19-4416; Rev 0; 3/09

MAX4889B Evaluation Kit

General Description

The MAX4889B evaluation kit (EV kit) provides a proven design to evaluate the MAX4889B PCI Express® (PCIe) Gen II 5.0Gbps passive switch. The MAX4889B is a quad double-pole/double-throw (4 x DPDT) switch ideal for switching four half lanes of PCIe data between two destinations. The MAX4889B EV kit is used for critical tests (e.g., eye diagrams and s-parameter measurements such as insertion loss, return loss, and off-isolation).

The MAX4889B EV kit PCB comes with a MAX4889BETO+ installed. The MAX4889BETO+ is available in a lead(Pb)-free 3.5mm x 9.0mm, 42-pin TQFN package with an exposed pad.

The MAX4889B EV kit can also be used to evaluate the MAX4889C. Contact the factory for a free sample of the pin-compatible MAX4889CETO+.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C6, C8, C10, C12, C14, C16	8	0.1µF ±10%, 16V X7R ceramic capacitors (0402) Murata GRM155R71C104K
C3, C4, C5, C7, C9, C11, C13, C15	8	1000pF ±10%, 16V X5R ceramic capacitors (0402) Murata GRM155R61C102K
C17	1	10µF ±10%, 16V X5R ceramic capacitor (0805) Murata GRM21BR61C106K
JU1	1	3-pin header
P1–P12	12	Edge-mount receptacle, SMA connectors
R1, R2	2	49.9Ω ±1% resistors (0402)
U1	1	5.0Gbps PCIe passive switch (42 TQFN-EP*) Maxim MAX4889BETO+
—	1	Shunt
—	1	PCB: MAX4889B Evaluation Kit+

*EP = Exposed pad.

Component Supplier

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com

Note: *Indicate that you are using the MAX4889B when contacting this component supplier.*

PCI Express is a registered trademark of PCI-SIG Corp.

Features

- ♦ **Eye Diagram Test Circuit with SMA Input/Output**
- ♦ **Calibration Trace Load and No Load**
- ♦ **Lead(Pb)-Free and RoHS Compliant**
- ♦ **Proven PCB Layout**
- ♦ **Fully Assembled and Tested**

Ordering Information

PART	TYPE
MAX4889BEVKIT+	EV Kit

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

Quick Start

Required Equipment

- MAX4889B EV kit
- 3.3V/100mA DC power supply
- Pulse data generator with frequency of at least 2.5GHz (e.g., Agilent 81142A)
- Digital serial analyzer sampling oscilloscope with frequency of at least 2.5GHz (e.g., Tektronix DSA8200)
- Six SMA cables of equal lengths

Procedure

The MAX4889B EV kit is fully assembled and tested. Follow the steps below to verify board operation and eye diagram/jitter measurements. **Caution: Do not turn on the power until all connections are completed.**

1) Connect the 3.3V/100mA power supply to the VCC and GND pads of the EV kit.
2) Verify that JU1 is in the 2-3 position.
3) Set up the pulse data generator to a bit rate of 5Gbps (2.5GHz), the V_{HI} and V_{LO} to +250mV and -250mV, respectively, nonreturn-to-zero (NRZ) mode, and desired pseudorandom binary (bit) sequence (PRBS) with 2^{15}-1 or 2^{7}-1 patterns.
4) Use a pair of SMA cables to connect the differential output signals of the pulse data generator to the AOUTA+ and AOUTA- (P5 and P6) of the EV kit.
5) Use a single SMA cable to connect the trigger input of the digital serial analyzer to the trigger output of the pulse data generator.

6) Use a single SMA cable to connect the clock input of the pattern sync module of the digital serial analyzer to the clock output of the pulse data generator.
7) Use the other pair of SMA cables to connect the two sampling channels of the digital serial analyzer to AIN+ and AIN- (P1 and P2) of the EV kit.
8) Set the digital serial analyzer to infinite persistence and select the math function of the signal ((AIN+) - (AIN-)).
9) Adjust the vertical scale to 100mV/div and horizontal scale to 200ps/div on the digital serial analyzer.
10) Turn on the DC power supply.
11) Enable the data and clock outputs on the pulse data generator and observe the waveform on the digital serial analyzer.
12) Save the waveform on the digital serial analyzer.
13) Disable the data and clock outputs of the pulse generator.
14) Turn off the DC power supply.
15) Remove the pair of SMA cables connected to AOUTA+ and AOUTA- (P5 and P6) of the EV kit and connect the cables to R_AOUT_+ and R_AOUT_- (P9 and P10) of the EV kit.
16) Remove the pair of SMA cables connected to AIN+ and AIN- (P1 and P2) of the EV kit and connect the cables to R_AIN+ and R_AIN- (P7 and P8) of the EV kit.
17) Enable the data and clock outputs on the pulse data generator and observe the waveform on the digital serial analyzer.
18) Compare the waveform to the waveform that includes the MAX4889B and observe the jitter/eye height of both systems. Take the difference in jitter/eye height, which is the extra jitter/eye height coming from the MAX4889B.

Detailed Description of Hardware

The MAX4889B EV kit provides a proven design to evaluate the MAX4889B PCIe Gen II 5.0Gbps passive switch. The MAX4889B is a quad double-pole/double-throw (4 x DPDT) switch ideal for switching four half lanes of PCIe data between two destinations. The MAX4889B EV kit is used for critical tests (e.g., eye diagrams and s-parameter measurements such as insertion loss, return loss, and off-isolation).

For simplicity, only one channel of the device is used in the EV kit. Only the AIN_, AOUTA_, and AOUTB_ signals are used in the EV kit. All signal traces coming out of the MAX4889B are 100Ω differential controlled-impedance traces. Once the traces split into separate directions, the traces are 50Ω single-ended controlled impedances, which is equivalent to 100Ω differentially.

The MAX4889B operates from a 3.0V to 3.6V supply.

Calibration Trace

At the bottom of the EV kit board are calibration traces used as a reference to differentiate the performance of the switch from the traces and SMA connector providing a complete analysis of the MAX4889B.

No Load

The first calibration traces are made with no load. The lengths of the traces are equal to the above circuitry minus the MAX4889B. The traces starting from R_AIN_ and R_AOUT_ are 50Ω single-ended controlled impedances. Once the traces run parallel to each other, and are matched side by side, the traces are 100Ω differential controlled impedances.

Load

The second calibration traces are made with a 50Ω load. The lengths of the traces are half the calibration traces without the load.

Jumper Selection

Table 1 shows the control input for SEL. The MAX4889B EV kit default setting is JU1 in the 2-3 position, which selects the signal's path between AIN_ and AOUTA_. Move JU1 to the 1-2 position to test the quality of the signals between AIN_ and AOUTB_.

Table 1. SEL Control Input (JU1)

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	Selects signal path between AIN_ and AOUTB_ channels
	2-3*	Selects signal path between AIN_ and AOUTA_ channels

*Default position.

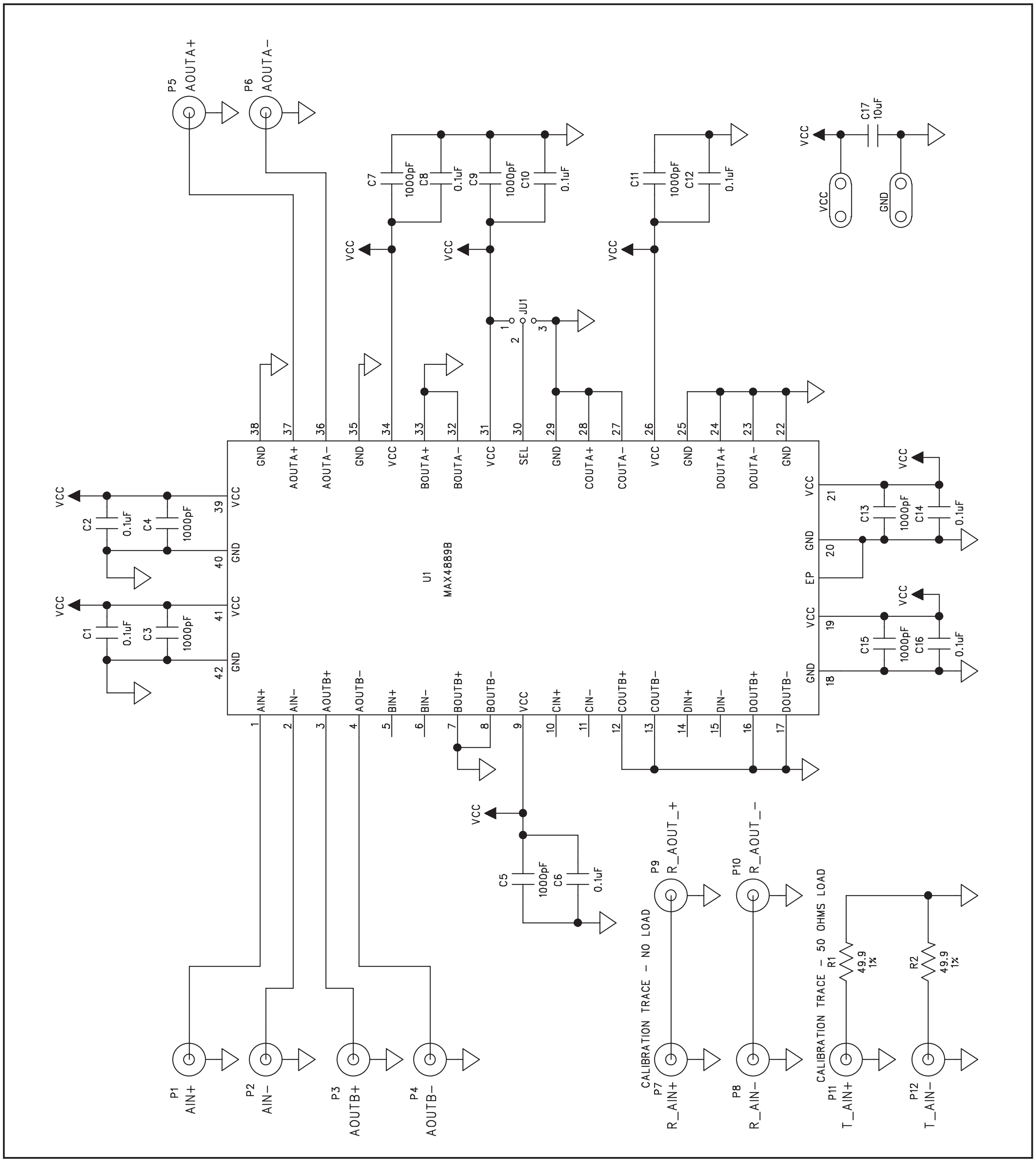

Figure 1. MAX4889B EV Kit Schematic

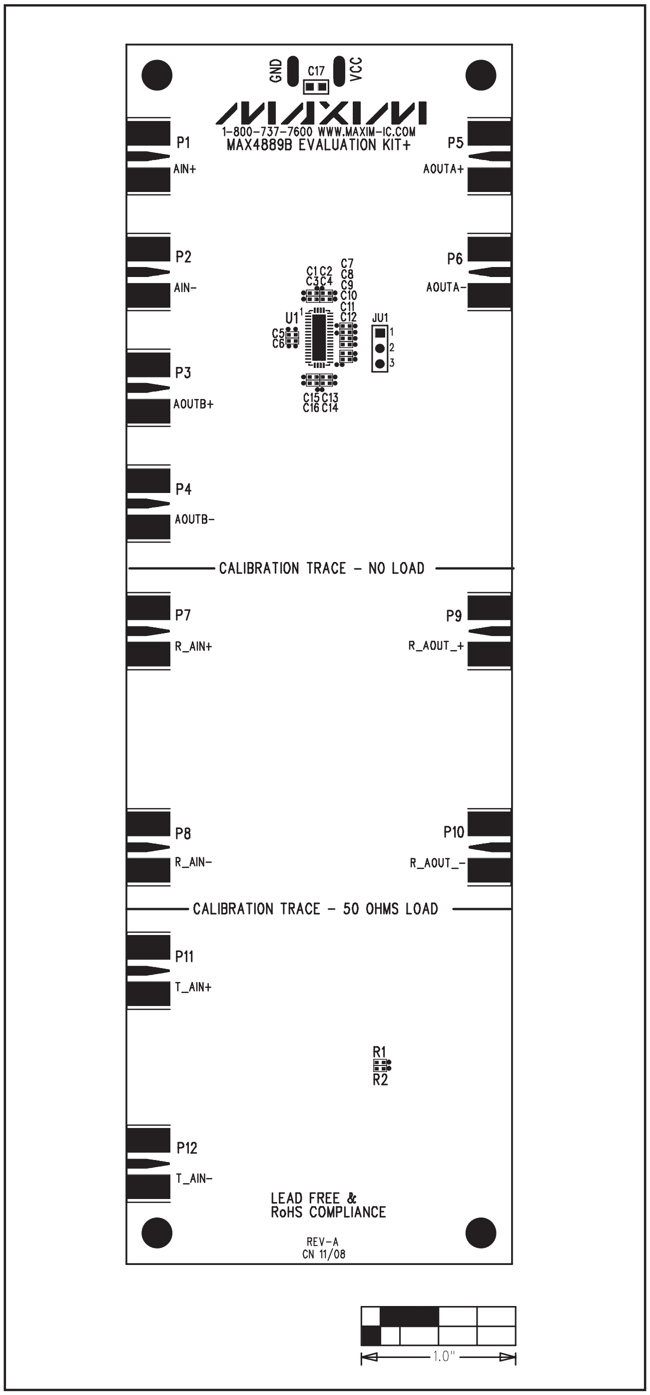

Figure 2. MAX4889B EV Kit Component Placement Guide—Component Side

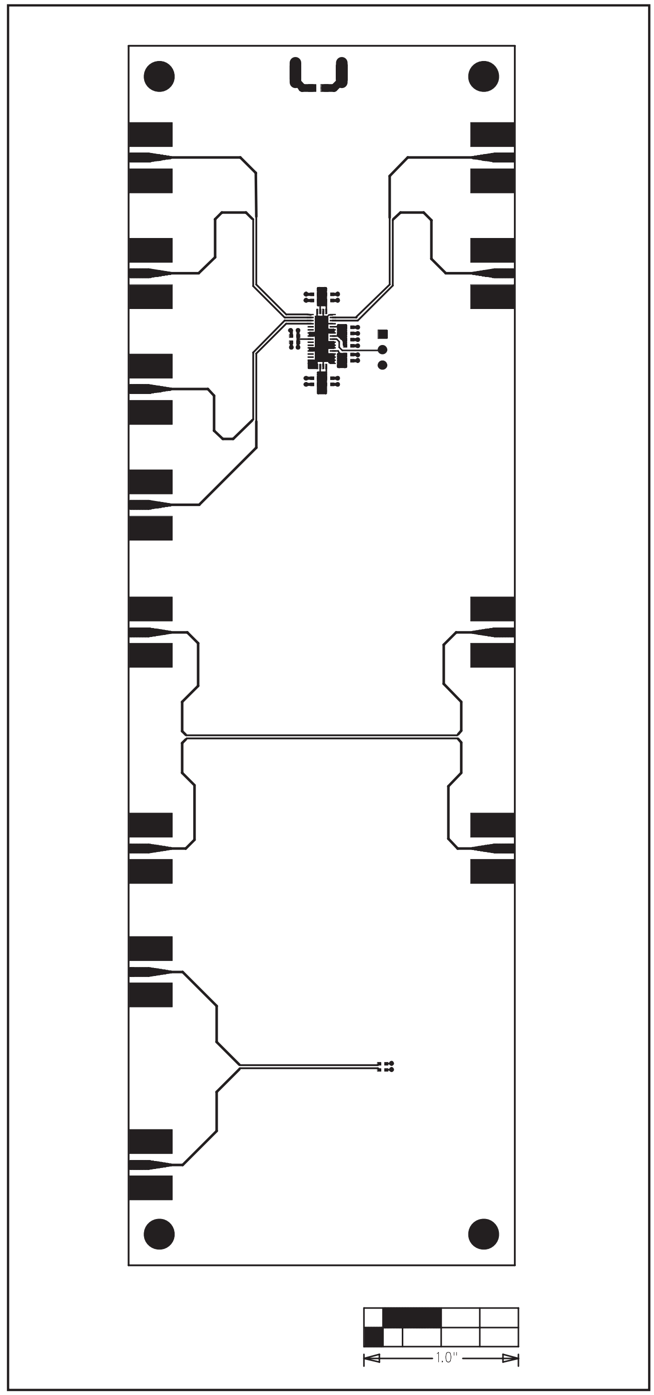

Figure 3. MAX4889B EV Kit PCB Layout—Component Side

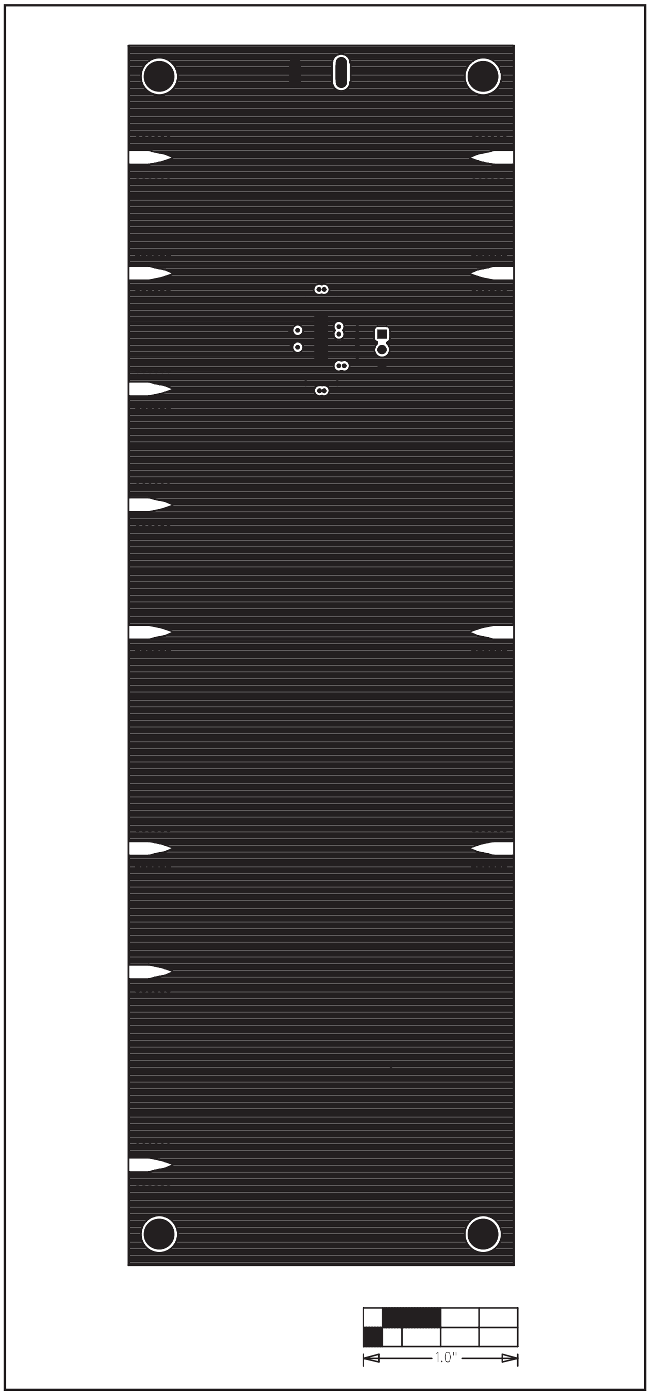

Figure 4. MAX4889B EV Kit PCB Layout—Inner Layer 2

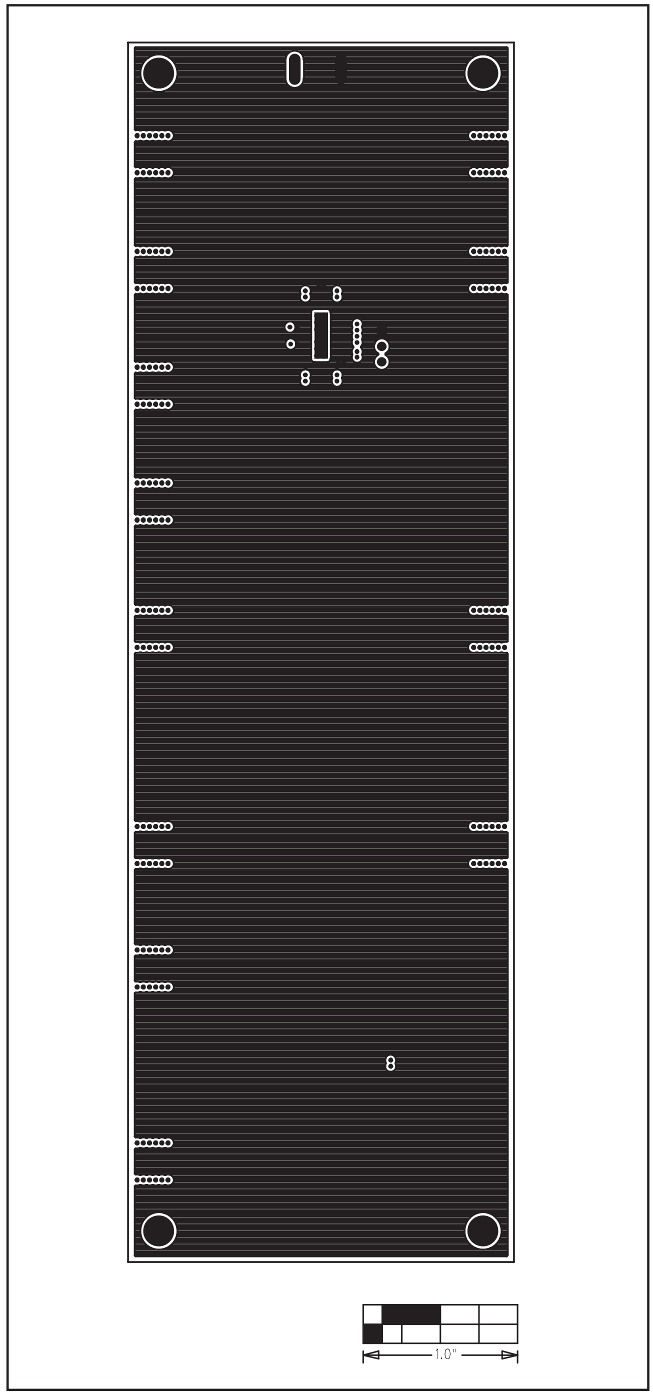

Figure 5. MAX4889B EV Kit PCB Layout—Inner Layer 3

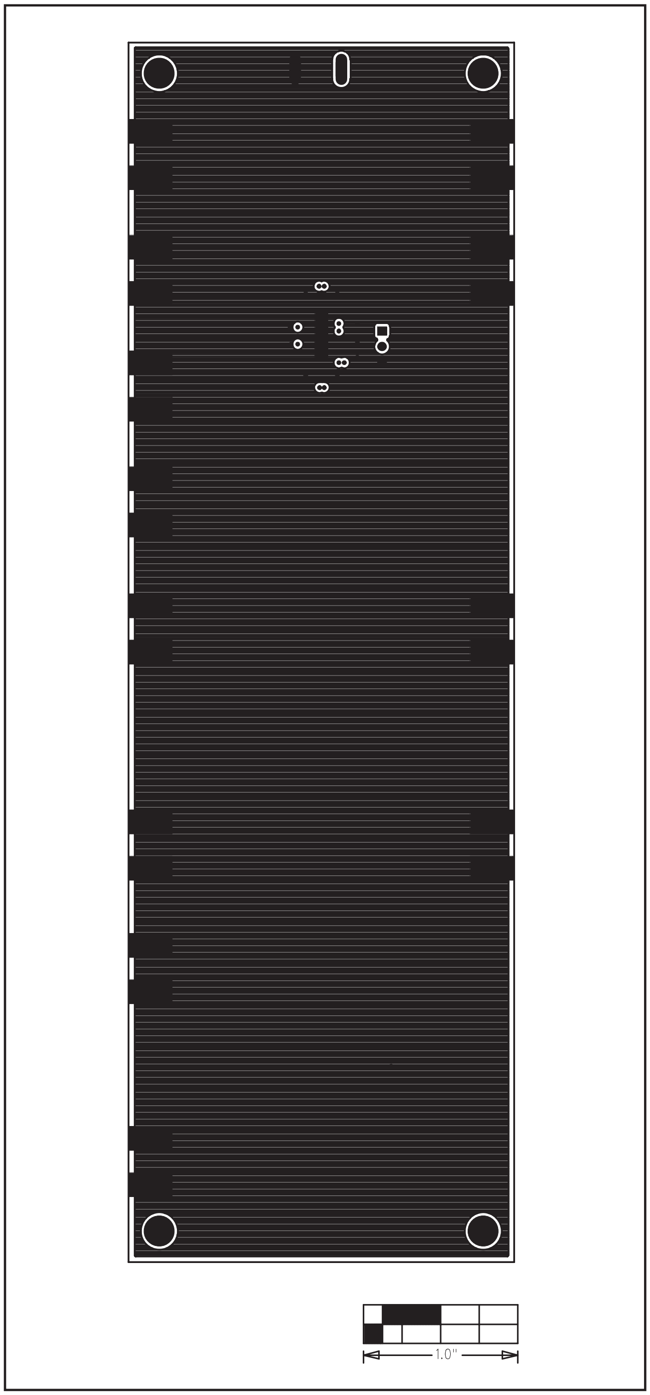

Figure 6. MAX4889B EV Kit PCB Layout—Solder Side