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MAXIM

MAX1427 Evaluation Kit

General Description

The MAX1427 evaluation kit (EV kit) is a fully assembled and tested circuit board that contains all the components necessary to evaluate the performance of the MAX1418, MAX1419, or MAX1427 15-bit analog-to-digital converters (ADCs). The MAX1427 requires a differential analog input signal. The MAX1427 EV kit features an on-board transformer that converts the output of a user-provided single-ended signal source to the required differential signal. The digital output produced by the MAX1427 can be captured with a user-provided high-speed logic analyzer or data-acquisition system. The EV kit operates from 5V and 2.5V power supplies. The EV kit comes with the MAX1427 installed. Order free samples of the pin-compatible MAX1418 or MAX1419 to evaluate these parts.

Part Selection Table

PART	SPEED (Msps)	TARGET APPLICATION
MAX1418ETN	65	IF
MAX1419ETN	65	Baseband
MAX1427ETN	80	Baseband

Features

- ◆ Up to 80Msps Sampling Rate with the MAX1427
- ◆ Low-Voltage Digital Outputs
- ◆ Fully Differential Signal Input Configuration
- ◆ On-Board Data Latch
- ◆ Assembled and Tested
- ◆ Also Evaluates the MAX1418, MAX1419

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1427EVKIT	0°C to +70°C	56 Thin QFN

Note: To evaluate the MAX1418 or the MAX1419, request a free sample with the MAX1427 EV kit.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C3	3	47µF ±20%, X5R 6.3V ceramic capacitors (1210) TDK C3225X5R0J476M
C4, C6, C7	3	10µF ±20%, X5R 6.3V ceramic capacitors (0805) TDK C2012X5R0J106M
C8, C9, C19	3	1.0µF ±20%, X5R 6.3V ceramic capacitors (0402) TDK C1005X5R0J105M Murata GRM155R60J105KE19B
C10–C18, C20, C24–C28	15	0.1µF ±20%, X5R 10V ceramic capacitors (0402) TDK C1005X5R1A104M
C21, C30	2	0.1µF ±20%, X7R 25V ceramic capacitors (0603) TDK C1608X7R1E104M
C22, C23, C32, C33, C35	0	Not installed (0402)

DESIGNATION	QTY	DESCRIPTION
C29, C44	2	0.1µF ±20%, X5R 6.3V ceramic capacitors (0201) TDK C0603X5R0J104M Murata GRM33R60J104K
C31, C34	2	0.01µF ±20%, X7R 25V ceramic capacitors (0402) TDK C1005X7R1E103M
C36, C37	0	Not installed (0603)
C38, C40, C42	0	Not installed (D case)
C39, C41, C43	3	220µF ±20%, 6.3V low-ESR tantalum capacitors (D case) AVX TPSD227M006R0100
D1	1	Dual Schottky diode (SOT23) Zetex BAS70-04
J1, J3	2	SMA PC-mount connectors
J2, J4	0	Not installed
J5	1	Dual-row, 40-pin header

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
L1-L4	4	EMI filters Murata NFM41PC204F1H3B
R1, R3, R5-R14, R18, R19	0	Not installed (0603)
R2, R4	2	49.9Ω ±1% resistors (0603)
R15, R16	2	54.9Ω ±1% resistors (0603)
R17	1	51.1Ω ±1% resistor (0603)
RA1, RA2, RA3	3	220Ω ±5% resistor arrays Panasonic EXB-2HV-221J
RA4, RA5, RA6	3	47Ω ±5% resistor arrays Panasonic EXB-2HV-470J

DESIGNATION	QTY	DESCRIPTION
T1, T2	2	1:2 RF transformers Mini-Circuits T2-1T-KK81
T3	1	1:1 RF transformer Mini-Circuits T1-1T-KK81
U1	1	MAX1427ETN (56-pin thin QFN)
U2	1	Low-voltage 22-bit register (64-pin TSSOP) Texas Instruments SN74AVC16722DGG
U3, U4	2	Tiny logic UHS buffers (5-pin SC70) Fairchild NC7SZ125P5
TP1, TP2	2	Test points (black)
None	1	MAX1427 PC board

Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
AVX	843-946-0238	843-626-3123	www.avxcorp.com
Fairchild	888-522-5372	N/A	www.fairchildsemi.com
Mini-Circuits	718-934-4500	718-332-4661	www.minicircuits.com
Murata	770-436-1300	770-436-3030	www.murata.com
Panasonic	714-373-7366	714-737-7323	www.panasonic.com
TDK	847-803-6100	847-390-4405	www.component.tdk.com
Zetex	631-543-7100	631-864-7630	www.zetex.com

Note: Please indicate that you are using the MAX1427 when contacting these component suppliers.

Quick Start

Recommended Equipment

- DC power supplies:
Digital (VDUT3) 2.5V, 100mA
Analog (VDUT5) 5.0V, 500mA
Logic (VL) 2.5V, 100mA
- Signal generator with low-phase noise and low jitter for clock input (e.g., HP 8662A, HP 8644A)
- Signal generator for analog signal input (e.g., HP 8662A, HP 8644A)
- Logic analyzer or data-acquisition system (e.g., HP 16500C, TLA671)
- Analog bandpass filters (e.g., Allen Avionics, K&L Microwave) for input signal and clock signal

Procedure

The MAX1427 EV kit is a fully assembled and tested surface-mount board. Follow the steps below to verify board operation. **Do not turn on power supplies or enable signal generators until all connections are completed:**

- 1) Connect the output of the 80MHz clock signal generator to the input of the clock bandpass filter.
- 2) Connect the output of the clock bandpass filter to the CLOCK (J3) SMA connector on the MAX1427 EV kit.
- 3) Connect the output of the analog signal generator to the input of the analog bandpass filter.
- 4) Connect the output of the analog bandpass filter to the INP (J1) SMA connector on the MAX1427 EV kit.
- 5) Connect the logic analyzer to header J5. See the *Output Signal* section for bit locations and J5 header designations.
- 6) Connect a 5.0V, 500mA power supply to VDUT5. Connect the ground terminal of this supply to the AGND pad.
- 7) Connect a 2.5V, 100mA power supply to VDUT3. Connect the ground terminal of this supply to the DGND pad.
- 8) Connect a 2.5V, 100mA power supply to VL. Connect the ground terminal of this supply to the corresponding GND pad.

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- 9) Turn on the power supplies.
- 10) Enable the signal generators. Set the clock signal generator for an output amplitude of 2.4V_{p-p} and a frequency (f_{CLK}) of 80MHz. Set the analog signal generator for an output amplitude of $\leq 1.81V_{p-p}$ and to the desired frequency. The signal generators should be phase locked. Adjust the analog input signal level to overcome cable and bandpass filter losses.
- 11) Enable the logic analyzer.
- 12) Collect data using the logic analyzer.

Detailed Description

The MAX1427 EV kit is a fully assembled and tested circuit board that contains all the components necessary to evaluate the MAX1418, MAX1419, and MAX1427. Data generated by the MAX1427 is captured on a single 15-bit bus. The default EV kit configuration features the MAX1427, which can be evaluated with a maximum clock frequency (f_{CLK}) of 80MHz.

The EV kit is designed as a six-layer PC board to optimize the performance of the MAX1427. The EV kit is specified to have 5.0V and 2.5V power supplies applied to the analog (VDUT5) and digital (VDUT3, VL) power planes, respectively.

Access to the digital outputs is provided through connector J5. The 40-pin connector easily interfaces directly with a user-provided logic analyzer or data-acquisition system. The digital output clock signal is available at the J5-38 pin (CLK), which can be used to synchronize the output data to the logic analyzer.

Power Supplies

The MAX1427 EV kit requires separate analog and digital power supplies. A 5.0V power supply is used to power the analog portion (VDUT5) of the MAX1427. Separate 2.5V power supplies are used to power the digital portion (VDUT3) of the MAX1427 and the data latch (VL) U2 of the MAX1427 EV kit. VDUT3 and VL can be operated between 2.5V and 3.3V.

Clock

A user-provided single-ended signal is converted to a differential signal through transformer T2. A diode (D1) limits the amplitude of the clock signal; thus, overdriving the CLOCK SMA input can increase the slew rate of the differential signal, thereby, reducing clock jitter.

Input Signal

The MAX1427 requires a differential analog input signal. The MAX1427 EV kit features an on-board transformer (T1) that converts the output of a user-provided single-ended signal source with an amplitude of less than 1.81V_{p-p} to the required differential signal.

Because cable and bandpass filter losses affect the amplitude of the received signal at the ADC, account for these losses when configuring the signal input generator.

Digital Output Signals

The MAX1427 features a single 15-bit, parallel, CMOS-compatible, digital output bus. The digital outputs of the MAX1427 are applied to a latch, capable of driving large capacitive loads, which may be present at the logic analyzer connection. The outputs of the latch are connected to a 40-pin header (J5), where the user can connect a logic analyzer or data-acquisition system. See Table 1 for header J5 bit locations.

A poor-quality connection may lead to apparent performance degradation. To optimize dynamic performance, avoid using "flying-" or "individual-"lead logic-analyzer probes for collecting data from the MAX1427 EV kit.

Evaluating the MAX1418/ MAX1419

To evaluate the MAX1418 or MAX1419, remove IC U1 from the EV kit and install a free sample of the desired ADC.

Table 1. Output Bit Locations

BIT	POSITION
CLK	J5-38
DOR	J5-34
D14	J5-32
D13	J5-30
D12	J5-28
D11	J5-26
D10	J5-24
D9	J5-22
D8	J5-20
D7	J5-18
D6	J5-16
D5	J5-14
D4	J5-12
D3	J5-10
D2	J5-8
D1	J5-6
D0	J5-4

Note: All odd-numbered pins are connected to ground.

Evaluates: MAX1418/MAX1419/MAX1427

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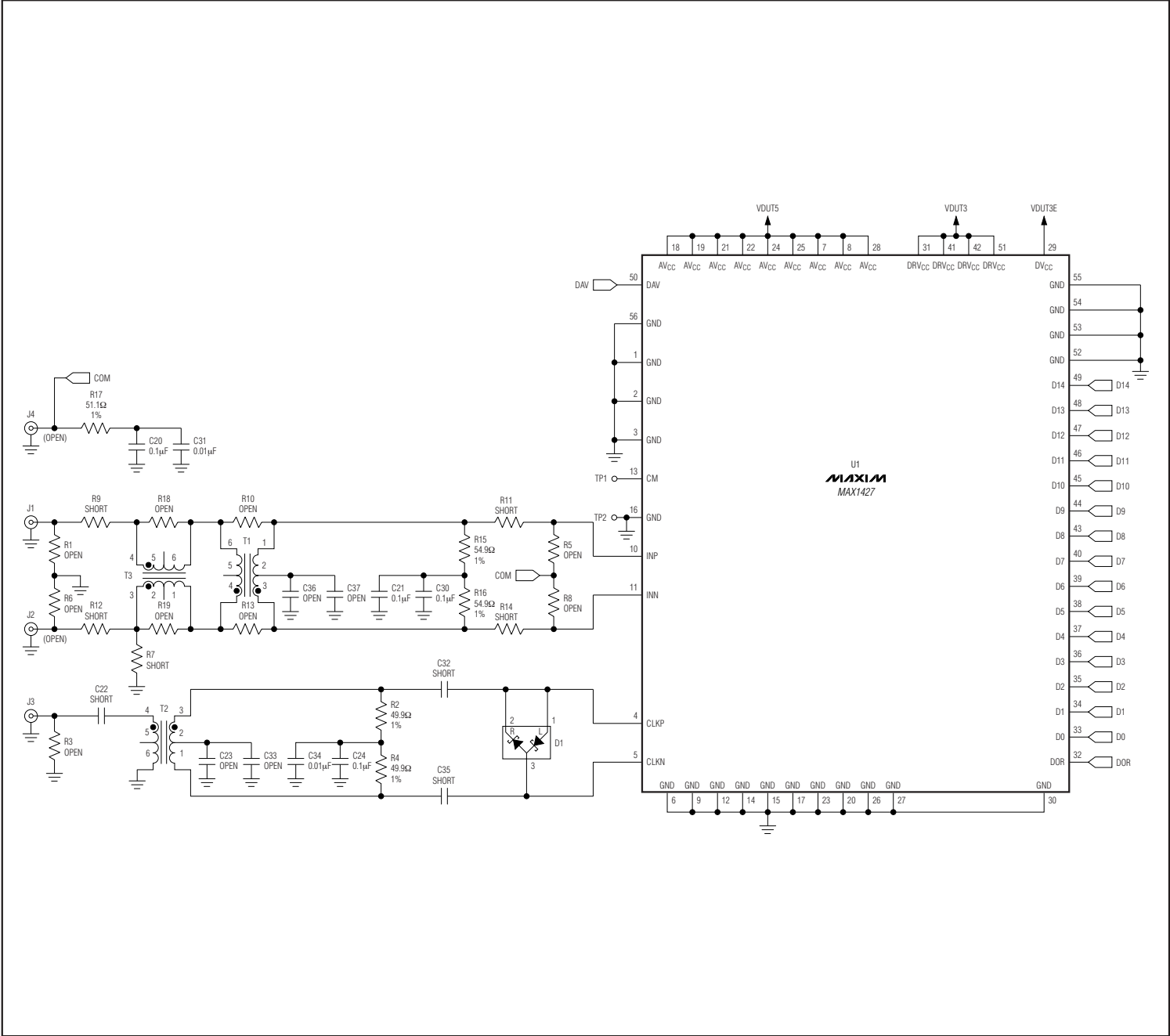


Figure 1. MAX1427 EV Kit Schematic (Sheet 1 of 3)

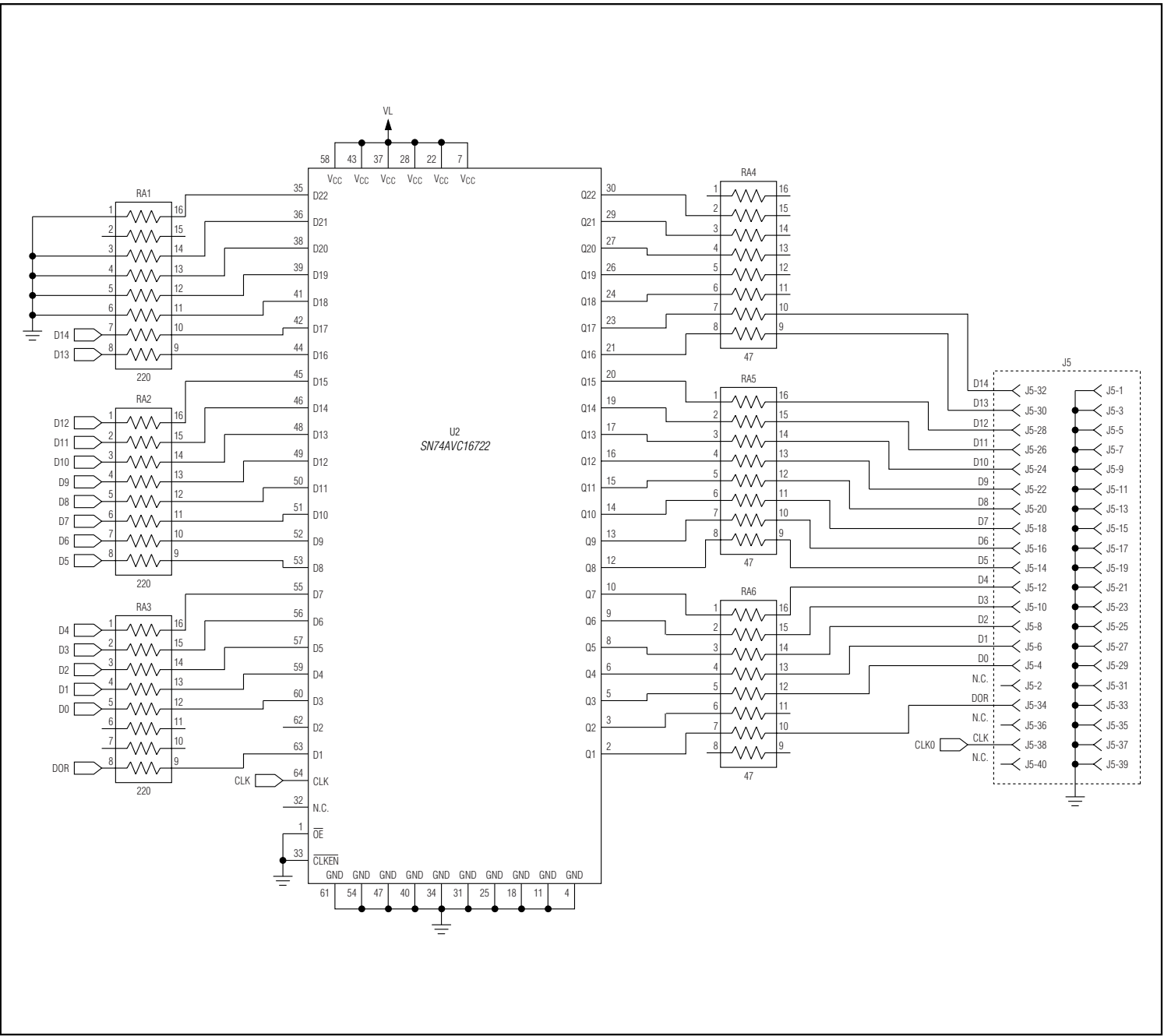


Figure 1. MAX1427 EV Kit Schematic (Sheet 2 of 3)

Evaluates: MAX1418/MAX1419/MAX1427

MAX1427 Evaluation Kit

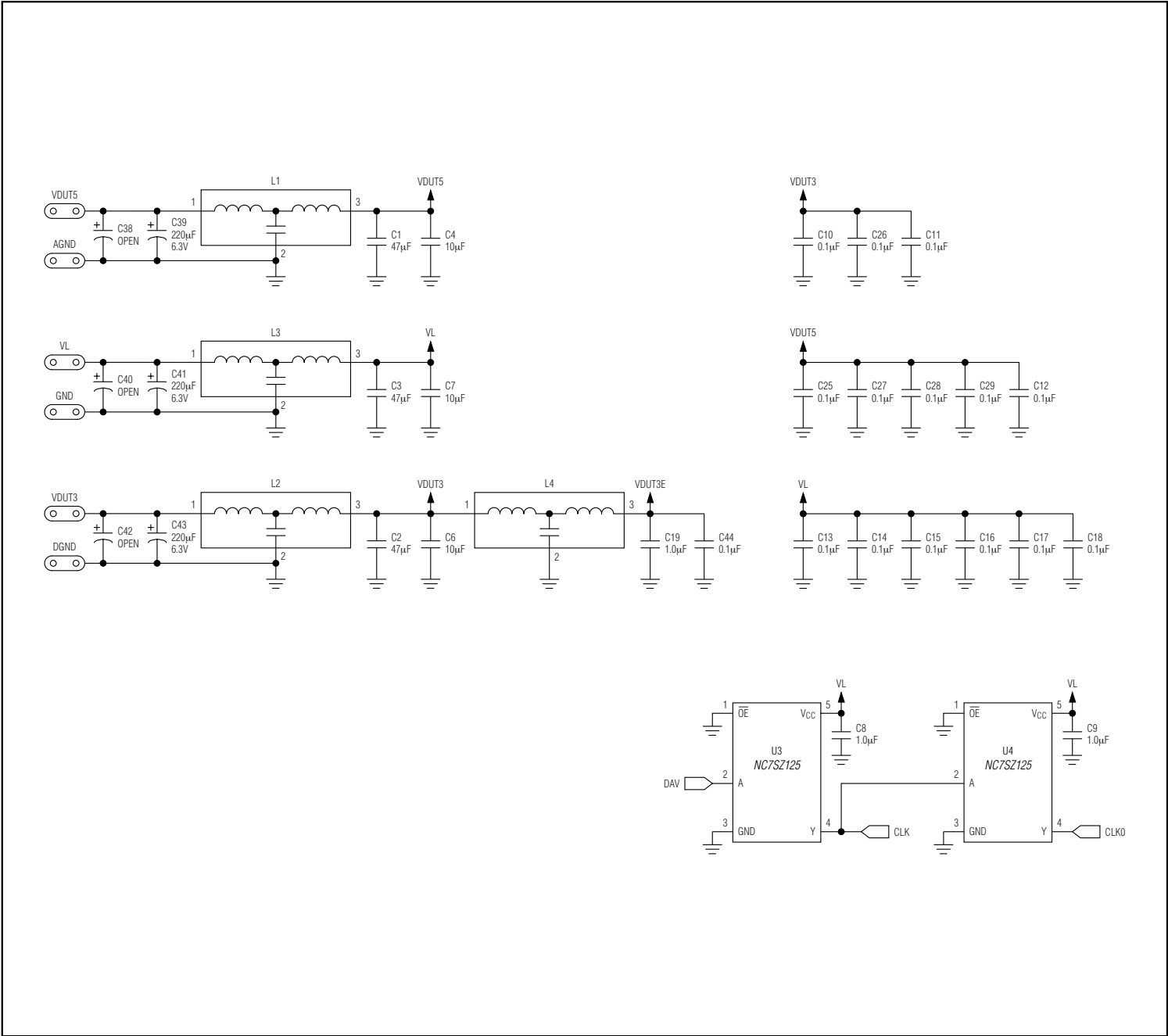


Figure 1. MAX1427 EV Kit Schematic (Sheet 3 of 3)

MAX1427 Evaluation Kit

Evaluates: MAX1418/MAX1419/MAX1427

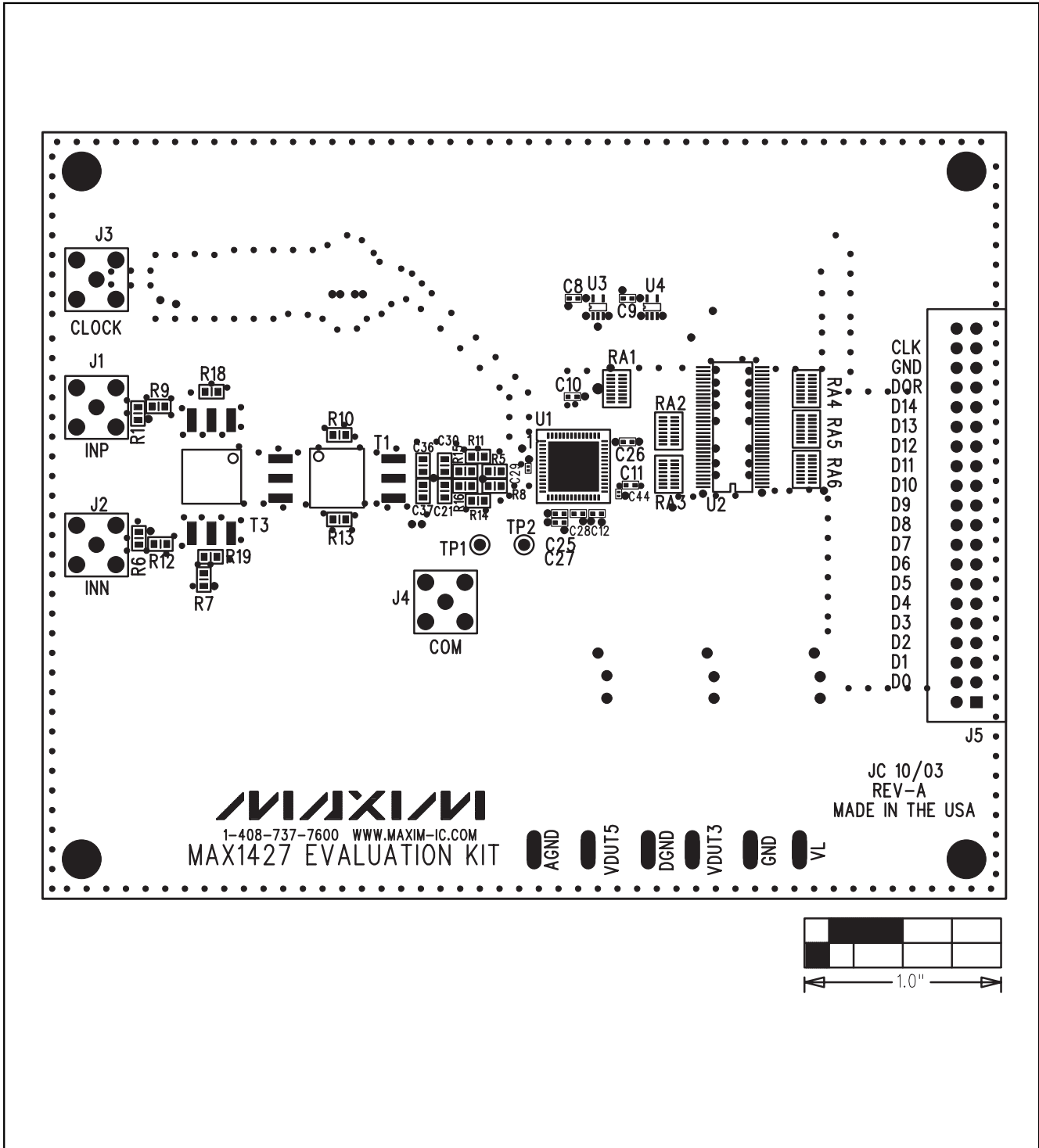


Figure 2. MAX1427 EV Kit PC Board Layout—Component Side

MAX1427 Evaluation Kit

Evaluates: MAX1418/MAX1419/MAX1427

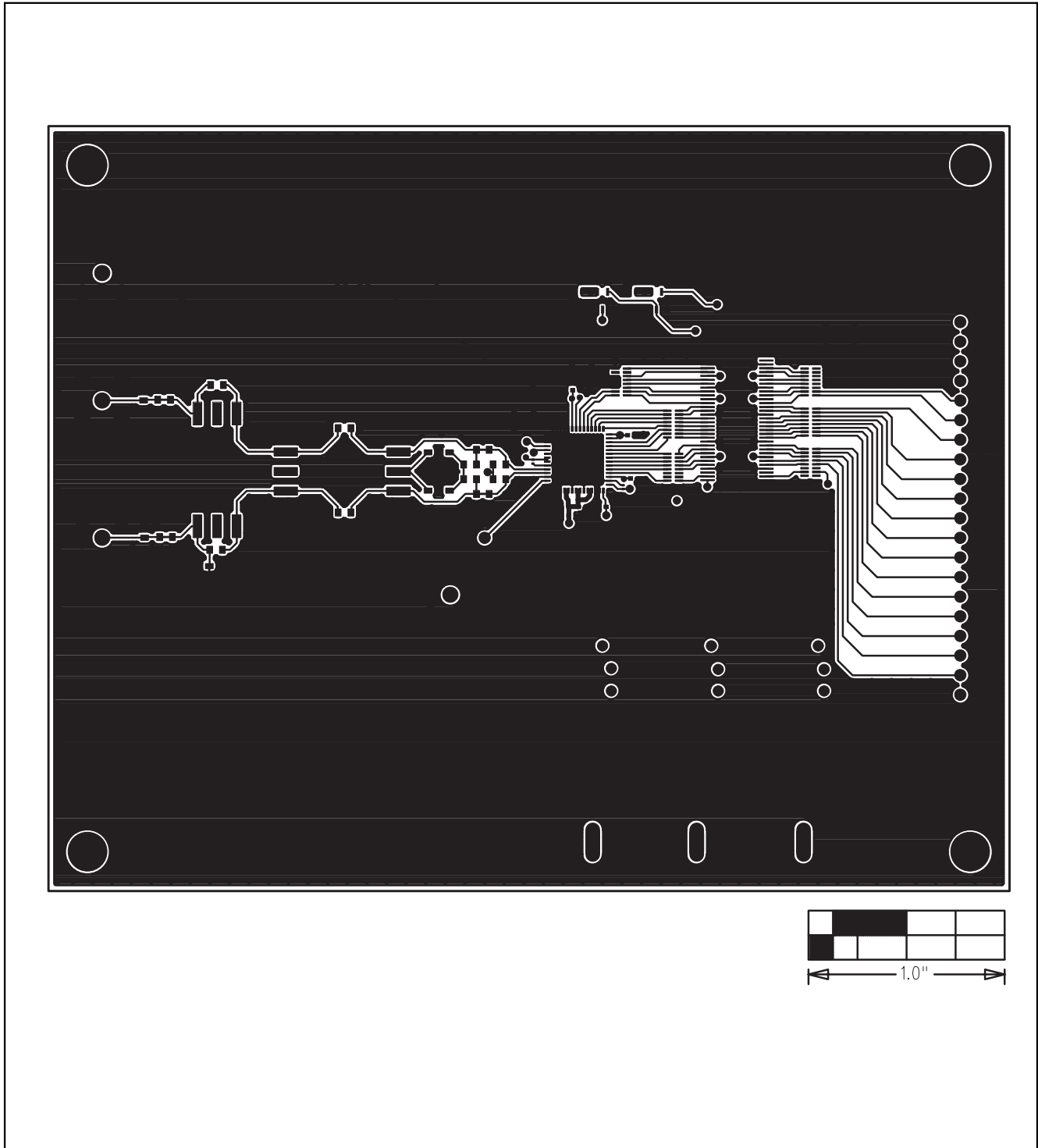


Figure 3. MAX1427 EV Kit PC Board Layout—Component Side

MAX1427 Evaluation Kit

Evaluates: MAX1418/MAX1419/MAX1427

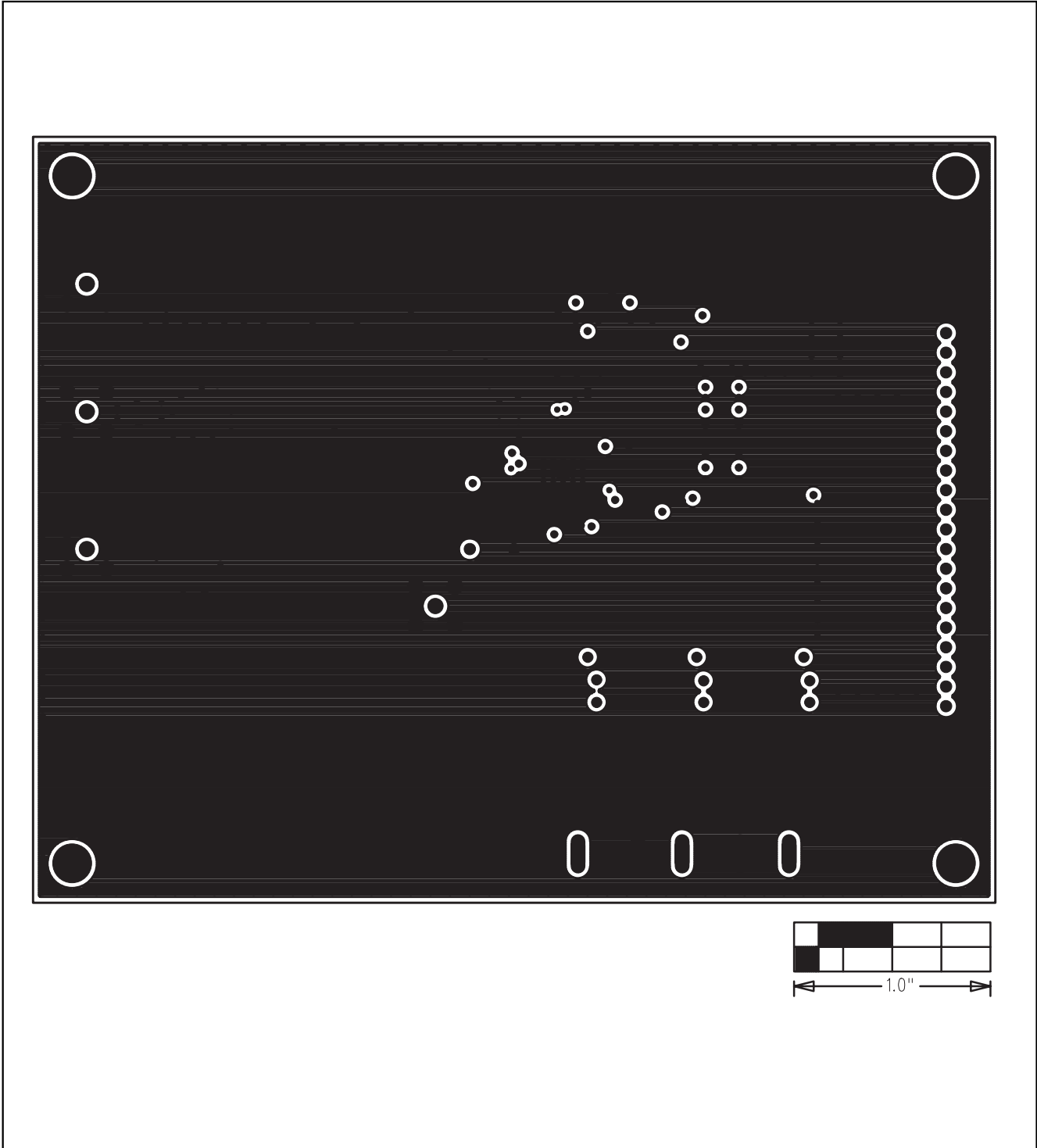


Figure 4. MAX1427 EV Kit PC Board Layout—Layer 2

MAX1427 Evaluation Kit

Evaluates: MAX1418/MAX1419/MAX1427

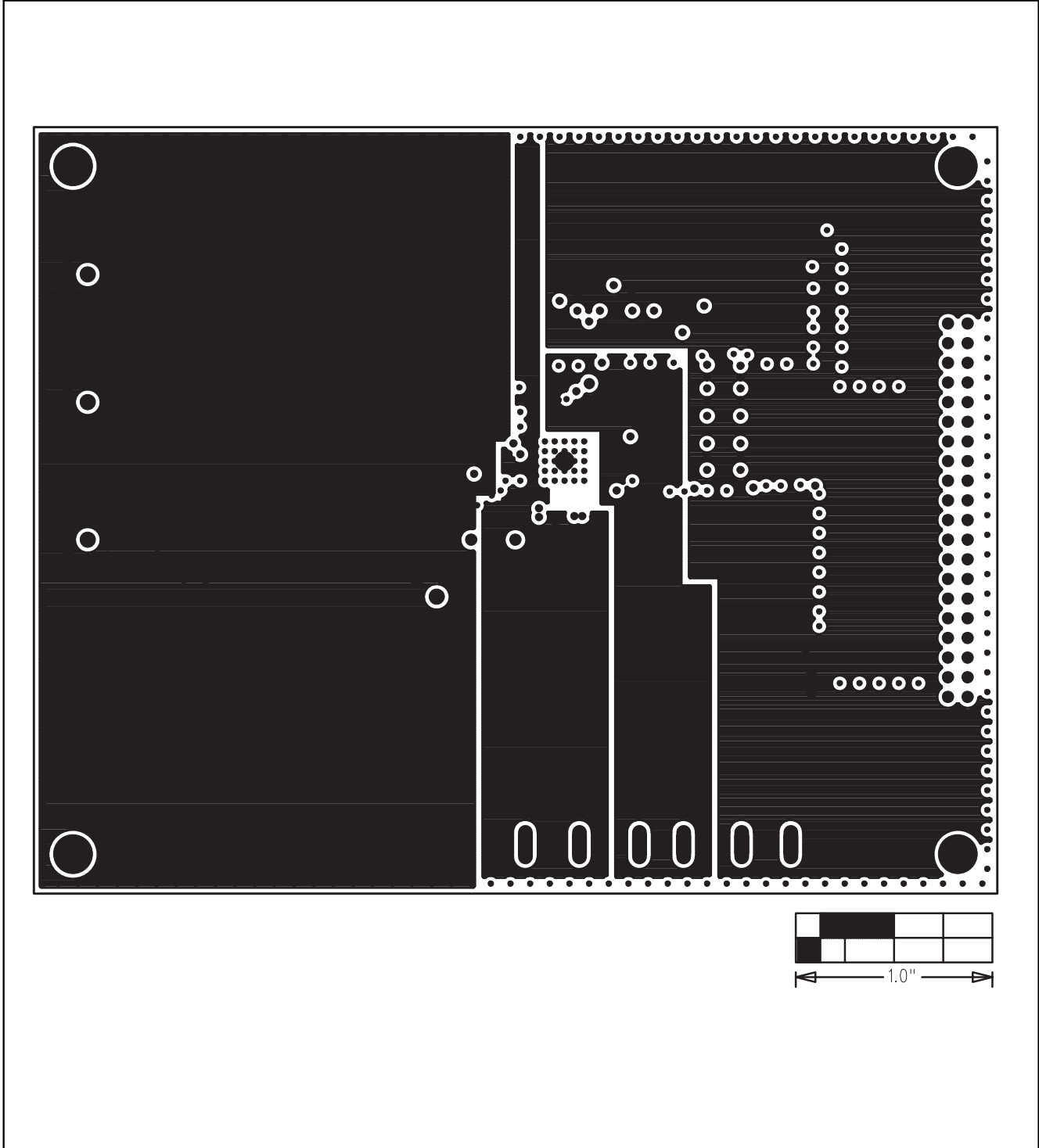


Figure 5. MAX1427 EV Kit PC Board Layout—Layer 3

MAX1427 Evaluation Kit

Evaluates: MAX1418/MAX1419/MAX1427

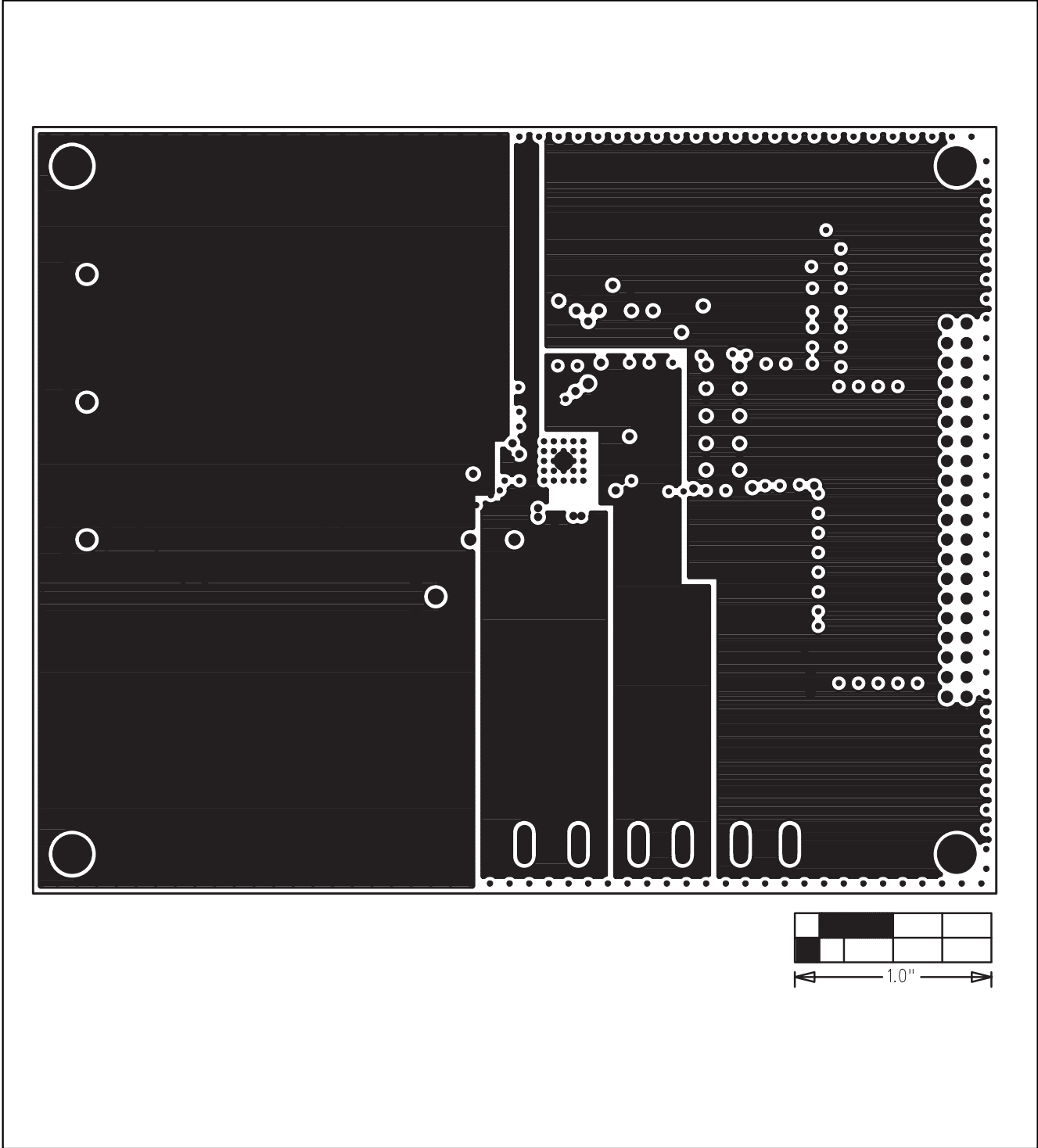


Figure 6. MAX1427 EV Kit PC Board Layout—Layer 4

MAX1427 Evaluation Kit

Evaluates: MAX1418/MAX1419/MAX1427

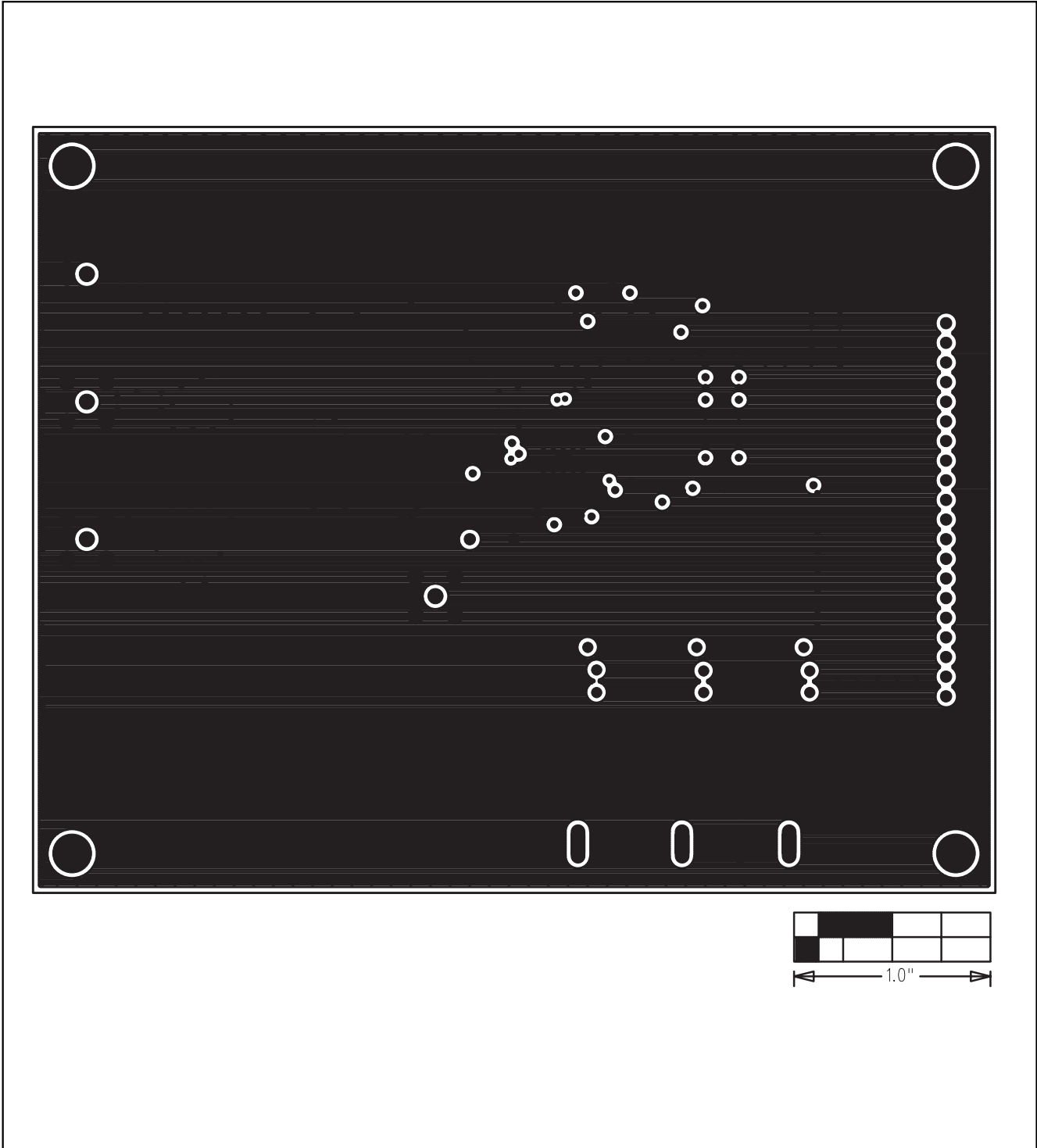


Figure 7. MAX1427 EV Kit PC Board Layout—Layer 5

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Evaluates: MAX1418/MAX1419/MAX1427

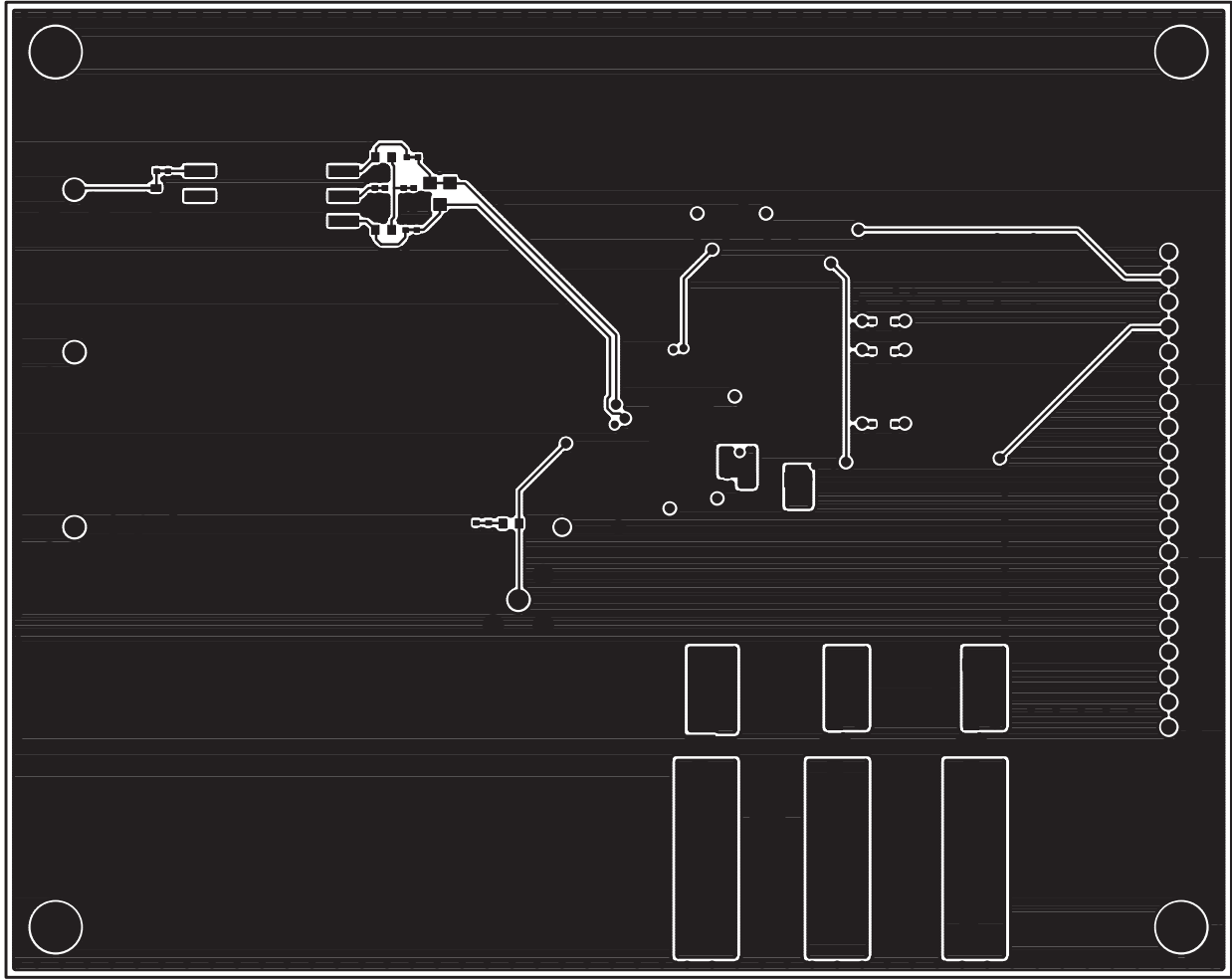


Figure 8. MAX1427 EV Kit PC Board Layout—Solder Side

MAX1427 Evaluation Kit

Evaluates: MAX1418/MAX1419/MAX1427

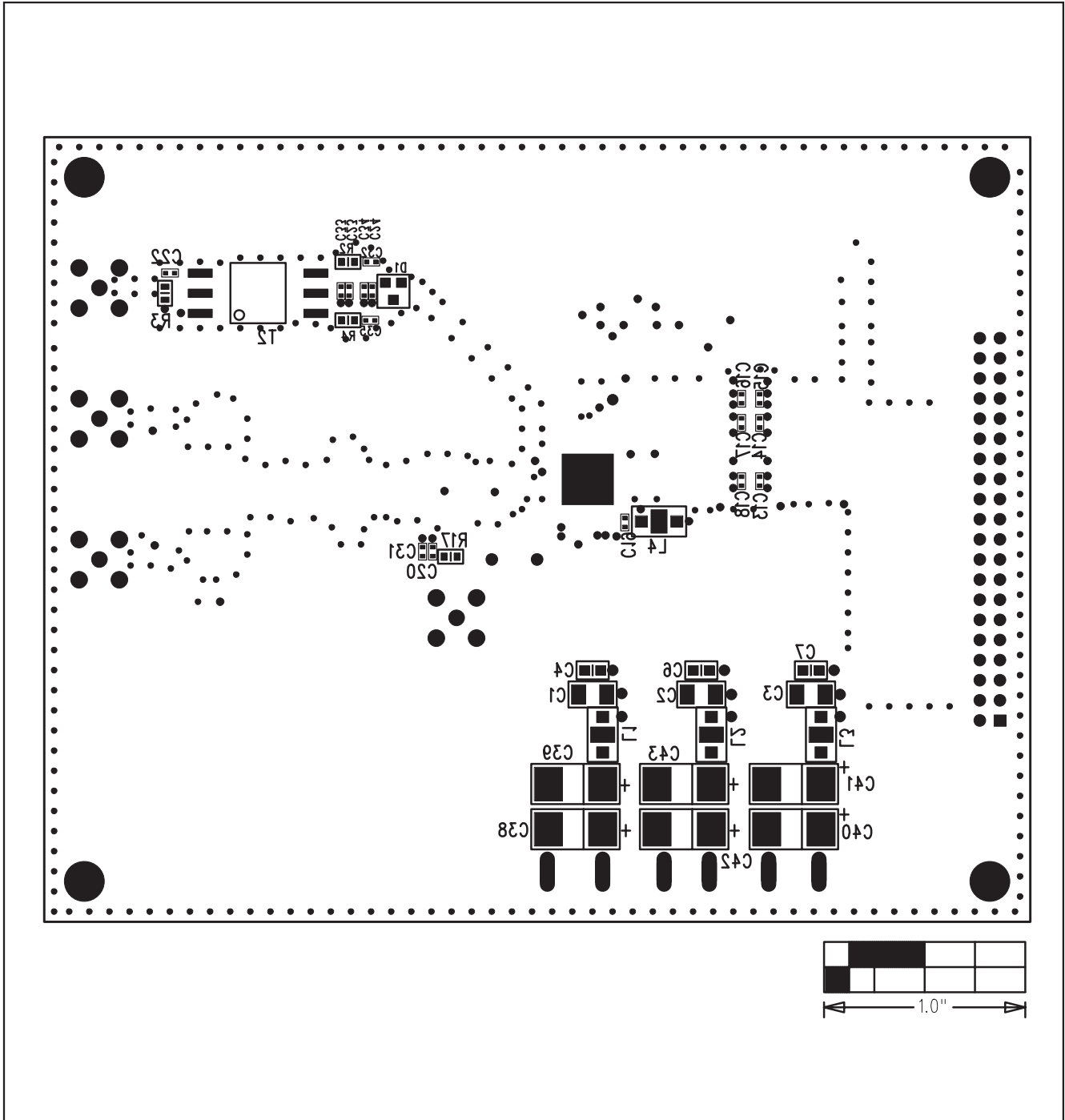


Figure 9. MAX1427 EV Kit Component Placement Guide—Solder Side

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