19-5061; Rev 0; 11/09

MAX11046 Evaluation Kit

General Description

The MAX11046 evaluation kit (EV kit) provides a proven design to evaluate the MAX11046 8-channel, 16-bit, simultaneous-sampling ADC. The EV kit also includes Windows® 2000-, Windows XP®-, and Windows Vista®-compatible software that provides a simple graphical user interface (GUI) for exercising the features of the MAX11046.

The MAX11046 EV kit PCB comes with a MAX11046ETN+ installed. The MAX11046 EV kit can also be used to evaluate the MAX11044, MAX11045, MAX11047, MAX11048, and MAX11049. Contact the factory for free samples of the pin-compatible MAX11044ETN+, MAX11045ETN+, MAX11047ETN+, MAX11048ETN+, and MAX11049ETN+ to evaluate these parts.

Features

- **8 Simultaneous ADC Channel Inputs**
- **BNC Connectors for all Signal Input Channels**
- **6V to 8V Single Power-Supply Operation**
- **USB-PC Connection**
- **Proven PCB Layout**
- **Windows 2000-, Windows XP-, and Windows Vista (32-Bit)-Compatible Software**

Ordering Information

PART	TYPE
MAX11046EVKIT+	EV Kit

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

Component List

DESIGNATION	QTY	DESCRIPTION
BNC1–BNC8	8	50Ω BNC female jacks
C1, C2, C4, C5, C13	5	33µF ±20%, 6.3V X5R ceramic capacitors (1210) Murata GRM32DR60J336ME19
C6, C7, C8, C16, C17	5	2.2µF ±10%, 25V X5R ceramic capacitors (0805) TDK C2012X5R1E225K
C9, C10	2	18pF ±5%, 50V C0G ceramic capacitors (0603) Murata GRM1885C1H180J
C11, C12, C18–C21, C57, C60–C63	11	0.1µF ±10%, 16V X7R ceramic capacitors (0402) TDK C1005X7R1C104K
C14, C15, C87, C88, C89	5	10µF ±10%, 10V X5R ceramic capacitors (0805) Murata GRM21BR71A106K
C22, C23, C54	3	0.01µF ±10%, 25V X7R ceramic capacitors (0603) TDK C1608X7R1E103K
C24–C38, C42–C53, C55	28	0.01µF ±10%, 25V X7R ceramic capacitors (0402) TDK C1005X7R1E103K
C39	1	33µF ±20%, 20V aluminum capacitor (E7) SANYO 20SVP33M
C40, C41	0	Not installed, ceramic capacitors
C56, C58, C59, C64, C73, C74, C75, C78–C82, C91, C92, C93	15	0.1µF ±10%, 25V X7R ceramic capacitors (0603) Murata GRM188R71E104K
C65–C72	8	1000pF ±5%, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H102J
C76, C77, C83–C86	6	330pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H331J
C99, C100	2	1000pF ±5%, 50V C0G ceramic capacitors (0603) Murata GRM1885C1H102J
D1, D2	2	Power zener diodes (430C-01) ON Semi 1SMB10CAT3G
D3	1	Green LED (0603)
FB1, FB2	2	Ferrite beads (0603) TDK MMZ1608R301A
J9	1	USB type-B right-angle PC-mount receptacle
J10–J13	0	Not installed
JU1–JU4, JU9–JU14	10	3-pin headers
JU5, JU6	2	Dual-row (2 x 4) 8-pin headers
JU7, JU8	2	2-pin headers

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MAX11046 Evaluation Kit

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
JU15	0	Not installed, 2-pin header
RN1, RN2, RN3, RN7	4	33Ω x 8-resistor network (0402)
RN4	1	1kΩ x 4-resistor network (0402)
RN5, RN6	2	10kΩ x 4-resistor network (0402)
RN8, RN9, RN10	3	0Ω x 8-resistor network (0402)
R1, R2, R11, R41	4	200Ω ±1% resistors (0603)
R3–R8, R35, R44	8	1kΩ ±1% resistors (0603)
R9	1	0Ω ±5% resistor (0603)
R10, R13, R18, R20, R29	5	10Ω ±1% resistors (0603)
R12, R26, R42, R46	4	33.2Ω ±1% resistors (0603)
R14	1	680kΩ ±5% resistor (0603)
R15, R16	2	27Ω ±5% resistors (0603)
R17, R21, R22	3	1.5kΩ ±5% resistors (0603)
R19	1	47kΩ ±5% resistor (0603)
R23, R34, R43	3	10kΩ ±1% resistors (0603)
R24	1	2.2kΩ ±5% resistor (0603)
R25	1	1kΩ ±5% resistor (0805)
R27, R30–R33, R37–R40	0	Not installed, resistors
R28	1	300kΩ, ±5% resistor (0603)
R36, R45	2	100Ω ±1% resistors (0603)
S1	1	Half-pitch, 4-position DIP switch
TP3–TP11	0	Not installed, test points
U1	1	8-channel 16-bit ADC (56 TQFN-EP*) Maxim MAX11046ETN+
U2	1	16-bit 200MHz DSP (179 BGA)
U3	1	Voltage reference (8 SO) Maxim MAX6126AASA41+
U4	1	256k x 16 flash memory (48 TSOP)
U5	1	LDO linear regulator (8 TDFN) Maxim MAX1976AETA160+
U6	1	350mA, 16.5V input, LDO linear regulator (8 SO) Maxim MAX1658ESA+
U7	1	350mA, 16.5V input, LDO linear regulator (8 SO) Maxim MAX1659ESA+
U8	1	64Mbit SDRAM (54 TSOP)
U9, U10	0	Not installed, op amps (8 MOSP)
Y1	1	12MHz, 6mm SMT crystal
Y2	0	Not installed, crystal
—	1	PCB: MAX11046 EVALUATION KIT+

**EP = Exposed pad.*

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
ON Semiconductor	602-244-6600	www.onsemi.com
SANYO Electric Co., Ltd.	619-661-6835	www.sanyodevice.com
TDK Corp.	847-803-6100	www.component.tdk.com

Note: *Indicate that you are using the MAX11046, MAX11044, MAX11045, MAX11047, MAX11048, or MAX11049 when contacting these component suppliers.*

MAX11046 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX11046.EXE	Application program
LIBUSB.INF	USB device driver file
UNINST.INI	Uninstalls the EV kit software

Quick Start

Required Equipment

Before beginning, the following equipment is needed:

- MAX11046 EV kit (USB cable included)
- 6V to 8V DC power supply
- 5V signal source
- BNC cable
- A user-supplied Windows 2000/XP/Vista-compatible PC with a spare USB port

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 MAX11046 EV kit is fully assembled and tested. Follow the steps below to verify board operation:

1) Visit www.maxim-ic.com/evkitsoftware to download the latest version of the EV kit software, 11046Rxx.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 are in their default positions, as shown in Table 1.
4) Connect the 6V power supply to the MAX11046 EV kit between VDD and GND pads.
5) Turn on the 6V power supply.
6) Set the signal source to generate a 60Hz, $2V_{P-P}$ sinusoidal wave.
7) Using the BNC cable, connect the signal source to the BNC1 jack (CH0).
8) 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 30 seconds, remove the USB cable from the board and reconnect it. Administrator privileges are required to install the USB device driver on Windows.
9) Follow the directions of the **Found New Hardware** window to install the USB device driver. Manually specify the location of the device driver to be **C:\Program Files\MAX11046** (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.
10) Start the MAX11046 EV kit software by opening its icon in the **Start | Programs** menu. The EV kit software main window appears, as shown in Figure 1.
11) Press the **Convert** button in the **ADC Conversion** group box. Observe that the data changes under **BNC1 (CH0)** in the **ADC Value Display** group box.

Detailed Description of Software

The evaluation software's window is shown in Figure 1. There are three sections on the GUI to control the IC. They are **Setup**, **ADC Conversion**, and **Data Logging**.

Setup

The MAX11046 EV kit software supports the MAX11044–MAX11049. The **Part Number** drop-down list provides the selection to evaluate these ICs.

The **Control Register** group box contains four control bits of the MAX11046 control register.

The **Ref. Voltage (V)** edit box sets up the reference voltage of the MAX11046. The voltages are calculated from this reference voltage value.

The **SHDN** checkbox controls the SHDN pin of the MAX11047/MAX11048/MAX11049. When checked, these parts will go into a low-current shutdown state.

When using an external convert start signal, connect it to pin 2 of JU8, and check the **Ext CONVST** checkbox. For an on-board generated convert start signal, uncheck the **Ext CONVST** checkbox and place the shunt of jumper JU8 in the 1-2 position.

ADC Conversion

The **ADC Value Display** group box displays the output data **Code** and the calculated **Voltage** values for a single sample of all channels on the IC specified in the **Part Number** drop-down list. Press the **Convert** button to update the samples.

Check the **Auto Convert** checkbox to continually read the current ADC value at a rate set by the **Time Interval** drop-down list.

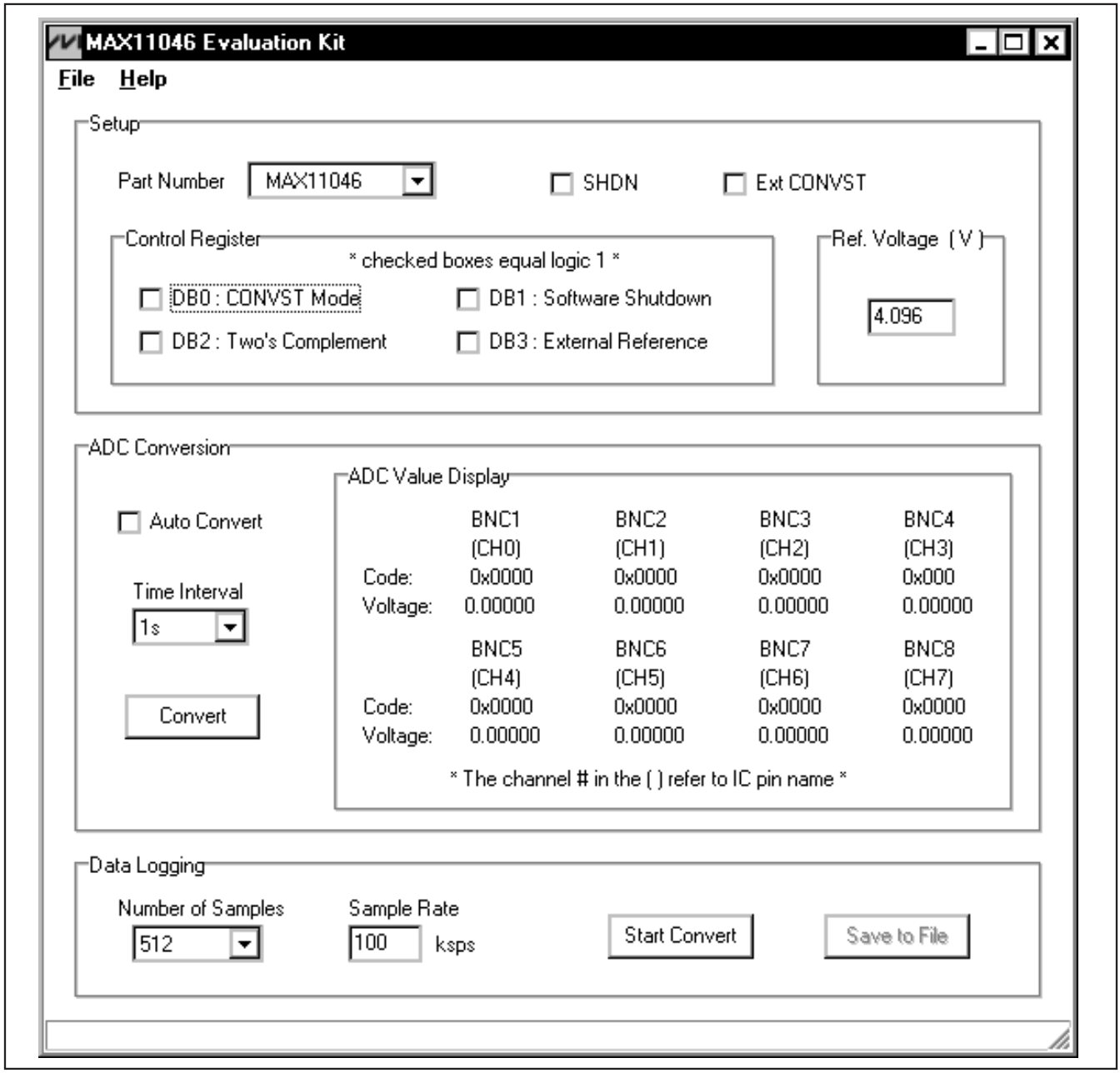

Figure 1. MAX11046 Evaluation Kit Main Window

Data Logging

Start Convert

The **Number of Samples** drop-down list selects the desired number of conversions. Press the **Start Convert** button to start sampling at the rate set by the **Sample Rate** edit box.

The on-board-generated convert start signal range is from 1ksps to 130ksps. The external convert start signal range is from 1ksps to 180ksps.

If using an external convert start signal, the GUI software will measure and display the sample rate.

Output File Data

The **Save to File** button is not active until the sampling is done. Press the **Save to File** button to save the sampled data into a file.

_Detailed Description of Hardware

MAX11046 EV Kit

The MAX11046 EV kit board provides a proven layout for evaluating the MAX11046 8-channel, 16-bit, simultaneous-sampling ADC. The EV kit comes with the MAX11046ETN+ installed. Eight BNC connectors are provided on the EV kit for all input channels of the MAX11046.

Power Supply

One DC power supply is required to power up the MAX11046 EV kit. Connect the power supply (from 6V to 8V) between the VDD and the GND pads on the EV kit.

Jumper Settings

Table 1 provides an overview of jumper settings.

Table 1. Jumper Configuration

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	BNC1 protected by a transient voltage suppressor (D2)
	2-3	BNC1 shorted to ground
	Open	BNC1 disconnected from D2
JU2	1-2*	BNC2 protected by a transient voltage suppressor (D1)
	2-3	BNC2 shorted to ground
	Open	BNC2 disconnected from D1
JU3	1-2*	BNC1 bypassing optional op amp
	2-3	BNC1 connected to an optional op amp
JU4	1-2*	BNC2 bypassing optional op amp
	2-3	BNC2 connected to an optional op amp
JU5	1-2	BNC1 connected to CH0 through a 10kΩ resistor
	3-4	BNC1 connected to CH0 through a 1kΩ resistor
	5-6	BNC1 connected to CH0 through a 100Ω resistor
	7-8*	BNC1 connected to CH0
JU6	1-2	BNC2 connected to CH1 through a 10kΩ resistor
	3-4	BNC2 connected to CH1 through a 1kΩ resistor
	5-6	BNC2 connected to CH1 through a 100Ω resistor
	7-8*	BNC2 connected to CH1
JU7	1-2*	Use on-board external voltage reference (U3)
	Open	Use an internal voltage reference or user-supplied external voltage reference connected to pin 2 of JU7
JU8	1-2*	Use on-board DSP (U2) generated convert start signal
	Open	Use a user-supplied external convert start signal connected to pin 2 of JU8
JU9	1-2*	CH2 connected to BNC3 directly
	2-3	CH2 shorted to ground
	Open	CH2 connected to BNC3 through a 1kΩ resistor

**Default position.*

Note: *CH_ refer to MAX11046 and MAX11049 pin names only.*

Table 1. Jumper Configuration (continued)

JUMPER	SHUNT POSITION	DESCRIPTION
JU10	1-2*	CH3 connected to BNC4 directly
	2-3	CH3 shorted to ground
	Open	CH3 connected to BNC4 through a 1kΩ resistor
JU11	1-2*	CH4 connected to BNC5 directly
	2-3	CH4 shorted to ground
	Open	CH4 connected to BNC5 through a 1kΩ resistor
JU12	1-2*	CH5 connected to BNC6 directly
	2-3	CH5 shorted to ground
	Open	CH5 connected to BNC6 through a 1kΩ resistor
JU13	1-2*	CH6 connected to BNC7 directly
	2-3	CH6 shorted to ground
	Open	CH6 connected to BNC7 through a 1kΩ resistor
JU14	1-2*	CH7 connected to BNC8 directly
	2-3	CH7 shorted to ground
	Open	CH7 connected to BNC8 through a 1kΩ resistor

**Default position.*

Note: *CH_ refer to MAX11046 and MAX11049 pin names only.*

Stand-Alone

A user-supplied signal generator and logic analyzer can be used to evaluate the MAX11046 without the on-board DSP (U2). First disconnect the MAX11046 from U2 by removing RN8, RN9, and RN10. Then connect all necessary signals from the signal generator and logic analyzer to connector J12. The MAX11046 pins are connected to J12, as shown in Table 2.

Table 2. MAX11046 Breakout to J12

PIN	SIGNAL NAME
1	D0
2	D1
3	D2
4	D3
5	D4
6	D5
7	D6
8	D7
9	D8
10	D9
11	D10
12	D11
13	D12
14	D13
15	D14
16	D15
17, 18	GND
19	WRB
20	CSB
21	RDB
22	SHDN
23	EOCB
24	CONVST

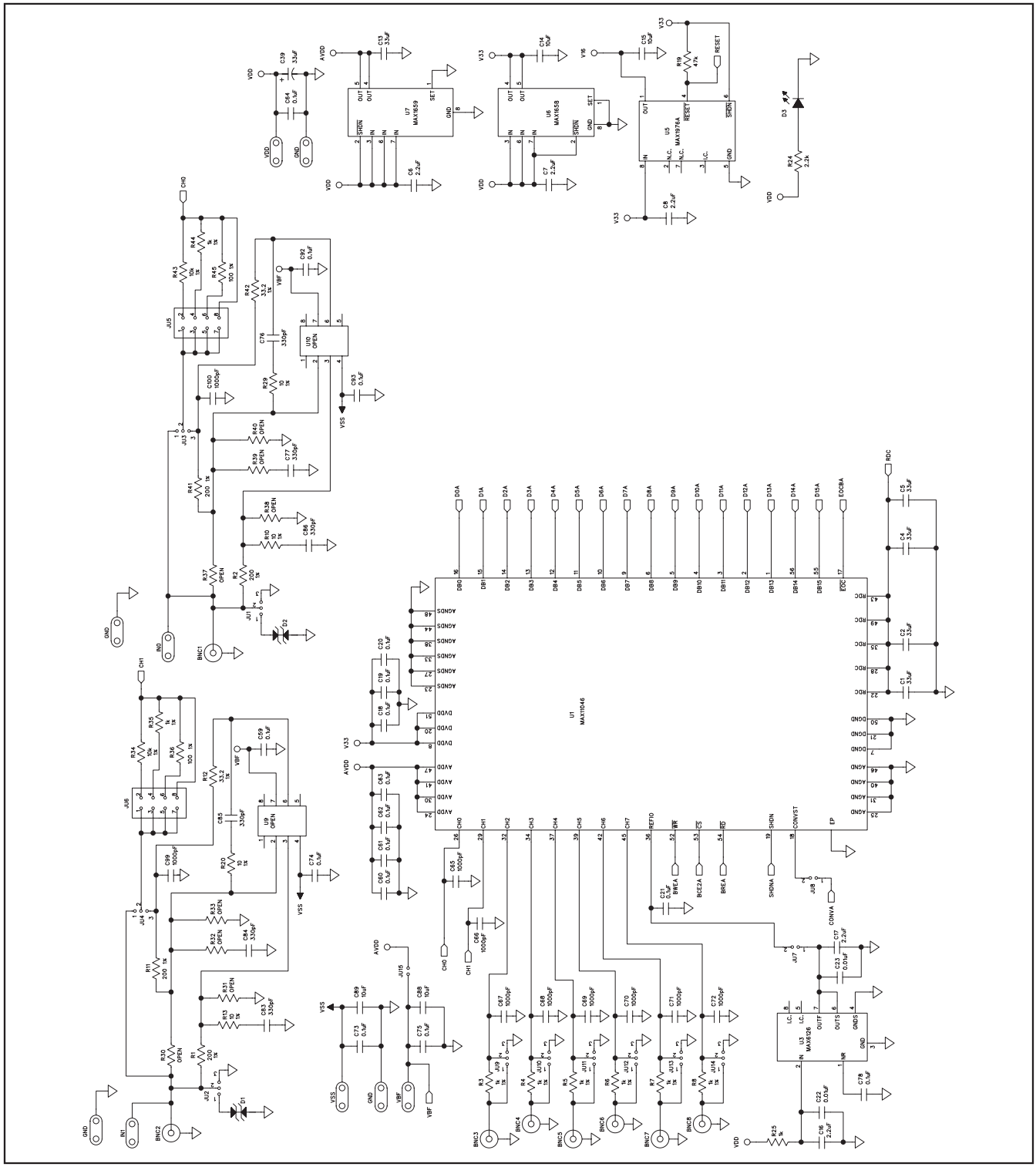

Figure 2a. MAX11046 EV Kit Schematic (Sheet 1 of 3)

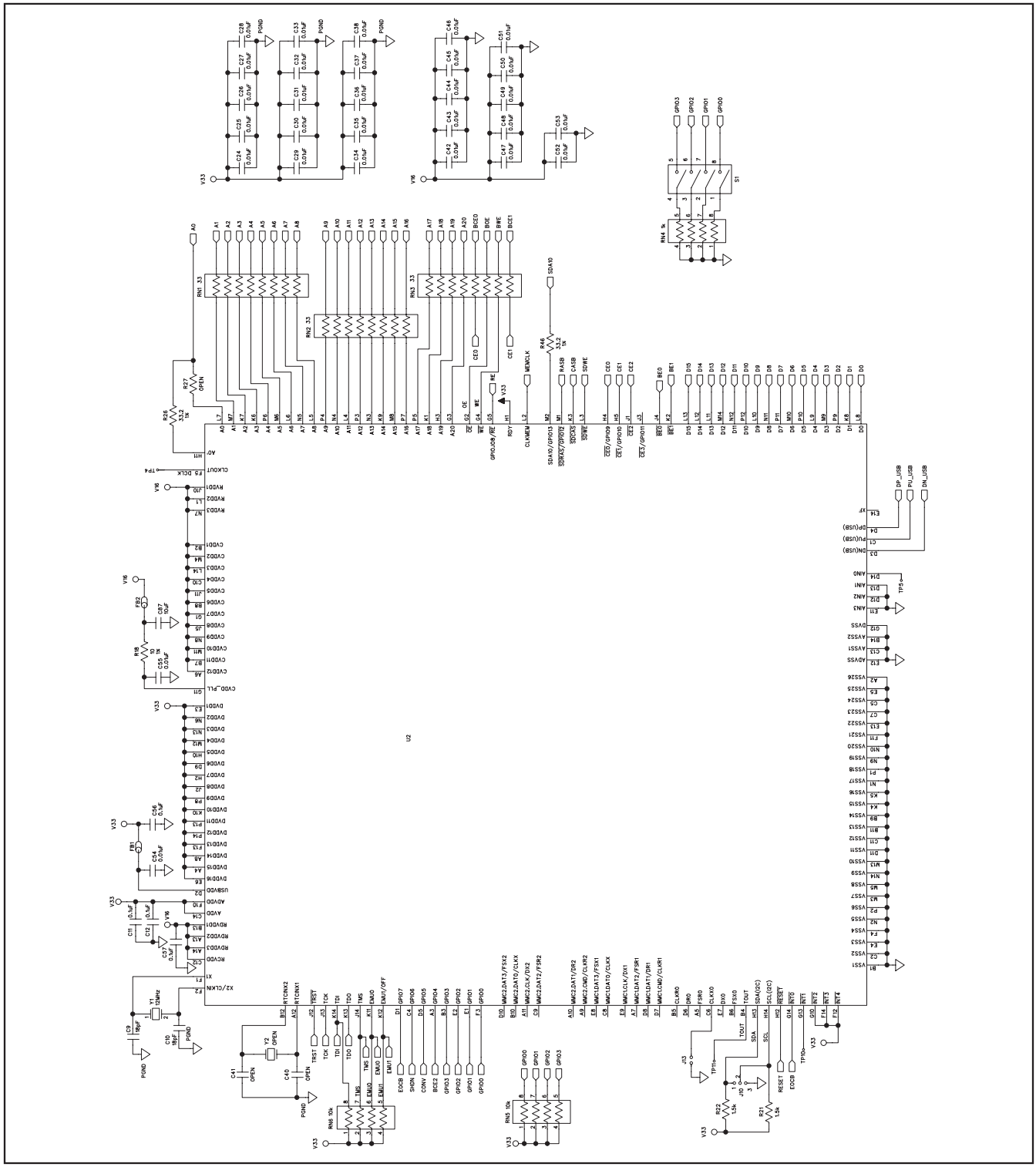

Figure 2b. MAX11046 EV Kit Schematic (Sheet 2 of 3)

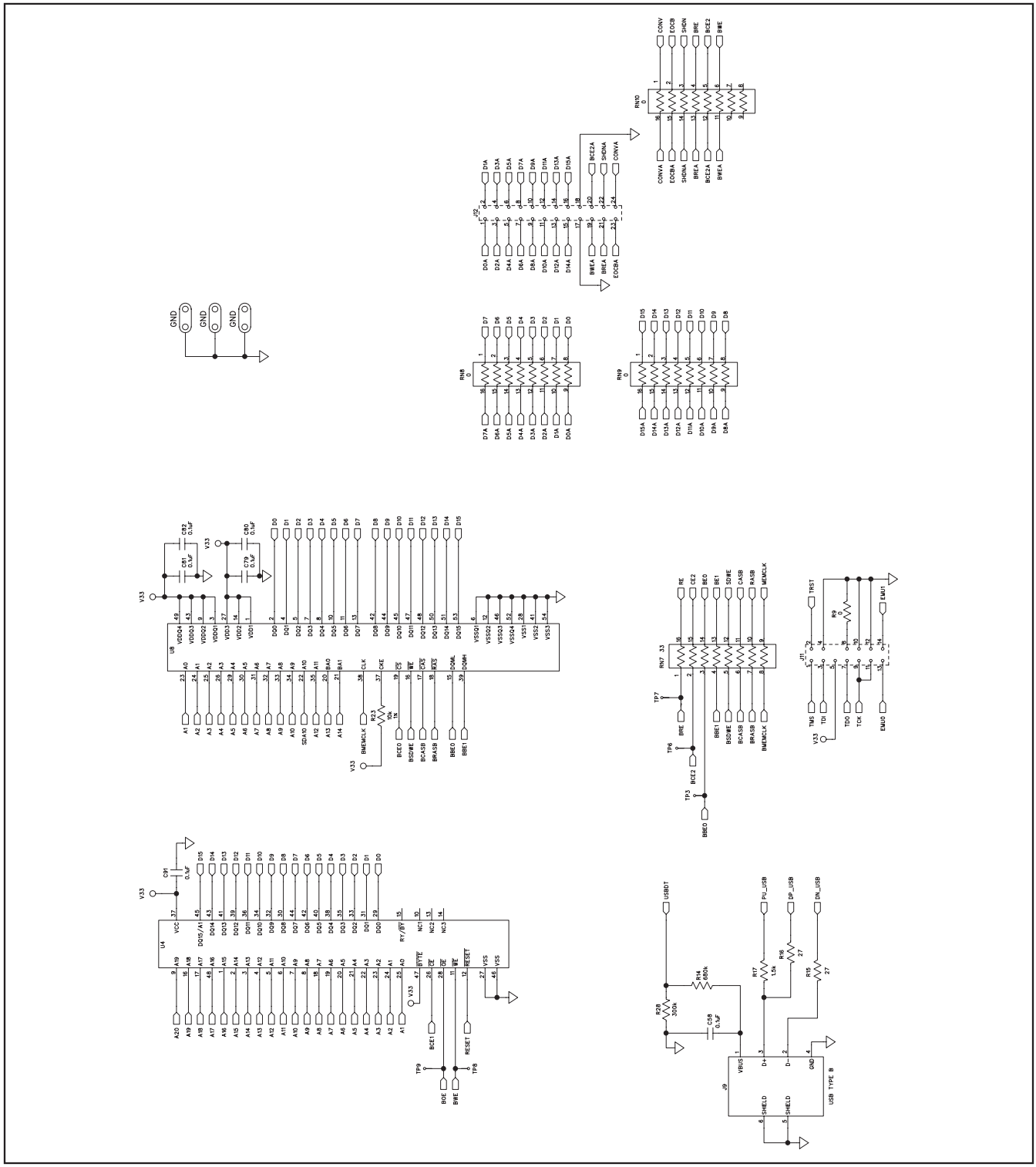

Figure 2c. MAX11046 EV Kit Schematic (Sheet 3 of 3)

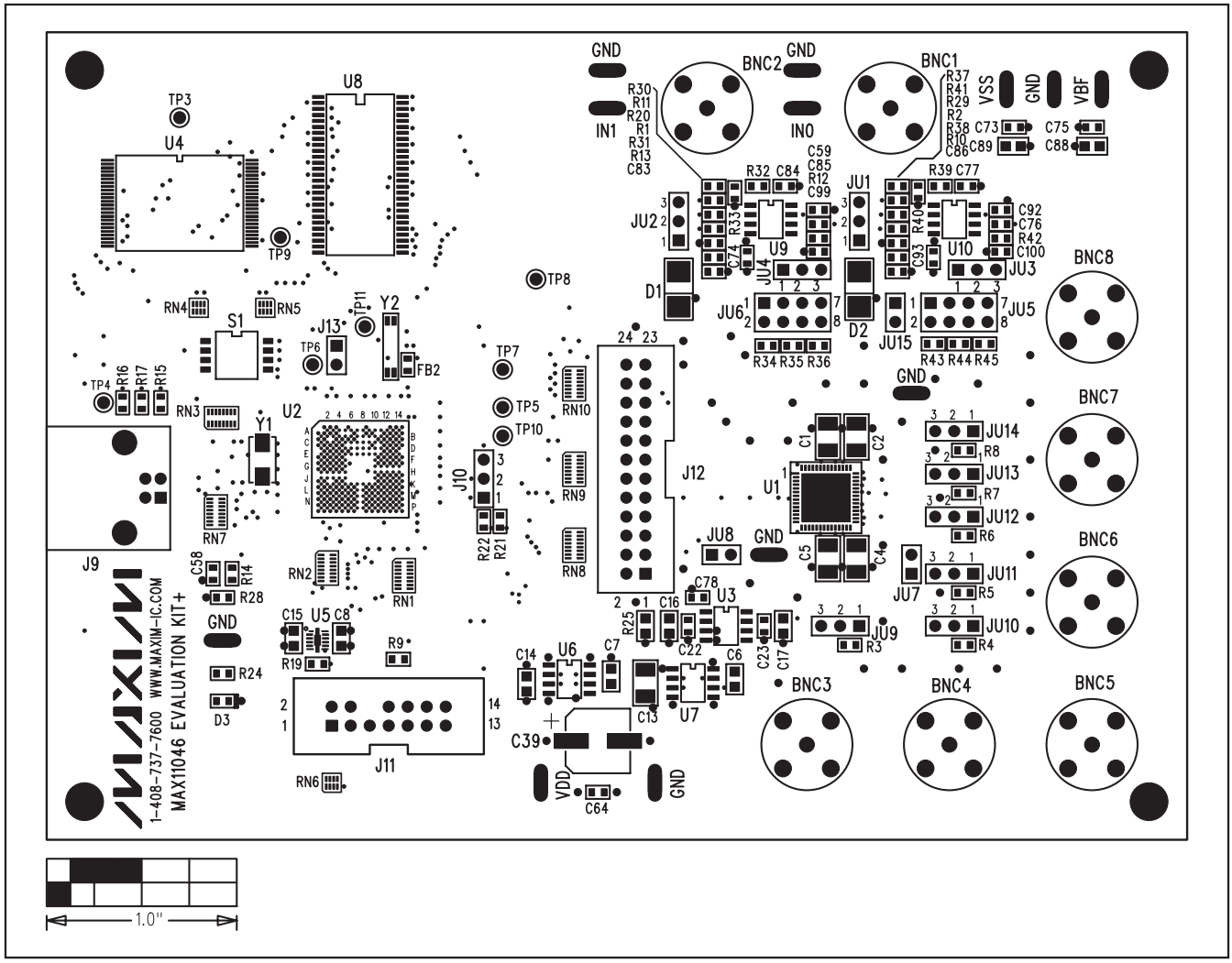

Figure 3. MAX11046 EV Kit Component Placement—Component Side

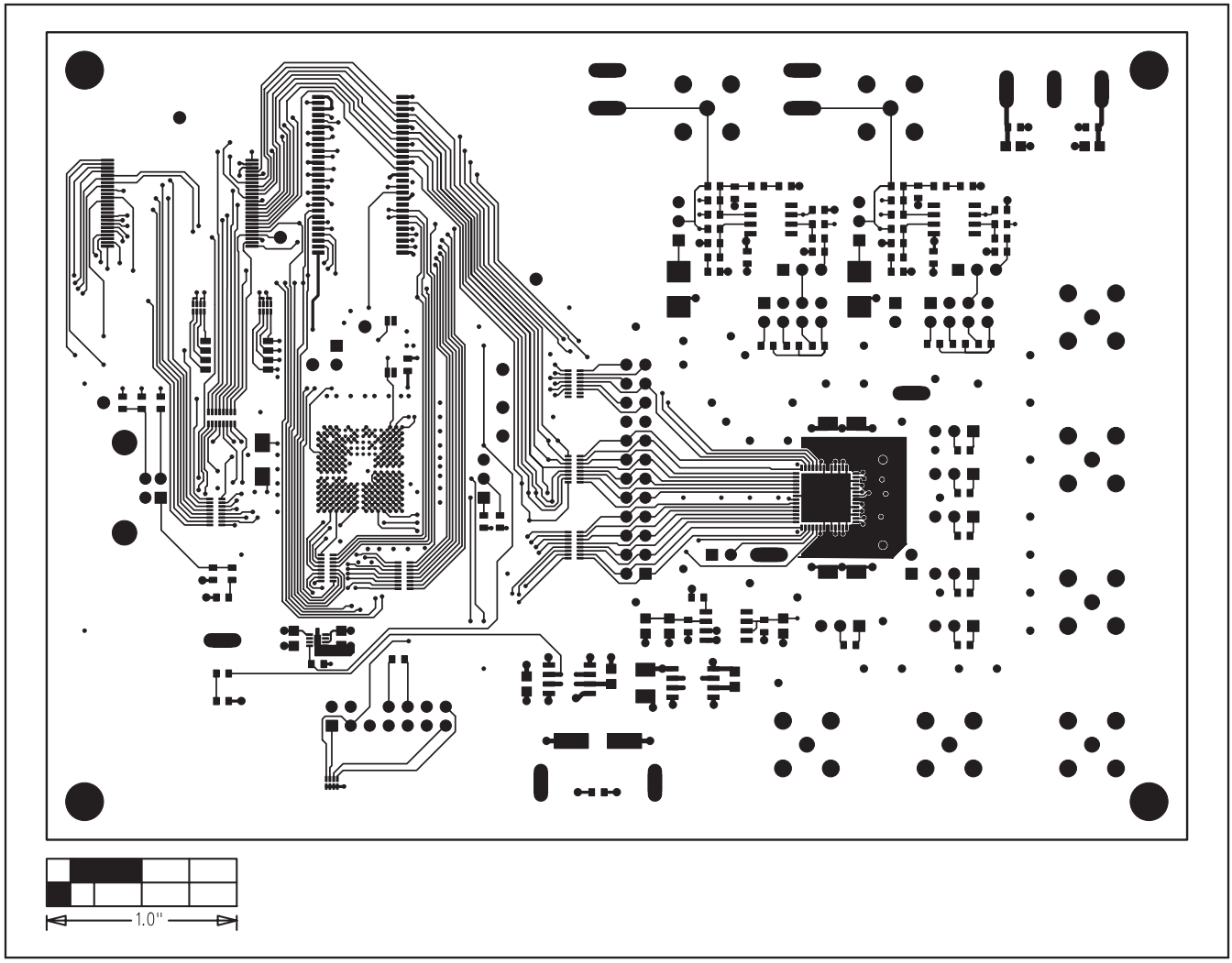

Figure 4. MAX11046 EV Kit PCB Layout—Component Side

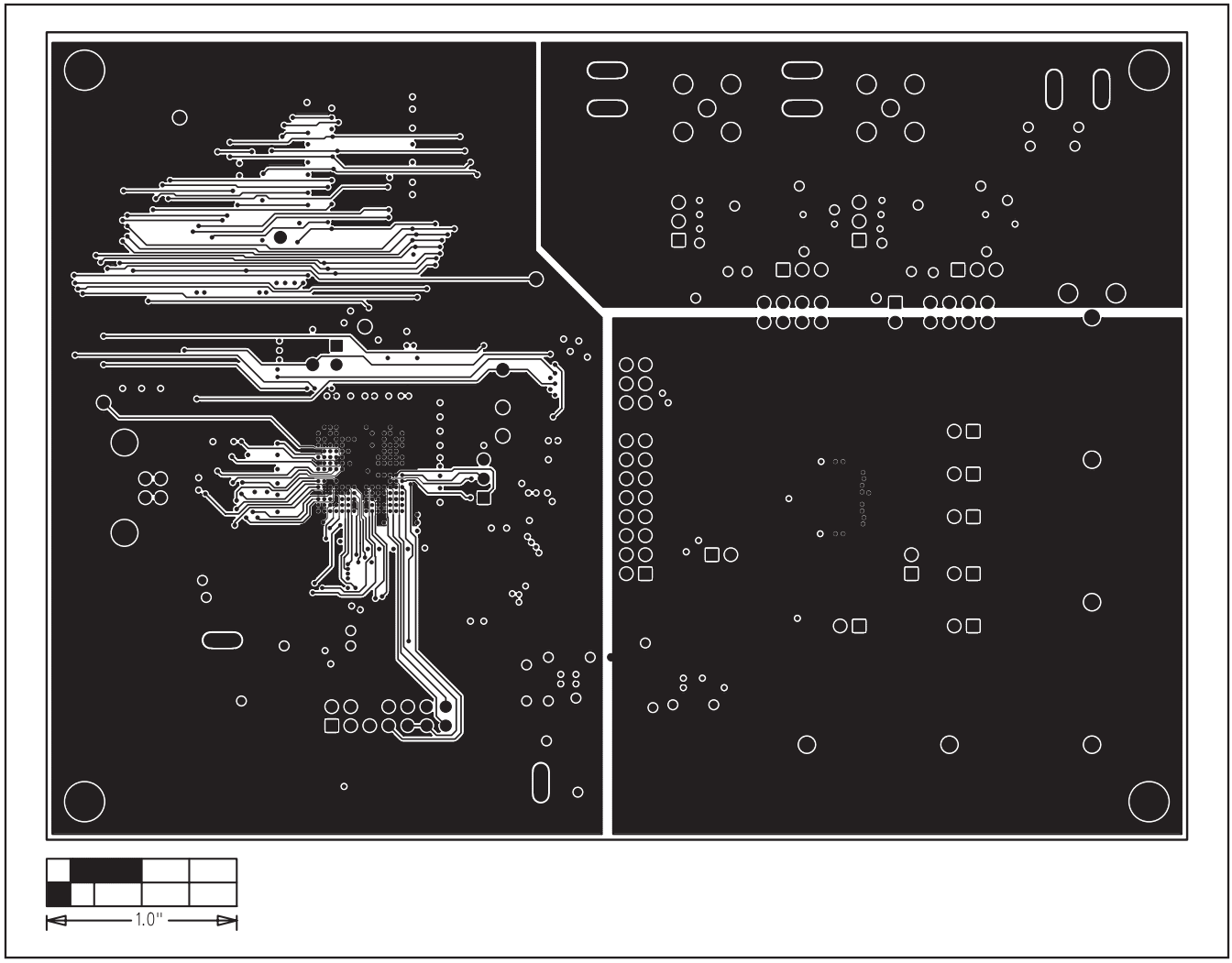

Figure 5. MAX11046 EV Kit PCB Layout—Inner Layer 2

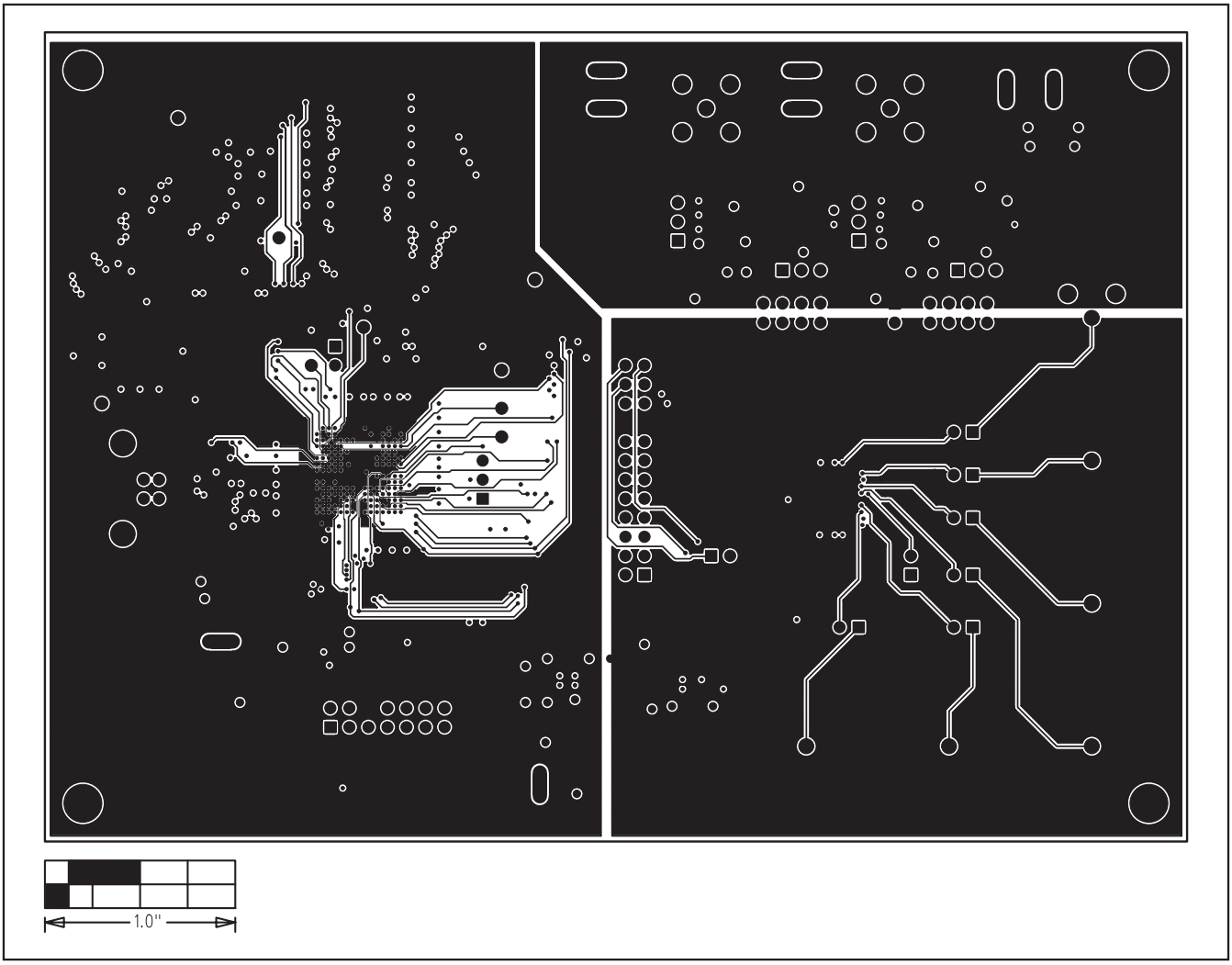

Figure 6. MAX11046 EV Kit PCB Layout—Inner Layer 3 (Power)

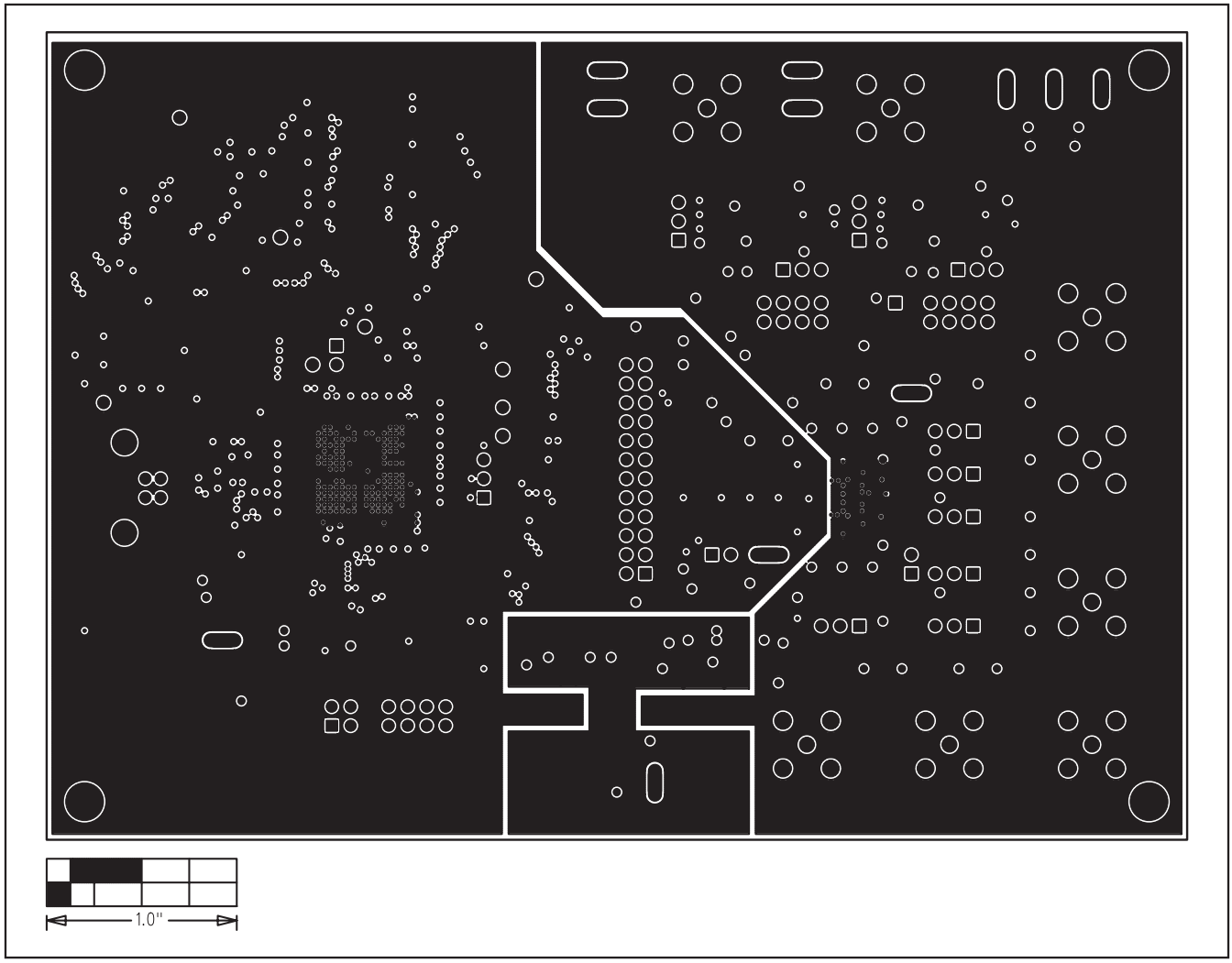

Figure 7. MAX11046 EV Kit PCB Layout—Inner Layer 4 (Ground)

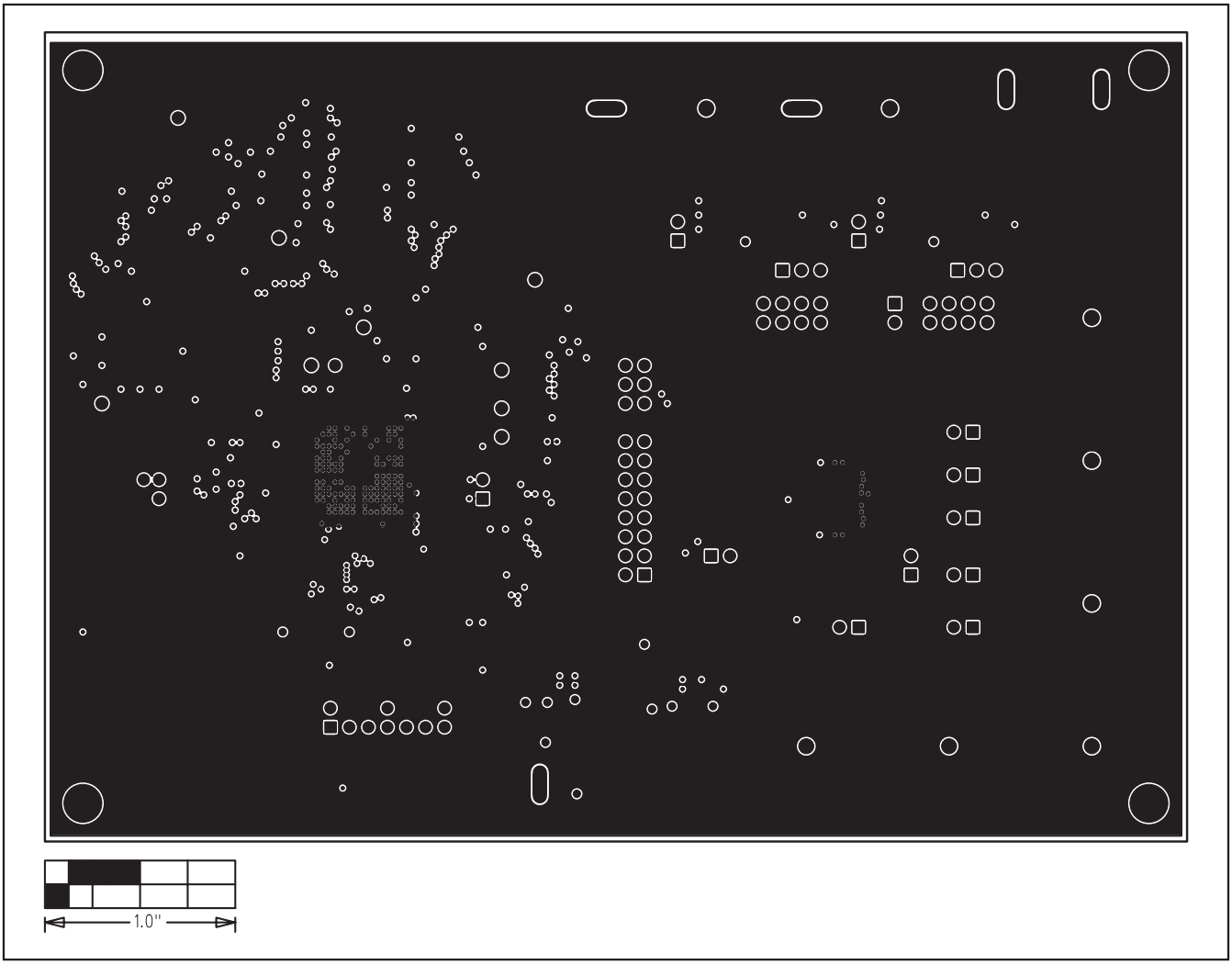

Figure 8. MAX11046 EV Kit PCB Layout—Inner Layer 5

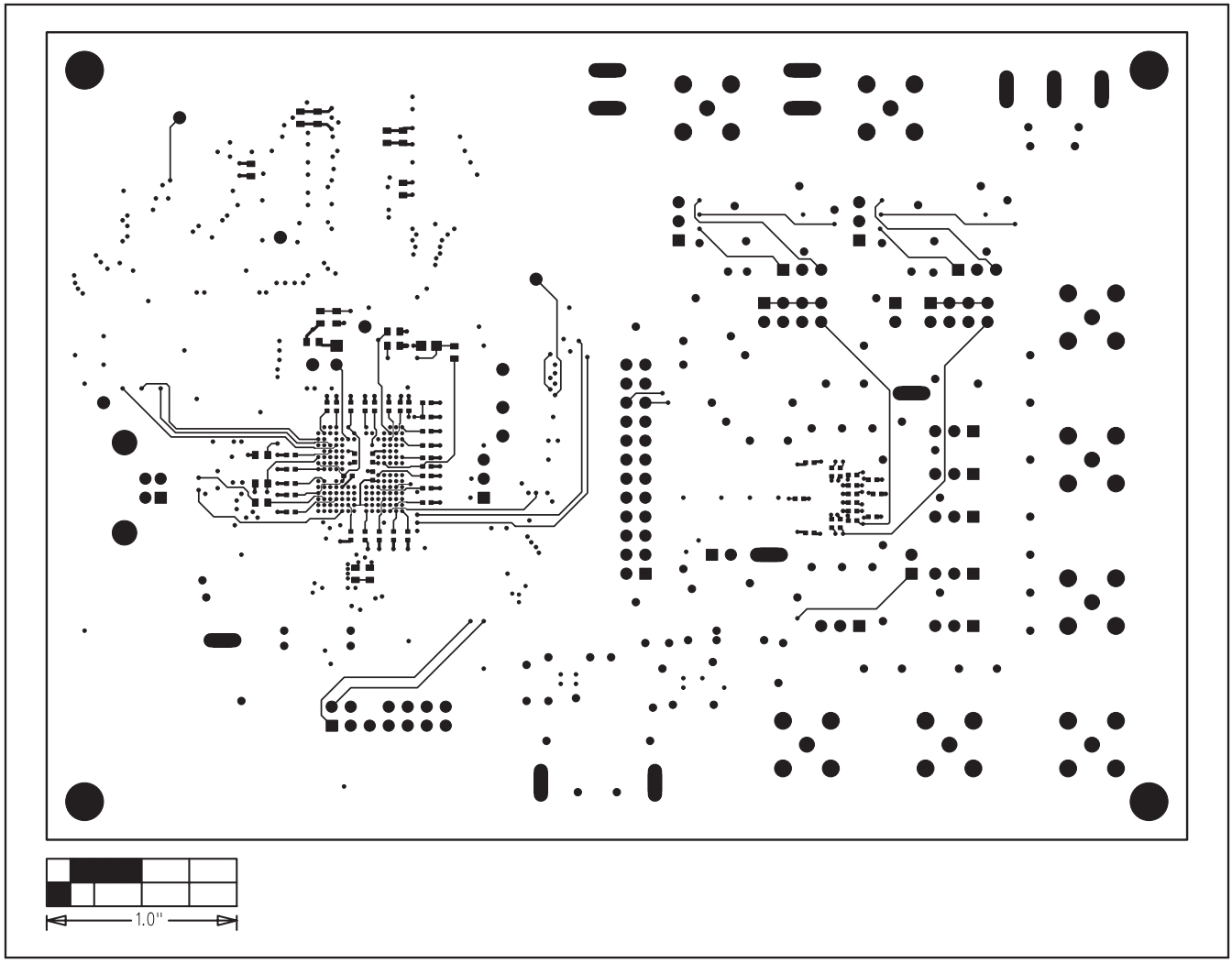

Figure 9. MAX11046 EV Kit PCB Layout—Solder Side

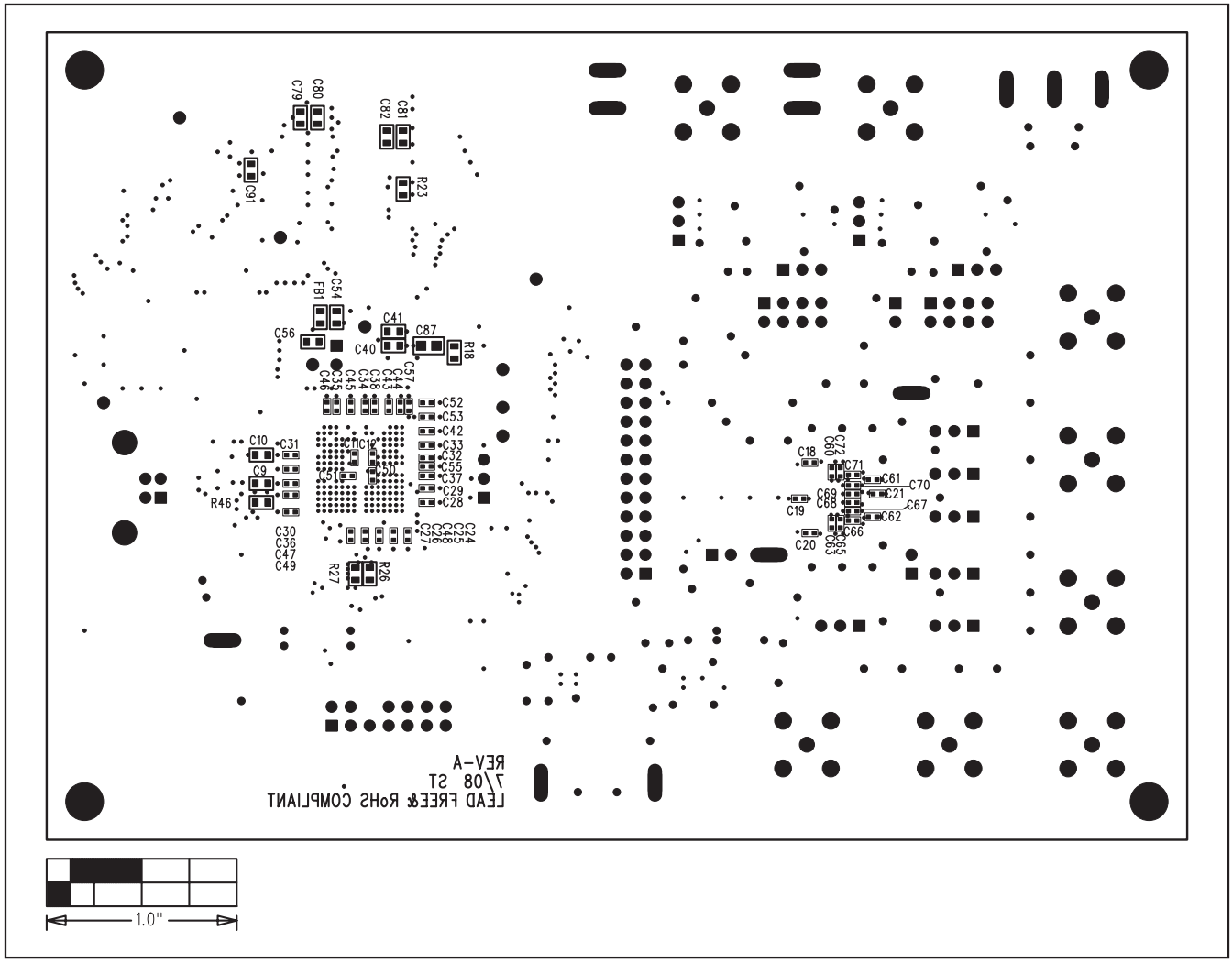

Figure 10. MAX11046 EV Kit Component Placement—Solder Side

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