

# MAXIM

## MAX1238 Evaluation Kit

**Evaluates: MAX1238**

### General Description

The MAX1238 evaluation kit (EV kit) is designed to evaluate the MAX1238. The MAX1238 is a 12-bit, 12-channel (six differential-channel) ADC with a 2-wire serial interface. The MAX1238 EV kit board supports three standard 2-wire interface speeds: standard mode (S-Mode), fast mode (F-Mode), and high-speed mode (HS-Mode). The software provided with this EV kit only supports S-Mode.

The provided Windows® 95/98 software uses the parallel (printer) port of an IBM-compatible PC to emulate a processor with a 2-wire interface (S-Mode). The Windows software also provides a friendly graphical-user interface (GUI) to exercise the features of the MAX1238 with control buttons and menus.

Order the MAX1238 EV kit for comprehensive evaluation of the MAX1238 using a personal computer with an available parallel port.

Windows is a registered trademark of Microsoft Corp.

### Features

- ◆ Proven PC Board Layout
- ◆ Windows 95/98 Evaluation Software
- ◆ 2-Wire Serial Interface
- ◆ Fully Assembled and Tested

### Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1238EVKIT	0°C to +70°C	16 QSOP

### MAX1238 EV Kit Files

INSTALL.EXE	Installation program
MAX1238.EXE	Application program

### Component Suppliers

SUPPLIER	PHONE	WEBSITE
Diodes Inc.	805-446-4800	www.diodes.com
TDK	847-803-6100	www.component.tdk.com

**Note:** Please indicate you are using the MAX1238 when contacting these component suppliers.

### Component List

DESIGNATION	QTY	DESCRIPTION
C1–C4, C10–C17	12	0.22µF ±10%, 10V X7R ceramic capacitors (0603) TDK C1608X7R1A224KT
C5	1	100pF ±5%, 50V COG ceramic capacitor (0603) TDK C1608C0G1H101JT
C6, C9	2	0.1µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104KT
C7, C8	2	10µF ±20%, 16V X5R ceramic capacitors (1210) TDK C3225X5R1C106M
D1–D4	4	Zener diodes, Vz = 5.1V Diodes Inc. BZX84C5V1 3-pin SOT23 top mark KZ2
FB1	1	Surface-mount ferrite bead (0603) TDK MMZ1608B601C

DESIGNATION	QTY	DESCRIPTION
J1	1	Male DB-25 right-angle plug Mouser 152-3325
R1–R4, R17–R24	12	14Ω ±1% resistors (0603)
R5, R7	2	Open (1206) (not installed)
R6, R8, R9, R13	4	47kΩ ±5% resistors (1206)
R10, R12, R14, R16	4	100Ω ±5% resistors (1206)
R11, R15	2	4.7kΩ ±5% resistors (0603)
U1	1	MAX1238EEE (16-pin QSOP)
U2	1	Open-collector logic inverter (14-pin SO) SN74HC05D
None	1	PC board, MAX1238 EV kit
None	1	3.5in software disk, MAX1238 EV kit
None	1	MAX1238 data sheet

# MAX1238 Evaluation Kit

## Quick Start

### Recommended Equipment

Before you begin, the following equipment is needed:

- A fixed +5VDC power supply
- An IBM-compatible PC with Windows 95/98
- An available parallel port (DB-25 female connector on back of PC)
- A standard 25-pin, straight-through, male-to-female cable to connect the computer's parallel port to the MAX1238 EV kit board

### Procedure

- 1) Connect a cable from the computer's parallel port to the MAX1238 EV kit board. Use a 25-pin straight-through, female-to-male cable.
- 2) Install the MAX1238 EV kit software on your computer by running the INSTALL.EXE program on the floppy disk. The program files are copied and icons are created in the **Programs** section within the **Start** menu.

- 3) Connect a +5VDC power supply between the +5V and the GND pads of the MAX1238 EV kit board.
- 4) Start the MAX1238 EV kit program by clicking its icon in the **Programs** section within the **Start** menu.
- 5) Apply an analog input voltage (0V to +VREF) between the AIN0 and GND pads of the MAX1238 EV kit board.
- 6) The program automatically detects the MAX1238 EV kit board and displays **2-Wire Hardware Detected** in green. The **AIN0** label automatically displays the voltage applied to the pad labeled AIN0 on the MAX1238 EV kit board.

## Detailed Description of Software

The evaluation software's main window (shown in Figure 1) controls the setup byte and configuration byte. It also displays the voltage and output code of the input signal(s), depending on the configuration of the MAX1238.

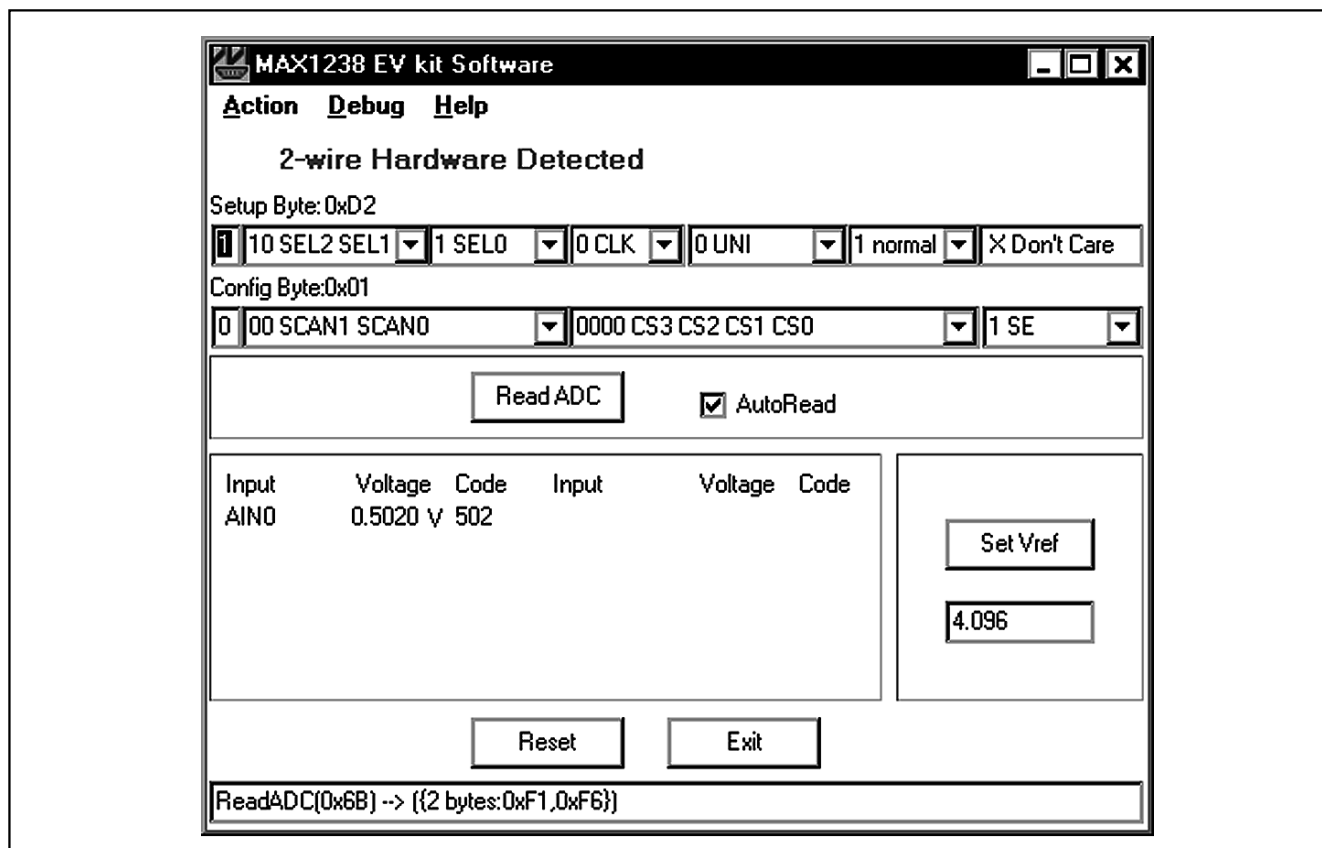


Figure 1. MAX1238 Evaluation Software Main Window

# MAX1238 Evaluation Kit

## Read ADC

The **Read ADC** button manually reads the MAX1238 while using the current setup and configuration byte settings. When the **AutoRead** checkbox is checked, the software automatically reads the MAX1238 approximately every 300ms. **AutoRead** allows users to modify the setup and configuration bytes on-the-fly without having to manually press the **Read ADC** button each time.

## Setup Byte

The **Setup Byte** always begins with a start bit value of one. The **SEL2**, **SEL1**, and **SEL0** bits control the state of the reference. The **CLK** bit selects either internal clock or external clock mode. The **UNI/BIP** bit selects either unipolar or bipolar mode. Setting **RST** to zero resets the configuration register. The setup register remains unchanged. The **X Don't Care** bit can be ignored. Refer to the MAX1238 data sheet for more information on the **SEL2**, **SEL1**, and **SEL0** bits within the **Setup Byte**.

## Config Byte

The **Config Byte** always begins with a start bit value of zero. The **SCAN1** and **SCAN0** bits select the scanning mode. The **CS3**, **CS2**, **CS1**, and **CS0** bits select one of the 12 analog input channels. The **SE/DIFF** bit selects either single-ended or differential mode. Refer to the MAX1238 data sheet for more information on the **SCAN1**, **SCAN0**, **CS3**, **CS2**, **CS1**, and **CS0** bits within the **Config Byte**.

## Reference Voltage

The evaluation software assumes a +4.096V reference voltage, unless otherwise specified. To override the internal 4.096V reference value, ensure bit **SEL2** equals zero and bit **SEL1** equals one within the **Setup Byte**. Then, apply the new reference voltage at the VREF pad on the board, type in the new reference voltage, without the volt unit, and press the Set **Vref** button. The EV kit software uses the value typed in the  $V_{ref}$  field to translate the digital code to a voltage.

## Keyboard Navigation

When you type on the keyboard, the system must know which control should receive the keys. Press the **TAB** key to move the keyboard's focus from one control to the next. The focused control is indicated by a dotted outline. **SHIFT + TAB** moves the focus to the previously focused control. Buttons respond to the keyboard's **SPACE** bar. Some controls respond to the keyboard's **UP** and **DOWN** arrow keys. Activate the program's menu bar by pressing the **F10** key, and then press the letter of the menu item you want. Most menu items have one letter underlined, indicating their shortcut key.

## Detailed Description of Hardware

The MAX1238 is a 12-channel (six differential-channel) 12-bit ADC with a 2-wire serial interface. The open-collector inverter (U2) interfaces the PC parallel port to the 2-wire serial interface. U2 and the associated circuitry are only required when interfacing to the parallel port. Power the MAX1238 EV kit from a +5VDC power supply. To prevent damage to the MAX1238 EV kit, do not exceed +5.5VDC on the supply.

## User-Supplied 2-Wire Interface

The MAX1238 EV kit provides a proven PC board layout and software to evaluate the features of the MAX1238. The Windows software only supports a 2-wire serial interface in S-Mode. To evaluate the MAX1238 with a user-supplied 2-wire serial interface in F-Mode or HS-Mode, do the following:

- 1) Disconnect the MAX1238 EV kit from the PC parallel port.
- 2) Install 3k $\Omega$  resistors at locations R5 and R7. (This resistor value may require optimization for each system.)
- 3) Connect the user-supplied 2-wire bus to the SDA, SCL, and GND pads. (Connect to the GND pad nearest the 5V pad on the MAX1238 EV kit board.)
- 4) Refer to the MAX1238 data sheet to ensure all timing specifications are met.

# MAX1238 Evaluation Kit

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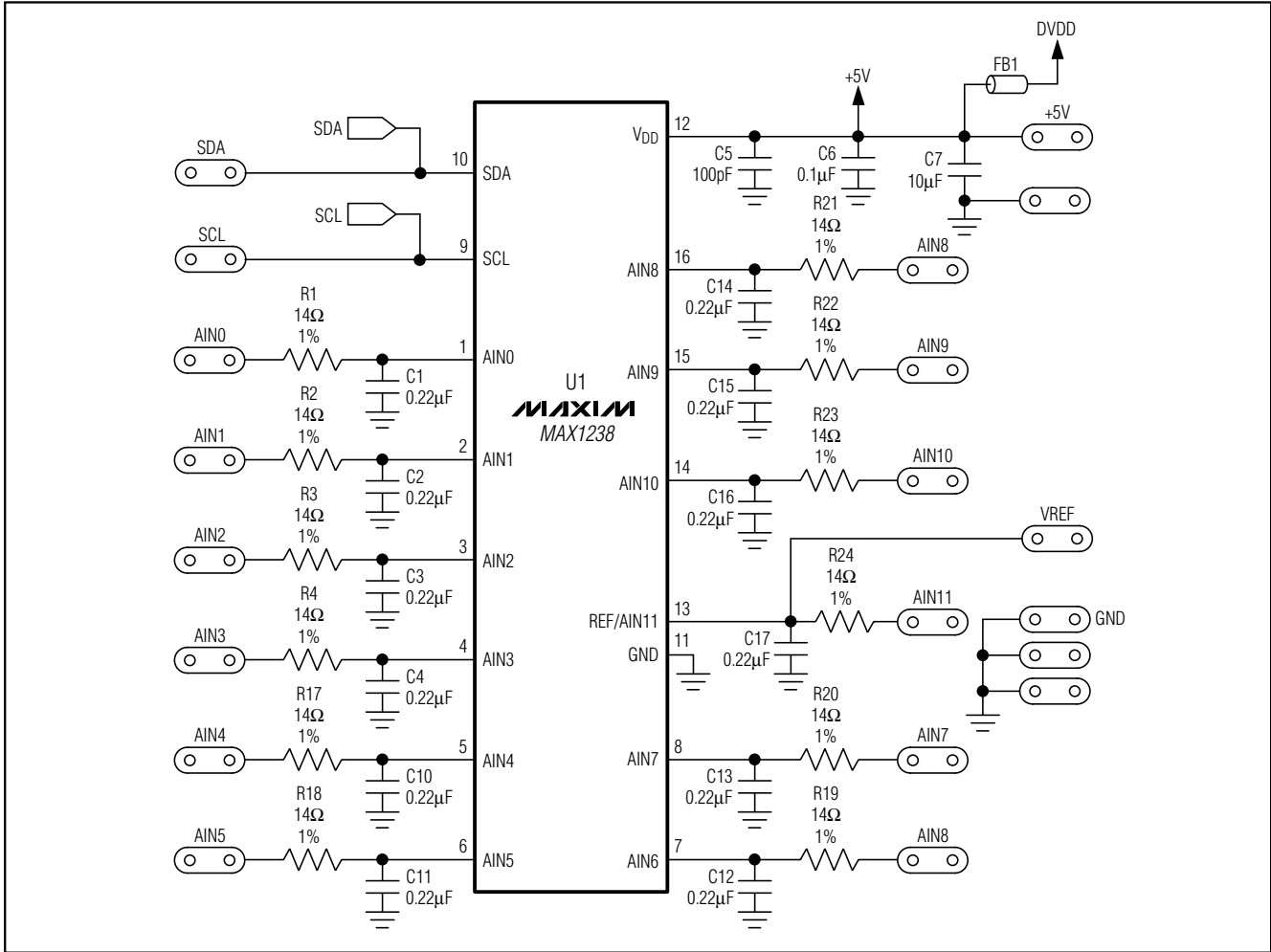


Figure 2. MAX1238 EV Kit Schematic (Sheet 1 of 2)

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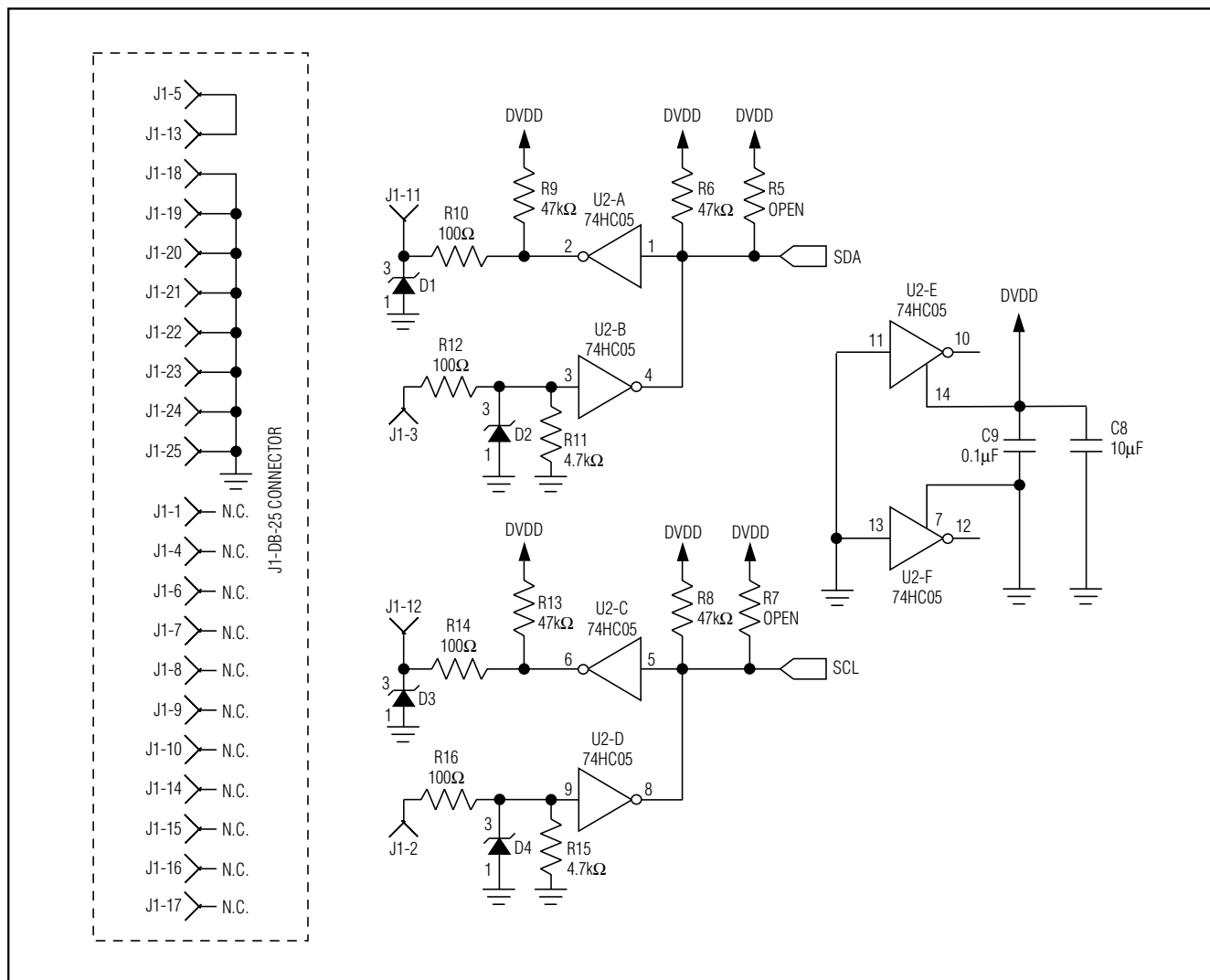


Figure 2. MAX1238 EV Kit Schematic (Sheet 2 of 2)

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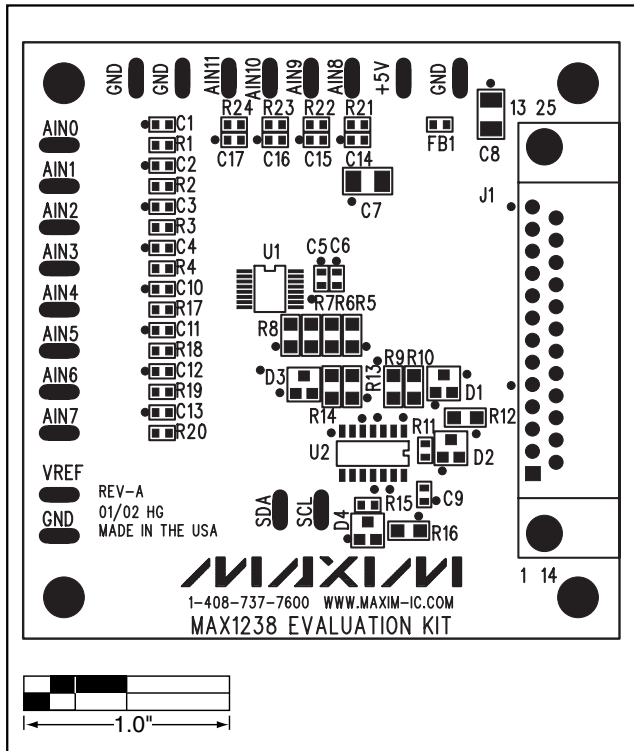


Figure 3. MAX1238 EV Kit Component Placement Guide—Component Side

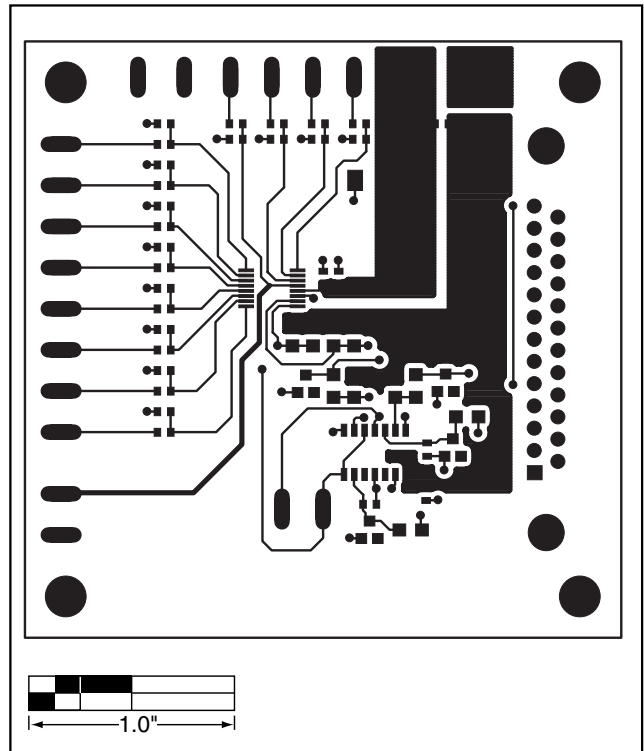


Figure 4. MAX1238 EV Kit PC Board Layout—Component Side

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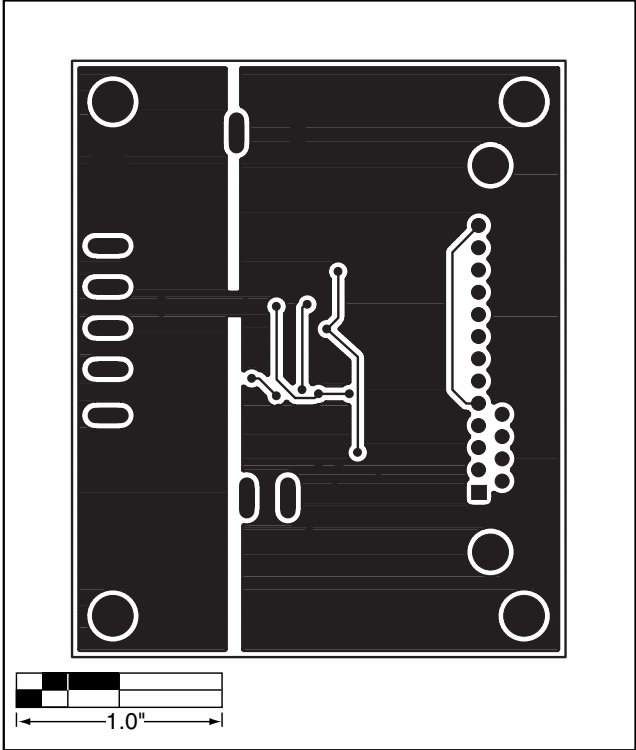


Figure 5. MAX1238 EV Kit PC Board Layout—Solder Side

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