19-5869; Rev 0; 5/11

MAXADC-RTD Evaluation Kit
Evaluates: MAX11213

General Description

The MAXADC-RTD evaluation kit (EV kit) evaluates the MAX11213 ultra-low-power, 16-bit, serial-output delta-sigma analog-to-digital converter (ADC) with programmable gain. The EV kit provides accurate temperature measurements (error < ±0.3°C) in the -15°C to +100°C range using a PT1000 platinum RTD temperature sensor. The RTD can be used in connection with the rest of the board, or wired for remote sensing. Do not immerse the RTD in water.

The EV kit includes Windows XP®-, Windows Vista®-, and Windows 7®-compatible software for data acquisition through a USB cable.

Features

- **Accurate Temperature Measurement (Error < ±0.3°C)**
- **Real-Time Data Acquisition Through the USB**
- **USB-PC Connection (Mini-USB Type A to B)**
- **USB Powered (External Power Supply Not Required)**
- **Windows XP-, Windows Vista-, and Windows 7-Compatible Software**
- **Proven PCB Layout**
- **Fully Assembled and Tested**

***Ordering Information* appears at end of data sheet.**

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2	2	18pF ±5%, 50V ceramic capacitors (0603)
C3–C6, C13	5	1µF ±10%, 16V ceramic capacitors (0603)
C7, C9, C10, C11	4	0.1µF ±10%, 25V ceramic capacitors (0603)
C8	1	10µF ±10%, 10V ceramic capacitor (0805)
C12	1	1000pF ±5%, 25V ceramic capacitor (0805)
D1	1	Green LED (0603)
D2	1	Yellow LED (0603)
J1	0	Not installed, 10-pin JTAG connector
J2	1	Mini-USB type-B receptacle
J11	0	Not installed, 2-pin header
PT1000	1	1kΩ RTD temperature sensor (1206)

DESIGNATION	QTY	DESCRIPTION
R2, R3	2	27Ω ±5% resistors (0603)
R4	1	27kΩ ±0.1%, 1/4W through-hole resistor
R5	0	Not installed, resistor (1206)
R6, R7	2	1kΩ ±5% resistors (0603)
R8	0	Not installed, resistor (0402)
TP1, TP2	0	Not installed, 1-pin test points
U1	1	Ultra-low-power ADC (16 QSOP) Maxim MAX11213EEE+
U2	1	16-bit RISC microcontroller (64 LQFP) Maxim MAXQ622G-0000+
U4	1	Ultra-low-noise LDO linear regulator (5 SC70) Maxim MAX8511EXK33+
Y1	1	12MHz crystal
—	1	PCB: MAXADC-RTD#

Quick Start

The MAXADC-RTD board is a plug-n-play temperature-acquisition EV kit that connects to the PC through a USB cable. The MAXADC-RTD provides accurate temperature-measurement readings in the -15°C to +100°C range and does not require an external power supply or a USB device driver. The RTD is soldered on a stick, which can be connected to the rest of the PCB or broken off for remote monitoring. The RTD's differential output must be connected to the ADC's inputs for proper measurement.

The kit is preloaded with default firmware that communicates with the MAXADC-RTD evaluation software. Software can be installed and run on any Windows-based system.

MAXADC-RTD EV Kit Components

The EV kit comes with the following components:

1) MAXADC-RTD evaluation board
2) MAXADC-RTD GUI application

Detailed Description of Hardware

The MAXADC-RTD board is loaded with the MAX11213 ultra-low-power, 16-bit, fully differential ADC with programmable gain. The ADC communicates over the SPI™ interface to Maxim's 16-bit RISC MAXQ622 microcontroller with built-in USB serial-interface engine (SIE). This microcontroller communicates to the PC through the USB as an HID device (see Figure 1).

The MAXADC-RTD software provides features for real-time temperature monitoring and logging.

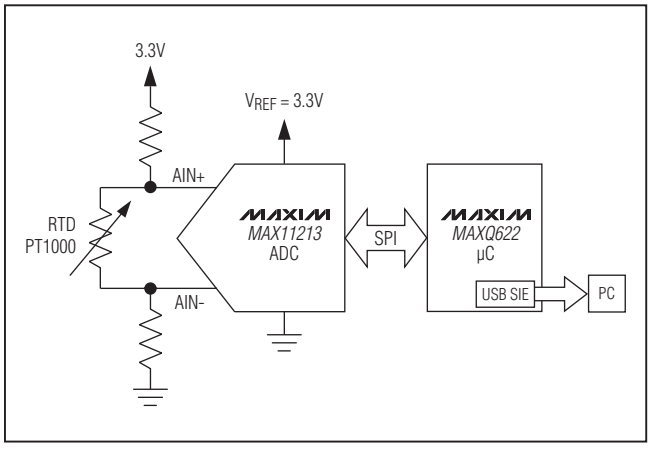

Figure 1. MAXADC-RTD Block Diagram

Data Acquisition Through the MAXADC-RTD

Use the following steps to acquire data through the MAXADC-RTD:

1) Connect the MAXADC-RTD board to a PC through the USB cable. The MAXADC-RTD board receives power from the USB.
2) Visit **www.maxim-ic.com/MAXADC-RTD** to download and run the MAXADC-RTD GUI application (no need for installation).
3) The status bar displays the **Hardware Connected** message and temperature acquisition begins at 2.5sps. Data is also displayed in terms of voltage and code values read by the ADC (see Figure 2).

MAXADC-RTD Extended Features

- The MAX11213 ADC on the EV kit board is connected with +3.3V reference. The input range is 0 to 3.3V.
- The MAXADC-RTD provides an external +3.3V, 100mA supply, to be used with any external circuit.
- The ADC's analog inputs are connected at test points A and B.
- The EV kit provides an external +5V, 300mA supply at J11, to be used with any external circuit (see Table 1).
- The microcontroller on the EV kit board can also be programmed with custom firmware through the J1 JTAG connector (see Table 2).
- If the RTD stick is broken for remote monitoring, external wires need to be connected from test points A and B on the RTD stick to the A and B test points on the EV kit board, respectively.
- Other sensors with a differential output can also be connected to the EV kit board at test points A and B, where A is directly connected to AINP (the positive differential input of the ADC) and B is directly connected to AINN (the negative differential input of the ADC). **Note:** AINP is pulled up through resistor R4 and AINN is grounded through resistor R5 (shorted). To use different values, R4 needs to be replaced and R5 needs to be installed after cutting the shorting trace.

Table 1. MAXADC-RTD Connector J11 Description

PIN NO.	LABEL	FUNCTION
1	VUSB	+5V, 300mA supply for an external circuit
2	GND	Digital ground pin

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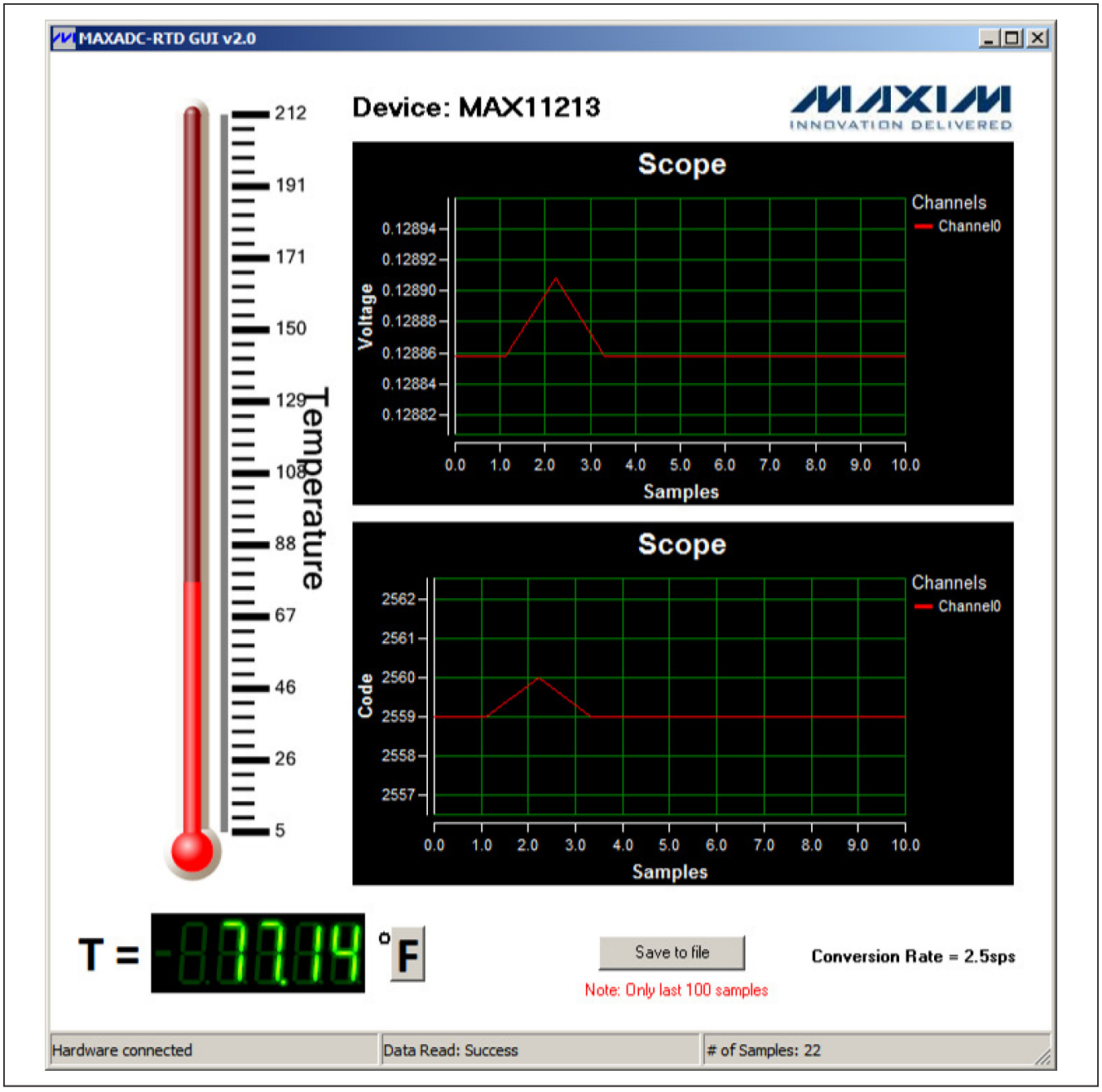

Figure 2. MAXADC-RTD GUI Application

Table 2. MAXADC-RTD Connector J1 Description

PIN NO.	LABEL	FUNCTION
1	TCK	Test clock
2	GND	Digital ground pin
3	TDO	Test data output
4	+3V3	Supply voltage for reference only
5	TMS	Test mode select

PIN NO.	LABEL	FUNCTION
6	RST	Microcontroller MAXQ622 reset pin
7	N.C.	No connection
8	N.C.	No connection
9	TDI	Test data input
10	GND	Digital ground pin

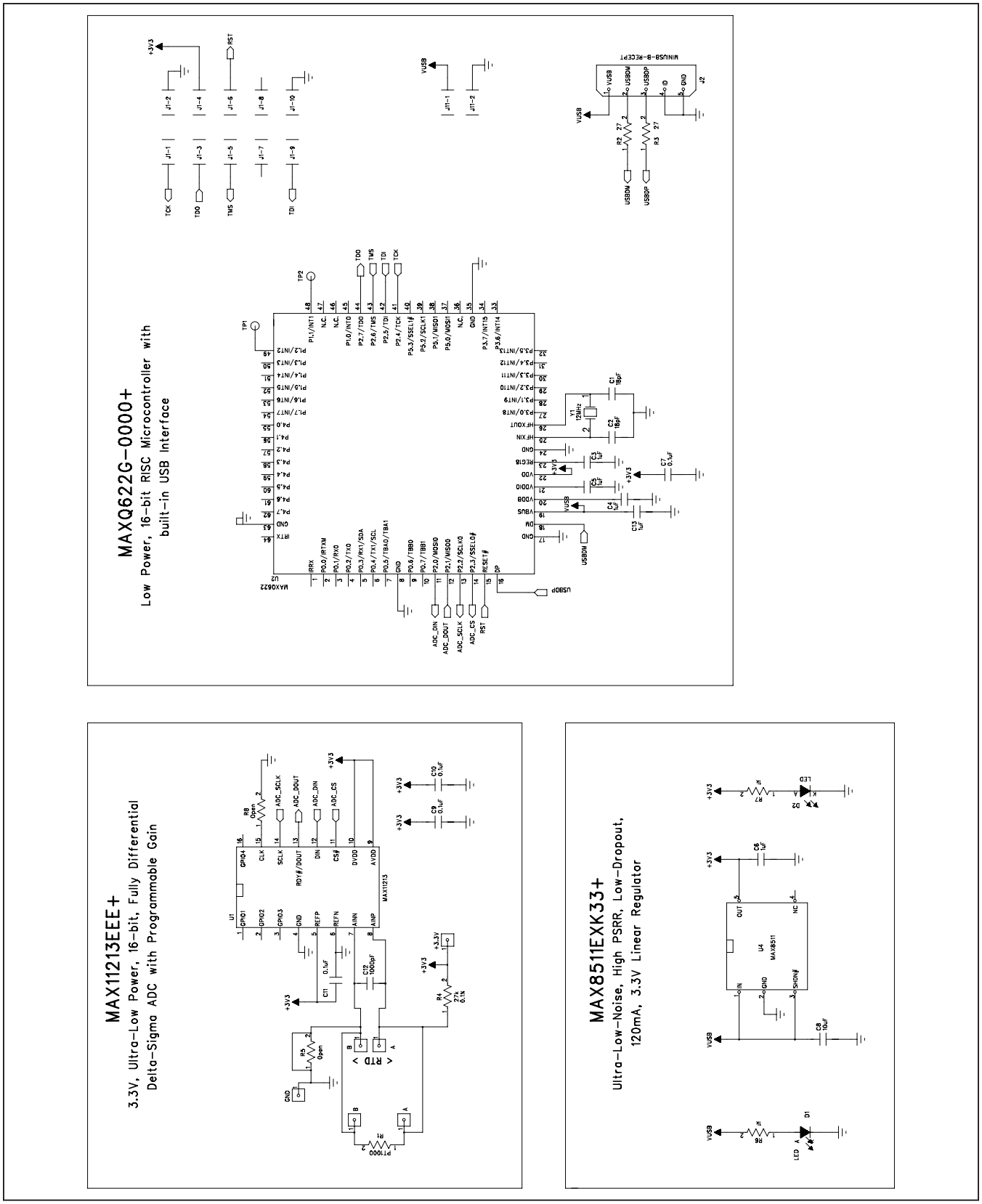

Figure 3. MAXADC-RTD EV Kit Schematic

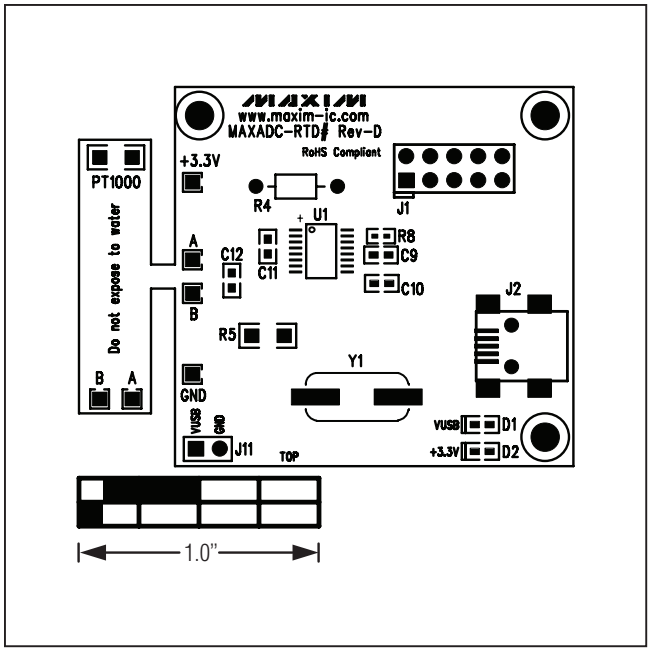

Figure 4. MAXADC-RTD Component Placement Guide—Component Side

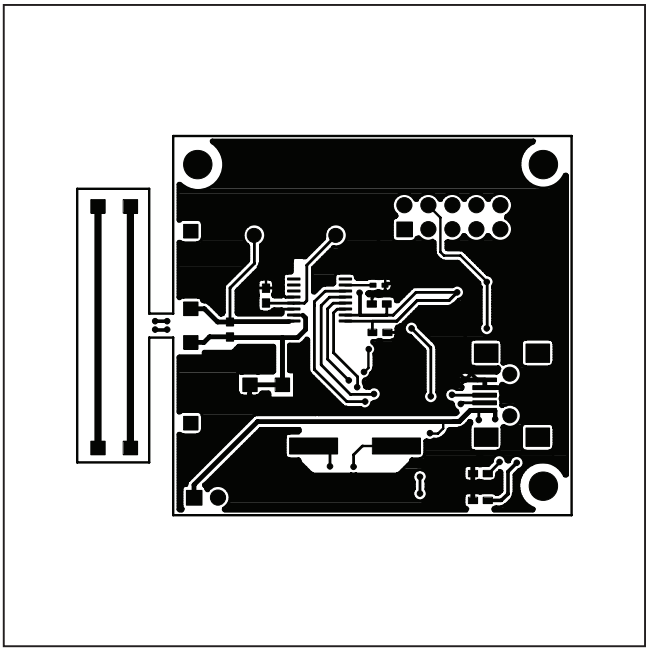

Figure 6. MAXADC-RTD PCB Layout—Component Side

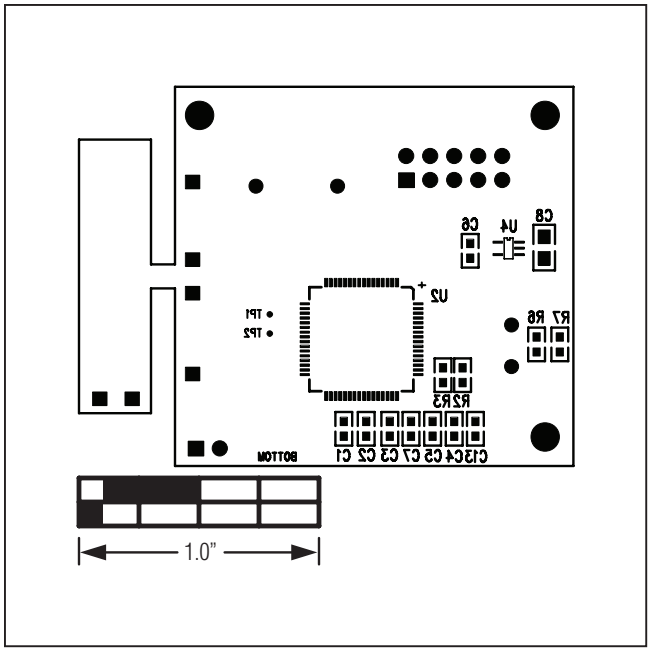

Figure 5. MAXADC-RTD Component Placement Guide—Solder Side

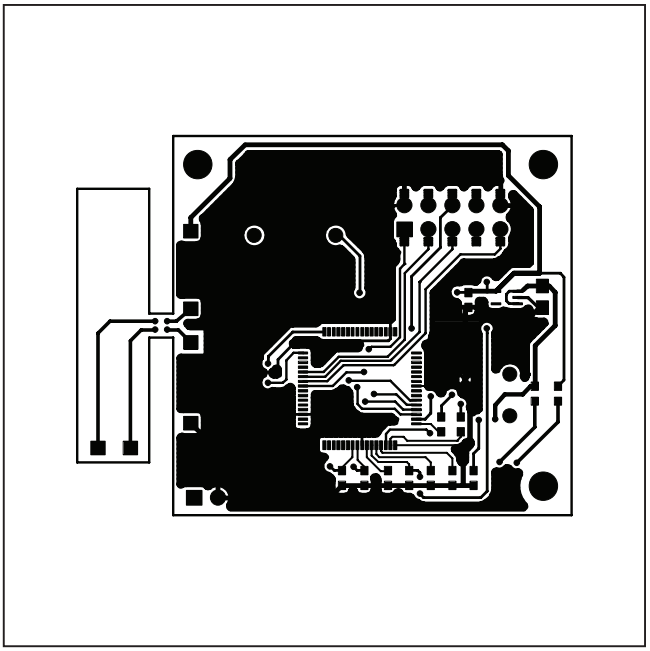

Figure 7. MAXADC-RTD PCB Layout—Solder Side

Ordering Information

PART	TYPE
MAXADC-RTD#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/11	Initial release	—