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MAX1396 Evaluation Kit

Evaluates: MAX1391–MAX1396

General Description

The MAX1396 evaluation kit (EV kit) is a fully assembled and tested PC board that evaluates the MAX1396 2-channel, single-ended, 12-bit, SAR ADC. The EV kit also includes Windows® 98 SE/2000/XP-compatible software, which provides a simple graphical user inter-face (GUI) for exercising the MAX1396's features.

The EV kit comes with the MAX1396ETB installed. The MAX1396 EV kit can also be used to evaluate the MAX1391–MAX1395. Order free samples of MAX1391ETB, MAX1392ETB, MAX1393ETB, MAX1394ETB, and MAX1395ETB through Maxim's website to evaluate these parts.

Features

♦ **2-Channel, Single-Ended Inputs**
♦ **External +1.5V to +3.6V Supply**
♦ **On-Board Supply: +1.54V (V_{CC})**
♦ **On-Board Reference: +1.54V (V_{CC})**
♦ **External Reference: +0.6V to V_{CC}**
♦ **USB Connection**
♦ **USB Powered**
♦ **Proven PC Board Layout**
♦ **Windows 98 SE/2000/XP-Compatible Evaluation Software**
♦ **Fully Assembled and Tested**

Ordering Information

PART	TYPE	INTERFACE
MAX1396EVKIT	EV kit	USB/SPI™ 3-wire

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2	2	0.22µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C224K
C3, C9, C10, C12–C15, C20, C21, C23, C26, C29–C32	15	100nF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K
C4, C5	2	10pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H100J
C6	1	33nF ±10%, 10V X7R ceramic capacitor (0603) TDK C1608X7R1H333K
C7, C8	2	22pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H220J
C11, C22	2	10µF ±10%, 10V X5R ceramic capacitors (1210) TDK C3225X5R1A106K

DESIGNATION	QTY	DESCRIPTION
C16–C19, C24, C25, C27, C28	8	1µF ±10%, 10V X7R ceramic capacitors (0603) TDK C1608X7R1C105K
J1	1	USB series B right-angle PC mount receptacle connector
J2	0	Not installed
JU1–JU7	7	3-pin headers
L1	1	Ferrite bead (0603) TDK MMZ1608R301A
LED1	1	Red LED (0603)
R1, R2	2	5.1Ω ±5% resistors (0603)
R3	1	220Ω ±5% resistor (0603)
R4	1	2.2kΩ ±5% resistor (0603)
R5	1	1.5kΩ ±5% resistor (0603)
R6, R7	2	27Ω ±5% resistors (0603)
R8	1	470Ω ±5% resistor (0603)
R9	1	100kΩ ±5% resistor (0603)
R10	1	7.5kΩ ±1% resistor (0603)

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SPI is a trademark of Motorola, Inc.

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For pricing, delivery, and ordering information, please contact Maxim/Dallas Direct! at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R11	1	102kΩ ±1% resistor (0603)
R12	1	54.9kΩ ±1% resistor (0603)
R13	1	24kΩ ±1% resistor (0603)
R14	1	93.1kΩ ±1% resistor (0603)
R15	1	10kΩ ±5% resistor (0603)
U1	1	MAX1396ETB (10-pin TDFN)
U2	1	MAXQ2000-RAX (68-pin QFN-EP)
U3	1	FTDI FT232BL (7mm x 7mm, 32-pin TQFP-L)
U4	1	AT93C46A 3-wire EEPROM (8-pin SO)
U5	1	MAX890LESA (8-pin SO)
U6	1	MAX8511EXK25-T (5-pin SC70) Top mark: ADV
U7, U8	2	MAX8512EXK-T (5-pin SC70) Top mark: ADW
U9	1	MAX3376EEKA-T (8-pin SOT23)
U10	1	MAX3375EEKA-T (8-pin SOT23)
Y1	1	20MHz crystal
Y2	1	6MHz crystal
—	7	Shunts
—	1	USB cable
—	1	MAX1396 PC board
—	1	MAX1396 EV kit software CD-ROM

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Citizen America Corporation	949-428-3700	www.citizencrystal.com
TDK	847-803-6100	www.component.tdk.com

Note: Indicate you are using the MAX1391–MAX1396 when contacting these manufacturers.

Quick Start

Recommended Equipment

- MAX1396 EV kit (USB cable included)
- MAX1396 evaluation kit software (downloaded from www.maxim-ic.com)
- Signal source to drive ADC input
- Windows 98 SE/2000/XP-compatible PC
- Available USB port on the PC

MAX1396EVKIT Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX1396.EXE	Application program
FTDIBUS.INF	USB device driver file
FTDIPORT.INF	VCP device driver file
UNINST.INI	Uninstalls the EV kit software
TROUBLESHOOTING_USB.PDF	USB driver installation help file

Procedure

1) Make sure the shunts of all jumpers are in the right position.

   JU1: (1-2) VCC connected to on-board +1.54V voltage regulator.

   JU2: (1-2) $\overline{CH1}$/CH2 connected to on-board µC through a voltage-level translator.

   JU3: (1-2) $\overline{OE}$ connected to on-board µC through a voltage-level translator.

   JU4: (1-2) $\overline{CS}$ connected to on-board µC through a voltage-level translator.

   JU5: (1-2) SCLK connected to on-board µC through a voltage-level translator.

   JU6: (1-2) DOUT connected to on-board µC through a voltage-level translator.

   JU7: (1-2) Reference voltage connected to VCC.

2) Connect the signal source to the AIN1 pad and the GND terminal of the signal source to the GND pad. Connect AIN2 to GND.

3) Set the signal source to +1V.

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4) Install the MAX1396 evaluation software on your computer by running the INSTALL.EXE program on the installation CD-ROM. The program files are copied and icons are created for them in the Windows **Start** menu I Programs I Maxim MAX1396 Evaluation Kit.

5) Connect the USB cable from the PC to the MAX1396 EV kit. A **Building Driver Database** window pops up in addition to a **New Hardware Found** message. If you do not see a window that is similar to the one described above after 30 seconds, remove the USB cable from the MAX1396 EV kit and connect it again. Administrator privileges are required to install the USB device driver on Windows 2000 and Windows XP. Refer to the TROUBLESHOOTING_USB.PDF document included with the software for more information.

6) Follow the directions of the **Add New Hardware Wizard** to install the USB device driver. Choose the **Search for the best driver for your device** option. Specify the location of the device driver to be **C:\Program Files\MAX1396** (default installation directory) using the **Browse** button.

7) Start the MAX1396 EV kit software by opening its icon in the **Start** menu I Programs I Maxim MAX1396 Evaluation Kit.

8) Wait until the program automatically detects the MAX1396 hardware and displays the user-interface panel (Figure 1).

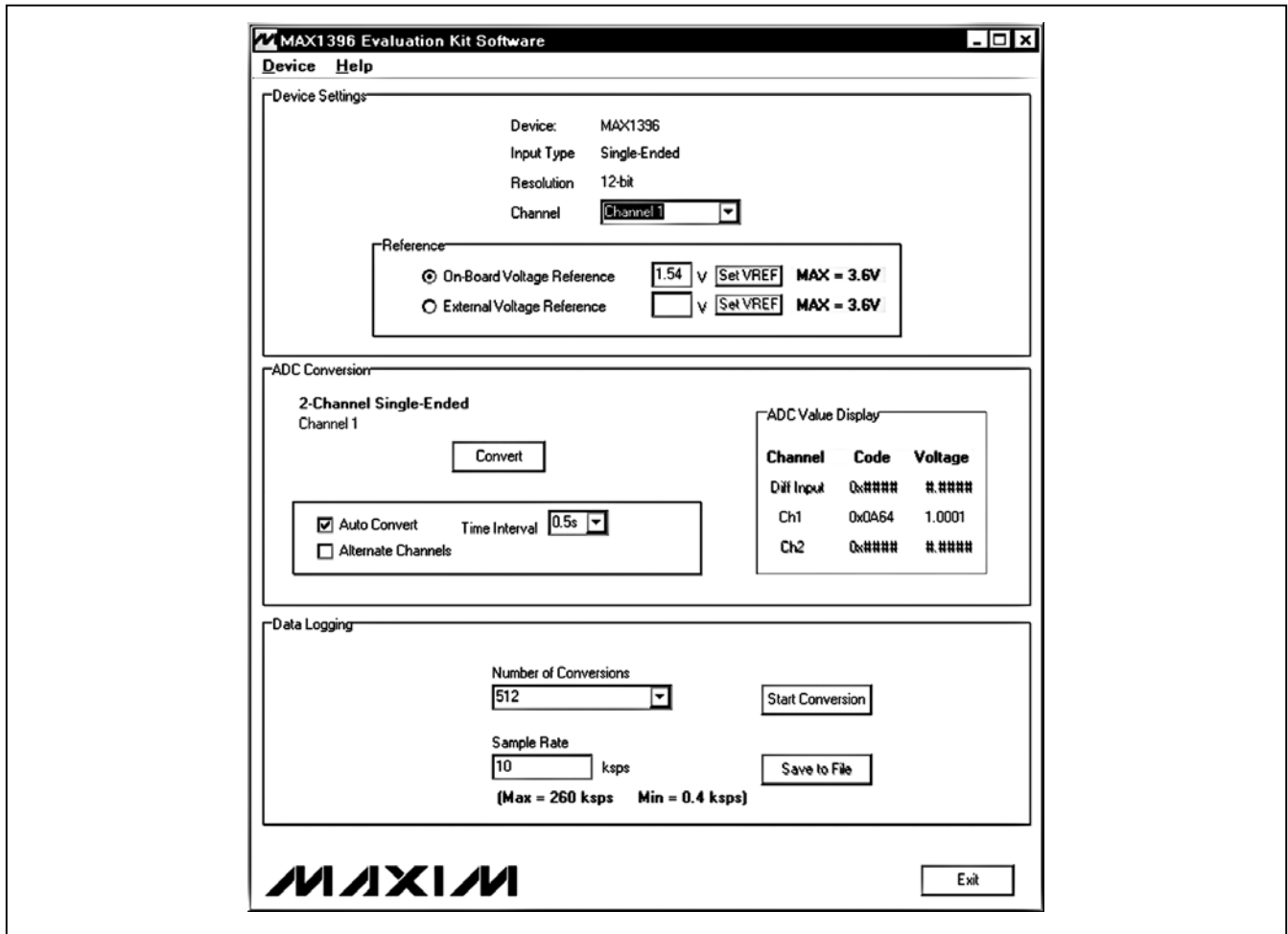9) Verify the voltage value of approximately 1V is displayed in the **ADC Value Display** box.

Figure 1. MAX1396 Evaluation Kit Main Window

Evaluates: MAX1391–MAX1396

MAX1396 Evaluation Kit

Detailed Description of Software

The evaluation software's window is shown in Figure 1. The **Device Settings** box located at the top of the window contains IC information, mode/channel selection, and a **Reference** box. Functions that relate to reading the ADC values in the **ADC Conversion** box are located in the middle section. Data logging functions are in the **Data Logging** box located at the bottom of the main window.

Device

The MAX1396 EV kit can be used to evaluate the MAX1391–MAX1396. Select the appropriate IC device on the **Device** menu. The MAX1396 is selected by default.

Device Settings

Device, **Input type**, and output data **Resolution** information are shown in the **Device Settings** box. The pulldown menu in the **Device Settings** panel can be either **Channel** or **Mode** depending on whether a 2-channel, single-ended device or a 1-channel, true-differential device has been selected in the **Device** menu.

If a 2-channel, single-ended ADC device (MAX1392, MAX1394, or MAX1396) has been selected on the **Device** menu, **Channel 1** and **Channel 2** are the selections on the **Channel** pulldown menu. When **Channel 1** is selected, AIN1 becomes the input of the device. When **Channel 2** is selected, AIN2 becomes the input of the device.

If a 1-channel, true-differential ADC device (MAX1391, MAX1393, or MAX1395) has been selected on the **Device** menu, **Unipolar** or **Bipolar** mode can be chosen on the **Mode** pulldown menu to select the proper output data format.

Choose **On-Board Voltage Reference** or **External Voltage Reference** in the **Reference** box. If the actual reference voltage is not the same as the value in the edit field, enter the correct voltage value into the edit field and click on the **Set VREF** button located on the right.

See the *Detailed Description of Hardware* section for information on changing the voltage reference.

ADC Conversion

The **ADC Value Display** box shown in the **ADC Conversion** box displays the input **Channel**, output data **Code**, and calculated **Voltage**. The input **Channel** that is not selected on the **Channel** pulldown menu, or is not applicable to the device selected on the **Device** menu, is grayed out in the **ADC Value Display** box. Pressing the **Convert** button in the **ADC Conversion** box updates the status of the **ADC Value Display** box.

Check the **Auto Convert** checkbox to automatically read the current ADC value at a rate set by the **Time Interval** pulldown menu.

When the **Auto Convert** checkbox is checked, select the **Alternate Channels** checkbox to make the ADC alternate conversions between AIN1 and AIN2.

Data Logging

The **Data Logging** box is located at the bottom of the window. The user can select the desired number of conversions in the **Number of Conversions** pulldown menu. Before sampling, an appropriate sample rate should be entered into the **Sample Rate** field. Press the **Start Conversion** button in the **Data Logging** box to start sampling. After sampling is finished, the user can save the data to a file by pressing the **Save to File** button. The **Save to File** button is not active until the sampling is done.

Detailed Description of Hardware

MAX1396 EV Kit

The MAX1396 EV kit board provides a proven layout for evaluating the MAX1391–MAX1396. The EV kit comes with the MAX1396ETB installed. By placing the shunt on pin 1 and pin 2 of JU1, the MAX1396ETB (U1) is powered from the USB supply regulated to 1.54V.

To use the MAX1396 EV kit with a user-supplied SPI interface, supply voltage, and reference voltage, place the shunts on pin 2 and pin 3 of JU1 through JU7. Connect CHSEL, $\overline{OE}$, $\overline{CS}$, SCLK, DOUT, and GND lines from the user-supplied interface to the corresponding pads on the MAX1396 EV kit board. Apply a +1.5V to +3.6V power supply to the VCC and GND pads. Also apply a reference voltage to the VREF within the +0.6V to V_{CC} range.

To evaluate a different IC using the MAX1396 EV kit, order one of the MAX1391–MAX1395 ICs in a TDFN package and replace the on-board MAX1396ETB. In the program, select the corresponding IC in the **Device** menu.

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Evaluates: MAX1391–MAX1396

Power Supply and Voltage Reference

By default, the on-board MAX8512EXK-T, with +1.54V output voltage, is both the power supply and voltage reference of the MAX1396. To use the user-supplied power supply and/or external voltage reference, place the shunts in the appropriate positions of JU1 and JU7 as shown in Tables 1 and 2. Attach the power supply and voltage reference to the VCC and VREF pad, respectively. Adjust the value of the **On-Board Voltage Reference** or **External Voltage Reference** in the program to the actual reference voltage used.

Table 1. External/On-Board Power-Supply Selection

JU1 SHUNT POSITION	VDD (MAX1396 POWER-SUPPLY VOLTAGE INPUT)
1-2*	On-board 1.54V
2-3	External power supply attached to VCC pad

Default configuration.

Table 2. External/On-Board Reference Input Selection

JU7 SHUNT POSITION	REF (MAX1396 REFERENCE VOLTAGE INPUT)
1-2*	Same as VDD (on-board voltage reference)
2-3	External reference voltage attached to VREF pad

Default configuration.

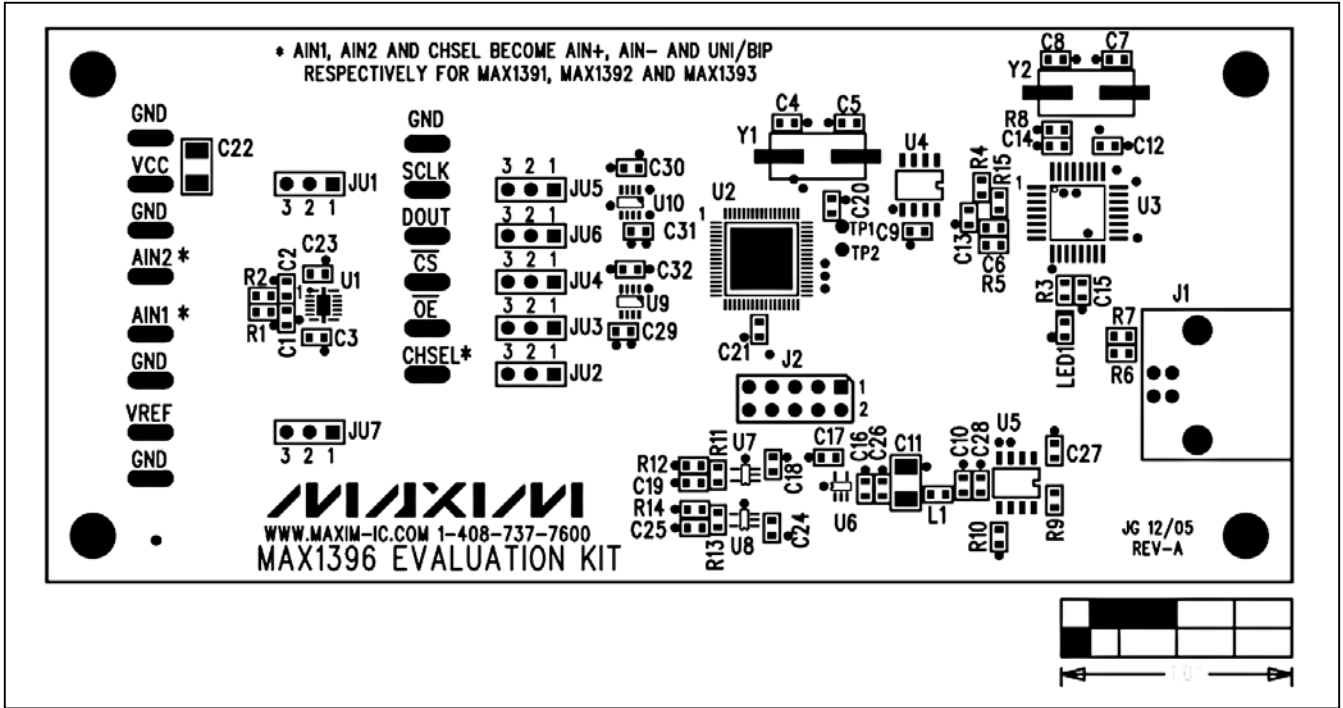**МАХІМ** _____ 5
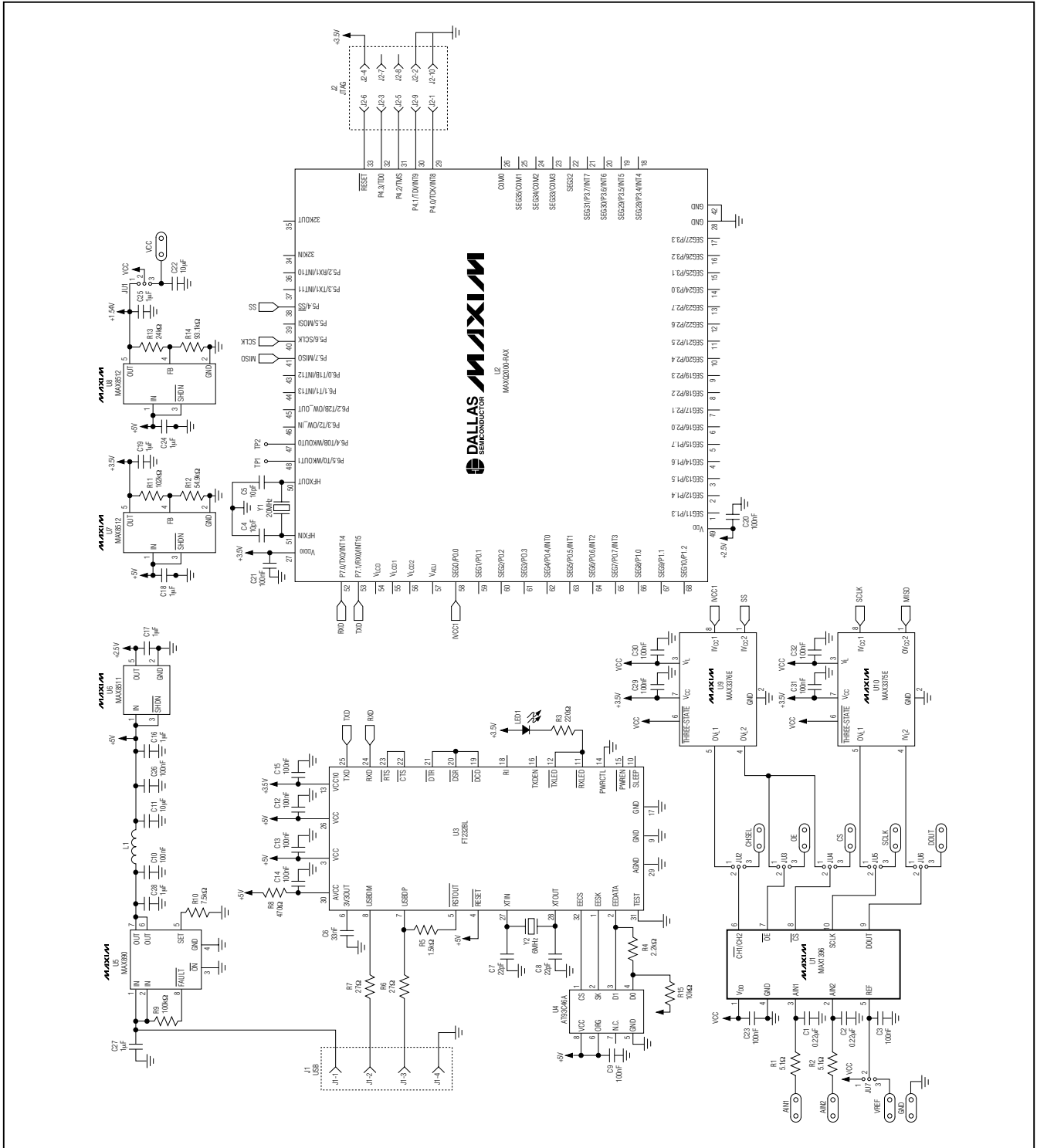
Figure 2. MAX1396 EV Kit Schematic

Figure 3. MAX1396 EV Kit Component Placement Guide—Component Side
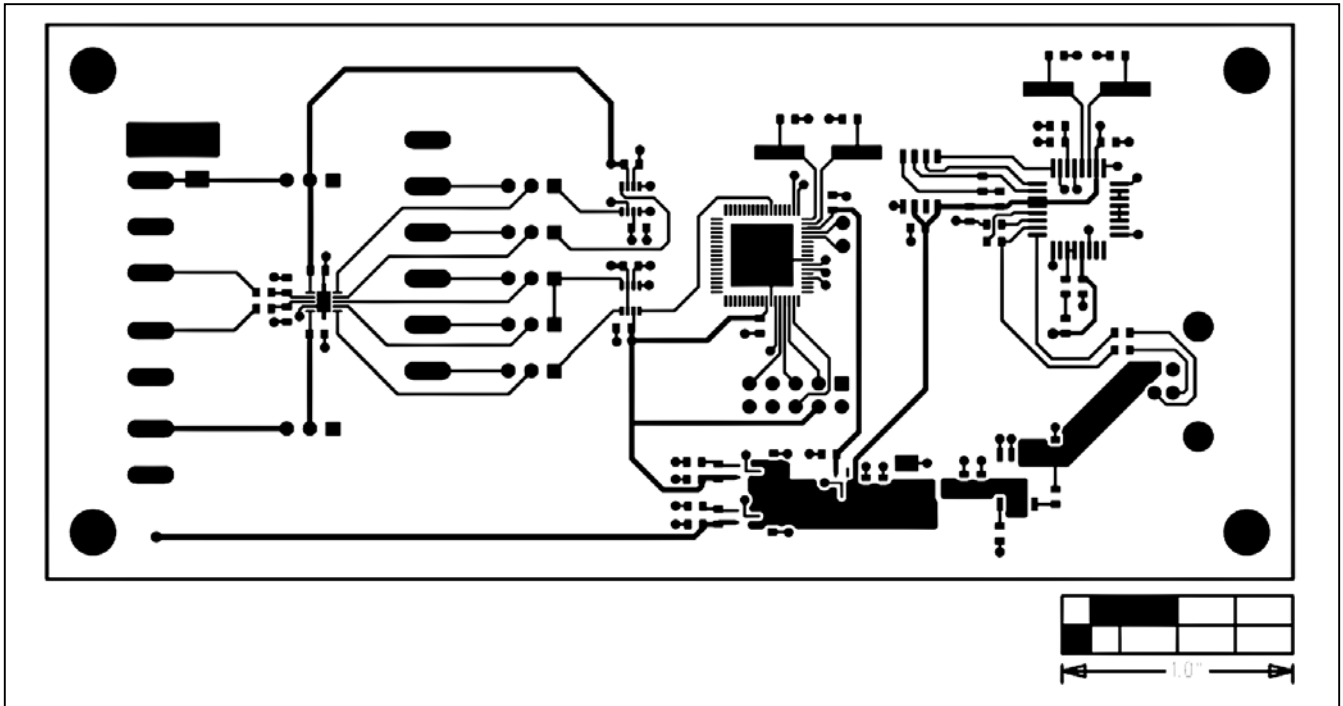

Figure 4. MAX1396 EV Kit PC Board Layout—Component Side
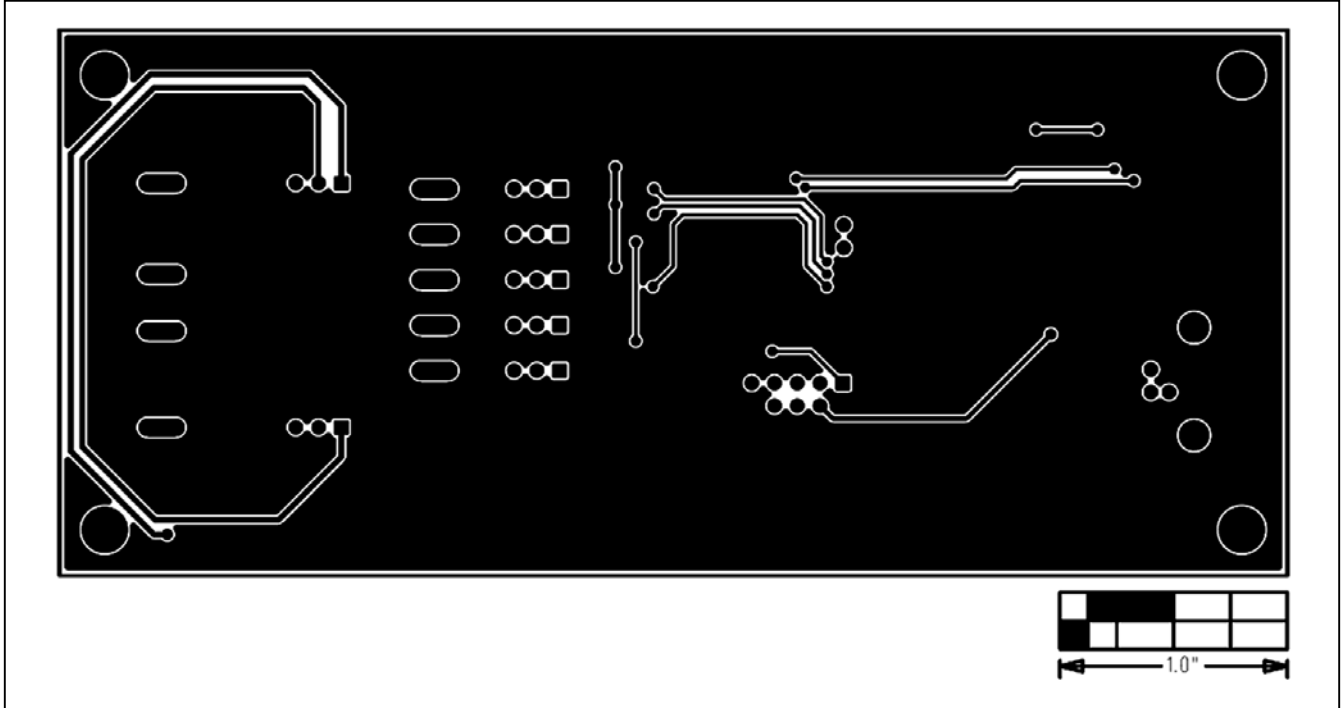
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Figure 5. MAX1396 EV Kit PC Board Layout—Solder Side

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