Either Conversion Mode**

EV System Contents List

QTY	DESCRIPTION
1	Software and driver CD-ROM.
1	EV kit (with the TSCs mounted on it, but can be separated from the TEVS for evaluation of the TSCs in the user setup).
1	USB interface board (UTIB+). This acts as a gateway converting and accepting data from the USB port to SPI/I²C for the EV kit. The EV kit plugs into the UTIB+.
1	USB cable for power and communication.

Ordering Information

PART	TYPE	INTERFACE TYPE/ PACKAGE
MAX11800TEVS+	EV System	SPI/TQFN
MAX11801TEVS+	EV System	I²C/TQFN

+Denotes lead(Pb)-free and RoHS compliant.

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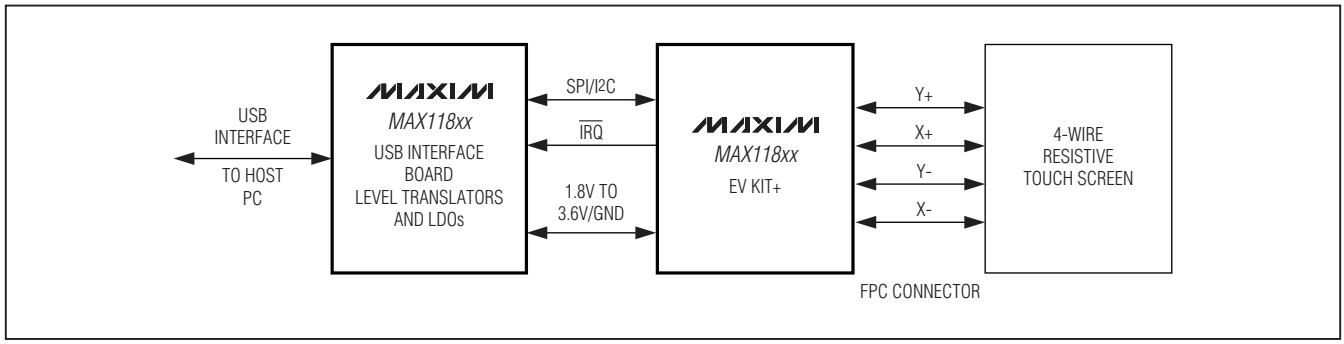
SPI is a trademark of Motorola, Inc.

MAX11800/MAX11801 Touch Evaluation Systems (TEVS)

MAX11800/MAX11801 TEVS+ Block Diagram



Component Lists

MAX11800–MAX11803 Interface Board

DESIGNATION	QTY	DESCRIPTION
A0/CSB, A1/DOUT, CSB, GPIO_K1–GPIO_K8, MISO, MOSI, P1_4–P1_7, P3_4–P3_7, PGND2, PGND3, PIRQB, SCL, SCL/CLK, SCLK, SDA, SDA/DIN, TIRQB, U2-PIN1, U2-PIN20	32	Test points
C1, C2, C11, C13	4	1µF ±10%, 16V X5R ceramic capacitors (0603) TDK C1608X5R1C105K
C3, C6, C12, C14	4	10µF ±20%, 6.3V X5R ceramic capacitors (0603) TDK C1608X5R0J106M
C4, C5, C9, C10, C15–C19, C23, C24, C25	12	0.1µF ±10%, 50V X7R ceramic capacitors (0603) TDK C1608X7R1H104K
C7, C8	2	22pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H220J
C20, C21	2	10pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H100J
C22	1	33nF ±10%, 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ333KA

DESIGNATION	QTY	DESCRIPTION
C26, C27	0	Not installed, capacitors (0603)
EN1B, EN2B	0	Not installed, headers
FB1, FB2	2	1A, 19Ω SMD ferrite beads (1206) Steward HF1206J150R-10
J1–J5, J11–J17	0	Not installed, headers
J6, J7	2	2-pin headers, 0.1in centers
J8, J9, J18, J19	4	3-pin headers, 0.1in centers
J10	1	21-position SMD female connector Hirose DF9-21S-1V(32)
J20	1	5-position mini-USB connector Hirose UX60A-MB-5ST
J21	1	Dual-row header, 0.1in centers, gold plated
LED2, LED3, LED4	3	Red clear SMD LEDs (0603) Lite-On LTST-C190CKT
PGND103, PGND104	2	Loops for test with 2 vias (use 20 AWG wire to make loops)
R1, R2	2	4.7kΩ resistors (0805)
R3, R4, R10, R19, R32–R36, R37–R41	0	Not installed, resistors (0603)
R5	1	196kΩ ±1% resistor (0805)
R6	1	590kΩ ±% resistor (0805)
R7	1	61.9kΩ ±1% resistor (0805)
R8, R22	2	100kΩ ±1% resistors (0805)
R9, R16, R17	3	215Ω resistors (0805)

Component Lists (continued)

MAX11800–MAX11803 Interface Board (continued)

DESIGNATION	QTY	DESCRIPTION
R11–R14	4	0Ω resistors (0805)
R15, R18	2	51kΩ resistors (0805)
R20	1	100kΩ resistor (0805)
R21	1	169kΩ ±1% resistor (0805)
R23, R24	2	27Ω resistors (0805)
R25	1	1.5kΩ resistor (0805)
R26	1	2.2kΩ resistor (0805)
R27	1	470Ω resistor (0805)
R28	1	10kΩ resistor (0805)
R29, R30, R31	3	3.3kΩ resistors (0805)
U1, U7	2	Adjustable output LDO regulators (5 SC70) Maxim MAX8512EXK+
U2	1	8-channel level translator (20 TSSOP) Maxim MAX3001EEUP+
U3	1	LDO regulator (5 SC70) Maxim MAX8511EXK25+
U4	1	USB-to-serial UART (32 LQFP) FTDI FT232BL
U5	1	1Kb, 1.8V SRL EEPROM (8 SO) Atmel AT93C46EN-SH-B
U6	1	Microcontroller (68 QFN-EP*) Maxim MAX2000-RAX+
U8	1	Octal-level translator (12 TQFN-EP*) Maxim MAX3395EETC+
U9	0	Not installed
Y1	1	16MHz crystal ECS ECS-160-20-5PXDN-TR
Y2	1	6MHz crystal ECS ECS-60-20-5G3XDS-TR
Y3	0	Not installed, crystal
—	5	Bumpers (rubber feet, on bottom of board) 3M SJ-5003 (GRAY)
—	4	Shunts (J8, J9, J18, and J19) Sullins STC02SYAN

**EP = Exposed pad.*

MAX11800/MAX11801 EV Kit Daughter Board

DESIGNATION	QTY	DESCRIPTION
A0/CSB, A1/DOUT, AUX, SCL/CLK, SDA/DIN, TIRQB, VDD, X-, X+, Y-, Y+	11	Test points
C1–C5	0	Not installed, capacitors (0603)
C6	1	10µF ±20%, 6.3V X5R ceramic capacitor (0603) TDK C1608X5R0J106M
C7	1	0.1µF ±10%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H104K
J1	1	4-position SMD connector FCI SFW4R-1STE1LF
J2	1	21-position SMD male connector Hirose DF9-21P-1V(32)
J3	1	4-position SMD connector, gold Hirose FH19C-4S-0.5SH(25)
J4	0	Not installed, jumpers
LED1	1	Red clear SMD LED (0603) Lite-On LTST-C190CKT
R1–R5, R9	6	0Ω resistors (0603)
R6	1	215Ω resistor (0603)
R7	1	1Ω ±1% resistor (0603)
R11–R15	0	Not installed, resistors (0603)
U1	1	Touch-screen controller (12 TQFN-EP*) Maxim MAX11800ETC+ or Maxim MAX11801ETC+

**EP = Exposed pad.*

MAX11800/MAX11801 Touch Evaluation Systems (TEVS)

Vendor Specifications

Touch-Panel Vendor and Specification

Densitron and Fujitsu are approved panel vendors for resistive touch-screen controllers from Maxim (see Tables 1 and 2 for recommended touch panels).

Table 1. Densitron 4-Wire Resistive Touch-Panel Specification

Part Number	DTS408-0380-00	DTS408-0280-00
Screen Diagonal	3.8in	2.8in
Dimension (W x H x D)	91mm x 72mm x 0.95mm	70mm x 55mm x 1.4 mm
Viewing Area	81mm x 63mm	59.6mm x 46.1mm
Active Area Width (mm)	79mm	58mm
Active Area Height (mm)	58mm	44mm
Package Mode	Film glass	
Transparency	80%	

Table 2. Fujitsu 4-Wire Resistive Touch-Panel Specification

Part Number	T010-1401-T670
Outer Dimension	61.4mm x 80.3mm
Transparent Area	54.4mm x 71.2mm
Active Area	51.4mm x 68.2mm
Flex Tail	30mm
Glass Thickness	0.7mm
PET Film Features	Clear
Transparency	80%

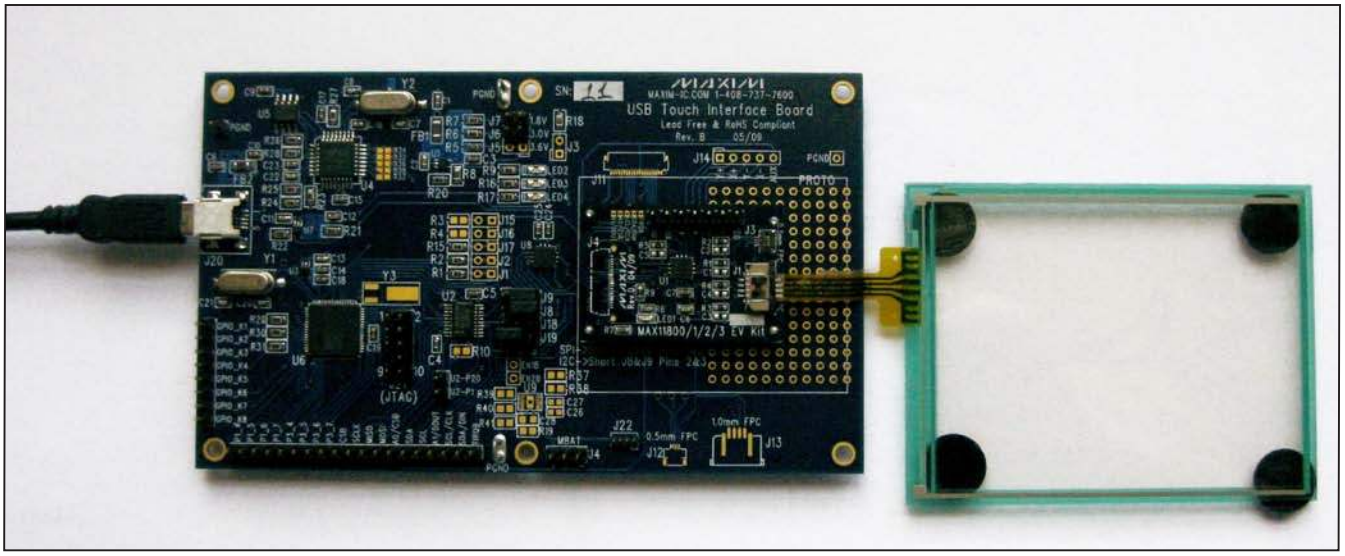


Figure 1. Complete MAX11800/MAX11801 Touch Evaluation System (TEVS) Photo

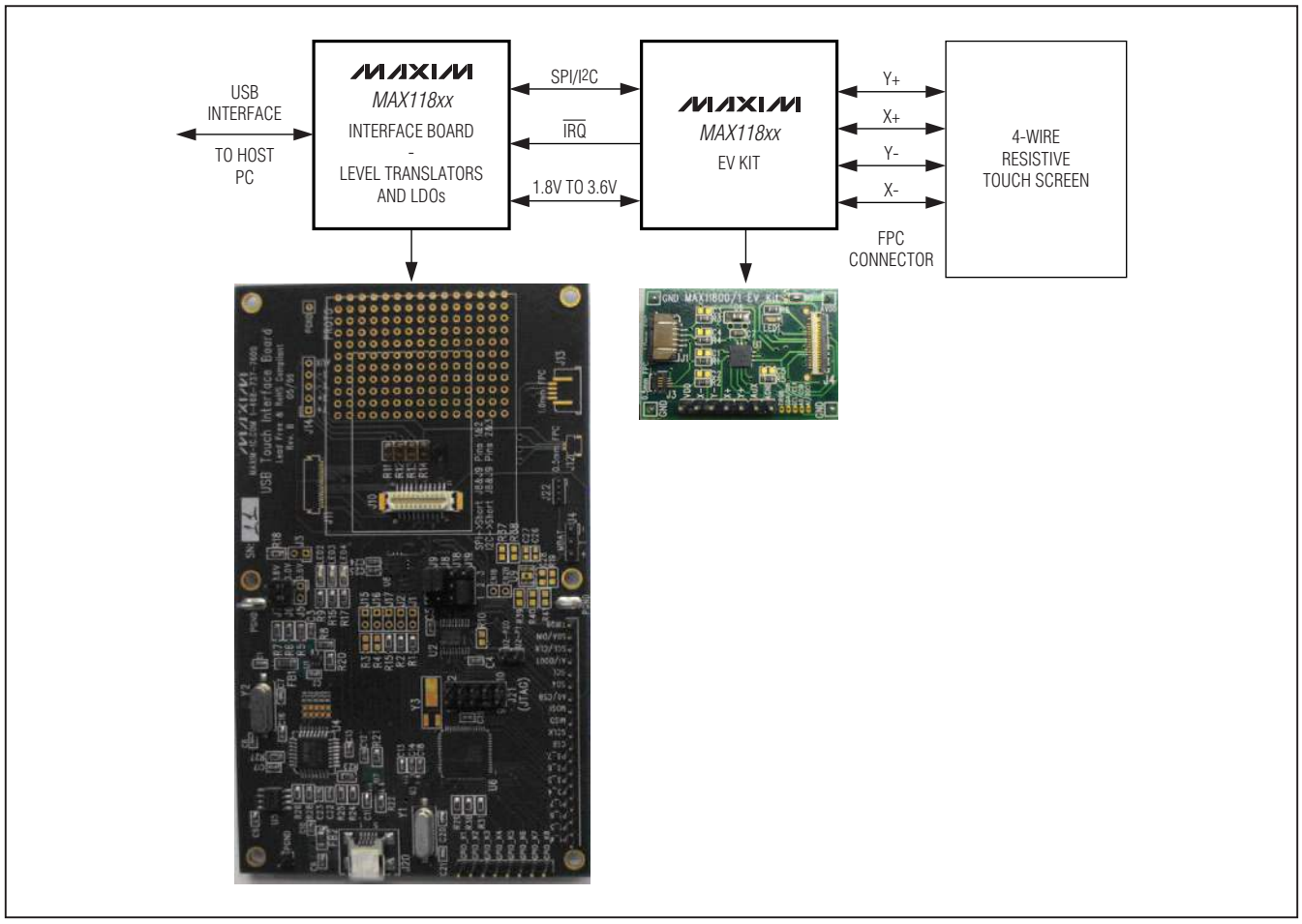


Figure 2. MAX11800/MAX11801 Touch Evaluation System (TEVS) Block Diagram

Quick Start

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items directly from the EV kit software. Text in **bold and underlined** refers to items from the Windows operating system.

Procedure (TEVS Software and USB Driver Installation)

1) Before plugging the TEVS into an available port on a Windows XP- or Windows 7-compatible PC, the TEVS software must be installed.
2) The software comes with the USB driver and a GUI application. Unzip the files and put the contents in an easily accessible location.
3) Locate the Setup.exe and double-click on it and follow the instructions for installation.
4) The driver for the EV kit is installed in the following location:

   C:\CMAXQUSB

   or

   C:\MAXIM TSC USB DRIVER CDM20602 (for newer drivers)
5) The application along with its supporting files is located at:

   C:\Program Files\Maxim Integrated Products\MAX118xx EVS <version>
6) A short cut to the application executable file is created on the desktop and in the **Start | Programs** menu.
7) To uninstall the software, go to **My Computer | Add or Remove** program.

MAX11800/MAX11801 Touch Evaluation Systems (TEVS)

_Detailed Description of Hardware

Ensure that the MAX11800/MAX11801 EV kit daughter board is properly mounted on the UTIB+ and the touch-screen panel is properly connected to the daughter board. The daughter board houses the TSC IC. This module processes the data from the touch-screen panel connected to it and streams it out to the UTIB+ interface board.

The UTIB+ acts as an intermediary gateway that converts the SPI/I²C (signal levels and protocol) into the USB for processing by the PC. The UTIB+ includes a MAXQ2000 microcontroller to carry out this task.

For the MAX11800TEVS+, the jumpers on the UTIB+ should be in the following positions:

J9: 1-2

J8: 1-2

J9: 1-2

For the MAX11801TEVS+ , the jumpers on the UTIB+ should be on the following positions:

J19: 1-2

J8: 2-3

J9: 2-3

Hardware Installation

Note: Install the software before starting this step. Connect the TEVS to the PC using the USB cable provided. A dialog box appears, as shown in Figure 3.

Click on the **Install from a list or specific location (Advanced)** radio button and then press the **Next** button.

Type **C:\CMAXQUSB** in the edit box, as shown in Figure 4, or press the **Browse** button to find the CMAXQUSB driver folder. Press the Next button to proceed. For the new driver, change **CMAXQUSB** to **MAXIM TSC USB DRIVER CDM20602**.

Figure 3. Found New Hardware Dialog

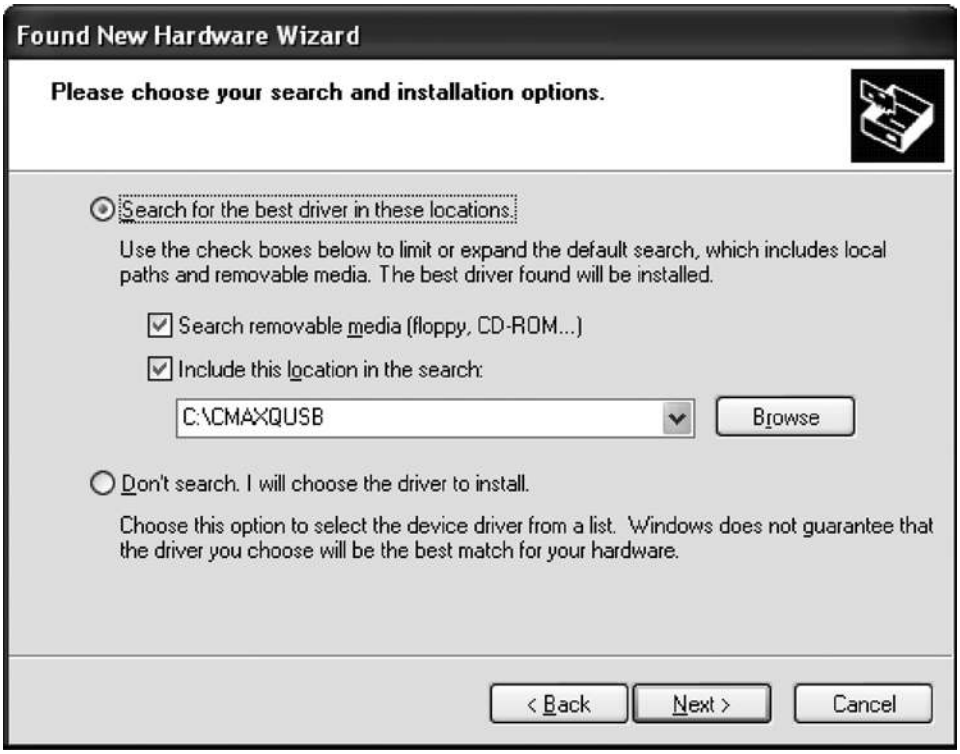


Figure 4. Search for the Best Driver

Figure 5. Windows Logo Testing Warning

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During the installation steps, the warning shown in Figure 5 is displayed. Press the **Continue Anyway** button to proceed.

Follow the remaining steps that come up and exit when done. At the end of the process, the driver is installed and the device is ready to be used. Disconnect and plug the device back in again.

MAX11800/MAX11801 TEVS GUI Description

Note: The MAX11802 and MAX11803 are subsets of the MAX11800 and MAX11801, respectively, and operate only in direct conversion mode. After the successful installation of the driver, connect the MAX11800/MAX11801 TEVS to the PC using the USB cable. Start the GUI by double-clicking on the **MAX118xx EVS <version>.exe** file. The GUI can also be selected from the Windows **Start** menu.

The GUI searches for the device and after a successful USB communication link displays **USB comm. successful** in the right-hand side of the status bar. If the GUI fails to establish a communication link, **USB comm. failure** is displayed.

Following a successful USB communication link, the GUI pings the TSC (MAX11800/MAX11801) and establishes a link with the device and displays the following on the GUI window.

1) Window caption:

   For the MAX118xx: **MAX118xx 4-wire Advanced Touch Screen Controller**, where xx = 00, 01

2) Left side of status bar:

   For the MAX11800: **TSC Communication: SPI TSC device found**

   For the MAX11801: **TSC Communication: I2C TSC device found**

If the MAX11802 or MAX11803 are to be evaluated, select the appropriate device under the **Manual Search** menu item. The right side of the status bar then displays **USB communication successful**.

Registers Tab

The **Registers** tab shown in Figure 6 displays a successful communication link with the MAX11800 device. The ensuing discussion applies to all MAX118xx devices. This tab displays the registers related to X, Y, Z1, and Z2 measurements of the MAX118xx. The user can manipulate the register values by changing the binary bit patterns on the right or the hex values on the left. Refer to the MAX11800–MAX11803 IC data sheet for details on the registers.

Upon startup, factory-default values from the MAX11800-01_init.ini files are loaded onto the GUI and then written into the MAX11800/MAX11801 TSC.

The user can change the factory-default values in the MAX11800-01_init.ini file and enter new values on the GUI, by selecting the **File | Save** option from the menu bar. This overwrites the factory-default values in the MAX11800-01_init.ini file. The user also has the option to save the register values on the GUI screen under a different name by selecting the **File | Save As** option, or open and load a previously saved file by selecting the **File | Open and Load** option.

The GUI automatically writes to the MAX11800/MAX11801 TSC when a new .ini file is opened and loaded. However, when the user individually manipulates bits on the GUI screen, it must be followed by pressing the **Write Registers** button. The **Read Registers** button reads all the registers from the TSC and displays them in the binary and hex fields.

At any given time, the computer mouse can be scrolled over a checkbox (the bit indicators) and the status with a description is indicated by the tool tip.

Note: Any changes on the GUI must be followed by pressing the **Write Registers** button for the value to be loaded into the MAX11800/MAX11801 TSC.

Touch Data Tab

The **Touch Data** tab displays the user inputs in the touch panel on the screen. The user can make various selections to display a combination of X, Y, Z1, and Z2 data along with their processed/mathematical interpretation.

The MAX11800 and MAX11801 TSCs have two modes of operation: direct conversion and autonomous conversion. Refer to the MAX11800–MAX11803 IC data sheet for more details. The MAX11802 and MAX11803 only support direct mode.

Direct Conversion Mode: Direct conversion mode can be selected either in the **Registers** tab by selecting it in the **Operating Mode Configuration** register or by selecting it in the **Touch Data** tab, as shown in Figure 7.

Autonomous Conversion Mode: Autonomous conversion mode can be selected in the **Registers** tab by selecting it in the **Operating Mode Configuration** register, or by selecting it in the **Touch Data** tab, as shown in Figure 8.

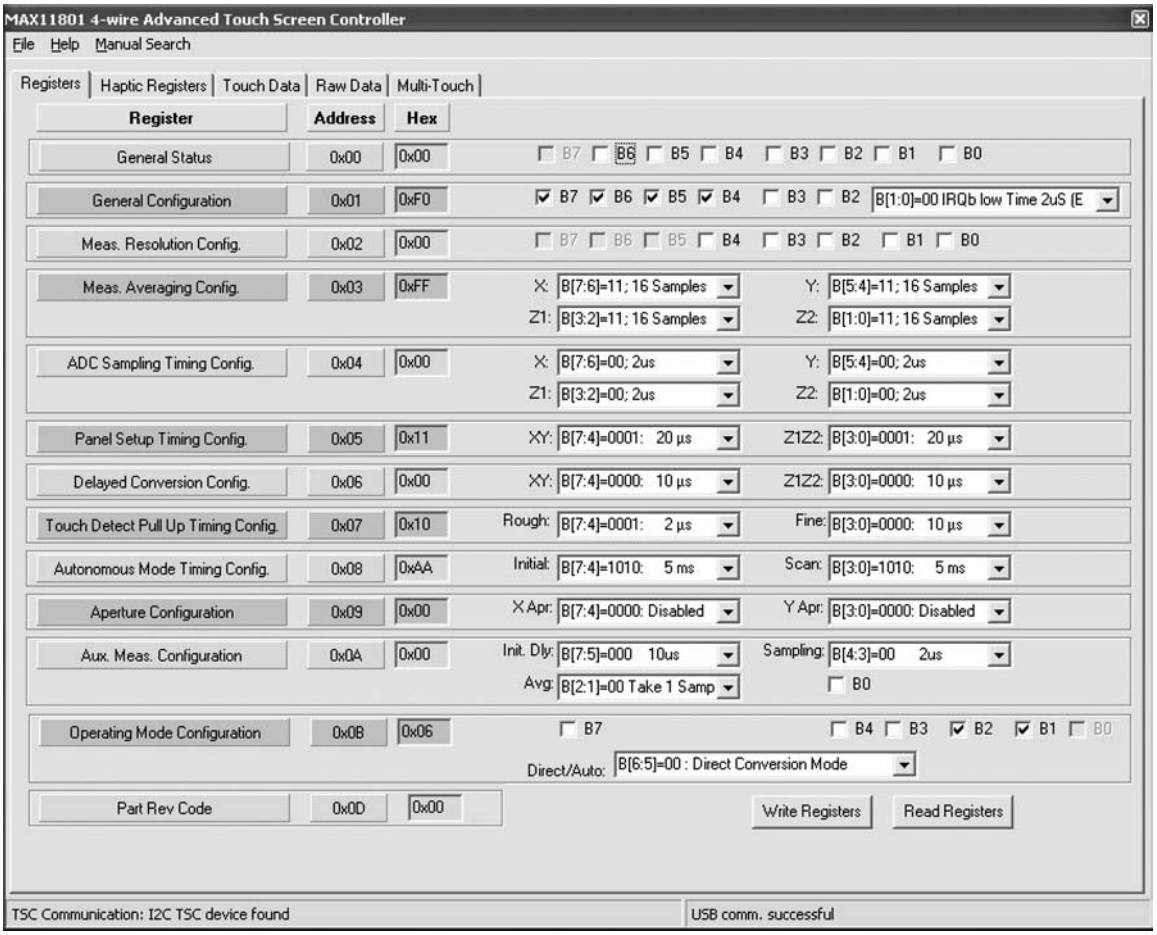

Figure 6. Registers Tab

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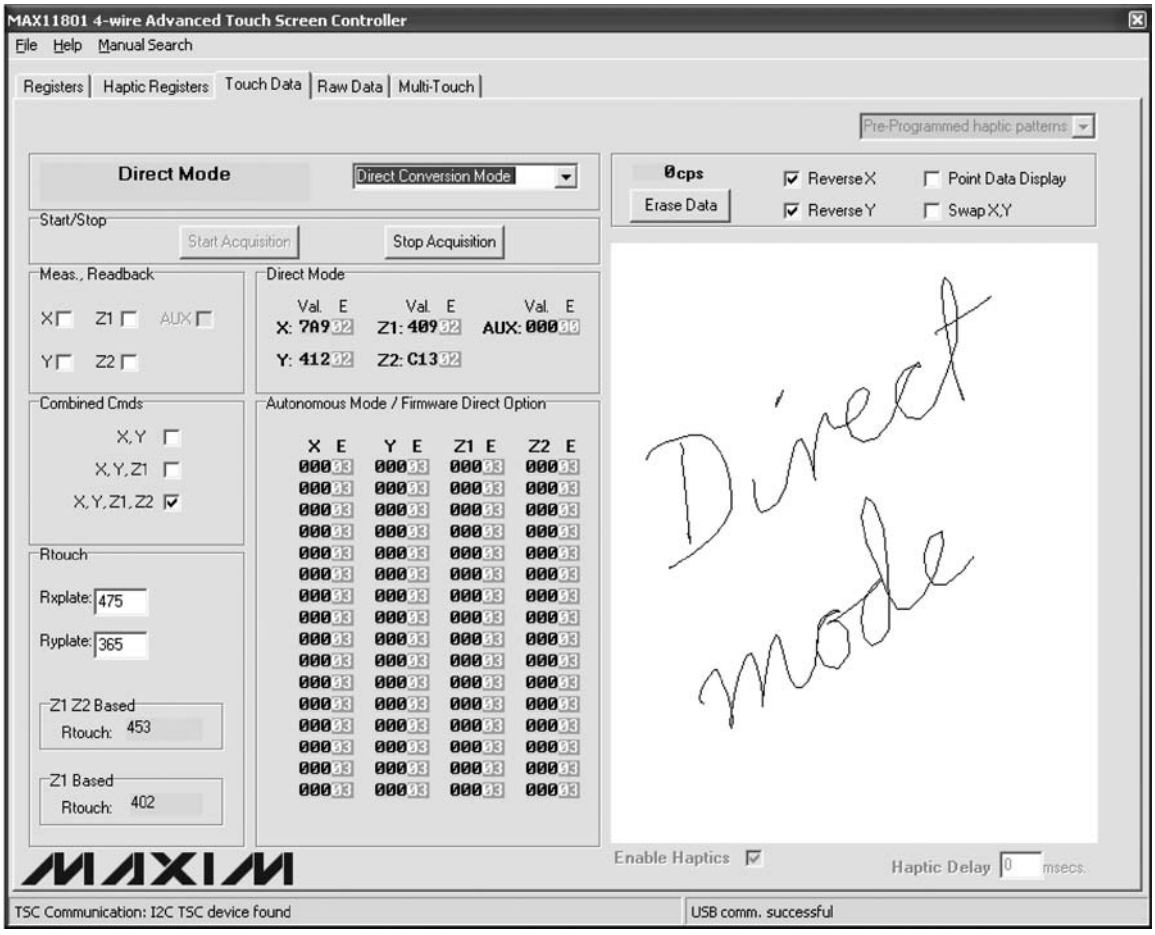

Figure 7. Touch Data Tab (Direct Mode)

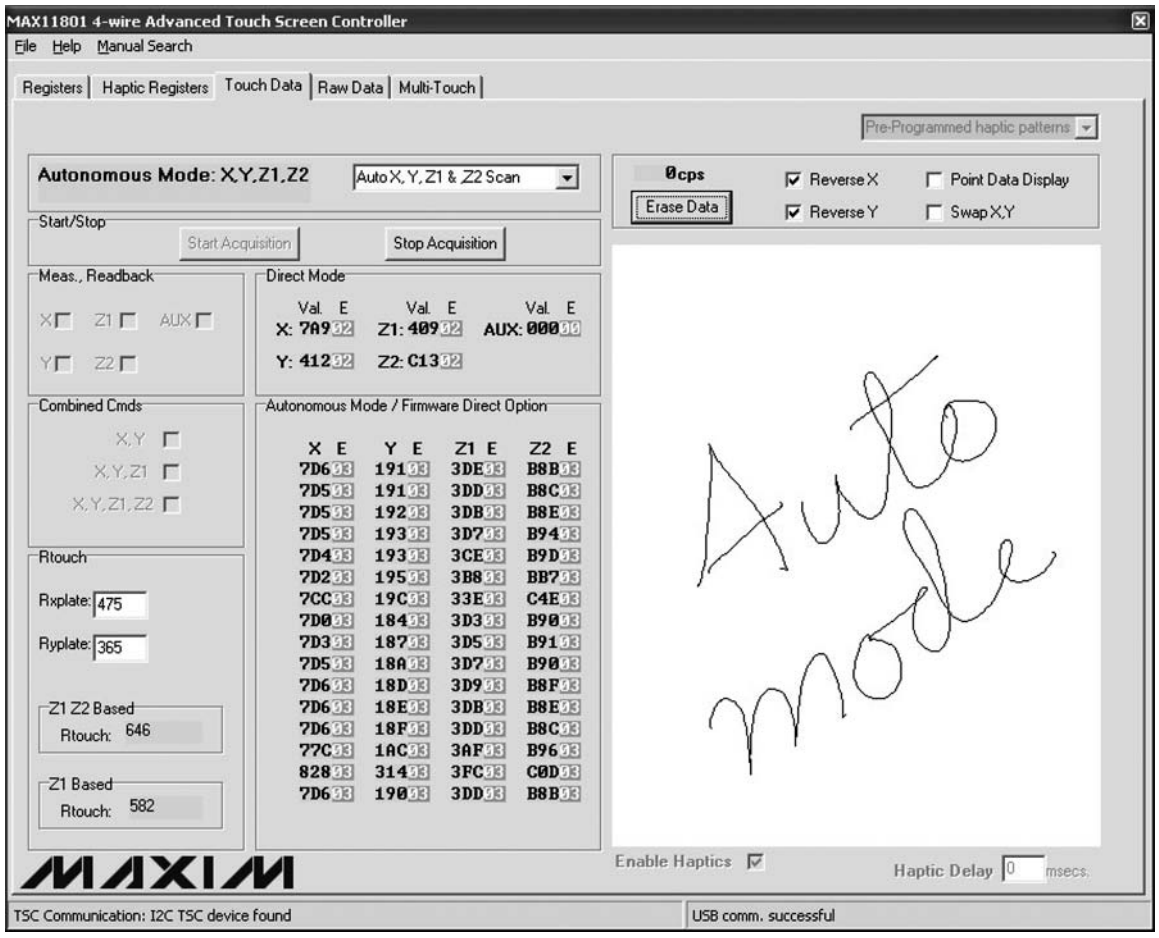

Figure 8. Touch Data Tab (Auto Mode)

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Raw Data

The **Raw Data** tab (Figure 9) displays a stream of raw data that gets collected during the operation of the TSC. This data can be saved by pressing the **Save Data** button for data analysis.

Multi-Touch Tab

The **Multi-Touch** tab (Figures 10 and 11) gives a simple demo of the multi-touch on a resistive panel. Use the touch panel to enlarge and reduce the picture found in this tab. This works only in the autonomous mode. Contact the factory for details on this feature.

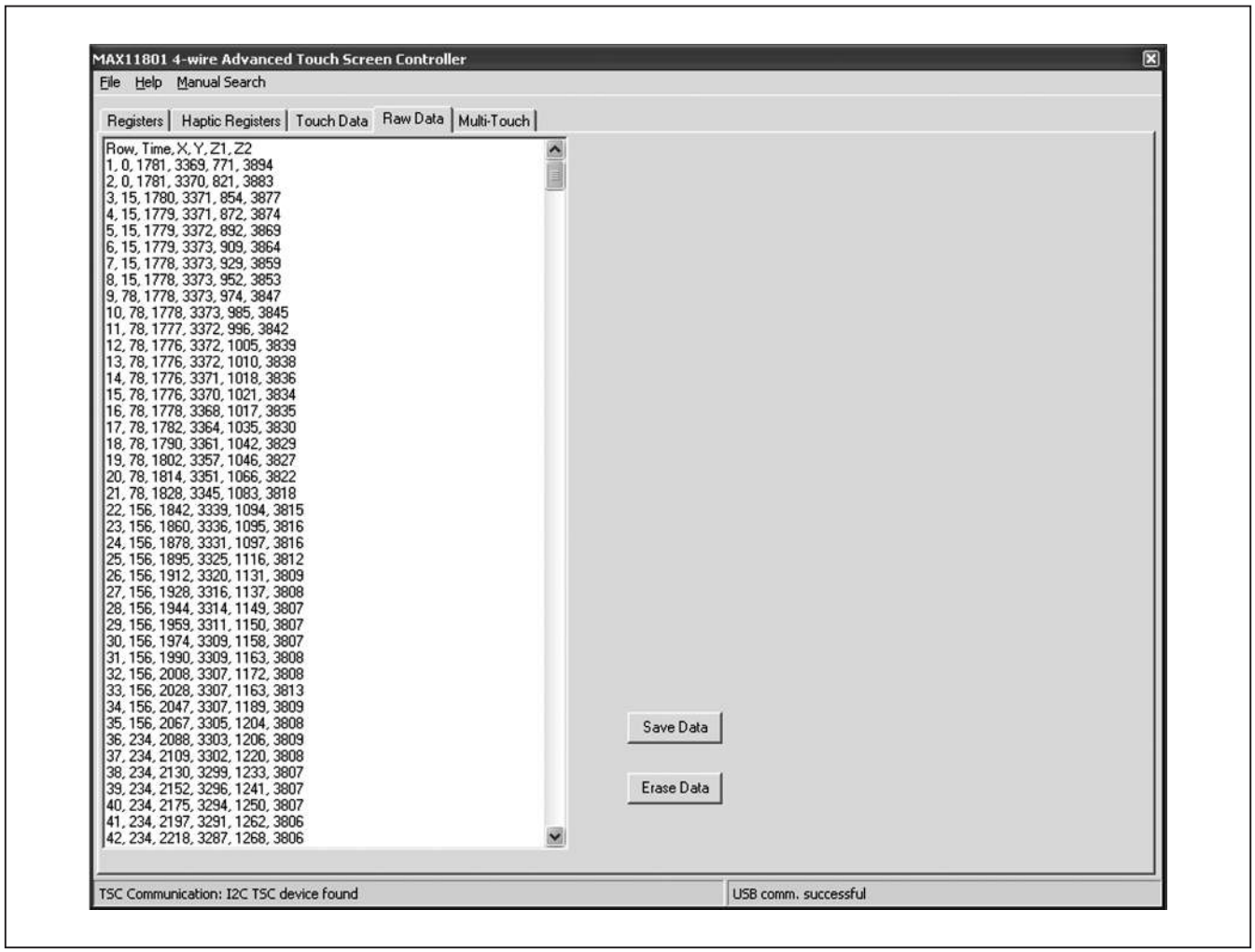

Figure 9. Raw Data Tab

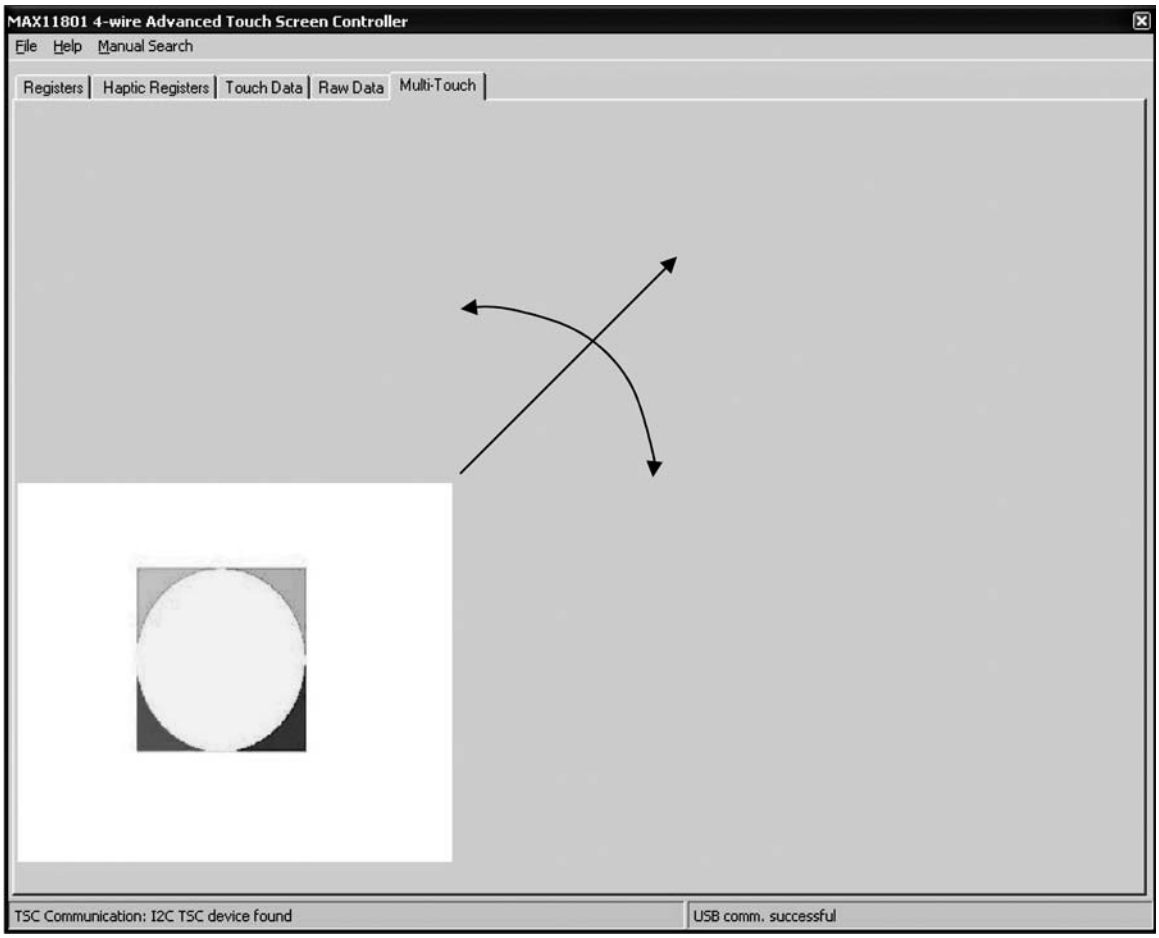

Figure 10. Multi-Touch Tab (Before Zoom Out and Rotate)

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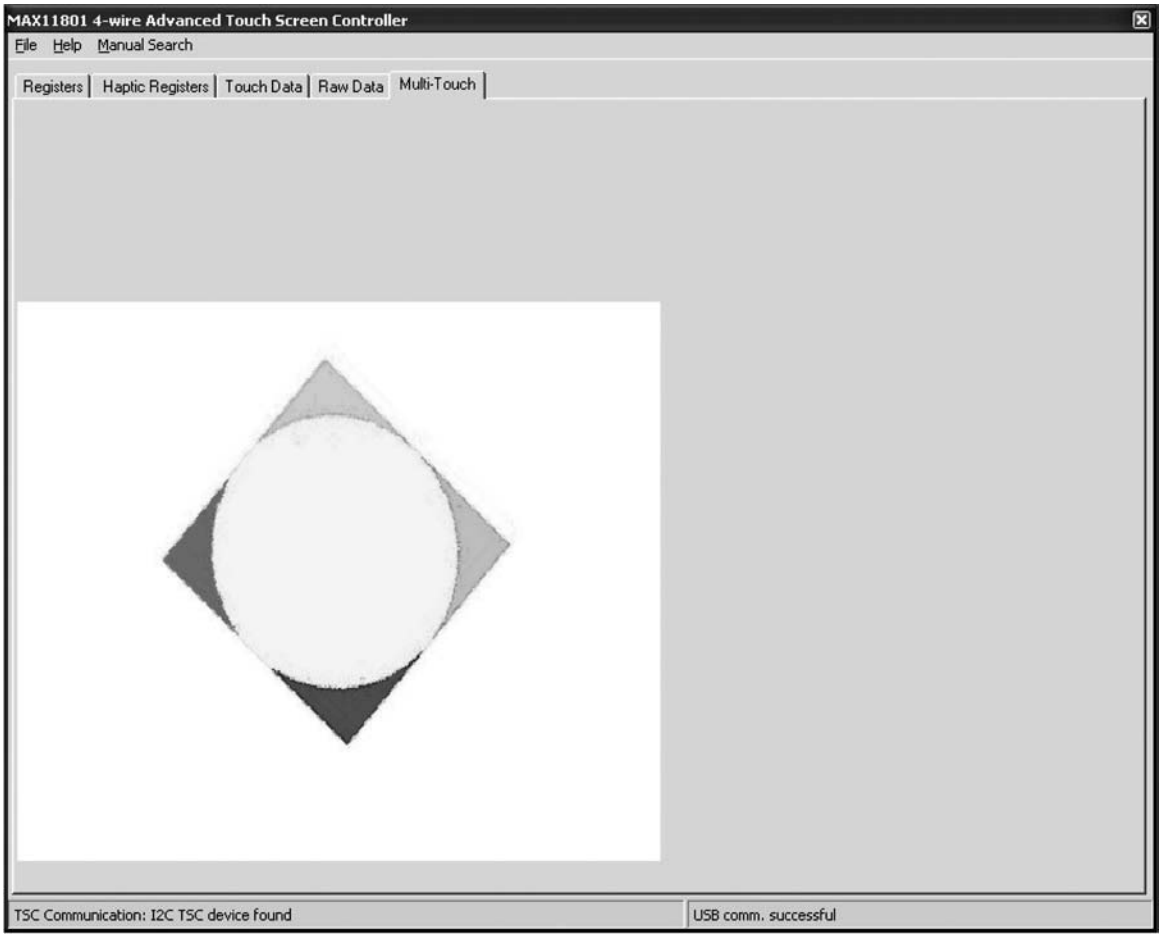

Figure 11. Multi-Touch Tab (After Zoom Out and Rotate)

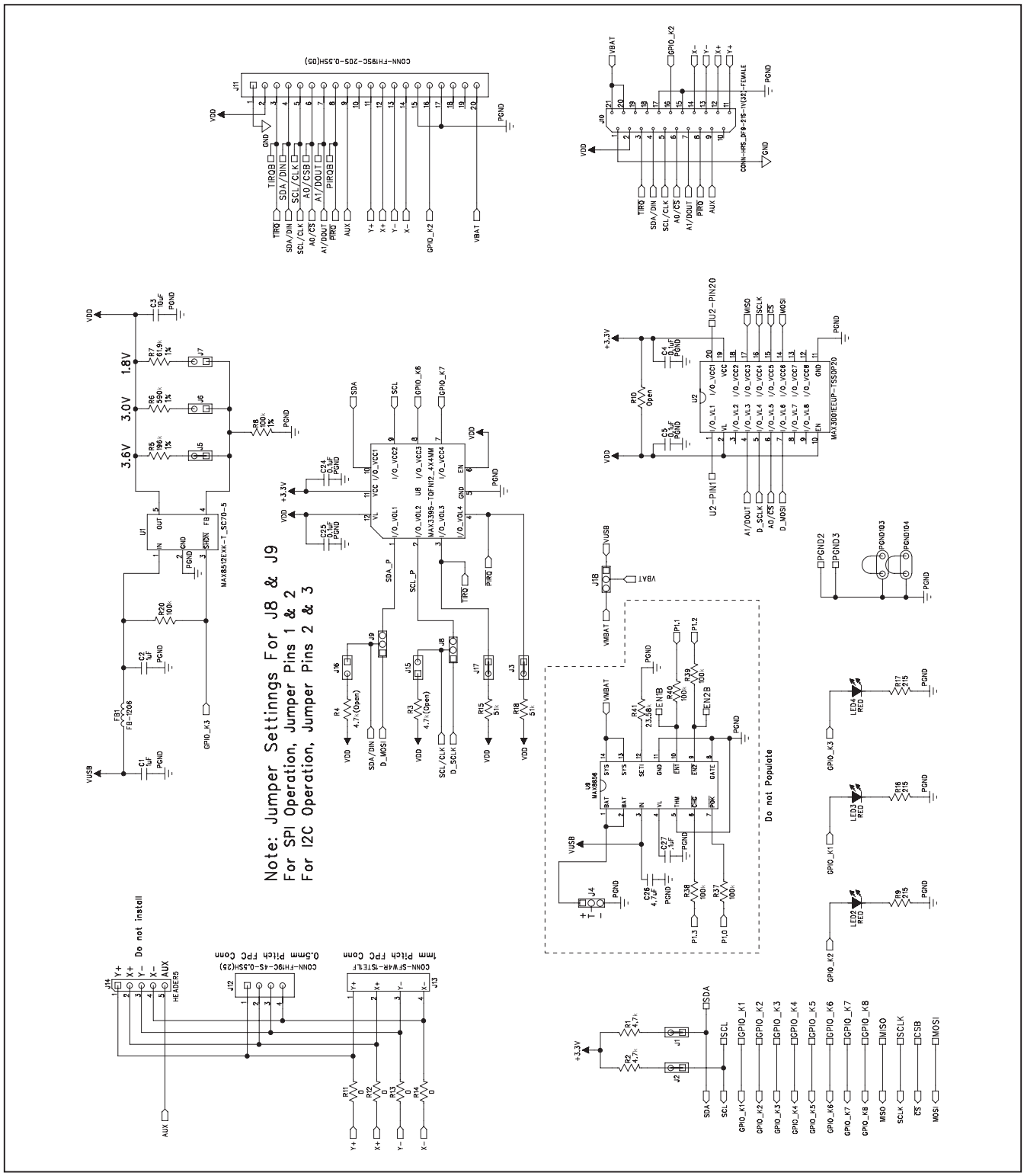

Figure 12a. MAX11800–MAX11803 Interface Board Schematic (Sheet 1 of 2)

MAX11800/MAX11801 Touch Evaluation Systems (TEVS)

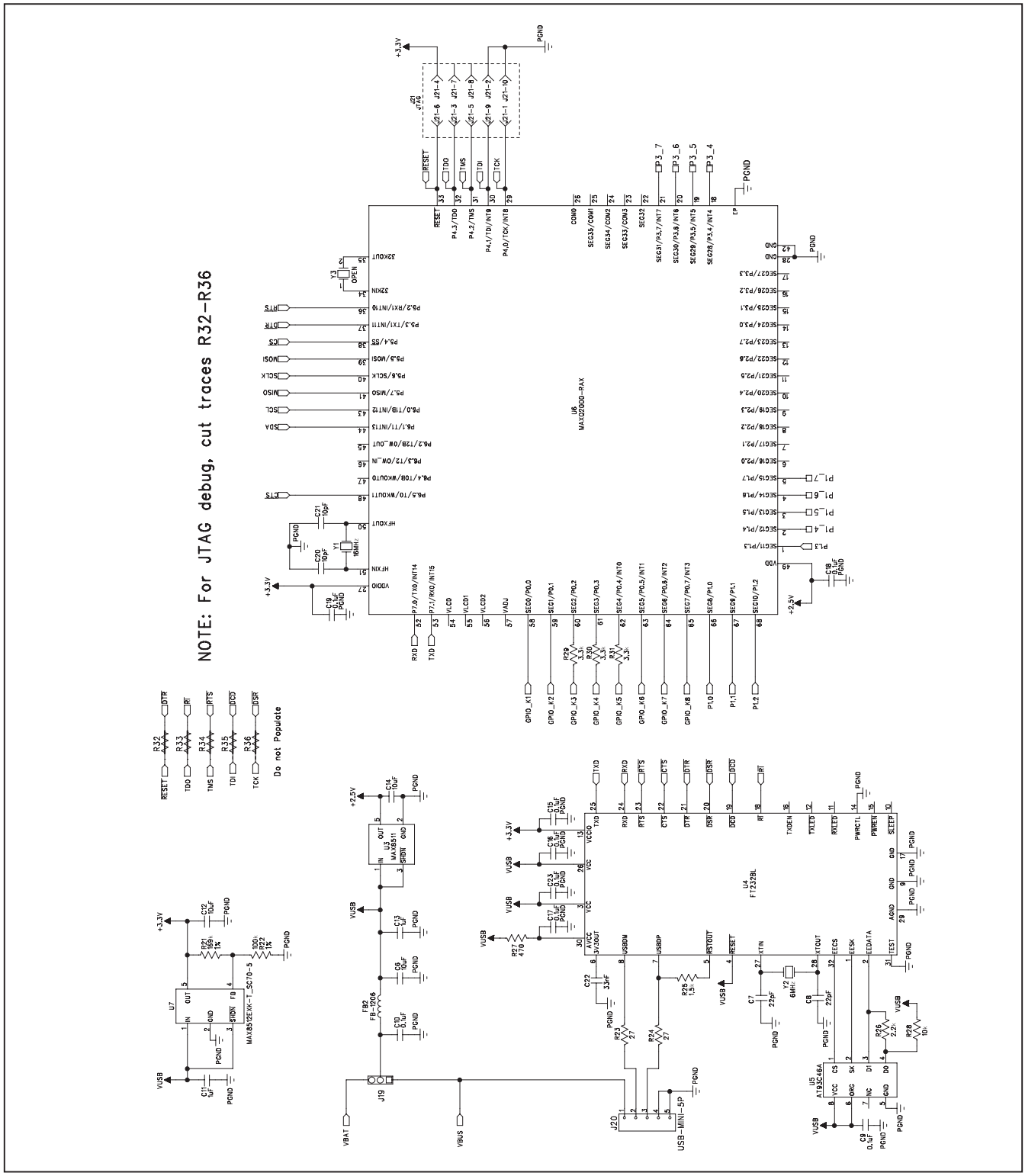

Figure 12b. MAX11800–MAX11803 Interface Board Schematic (Sheet 2 of 2)

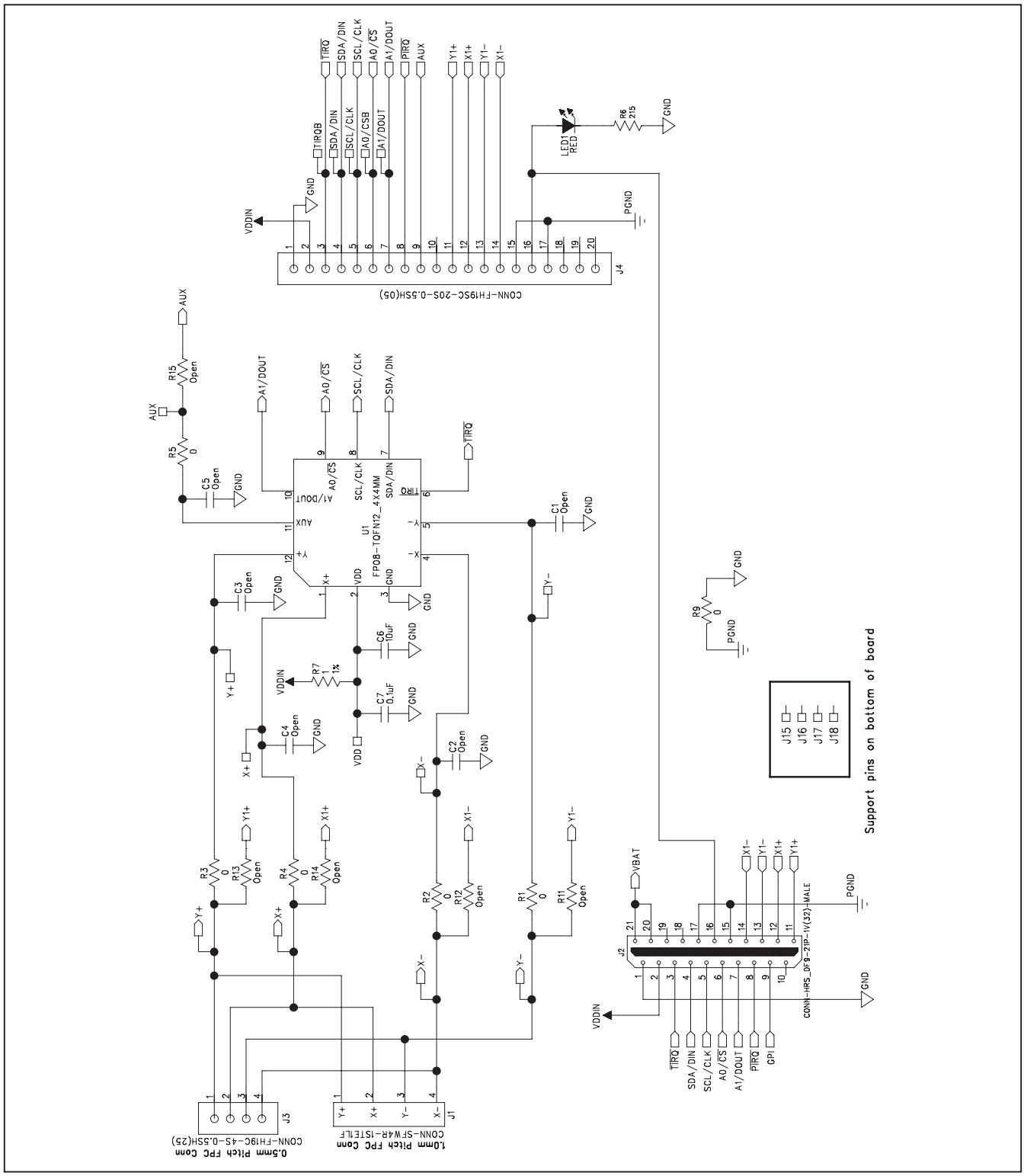

Figure 13. MAX11800/MAX11801 EV Kit Schematic

MAX11800/MAX11801 Touch Evaluation Systems (TEVS)

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	10/10	Initial release	—