

# MAXIM

## MAX7440 Evaluation Kit

### General Description

The MAX7440 evaluation kit (EV kit) is a fully assembled and tested surface-mount board. The MAX7440 EV kit includes the MAX7440, a six-channel reconstruction filter, unity-gain input-level-shift circuits, and output buffers with a gain of 2V/V. The input and output buffers are included to ease the evaluation of the MAX7440, and are not needed in the actual application.

The MAX7440 EV kit can be also used to evaluate the MAX7441 and MAX7442.

### Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C3, C23–C27	8	1 $\mu$ F $\pm$ 10%, 10V X5R ceramic capacitors (0603) TDK C1608X5R1A105K
C4–C22	18	0.1 $\mu$ F $\pm$ 10%, 16V X7R ceramic capacitors (0603) Taiyo Yuden EMK107BJ104KA or TDK C1608X7R1C104KT
INPUT1–INPUT6, OUTPUT1–OUTPUT6	12	BNC PC board mount connectors
JU1–JU18	18	3-pin headers
JU19–JU35	17	2-pin headers
R1–R12	12	75 $\Omega$ $\pm$ 1% resistors (0603)
R13–R18	6	200 $\Omega$ $\pm$ 1% resistors (0603)
R19–R24	6	162 $\Omega$ $\pm$ 1% resistors (0603)
R25–R36	12	511 $\Omega$ $\pm$ 1% resistors (0805)
R37–R48	12	511 $\Omega$ $\pm$ 0.1% resistors (0805) IRC PFC-W0805R-03-5110B
R49–R54	6	5.11k $\Omega$ $\pm$ 1% resistors (0805)
R55–R60	6	5.76k $\Omega$ $\pm$ 1% resistors (0805)
TB1	1	Three-circuit terminal block
TB2	1	Six-circuit terminal block
U1	1	MAX7440ESD (14-pin SO)
U2–U13	12	MAX4390EXT-T (6-pin SC70, Top Mark ABE)
None	35	Shunts
None	1	MAX7440 PC board

### Features

- ◆ Selectable Input 75 $\Omega$  Termination or DAC Termination
- ◆ Input Buffer Bypass Option
- ◆ Output Buffer to Drive Cable
- ◆ Separate Level Shift Settings for Each Channel
- ◆ Direct-Coupled Input/Direct-Coupled Output
- ◆ Surface-Mount Construction
- ◆ Fully Assembled and Tested

### Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX7440EVKIT	0°C to +70°C	14 SO

**Note:** To evaluate the other devices MAX7441/MAX7442, please order a free MAX7441ESD/MAX7442ESD sample with the MAX7440EVKIT.

### Quick Start

#### Recommended Equipment

- Three 5.0VDC power supplies (optionally one)
- Video signal generator (e.g., Tektronix TG 2000)
- Video measurement equipment (e.g., Tektronix VM 700A)

#### Recommended Channel Assignment

CHANNEL NO.	ASSIGNMENT
1	CVBS
2	Y or G
3	Pr or R
4	Pb or B
5	Y
6	C

The MAX7440 EV kit is a fully assembled and tested surface-mount board. Utilize the following steps to verify the board operation. **Do not turn on the power supply until all connections are completed.**

#### Evaluating Channel 1 with a Ground-Referenced Video Generator

- 1) Verify that there are shunts across on JU1 (pins 1 and 2), JU2 pins (1 and 2), and JU3 pins (1 and 2).
- 2) Verify that there are shunts across jumpers JU19 and JU31.

Evaluates: MAX7440/MAX7441/MAX7442

# MAX7440 Evaluation Kit

## Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
IRC	361-992-7900	361-992-3377	www.irctt.com
Taiyo Yuden	800-348-2496	847-925-0899	www.t-yuden.com
TDK	847-803-6100	847-390-4405	www.component.tdk.com

**Note:** Please indicate that you are using the MAX7440/MAX7441/MAX7442 when contacting these suppliers.

- 3) Connect the output of the ground-referenced video signal generator to the INPUT1 BNC connector on the EV kit.
- 4) Connect the input of the ground-referenced video measurement equipment to the OUTPUT1 BNC connector on the EV kit.
- 5) Connect all grounds of the power supplies together. Connect the power-supply ground to GND.
- 6) Connect one 5.0V supply to the three-circuit terminal block labeled VCC1. Connect another 5.0V supply to VCC2.
- 7) Connect the third 5.0V supply to the six-circuit terminal block labeled VB1.
- 8) Set the video signal generator for the desired video input signal, such as multiburst sweep.
- 9) Turn on all power supplies, and enable the signal generator.
- 10) Analyze the output signal with the VM700 video measurement equipment.

**Note 1:** To evaluate the other channel(s), see Tables 1 and 3 for jumper settings.

**Note 2:** VCC1: 5V max  
VCC2: 5V typ, 10V max  
VB1–VB6: 5V typ, 10V max

## Detailed Description

### Input Level-Shift Circuit

The MAX7440 EV kit is designed for evaluating the MAX7440/MAX7441/MAX7442 with ground-referenced video equipment or a DAC output with 200Ω termination. To evaluate the EV kit with ground-referenced video equipment, the input signals need to be level shifted before entering the MAX7440/MAX7441/MAX7442, since most video generators are bipolar and ground referenced. The input buffer (MAX4390) is used with an external bias voltage as a level shift circuit with a gain of +1V/V. The MAX7440 EV kit provides jumpers JU1, JU4, JU7, JU10, JU15, and JU18 to terminate the input signals with either 75Ω or 200Ω. Table 1 lists jumper settings for the ground-referenced video equipment. To evaluate the EV kit with an input signal coming directly from a video DAC or video encoder output, the level shift circuit needs to be bypassed. Table 2 lists the jumpers' settings for evaluating with a DAC.

**Table 1. Jumper Settings for Evaluating with Ground-Referenced Video Equipment**

CHANNEL	TERMINATION JUMPER	LEVEL SHIFT BYPASS JUMPER	
INPUT1	JU1, pins 1 and 2	JU2, pins 1 and 2	JU3, pins 1 and 2
INPUT2	JU4, pins 1 and 2	JU5, pins 1 and 2	JU6, pins 1 and 2
INPUT3	JU7, pins 1 and 2	JU8, pins 1 and 2	JU9, pins 1 and 2
INPUT4	JU10, pins 1 and 2	JU11, pins 1 and 2	JU12, pins 1 and 2
INPUT5	JU13, pins 1 and 2	JU14, pins 1 and 2	JU15, pins 1 and 2
INPUT6	JU16, pins 1 and 2	JU17, pins 1 and 2	JU18, pins 1 and 2

# MAX7440 Evaluation Kit

Evaluates: MAX7440/MAX7441/MAX7442

**Table 2. Jumper Settings for Evaluating with a DAC**

CHANNEL	TERMINATION JUMPER	LEVEL SHIFT BYPASS JUMPER	
INPUT1	JU1, pins 2 and 3	JU2, pins 2 and 3	JU3, pins 2 and 3
INPUT2	JU4, pins 2 and 3	JU5, pins 2 and 3	JU6, pins 2 and 3
INPUT3	JU7, pins 2 and 3	JU8, pins 2 and 3	JU9, pins 2 and 3
INPUT4	JU10, pins 2 and 3	JU11, pins 2 and 3	JU12, pins 2 and 3
INPUT5	JU13, pins 2 and 3	JU14, pins 2 and 3	JU15, pins 2 and 3
INPUT6	JU16, pins 2 and 3	JU17, pins 2 and 3	JU18, pins 2 and 3

**Note:** To emulate a 200Ω DAC source resistor, remove jumpers JU19, JU21, JU23, JU25, JU27, and JU29. The 162Ω resistor added to the standard 75Ω termination equals approximately 200Ω.

### Bias Voltage

An external bias voltage is required in the level shift circuit for every channel. The MAX7440 EV kit provides options to tie each bias voltage to VB1 or to have an individual bias voltage. If the individual bias voltage is desired, remove its respective jumper and connect it to a separate power supply. Table 3 lists the bias voltage settings. **Do not set a bias voltage higher than 10V.**

**Table 3. Bias Voltage Settings**

CHANNEL	BIAS VOLTAGE JUMPER	BIAS VOLTAGE
INPUT2	JU20, installed	Connected to VB1
	JU20, not installed	Connected to VB2
INPUT3	JU22, installed	Connected to VB1
	JU22, not installed	Connected to VB3
INPUT4	JU24, installed	Connected to VB1
	JU24, not installed	Connected to VB4
INPUT5	JU26, installed	Connected to VB1
	JU26, not installed	Connected to VB5
INPUT6	JU28, installed	Connected to VB1
	JU28, not installed	Connected to VB6

### Output Buffers

The MAX7440/MAX7441/MAX7442 require external buffering to drive a standard 150Ω video load. The MAX7440 EV kit uses the MAX4390 op amp configured to a gain of +2V/V to drive standard video loads. If the output buffer is not needed, remove the shunts from jumpers JU30–JU35. Access the output signals from test points OUT1–OUT6. To alleviate any output clipping, increase VCC2 up to 10V.

Since the circuit is DC-coupled and the output buffer has a gain of 2V/V, output clipping can occur if the level shift input circuitry is set incorrectly. This can be resolved by either using different power supplies for the level shift input circuitry, or by increasing VCC2 up to 10V. (Remember to keep VCC1 at 5V.)

### Evaluating MAX7441/MAX7442

The MAX7440 EV kit can also be used to evaluate the MAX7441/MAX7442. To evaluate the MAX7441/MAX7442, replace the MAX7440ESD with a MAX7441ESD/MAX7442ESD.

# MAX7440 Evaluation Kit

Evaluates: MAX7440/MAX7441/MAX7442

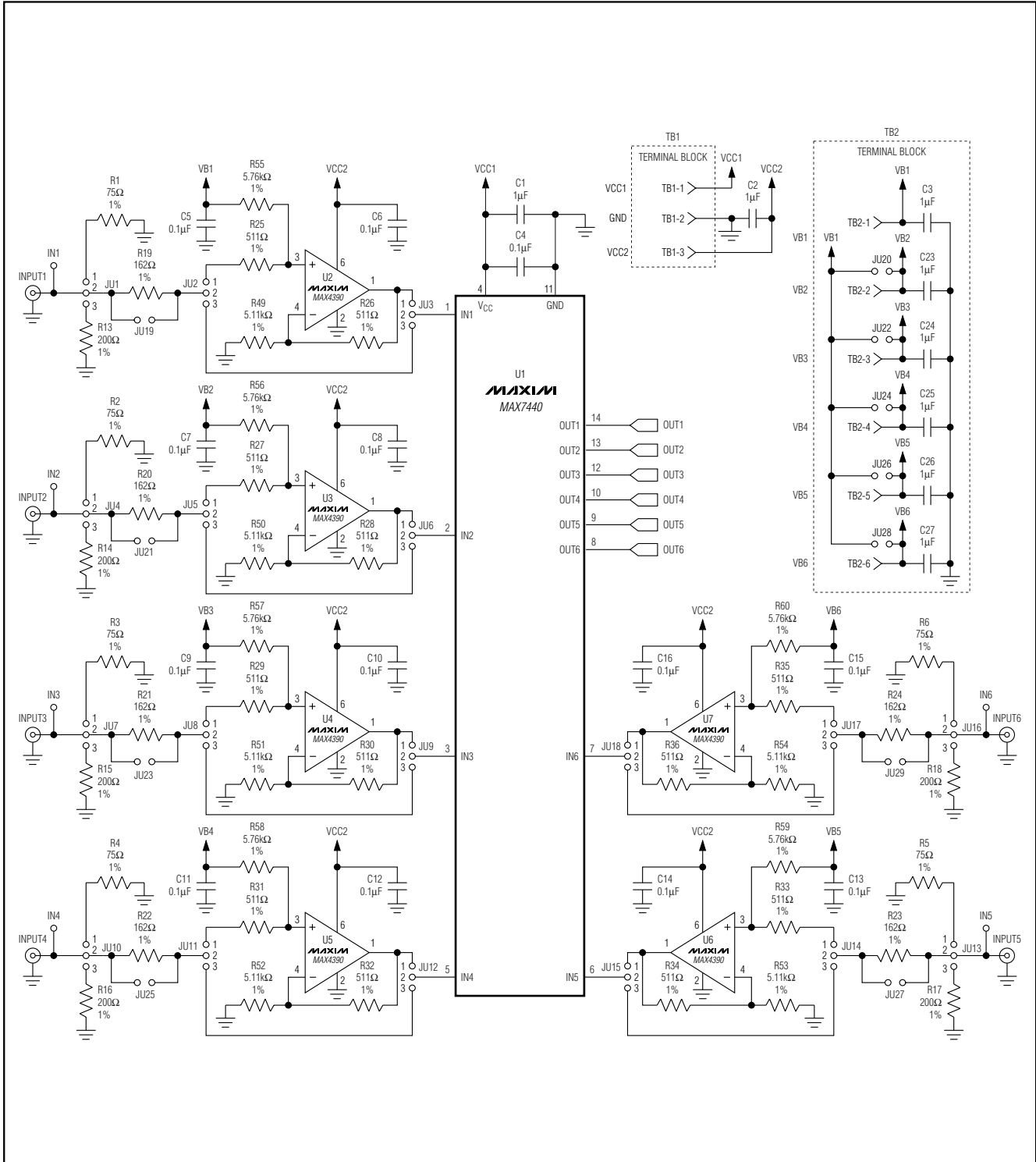


Figure 1. MAX7440 EV Kit Schematic (Sheet 1 of 2)

# MAX7440 Evaluation Kit

Evaluates: MAX7440/MAX7441/MAX7442

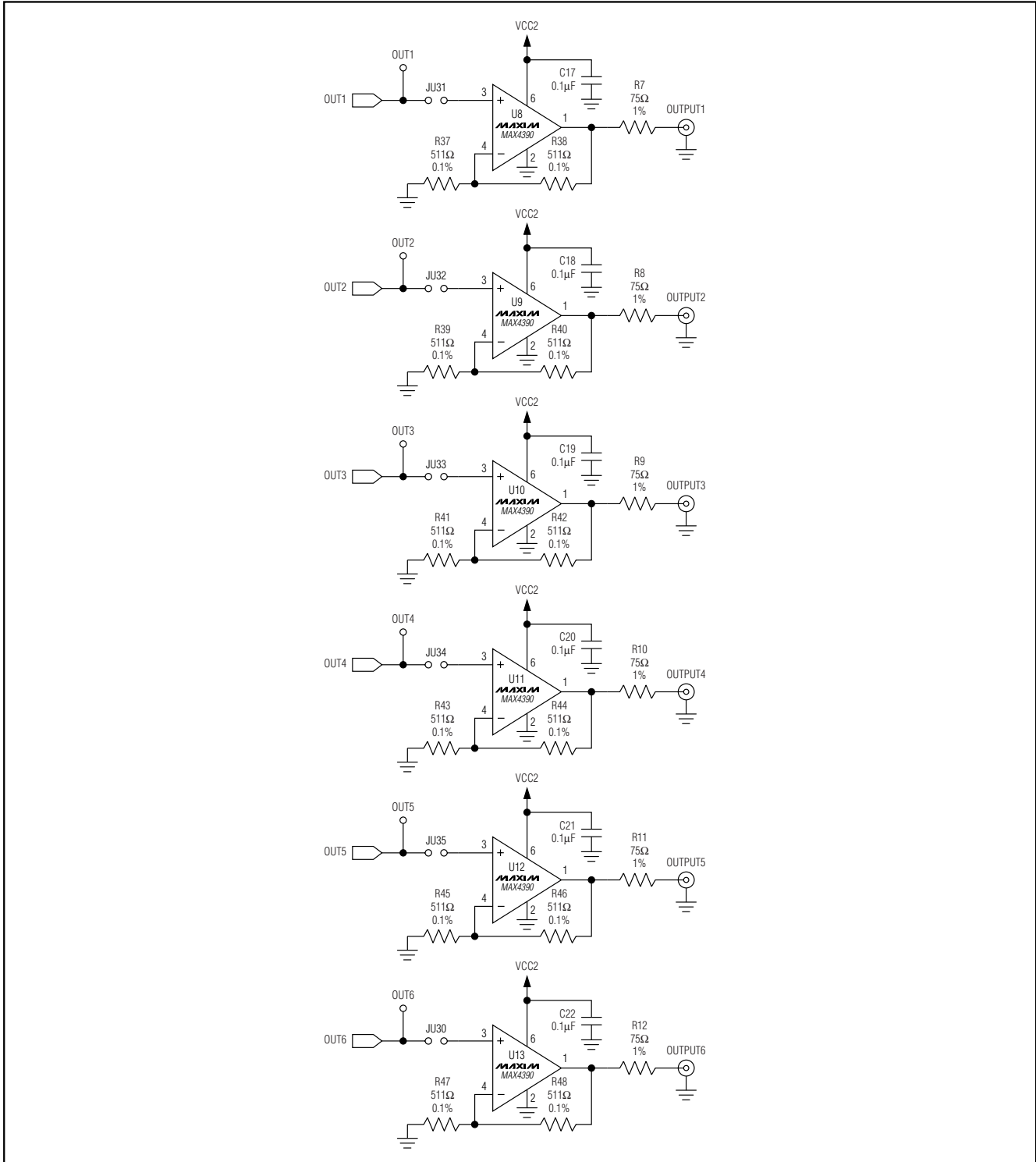


Figure 2. MAX7440 EV Kit Schematic (Sheet 2 of 2)

# MAX7440 Evaluation Kit

Evaluates: MAX7440/MAX7441/MAX7442

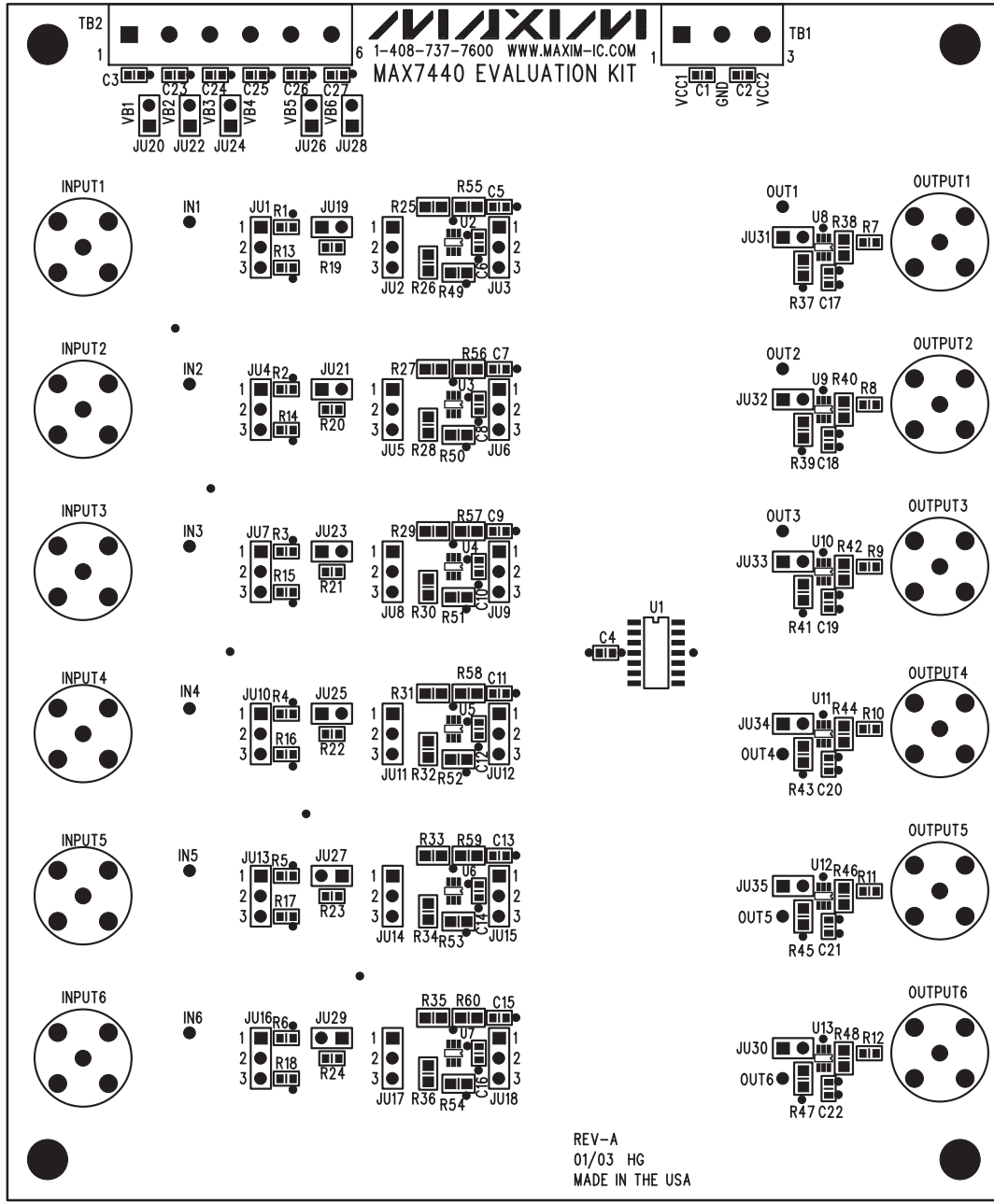


Figure 3. MAX7440 EV Kit Component Placement Guide—Component Side

# MAX7440 Evaluation Kit

Evaluates: MAX7440/MAX7441/MAX7442

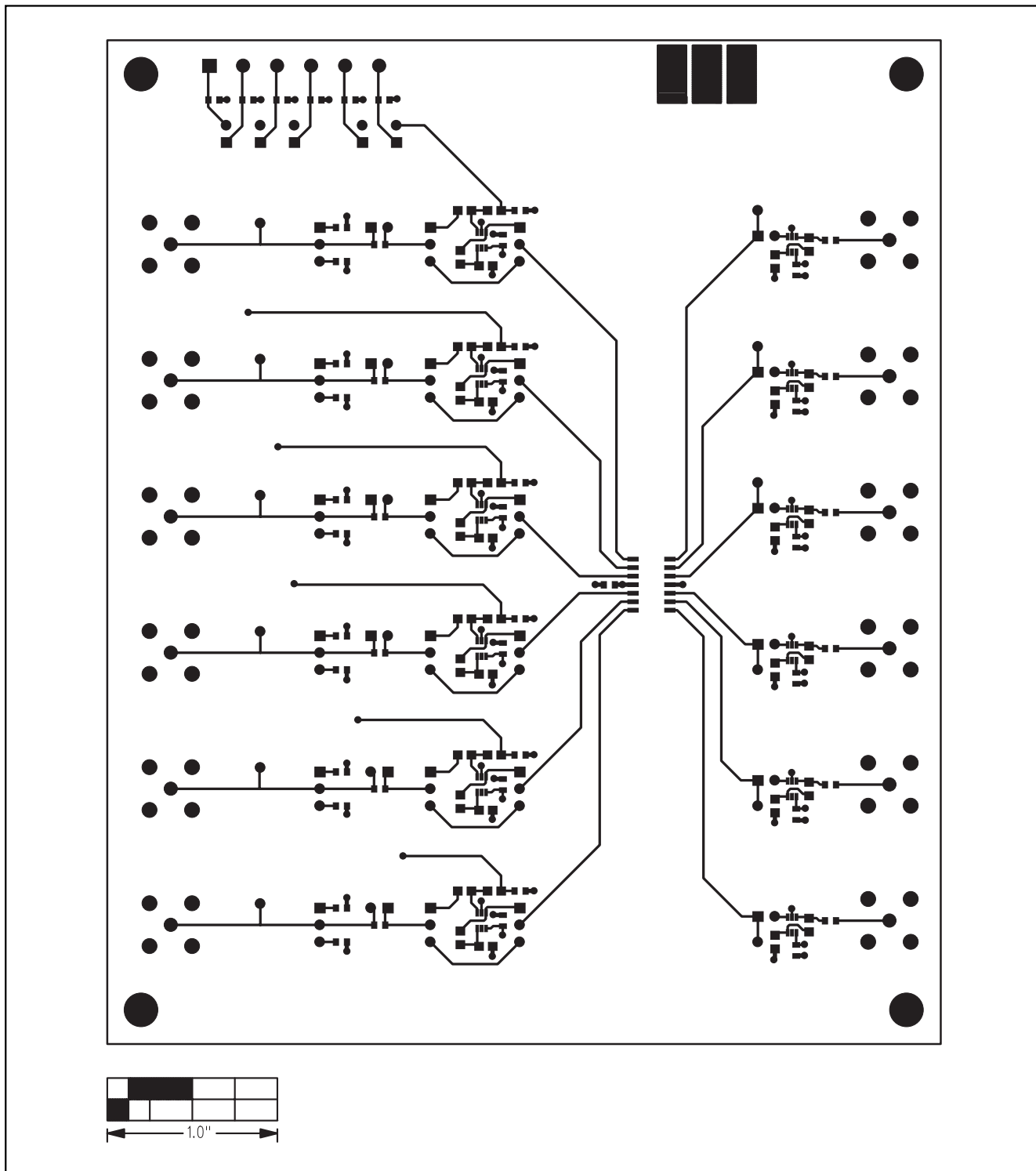


Figure 4. MAX7440 EV Kit PC Board Layout—Component Side

# MAX7440 Evaluation Kit

Evaluates: MAX7440/MAX7441/MAX7442

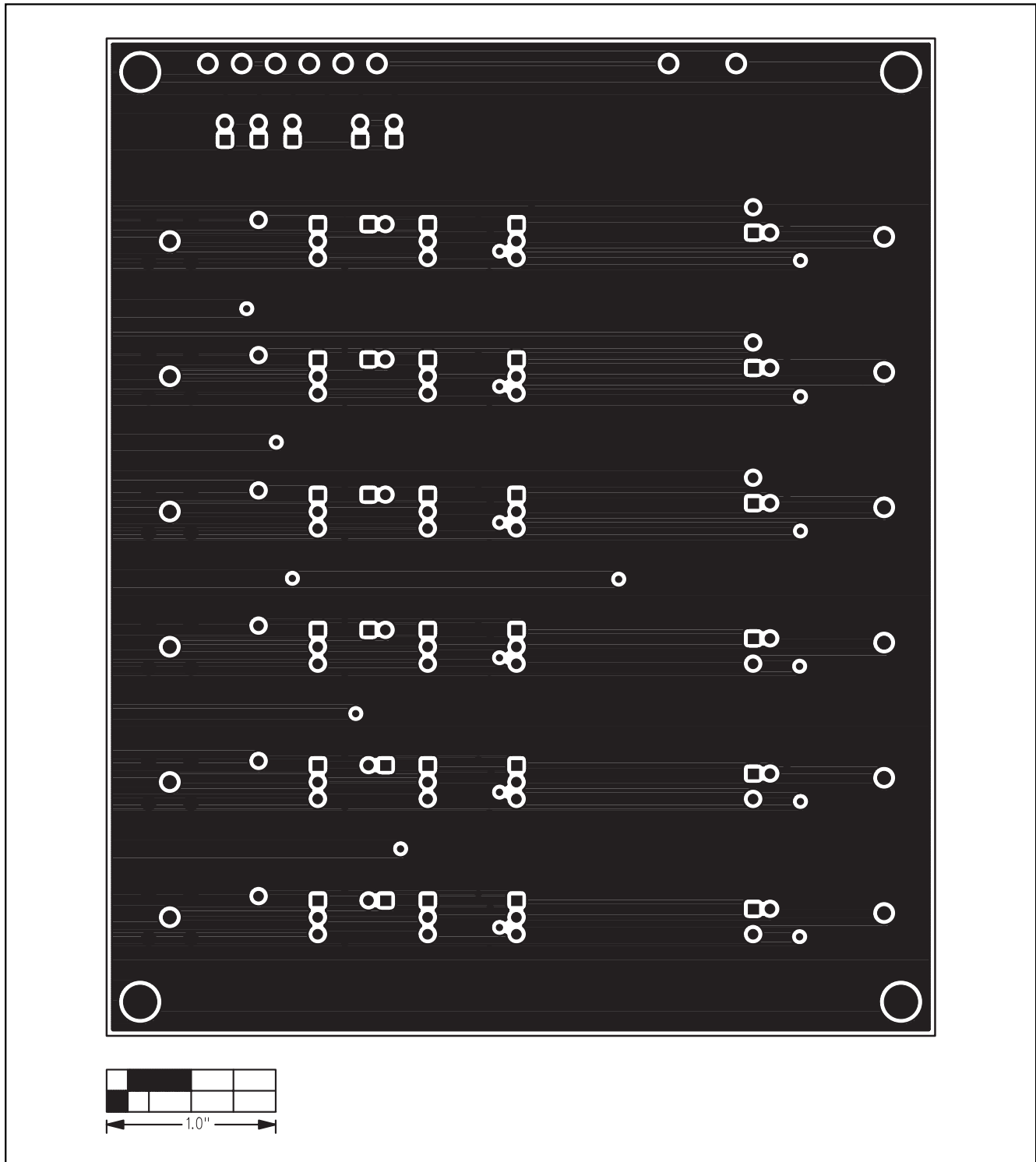


Figure 5. MAX7440 EV Kit PC Board Layout—Inner Layer 2 (GND Layer)



# MAX7440 Evaluation Kit

Evaluates: MAX7440/MAX7441/MAX7442

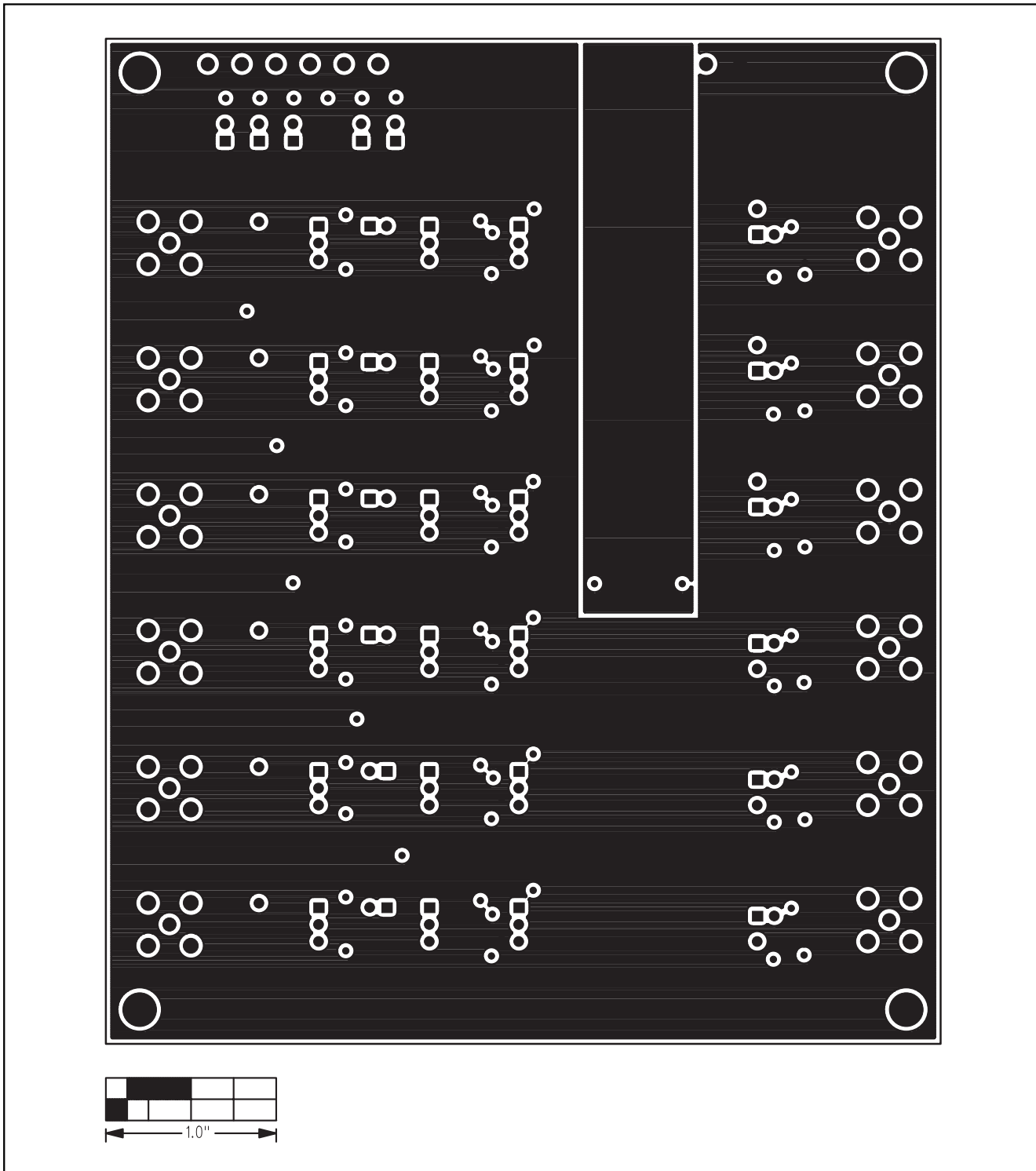


Figure 6. MAX7440 EV Kit PC Board Layout—Inner Layer 3 (VCC1 and VCC2 Layers)

# MAX7440 Evaluation Kit

Evaluates: MAX7440/MAX7441/MAX7442

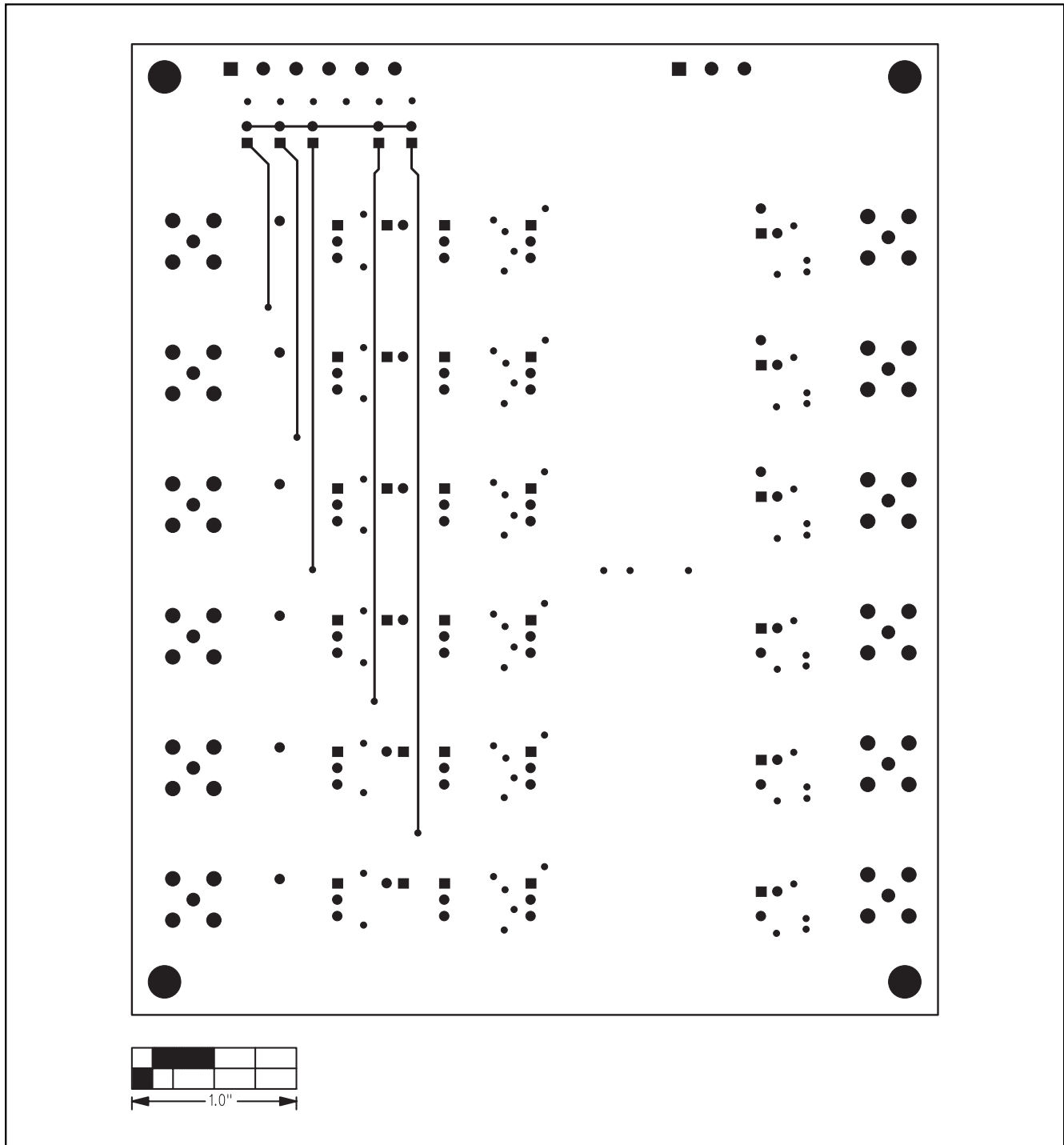


Figure 7. MAX7440 EV Kit PC Board Layout—Solder Side

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