19-4306; Rev 0; 10/08

MAX9132 Evaluation Kit

Evaluates: MAX9132

General Description

The MAX9132 evaluation kit (EV kit) provides a proven design to evaluate the MAX9132 high-speed multiple-port LVDS crossbar switches. The MAX9132 has three input ports and two output ports. The EV kit also includes Windows® 2000/XP/Vista®-compatible software that provides a simple graphical user interface (GUI) for exercising the features of the MAX9132.

The MAX9132 EV kit PCB comes with a MAX9132GUP+ installed.

Features

- **Windows 2000/XP/Vista (32-Bit)-Compatible Software**
- **USB-PC Connection (Cable Included)**
- **On-Board Microcontroller to Generate I²C and LIN Bus Commands**
- **I²C Interface Terminals**
- **Lead(Pb)-Free and RoHS Compliant**
- **Proven PCB Layout**
- **Fully Assembled and Tested**

Ordering Information

PART	TYPE
MAX9132EVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C3–C10, C17, C21–C30, C40, C41, C42	23	0.1µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K
C2, C13, C15, C34, C39, C43	6	10µF ±20%, 6.3V X5R ceramic capacitors (0805) TDK C2012X5R0J106M
C11, C12	2	10pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H100J
C14, C16, C44	3	1µF ±20%, 6.3V X5R ceramic capacitors (0603) TDK C1608X5R0J105K
C18, C19	2	22pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H220J
C20	1	3300pF ±10%, 50V X7R ceramic capacitor (0603) TDK C1608X7R1H332K
C31, C37	2	0.1µF ±10%, 50V X7R ceramic capacitors (0603) Murata GRM188R71H104K
C32, C38	2	2.2µF ±10%, 50V C0G ceramic capacitors (1206) Murata GRM31CR71H225K
C33	1	1000pF ±5%, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H102J
C35	1	10µF ±10%, 50V X7R ceramic capacitor (2220) Murata GRM55DR61H106K
C36	1	220pF ±5%, 50V X7R ceramic capacitor (0603) Murata GRM188R71H221K
D1	1	Green LED (0603)
D2	1	High-speed switching diode (3 SOT-23) Central Semiconductor CMPD914
D3	1	60V, 3A Schottky diode (DO-214AB) Vishay 30BQ060PBF
FB1	1	Ferrite bead (0603) TDK MMZ1608R301A
H1	0	Not installed, 2 x 5-pin header
JU1–JU5	5	3-pin headers
JU6, JU7, JU9	3	2-pin headers
JU8	1	4-pin header
P1	1	USB type-B right-angle female receptacle
P2–P11	10	Edge-mount receptacle SMA connectors
R1	1	470Ω ±5% resistor (0603)
R2	1	220Ω ±5% resistor (0603)

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R3, R10, R11	3	10kΩ ±5% resistors (0603)
R4	1	2.2kΩ ±5% resistor (0603)
R5, R8, R9	3	1.5kΩ ±5% resistors (0603)
R6, R7, R22, R23	4	27Ω ±5% resistors (0603)
R12–R16	5	100Ω ±1% resistors (0402)
R17	1	1kΩ ±5% resistor (0603)
R18, R19	0	Not installed, resistors (0603)
R20, R21	2	4.99kΩ ±1% resistors (0603)
U1	1	Multiple-port LVDS crossbar switch (20 TSSOP-EP*) Maxim MAX9132GUP+
U2	1	Microcontroller (68 QFN-EP*) Maxim MAXQ2000-RAX+
U3	1	93C46 type 3-wire EEPROM (8 SO) Atmel AT93C46A-10SU-2.7
U4	1	UART-to-USB converter (32 TQFP) FTDI FT232BL
U5	1	3.3V regulator (5 SC70) Maxim MAX8511EXK33+T (Top Mark: AEI)
U6	1	2.5V regulator (5 SC70) Maxim MAX8511EXK25+T (Top Mark: ADV)
U7, U8	2	±60V fault-protected LIN transceivers (8 SO) Maxim MAX13020ASA+
Y1	1	16MHz crystal Hong Kong X'tals SSM1600000E18FAF
Y2	1	6MHz crystal Hong Kong X'tals SSL600000E18FAF
—	9	Shunts
—	1	USB high-speed A-to-B cables, 5ft (1.5m)
—	1	PCB: MAX9132 Evaluation Kit+

**EP = Exposed pad.*

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Central Semiconductor Corp.	631-435-1110	www.centralsemi.com
Hong Kong X'tals Ltd.	852-35112388	www.hongkongcrystal.com
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
TDK Corp.	847-803-6100	www.component.tdk.com
Vishay	402-563-6866	www.vishay.com

Note: *Indicate that you are using the MAX9132 when contacting these component suppliers.*

MAX9132 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX9132.EXE	Application program
FTDIBUS.INF	USB device driver file
FTDIPORT.INF	VCP device driver file
UNINST.INI	Uninstalls the EV kit software
USB_Driver_Help	USB driver installation help file

Quick Start

Required Equipment

Before beginning, the following equipment is needed:

- MAX9132 EV kit (USB cable included)
- A user-supplied Windows 2000/XP/Vista-compatible PC with a spare USB port
- 3.3V/100mA power supply
- 12V/100mA power supply
- 1GHz digital oscilloscope
- 1GHz pulse generator
- Four SMA cables

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 operating system.

Procedure

The MAX9132 EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Note:** It is important to follow the power-supply sequence for correct operation.

1) Visit www.maxim-ic.com/evkitsoftware to download the latest version of the EV kit software, 9132Rxx.ZIP. Save the EV kit software to a temporary folder and uncompress the ZIP file.
2) Install the EV kit software on your computer by running the INSTALL.EXE program inside the temporary folder. The program files are copied and icons are created in the Windows **Start | Programs** menu.
3) Verify that all jumpers (JU1–JU9) are in their default positions, as shown in Table 1.
4) Connect SMA cables from the differential data channels on the pulse generator to the DIN0+ and DIN0- SMA connectors of the EV kit.
5) Connect SMA cables from the channels on the digital oscilloscope to the DOUT0+ and DOUT0- SMA connectors on the EV kit.
6) Set the pulse generator to a frequency of 420MHz, amplitude to 700mV peak-to-peak, and the data input to the uplink port.
7) Connect the 12V/100mA supply to the VBAT0 and GND pads.
8) Connect the 3.3V/100mA supply to the VCC and GND pads.
9) Turn on both supplies.
10) Enable the pulse generator.
11) Connect the USB cable from the PC to the EV kit board. A **New Hardware Found** window pops up when installing the USB driver for the first time. If you do not see a window that is similar to the one described above after 30s, remove the USB cable from the board and reconnect it. Administrator privileges are required to install the USB device driver on Windows.
12) 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\MAX9132** (default installation directory) using the **Browse** button. During device driver installation, Windows may show a warning message indicating that the device driver Maxim uses does not contain a digital signature. This is not an error condition and it is safe to proceed with installation. Refer to the USB_Driver_Help.PDF document included with the software for additional information.
13) Start the EV kit software by opening its icon in the **Start | Programs** menu. A **MAX9132 Information** window appears requesting the user to configure the jumper settings properly before proceeding (Figure 1). Press the **OK** button and the EV kit main window appears, as shown in Figure 2.
14) Click on the **LIN BUS** radio button and the EV kit main window appears, as shown in Figure 3.
15) Select **010: Connect to DIN0** from the **DOUT0 Port** drop-down list and press the **Set Switch** button.
16) Observe that the DIN0 port was routed to the proper DOUT0 ports.

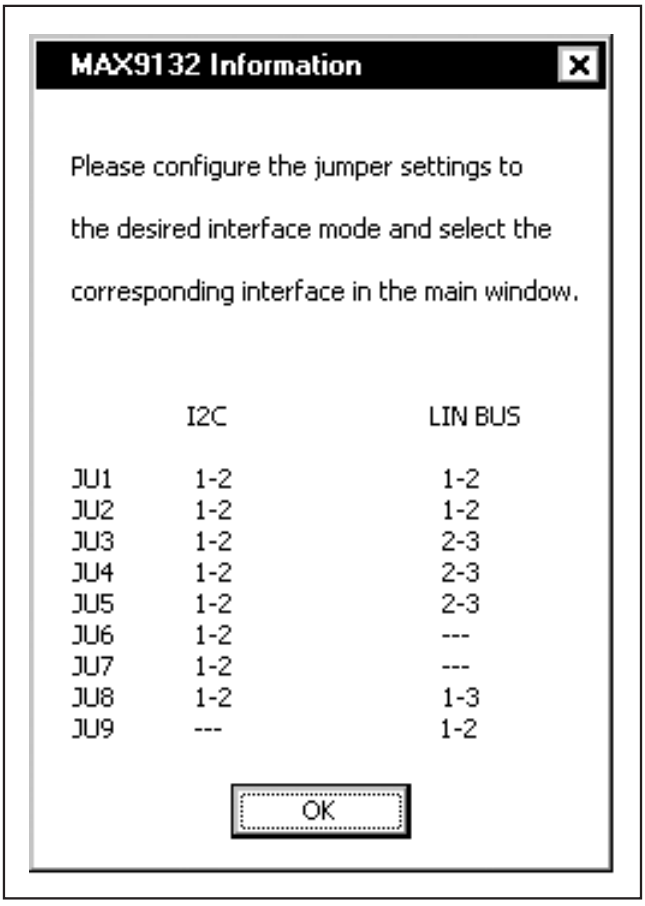

Figure 1. MAX9132 Information Window

Detailed Description of Software

The main window of the evaluation software allows the user to configure the DOUT0 and DOUT1 ports using a LIN bus or I²C protocol.

LIN Bus Protocol

To select the LIN bus protocol, click on the **LIN BUS** radio button and follow the instructions that appear below the radio button. A **Switch Routing Controls, LINBUS Identifier Selection**, and **Read Status** group box appears in the GUI's main window, as shown in Figure 3.

The **LINBUS Identifier Selection** is defaulted to **High** at the start of the program. It is the user's responsibility to follow the jumper setting instructions (see Table 2) once a selection is made. The LIN bus protocol can also control the switch by selecting the uplink ports from the **DOUT0 Port** and **DOUT1 Port** drop-down lists and **Pre-emphasis ON** checkboxes. Once the desired routing has been chosen, press the **Set Switch** button.

I²C Protocol

To select the I²C protocol, click on the **I2C** radio button in the **Interface** group box and follow the instructions that appear below the radio button. A **Switch Routing Controls**, **I2C Device Address**, and **Read Status** group box appears in the GUI's main window, as shown in Figure 4. Table 3 shows the I²C address selection for the device.

Error Status

Press the **Read** button within the **Read Status** group box, which shows if the LIN bus protocol has an error. There is no error status for the I²C protocol.

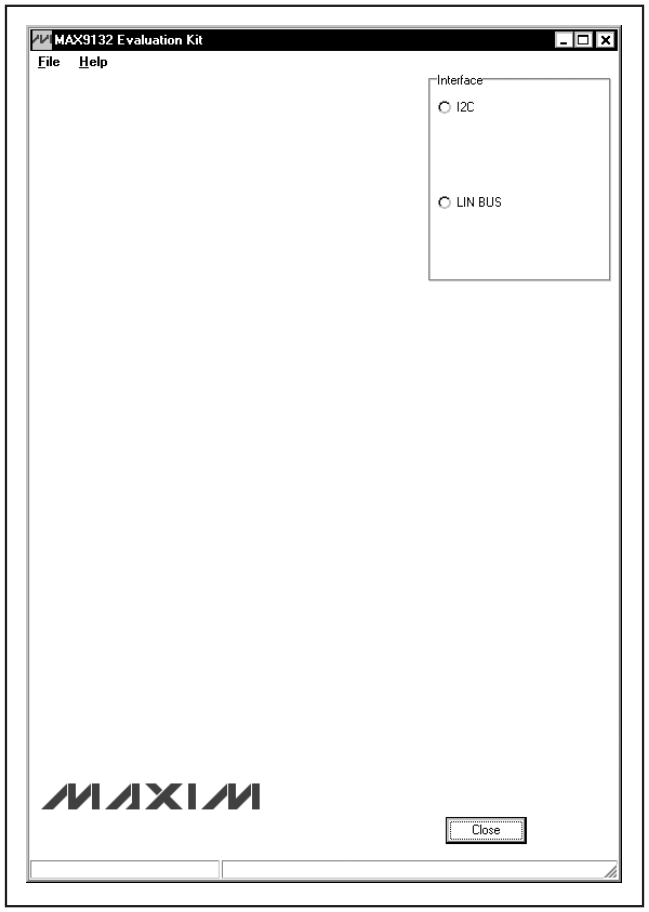

Figure 2. MAX9132 EV Kit Software Main Window (Interface Setting)

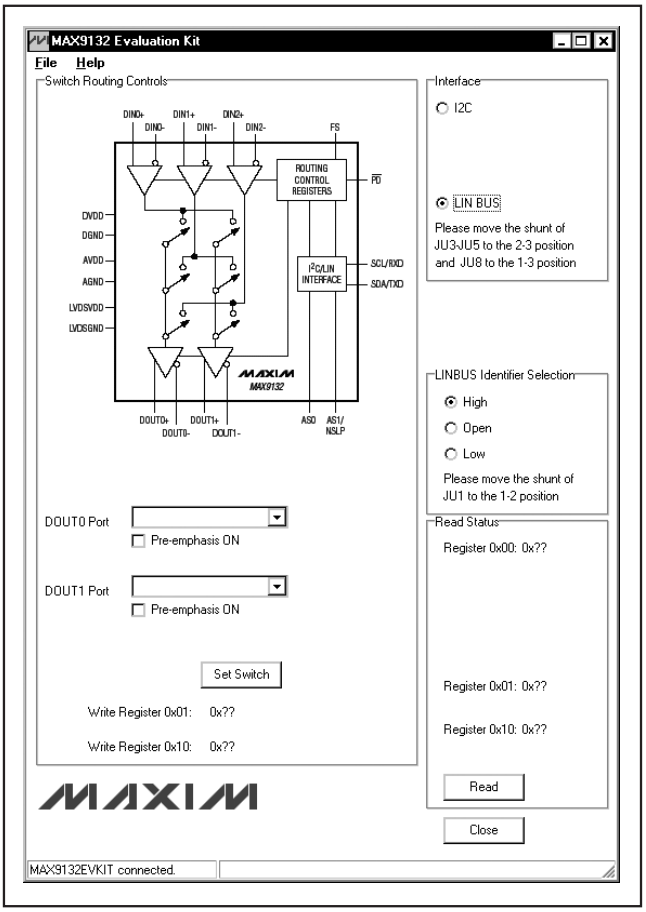

Figure 3. MAX9132 EV Kit Software Main Window (LIN Bus Mode)

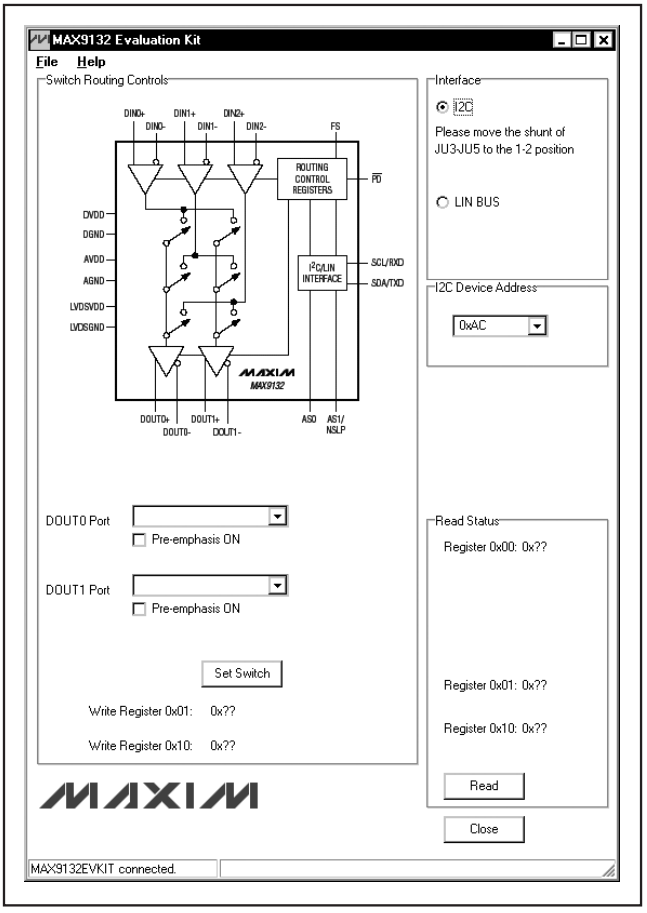

Figure 4. MAX9132 EV Kit Software Main Window (I²C Mode)

Table 1. MAX9132 EV Kit Jumper Descriptions (JU1–JU9)

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	Connects LIN bus and I²C address selection AS0 to VCC (see Table 2 for LIN bus or Table 3 for I²C configuration)
	2-3	Connects LIN bus and I²C address selection AS0 to ground (see Table 2 for LIN bus or Table 3 for I²C configuration)
JU2	1-2*	Powers up without pre-emphasis
	2-3	Powers down
	Open	Powers up with pre-emphasis on all ports
JU3	1-2	Selects I²C protocol
	2-3*	Selects LIN bus protocol
JU4	1-2	Connects SCL signal for I²C protocol
	2-3*	Connects RX0 signal for LIN bus protocol
JU5	1-2	Connects SDA signal for I²C protocol
	2-3*	Connects TX0 signal for LIN bus protocol
JU6	1-2*	Connects to on-board SDA
	Open	Disconnects the on-board SDA from the MAX9132. Apply user-supplied SDA to on-board SDA pad.
JU7	1-2*	Connects to on-board SCL
	Open	Disconnects the on-board SCL from the MAX9132. Apply user-supplied SCL to on-board SCL pad.
JU8	1-2	Connects I²C address selection AS1 to ground (see Table 3 for I²C configuration)
	1-3*	Connects to NSLP of the slave LIN bus transceiver
	1-4	Connects I²C address selection AS1 to VCC (see Table 3 for I²C configuration)
	Open	I²C address selection AS1 open (see Table 3 for I²C configuration)
JU9	1-2*	Connects LIN signal from master to slave transceiver
	Open	Disconnects LIN signal from master-to-slave transceiver, which allows the user to connect their own wire between transceivers

**Default position.*

Table 2. MAX9132 LIN Bus Jumper Configurations

AS0 (JU1)	WRITE ID		READ ID	
	ID[0..5]	PID FIELD	ID[0..5]	PID FIELD
1-2	0x1C	0x9C	0x2B	0x2B
2-3	0x08	0x08	0x27	0xE7
Open	0x0A	0xCA	0x29	0xE9

Table 3. MAX9132 I²C Jumper Configurations

ASO (JU1)	AS1 (JU8)	SLAVE ADDRESS
		A[7:1]
1-2	1-2	1011000
1-2	2-3	1010110
1-2	Open	1010111
2-3	1-2	1010010
2-3	2-3	1010000
2-3	Open	1010001
Open	1-2	1010101
Open	2-3	1010011
Open	Open	1010100

_Detailed Description of Hardware

The MAX9132 EV kit provides a proven layout for the MAX9132. On-board level translators, I²C interface pads, and an easy-to-use USB-PC connection are included on the EV kit.

The MAX9132 routes LVDS signals from three different input ports to two output ports. Once the switching is configured through the software, observe the LVDS signals through the SMA connectors (P8 and P9 for DOUT0+ and DOUT0- and P10 and P11 for DOUT1+ and DOUT1-). All signals are 100Ω differential controlled-impedance traces.

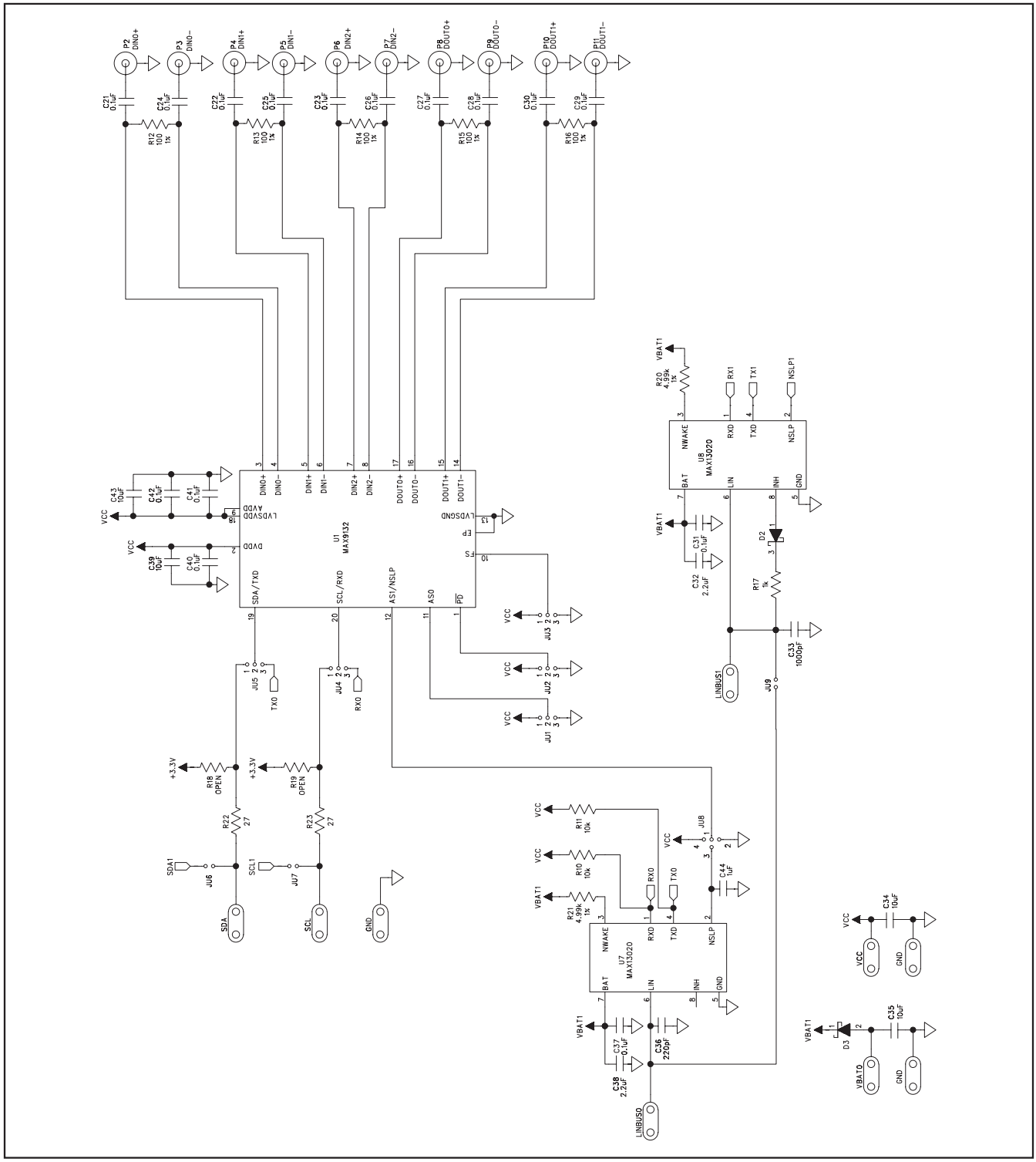

Figure 5a. MAX9132 EV Kit Schematic (Sheet 1 of 2)

MAX9132 Evaluation Kit

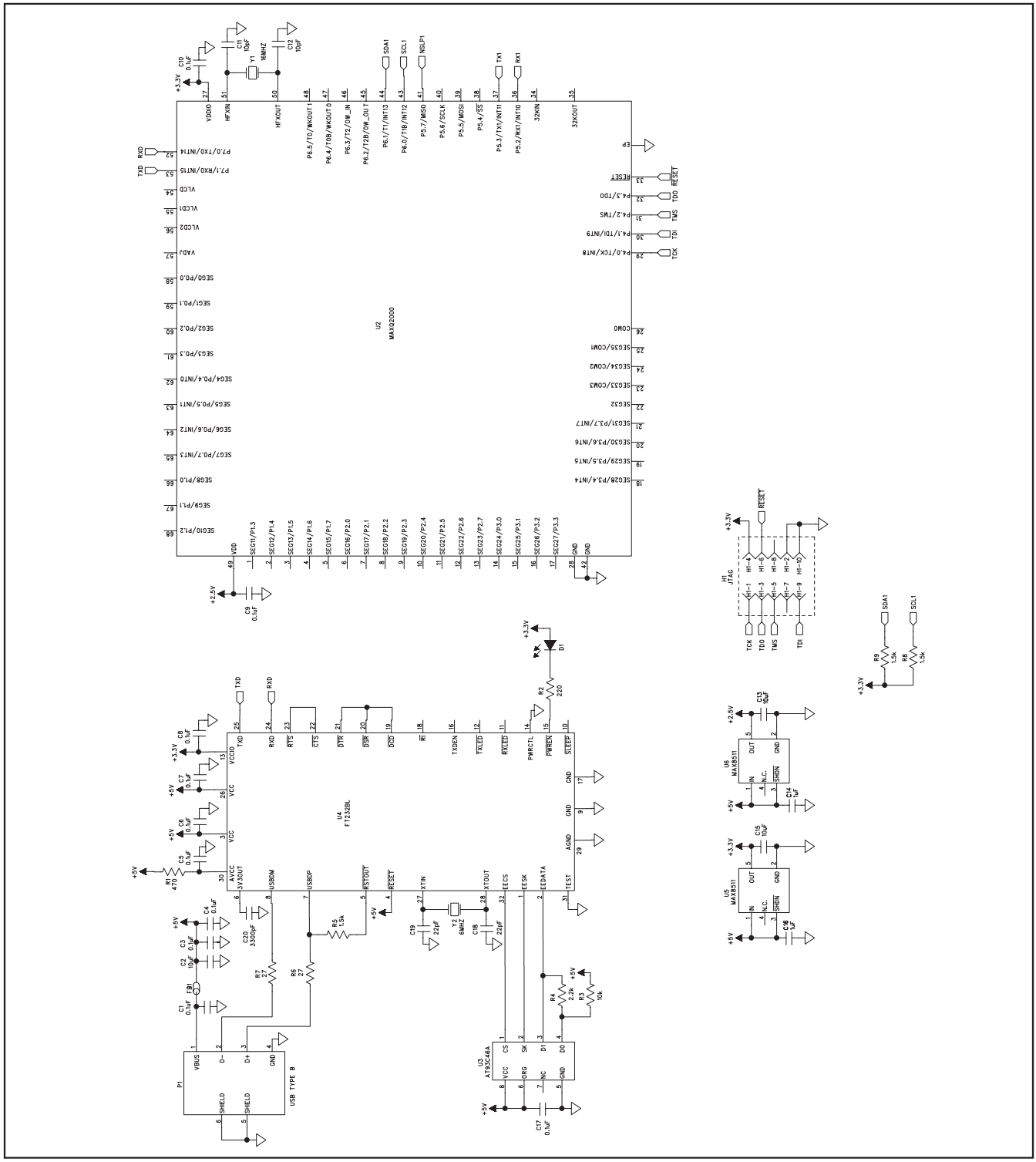

Figure 5b. MAX9132 EV Kit Schematic (Sheet 2 of 2)

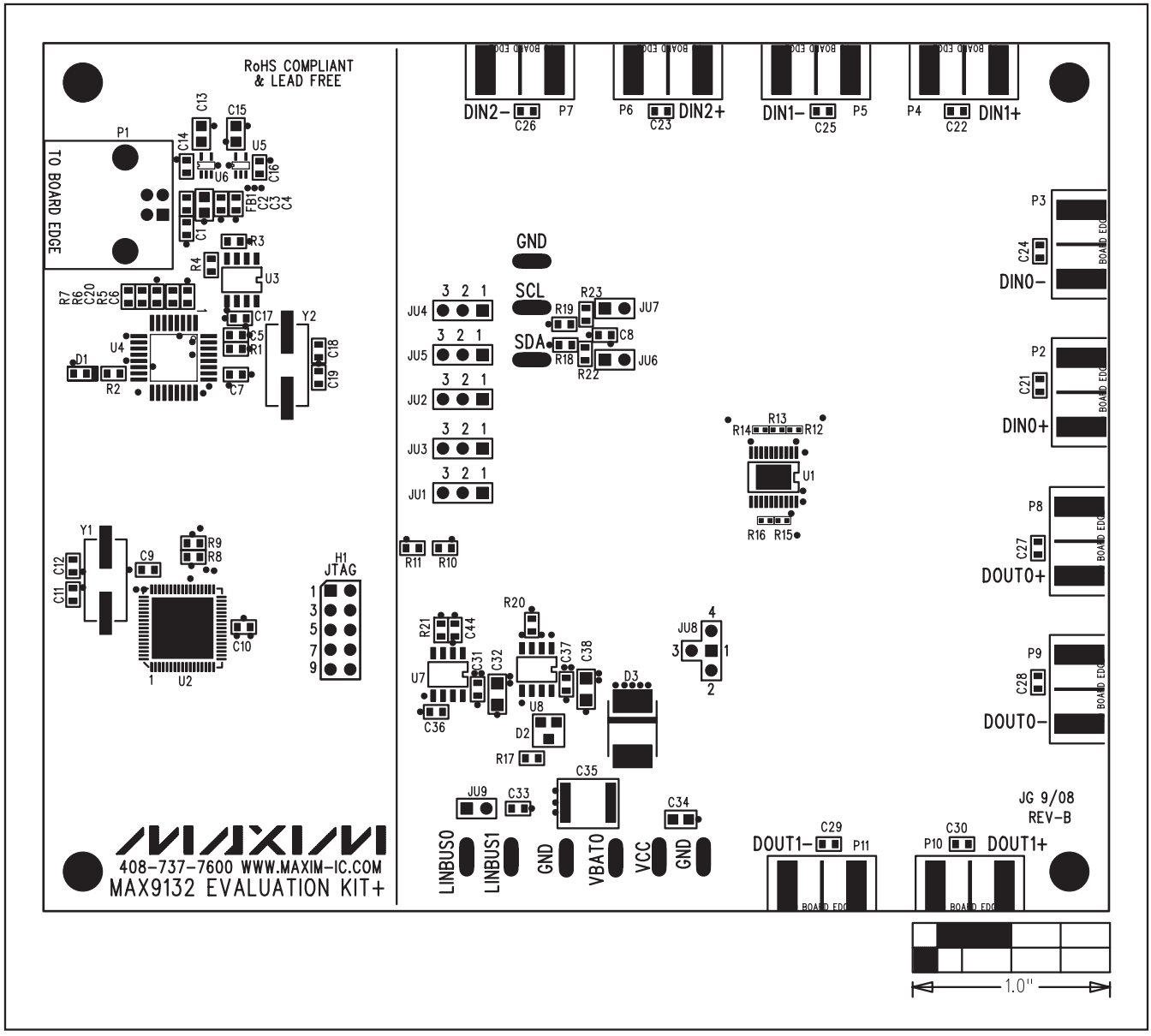

Figure 6. MAX9132 EV Kit Component Placement Guide—Component Side

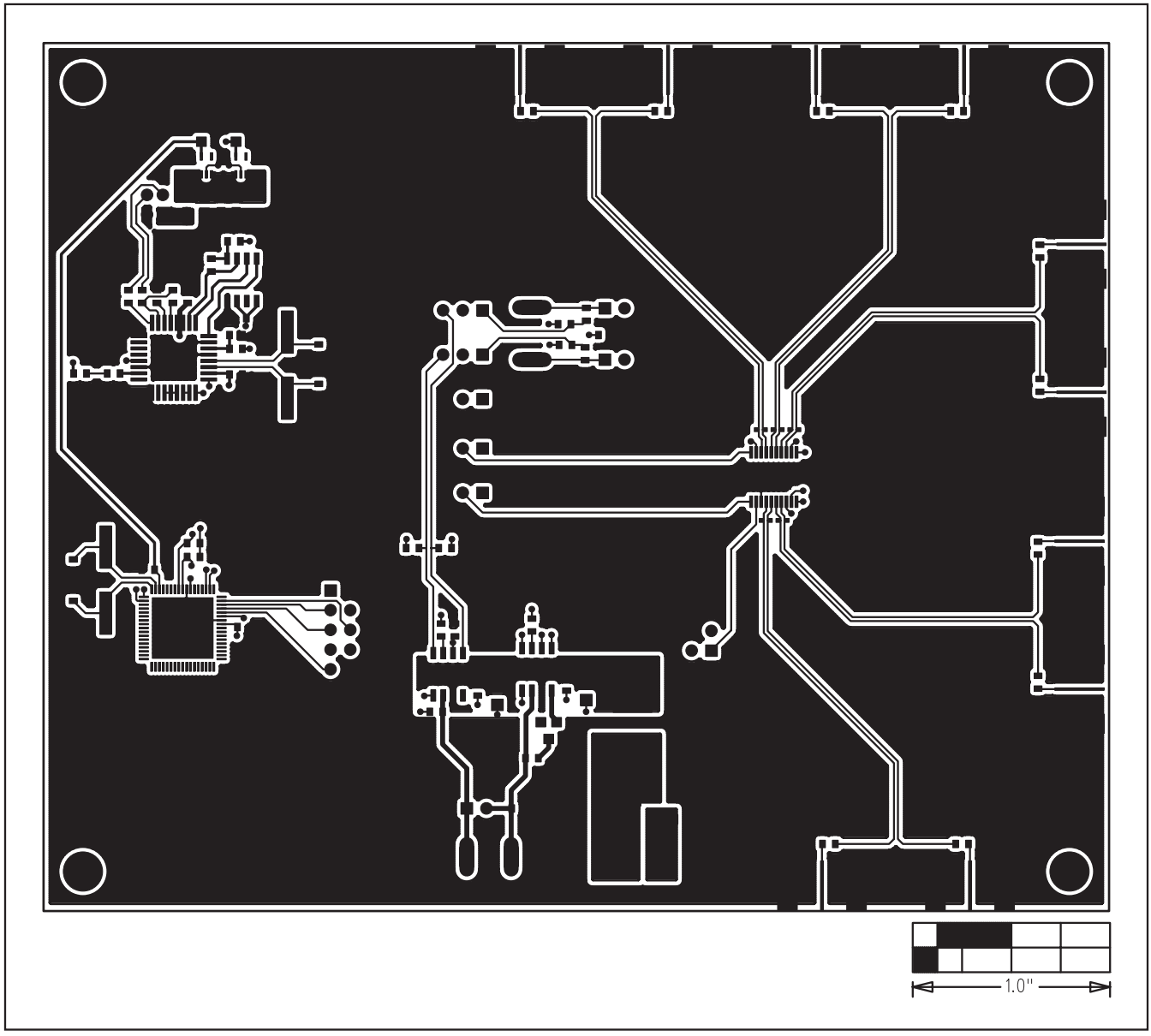

Figure 7. MAX9132 EV Kit PCB Layout—Component Side

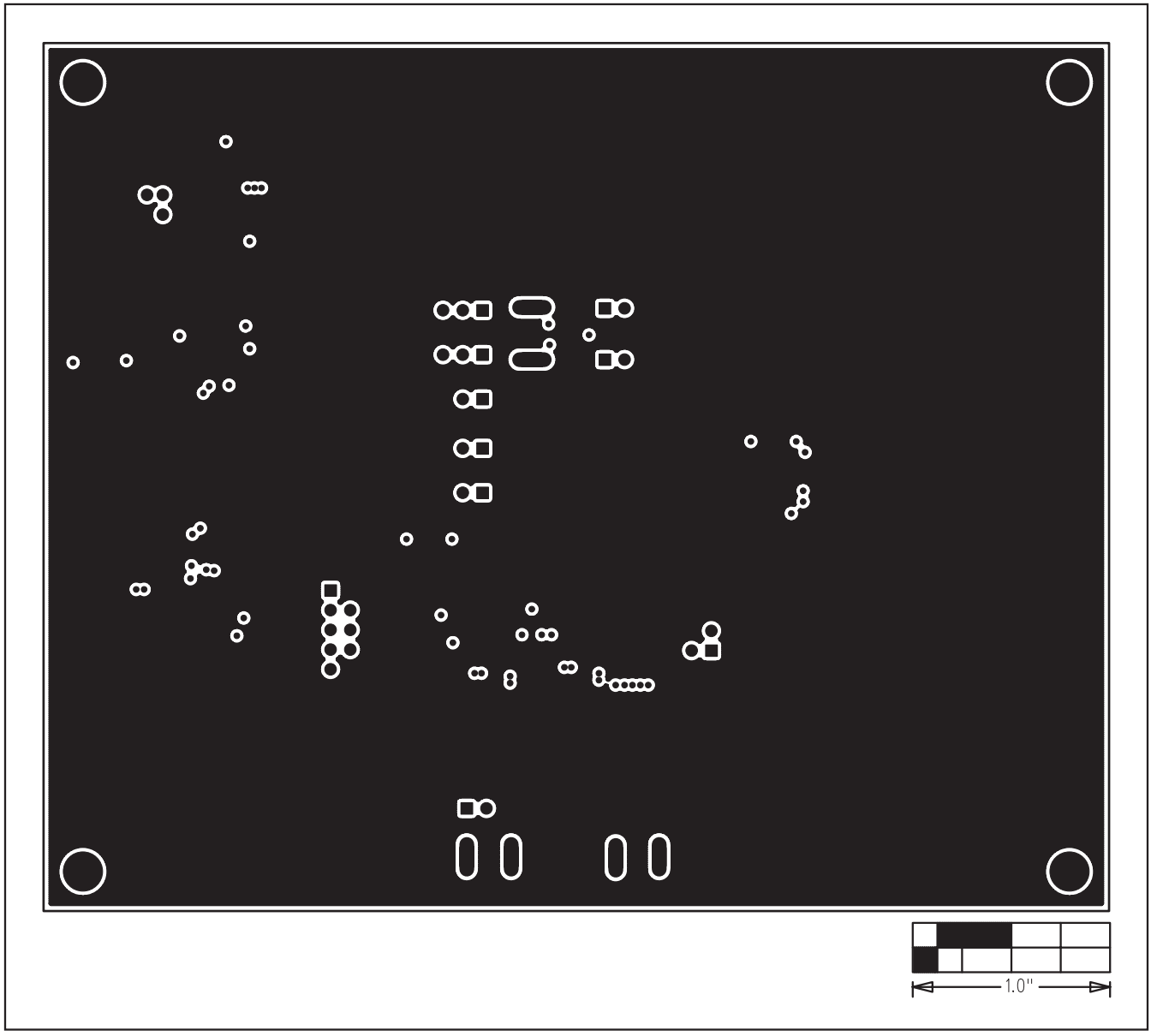

Figure 8. MAX9132 EV Kit PCB Layout—Inner Layer 2

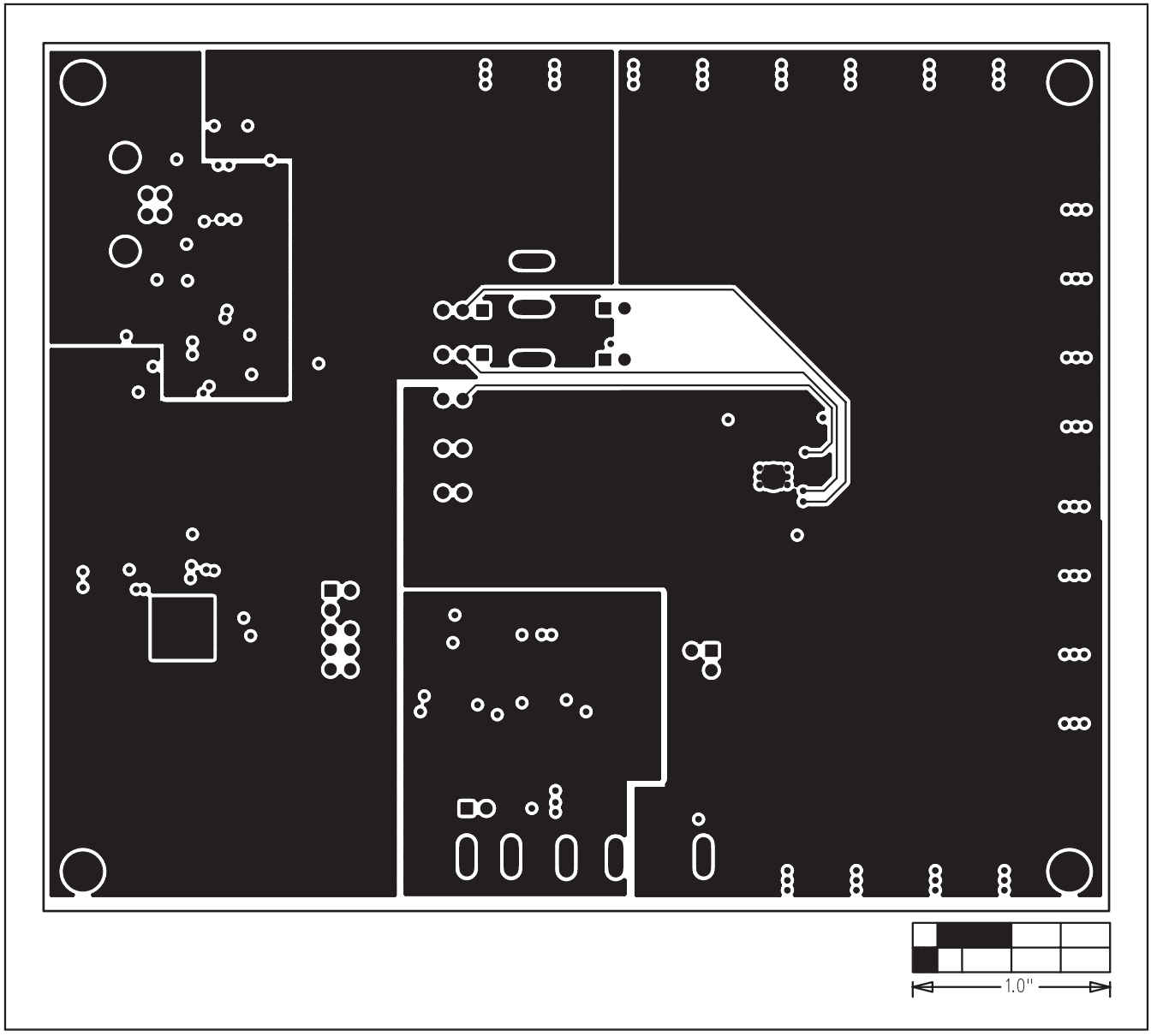

Figure 9. MAX9132 EV Kit PCB Layout—Inner Layer 3

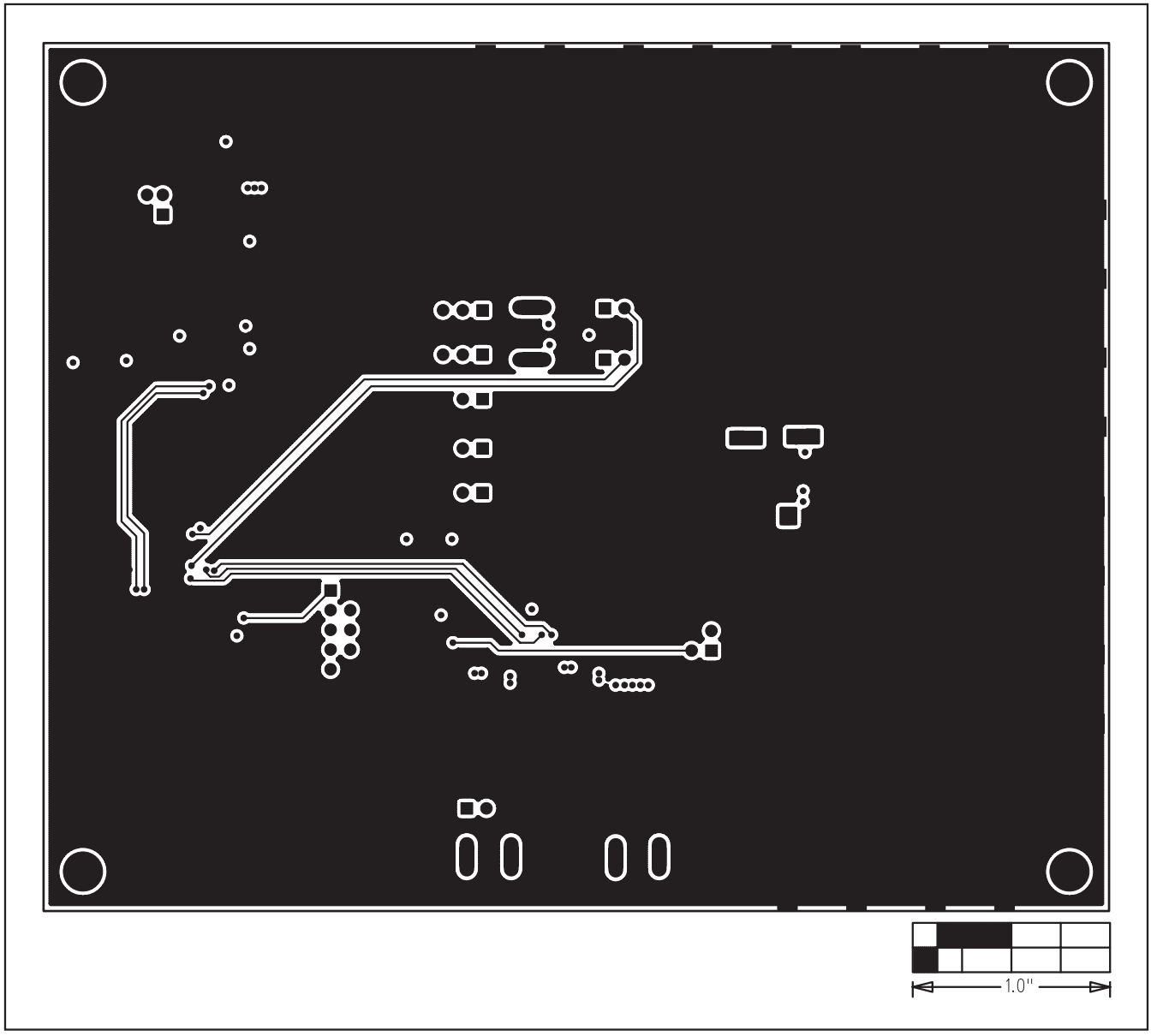

Figure 10. MAX9132 EV Kit PCB Layout—Solder Side

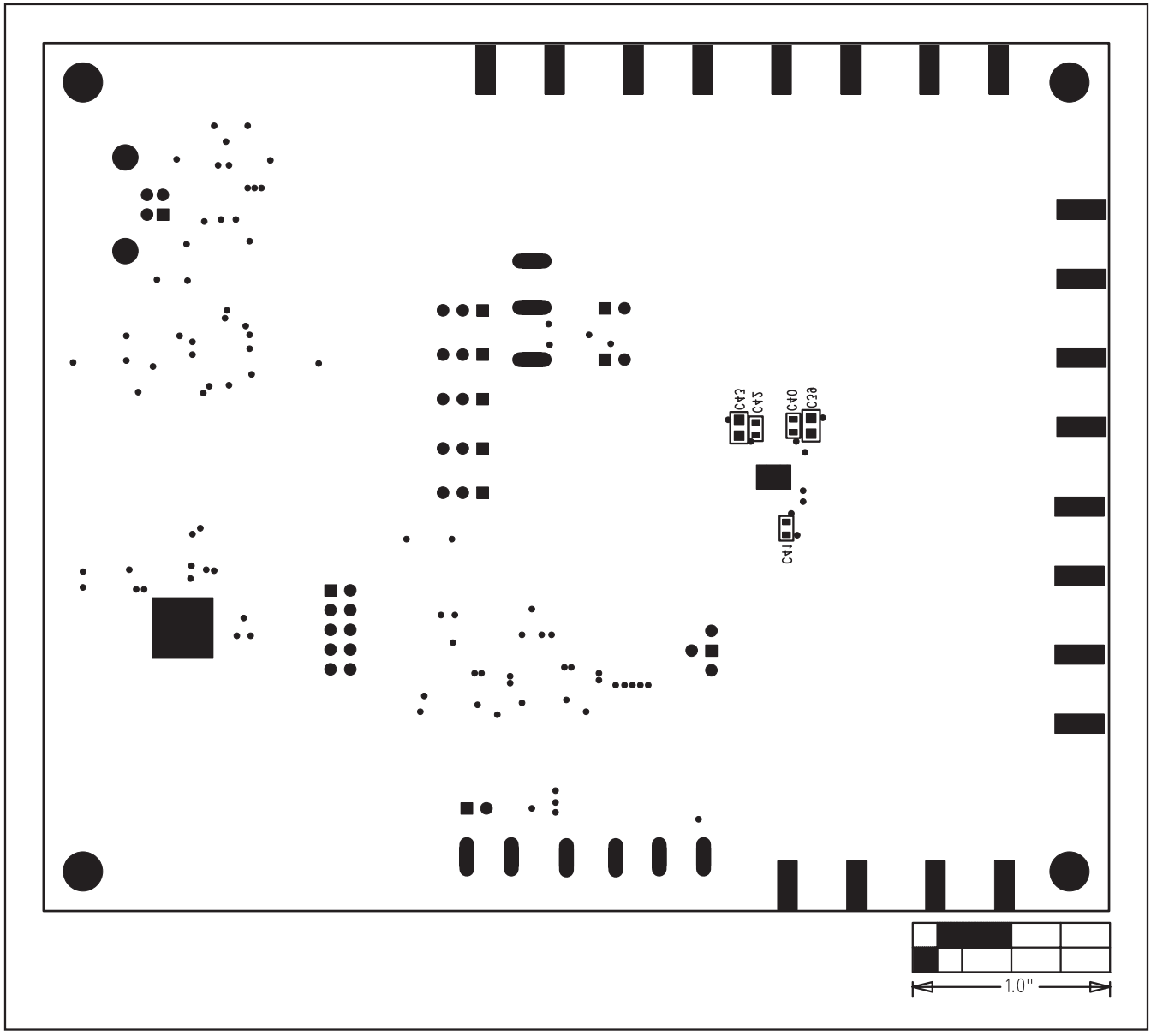

Figure 11. MAX9132 EV Kit Component Placement Guide—Component Side