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MAX6651 Evaluation Kit/Evaluation System

Evaluate: MAX6651

General Description

The MAX6651 evaluation kit (EV kit) is an assembled and tested printed-circuit board (PCB) that demonstrates the MAX6651 intelligent fan controller IC. Windows® 98SE/2000/XP-compatible software provides a handy user interface to exercise the MAX6651's features. Order the MAX6651 EV system for complete evaluation of the MAX6651, including a Maxim SMBus™ interface board (CMAXQUSB). Order the MAX6651 EV kit if you already have an SMBus interface.

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

Features

♦ **Proven PCB Layout**

♦ **Convenient On-Board Test Points**

♦ **Fully Assembled and Tested**

♦ **EV System Includes USB Connectivity**

Ordering Information

PART	TEMP RANGE	INTERFACE TYPE
MAX6651EVKIT	0°C to +70°C*	User supplied
MAX6651EVCMAXQU	0°C to +70°C*	Windows software

*This limited temperature range applies to the EV kit PCB only. The MAX6651 IC temperature range is -40°C to +85°C.

Component Lists

MAX6651 EV Kit

DESIGNATION	QTY	DESCRIPTION
C1	1	10µF, 25V radial leaded electrolytic capacitor
C2	0	Open
C3	1	0.1µF ceramic capacitor (1206)
J1–J5, J7–J12	11	2-pin headers
LED1	1	Light-emitting diode
P1	1	2 x 10 right-angle socket SamTec SSW-110-02-S-D-RA
Q1	1	TO-220 logic-level N-channel FET International Rectifier IRFZ24N (Rdson < 0.1Ω at 5Vgs, 30Vbdss)
	1	Heatsink, thermalloy 6028
	1	No. 4 nut
	1	4-40 x 1/4in machine screw
R1	1	10kΩ ±1% resistor (1206)
R2	1	100kΩ ±1% resistor (1206)
R3	1	560Ω ±5% resistor (1206)
R4–R8	5	49.9kΩ ±1% resistors (1206)
RP1	1	SIP resistor network, 10kΩ, 6 pins, common
U1	1	MAX6651EEE
—	7	Shunts (J1, J5, J8–J12)
—	1	PCB: MAX6651 Evaluation Kit

MAX6651 EV System

PART	QTY	DESCRIPTION
MAX6651EVKIT	1	MAX6651 EV kit
CMAXQUSB+	1	Serial interface board

+Denotes lead-free and RoHS-compliant.

Quick Start

Recommended Equipment

Before beginning, the following equipment is needed:

• MAX6651 EV system:

    MAX6651 EV kit

    Maxim CMAXQUSB interface board (USB cable included)

• A user-supplied Windows 98SE/2000/XP computer with a spare USB port

• A 12VDC power supply

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.

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For price, delivery, and to place orders, please contact Maxim Distribution at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

Procedure

The MAX6651 EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power supply until all connections are completed.**

1) Visit the Maxim website (www.maxim-ic.com/evkit-software) to download the latest version of the EV kit software, 6651Rxx.ZIP.

2) Install the MAX6651 evaluation software on your computer by running the INSTALL.EXE program. The program files are copied and icons are created in the Windows **Start** menu.

3) On the CMAXQUSB board, ensure the shunt of jumper JU1 is in the 5V position.

4) Carefully connect the boards by aligning the 20-pin connector of the MAX6651 EV kit with the 20-pin header of the CMAXQUSB interface board. Gently press them together.

5) Also connect the 12VDC supply to the MAX6651 EV kit at the pad labeled FAN SUPPLY (±) (the MAX6651's +5V supply comes from the CMAXQUSB board).

6) Ensure that the jumper settings are in the default position (Table 1).

7) Connect a 12V tachometer-output fan to the FAN0+, FAN0-, and FAN0T terminals. Additional fans may be connected at FAN1+/FAN1-, FAN2+/FAN2-, and FAN3+/FAN3-. Optional tachometer inputs FAN1T, FAN2T, and FAN3T may be used to monitor the auxiliary fans' speed.

8) Connect the USB cable from the PC to the CMAXQUSB board. 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 CMAXQUSB and reconnect it. Administrator privileges are required to install the USB device driver on Windows 98SE/2000/XP. Refer to the TROUBLESHOOTING_USB.PDF document included with the software if you have any problems during this step.

9) 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\MAX6651** (or the directory chosen during installation) using the **Browse** button.

10) Turn on the power supply. The fan will turn on at full speed.

11) Start the MAX6651 program by opening its icon in the Windows **Start** menu.

12) Click the **Registers** panel at the top of the program. In the **Config** register, drop down the full-on combo box and choose closed-loop mode.

13) In the **Speed** register, type in the value "100." Adjust this value up or down to choose the target fan speed. Increasing the **Speed** value makes the closed-loop set point a slower fan speed.

14) Observe measured fan speed in the **Tach0** tachometer display.

Detailed Description of Software

The main window (Figure 1) shows a block diagram of the MAX6651 EV kit, which allows the user to configure the **Fan Mode** and **Speed**. The **Registers** tab (Figure 2) shows the register values of the MAX6651. Register bit fields are presented as drop-down combo boxes. The **Speed** and **Tach0-3** register values are also translated into the corresponding fan (RPMs).

Detailed Description of Hardware

U1, the MAX6651, is an intelligent fan controller. MOSFET Q1 regulates the fan voltage (measured by the FB input). In closed-loop mode, adjusting the fan voltage set point regulates the main fan's tachometer output.

PCB Layout Tips

For best results, keep the Q1 gate drive trace as short as possible.

See Figure 3, which shows the MAX6651 EV kit schematic, and refer to the MAX6651 IC data sheet.
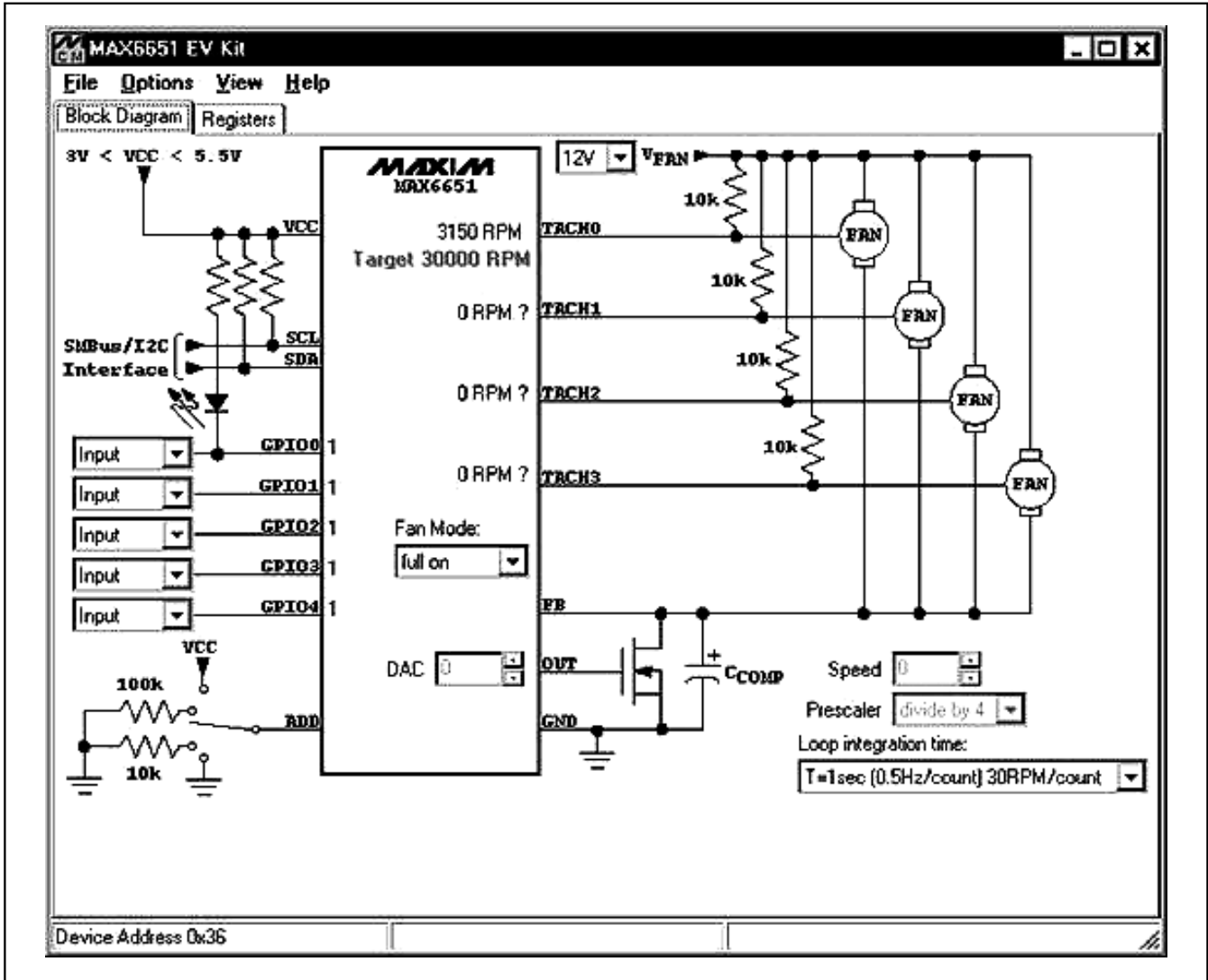
Figure 1. MAX6651 EV Kit Software Main Window (Block Diagram Tab)
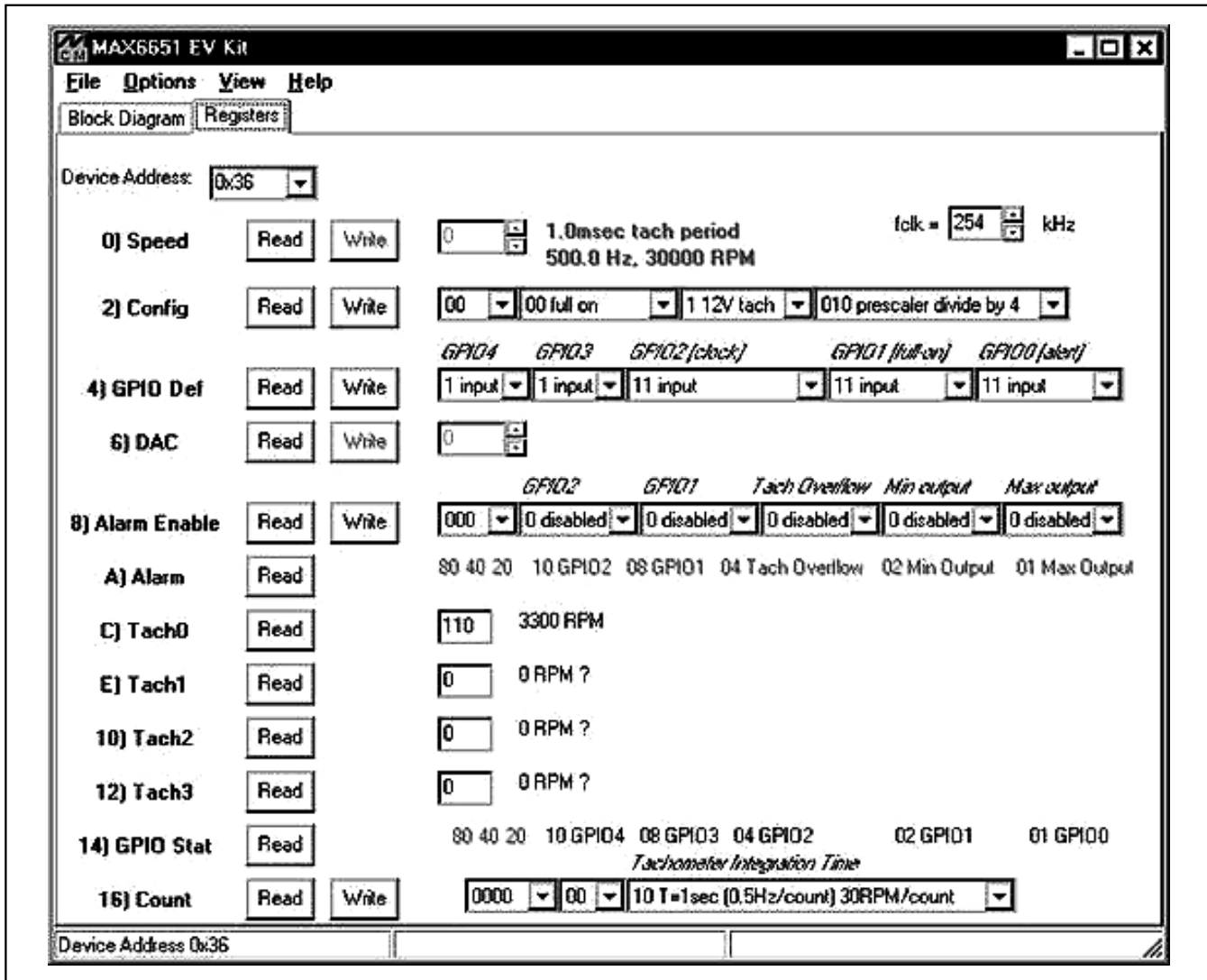
Figure 2. MAX6651 EV Kit Software Main Window (Registers Tab)

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MAX6651 Evaluation Kit/Evaluation System

Table 1. Jumper Functions

JUMPER	POSITION	FUNCTION
J1	Open*	See Table 2.
J2	Open*	See Table 2.
J3	Open*	See Table 2.
J4	Closed*	See Table 2.
J5	Closed*	Connect on-board LED to GPIO0 output.
J5	Open	Disconnect on-board LED from GPIO0 output.
J7	Closed	Connect GPIO0 to GPIO1.
J7	Open*	GPIO0 is not connected to GPIO1.
J8	Closed*	Fan 3 tachometer connects to FAN3T directly.
J8	Open	Fan 3 tachometer connects to FAN3T through 49.9kΩ resistor R8.
J9	Closed*	Fan 2 tachometer connects to FAN2T directly.
J9	Open	Fan 2 tachometer connects to FAN2T through 49.9kΩ resistor R7.
J10	Closed*	Fan 1 tachometer connects to FAN1T directly.
J10	Open	Fan 1 tachometer connects to FAN1T through 49.9kΩ resistor R6.
J11	Closed*	Fan 0 tachometer connects to FAN0T directly.
J11	Open	Fan 0 tachometer connects to FAN0T through 49.9kΩ resistor R5.
J12	Closed*	FB feedback input connects to Q1 drain directly.
J12	Open	FB feedback input connects to Q1 drain through 49.9kΩ resistor R4.

*Default position.

Table 2. Address Selection Jumpers

J1	J2	J3	J4	ADDRESS
Closed	Open	Open	Open	1001 011R
Open	Closed	Open	Open	0011 111R
Open	Open	Closed	Open	1001 000R
Open*	Open*	Open*	Closed*	0011 011R

*Default position.

Evaluate: MAX6651
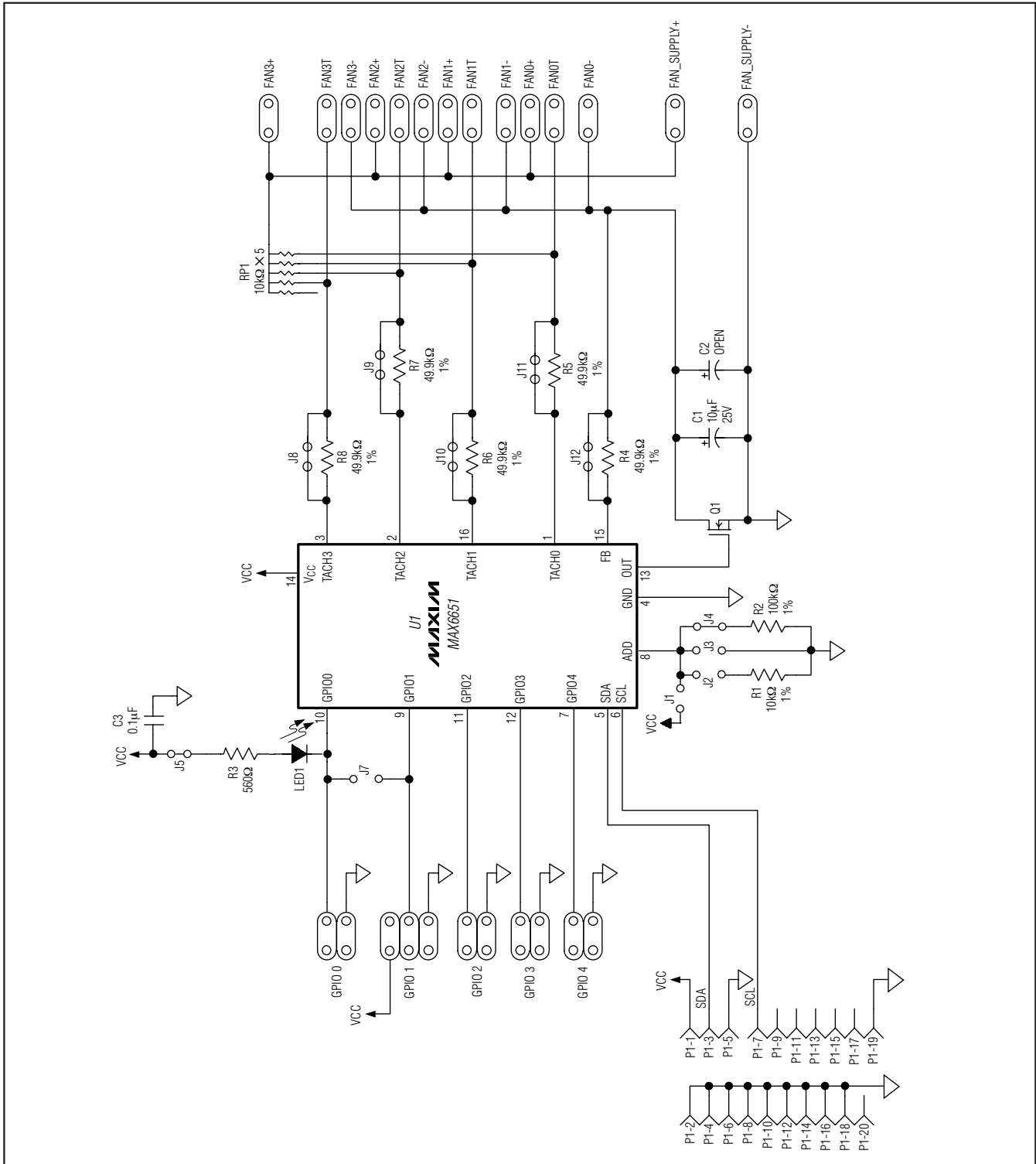

Figure 3. MAX6651 EV Kit Schematic

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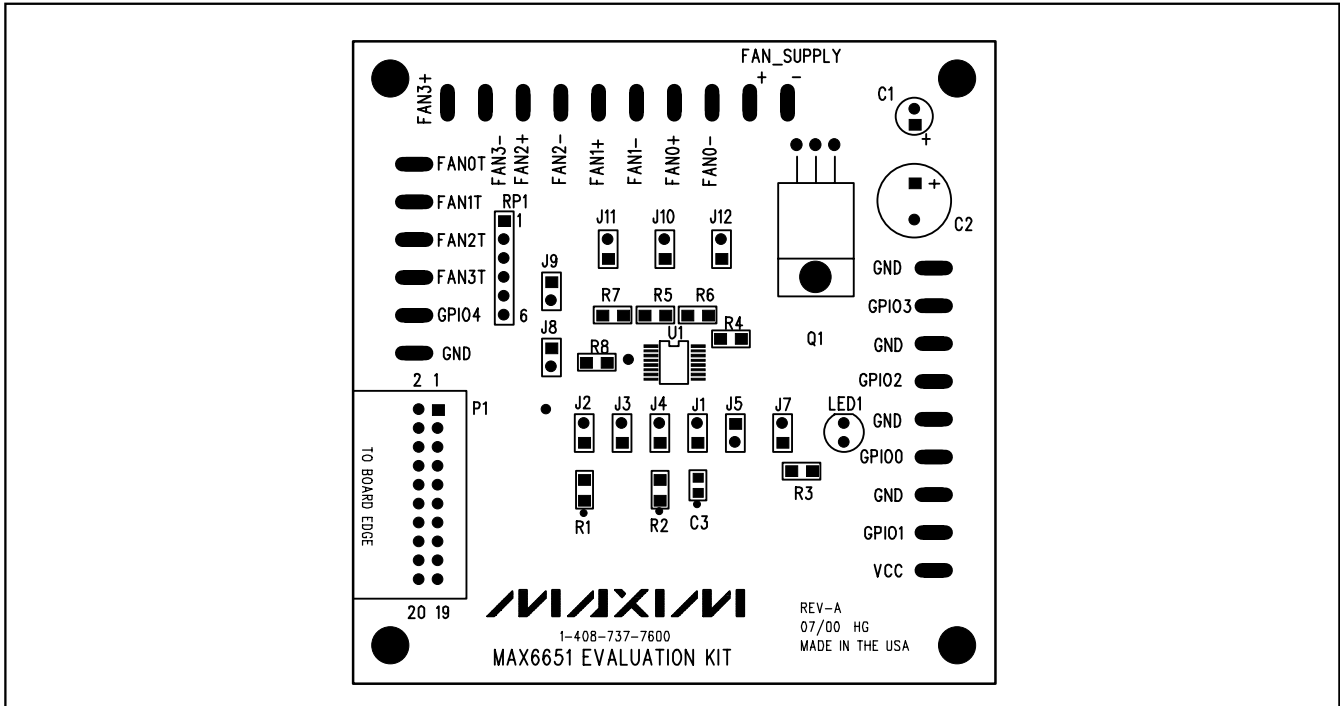# MAX6651 Evaluation Kit/Evaluation System
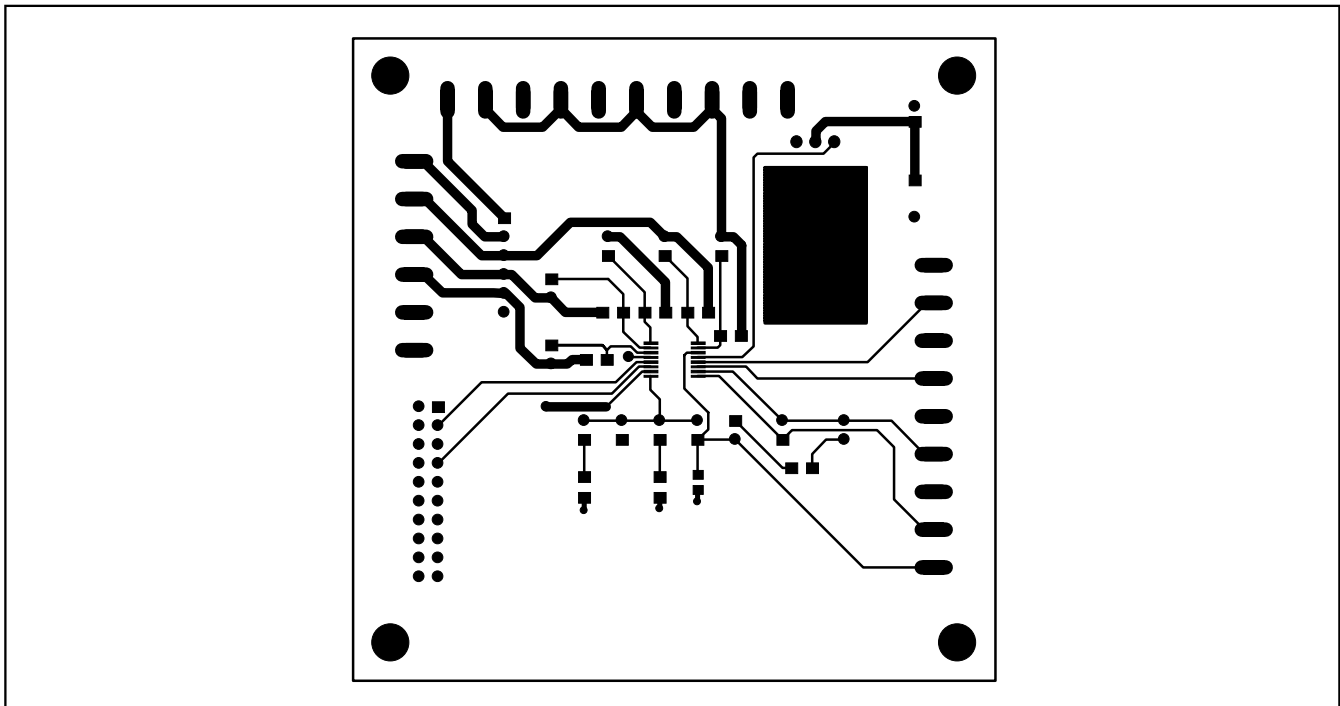
Figure 4. MAX6651 EV Kit Component Placement Guide—Component Side

Figure 5. MAX6651 EV Kit PCB Layout—Component Side