19-5529; Rev 1; 1/11

MAX1441 Evaluation System

General Description

The MAX1441 evaluation system (EV system) provides a proven design to evaluate the MAX1441 capacitive proximity and touch sensor. The EV system consists of two PCBs. The MAX1441 evaluation kit (EV kit) includes the typical application circuit and all electronics for USB-to-JTAG communication between the on-board device and the PC. The MAX1441TP evaluation kit (TP EV kit) includes two touch pads. The TP EV kit connects to the EV kit through 20-pin right-angle connectors. The EV kit board connects to either the factory-provided kit touch pads board, or a custom user-supplied touch sensor. The EV system also includes Windows XP®- or Windows Vista®-compatible integrated development environment (MAX-IDE) for the MAXQ® microcontroller core of the device.

The EV kit comes with a MAX1441GUP/V+ installed.

Features

- **Wide 6V to 28V VBAT Supply Range**
- **External Touch-Sense Pad Included**
- **Adaptive Firmware Source Code Included**
- **USB PC-to-JTAG Connection**
- **USB Powered or Battery Powered**
- **Compatible with the MAX-IDE Development Tool**
- **Proven PCB Layout**
- **Fully Assembled and Tested**

Ordering Information

PART	TYPE
MAX1441EVSYS+	EV System

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

Component Lists

MAX1441 EV System

QTY	DESCRIPTION
1	MAX1441 EV Kit
1	MAX1441TP EV Kit

Component Lists continued at end of data sheet.

Quick Start

Required Equipment

- MAX1441 EV kit
- 6V to 28V DC power supply (9V battery) or PC with an available USB port

The EV kit is shipped from the factory configured (through jumper settings) for battery operation. To operate the EV kit from a USB port, see the *Configuring the EV Kit for USB Interface* section for jumper setting.

The device's on-board ASIC is preloaded with firmware that causes the on-board output LEDs (LEDOUT1 and LEDOUT2) to turn on when capacitance applied on the input terminals is increased (e.g., by moving your hand close to the touch pads).

Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation:

1) Verify that jumper settings are consistent with the default positions shown in Tables 1 and 2.
2) Apply a 6V to 28V power supply (or 9V battery) on the EXT_VBAT and GND terminals on the board.

Channel-1 (PAD1) Nonadaptive to Environment

1) Slowly move your hand towards PAD1. LEDOUT1 turns on when your hand is about 1cm from the PAD1 touch pad.
2) Move your hand away from the touch pad. LEDOUT1 immediately turns off.
3) Move your hand away from PAD1 and then back. LEDOUT1 turns on again.

Channel-2 (PAD2) Adaptive to Environment

1) Slowly move your hand towards PAD2. LEDOUT2 turns on when your hand is about 2cm from the PAD2 touch pad.
2) Move your hand away from the touch pad. LEDOUT2 immediately turns off.
3) Move your hand close to PAD2 again. Stop and keep your hand stable when LEDOUT2 turns on. LEDOUT2 stays on for a few seconds and then turns off. During this time, the device has monitored the capacitance changes on its input terminal and adjusted its Wake-Up Threshold register, AT2H. At the end of this period, the value in the AT2H register is the same level as a new capacitance-to-digital (C2D) conversion and does not result in LEDOUT2 turning on (i.e., the device has adapted to its environment).
4) Move your hand away from PAD2 and then back. LEDOUT2 turns on again. Within the time you moved your hand away from and then back to PAD2, the device readjusted its Wake-up Threshold register again, and your approaching hand causes a wake-up.

Note: The device is *programmed* to respond only to a capacitance *increase* at its input terminals (in this case, caused by your hand moving towards the touch pads). The output LEDs *do not* remain on, or turn on again, if your hand is steady at a fixed distance from the touch pads. Users can implement a different turn-on/turn-off logic more suitable for their applications.

Programming and Operating Through the USB Interface

Required Equipment

- MAX1441 EV kit (USB cable included)
- User-supplied Windows XP, Windows Vista, or Windows 7 PC with a spare USB port

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.

Note: Complete installation of the USB driver before proceeding with installation of the MAX-IDE application.

Note: For programming and debugging of the device, a change from battery-operated demo mode to USB-powered mode is required. The USB port powers on the evaluation board only after the USB driver is installed. Therefore, all LEDs on the board remain off and there is no response to the touch pads until the USB driver installation is complete and successful.

Installing the USB Driver

1) Visit **www.maxim-ic.com/evkitsoftware** to download the latest version of the EV kit software, 1441Rxx.ZIP. Save the EV kit software to a temporary folder and uncompress the ZIP file.
2) Install the EV kit software and USB driver on your computer by running the INSTALL.EXE program inside the temporary folder. The program files are copied to your PC and icons are created in the Windows **Start | Programs** menu. During software installation, some versions of Windows may show a warning message indicating that this software

is from an unknown publisher. This is not an error condition and it is safe to proceed with installation. Administrator privileges are required to install the USB device driver on Windows.

3) Set up the evaluation board for communicating through the USB port. See the *Configuring the EV Kit for USB Interface* section for jumper setting.
4) Connect the USB cable from the PC to the EV kit board. A Windows message appears when connecting the EV kit board to the PC for the first time. Each version of Windows has a slightly different message. If you see a Windows message stating **ready to use,** then proceed to the next step. Otherwise, open the USB_Driver_Help_200.PDF document in the Windows **Start | Programs** menu to verify that the USB driver was installed successfully.
5) Open the device manager by opening the shortcut icon in the Windows **Start | Programs | Maxim EVKIT Software | MAX1441 | Open Device Manager** menu. Identify the COM number under the **Ports (COM&LPT)** category for the just-installed USB driver. Write down the COM number for later action when installing and configuring the MAX-IDE.
6) At this point, the evaluation board should be powered up, LED0 and LED120 should be lit, and the on-board CPU should be executing the preprogrammed firmware.
7) Move your hand close to the PAD1 and PAD2 touch pads on the evaluation board. LEDOUT1 and LEDOUT2, corresponding to the PAD1 and PAD2 touch pads, respectively, blink.

Installing the MAX-IDE Application

Normally this installation is launched automatically by the EV kit software installer. Use this procedure in case the MAX-IDE setup was cancelled or MAX-IDE was uninstalled.

1) Set up the evaluation board for communicating through the USB port. See the *Configuring the EV Kit for USB Interface* section for jumper setting.
2) Run **SETUP.exe** in the **C:\Program Files\Maxim\MAX1441\MAX-IDE\install** folder to install MAX-IDE application to your hard drive.
3) In the InstallShield dialogs that appear, select the **Typical** installation, which installs all the necessary files for application development for the device. Throughout the installation process, accept the defaults offered by the installation procedure.
4) Copy the device configuration file, **MAX1441.cfg** from the **C:\Program Files\Maxim\MAX1441\MAX-IDE\Devices\MAXQ** folder to the **C:\Program Files\MAX-IDE\Devices\MAXQ** folder.

The MAX-IDE installation is now complete.

Opening and Working with an Existing MAX-IDE Project File

1) Set up the EV kit for communicating through the USB port. See the *Configuring the EV Kit for USB Interface* section for jumper settings.
2) Launch MAX-IDE from the **Start | All Programs** menu or run **GenericIDE.exe** directly from the **C:\Program Files\MAX-IDE** directory (see Figure 1).
3) Select the **MAXQ JTAG** menu item (default) under **Device** in the menu bar (if not already selected).
4) Select the **Options** menu item under **Device** in the menu bar (see Figure 2).
   a) Select the serial port corresponding to the device's USB driver (previously described in Step 5 of the *Installing the USB Driver* section).
   b) Type **MAX1441.cfg** in the **Device Configuration File** edit box.
   c) Type **75** in the **Desired JTAG Clock Freq. (kHz)** edit box.
   d) Press the **OK** button. The MAX-IDE opens the specified COM port and establishes communication at the specified frequency (75kHz). MAX-IDE is now configured for the EV kit application.
5) Click on **Open Project** in the **Project** tab and open **C:\Program Files\MAX1441\example\appcode\appcode.prj**.
6) Select the **Message** tab at the bottom to view status messages on the **MAX-IDE** window.
7) Select the **Make** menu item under **Debug** in the menu bar to assemble the code. **Build Successful** appears in the **Message** window.
8) Select the **Step Into** menu item under **Debug** in the menu bar.
   a) The hex code generated in the previous step is downloaded into the program memory of the device, and progress status is displayed in the MAX-IDE **Message** window. Loading the firmware into the program memory is complete and successful when **Delay Complete** is displayed.

9) Select **Debug | Run** to start the execution of the firmware just loaded into the device.

The device starts executing the firmware. Move your hand towards the touch pads to see the device's response indicated by turning on/off LEDOUT1 and LEDOUT2, corresponding to touch pads PAD1 and PAD2, respectively. Select **Debug | Pause** to stop the execution and view the content of each register (displayed on the right side) in the **Register** window. Select **Debug | Run** to resume execution.

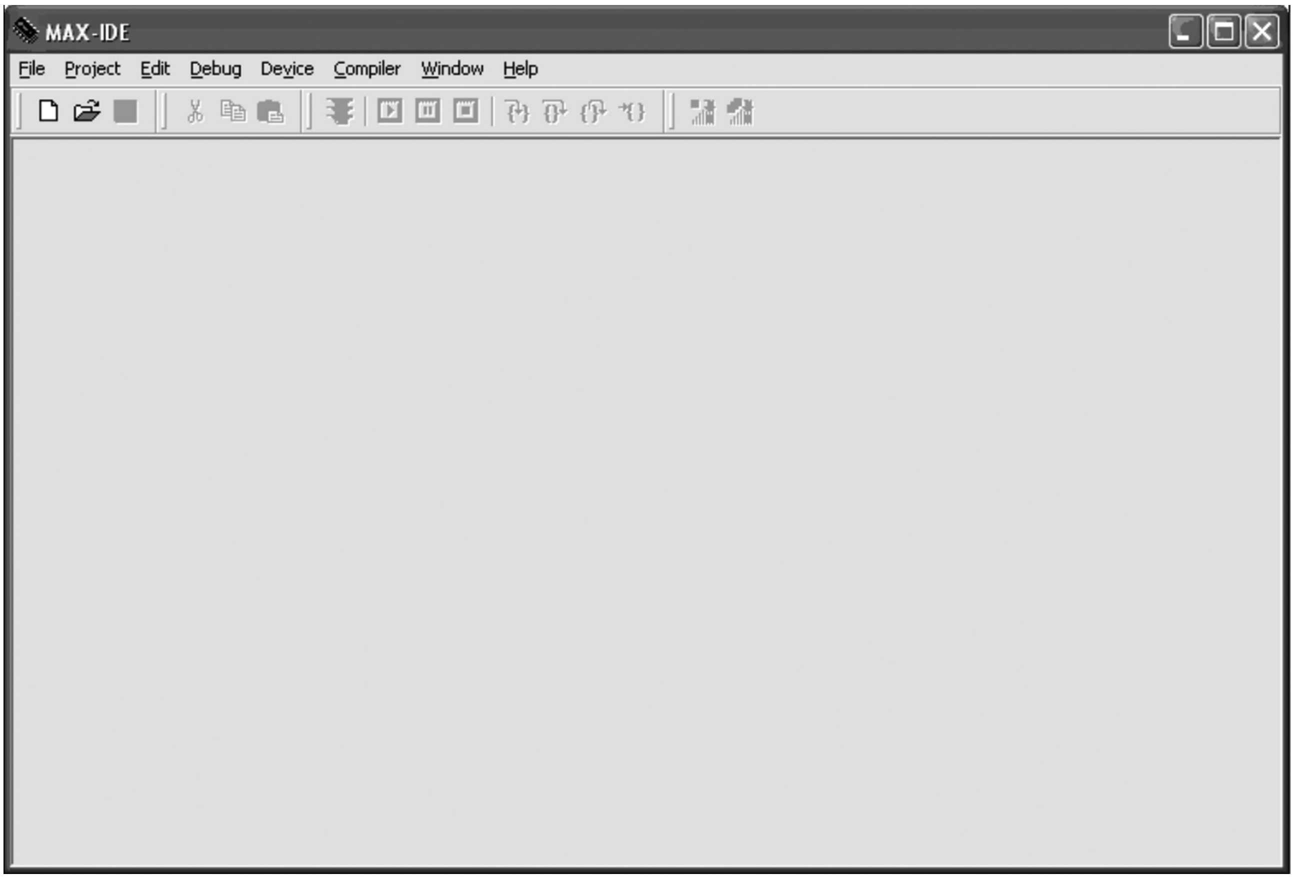


Figure 1. MAX-IDE Main Window

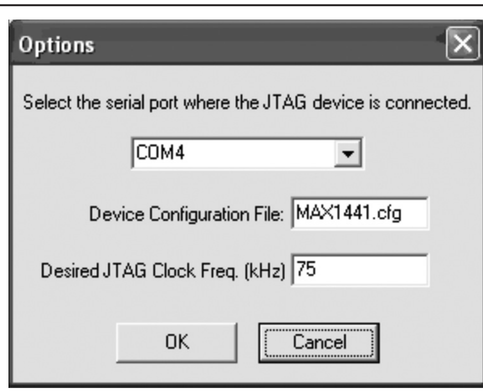


Figure 2. MAX-IDE Device Options Window

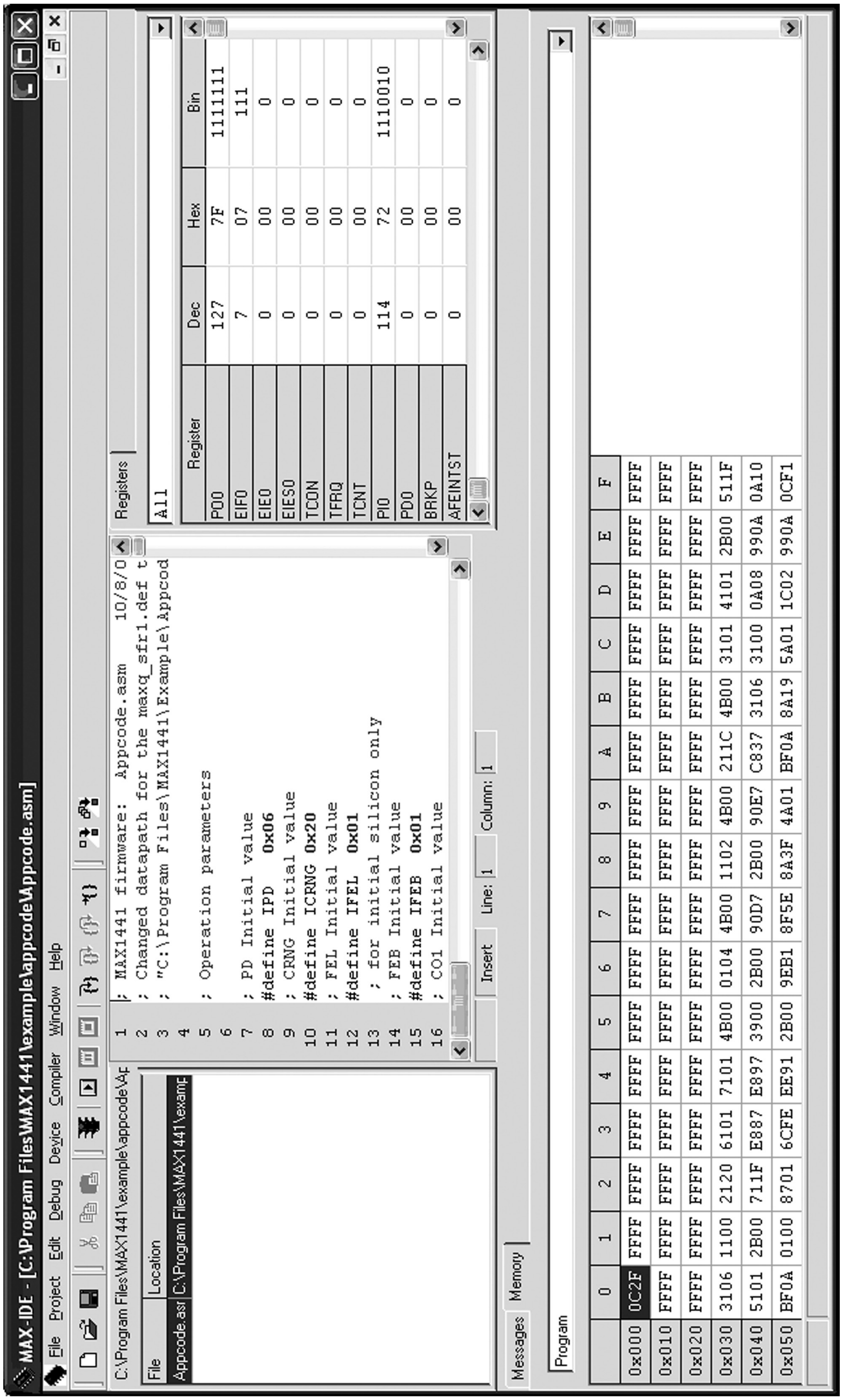


Figure 3. MAX-IDE Example Project Appcode

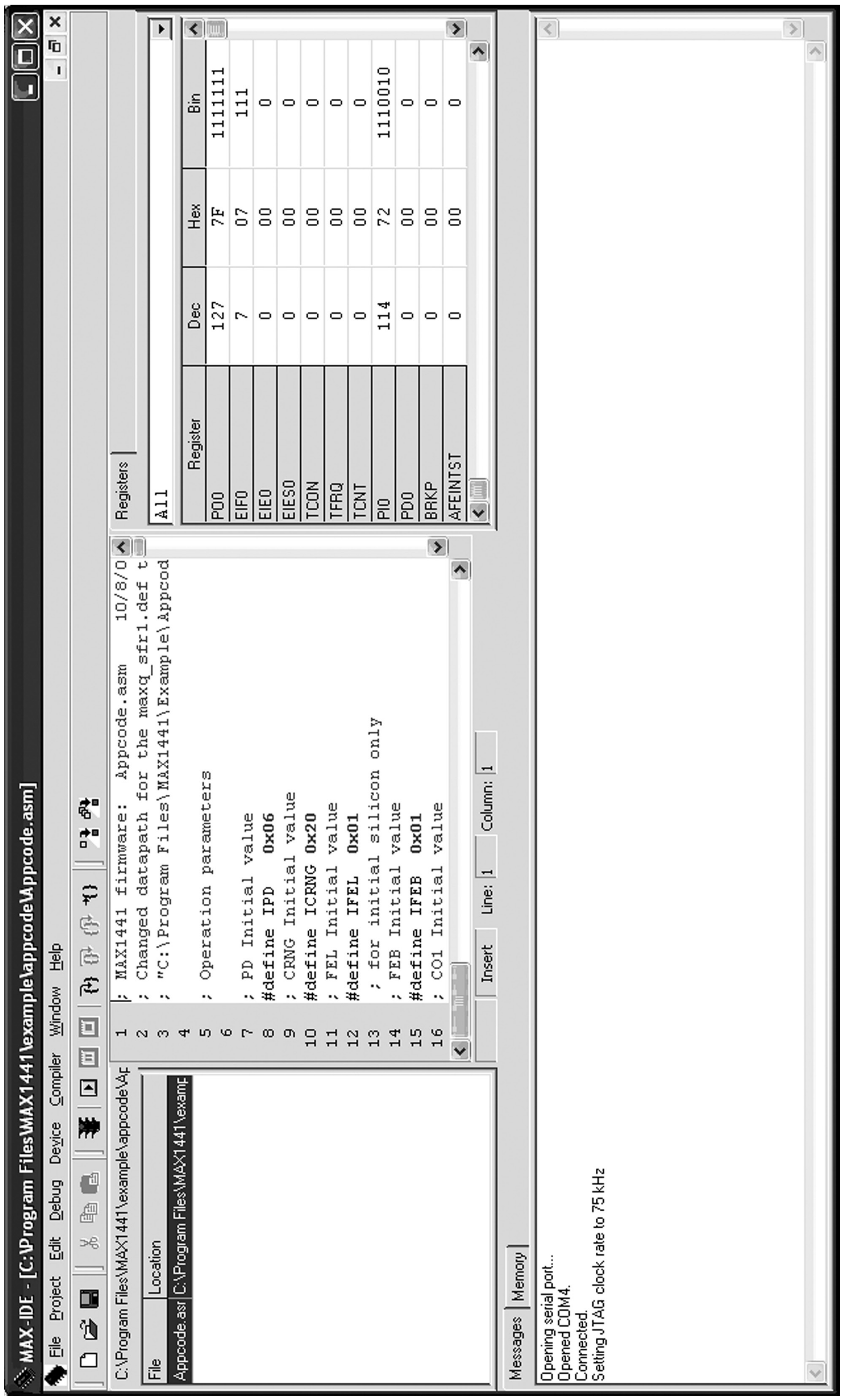


Figure 4. MAX-IDE Messages Tab

Creating a New Project with MAX-IDE

1) Set up the EV kit for communicating through the USB port. See the *Configuring the EV Kit for USB Interface* section for jumper settings.
2) Launch MAX-IDE from the **Start | All Programs** menu or run **GenericIDE.exe** directly from the **C:\Program Files\MAX-IDE** directory.
3) Select the **Options** menu item under **Device** in the menu bar and follow the same steps mentioned in step 4 in the *Opening and Working with an Existing MAX-IDE Project File* section.
4) Select the **New Project** menu item under **Project** in the menu bar of the MAX-IDE program.
5) Select the **Add Files…** menu item under **Project** in the menu bar and select an existing assembly file (e.g., **test.asm**) in the **C:\Program Files\Maxim\MAX1441\example\appcode** directory.
6) Double-click the just-added file name to open it in the editor window. You can edit, debug, and run the source code in the MAX-IDE window.
7) Select **Window | Show | Registers** to see the contents of the device registers.
8) Select **Window | Show | Memory** to see the contents of the device flash memory. Use the drop-down list to switch between **Program** memory and **Data** memory (see Figure 7).
9) Select **Project | Save Project As** and type in the name for the newly created project.

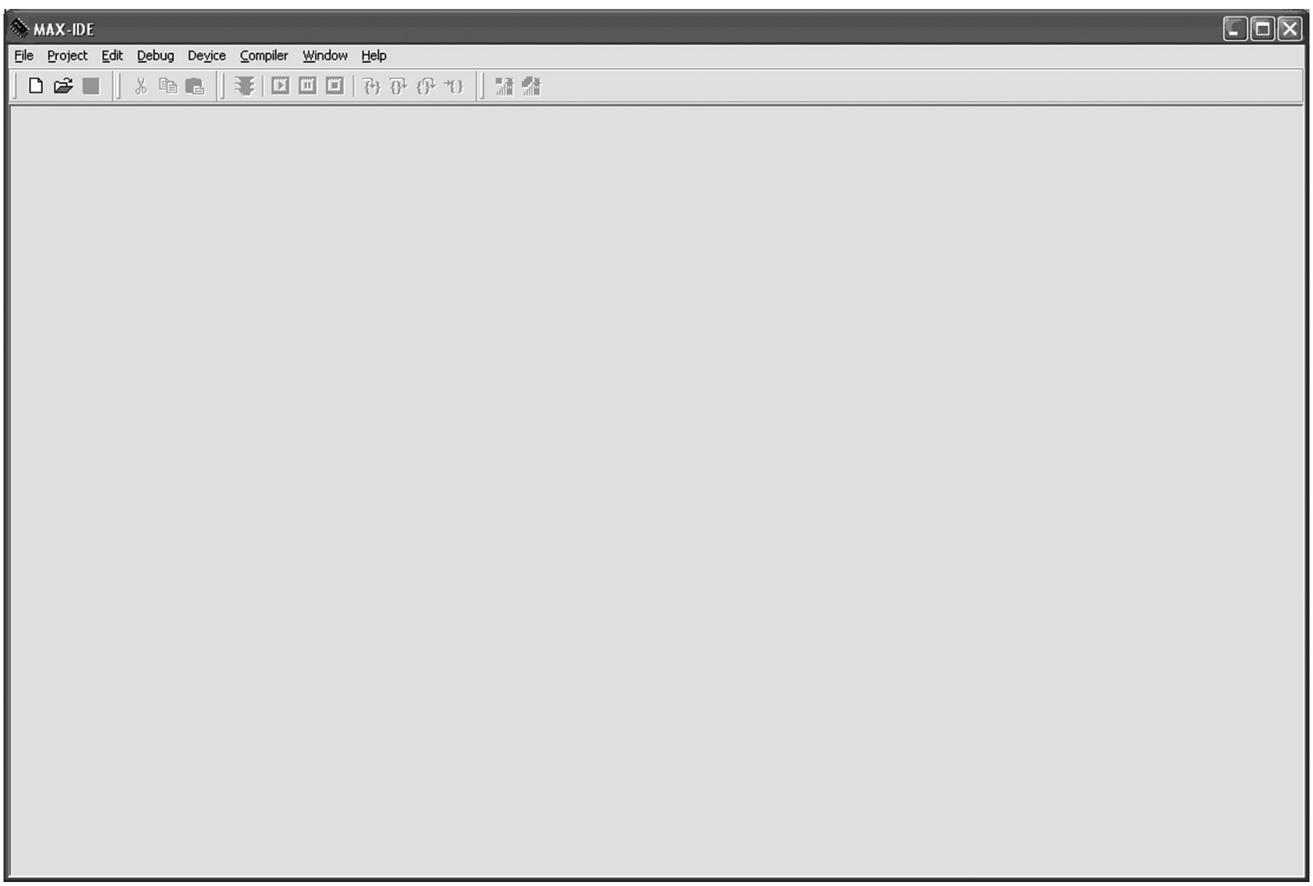


Figure 5. MAX-IDE Main Window

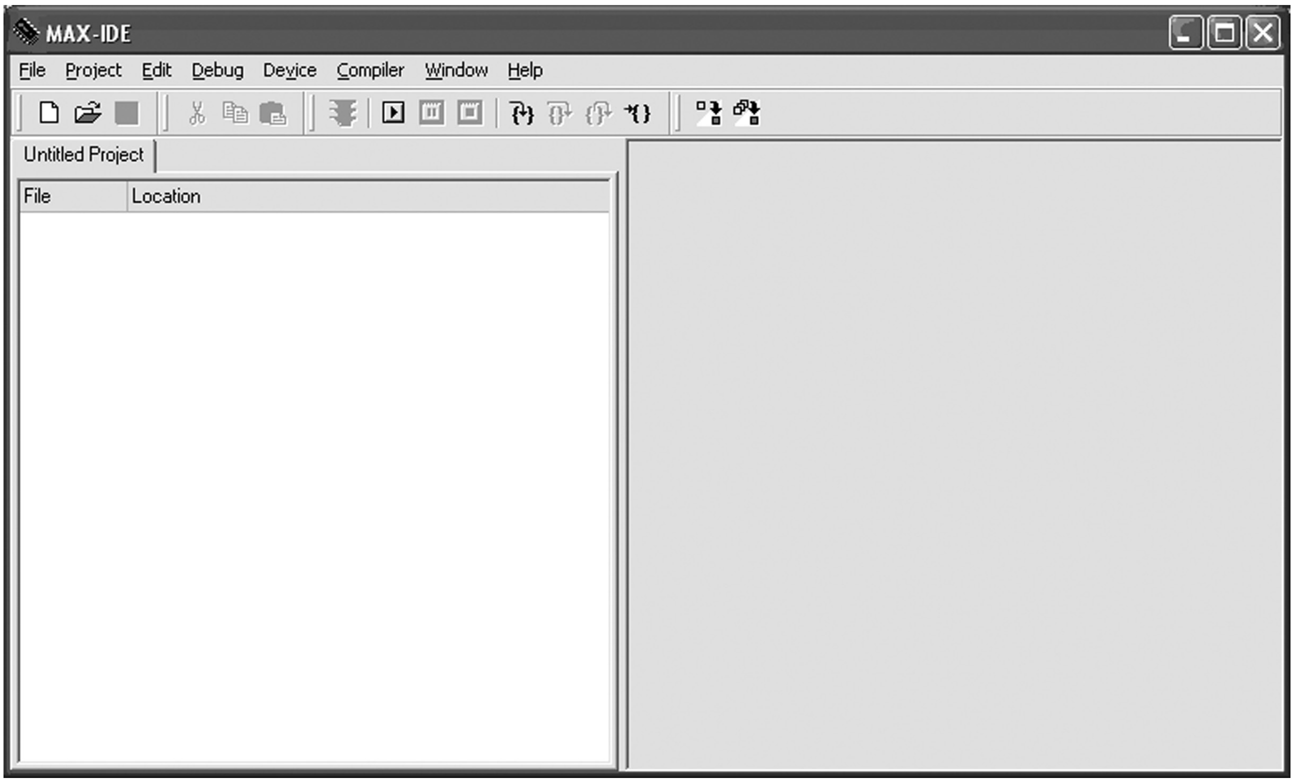
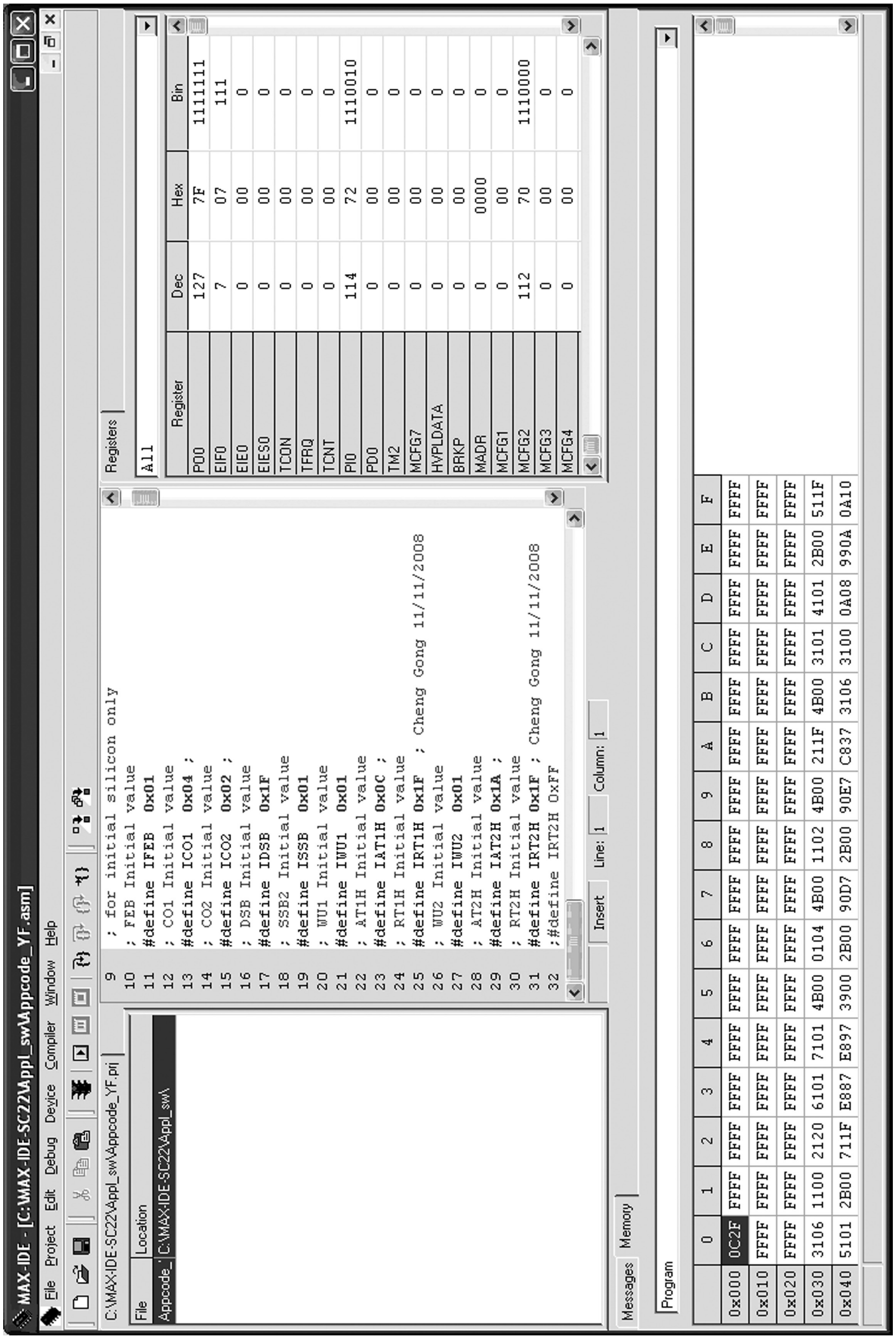


Figure 6. MAX-IDE Untitled Project Window



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0x000	0C2F	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
0x010	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
0x020	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
0x030	3106	1100	2120	6101	7101	4B00	0104	4B00	1102	4B00	211F	4B00	3101	4101	2B00	511F
0x040	5101	2B00	711F	E887	E897	3900	2B00	90D7	2B00	90E7	C837	3106	3100	0A08	990A	0A10

Figure 7. MAX-IDE Registers Tab

Operating the Device Using MAX-IDE

Start the MAX-IDE application, open a project, and run it.

To view changes or values in registers as instructions are executed, add a break point. To add a break point, click on the line number to the left of the instruction of interest. A break point (denoted by a big red dot) on the instruction causes the device to pause when the program counter gets to the marked instruction (the device pauses before the instruction is executed). When the device is stopped, the latest contents of the registers are displayed in the **Register** window. Then, use one of the **Debug | Step Into**, **Debug | Step Over**, **Debug | Out**, or **Debug | Run to Cursor** functions to get to a different part of the program and see how the register values change.

To change the content of a register to observe how it affects the device operation, press **Debug | Pause** (if not paused already), locate the desired register in the **Register** window, delete the current content and type in a new value, and then select **Debug | Run**. An example of how this works follows.

Adjusting Touch-Detection Sensitivity

1) Set up the EV kit for communicating through the USB port. See the *Configuring the EV Kit for USB Interface* section for jumper settings.
2) Launch MAX-IDE and open appcode.prj.
3) Set the **Device | Options**, as shown in Figure 2.
4) Select **Debug | Run**.
5) Move your hand towards the touch pads. The output LEDs come on when your hand is about 2cm from the touch pads.
6) Select **Debug | Pause**.
7) Select **System Registers** from the **Registers** drop-down list.
8) Locate the LC[0] and LC[1] registers.
9) Change the value in the LC[0] register from 0001 to 3. Press Enter.
10) Change the value in the LC[1] register from 0001 to 6. Press Enter.
11) Select **Debug | Run**.
12) Move your hand towards the PAD1 touch pad until LEDOUT1 turns on. Observe that your hand must get much closer to the touch pad for LEDOUT1 to turn on.
13) Move your hand towards the PAD2 touch pad until LEDOUT2 turns on. Observe that your hand must get even closer than that for PAD1 for LEDOUT2 to turn on.

It is also possible to change the touch sensitivity by adjusting the Range register, CRNG. However, note that reducing the detection range could result in C2D register overflow and cause the output LEDs to persistently remain on.

Note: Only LEDOUT1 and LEDOUT2 on the EV kit are controlled by the device, indicating input capacitance change on the SINPUT1 and SINPUT2 terminals. All other LEDs on the board indicate the status of the JTAG communication lines and other activities on the EV kit. See the EV kit circuit schematic for their function.

Configuring the EV Kit for USB Interface

The evaluation board is shipped from the factory with jumper settings for battery operation. To program and operate the board through the USB port, the jumpers must be set as follows:

1) Disconnect the USB cable from the board (if connected). Verify that jumper settings are consistent with that of Tables 1 and 2 default positions.
2) Move the shunt of jumper JU4 to the 1-2 position to power the device from the USB+5V supply.
3) Insert jumper JU125 so the device's VDD powers the JTAG level translators.

Detailed Description of Hardware

The MAX1441 EV kit provides a proven layout for the MAX1441. On-board USB-to-JTAG circuitry supports custom firmware development.

U3 (MAX8511) is an on-board 3.3V regulator that optionally powers the LED indicators.

The low-voltage I/O pins (P0.0, P0.1, P0.2, and P0.4) optionally connect to LED indicators LED0–LED3. In addition, P0.4 can be used to sense pushbutton switch SW3. The high-voltage I/O pins (P0.5/OUT1 and P0.6/OUT2) optionally connect to LED indicators LEDOUT1 and LEDOUT2 to indicate a capacitance change on the input terminals.

The U10–U15 components are USB-interfaced JTAG controller circuits, which are equivalent to the MAXQ2000 EV kit's JTAG controller board (MAXQJTAG-001B). Jumpers JU120–JU125 connect U10–U15 to the JTAG port of the MAX1441 (U1). Port I/O pins P0.0–P0.3 are used for JTAG.

Table 1. Jumper Descriptions (JU1, JU2, JU4–JU7, JU12–JU16, JU19, JU20, JU21)

JUMPER	SIGNAL	SHUNT POSITION	DESCRIPTION
JU1	VDD	Not installed*	Powers VDD from the on-chip 3.4V VAA LDO.
		PCB trace cut open	Powers VDD from an external supply.
JU2	VBAT	Not installed*	Normal operation.
		PCB trace cut open	Measure supply current using jumper JU2. Cut the PCB trace and place a current meter in series with the two terminals of the jumper.
JU4	VBAT	1-2	Powers VBAT from the USB+5V bus power.
		2-3*	Powers VBAT from an external user-supplied power. JU125 must be open.
JU5	DAC_VDD	1-2*	+3.3V (U3) powers the reconstruction DAC (U7).
		Open	External power must drive the DAC VDD.
JU6	DAC_SCL	1-2	P0.0/INT0/TCK drives the reconstruction DAC SCL.
		Open*	Reconstruction DAC is not used.
JU7	DAC_SDA	1-2	P0.1/INT1/TDO drives the reconstruction DAC SDA.
		Open*	Reconstruction DAC is not used.
JU12	ledpwrA	1-2*	Powers port 0 LEDs from VDD.
		2-3	Powers port 0 LEDs from +3.3V (U3).
JU13	P0.0 LED	1-2*	P0.0/INT0/TCK drives LED0.
		2-3	P0.0/INT0/TCK is pulled up by 10kΩ (R38).
JU14	P0.1 LED	1-2*	P0.1/INT1/TDO drives LED1.
		2-3	P0.1/INT1/TDO is pulled up by 10kΩ (R39).
JU15	P0.2 LED	1-2*	P0.2/INT3/TDI drives LED2.
		2-3	P0.2/INT3/TDI is pulled up by 10kΩ (R40).
JU16	P0.4 LED	1-2*	P0.4 drives LED3.
		2-3	P0.4 is pulled up by 10kΩ (R41).
JU19	P0.5 LED	1-2*	P0.5/OUT1 drives LEDOUT1.
		2-3	P0.5/OUT1 is pulled up by 10kΩ (R16).
JU20	P0.6 LED	1-2*	P0.6/OUT2 drives LEDOUT2.
		2-3	P0.6/OUT2 is pulled up by 10kΩ (R17).
JU21	ledpwrH	1-2*	Powers LEDOUT_ from VBAT.
		2-3	Powers LEDOUT_ from +3.3V (U3).

Default position.

Table 2. Jumper Descriptions for JTAG (JU100–JU109 and JU120–JU125)

JUMPER	SIGNAL	SHUNT POSITION	DESCRIPTION
JU100	USB_VDDIO	1-2*	Normal MAXQJTAG-001B-equivalent JTAG host. USB bridge chip I/O is at 5V.
		2-3	FT232 JTAG bit-banging JTAG host. USB bridge chip I/O is at 3.3V.
JU101	USB_TXD	Not installed*	Normal MAXQJTAG-001B-equivalent JTAG host.
		PCB trace cut open	FT232 JTAG bit-banging JTAG host.
JU102	USB_RXD	Not installed*	Normal MAXQJTAG-001B-equivalent JTAG host.
		PCB trace cut open	FT232 JTAG bit-banging JTAG host.
JU103	USB_RTS	Open*	Normal MAXQJTAG-001B-equivalent JTAG host.
		1-2	FT232 JTAG bit-banging JTAG host.
JU104	USB_CTS	Open*	Normal operation.
JU105	USB_DTR	1-2	Reserved.
		2-3*	Normal MAXQJTAG-001B-equivalent JTAG host.
JU106	USB_DSR	Open*	Normal MAXQJTAG-001B-equivalent JTAG host.
		1-2	FT232 JTAG bit-banging JTAG host.
JU107	USB_DCD	Open*	Normal MAXQJTAG-001B-equivalent JTAG host.
		1-2	FT232 JTAG bit-banging JTAG host.
JU108	USB_RI	Open*	Normal MAXQJTAG-001B-equivalent JTAG host.
		1-2	FT232 JTAG bit-banging JTAG host.
JU109	JTAG HV PWR	Open*	Normal operation.
		1-2	Connects USB+5V to JTAG pin 8 to provide power to the JTAG host.
JU120	TCK	1-2*	Normal MAXQJTAG-001B-equivalent JTAG host.
		Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU121	TDO	1-2*	Normal MAXQJTAG-001B-equivalent JTAG host.
		Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU122	TDI	1-2*	Normal MAXQJTAG-001B-equivalent JTAG host.
		Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU123	TMS	1-2*	Normal MAXQJTAG-001B-equivalent JTAG host.
		Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU124	U1 $\overline{\text{RESET}}$	1-2*	Normal MAXQJTAG-001B-equivalent JTAG host.
		Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU125	JTAG VDD	1-2	Normal MAXQJTAG-001B-equivalent JTAG host.
		Open*	External JTAG host or FT232 JTAG bit-banging JTAG host.

**Default position.*

Jumper Settings for MAXQJTAG-001B (Normal Defaults)

The normal default configuration connects an on-board MAXQJTAG-001B-equivalent JTAG host to the device. A virtual communications port (VCP) device driver connects the FT232 USB bridge chip to the DS89C450-ENL+, which runs the JTAG host firmware. This JTAG host can be driven by Maxim's MAX-IDE integrated development environment.

Jumper Settings for External JTAG Host

To connect the EV kit to an external user-supplied JTAG interface, disconnecting the on-board JTAG host, remove the shunts from jumpers JU120–JU125, and move the shunt on jumper JU105 to the 2-3 position. Install header pins at JTAGU1 and connect your JTAG host.

Table 3. Default Jumper Settings for MAXQJTAG-001B (JU100–JU108 and JU120–JU125)

JUMPER	SIGNAL	DEFAULT SHUNT POSITION	DESCRIPTION
JU100	USB_VDDIO	1-2	Normal MAXQJTAG-001B-equivalent JTAG host. USB bridge chip I/O is at 5V.
JU101	USB_TXD	Not installed (shorted by PCB trace)	Normal MAXQJTAG-001B-equivalent JTAG host.
JU102	USB_RXD	Not installed (shorted by PCB trace)	Normal MAXQJTAG-001B-equivalent JTAG host.
JU103	USB_RTS	Open	Normal MAXQJTAG-001B-equivalent JTAG host.
JU104	USB_CTS	Open	Normal operation.
JU105	USB_DTR	2-3	Normal MAXQJTAG-001B-equivalent JTAG host.
JU106	USB_DSR	Open	Normal MAXQJTAG-001B-equivalent JTAG host.
JU107	USB_DCD	Open	Normal MAXQJTAG-001B-equivalent JTAG host.
JU108	USB_RI	Open	Normal MAXQJTAG-001B-equivalent JTAG host.
JU120	TCK	1-2	Normal MAXQJTAG-001B-equivalent JTAG host.
JU121	TDO	1-2	Normal MAXQJTAG-001B-equivalent JTAG host.
JU122	TDI	1-2	Normal MAXQJTAG-001B-equivalent JTAG host.
JU123	TMS	1-2	Normal MAXQJTAG-001B-equivalent JTAG host.
JU124	U1 $\overline{\text{RESET}}$	1-2	Normal MAXQJTAG-001B-equivalent JTAG host.
JU125	JTAG VDD	1-2	Normal MAXQJTAG-001B-equivalent JTAG host.

Table 4. JTAGU1 Header (JTAGU1-1–JTAGU1-10)

PIN	NAME	FUNCTION
JTAGU1-1	P0.0/INT0/TCK	Port 0, bit 0 digital input/output with configurable edge/level-triggered interrupt (TCK).
JTAGU1-2	GND	Ground.
JTAGU1-3	P0.1/INT1/TDO	Port 0, bit 1 digital input/output with configurable edge/level-triggered interrupt (TDO); CPU port 0, bit 0.
JTAGU1-4	VDD	Digital power-supply input.
JTAGU1-5	P0.3/TMS	Port 0, bit 3 digital input/output (TMS); CPU port, bit 3.
JTAGU1-6	U1 $\overline{\text{RESET}}$	U1 active-low reset input.
JTAGU1-7	N/C	No connection; PCB not drilled.
JTAGU1-8	USB+5V	+5V supply from the USB terminal.
JTAGU1-9	P0.2/TDI	Port 0, bit 2 digital input/output with configurable edge/level-triggered interrupt (TDI).
JTAGU1-10	GND	Ground.

Table 5. Jumper Settings for External JTAG Host (JU103, JU105–JU109 and JU120–JU125)

JUMPER	SIGNAL	SHUNT POSITION	DESCRIPTION
JU103	USB_RTS	Open*	Normal MAXQJTAG-001B-equivalent JTAG host.
JU105	USB_DTR	2-3	EV kit factory test: Enable loading DS89C450 firmware into MAXQJTAG-001B-equivalent JTAG host.
JU106	USB_DSR	Open*	Normal MAXQJTAG-001B-equivalent JTAG host.
JU107	USB_DCD	Open*	Normal MAXQJTAG-001B-equivalent JTAG host.
JU108	USB_RI	Open*	Normal MAXQJTAG-001B-equivalent JTAG host.
JU109	JTAG HV PWR	Open*	Normal operation.
		1-2	Connect USB+5V to JTAG pin 8 to provide power to JTAG host.
JU120	TCK	Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU121	TDO	Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU122	TDI	Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU123	TMS	Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU124	U1 $\overline{\text{RESET}}$	Open	External JTAG host or FT232 JTAG bit-banging JTAG host.
JU125	JTAG VDD	Open	External JTAG host or FT232 JTAG bit-banging JTAG host.

Default position.

Table 6. Jumper Descriptions for Touch Pads (H5 and H6)

JUMPER	SIGNAL	SHUNT POSITION	DESCRIPTION
H5	SINPUT2	1, 3, 5	Top guard ring for PAD2.
		2	AGND.
		4	AGUD2 pin of the device and guard plate on back side of PAD2.
		6	SINPUT2 pin of device and touch pad PAD2.
		3-4*	Top guard ring connected to AGUD2.
H6	SINPUT1	1, 3, 5	Top guard ring for PAD1.
		2	AGND.
		4	AGUD1 pin of the device and guard plate on back side of PAD1.
		6	SINPUT1 pin of the device and touch pad PAD1.
		3-4*	Top guard ring connected to AGUD1.

Default position.

Component Lists (continued)

MAX1441 EV Kit

DESIGNATION	QTY	DESCRIPTION
C1, C2, C13	3	0.47µF ±10%, 100V X7R ceramic capacitors (0805) Murata GRM21BR72A474K
C3	0	Not installed, ceramic capacitor (1210)
C10, C108	2	1µF ±10%, 16V X5R ceramic capacitors (0603) TDK C1608X5R1C105K
C11, C109	2	10µF ±20%, 16V X5R ceramic capacitors (1206) Murata GRM31CR61C106M
C12	1	10µF ±20%, 50V X7S ceramic capacitor (1210) Taiyo Yuden UMK325BJ106MM
C100–C105, C111, C121, C131, C141, C151	11	0.1µF ±10%, 16V X7R ceramic capacitors (0603) Murata GRM188R71C104K
C106, C107, C122, C123	4	22pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H220J
C110	1	33000pF ±10%, 25V X7R ceramic capacitor (0603) Murata GRM188R71E333K
C142	1	47pF ±5%, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H470J
D1	1	1A, 50V diode (DO41) Diodes Inc. 1N4001
D2	1	1A, 40V Schottky diode (SOD123) Diodes Inc. 1N5819HW-7-F
H1, H2	0	Not installed, 10-pin headers
H3	1	3-pin header
INPUT1, INPUT2	2	Dual-row (2 x 8) right-angle receptacles
J10	1	USB type-B right-angle female receptacle
JTAGU1	1	10-pin (2 x 5) header
JU1, JU2, JU101, JU102	0	Not installed, 2-pin headers—shorted with PCB trace
JU4, JU12–JU16, JU19, JU20, JU21, JU100, JU105	11	3-pin headers
JU5, JU6, JU7, JU103, JU104, JU106, JU107, JU108, JU109, JU120–JU125	15	2-pin headers
L101	1	Ferrite bead (0603) TDK MMZ1608R301A
LED0–LED3, LEDOUT1, LEDOUT2, LED120	7	Red LEDs (0805)
Q100	1	p-channel FET (SOT223) Fairchild NDT456P
Q142	1	n-channel FET (SOT23) Central Semi 2N7002
R0, R12	2	0Ω ±5% resistors (0603)
R9	1	4.7kΩ ±5% resistor (0603)
R14, R15	2	510Ω ±5% resistors (0603)
R16, R17, R112, R122, R131, R142	6	10kΩ ±5% resistors (0603)
R32–R35	4	160Ω ±5% resistors (0603)
R38–R41	4	10kΩ ±5% resistors (0402)
R54	1	200Ω ±5% resistor (0603)
R100, R152	2	1kΩ ±5% resistors (0603)
R101, R102	2	27Ω ±5% resistors (0603)
R103	1	1.5kΩ ±5% resistor (0603)
R104	1	470Ω ±5% resistor (0603)
R111	1	2.2kΩ ±5% resistor (0603)
R121	1	1.1kΩ ±5% resistor (0603)
R123	1	820Ω ±5% resistor (0603)
R151	1	3.3kΩ ±5% resistor (0603)
SW7, SW122	2	Momentary NO switches

Component Lists (continued)

MAX1441 EV Kit (continued)

DESIGNATION	QTY	DESCRIPTION
TP0–TP4	0	Not installed, multipurpose test points
U1	1	Automotive two-channel proximity and touch sensor (20 TSSOP) Maxim MAX1441GUP/V+
U3	1	Ultra-low-noise, high-PSRR, 120mA, 3.3V LDO linear regulator (5 SC70) Maxim MAX8511EXK33+ (Top Mark: AEI)
U7	1	12-bit, low-power, 2-wire, serial voltage-output DAC (6 SOT23) Maxim MAX5812LEUT+ (Top Mark: AAYT)
U10	1	UART-to-USB converter (32 TQFP)
U11	0	Not installed, 93C46-type 3-wire EEPROM 16-bit architecture (8 SO)
U12	1	Ultra-high-speed flash microcontroller (44 TQFP) Maxim DS89C450-ENL+
U13	1	Quad buffer, three-state IC (14 SO) Fairchild 74AC125SC
U14	1	CMOS analog mux/switch (16 TSSOP-EP*) Maxim MAX4619EUE+
U15	1	Single-supply comparator (5 SOT23) Maxim MAX9140EUK+ (Top Mark: ADQP)
Y10	1	6MHz crystal Hong Kong X'tals SSL6000000E18FAF
Y12	1	7.3728MHz crystal Hong Kong X'tals SSL73728NSMI028X1-0
—	18	Shunts
—	1	USB high-speed A-to-B cables, 6ft
—	1	PCB: MAX1441 EVALUATION KIT+

**EP = Exposed pad.*

/V denotes an automotive qualified part.

MAX1441TP EV Kit

DESIGNATION	QTY	DESCRIPTION
H5, H6	0	Not installed, 6-pin headers (2 x 3)—shorted with PCB trace
INPUT1, INPUT2	2	Dual-row (2 x 8) right-angle headers
—	1	PCB: MAX1441 TOUCH PADS+

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Central Semiconductor Corp.	631-435-1110	www.centralsemi.com
Diodes Incorporated	805-446-4800	www.diodes.com
Fairchild Semiconductor	888-522-5372	www.fairchildsemi.com
Hong Kong X'tals Ltd.	852-35112388	www.hongkongcrystal.com
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
Taiyo Yuden	800-348-2496	www.t-yuden.com
TDK Corp.	847-803-6100	www.component.tdk.com

Note: *Indicate that you are using the MAX1441 when contacting these component suppliers.*

MAX1441 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer.
usb_driver	Folder containing USB device driver files.
usb_driver\USB_Driver_Help_200.PDF	USB driver installation help file.
MAX-IDE\install\SETUP.EXE	Setup file for the MAX-IDE development tool for the MAXQ microcontroller core.
MAX-IDE\Devices\MAXQ\MAX1441.cfg	Configuration file for the device. Copy into the "Program Files\MAX-IDE\Devices\MAXQ" folder after installing MAX-IDE application.
example\appcode\MAX1441.inc	Register definition include file for the device.
example\appcode\maxq_sfr1.def	System register definition include file for the device.
example\appcode\Appcode.asm	Example firmware source code for the EV kit firmware.

MAX1441 Evaluation System

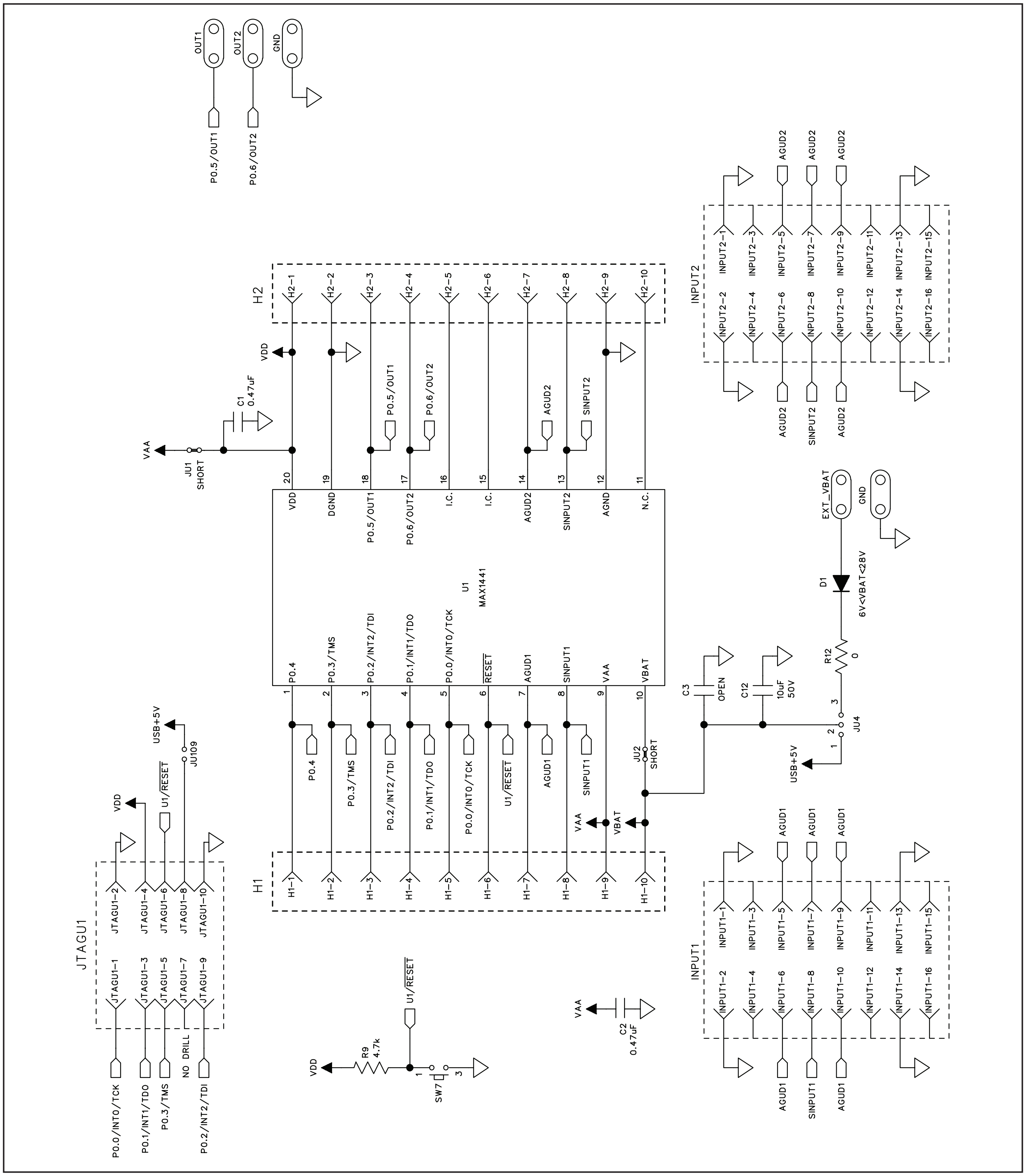


Figure 8a. MAX1441 EV Kit Schematic (Sheet 1 of 6)

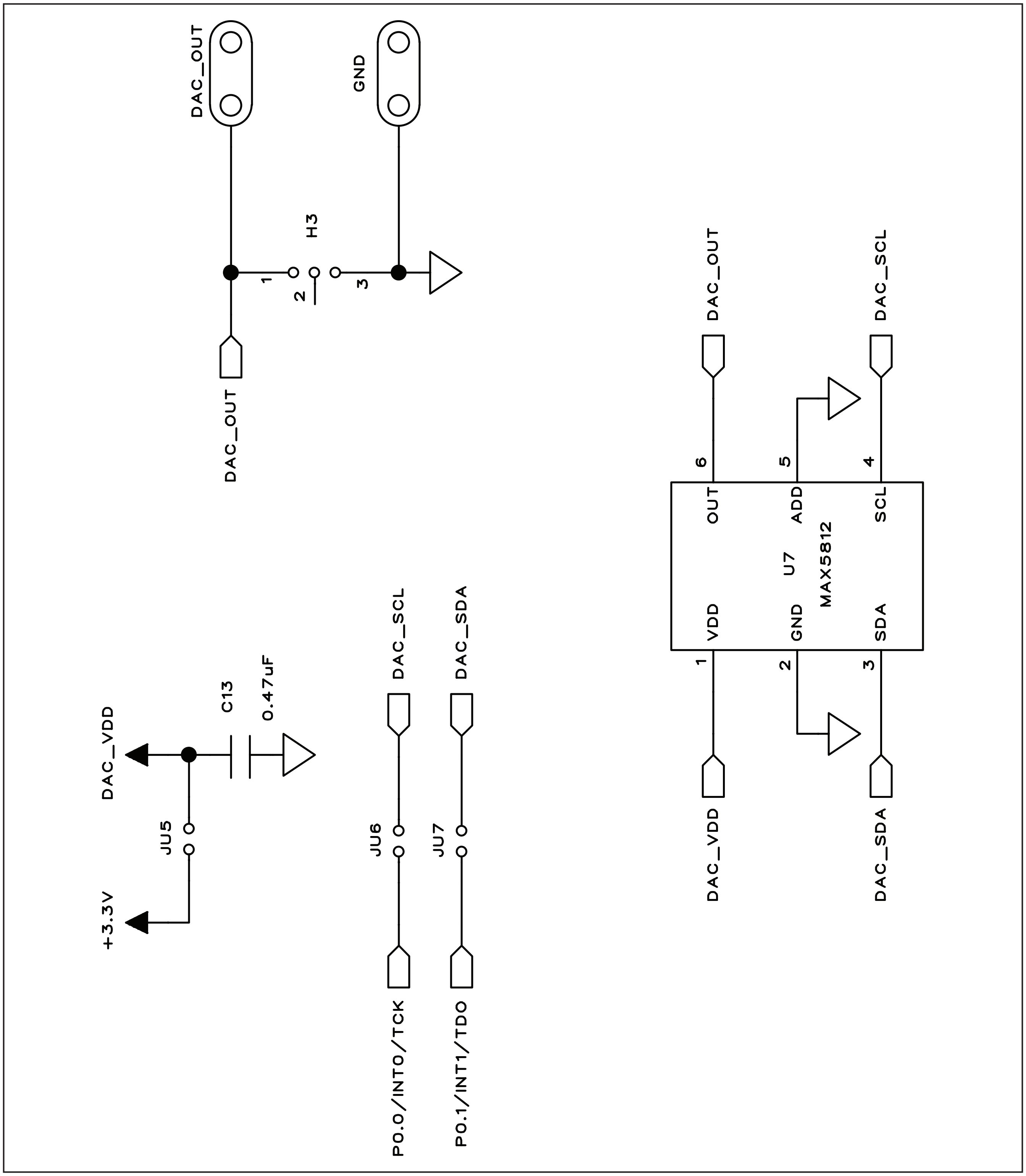


Figure 8b. MAX1441 EV Kit Schematic (Sheet 2 of 6)

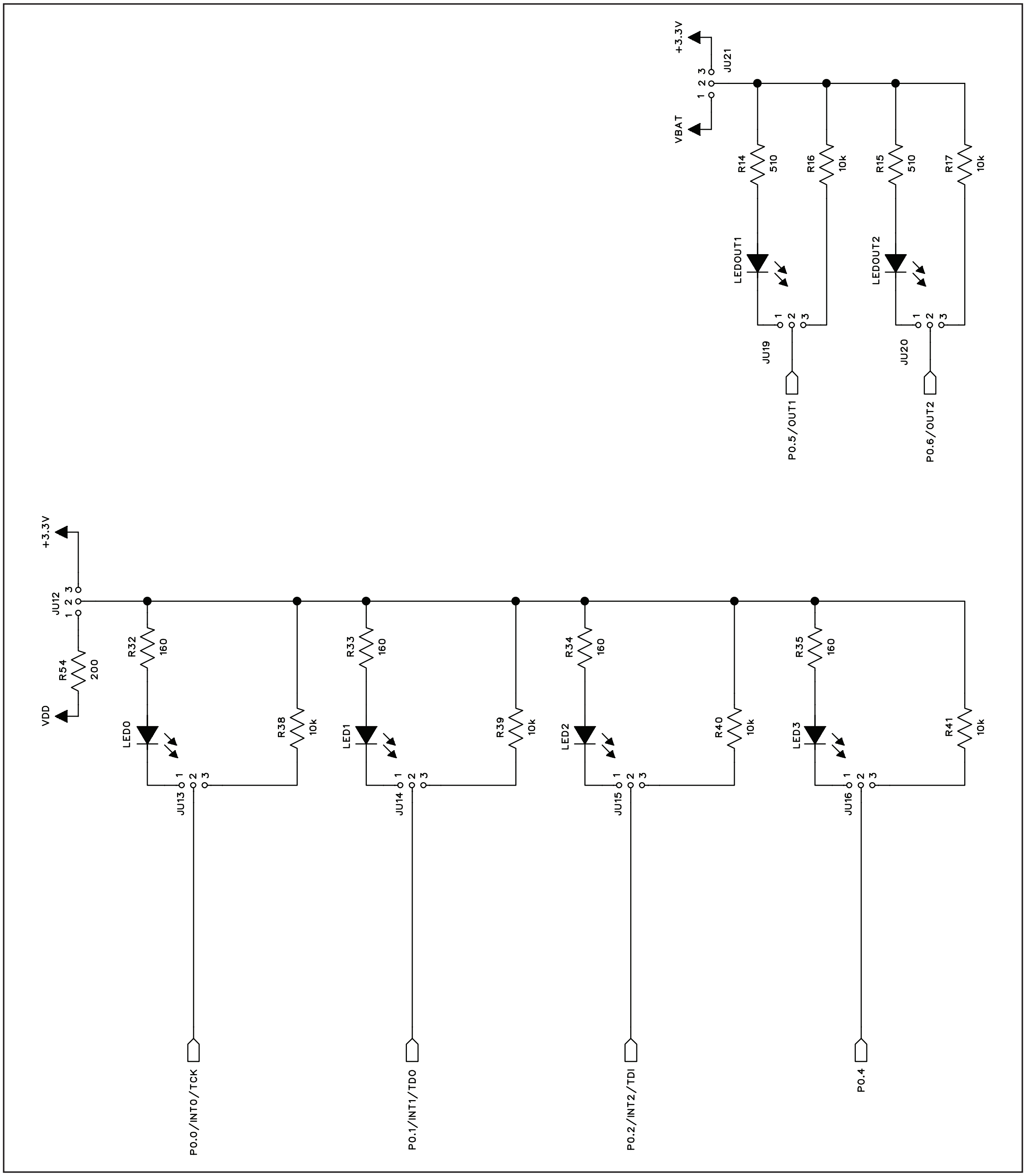


Figure 8c. MAX1441 EV Kit Schematic (Sheet 3 of 6)

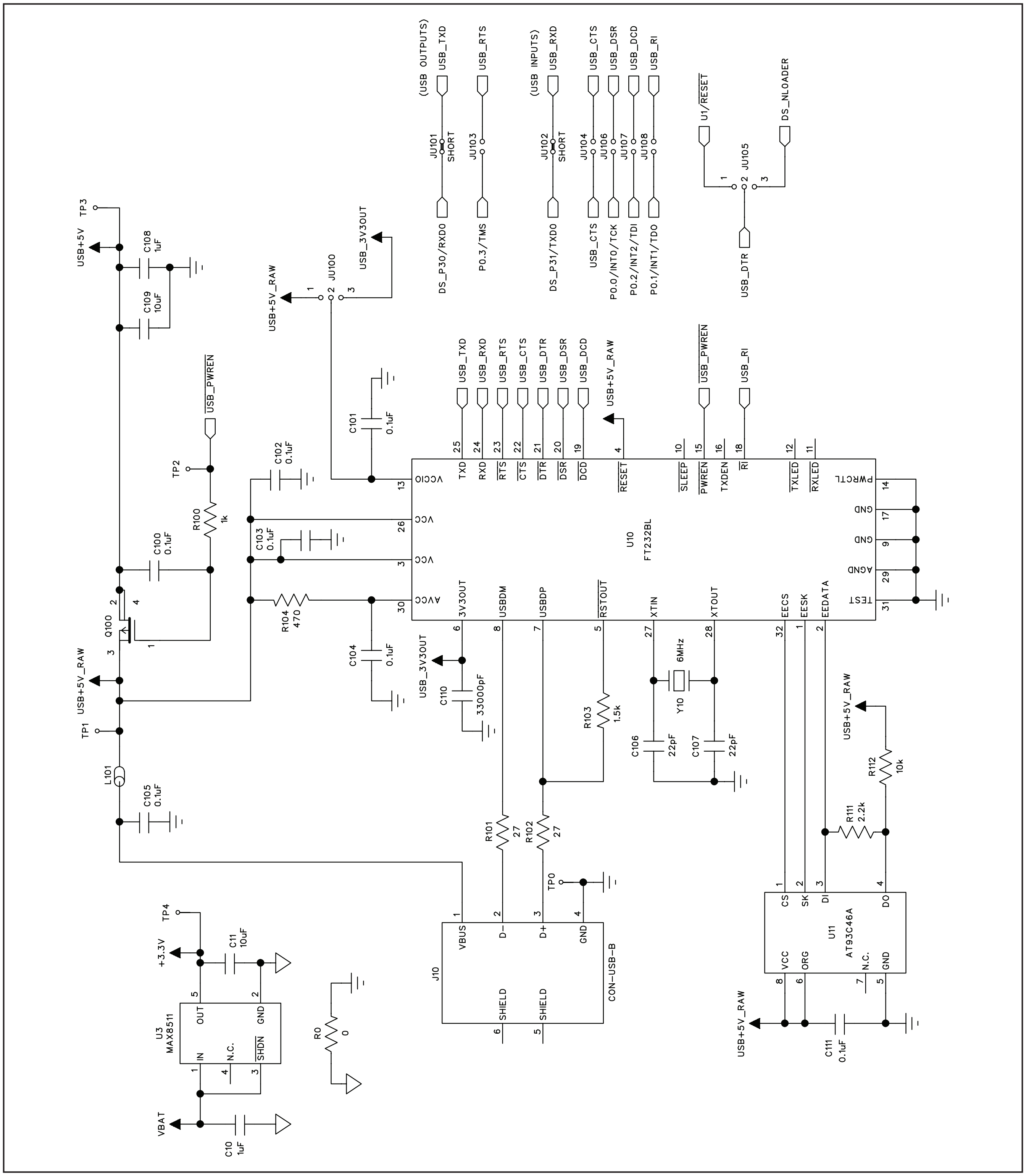


Figure 8d. MAX1441 EV Kit Schematic (Sheet 4 of 6)

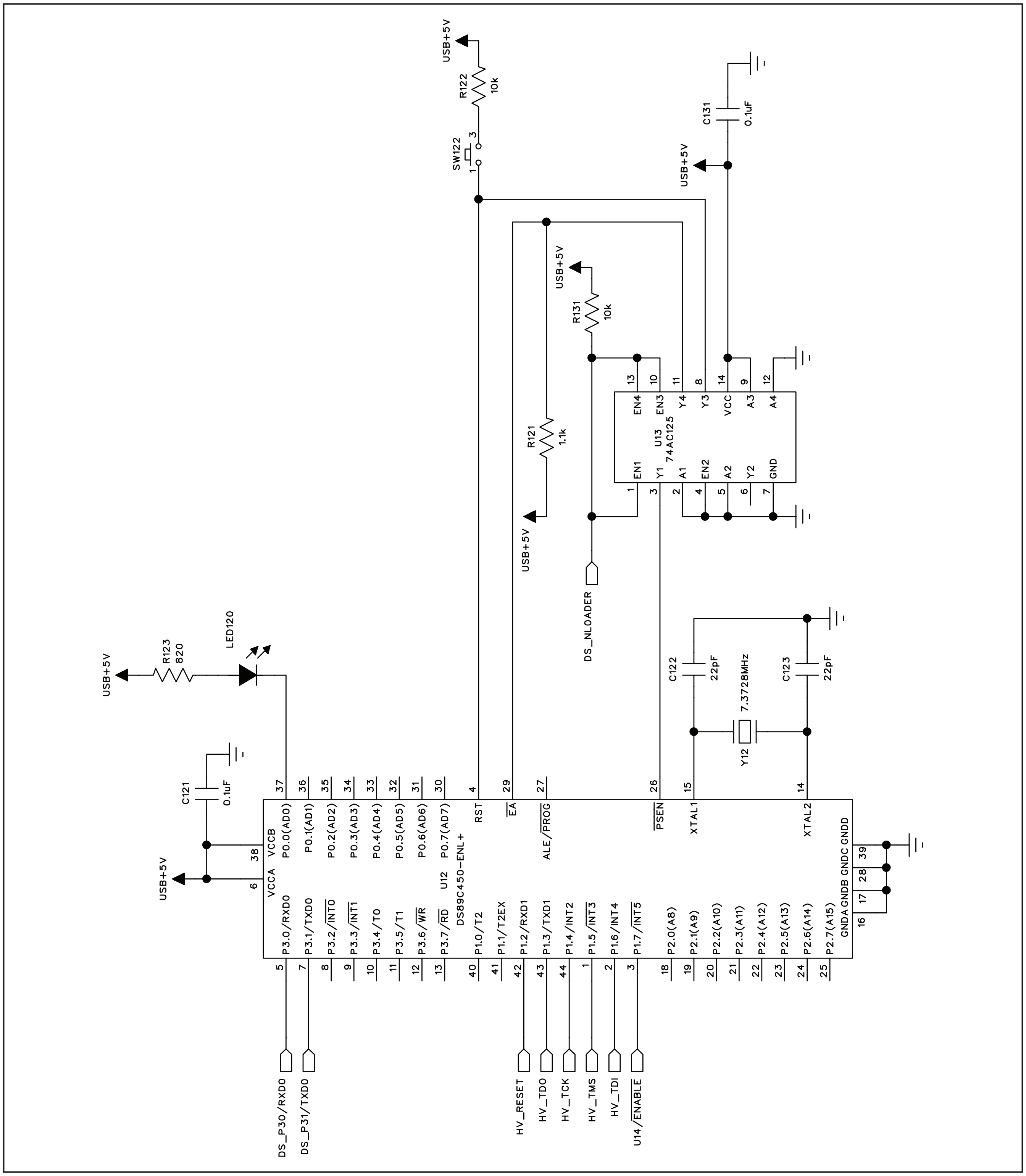


Figure 8e. MAX1441 EV Kit Schematic (Sheet 5 of 6)

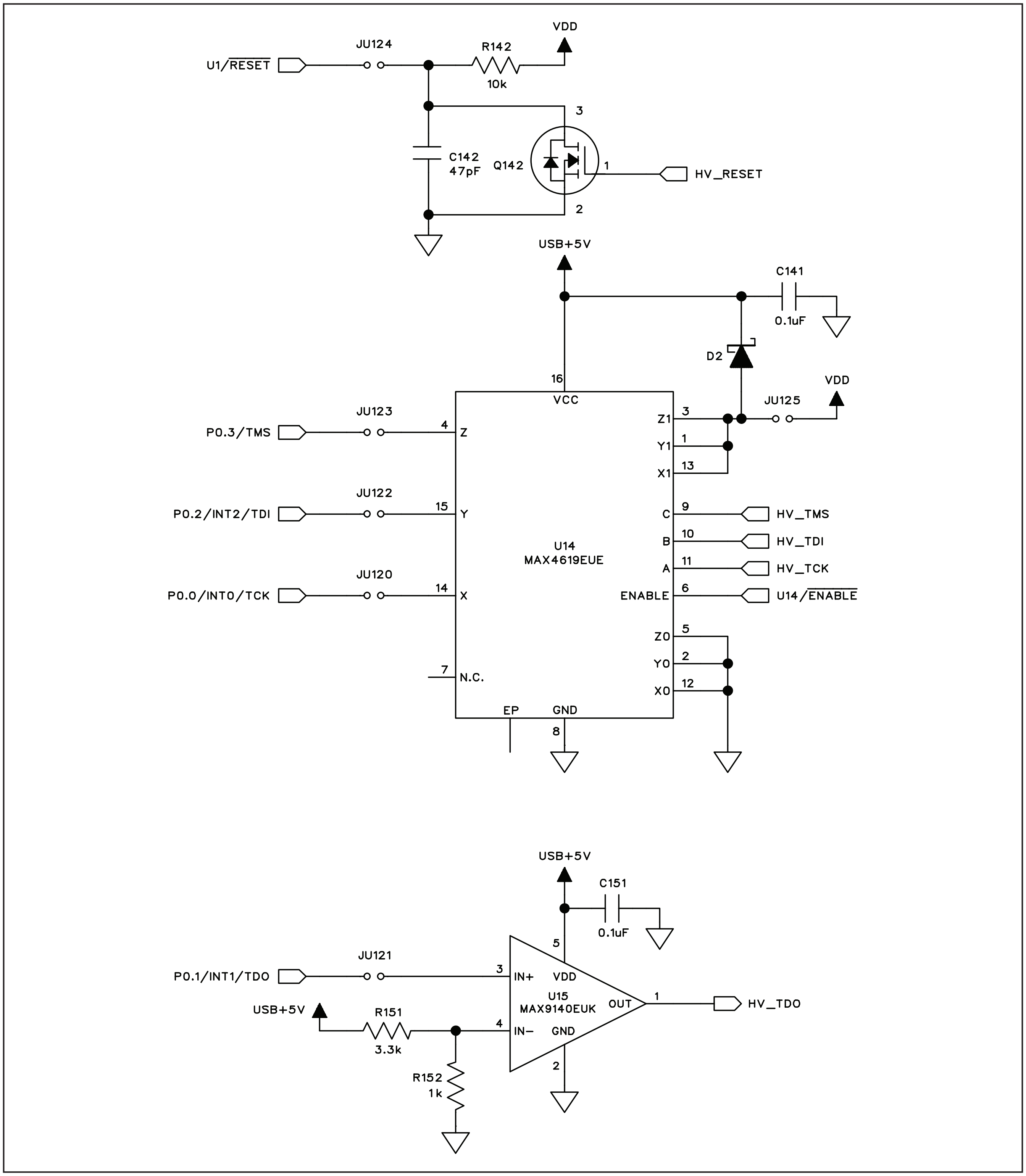


Figure 8f. MAX1441 EV Kit Schematic (Sheet 6 of 6)

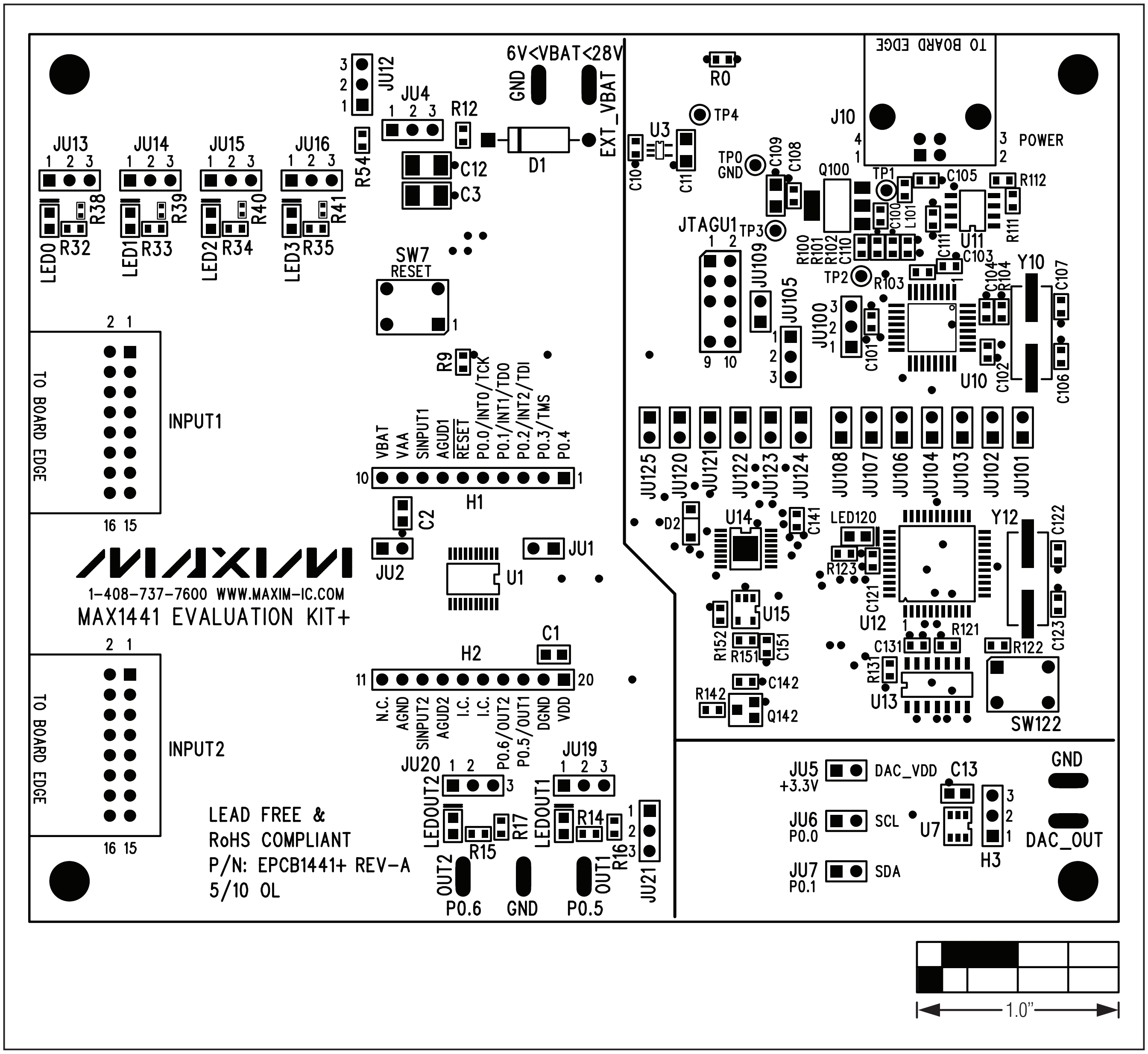


Figure 9. MAX1441 EV Kit Component Placement Guide—Component Side

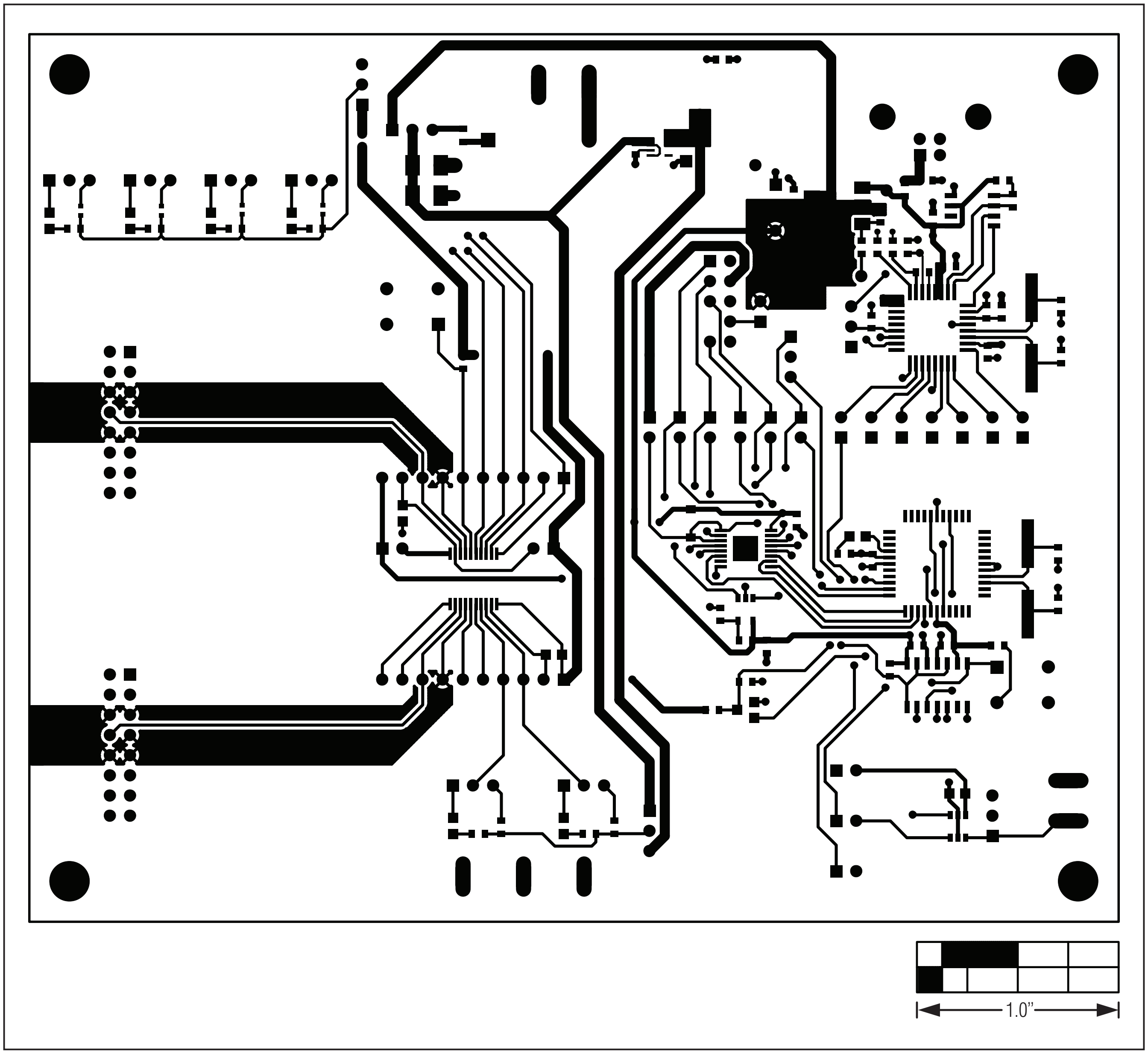


Figure 10. MAX1441 EV Kit PCB Layout—Component Side

MAX1441 Evaluation System

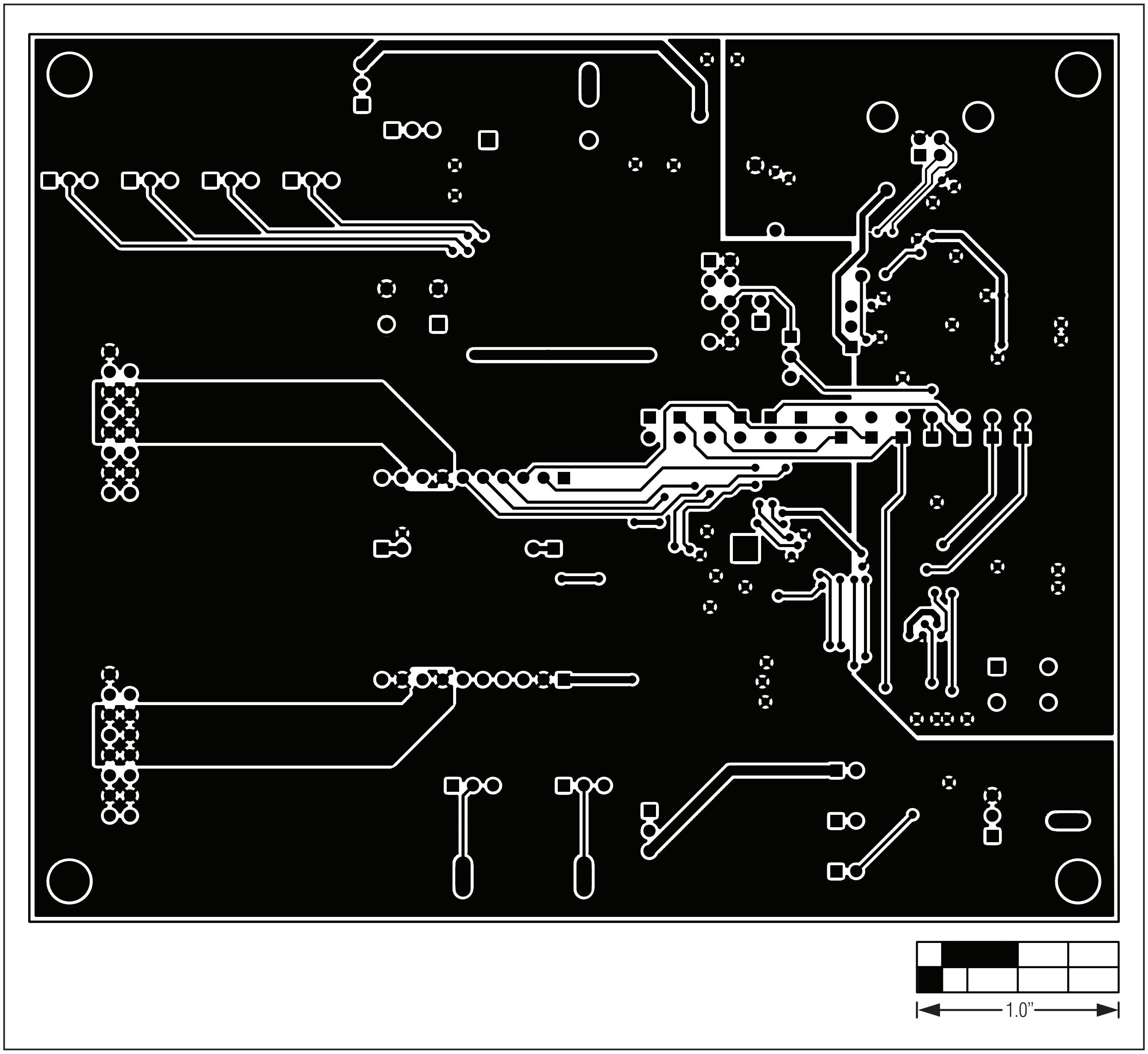


Figure 11. MAX1441 EV Kit PCB Layout—Solder Side

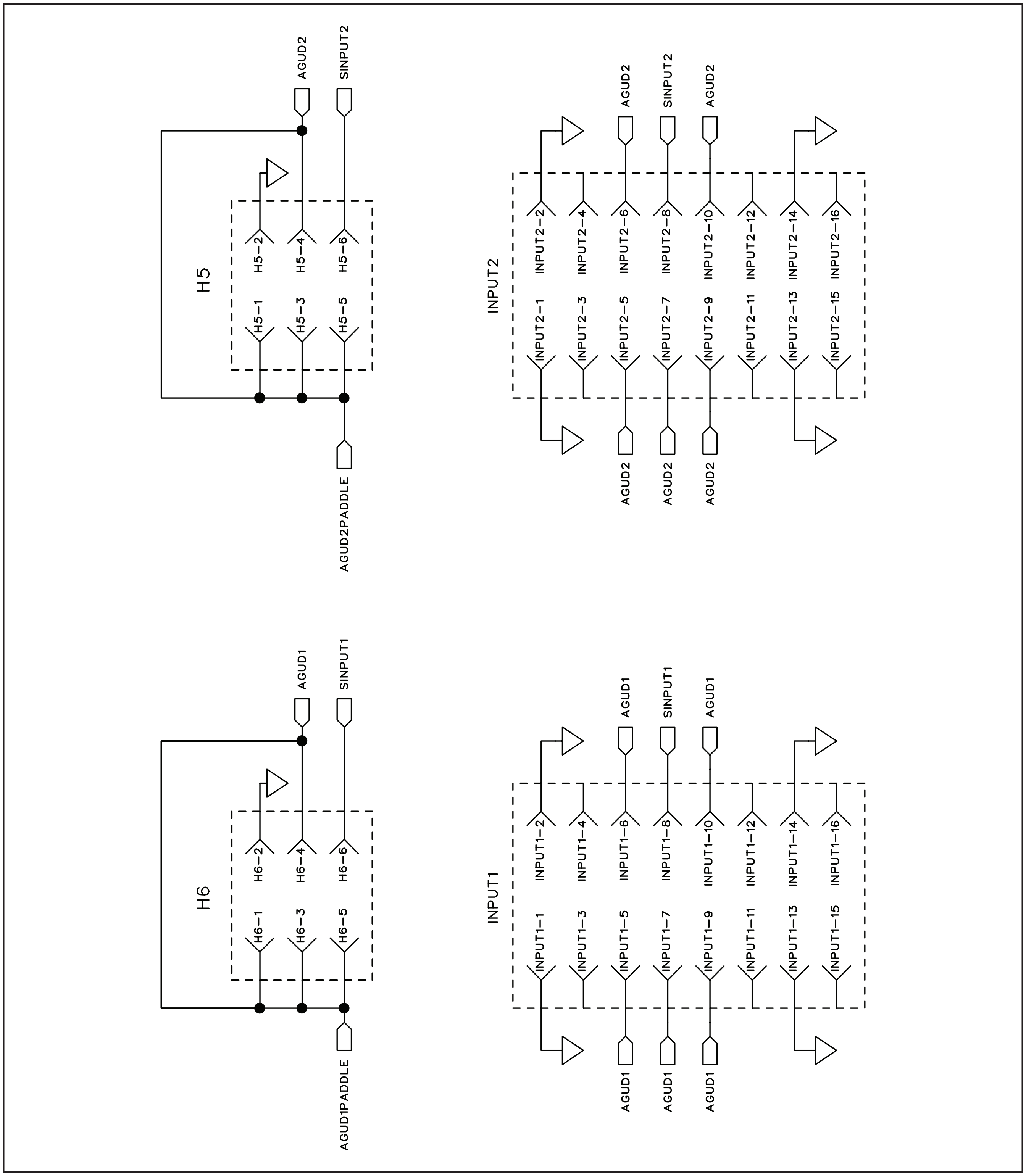


Figure 12. MAX1441TP EV Kit Schematic

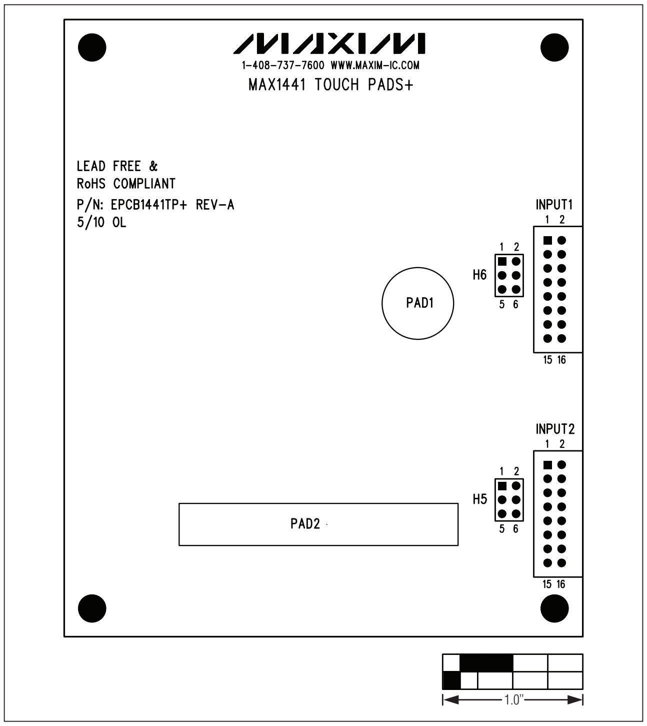


Figure 13. MAX1441TP EV Kit Component Placement Guide—Component Side

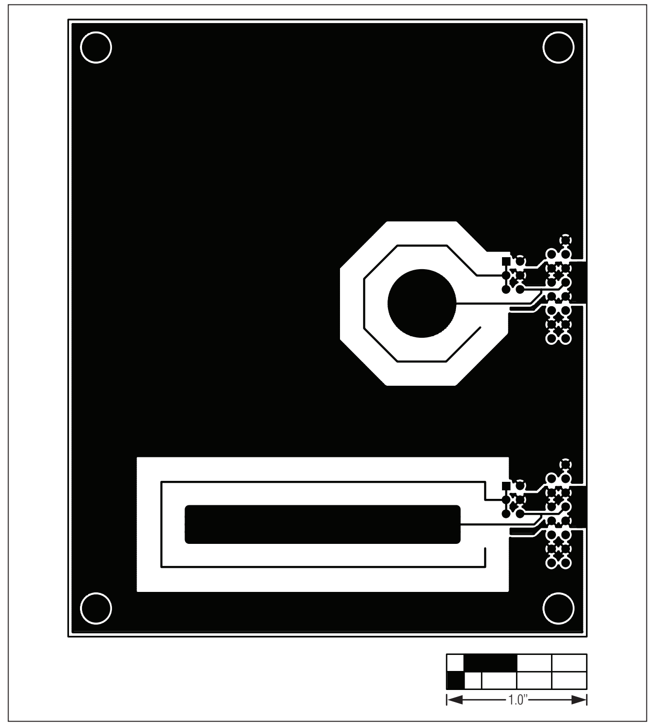


Figure 14. MAX1441TP EV Kit PCB Layout—Component Side

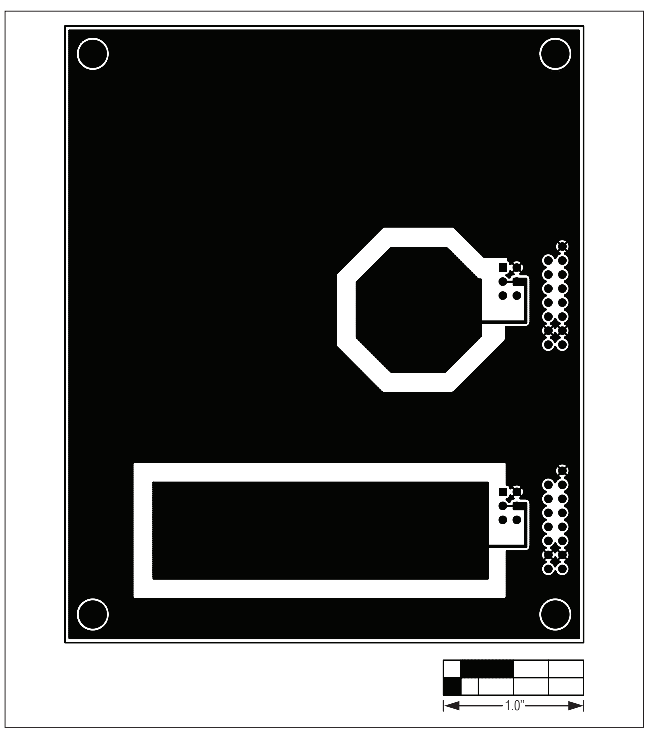


Figure 15. MAX1441TP EV Kit PCB Layout—Solder Side

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	10/10	Initial release	—
1	1/11	Removed reference to Windows 7 and updated jumper JU105 in Tables 2 and 3	1, 12, 13