19-2051; Rev 0; 5/01

MAXIM

MAX6654 Evaluation System

Evaluates: MAX6654

General Description

The MAX6654 evaluation system (EV system) consists of a MAX6654 evaluation kit (EV kit) and a companion system management bus (SMBus™) interface board.

The MAX6654 EV kit is an assembled and tested PC board that demonstrates the MAX6654 temperature sensor. It monitors both the junction temperature of the MAX6654 and the temperature of an external diode-connected transistor, and converts the temperature to 8-bit or 11-bit (extended resolution mode), 2-wire serial data. A 2N3906 temperature-sensor transistor comes soldered to the board in a SOT23 package, but it 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 SMBus 2-wire interface. Windows® 95/98/2000-compatible software provides a user-friendly interface to exercise the features of the MAX6654. The program is menu driven and offers a graphic interface with control buttons and status display.

Order the MAX6654EVSYS for a complete IBM PC-based evaluation of the MAX6654. Order the MAX6654EVKIT if you already have an SMBus interface.

Windows is a registered trademark of Microsoft Corp.

SMBus is a trademark of Intel Corp.

I²C is a trademark of Philips Corp.

Features

- **Measures and Displays Remote Sensor Temperature**
- **Programmable Alarms and Configuration**
- **Operating Temperature Ranges**
  -55°C to +125°C (Remote Sensor)
  0°C to +70°C (Board)
- **SMBus/I²C™-Compatible Interface**
- **Easy-to-Use Menu-Driven Software**
- **Assembled and Tested**
- **Includes Windows 95/98/2000-Compatible Software and Demo PC Board**

Ordering Information

PART	SMBus INTERFACE TYPE	IC PACKAGE
MAX6654EVKIT	Not included	16 QSOP
MAX6654EVSYS	MAXSMBUS	16 QSOP

Note: *The MAX6654 EV kit software is provided with the MAX6654EVKIT. However, the MAXSMBUS board is required to interface the EV kit to the computer when using the software.*

MAX6654EVSYS Component List

PART	QTY	DESCRIPTION
MAX6654EVKIT	1	MAX6654 EV kit
MAXSMBUS	1	SMBus interface board

MAX6654EVKIT Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	0.1µF, 16V X7R ceramic capacitor Taiyo Yuden EMK107BJ104KA or Murata GRM39X7R104K016
C2	1	2200pF, 50V X7R ceramic capacitor
J1	1	2 x 10 right-angle female receptacle
JU1, JU2, JU3	3	3-pin headers
JU4, JU5, JU6	0	Not installed

DESIGNATION	QTY	DESCRIPTION
Q1	1	PNP transistor Central Semiconductor CMPT3906 or Fairchild MMBT3906 or General Semiconductor MMBT3906 or On Semiconductor MMBT3906 or Vishay/Lite-On MMBT3906
R1	0	Not installed
SW1	1	Slide switch, 0.150in pitch
U1	1	MAX6654MEE
None	3	Shunts

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.

Quick Start

Before you begin, you will need the following equipment:

- An IBM PC-compatible computer running Windows 95/98/2000
- 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 SMBus interface board
- A DC power supply capable of supplying any voltage between +7V and +20V at 100mA

Procedure

1) Carefully connect the boards by aligning the 20-pin connector of the MAX6654 EV kit with the 20-pin header of the MAXSMBUS interface board. Gently press them together. The two boards should be flush against each other.
2) Make sure switch SW1 on the MAX6654 EV kit is in the OFF position.

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

3) Connect the power supply to the pads labeled POS9 and GND1 of the SMBus interface board.
4) Make sure JU3 is set to the 1-2 position.
5) Connect a cable from the computer's parallel port to the SMBus 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.
6) The MAX6654.EXE software program can be run from the floppy or hard drive. Use the Windows program manager to run the program. If desired, you may use the INSTALL.EXE program to copy the files and create 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.
7) Turn on the power supply.
8) Turn the EV kit on by moving SW1 to the ON position.
9) Start the MAX6654 program by opening its icon in the Start menu.
10) Observe as the program automatically detects the address of the MAX6654 and starts the main program.

    Note: The MAX6654 reads the address select pins at device power-up only.

Detailed Description

User-Interface Panel

The user interface is easy to operate. Use the mouse, or press the Tab key to navigate with the arrow keys. Each of the buttons corresponds to bits in the command and configuration bytes. By clicking on them, the correct SMBus write operation is generated to update the internal registers.

Note: Words in bold are user-selectable features in the software.

The program continually polls the device for new temperature data and status, and monitors for alert conditions. To disable the continuous polling of data, uncheck the **Automatic Read** checkbox. To change the T_{HIGH} and T_{LOW} threshold comparison registers, select the appropriate data field and type in the new value. Pressing Enter, after typing in the new values, updates the internal registers.

If an interrupt condition is generated by the temperature crossing one of the alarm threshold levels, the message ALERT will appear. To clear the interrupt, first eliminate the condition that caused it and then click on **Read Alert**. This action reads the Alert Response address, returns the value of the current MAX6654 slave address, and clears the interrupt. **Note:** The least significant bit (LSB) of the address is the read/write status bit; therefore, the address returned will be 1 higher.

To make single-shot conversions, check the **STOP** checkbox under Configuration Byte, and then click on the **One-Shot** button. Single-shot conversions can also be performed while the device is autoconverting. The

Component Suppliers

SUPPLIER	PHONE	FAX
Central Semiconductor	515-435-1110	515-435-1824
Fairchild	408-822-2000	408-822-2102
General Semiconductor	631-847-3000	631-847-3236
Murata	814-237-1431	814-238-0490
On Semiconductor	602-303-5454	602-994-6430
Taiyo Yuden	408-573-4150	408-573-4159
Vishay/Lite-On Diodes, Inc.	805-446-4800	805-446-4850

Note: *Please indicate you are using the MAX6654 when contacting these component suppliers.*

single-shot command overrides the automatic conversion. After the single shot is complete, the device returns to automatic operation.

Simple SMBus Commands

There are two methods for communicating with the MAX6654: through the normal user-interface panel or through the SMBus commands available from pressing the **MAXSMBUS** button. 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 that slaves the program to the conversion rate by unchecking the **Automatic Read** checkbox.

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 MAX6654 as determined by ADD0 and ADD1 with the last bit always set to 1.

Data Logging

Check the **Data Logging** checkbox to activate data logging. Data logging saves temperature 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 either the temperature or status change. This slows the growth of the data-logging file. When Automatic Read is disabled, the data is logged each time the **Read All** button is clicked. To stop data logging, uncheck the **Data Logging** checkbox.

Jumper and Switch Settings

Two jumpers set the MAX6654 slave address. The default address is 1001 110 (ADD0 = ADD1 = V_{CC}). JU1 corresponds to ADD0 and JU2 corresponds to ADD1; see Table 1 for a complete list of addresses. The MAX6654 must undergo a power-on reset for the new address to become effective.

The +5V supply voltage for the MAX6654 comes from the SMBus interface board. To evaluate the MAX6654 with a different voltage, cut the trace shorting the two pins of JU4 and apply a voltage to the VCC pad. A slide switch, SW1, is provided as a means to force a power-on reset of the MAX6654. This switch disables power to the device.

Evaluating PRC Mode

The MAX6654 includes a parasitic resistance cancellation (PRC) mode. In PRC mode, the effect of series resistance on the leads of the external diode is canceled. To test this feature, cut the trace shorting the two pins of JU5 and solder a 100Ω resistor at the R1 location on the board. Then check the **Parasitic Cancel** checkbox on the main display.

Using a Remote-Diode Sensor

The MAX6654 EV kit can be connected through a twisted pair to a remote diode close to your system. Cut the trace shorting the two pins of JU6 and solder the twisted pair from your remote diode to the pads labeled DXP and DXN.

Table 1. JU1 and JU2 Shunt Settings for SMBus Address

SHUNT LOCATION		
JU1 (ADD0)	JU2 (ADD1)	MAX6654 ADDRESS
2-3	2-3	0011 000
2-3	Open	0011 001
2-3	1-2	0011 010
Open	2-3	0101 001
Open	Open	0101 010
Open	1-2	0101 011
1-2	2-3	1001 100
1-2	Open	1001 101
1-2	1-2	1001 110

Table 2. JU3 Shunt Settings for $\overline{STBY}$

SHUNT LOCATION	$\overline{STBY}$ PIN	FUNCTION
1-2	Connected to VCC	In operate mode
Open	Connect an external signal to $\overline{STBY}$	
2-3	Connected to GND	In standby mode

MAX6654 Evaluation System

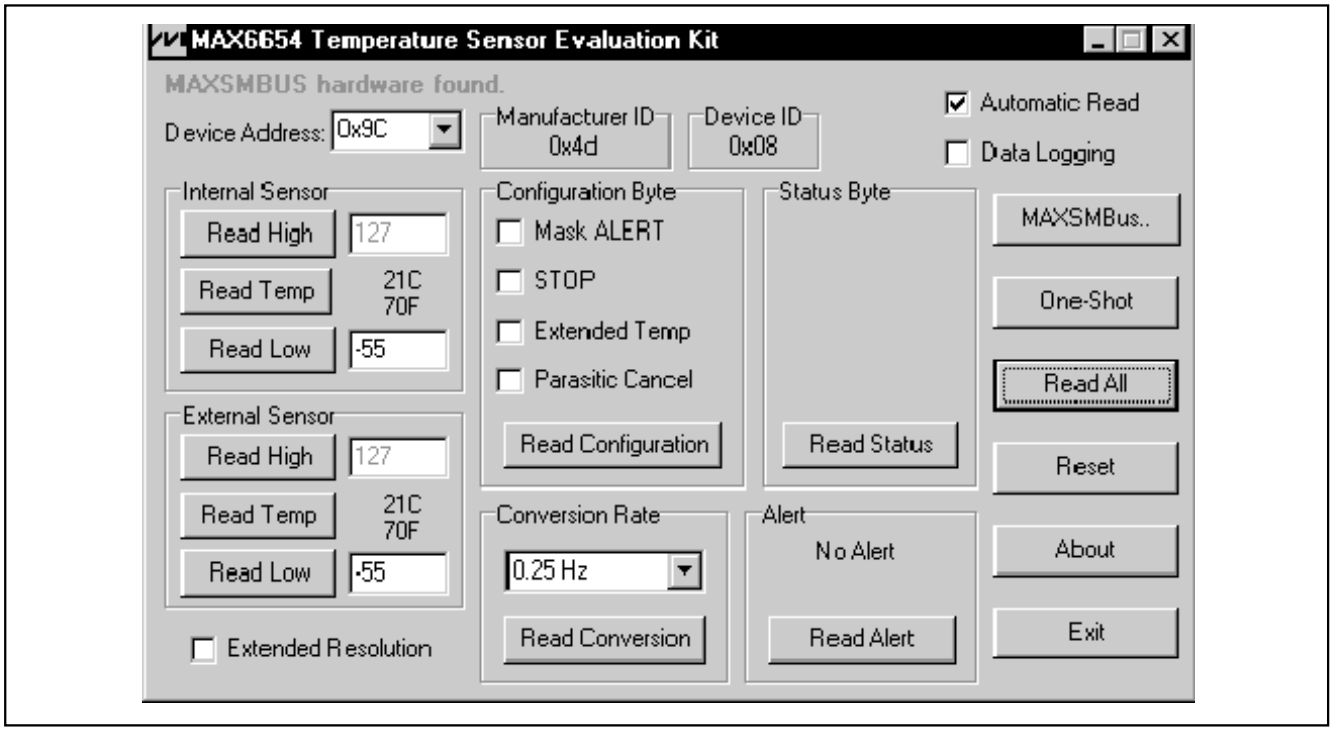

Figure 1. Main Display for MAX6654EVKIT

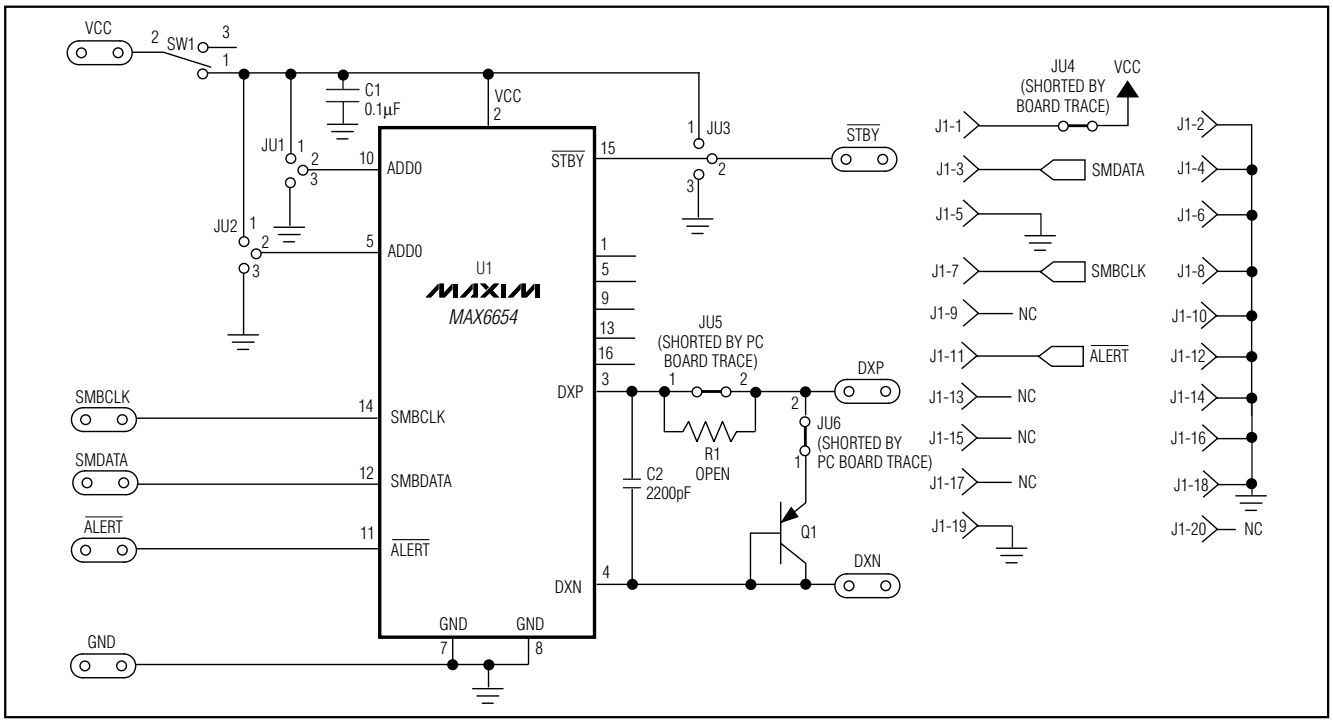

Figure 2. MAX6654 EV Kit Schematic

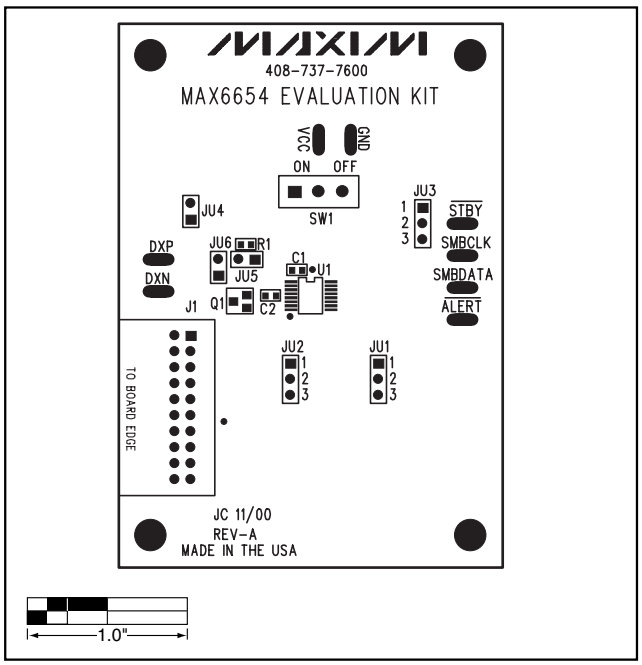

Figure 3. MAX6654 EV Kit Component Placement Guide— Component Side

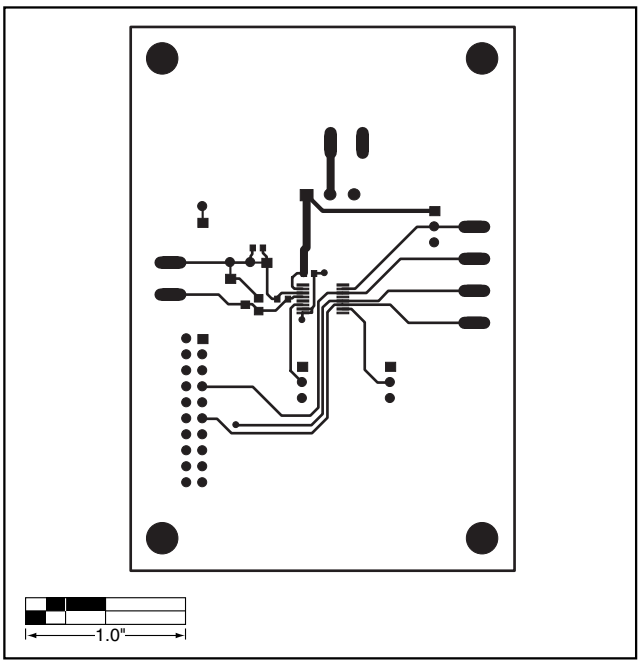

Figure 4. MAX6654 EV Kit PC Board Layout— Component Side

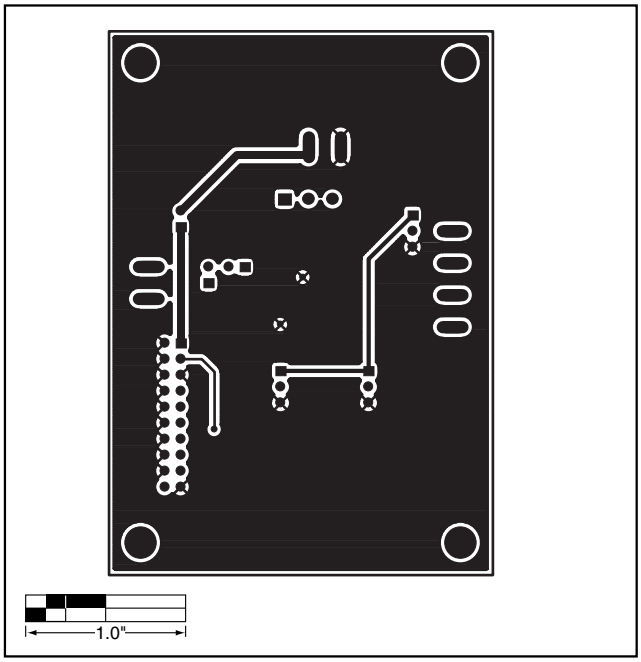

Figure 5. MAX6654 EV Kit PC Board Layout—Solder Side

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