19-4296; Rev 0; 10/08

MAX1379 Evaluation Kit

Evaluates: MAX1379

General Description

The MAX1379 evaluation kit (EV kit) is a fully assembled and tested PCB that evaluates the MAX1379 dual, 12-bit, 1.25Msps, simultaneous sampling ADC. 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 MAX1379.

The MAX1379 EV kit PCB comes with a MAX1379ATP+ installed.

Ordering Information

PART	TYPE
MAX1379EVKIT+	EV Kit

+Denotes lead-free and RoHS compliant.

Features

- **2 Simultaneous ADC Channel Inputs**
- **4 Banana Jacks for Power-Supply Inputs**
- **4 On-Board Input Buffers**
- **BNCs for Input Channels**
- **Frequency, RMS, MIN, MAX, and Average DC Calculations**
- **USB-PC Connection**
- **Proven PCB Layout**
- **Windows 2000/XP/Vista (32-Bit)-Compatible Evaluation Software**
- **Lead-Free and RoHS Compliant**
- **Fully Assembled and Tested**

Component List

DESIGNATION	QTY	DESCRIPTION
AIN1A_BNC, AIN1B_BNC, AIN2A_BNC, AIN2B_BNC	4	75Ω BNC female jacks, 4-pin
AVDD, AGND, DVDD, DGND	4	Uninsulated banana jacks
C1, C2, C10, C11	4	0.001µF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H102J
C3, C6, C12	3	0.01µF ±10%, 25V X7R ceramic capacitors (0402) TDK C1005X7R1E103K
C4, C7, C13, C15, C18, C21, C23, C26, C31, C32, C37	11	0.1µF ±10%, 16V X7R ceramic capacitors (0402) Murata GRM155R71C104K
C5	1	4.7µF ±10%, 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ475KG
C8, C14, C16, C19, C24, C25, C29, C33, C35, C38	10	10µF ±10%, 10V X5R ceramic capacitors (0805) Murata GRM21BR61A106K
C9, C22, C27, C30, C39, C110, C112, C114	8	10µF ±20%, 10V X5R ceramic capacitors (1210) TDK C3225X5R1A106M
C17, C36, C40	3	1µF ±10%, 10V X7R ceramic capacitors (0603) TDK C1608X7R1A105K
C20, C28, C34, C111	4	100pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H101J
C41	1	22µF ±10%, 6.3V X5R ceramic capacitor (0805) TDK C2012X5R0J226K
C42	1	4.7µF ±10%, 6.3V X5R ceramic capacitor (0603) Murata GRM188R60J475K
C43, C44, C45, C57, C58, C61	0	Not installed, capacitors (0603)
C46, C47	2	10pF ±5%, 50V C0G ceramic capacitors (0603) TDK C1608C0G1H100J
C48, C59, C64–C78, C80–C99, C101–C104	41	0.01µF ±10%, 25V X7R ceramic capacitors (0603) TDK C1608C0G1E103J
C49	1	10µF ±20%, 6.3V X5R ceramic capacitor (0603) TDK C1608X5R0J106M
C50–C55, C60, C62, C63	9	0.1µF ±10%, 16V X7R ceramic capacitors (0603) TDK C1608X7R1C104K

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For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
C79	1	22µF ±20%, 6.3V X7R ceramic capacitor (1206) TDK C3216X7R0J226M
C100	1	10µF ±20%, 6.3V X5R ceramic capacitor (1206) TDK C3216X5R0J106M
C115–C118	0	Not installed, capacitors (0603)
D9	1	Zener diode, 6.2V, 500mW Diodes, Inc. ZMM5234B-7
J1	1	USB type-B right-angle female receptacle
J2	0	14-pin dual-row header (2 x 7) (Not installed)
J1A, JAIN1A, JSEL, JS/D, JCS, JCNVST, JOP1-, JOP2-, JSCLK, JU/B, J2A, JAIN2A, JREFSEL, JREF, JU20, J1B, J2B	17	3-pin headers
JAIN1B, JAIN2B	2	4-pin headers
JUAVDD, JDVDD	2	2-pin headers
L1, L2	2	Ferrite beads, 30Ω (0603)
L3–L6	4	Ferrite beads, 220Ω (0805) Murata BLM21PG221SN1D
L7	1	Ferrite bead, 100Ω (0603) TDK MPZ1608S101ATAH0
P1	1	10-pin dual-row header (2 x 5)
R1, R2, R20, R23	4	49.9Ω ±1% resistors (0805)
R3–R9, R12, R14–R17, R21, R22, R25, R35	16	1kΩ ±1% resistors (0805)
R10, R11, R13, R24	4	12Ω ±5% resistors (0805)
R18, R19	2	100Ω ±5% resistors (0805)
R26, R27, R36, R37, R38	5	10kΩ ±5% resistors (0603)
R28, R30, R49	0	Not installed, resistors (0603)
R29, R31, R32, R33, R50, R51	6	33Ω ±5% resistors (0603)
R34	1	10Ω ±5% resistor (0603)
R41, R42	2	27Ω ±5% resistors (0603)
R43, R54, R55	3	1.5kΩ ±1% resistors (0603)
R44	1	300kΩ ±5% resistor (0603)
R45	1	680kΩ ±5% resistor (0603)
R46, R47, R48	3	1MΩ ±1% resistors (0603)
R56	1	100kΩ ±5% resistor (0603)
RN1–RN5	5	Resistor networks, 8-pin, 33Ω
RN6	1	Resistor network, 16-pin, 10kΩ
RN7–RN11	5	Resistor networks, 16-pin, 33Ω
RN12	1	Resistor network, 16-pin, 2.2kΩ
RN13	1	Resistor network, 8-pin, 1kΩ
S1	1	4-position DIP switch
U1	1	Dual-channel, 12-bit ADC (20 TQFN-EP*) Maxim MAX1379ATP+
U2, U3, U5, U6	4	16-bit accurate op amps (8 SO) Maxim MAX4430ESA+
U7	1	1.6V LDO regulator (8 TDFN) Maxim MAX1976AETA160+
U8	1	Controller
U9	1	256kword flash memory (48 TSOP)
U10	1	64Mb SDRAM (54 TSOP)
U12, U13	2	2-input positive-OR gates (5 SOT23)
U14	0	Not installed (8 SO)
Y2	1	12MHz crystal
Y3	1	32.768kHz crystal
—	20	Shunts
—	1	PCB: MAX1379 Evaluation Kit+

**EP = Exposed pad.*

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Diodes, Inc.	805-446-4800	www.diodes.com
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
Taiyo Yuden	800-348-2496	www.t-yuden.com
TDK Corp.	847-803-6100	www.component.tdk.com

Note: *Indicate you are using the MAX1379 when contacting these component suppliers.*

MAX1379 EV Kit Files

FILE	DESCRIPTION
INSTALL.EXE	Installs the EV kit files on your computer
MAX1379.EXE	Application program
LIBUSB.INF	USB device driver file
UNINST.INI	Uninstalls the EV kit software

Quick Start

Recommended Equipment

Before beginning, the following equipment is needed:

- MAX1379 EV kit (USB cable included)
- +5V power supply (analog supply)
- +3.3V power supply, digital supply voltage +3.3V
- -5V power supply
- +2V DC source
- Function generator
- 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

1) Visit **www.maxim-ic.com/evkitsoftware** to download the latest version of the EV kit software, 1379Rxx.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) Make sure the shunts of all jumpers are in the default positions, as shown in Table 1.
4) Turn off all the power supplies.
5) Connect the positive terminal of the +5V power supply to the AVDD connector.
6) Connect the ground terminal of the +5V power supply to the AGND connector.
7) Connect the positive terminal of the +3.3V power supply to the DVDD connector.
8) Connect the ground terminal of the +3.3V power supply to the DGND connector.
9) Connect the positive terminal of the +5V power supply to the OP+ pad.
10) Connect the negative terminal of the -5V power supply to the OP- pad.
11) Connect the ground terminals of the +5V power supply and the -5V power supply together at the AGND pad.
12) Connect the CM1+, CM1-, CM2+, and CM2- pads to the AGND pads.
13) Connect the output of the +2V DC source to the AIN1A_BNC connector.
14) Turn on all the power supplies.
15) 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.
16) 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

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C:\Program Files\MAX1379 (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.

17) Start the MAX1379 EV kit software by opening its icon in the **Start | Programs** menu. The EV kit software main window appears, as shown in Figure 1.

18) Press the **Convert** button in the **ADC Conversion** group box.

19) Verify that voltage of approximately 2V is displayed in the **ADC Value Display** group box under the **DOUT1** label.

20) Disconnect the +2V DC source.

21) Move the shunt of jumper JAIN1B to the 1-2 position.

22) Connect the CM1+ and CM1- pads to the 2V DC source.

23) Connect the output of the function generator to the AIN1A_BNC connector.

24) Set the function generator to generate a 60Hz, 2V peak-to-peak sinusoidal wave with 0V DC common mode.

25) Press the **Start Conversion** button in the **Data Logging** group box.

26) Press the **Calculate** button.

27) Verify an approximate **Frequency** of 60Hz, a **Min** value of -1V, and a **MAX** value of 1V are displayed in the **Calculation** group box.

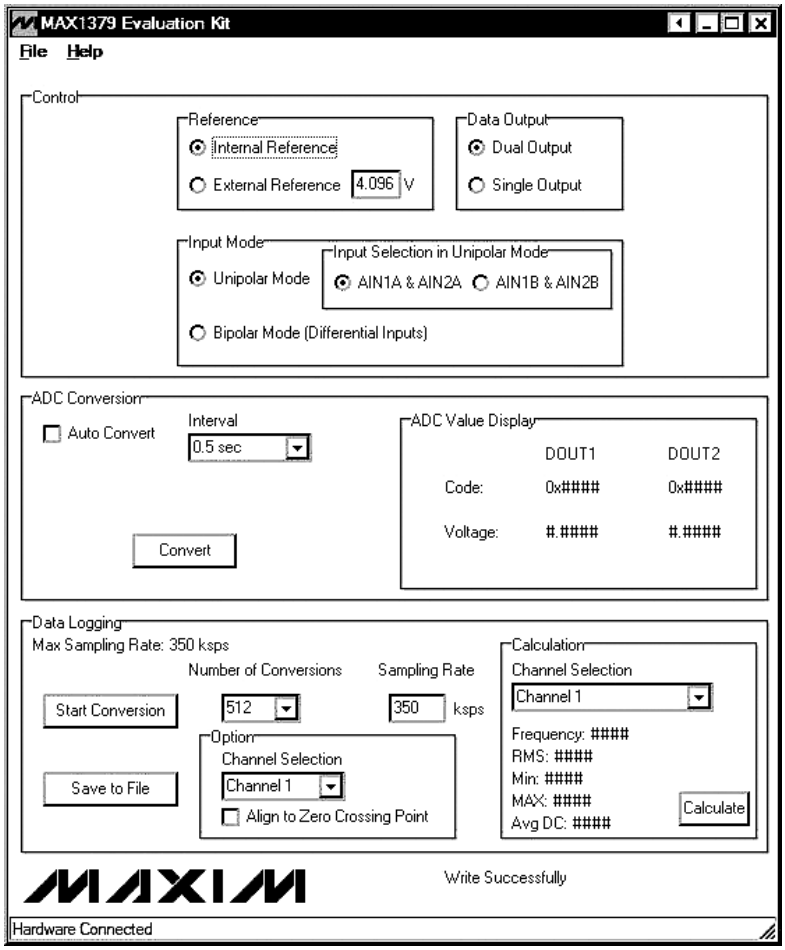

Figure 1. MAX1379 Evaluation Kit Main Window

Detailed Description of Software

The MAX1379 EV kit software's window is shown in Figure 1. The **Control** group box located at the top of the window has all the functions that configure the MAX1379. Functions that relate to reading single-sample ADC values in the **ADC Conversion** group box are located in the middle section. Data logging functions and data calculation are in the **Data Logging** group box located at the bottom of the main window.

Control

Reference

In the **Reference** group box, click on the **Internal Reference** radio button to select internal reference mode. If an external reference is used, press the **External Reference** radio button and enter the actual voltage on the REF pin of the MAX1379 into the adjacent edit box. This should be done before the external reference voltage is applied.

Data Output

In the **Data Output** group box, click on the **Dual Output** radio button to select the dual-output mode, in which conversion results from the two channels appear on separate outputs. DOUT1 outputs the result from channel 1 and DOUT2 outputs the result from channel 2.

Click on the **Single Output** radio button to select the single-output mode. In this mode, results from both channels appear on DOUT1.

Input Mode

To measure the input signals in unipolar mode click on the **Unipolar Mode** radio button in the **Input Mode** group box. Click on the **AIN1A & AIN2A** radio button to designate the inputs AIN1A and AIN2A, as the active single-ended inputs referenced to RGND. Click on the **AIN1B & AIN2B** radio button to designate the inputs, AIN1B and AIN2B, as the active single-ended inputs.

To make measurements in bipolar mode, click on the **Bipolar Mode (Differential Inputs)** radio button.

ADC Conversion

The **ADC Value Display** group box, shown in the **ADC Conversion** group box, displays the output data **Code** and the calculated **Voltage** values for a single sample of both channels on the MAX1379. Pressing the **Convert** button updates the status of the **ADC Value Display** group box.

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

Data Logging

Start Conversion

The **Data Logging** group box is located at the bottom of the window. The user can select the desired number of conversions in the **Number of Conversions** drop-down list. Press the **Start Conversion** button in the **Data Logging** group box to start sampling at the rate set by the **Sampling Rate** edit box.

Output File Data

After sampling is finished, press the **Save to File** button to save the data into a file.

Zero-Crossing Alignment Option

In the **Option** group box, when the **Align to Zero Crossing Point** checkbox is checked, the program will detect the zero-crossing point in the sampled data of the channel specified in the **Channel Selection** drop-down list. When the **Save to File** button is pressed, the program will save the sampled data starting from the zero-crossing point.

Calculation

After the sampling is finished, press the **Calculate** button to calculate the **Frequency**, **RMS**, **Min**, **MAX**, and **Avg DC** of the input signal of the channel specified in the **Channel Selection** drop-down list. The calculation for **Frequency** uses a simple algorithm that has limitations. The **Frequency** is calculated by measuring the time in between two rising-edge zero-crossing points. Error may show up in circumstances that DC offset is on the order of the input signal amplitude, or there is significant noise or other frequency content in the signal that creates multiple zero crossings near the fundamental crossing.

To calculate these results for a different channel, select a different channel in the **Channel Selection** drop-down list, and push the **Calculate** button.

Detailed Description of Hardware

MAX1379 EV Kit

The MAX1379 EV kit board provides a proven layout for evaluating the MAX1379 dual, 12-bit, 1.25Msps, simultaneous-sampling ADC. The EV kit comes with a MAX1379ATP+ installed. Four BNC connectors and four on-board input buffers are provided on the EV kit for all AIN inputs of the MAX1379.

Power Supply

Two separate power supplies are required to power up the MAX1379 EV kit. Connect the analog voltage supply (from 4.75V to 5.25V) to the AVDD connector and the

analog ground to the AGND connector. Connect the +3.3V digital voltage supply to the DVDD connector and the digital ground to the DGND connector on the EV kit. If the on-board input buffer circuitry is to be utilized, connect the +7V power supply and -2V power supply to the corresponding OP+ and the OP- pads. Connect the ground terminals of the +7V power supply and -2V power supply together at the AGND pad.

On-Board Input Buffers

When using the on-board input buffers, connect a desired common-mode voltage to the CMx+ and CMx- pads to set the common-mode voltages for AINxA and AINxB input channels, respectively.

When making the measurements for the true-differential signal, set the jumpers according to Table 2. Connect the positive input signal to the AINxA_BNC connector, and the negative input signal to the AINxB_BNC connector.

When measuring the single-ended signal, set the jumpers according to Table 2. Depending on the setting in the **Input Selection in Unipolar Mode** group box of the EV kit software, connect the single-ended signal to the appropriate BNC connector.

To create a differential signal from a single-ended signal using the input buffers, set the jumpers according to Table 3. Connect the single-ended signal to the AINxA_BNC connector.

Set the jumpers according to Table 4 to bypass the on-board input buffers.

Jumper Settings

Table 1. MAX1379 EV Kit Jumper Descriptions

JUMPER	SHUNT POSITION	DESCRIPTION
JREFSEL	1-2	Connects the external REFSEL signal to the on-board REFSEL pad
	2-3*	MAX1379 REFSEL signal connected to the on-board controller
JU/B	1-2*	MAX1379 $\overline{U}$/B signal connected to the on-board controller
	2-3	Connects the external $\overline{U}$/B signal to the on-board U/B pad
JDVDD	1-2*	Connects the power from the DVDD connector to the on-board controller
	Open	Disconnects the power to the on-board controller
JSCLK	1-2*	MAX1379 SCLK signal connected to the on-board controller
	2-3	Connects the external SCLK signal to the on-board SCLK pad
JCNVST	1-2*	MAX1379 CNVST signal connected to the on-board controller
	2-3	Connects the external CNVST signal to the on-board CNVST pad
JCS	1-2*	MAX1379 $\overline{CS}$ signal connected to ground
	2-3	Connects the external $\overline{CS}$ signal to the on-board $\overline{CS}$ pad
JS/D	1-2	Connects the external S/$\overline{D}$ signal to the on-board S/$\overline{D}$ pad
	2-3*	MAX1379 S/$\overline{D}$ signal connected to the on-board controller
JSEL	1-2	Connects the external SEL signal to the on-board SEL pad
	2-3*	MAX1379 SEL signal connected to the on-board controller
J1A	1-2*	Connects the signal from the AIN1A_ BNC connector to the noninverting input of the input buffer (U2) through a 1kΩ resistor
	2-3	Connects the noninverting input of the input buffer (U2) to ground through a 1kΩ resistor
JAIN1A	1-2*	Connects the output of the input buffer (U2) to the AIN1A input of the MAX1379
	2-3	Connects the signal from the AIN1A_BNC connector to the AIN1A input of the MAX1379
J1B	1-2	Connects the signal from the AIN1B_BNC connector to the noninverting input of the input buffer (U3) through a 1kΩ resistor
	2-3*	Connects the noninverting input of the input buffer (U3) to ground through a 1kΩ resistor

**Default position.*

Table 1. MAX1379 EV Kit Jumper Descriptions (continued)

JUMPER	SHUNT POSITION	DESCRIPTION
JAIN1B	1-2	Connects the output of the input buffer (U3) to the AIN1B input of the MAX1379
	1-3*	Connects the AIN1B input of the MAX1379 to ground
	1-4	Connects the signal from the AIN1B_BNC connector to the AIN1B input of the MAX1379
JOP1-	1-2	Connects the inverting input of the input buffer (U3) to ground through a 1kΩ resistor
	2-3*	Connects the signal from the AIN1A_BNC connector to the inverting input of the input buffer (U3) through a 1kΩ resistor
J2A	1-2*	Connects the signal from the AIN2A_BNC connector to the noninverting input of the input buffer (U5) through a 1kΩ resistor
	2-3	Connects the noninverting input of the input buffer (U5) to ground through a 1kΩ resistor
JAIN2A	1-2*	Connects the output of the input buffer (U5) to the AIN2A input of the MAX1379
	2-3	Connects the signal from the AIN2A_BNC connector to the AIN2A input of the MAX1379
J2B	1-2*	Connects the signal from the AIN2B_BNC connector to the noninverting input of the input buffer (U6) through a 1kΩ resistor
	2-3	Connects the noninverting input of the input buffer (U6) to ground through a 1kΩ resistor
JAIN2B	1-2*	Connects the output of the input buffer (U6) to the AIN2B input of the MAX1379
	1-3	Connects the AIN2B input of the MAX1379 to ground
	1-4	Connects the signal from the AIN2B_BNC connector to the AIN2B input of the MAX1379
JOP2-	1-2*	Connects the inverting input of the input buffer (U6) to ground through a 1kΩ resistor
	2-3	Connects the signal from the AIN2A_BNC connector to the inverting input of the input buffer (U6) through a 1kΩ resistor
JREF	1-2	Connects the REF input of the MAX1379 to AVDD
	2-3*	Connects the external reference voltage to the on-board REF pad
JUAVDD	1-2*	Connects the power from the AVDD connector to the MAX1379
	Open	Disconnects the power to the MAX1379

**Default position.*

Table 2. Jumper Settings for True-Differential or Single-Ended Signal Measurement

JUMPER	SHUNT POSITION	DESCRIPTION
J1A	1-2	Connects the signal from the AIN1A_BNC connector to the noninverting input of the input buffer (U2) through a 1kΩ resistor
JAIN1A	1-2	Connects the output of the input buffer (U2) to the AIN1A input of the MAX1379
J1B	1-2	Connects the signal from the AIN1B_BNC connector to the noninverting input of the input buffer (U3) through a 1kΩ resistor
JAIN1B	1-2	Connects the output of the input buffer (U3) to the AIN1B input of the MAX1379
JOP1-	1-2	Connects the inverting input of the input buffer (U3) to ground through a 1kΩ resistor
J2A	1-2	Connects the signal from the AIN2A_BNC connector to the noninverting input of the input buffer (U5) through a 1kΩ resistor
JAIN2A	1-2	Connects the output of the input buffer (U5) to the AIN2A input of the MAX1379

Table 2. Jumper Settings for True-Differential or Single-Ended Signal Measurement (continued)

JUMPER	SHUNT POSITION	DESCRIPTION
J2B	1-2	Connects the signal from the AIN2B_BNC connector to the noninverting input of the input buffer (U6) through a 1kΩ resistor
JAIN2B	1-2	Connects the output of the input buffer (U6) to the AIN2B input of the MAX1379
JOP2-	1-2	Connects the inverting input of the input buffer (U6) to ground through a 1kΩ resistor

Table 3. Jumper Settings for Single-Ended Signal Generated Differential Signal Measurement

JUMPER	SHUNT POSITION	DESCRIPTION
J1A	1-2	Connects the signal from the AIN1A_BNC connector to the noninverting input of the input buffer (U2) through a 1kΩ resistor
JAIN1A	1-2	Connects the output of the input buffer (U2) to the AIN1A input of the MAX1379
J1B	2-3	Connects the noninverting input of the input buffer (U3) to ground through a 1kΩ resistor
JAIN1B	1-2	Connects the output of the input buffer (U3) to the AIN1B input of the MAX1379
JOP1-	2-3	Connects the signal from the AIN1A_BNC connector to the inverting input of the input buffer (U3) through a 1kΩ resistor
J2A	1-2	Connects the signal from the AIN2A_BNC connector to the noninverting input of the input buffer (U5) through a 1kΩ resistor
JAIN2A	1-2	Connects the output of the input buffer (U5) to the AIN2A input of the MAX1379
J2B	2-3	Connects the noninverting input of the input buffer (U6) to ground through a 1kΩ resistor
JAIN2B	1-2	Connects the output of the input buffer (U6) to the AIN2B input of the MAX1379
JOP2-	2-3	Connects the signal from the AIN2A_BNC connector to the inverting input of the input buffer (U6) through a 1kΩ resistor

Table 4. Jumper Settings for Bypassing the Input On-Board Buffers

JUMPER	SHUNT POSITION	DESCRIPTION
J1A	2-3	Connects the noninverting input of the input buffer (U2) to ground through a 1kΩ resisto
JAIN1A	2-3	Connects the signal from the AIN1A_BNC connector to the AIN1A input of the MAX1379
J1B	2-3	Connects the noninverting input of the input buffer (U3) to ground through a 1kΩ resistor
JAIN1B	1-4	Connects the signal from the AIN1B_BNC connector to the AIN1B input of the MAX1379
JOP1-	1-2	Connects the inverting input of the input buffer (U3) to ground through a 1kΩ resistor
J2A	2-3	Connects the noninverting input of the input buffer (U5) to ground through a 1kΩ resistor
JAIN2A	2-3	Connects the signal from the AIN2A_BNC connector to the AIN2A input of the MAX1379
J2B	2-3	Connects the noninverting input of the input buffer (U6) to ground through a 1kΩ resistor
JAIN2B	1-4	Connects the signal from the AIN2B_BNC connector to the AIN2B input of the MAX1379
JOP2-	1-2	Connects the inverting input of the input buffer (U6) to ground through a 1kΩ resistor

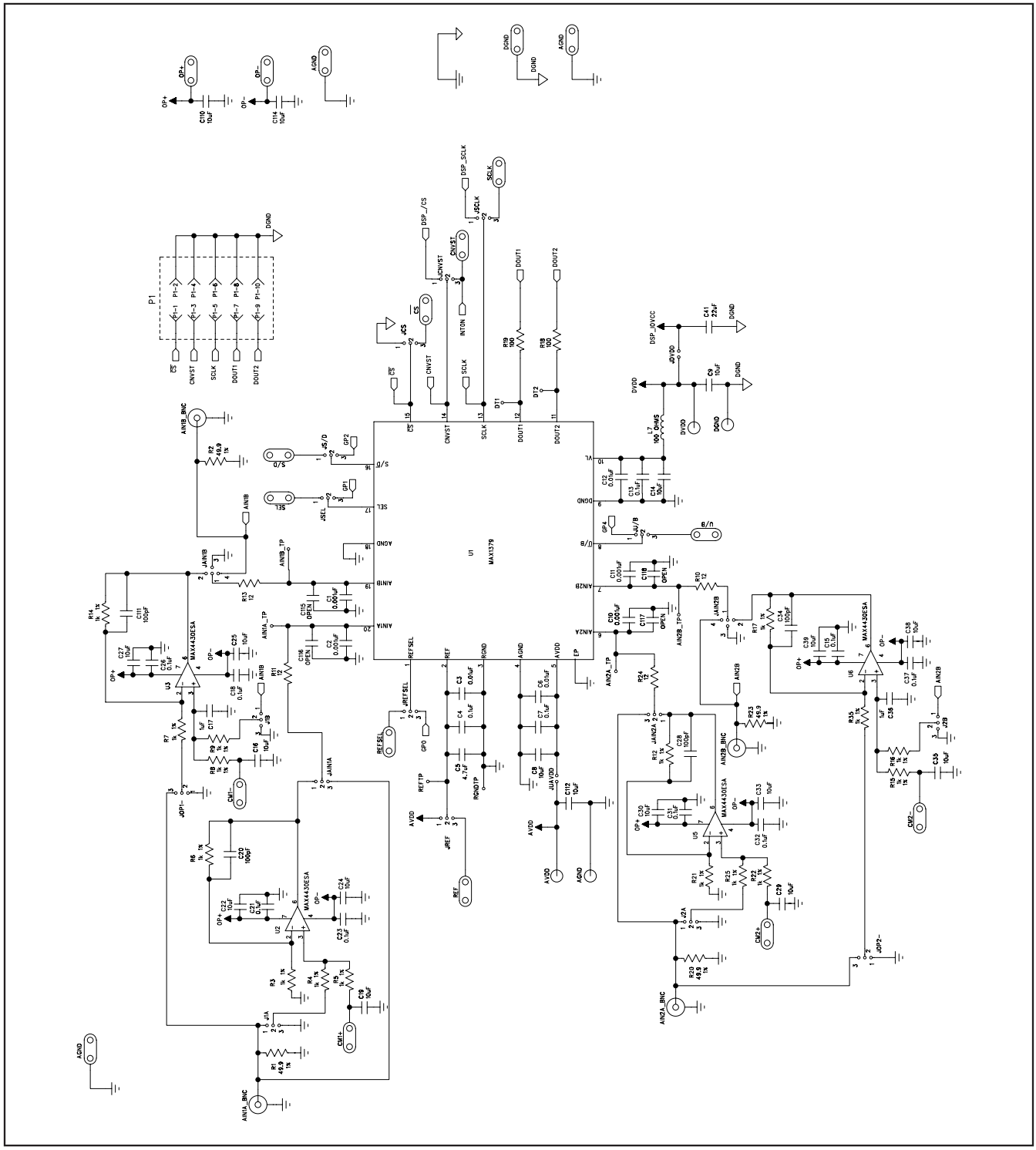

Figure 2a. MAX1379 EV Kit Schematic (Sheet 1 of 3)

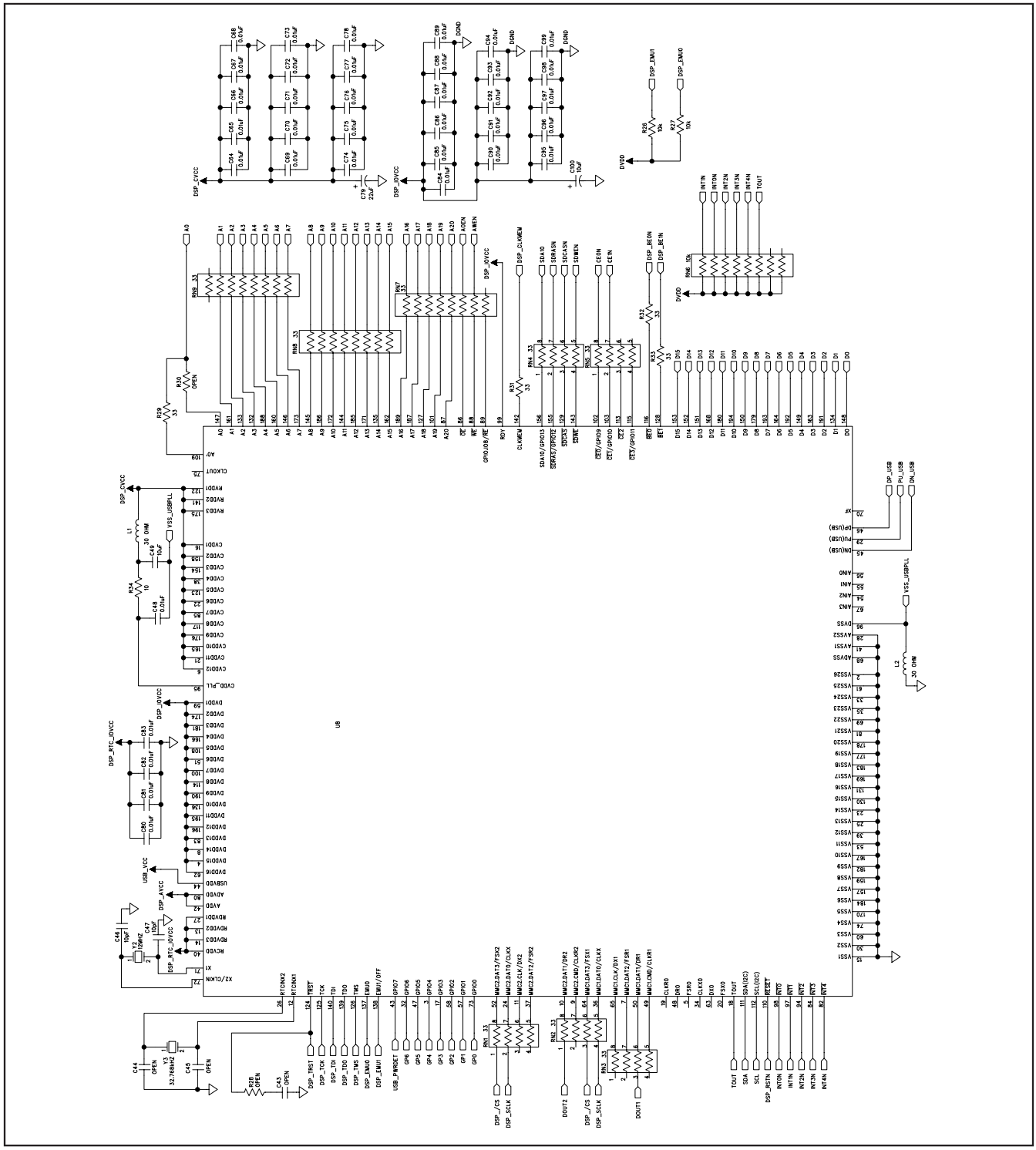

Figure 2b. MAX1379 EV Kit Schematic (Sheet 2 of 3)

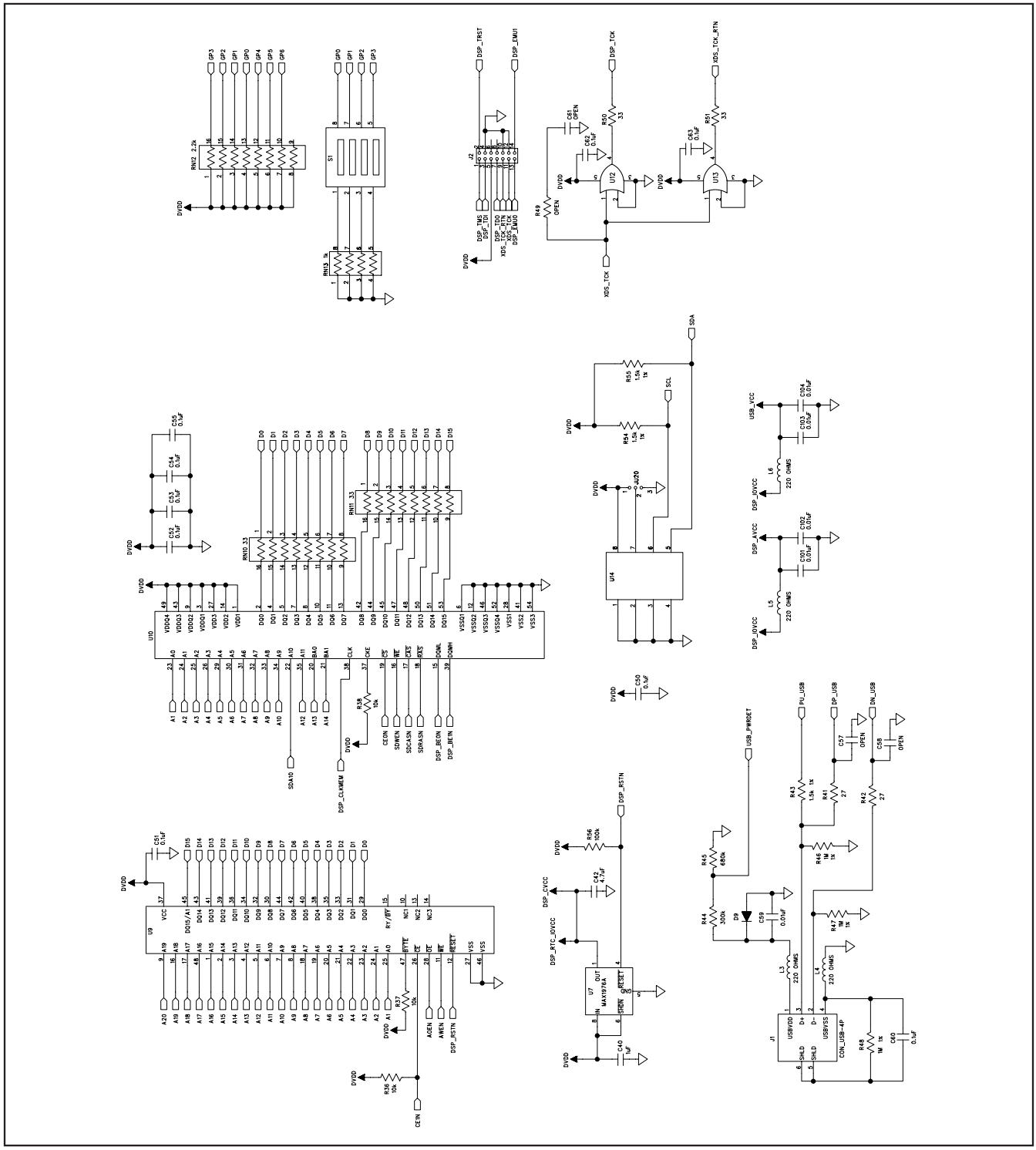

Figure 2c. MAX1379 EV Kit Schematic (Sheet 3 of 3)

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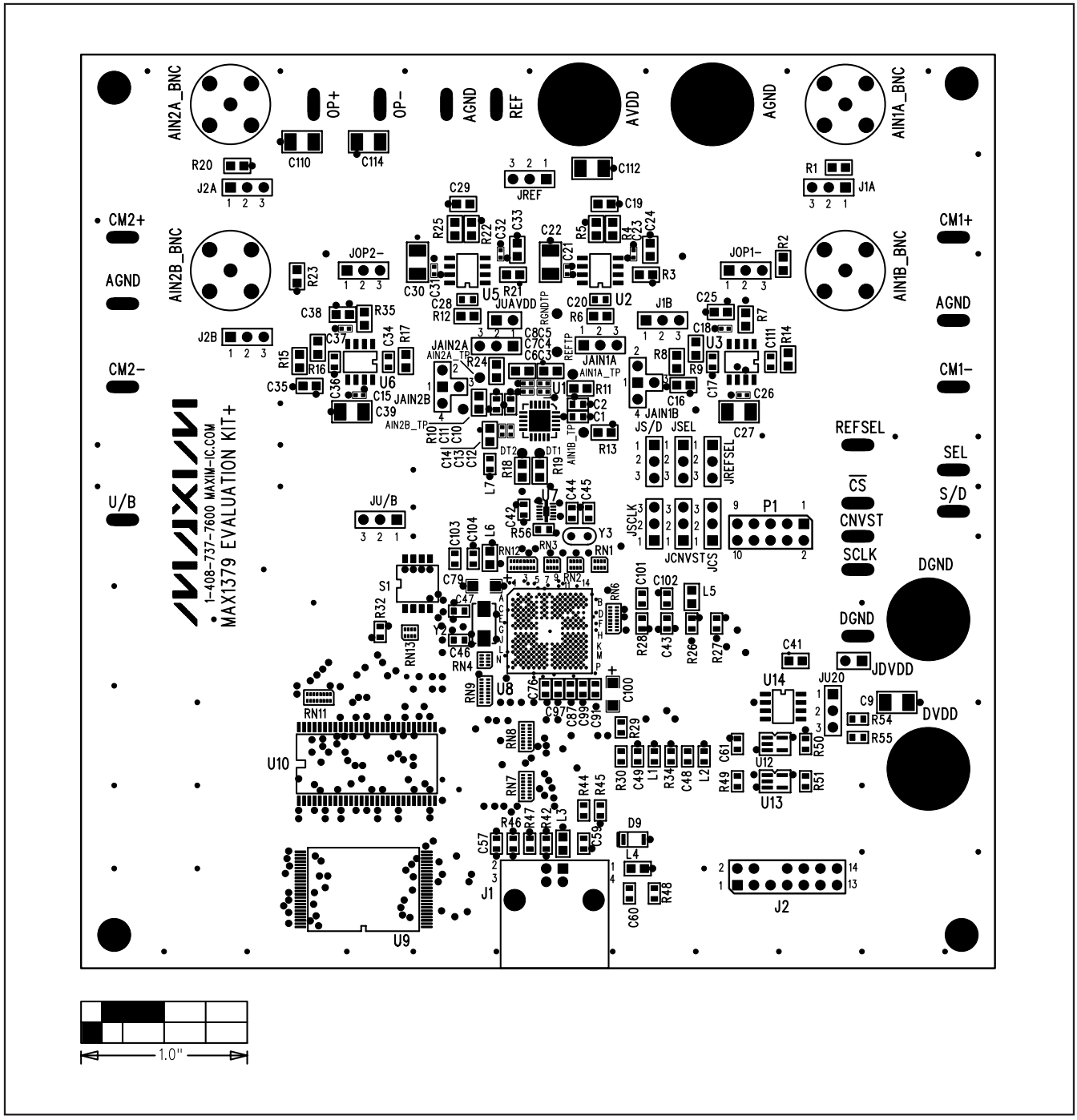

Figure 3. MAX1379 EV Kit Component Placement Guide—Top Silkscreen

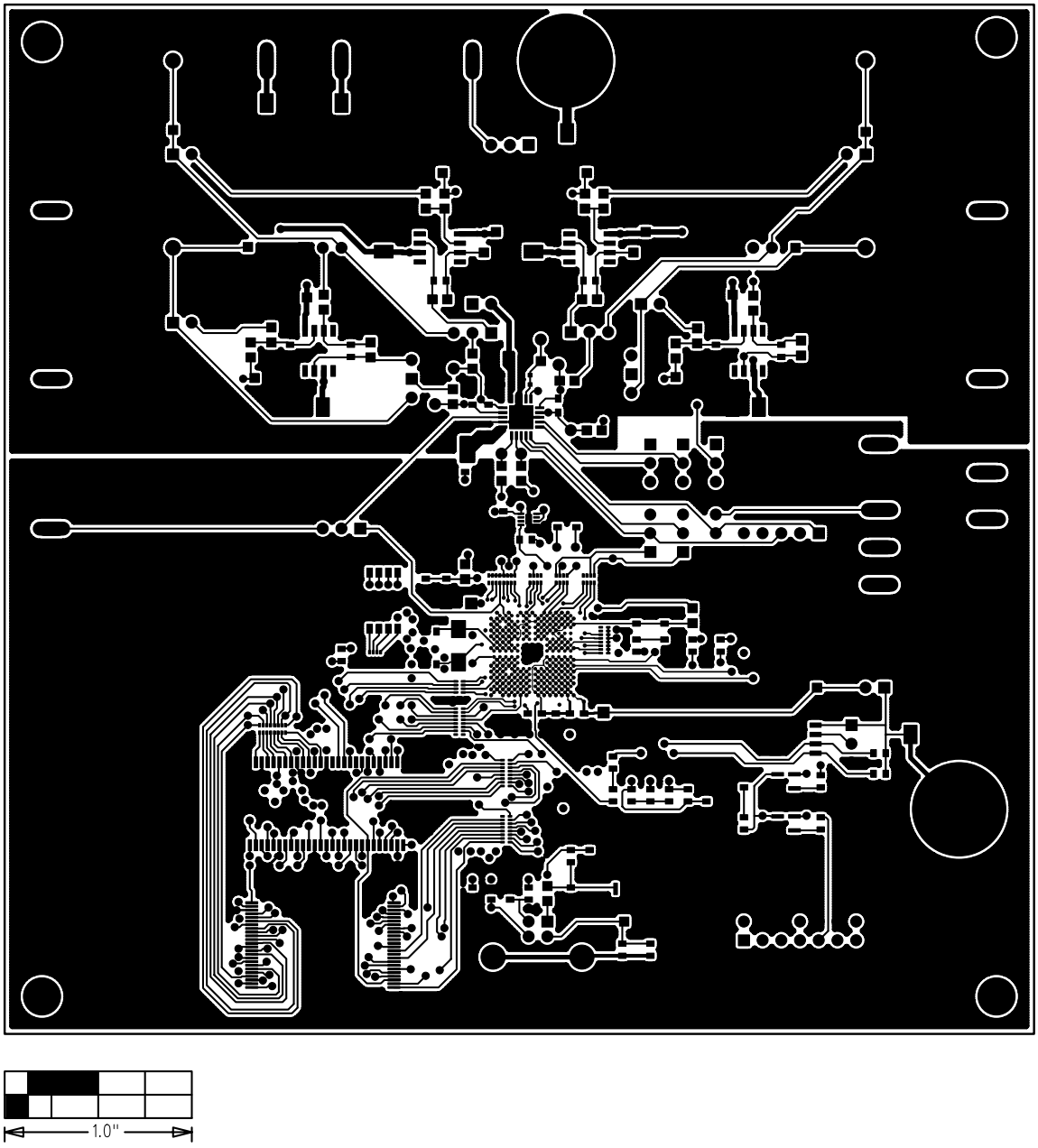

Figure 4. MAX1379 EV Kit PCB Layout—Component Side

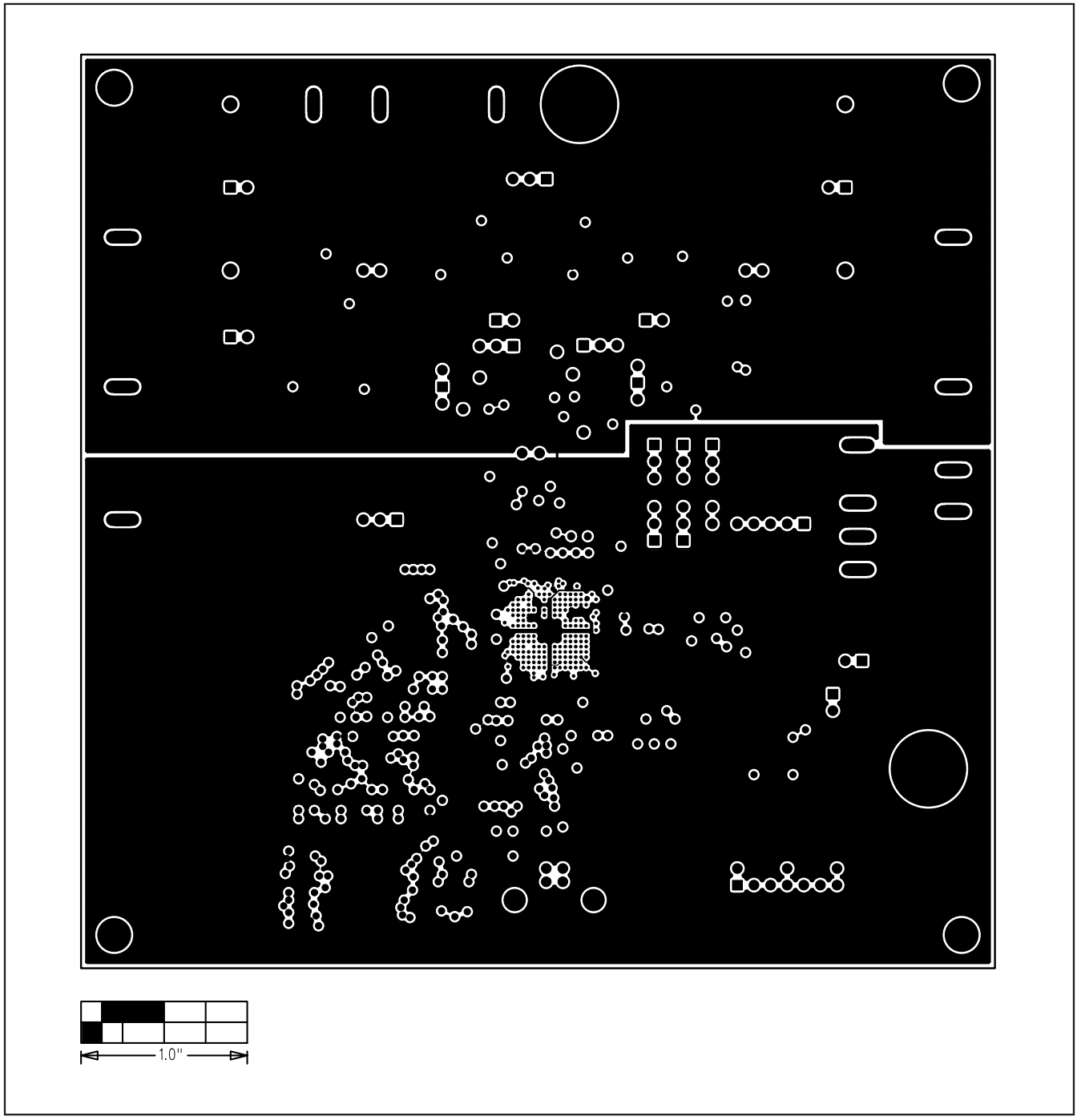

Figure 5. MAX1379 EV Kit PCB Layout—Layer 2

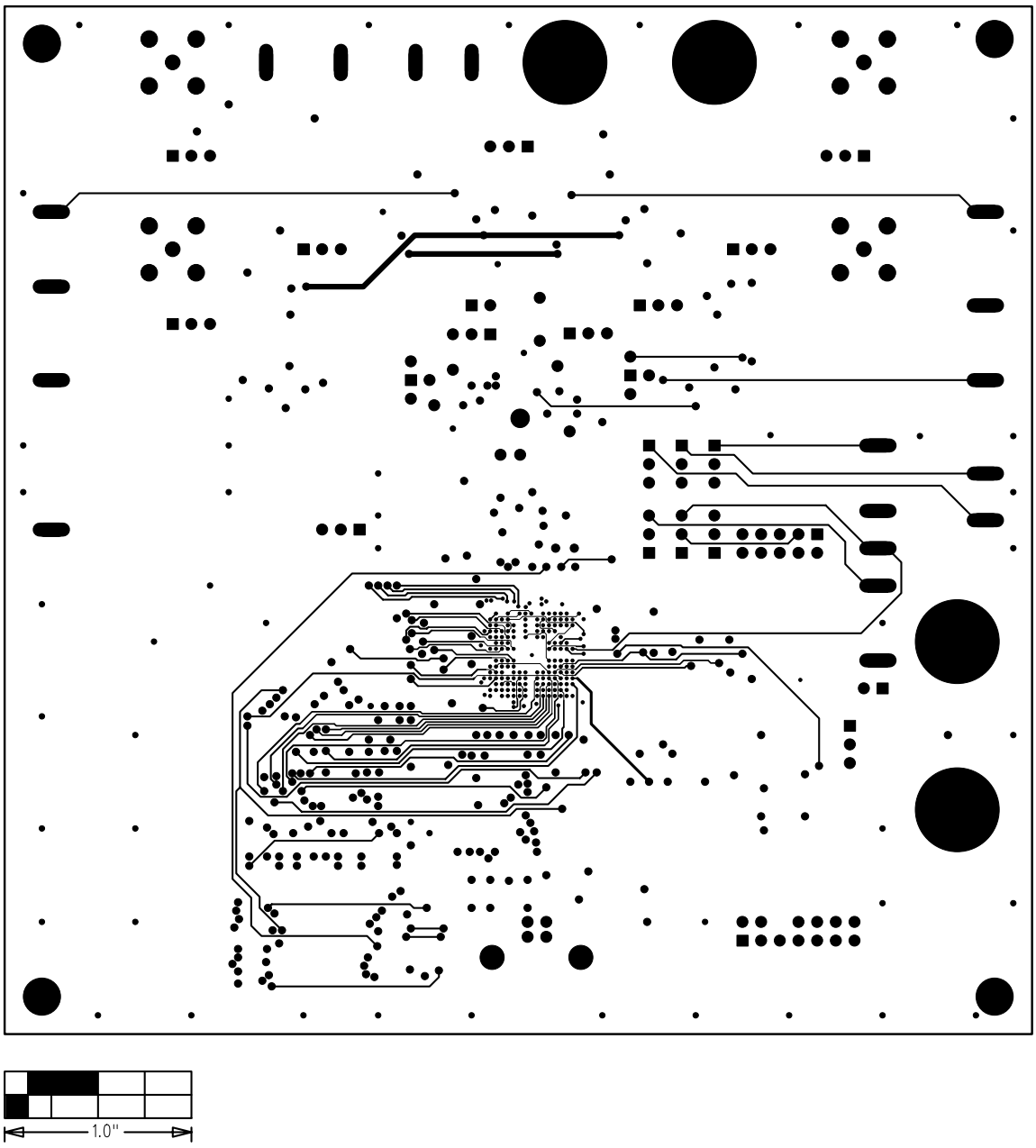

Figure 6. MAX1379 EV Kit PCB Layout—Layer 3

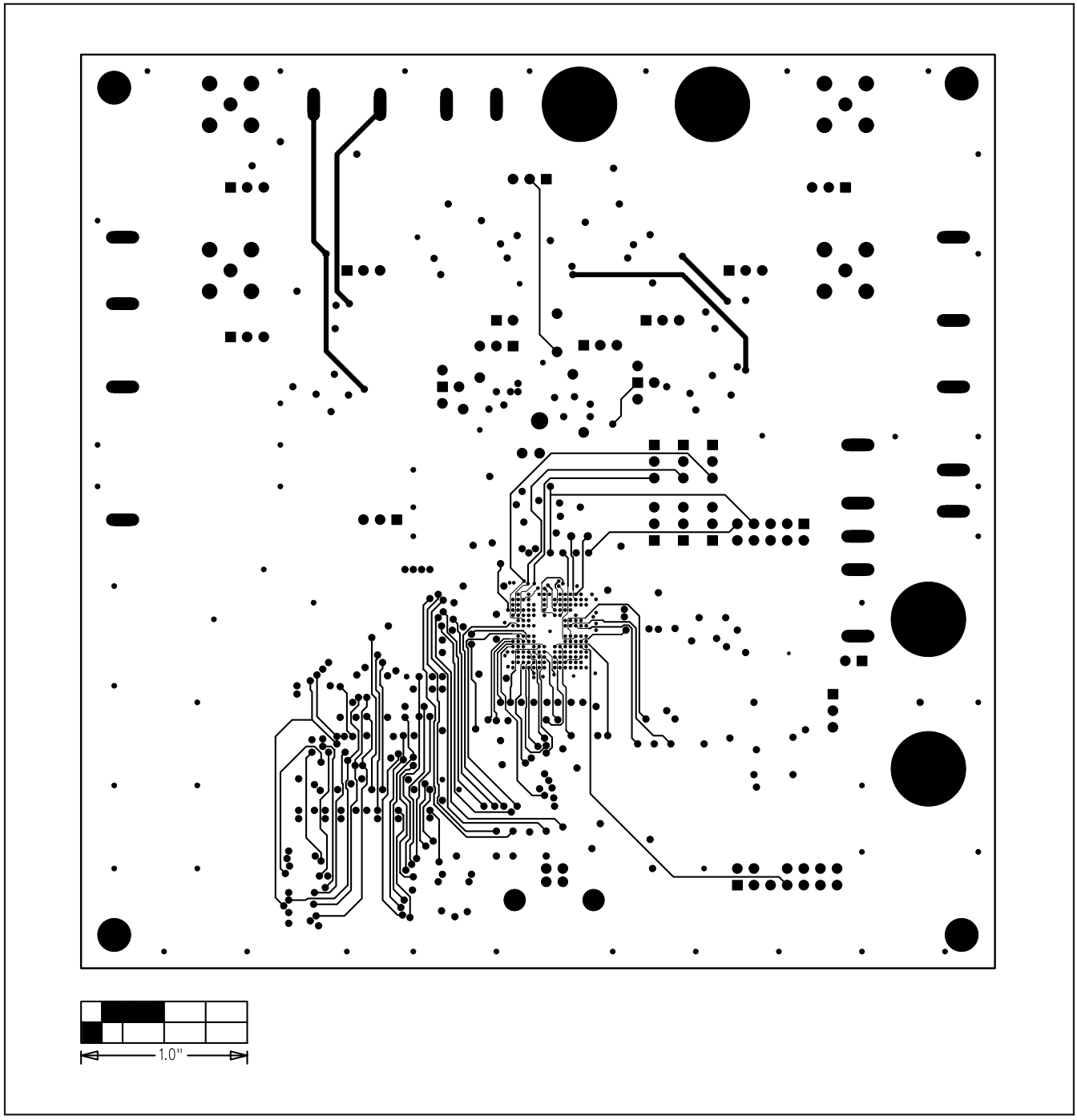

Figure 7. MAX1379 EV Kit PCB Layout—Layer 4

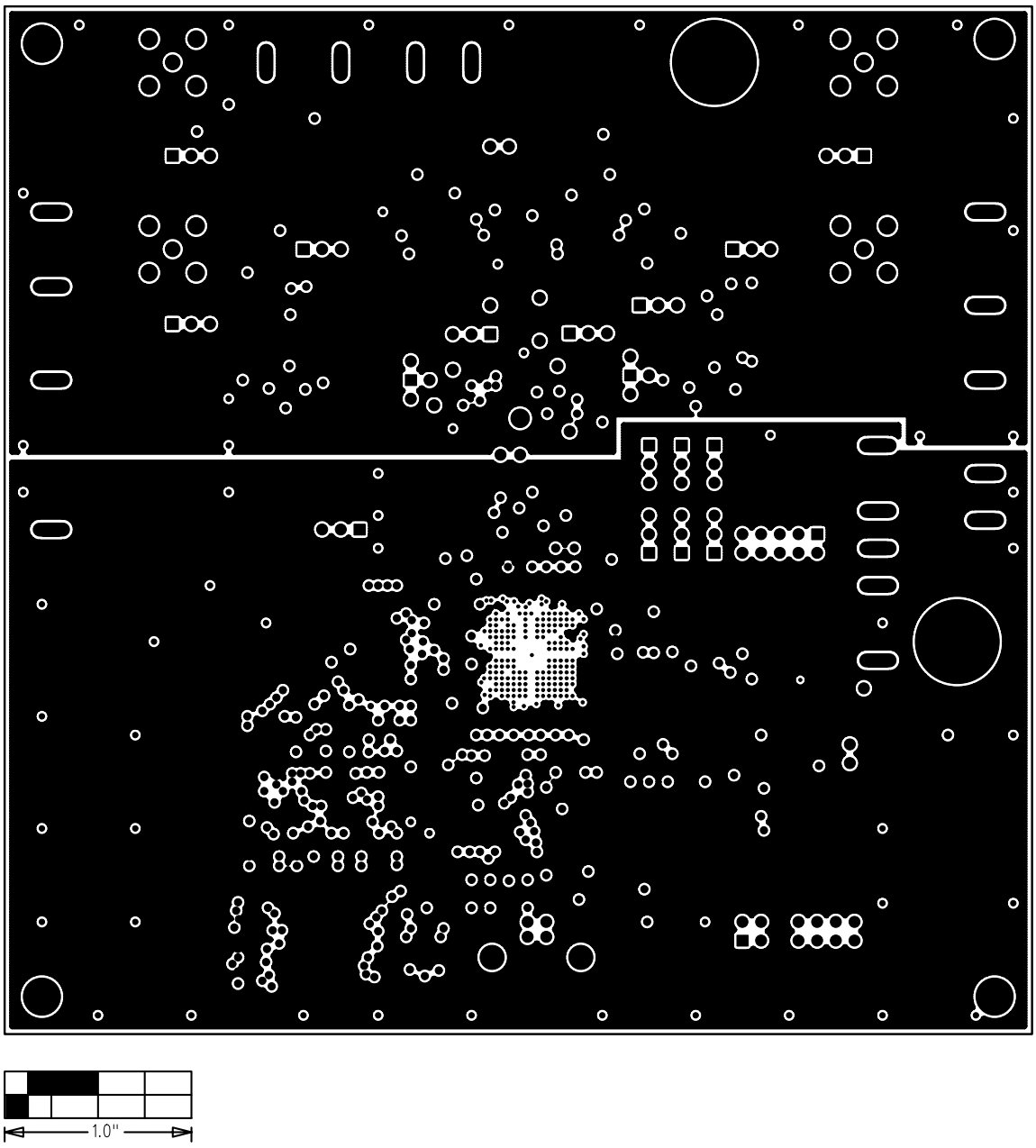

Figure 8. MAX1379 EV Kit PCB Layout—Layer 5

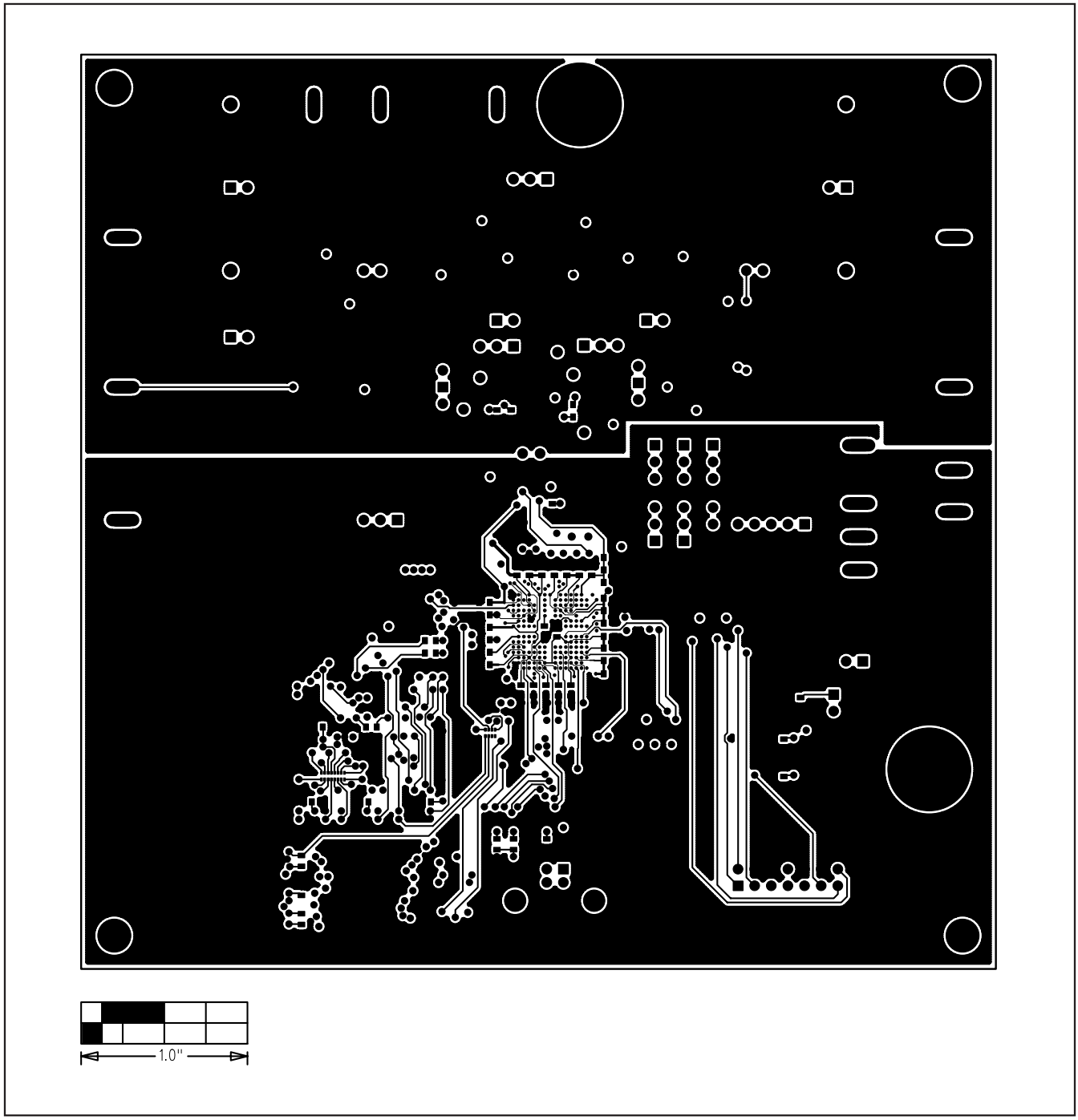

Figure 9. MAX1379 EV Kit PCB Layout—Solder Side

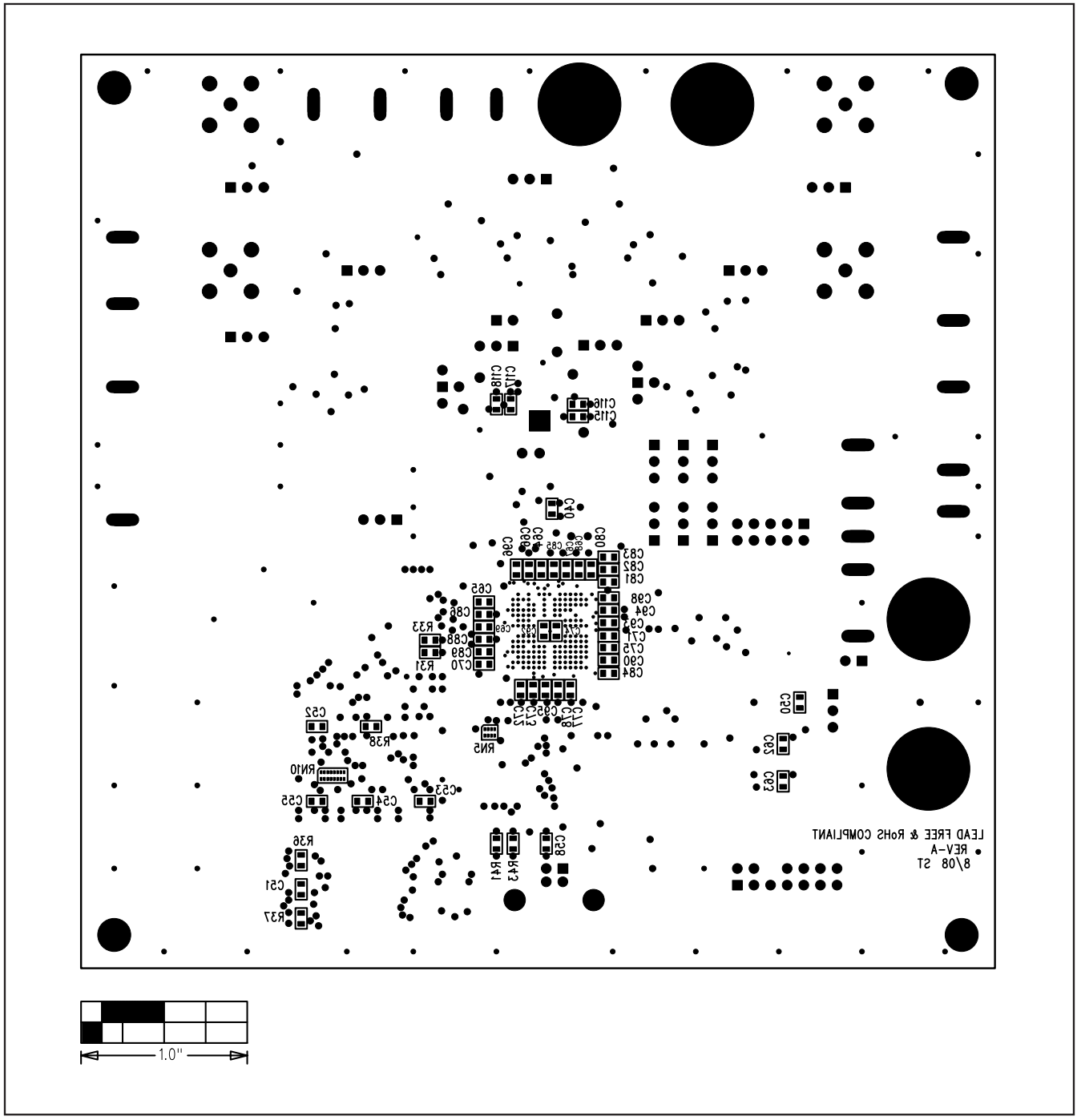

Figure 10. MAX1379 EV Kit Component Placement Guide—Bottom Silkscreen

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