19-0582; Rev 0; 12/06

MAX1464 Evaluation Kit

Evaluates: MAX1464

General Description

The MAX1464 evaluation kit (EV kit) is designed to evaluate the MAX1464 high-performance, low-power, low-noise multichannel sensor signal processor. The EV kit includes: an evaluation PCB, the EV board that contains a MAX1464 signal conditioner with a typical application circuit, and potentiometers that act as sensor inputs to the MAX1464; an interface PCB, KEY, which acts as a voltage level translator between the EV kit and the computer; a parallel-port extension cable; plus, supporting software, program examples, and related documentation and application notes.

The DB25 pin connector allows a PC's parallel port to provide the interface. Two Windows®-based software (hardware debugger and control program) provide a friendly graphics user interface (GUI) to utilize the features of the MAX1464, as well as to perform sensor compensation of one device. The **Hardware Debugger** program includes multiple tabs for accessing relevant registers and ports, writing programs to the on-chip flash memory, downloading flash memory contents into a file, etc. Use the **Hardware Debugger** program to learn the MAX1464 functions and see the significance of individual registers and ports. The **Control** program includes functional buttons to have the chip perform a series of predefined lower level operations, such as pushing single buttons to read the ADC. The **Control** program can be used to perform 2nd-order sensor compensation and calibration.

The EV board can be powered by either a fixed +5V supply or by an +8V to +40V supply that is regulated to +5V by a regulator present on the EV kit board before it is applied to the MAX1464 chip. Jumper JU1 must be set consistently with the used power supply.

Order the MAX1464 EV kit for comprehensive evaluation of the MAX1464 using a PC with an available parallel port.

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Component Suppliers

SUPPLIER	PHONE	WEBSITE
Digi-Key	800-344-4539	www.digikey.com
Methode Electronics	708-867-6777	www.methode.com
Murata	800-831-9172	www.murata.com/cap
PacTec	610-361-4200	www.pactecenclosures.com
TDK	408-437-9585	www.component.tdk.com

Note: *Indicate that you are using the MAX1464 when contacting these component suppliers.*

Features

- ♦ **Proven PCB Layout**
- ♦ **Windows 98/NT/2000/XP Compatible**
- ♦ **On-Board Potentiometers Act as Sensor Inputs**
- ♦ **Spare Area for Simple-Circuit Breadboarding**
- ♦ **LEDs for Visual Verification**
- ♦ **+5V or +8V to +40V Possible Supply**
- ♦ **Included Interconnect Cables**
- ♦ **Included Additional Samples**

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1464EVKIT	0°C to +70°C	28 SSOP
MAX1464KEY	—	—

MAX1464 EV Kit Files

FILE	OPERATION
Hardware debugger	Internal controls for learning the MAX1464
Control program	Sensor compensation
—	Simple functions and programming examples
—	Various related application notes

Component List

EV Kit Component List

REFERENCE	QTY	DESCRIPTION
C1	1	10µF ±20%, 10V tantalum capacitor (1210) TDK C3225X7R1C106M Taiyo-Yuden LMK325BJ106MN
C2, C5, C8	3	2.2µF ±10%, 10V X7R ceramic capacitors (0805) Murata GRM21BR71A225K or equivalent
C3, C9	2	1µF ±10%, 10V X7R ceramic capacitors (0805) Murata GRM21BR71A105K or equivalent
C4, C7, C10–C13	6	0.1µF ±10%, 10V X7R ceramic capacitors (0805) Murata GRM21BR71E104K or equivalent

EV Board Component List (continued)

REFERENCE	QTY	DESCRIPTION
C6	1	0.001µF ±10%, 10V X7R ceramic capacitor (0805) Murata GRM216R71H102K
FB1, FB2	2	0Ω resistors (0805) Digi-Key RL12T0.010JCT-ND or equivalent
H1, H2	2	14-pin headers 36-pin headers 0.01 centers (comes in 36-pin strips, cut to fit) Sullins PTC36SAAN Digi-Key S1012-36-ND
JU1, JU10	2	3-pin headers 36-pin headers 0.01 centers (comes in 36-pin strips, cut to fit) Closed: JU1, pins 1-2, JU10, pins 1-2 Sullins PTC36SAAN Digi-Key S1012-36-ND
JU2, JU3, JU4, JU8, JU9, JU11–JU14	9	2-pin headers 36-pin headers 0.01 centers (comes in 36-pin strips, cut to fit) Closed: JU2, JU4, JU8, JU9, JU11–JU14 Open: JU3 Sullins PTC36SAAN Digi-Key S1012-36-ND
LED1, LED2	2	LEDs Digi-Key P300-ND
P1	1	2 x 8 male shrouded vertical ribbon cable connector Digi-Key MHB16K-ND or equivalent
P2	0	2 x 20 right-angle receptacle (not installed) SAMTEC SSW-120-02-S-D-RA Methode Electronics RS2R-40-G
RB1–RB4	4	Rubberband standoffs
R2	1	22Ω ±5% resistor (1206) Digi-Key P22ECT-ND or equivalent
R4, R5	2	3kΩ ±5% resistors (1206) Digi-Key P3.0KECT-ND or equivalent
R13–R16	4	10Ω ±1% resistors (1206) Digi-Key P10RCT-ND or equivalent
R17	1	220Ω ±5% resistor (1206) Digi-Key P220ECT-ND or equivalent
TB1, TB2	2	0.2in screw terminal blocks Digi-Key ED1973

Component List (continued)

REFERENCE	QTY	DESCRIPTION
U1	1	MAX1464AAI (28-pin SSOP)
U1	0	Factory option 28-pin SO socket ENPLAS OTS-28(34)-0.65-1
U2	1	MAX6220ASA25 (8-pin SO)
U3	1	MAX6220ASA50 (8-pin SO)
VR1, VR2	2	20kΩ vertical adjust trimpots Digi-Key 490-2323ND
—	13	Shunts Closed: JU1 pins 1-2, JU2, JU4, JU8, JU9, JU11–JU14, JU10 pins 1-2 Open: JU3 Sullins STC02SYAN Digi-Key S9000-ND
—	1	MAX1464EVKIT PCB

Interface Board (KEY) Component List

REFERENCE	QTY	DESCRIPTION
C1, C2	2	0.1µF ±10%, 50V ceramic capacitors (1206) Murata GRM319R71H104K or equivalent
C3, C4	0	Open
C5, C6	2	470pF ±10%, 10V ceramic capacitors
JU1	0	Leave open
P1	1	DB25 pin male connector, solder cup Mount at edge of PCB Digi-Key ET25P or equivalent
P2	1	2 x 8 male shrouded vertical ribbon cable connector Mount at edge of PCB Digi-Key MHB16K-ND or equivalent
U1	1	MAX1841EUB
U2	1	MAX1841EUB
Screw	1	No. 2 56 x 1/2in Philips HD S/S machine screw
Spacer	1	No. 2 aluminum round spacer, 1/4in length, unthreaded Any
Spacer	1	No. 256 threaded 5/16in aluminum round standoff Digi-Key 1801CK-ND or equivalent
—	1	MAX1464KEY PCB
—	1	Snap-on plastic housing PacTec K-CNM0406 Newark K-CNM-0406-BLACK

Quick Start

Required Equipment

- MAX1464 EV kit
- A fixed +5VDC power supply
- Computer running Windows 98/NT/2000/XP with an available parallel port (USB-to-parallel-port converters not supported)
- A multimeter
- One parallel (printer) cable

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 98SE/2000/XP operating system.

Procedures

Applying Power to the MAX1464 EV Board

1) Verify that all jumpers on the EV kit board are set per the default setting shown in Table 1.
2) Connect a fixed +5V power supply to the EV kit board TB2 +5V terminal.
3) The LEDs on the EV kit board start blinking. The MAX1464 EV kit is shipped with a program, EVTEST1.hex, preloaded in the MAX1464 flash memory. This program alternatively flashes the two LEDs on the EV board.

Setting Up for Digital Communication

1) Download the latest MAX1464 software from the Maxim website.
2) Start the **INSTALL.EXE** program and follow the instructions to install all MAX1464 applications programs and to copy supporting files to your computer.
3) Set up the MAX1464 EV kit by connecting the EV board and the KEY using the 16-pin ribbon cable. Connect the KEY to the PC's parallel port using a 25-pin straight-through, female-to-male cable.

Example of Using the Hardware Debugger

1) Start the **Hardware Debugger** program from **Start | MAX1464 EV kit | Hardware Debugger**.
2) A window (Figure 1) appears on the monitor.
3) Read the text in the window next to the **Check CPU status** on the top row and verify that it reads **Running** or **Halted**. Any other reading indicates a hardware and/or setup problem. Fix the problem before continuing to the next step. The next few steps detail loading a new LED double blinking program to the MAX1464 flash memory and running it.
4) Press the **Flash Memory** tab in the **Hardware Debugger** window.
5) Press **Load Buffer from file** tab.
6) Select **... | MAX1464 | examples | cctmr1-64.hex** file to read the .hex file and save it in the temporary buffer.
7) Press **Write to device** tab to write the cctmr1-64.hex program to the flash memory.
8) Press **Verify device against buffer** to verify that the flash memory write operation is successful.
9) Execute the LED double-blinking program by pressing on the **Run CPU** button. The LEDs start blinking. This process verifies that the EV kit connections are correct, the EV board jumpers are set correctly, and the computer interface is working.

Example of Using the Control Program

Note: Exit the **Hardware Debugger** before starting the **Control** program.

This section demonstrates how to start the **Control** program and make the basic measurement of the input voltage.

1) Start the **Control** program from **Start | MAX1464 EV kit | Control Program**.
2) A window (Figure 2) appears on the monitor.
3) The **DUT?** button turns green if the hardware setup is correct and communication with the MAX1464 is established. A red button indicates a hardware and/or setup problem. The next few steps detail reading the signal applied on the MAX1464 input and write to the **Data Array**, which is the input to the compensation algorithm.
4) Set the value of **This Temp Point** and **This Press Point** to match one of the test conditions displayed in the **Data Array**.
5) Press the **Read ADC** button to convert the on-chip temperature sensor output and channel 1 input voltage and display the results of both conversions in the **Data Array**.
6) To read other input voltages, adjust VR1 and VR2 potentiometers and repeat steps 5 and 6.
7) Refer to the MAX1464 **Control** program manual for a full description of **Control** program capabilities.

Detailed Software Description

Two independent programs have been provided for the MAX1464 to aid the user in evaluating and designing in the MAX1464 signal conditioner into a product.

Hardware Debugger

The hardware debugger program includes multiple tabs for accessing the relevant registers and ports, writing programs to the on-chip flash memory, downloading flash memory contents into a file, etc. Use the hardware debugger program to learn the MAX1464 functions, registers, and ports.

CPU Registers r0..rf, p0..pf

In this window, users can read/write the CPU (module) registers, program counter r0, r1. Users can also read/write the CPU ports p0 through pf when the CPU is halted.

ADC Module

In this window, users can access the ADC control, ADC configuration, and ADC data registers for all three channels (channel 1, channel 2, and temperature sensor).

DOP Module

In this window, users can access the DOP control, DOP configuration, and DOP data registers for both output channels and the op amp configuration register.

Other Modules

In this window, users can access registers related to the timer, power control, oscillator, and GPIOs.

Flash Memory

This window can be used for all flash-memory operations, such as writing flash memory to/from a file.

Program Listing

In this window, users can view the list file of an assembly program. Select the filename from the **File** pulldown menu.

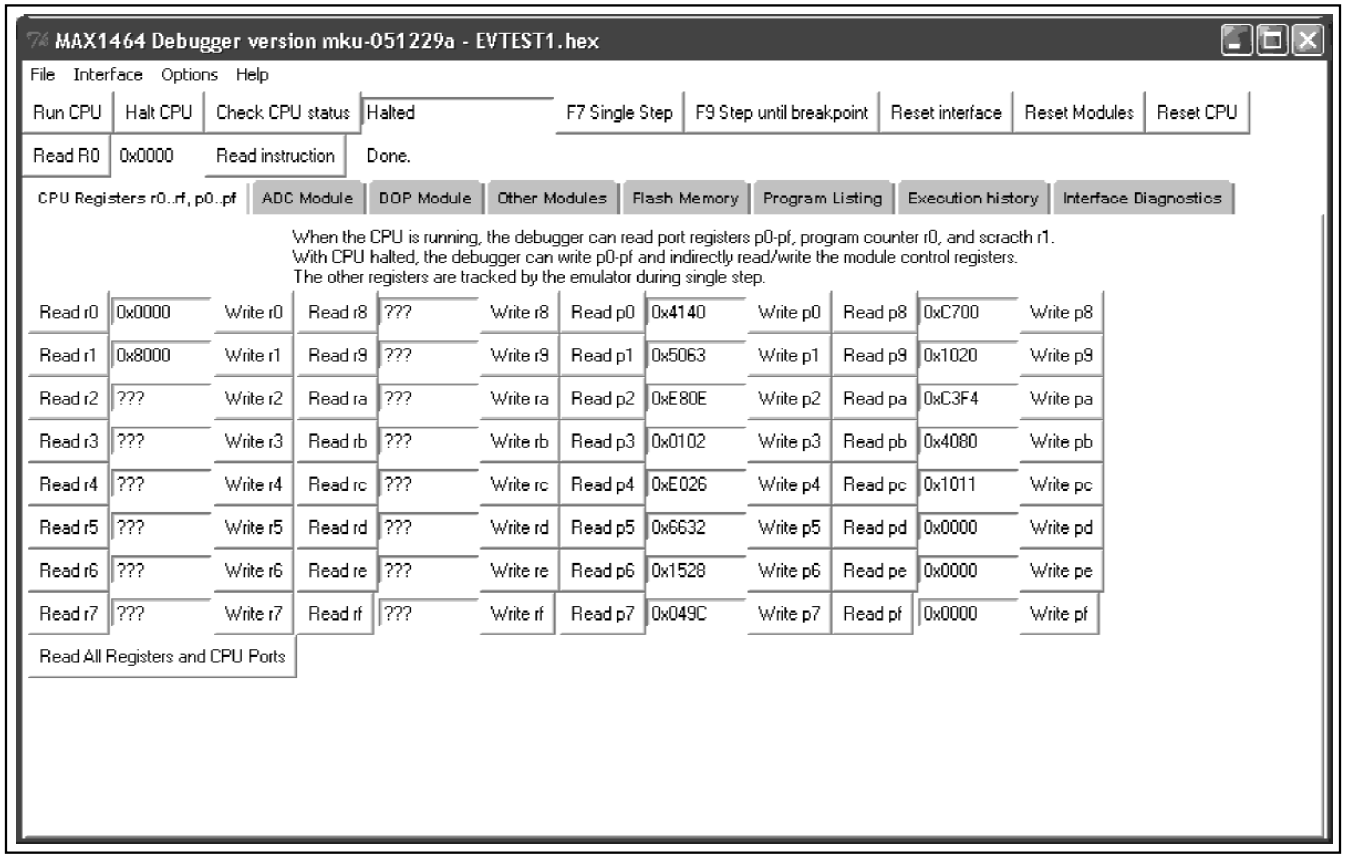

Figure 1. Hardware Debugger Window

Control Program (MAX1464 Main.exe)

The **Control** program includes functional buttons to have the MAX1464 perform a series of predefined lower level operations, such as reading the ADC, loading a file into flash memory, etc. The **Control** program can be used to perform a 2nd-order temperature compensation.

The main purpose of the **Control** program is to provide the user with a tool to easily compensate a sensor. The compensation algorithm defined in Application Note 3649, *MAX1464 Signal-Conditioner, Sensor Compensation Algorithm*, has been implemented. All the user needs to do is to properly set up the EV kit/sensor and the environment condition for the sensor, and press the **Read ADC** and **Characterize DAC** buttons at each environment condition to fill the **Data Array** with valid data. Then by pressing three more buttons, the compensation coefficients are created and copied into the MAX1464 flash memory, creating a compensated sensor.

Refer to the *Control Program User Manual* for a detailed description of each function/button and how to perform sensor compensation.

Detailed Hardware Description

A complete set of hardware is included in the MAX1464 EV kit package. A MAX1464 EV board, a MAX1464 KEY, a 16-pin ribbon cable, a parallel-port extension cable, and a few MAX1464 samples are included in the MAX1464 EV kit package. The MAX1464 EV kit board is designed to give the user the most flexibility and control over the MAX1464. The user can use a fixed +5V or an +8V to +40V power supply to power up the EV kit board. All critical pins are easily accessible. Two potentiometers are provided to emulate a sensor output and allow positive and negative input signals to the MAX1464, eliminating the need for an actual sensor while checking the functionality of the MAX1464. A small area with plated-through holes is intended to facilitate building a small application circuit. And, wherever possible, jumpers have been added to offer flexibility for configuring the EV kit board for user applications.

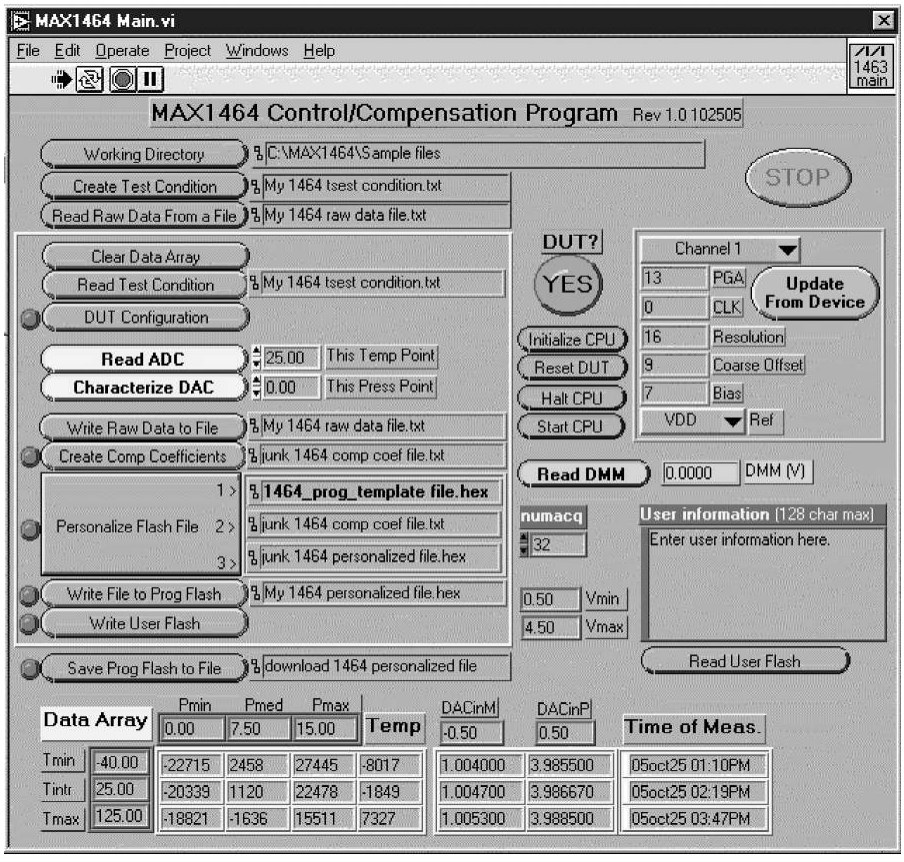

Figure 2. Control Software Window

Jumpers Setting

Table 1. EV Board Jumpers Configuration

NAME	NO. OF PINS	FUNCTION	STATE	DESCRIPTION
JU1	3	Power-supply selection (default)	**Open**	External TB2 +5V DC
			1-2	Unregulated external +8V DC to +40V DC
			2-3	Not used
JU2	2	VREF selection	Open	External V_{REF}
			Short	Internally generated 2.5V V_{REF} (U2)
JU3	2	Clock selection	**Open**	Internal oscillator
			Short	External 4MHz oscillator on CKIO
JU4	2	Communication interface	**Short**	3-wire communication interface
			Open	4-wire communication interface
JU8	2	LED1 configuration	**Short**	LED1. Driven by GPIO1.
			Open	LED1. Disconnected.
JU9	2	LED2 configuration	**Short**	LED2. Driven by GPIO2.
			Open	LED2. Disconnected.
JU10	3	Bridge voltage drive selection	**1-2**	Bridge voltage connected to +5V DUT. Pin 1 is at the bottom.
			2-3	Bridge voltage. Connected to regulated 2.5V.
JU11	2	INP1 configuration	Open	INP1. Floating.
			Short	INP1. Connected to VR1 variable resistor.
JU12	2	INM1 configuration	Open	INM1. Floating.
			Short	INM1. Connected to VR2 variable resistor.
JU13	2	Measures current on VDD	Open	Insert a current meter to measure current
			Short	Close circuit
JU14	2	Measures current on VDDF	Open	Insert a current meter to measure current
			Short	Close circuit

Note: *Default settings appear in bold.*

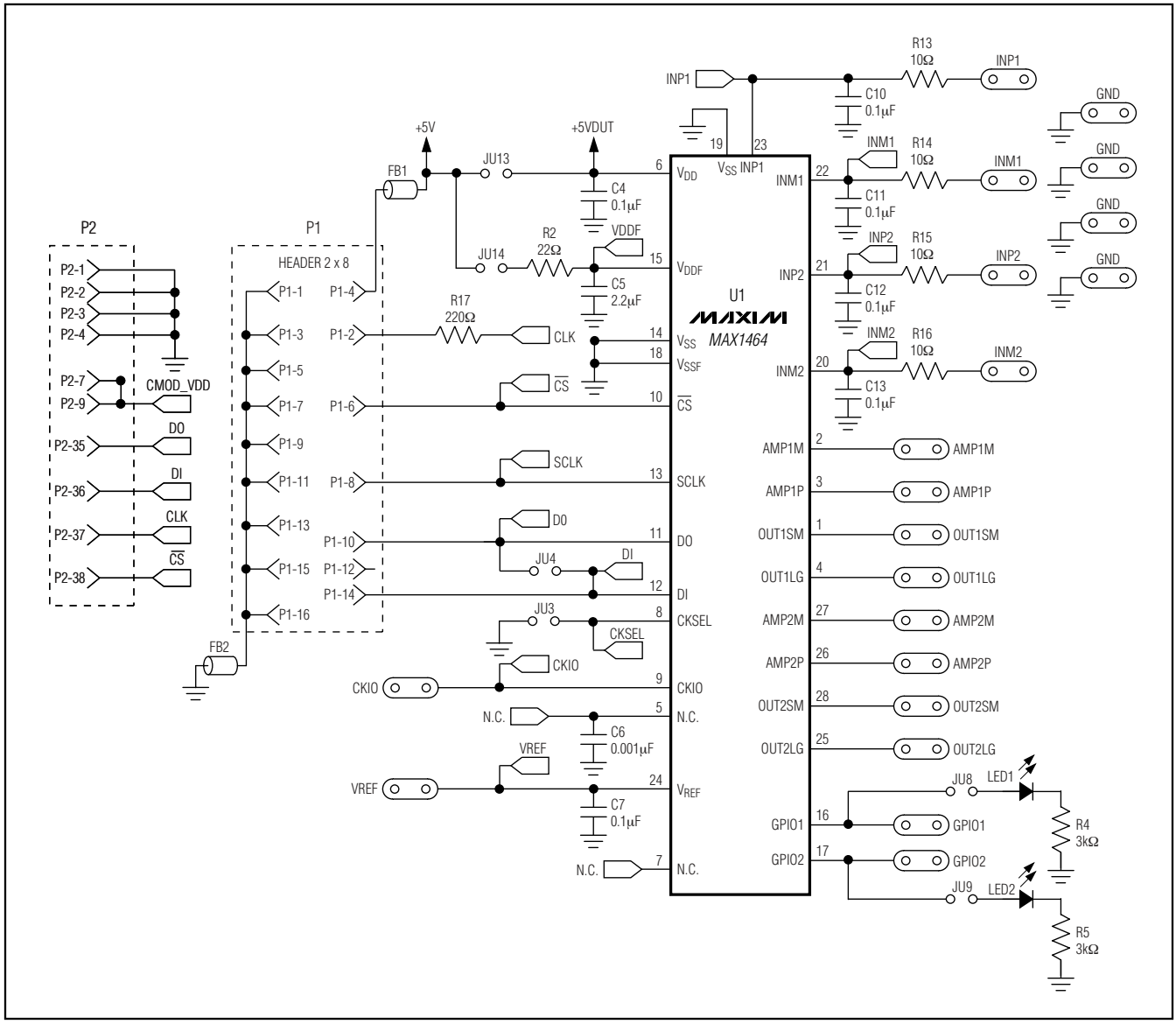

Figure 3. MAX1464 EV Kit Schematic (Sheet 1 of 2)

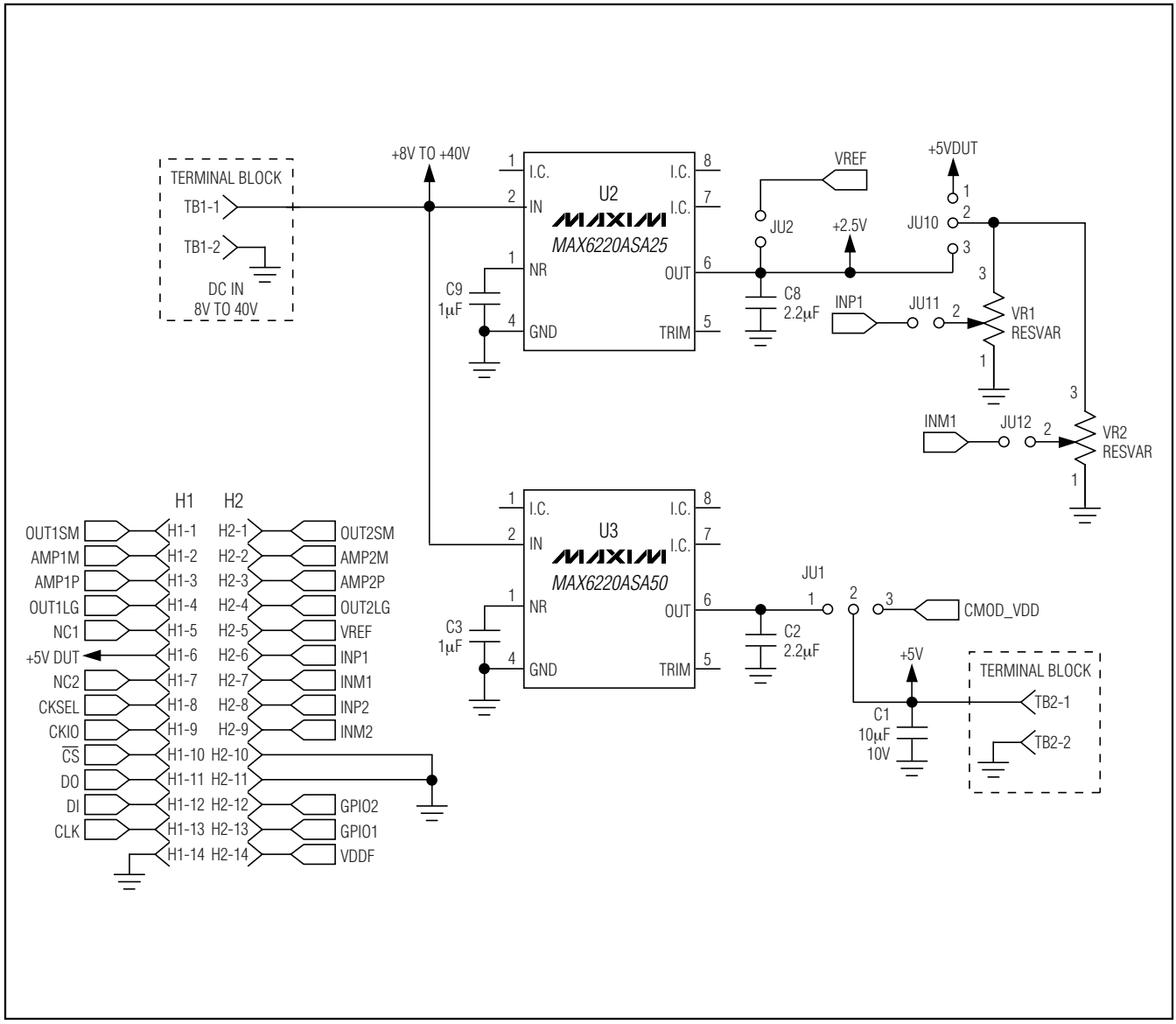

Figure 3. MAX1464 EV Kit Schematic (Sheet 2 of 2)

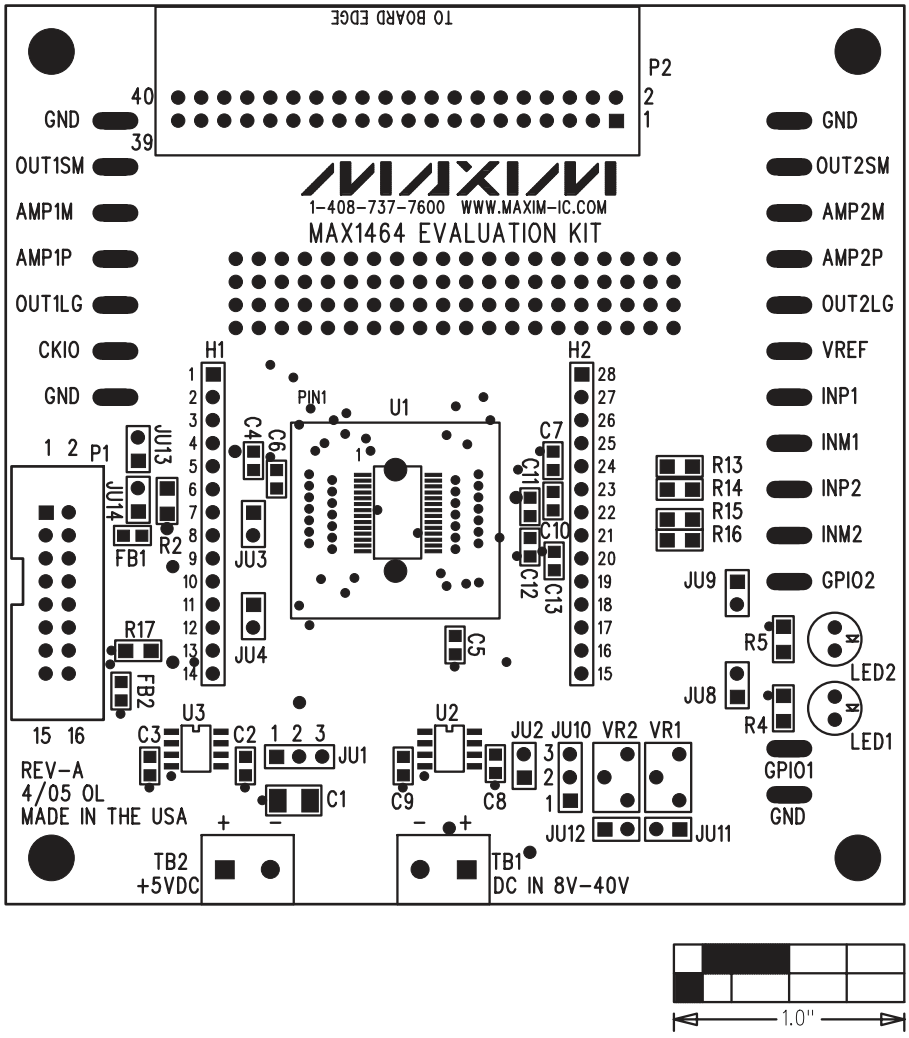

Figure 4. MAX1464 EV Kit Component Placement Guide—Component Side

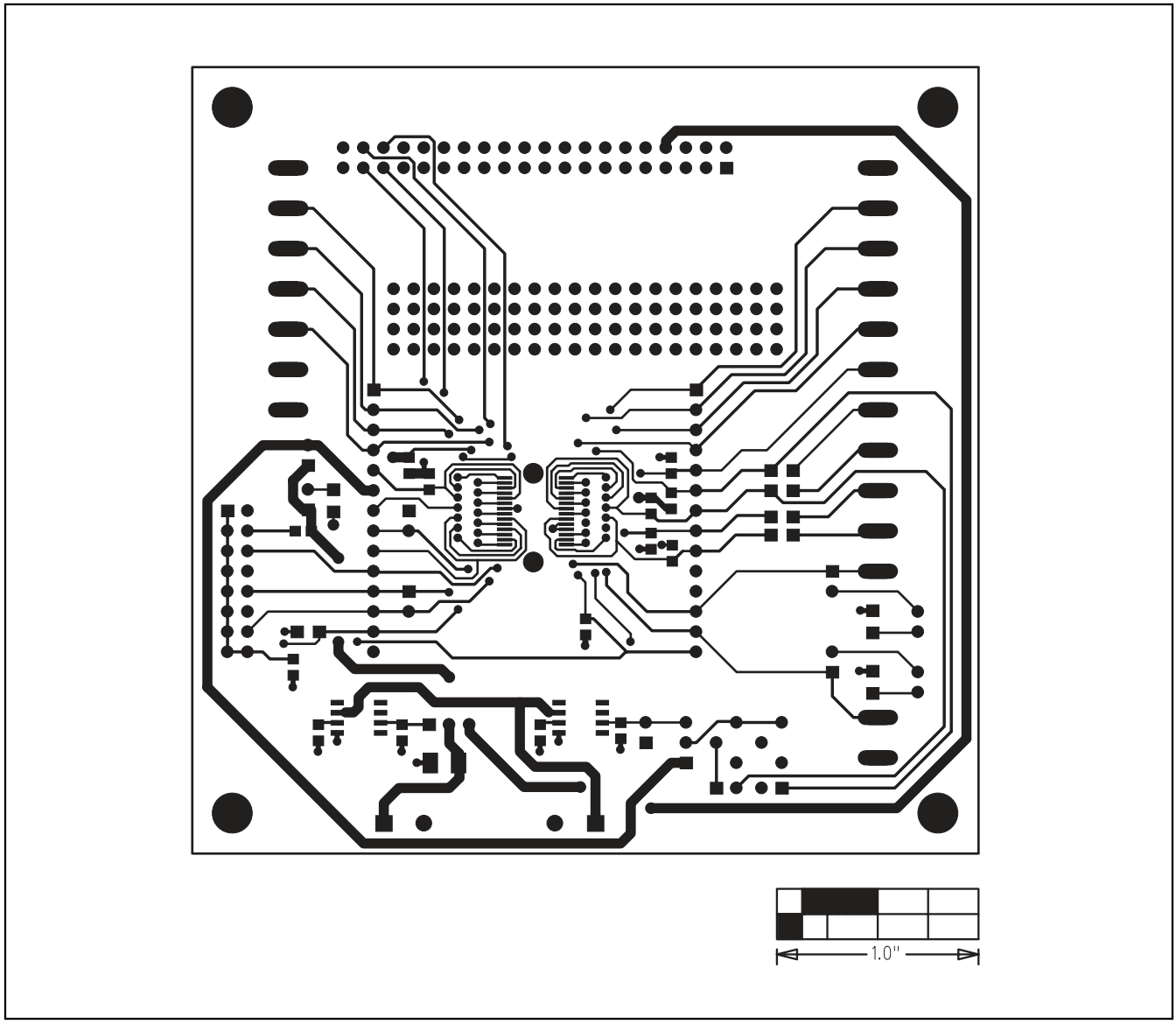

Figure 5. MAX1464 EV Kit PCB Layout—Component Side

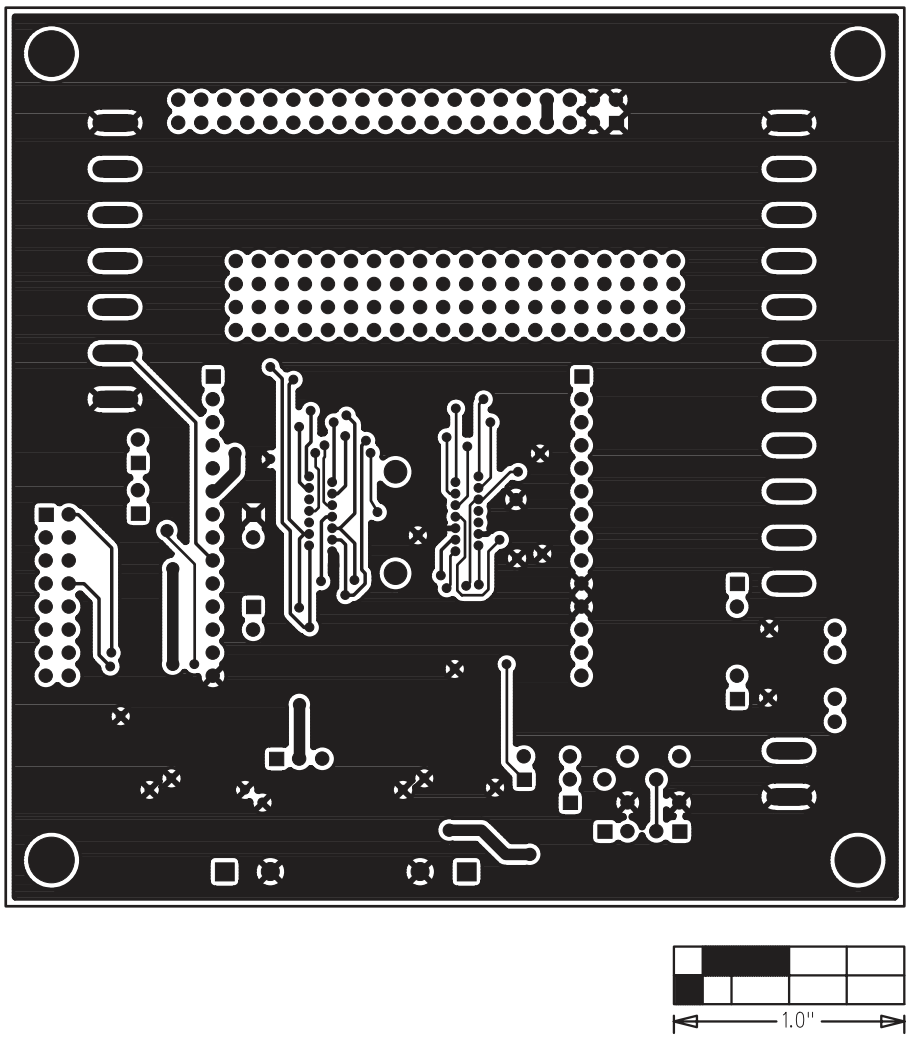

Figure 6. MAX1464 EV Kit PCB Layout—Solder Side

MAX1464 Evaluation Kit

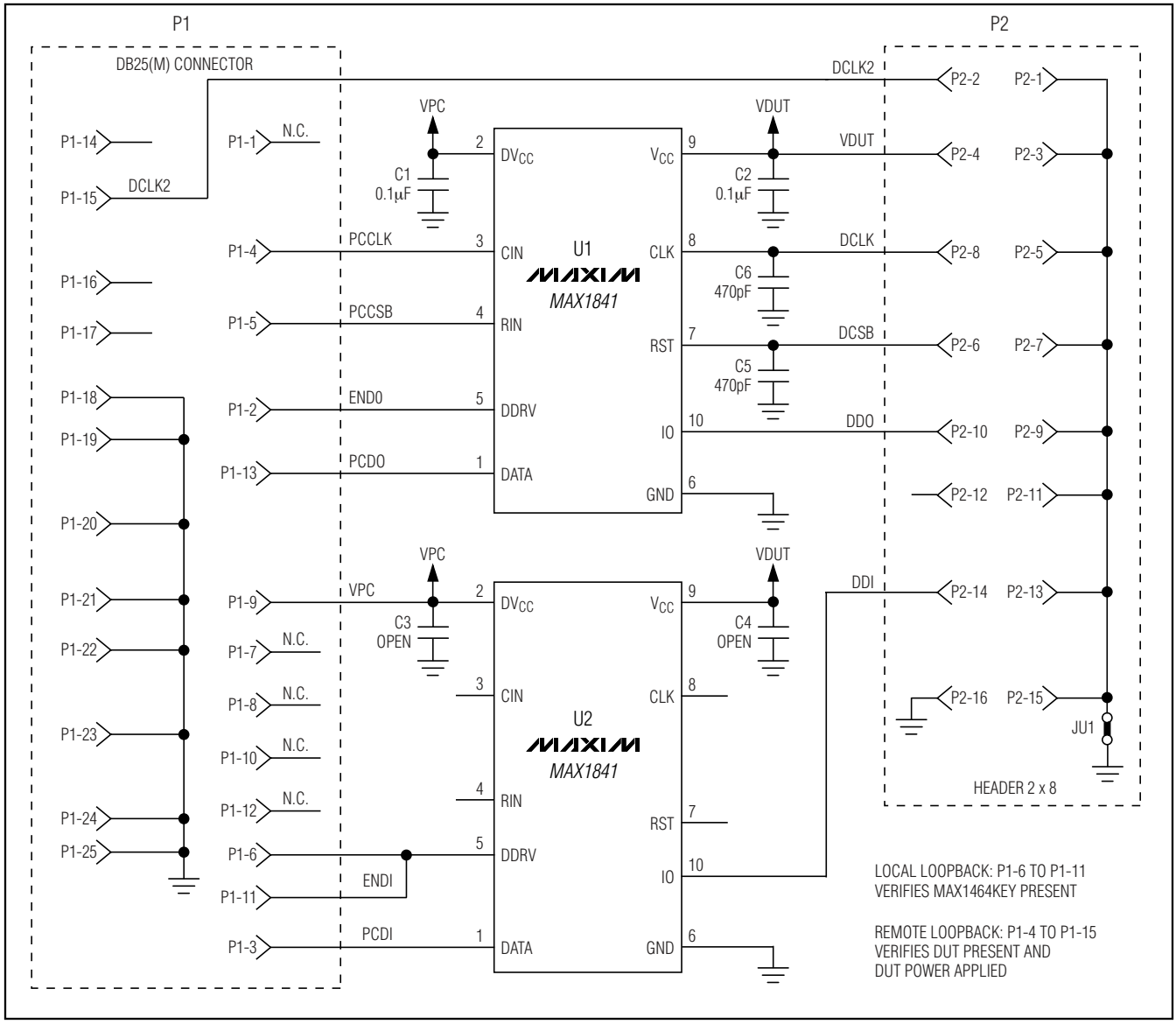

Figure 7. MAX1464 Interface Board (KEY) Schematic

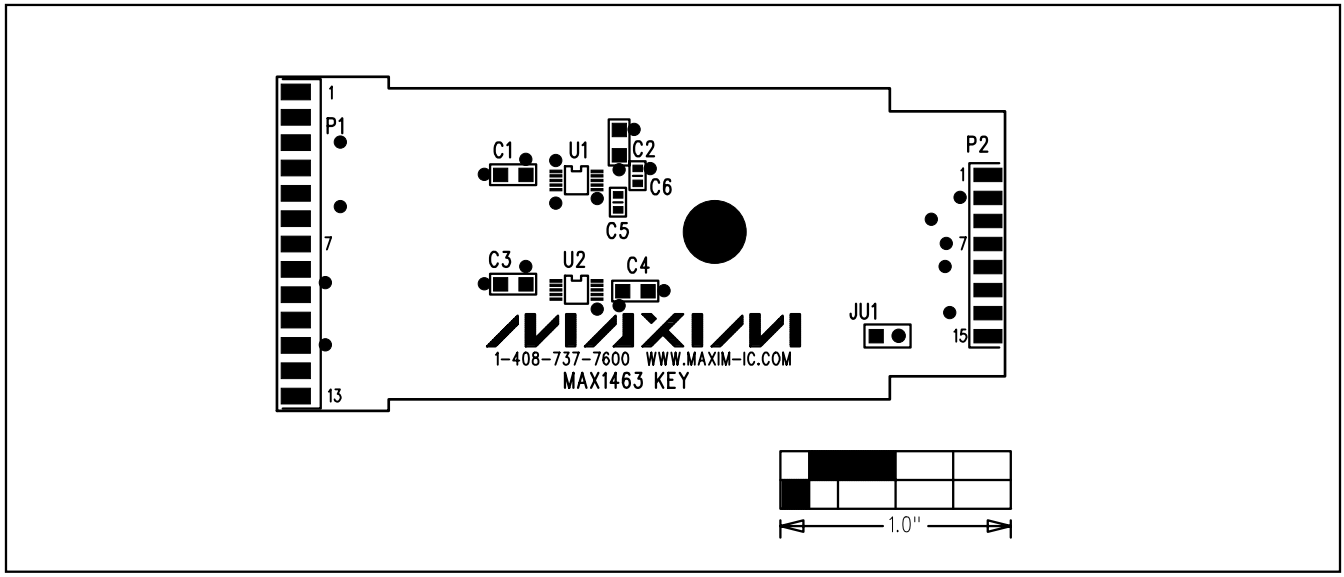

Figure 8. MAX1464 Interface Board (KEY) Component Placement Guide—Component Side

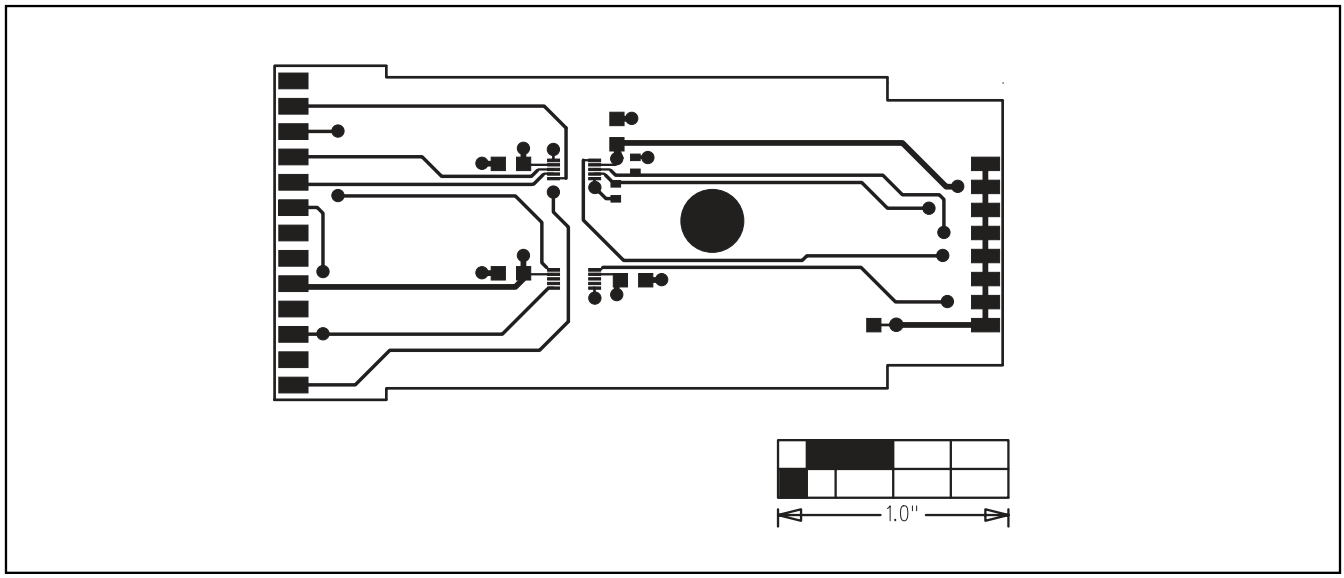

Figure 9. MAX1464 Interface Board (KEY) Layout—Component Side

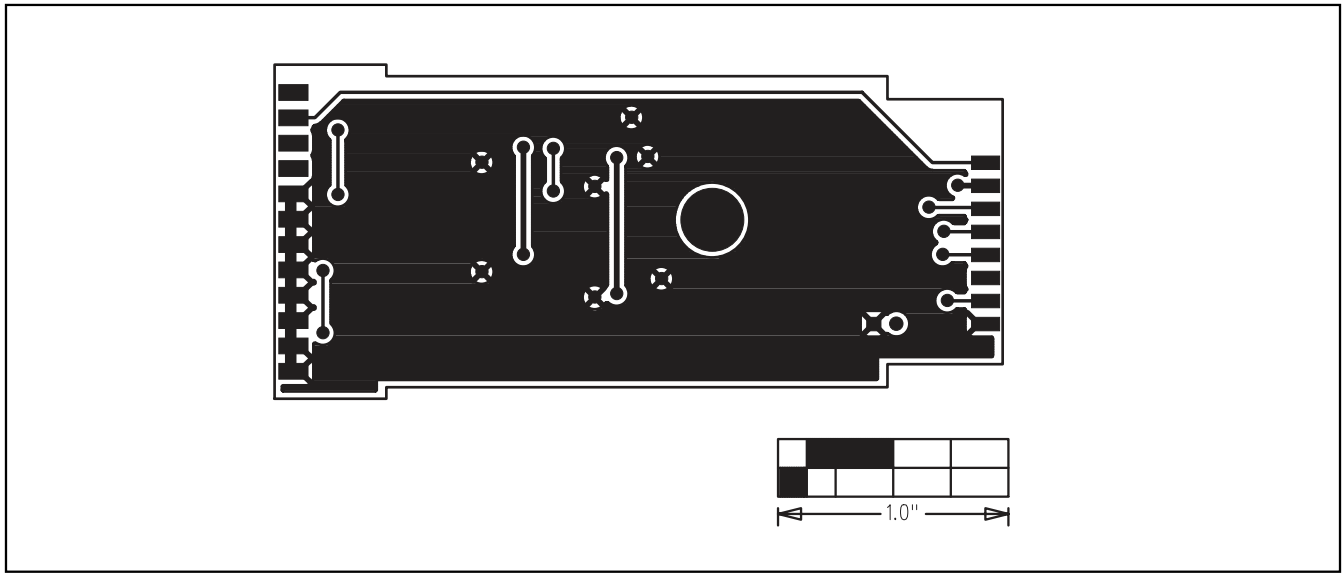

Figure 10. MAX1464 Interface Board (KEY) Layout—Solder Side