19-2150; Rev 0; 8/01

MAX6900 Evaluation System

General Description

The MAX6900 evaluation system (EV system) is a real-time clock evaluation system consisting of a MAX6900 evaluation kit (EV kit) and a Maxim MAXSMBus module. Windows® 98 software provides a handy user interface to exercise the features of the MAX6900. (**Note:** Windows NT/2000 requires additional driver software; contact factory.) This EV kit is intended to demonstrate the functionality and features of the MAX6900 real-time clock with an I²C™-compatible 2-wire interface. It is not designed to exercise the MAX6900 at its maximum serial bus interface speed. A typical bus interface speed is in the 90kHz range and depends upon the operating system and computer used.

Order the complete EV system (MAX6900EVSYS) for comprehensive evaluation of the MAX6900 using a PC. Order the EV kit (MAX6900EVKIT) if the MAXSMBus module has already been purchased with a previous Maxim EV system, or for custom use in other µC-based systems.

Features

- ♦ **Proven PC Board Layout**
- ♦ **Low-Voltage Operation**
- ♦ **Supply Current Monitoring**
- ♦ **Fully Assembled and Tested**

Ordering Information

PART	TEMP. RANGE	INTERFACE
MAX6900EVKIT	0°C to +70°C	User supplied
MAX6900EVSYS	0°C to +70°C	Windows software

Component List

REFERENCE	QTY	DESCRIPTION
C1, C3, C4	3	0.1µF, 10V X7R ceramic capacitors
C2, C5	2	10µF, 10V tantalum capacitors
J1	1	2 x 10 right-angle socket SamTec SSW-110-02-S-D-RA
JU1, JU2	2	2-pin jumpers
R1, R2	0	Open (site for optional 4.7kΩ ±5% 1206 resistor)
R3	1	49.9kΩ ±1% resistor
U1	1	MAX6900EUT
U2, U3	2	MAX3370EXK-T
Y1	1	32.768kHz crystal, 12.5pF load capacitance Digi-Key X801-ND
Y2	0	32.768kHz crystal, 12.5pF load capacitance
None	1	PC board, MAX6900 EV kit
None	1	3.5in software disk, MAX6900 EV kit

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I²C is a registered trademark of Philips Corp.

Quick Start

Recommended Equipment

Before you begin, the following equipment is needed:

- Maxim MAX6900EVKIT and MAXSMBus interface board
- 12VDC power supply (any supply voltage between +9V and +15V is acceptable)
- Computer running Windows 98
- Spare parallel port
- 25-pin I/O extension cable

Connections and Setup

1) With the power off, connect the 12VDC power supply to the MAXSMBus board between POS9 and GND. The MAX6900 IC's +5V supply comes from the MAXSMBus board.
2) Connect the boards together.
3) Connect the 25-pin I/O extension cable from the computer's parallel port to the MAXSMBus board. The EV kit software uses a loopback connection to confirm that the correct port has been selected.
4) Install the EV system software on your computer by running the INSTALL.EXE program on the floppy disk. The program files are copied and icons are created for them in the Windows Start menu.

Table 1. Jumper Functions

JUMPER	POSITION	FUNCTION
JU1	Closed*	V_L = +5V from MAXSMBus module
JU1	Open	User-supplied $V_L \leq +5V$
JU2	Closed*	The supply current-sensing resistor R3 is shorted, enabling communication with the real-time clock.
JU2	Open	The timekeeping supply current can be estimated by measuring voltage across R3. Communication is not possible in this state.

**An asterisk indicates a default configuration.*

5) Ensure that the jumper settings are in the default position (Table 1).
6) Start the program by opening its icon in the Start menu.
7) Click on the Set from computer's clock button to write the current time of day into the MAX6900.
8) Observe the difference between the computer's time and the MAX6900 time.
9) Unplug the MAX6900EVSYS from the parallel port for long-term drift testing.

Detailed Description of Hardware

The MAX6900 (U1) is a real-time clock with RAM. The MAX3370 level translators (U2 and U3) are not required for normal operation of the MAX6900, but allow operation at supply voltages down to +2V, while still communicating with the MAXSMBus board, which is using +5V logic levels. See Figure 6, and refer to the MAX6900 data sheet.

Measuring Timekeeping Supply Current

The MAX6900 is in standby mode whenever no commands are being sent. To measure the timekeeping supply current drawn in standby mode, first ensure that the main screen's Cyclic Burst Read checkbox is not checked, remove the shunt from jumper JU2, and measure the voltage across resistor R3. A voltage drop of 10mV represents 200nA of timekeeping supply current. For active bus operation (serial bus activity), replace shunt JU2 to prevent excessive voltage drop across resistor R3.

Surface-Mount Crystal

The EV kit comes with a 1.1mm cylindrical tuning-fork crystal; however, the PC board layout accommodates an optional surface-mount crystal. Only one crystal may be used.

MAXSMBus Connector

The MAXSMBus board connects to the device under test in accordance with Table 2.

Troubleshooting

Problem: Unable to communicate while measuring supply current.

Jumper JU2 must be closed to enable communication.

Detailed Description of Software

The EV software provides access to all registers. The main timekeeping registers appear in the main screen, with other screens accessible from the View menu. To write to a single register, click on the appropriate register select button, set the desired value, and then click the Write button. Cyclic Burst Read must be disabled before you can write to a single register. To read a register, click on the appropriate register select button, and then click the Read button.

Main Screen

The Read button reads the most recently selected timekeeping register. The Write button writes the most recently selected timekeeping register. The Burst Read button performs a Burst Read from the timekeeping registers (except Century). The Burst Write button performs a Burst Write to the timekeeping registers (except Century). The Set from computer's clock button writes the PC's time into the MAX6900. The Cyclic Burst Read checkbox tells the software to perform a Burst Read from the timekeeping registers, at a rate of approximately 4 times per second. Updates are shown in the register display, along with the difference between MAX6900 time and the host PC's time (Figure 1).

Table 2. MAXSMBUS Connector Signals

PIN	NAME	I^2C INTERFACE
1	+5V	Optional +5V supply
2	GND	Ground
3	SDA	SDA
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	SCL	SCL
8	GND	Ground
9	SMBSUS	No connection
10	GND	Ground
11	ALERT	No connection
12	GND	Ground
13	ALERT2	No connection
14	GND	Ground
15	OUTA	No connection
16	GND	Ground
17	OUTB	No connection
18	GND	Ground
19	GND	Ground
20	RAW PWR	No connection

Note: *Odd-numbered pins are on the outer row. Even-numbered pins are on the inner row.*

The Hour register setting can be switched from 12hr format to 24hr format by clicking the -->24 button.

RAM Screen

The Single Read button reads the most recently selected RAM location. The Single Write button writes the most recently selected RAM location. The Burst Read button performs a Burst Read from the entire RAM. The Burst Write button performs a Burst Write to the RAM. Normally, all 31 locations are read, but the Burst Write length can be reduced. Burst Write always begins with RAM location 0. The Preset Data button performs a Burst Write to the RAM, setting all data to the same value (Figure 2).

Setup Screen

Each Setup register is represented by a group of eight checkboxes, one for each bit. A checkmark indicates that the corresponding bit is a logic 1. The Read button updates the most recently selected Setup register's checkboxes. The Write button writes the most recently selected Setup register (Figure 3).

Auxiliary Functions

2-Wire Diagnostic

The transition from evaluation to custom software development requires access to the low-level interface. Access the 2-wire diagnostic from the main screen's View menu. The 2-wire Diagnostic screen allows you to send general-purpose SMBus commands. The Hunt for active devices button scans the entire address space, reporting each address that is acknowledged. The two most-often-used protocols are SMBusReadByte and SMBusWriteByte. SMBusReadByte transmits the device address, a command or register select byte, then re-transmits the device address and reads 1 byte. SMBusWriteByte transmits the device address, a command or register select byte, and 1 byte of data (Figure 4).

SPI/3-Wire Diagnostic

The transition from evaluation to custom software development requires access to the low-level interface. Access the SPI/3-wire diagnostic from the main screen's View menu. The SPI/3-Wire Diagnostic screen allows you to send SPI or 3-wire commands, or manipulate the parallel port pins directly. Each of the 25 pins is represented by a checkbox. A checkmark means that the corresponding pin is at a logic-high level. Pins that are inputs to the PC are grayed.

The bit-banging SPI diagnostic transmits data using synchronous serial format (similar to Motorola's 68HC11 SPI interface). The SPI interface sends and receives data simultaneously on separate pins. Parallel port pin 2 drives the clock, pin 1 drives DIN, pin 4 drives chip select, and pin 11 senses DOUT. Pins 2, 4, and 11 are inverted by open-collector drivers, while pin 1 drives DIN directly.

The 3-wire interface uses a bidirectional data pin. The MAXSMBus board implements the 3-wire interface by using an open-collector driver. Pin 2 drives the clock, pin 3 drives data, pin 4 drives chip select, and pin 11 senses data. All these signals are inverted by the open-collector drivers. The least-significant bit (LSB) is transmitted first, and (CPOL = 1, CPHA = 0) mode is used (Figure 5).

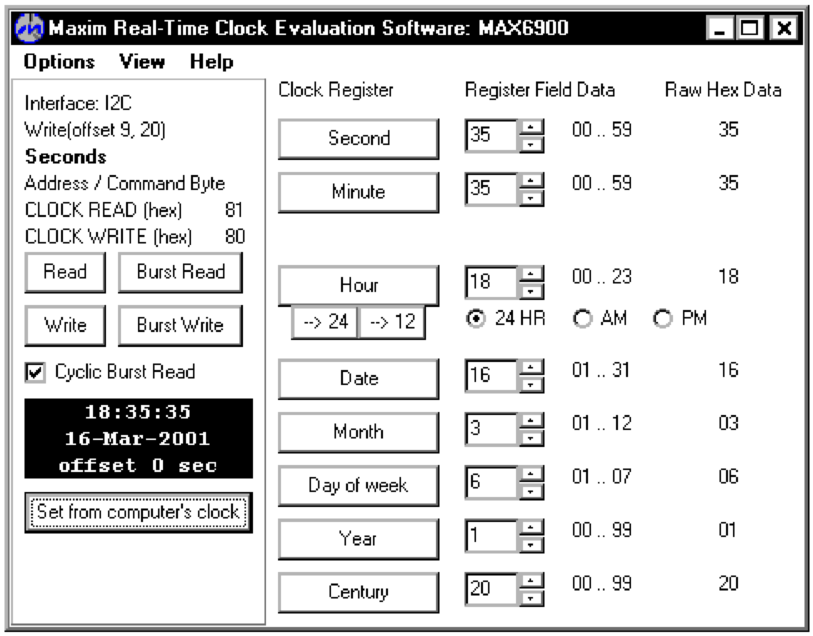

Figure 1. Main Screen

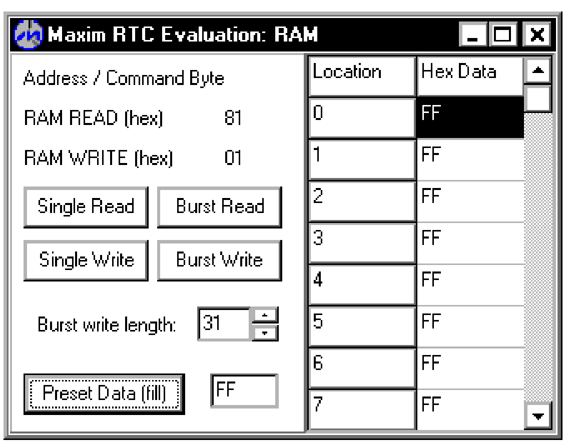

Figure 2. RAM Screen

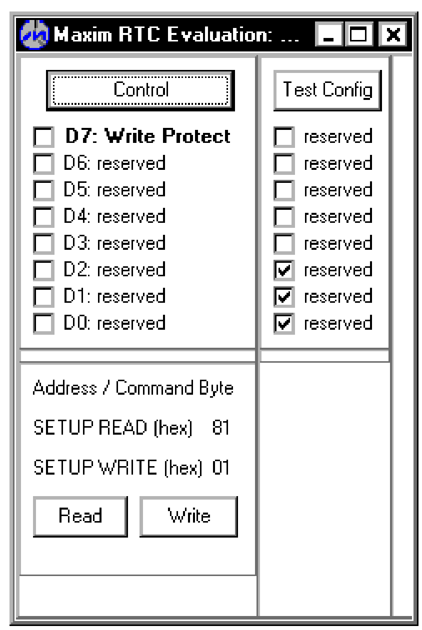

Figure 3. Setup Screen

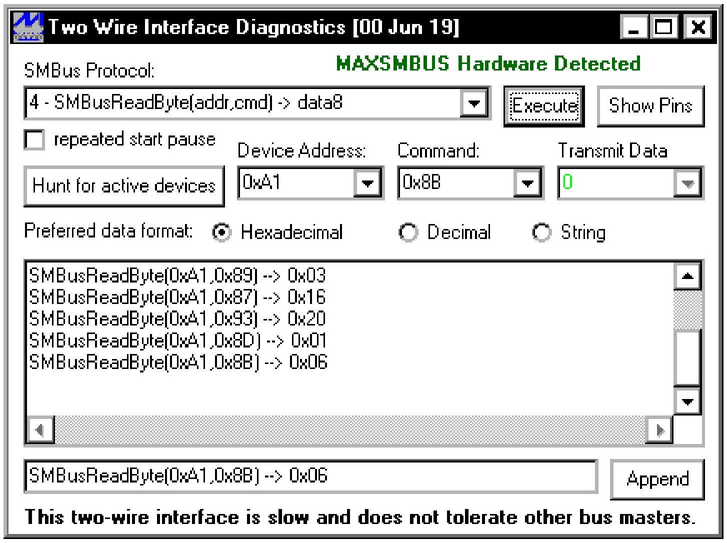

Figure 4. 2-Wire Diagnostic

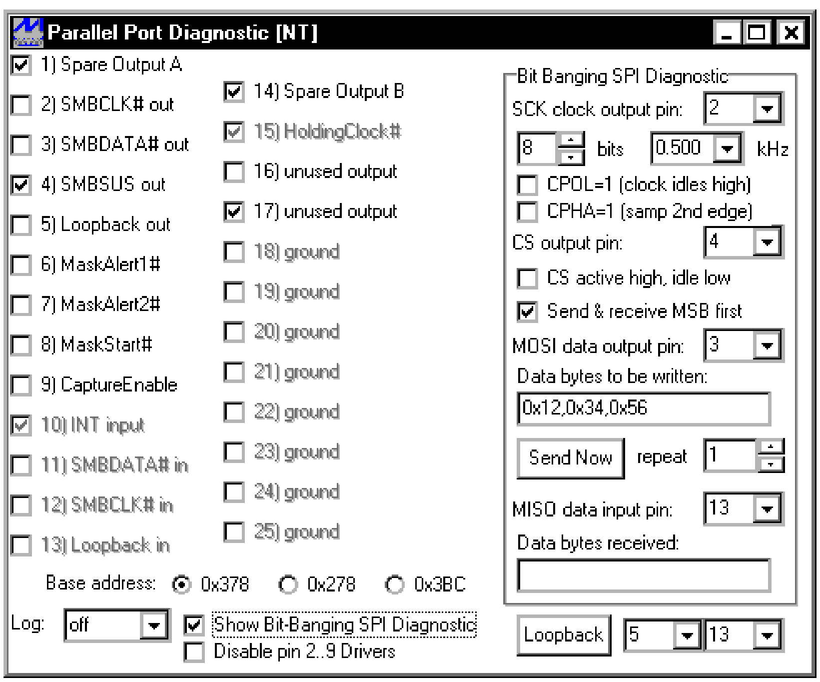

Figure 5. SPI/3-Wire Diagnostic

MAX6900 Evaluation System

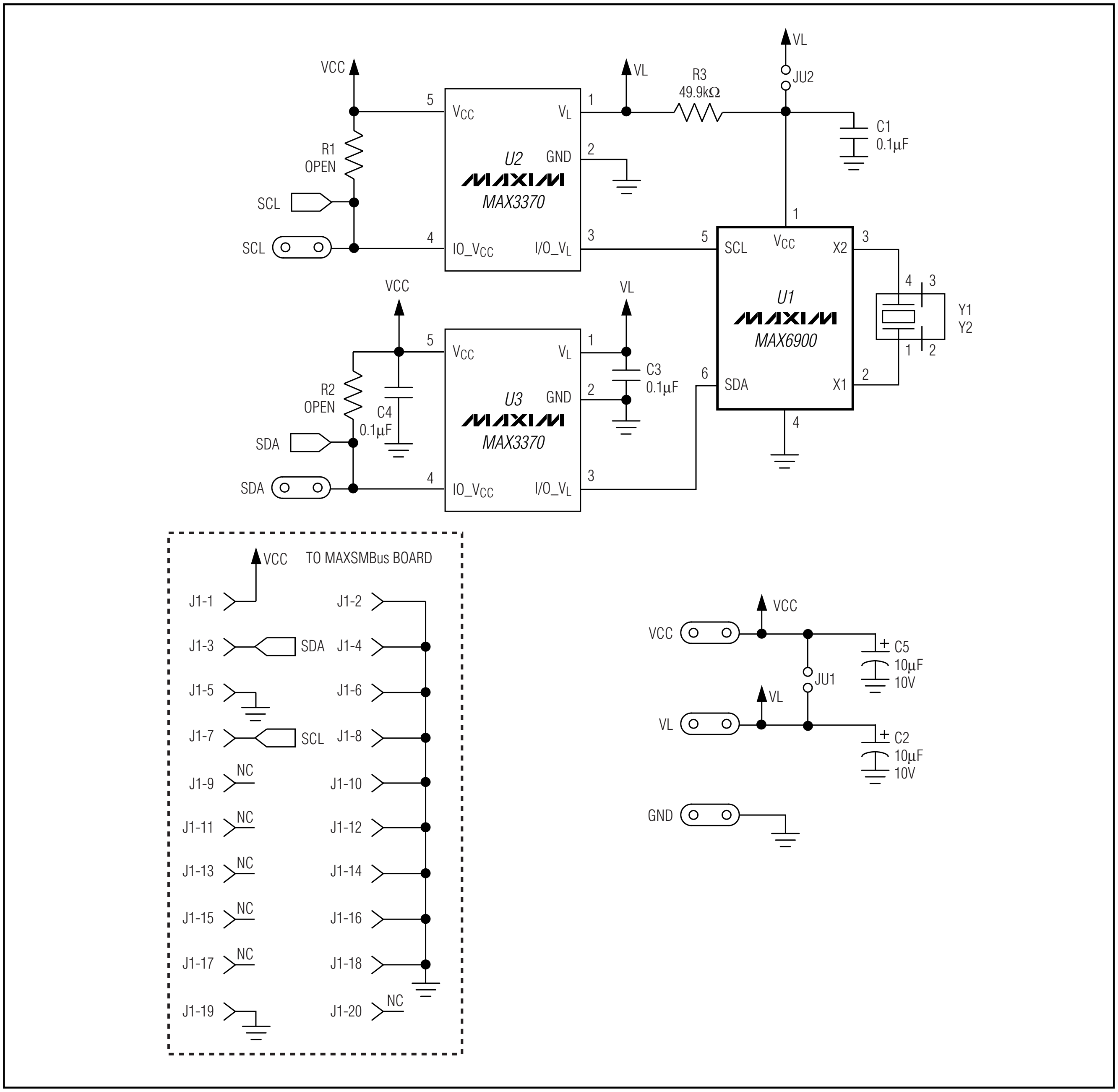

Figure 6. MAX6900 EV Kit Schematic

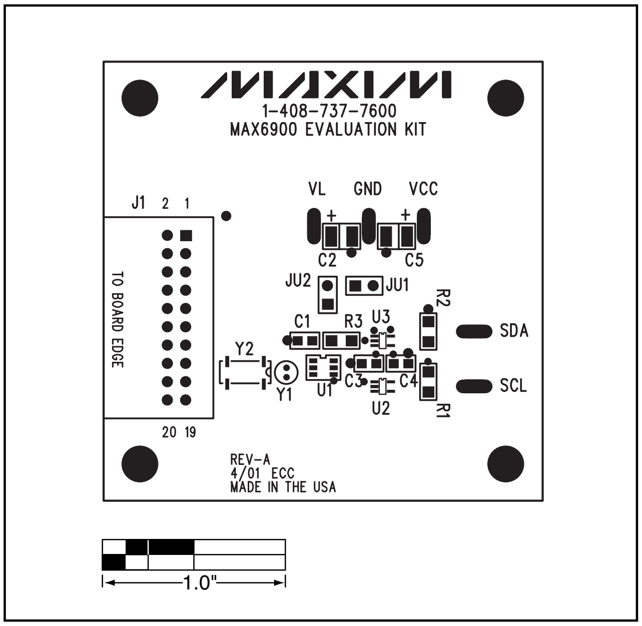

Figure 7. MAX6900 EV Kit Component Placement Guide—Component Side

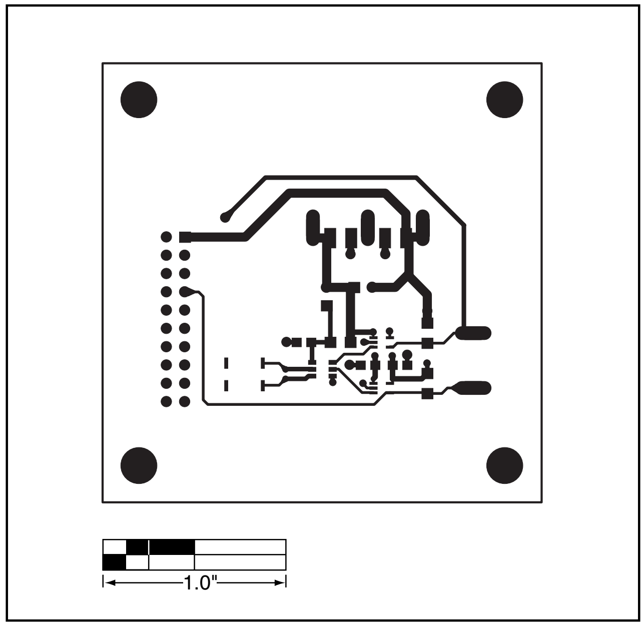

Figure 8. MAX6900 EV Kit PC Board Layout—Component Side

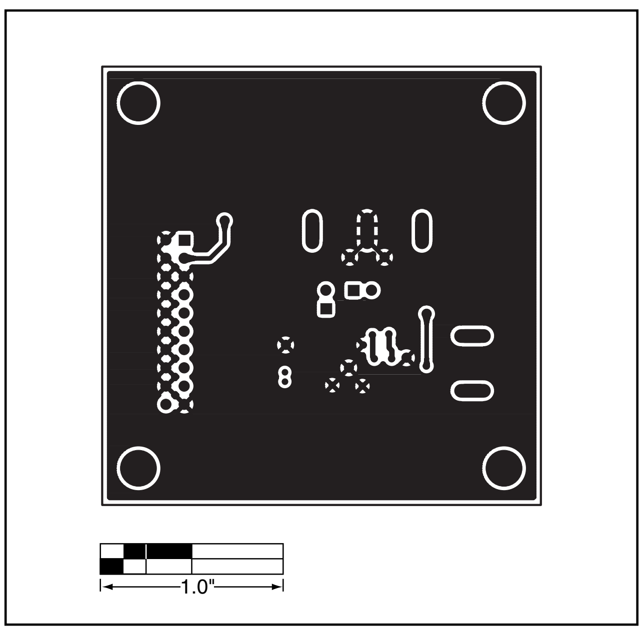

Figure 9. MAX6900 EV Kit PC Board Layout—Solder Side