MAXIM

MAX6692 Evaluation System/Evaluation Kit

Evaluates: MAX6648/MAX6649/MAX6692

General Description

The MAX6692 evaluation system (EV system) consists of a MAX6692 evaluation kit (EV kit) and a companion Maxim SMBus™ interface board.

The MAX6692 EV kit is an assembled and tested PC board with a mounted MAX6692. The EV kit allows full evaluation of the MAX6692 temperature sensor. The MAX6692 monitors its own die temperature and the junction temperature of an external diode-connected transistor. It converts the temperature to 11-bit data that may be accessed over a 2-wire serial bus.

The MAX6692 EV kit includes the external diode-connected transistor (2N3906) soldered to the board, which can be removed. The board can then be connected through a twisted pair to a remote diode close to your system.

The Maxim SMBus interface board (MAXSMBUS) allows an IBM-compatible PC to use its parallel port to emulate an Intel system management bus (SMBus) 2-wire interface. Windows® 95/98/2000-compatible software provides a user-friendly interface to exercise the features of the MAX6692. The program is menu driven and offers a graphic interface with control buttons and status display. (**Note:** Windows 2000 requires the installation of a driver; refer to Win2000.pdf or Win2000.txt located on the diskette.)

The MAX6692 EV kit can also evaluate the MAX6648 and MAX6649. Order free samples of either the MAX6648MUA or MAX6649MUA through Maxim's website. Order the MAX6692EVSYS for a complete IBM PC-based evaluation of the MAX6648/MAX6649/MAX6692. Order the MAX6692EVKIT if you already have an SMBus interface.

SMBus is a trademark of Intel Corp.
Windows is a registered trademark of Microsoft Corp.

Features

♦ **Measures and Displays Temperature of the MAX6648/MAX6649/MAX6692 and a Remote Diode**

♦ **Programmable Under/Overtemperature Alarms**

♦ **Programmable Conversion Rate**

♦ **Programmable Number of Faults Required to Assert the Alarm**

♦ **Programmable Overtemperature Hysteresis**

♦ **SMBus Compatible**

♦ **Easy-to-Use Menu-Driven Software**

♦ **Fully Assembled and Tested**

♦ **Includes Windows 95/98/2000-Compatible Software and Demo PC Board**

Ordering Information

PART	TEMP RANGE	SMBus INTERFACE TYPE
MAX6692EVKIT	0°C to +70°C	Not included
MAX6692EVSYS	0°C to +70°C	MAXSMBUS

Note: *The MAX6692 EV kit software is provided with the MAX6692EVKIT. However, the MAXSMBUS board is required to interface the EV kit to the computer when using the software.*

MAX6692EVSYS Component List

PART	QTY	DESCRIPTION
MAX6692EVKIT	1	MAX6692 EV kit
MAXSMBUS	1	SMBus interface board

MAX6692EVKIT Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	0.1µF, 16V X7R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104KA Murata GRM188R71C104KA01, TDK C1608X7R1C104K, TDK C1608X7R1E104K
C2	1	2200pF, 50V X7R ceramic capacitor (0603)
J1	1	2 × 10 right-angle female receptacle

DESIGNATION	QTY	DESCRIPTION
JU1	0	Not installed
Q1	1	PNP bipolar transistor (SOT23) Central Semiconductor CMPT3906, Diodes Inc. MMBT3906, General Semiconductor MMBT3906
R1	1	200Ω ±5% resistor (0603)
R2, R3, R4	3	10kΩ ±5% resistors (0603)
R5	1	100kΩ ±5% resistor (0603)
U1	1	MAX6692MUA (8-pin µMAX)

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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 Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
Central Semiconductor	631-435-1110	631-435-1824	www.centralsemi.com
Diodes Inc.	805-446-4800	805-381-3899	www.diodes.com
General Semiconductor	760-804-9258	760-804-9259	www.gensemi.com
Murata	770-436-1300	770-436-3030	www.murata.com
Taiyo Yuden	800-348-2496	847-925-0899	www.t-yuden.com
TDK	847-803-6100	847-390-4405	www.component.tdk.com

Note: Please indicate you are using the MAX6692 when contacting these manufacturers.

Quick Start

Required Equipment

Before you begin, the following equipment is needed:

- A computer running Windows 95, 98, or 2000. (**Note:** Windows 2000 requires the installation of a driver; refer to Win2000.pdf or Win2000.txt located on the diskette.)
- A parallel printer port (this is a 25-pin socket on the back of the computer)
- A standard 25-pin, straight through, male-to-female cable (printer extension cable) to connect the computer's parallel port to the Maxim SMBus interface board
- A DC power supply capable of supplying any voltage between 7V and 20V at 100mA
- A 5V, 100mA DC power supply

Procedure

1) Carefully connect the boards by aligning the 20-pin connector of the MAX6692 EV kit with the 20-pin header of the MAXSMBUS interface board. Gently press them together.

2) Connect a cable from the computer's parallel port to the MAXSMBus interface board. Use a straight-through 25-pin female-to-male cable. To avoid damaging the EV kit or your computer, do not use a 25-pin SCSI port or any other connector that is physically similar to the 25-pin parallel printer port.

3) Install the software by running the INSTALL.EXE program. The install program copies the files and creates icons for them in the Windows 95/98/2000 Start menu. An uninstall program is included with the software. Click on the UNINSTALL icon to remove the EV kit software from the hard drive.

   Do not turn on the power until all connections are made.

4) Connect the 7V to 20V power supply to the pads labeled POS9 and GND1 on the SMBus interface board.

5) Connect the 5V supply to the pads labeled VCC and GND on the MAX6692 EV kit.

6) Turn on the power supplies.

7) Start the MAX6692 program by opening its icon in the Start menu.

8) Wait until the program automatically detects the address of the MAX6648/MAX6649/MAX6692 and displays the user-interface panel (Figure 1).

9) If using the MAX6648 or MAX6649, select the appropriate device from the **Device** menu (Figure 1).

Detailed Description

User-Interface Panel

The user interface is easy to operate; use the mouse, or press the Tab and arrow keys to navigate. The check-boxes, edit fields, and radio buttons correspond to bits in the MAX6648/MAX6649/MAX6692 registers. Clicking on them generates the correct SMBus command and updates the registers. **Note:** Words in boldface are user-selectable features in the software.

Temperature

The MAX6648/MAX6649/MAX6692 monitors its own temperature and the temperature of an external diode. Both temperature measurements are capable of either 8-bit or 11-bit (extended) resolution; 8-bit resolution results in temperature resolution of 1°C/LSB. Extended resolution results in temperature resolution of 0.125°C/LSB. Enable extended resolution by selecting the **Extended Resolution** checkbox (Figure 1).

Read the temperatures by clicking on the **Read Temp** buttons (Figure 1). The temperature is shown to the right of the buttons.

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The MAX6648/MAX6649/MAX6692 have high, low, and critical limit registers. Temperature exceeding either the high- or low-limit registers generates an alert interrupt. Exceeding the critical limit generates an overtemperature (OVERT) alarm.

Read the high, low, and critical limits by clicking on the **Read High**, **Read Low**, or **Read Critical** buttons, respectively (Figure 1). The value (in Celsius) is shown to the right of the button. Change the high, low, and critical temperature limits by entering the value (in Celsius) into the appropriate edit field. Pressing Enter, after typing in the new value, updates the internal register.

The MAX6648/MAX6649/MAX6692 include hysteresis on the overtemperature alarm to prevent the OVERT pin from oscillating. The hysteresis sets the amount the temperature must decrease from the critical limit to de-assert the OVERT pin.

Read the hysteresis register by clicking on the **Read Hysteresis** button (Figure 1). The value (in Celsius) is shown to the right of the button.

Change the hysteresis by entering the value (in Celsius) into the edit field. Pressing Enter, after typing in the new value, updates the internal register.

External Diode

The MAX6648/MAX6649/MAX6692 remote temperature sensors are optimized for use with a diode-connected transistor whose ideality factor is equal to 1.008. Transistors with different ideality factors produce different remote temperature readings. Some typical discrete transistors may produce readings that vary up to 3°C from the correct value. Refer to the Maxim website (maxim-ic.com) Application Note: *Compensating for Ideality Factor and Series Resistance Differences Between Thermal Sense Diodes* for additional information.

Configuration

The configuration register has two functions. Figure 2 shows the checkboxes that configure the register. Each checkbox corresponds to a bit in the register. **Mask Alert** disables the ALERT interrupts. **STOP** places the MAX6648/MAX6649/MAX6692 in software standby mode.

Fault Queue

The fault queue determines how many times the limits have to be violated before the ALERT is set. Read the fault queue by clicking on the **Read Fault Queue** button (Figure 2). Change the fault queue by clicking on the radio button next to the desired number of faults.

Conversion Rate

The conversion rate sets the number of temperature samples the MAX6648/MAX6649/MAX6692 take per second. **Note:** The MAX6648/MAX6649/MAX6692 operate up to 4Hz; however, the EV kit software reads the device a maximum of two times a second (2Hz).

Read the conversion rate register by clicking on the **Read Conversion Rate** button (Figure 3). Change the conversion rate by clicking on the radio button next to the desired frequency.

Status

The Status box displays the critical and fault conditions that occur. It also displays BUSY if the MAX6648/MAX6649/MAX6692 are performing a conversion at the time that the status is read. The critical and fault conditions are Internal Hot Limit, Internal Cold Limit, External Hot Limit, External Cold Limit, Diode Open, Internal Critical Limit, and External Critical Limit. These conditions indicate that the temperature has exceeded one of the limits. Diode Open indicates that the external diode is open.

Read the status by clicking on the **Read Status** button.

Alert

The message ALERT appears in the Alert box when an interrupt condition occurs unless the configuration register is set to mask the alert. The cause of the interrupt is shown in the status box. To clear the interrupt, first eliminate the condition that caused it and then click on **Read Alert**.

Automatic Read

The program polls the device for new temperature and status data a maximum two times a second (2Hz). To disable the polling of data, deselect **Automatic Read** on the **Action** menu.

Data Logging

Select **Data Logging** on the **Action** menu to activate data logging. Data logging saves temperature, voltage, and status data to a text file that includes a time/date stamp next to each data point. If Automatic Read is enabled, data is sampled at 2Hz; however, the data is logged to the file only if the temperature or status has changed. This slows the growth of the data-logging file. When Automatic Read is disabled, the data is logged each time **Read All** is selected on the **Action** menu. To stop data logging, deselect **Data Logging** on the **Action** menu.

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Simple SMBus Commands

There are two methods for communicating with the MAX6648/MAX6649/MAX6692: through the normal user-interface panel or through the SMBus commands available by selecting **MAXSMBus..** on the **Debug** menu. A display pops up that allows the SMBus protocols, such as Read Byte and Write Byte, to be executed. To stop normal user-interface execution so that it does not override the manually set values, turn off the update timer by deselecting **Automatic Read** on the **Action** menu.

The SMBus dialog boxes accept numeric data in binary, decimal, or hexadecimal. Hexadecimal numbers should be prefixed by $ or 0x. Binary numbers must be exactly eight digits. **Note:** In places where the slave address asks for an 8-bit value, it must be the 7-bit slave address of the MAX6648/MAX6649/MAX6692 with the last bit set to 1 for a read operation and zero for a write.

Jumper JU1

Jumper JU1 connects the 2N3906 transistor as the external diode. To use a different diode, cut the trace short the two pins of JU1, and connect the diode (through twisted-pair wire) to the DXP and DXN pads.
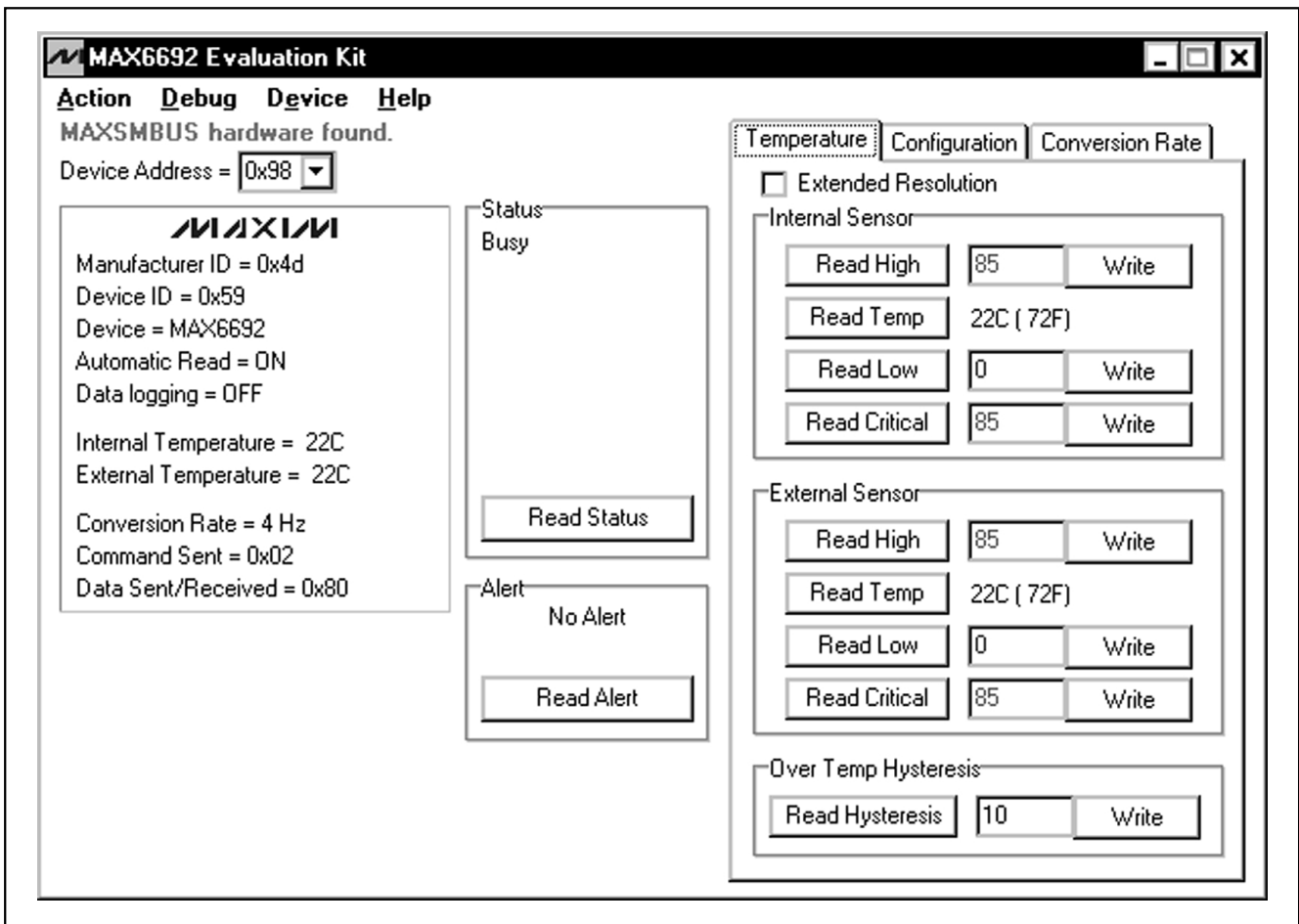
Figure 1. Main Window for the MAX6692 EV Kit Software
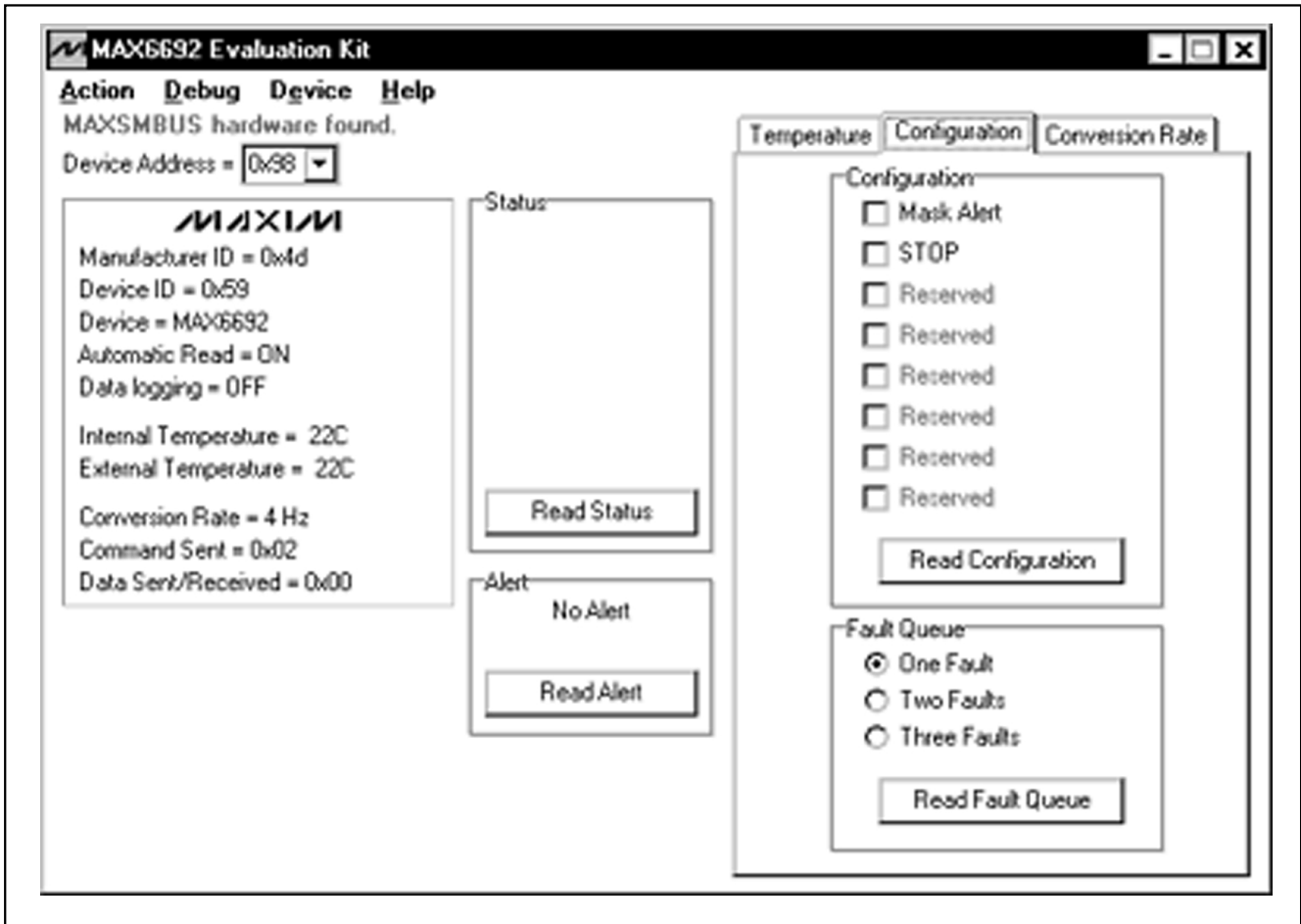
Figure 2. MAX6692 EV Kit Software Showing the Configuration Panel
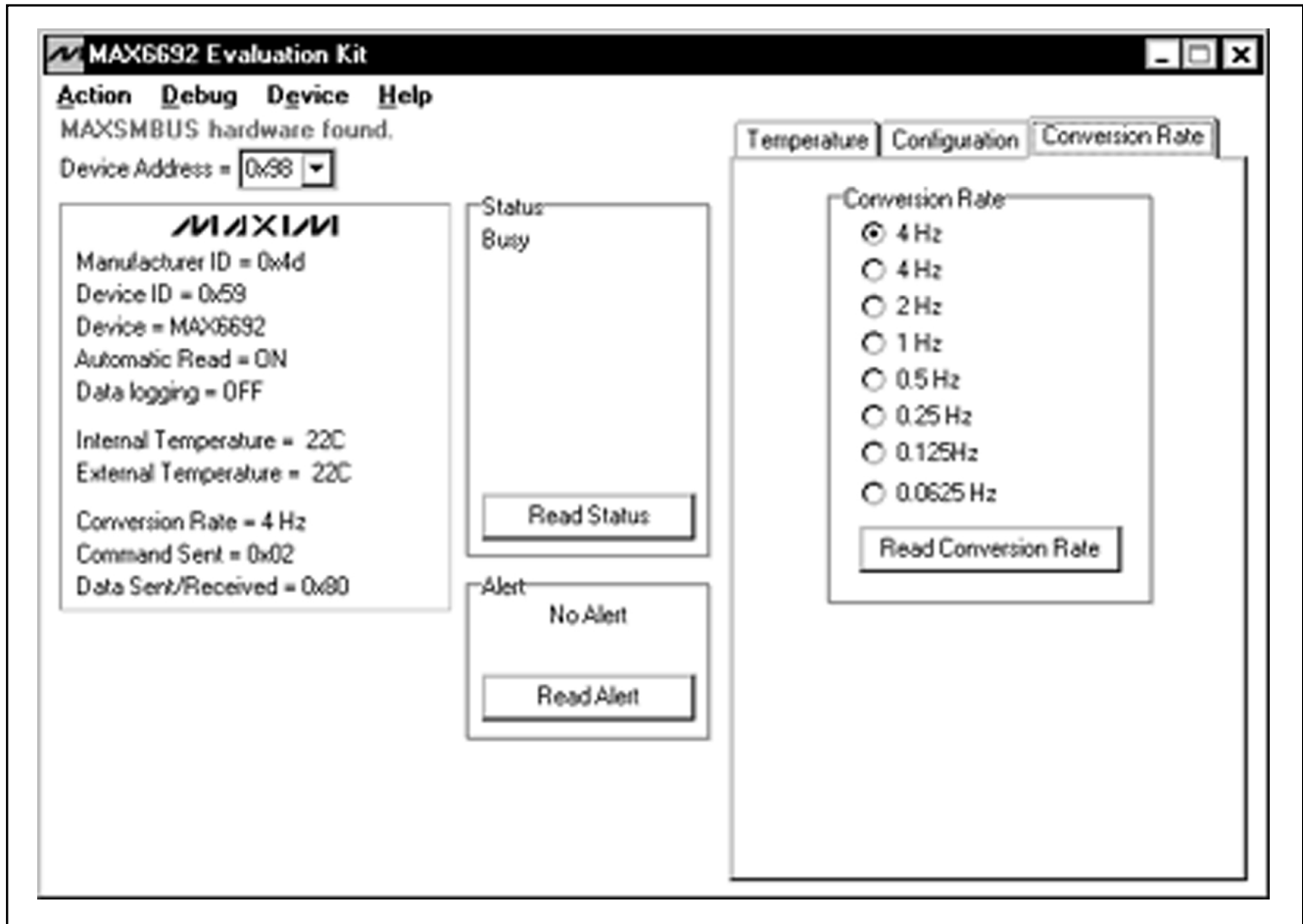
Figure 3. MAX6692 EV Kit Software Showing the Conversion Rate Panel
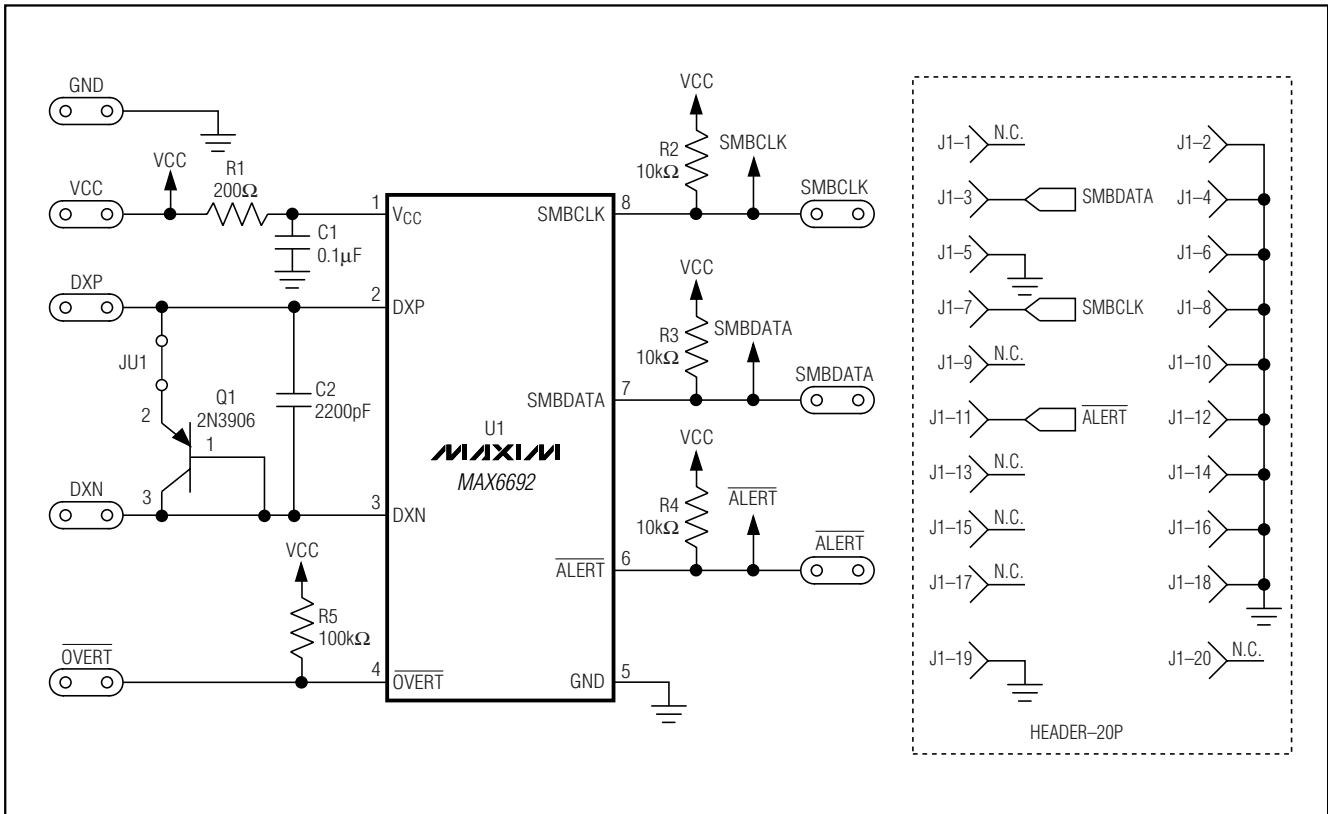
Figure 4. MAX6692 EV Kit Schematic

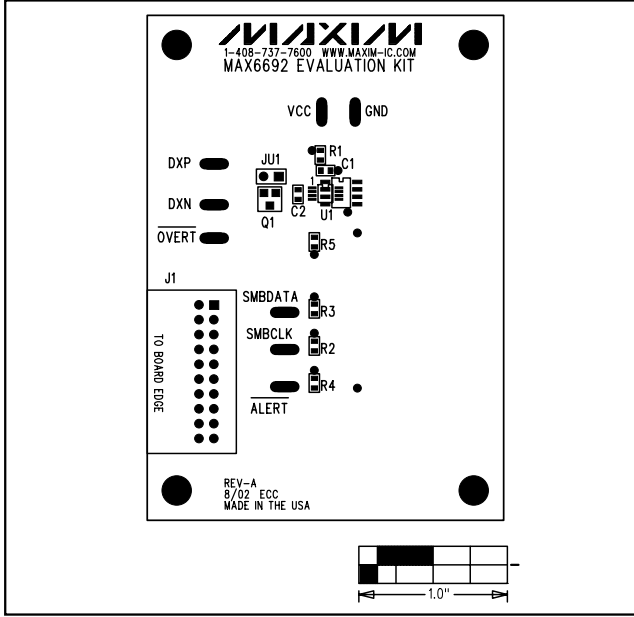# MAX6692 Evaluation System/Evaluation Kit

Figure 5. MAX6692 EV Kit Component Placement Guide—
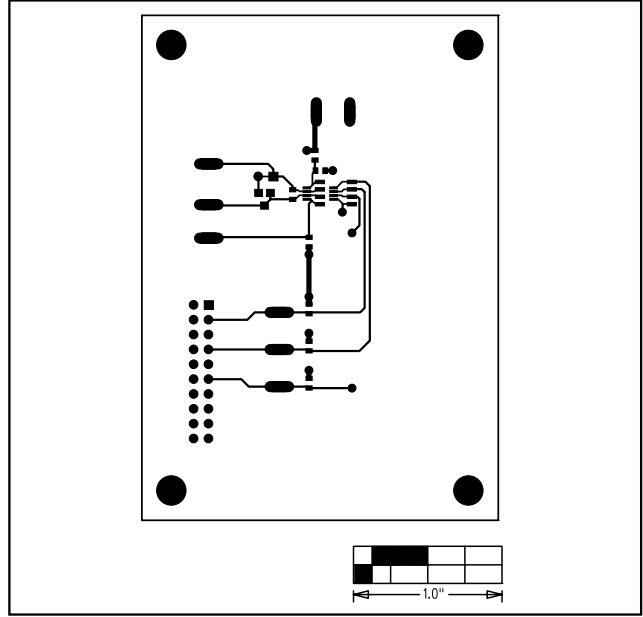Component Side

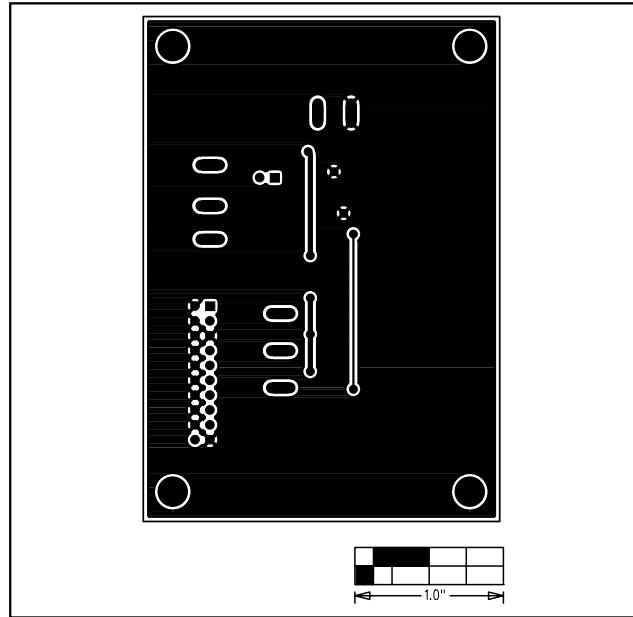Figure 6. MAX6692 EV Kit PC Board Layout—Component Side

Figure 7. MAX6692 EV Kit PC Board Layout—Solder Side

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