19-1420; Rev 1; 6/00

MAXIM

MAX3867 Evaluation Kit

Evaluates: MAX3867

General Description

The MAX3867 evaluation kit (EV kit) is an assembled demonstration board that provides optical or electrical evaluation of the MAX3867.

The EV kit is composed of two independent sections on the PC board. The output of the electrical evaluation section is interfaced to an SMA connector, which can be connected to a 50Ω terminated oscilloscope. The output of the optical evaluation section is configured for attachment to a laser/monitor diode.

Features

- ♦ **Fully Assembled and Tested**
- ♦ **+3.3V to +5.0V Operation**
- ♦ **Input Termination Provided On-Board**

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX3867EVKIT	-40°C to +85°C	48 TQFP

Electrical Component List

DESIGNATION	QTY	DESCRIPTION
C14, C21, C31, C33, C44	5	Do not install.
C24, C25, C28, C32	4	0.01µF ±10% ceramic capacitors (0402)
C26, C27, C29, C30, C34	5	0.1µF ±10% ceramic capacitors (0603)
C37, C39	2	0.056µF ±10% ceramic capacitors (0603)
C40	1	10µF ±20% tantalum (16V) capacitor AVX TAJC106M016
C41, C45	2	0.01µF ±10% ceramic capacitors (0603)
C42	1	0.22µF ±10% ceramic capacitor (0603)
C43	1	1000pF ±10% ceramic capacitor (0402)
D3	1	LED Digi-Key P363-ND
J5–J9	5	SMA edge-mount connectors EFJohnson 142-0701-801 or Digi-Key J502-ND
JU4, JU5	2	Shunts Digi-Key S9000-ND
JU4, JU5	2	2-pin headers (0.1in center) Digi-Key S1012-36-ND
L7, L13	2	1kΩ ferrite beads (0805) Murata BLM21A102S
L9	1	1.2µH inductor Coilcraft 1008LS-122XKBC
L10, L11	2	600Ω ferrite beads (0603) Murata BLM11A601SPT

DESIGNATION	QTY	DESCRIPTION
Q2	1	PNP transistor (SOT23) Zetex FMMT591A (“91A” marking)
R5, R22, R47	3	1.5kΩ ±1% resistors (0603)
R23	1	1kΩ ±1% resistor (0603)
R25, R26, R30, R31	4	84.5Ω ±1% resistors (0402)
R28, R29, R32, R33	4	124Ω ±1% resistors (0402)
R34	1	110Ω ±1% resistor (0603)
R37	1	Do not install.
R38, R49	2	49.9Ω ±1% resistors (0402)
R40	1	100kΩ variable resistor Bournes or Digi-Key 3296W-104-ND
R41	1	50kΩ variable resistor Bournes or Digi-Key 3296W-503-ND
R42	1	200kΩ variable resistor Bournes or Digi-Key 3296W-204-ND
R43, R45	2	0Ω resistors (0603)
R44	1	24.9Ω ±1% resistor (0402)
R46	1	15Ω ±1% resistor (0603)
U2	1	MAX3867ECM (48-pin TQFP)
U3	1	MAX495ESA
TP2, TP3, TP8, TP10–TP13, VCC1, GND1	9	Test points Digi-Key 5000K-ND
TP17, TP18	2	Do not install.
None	1	MAX3867 data sheet
None	1	MAX3867 EV kit circuit board (Rev D)

For free samples and the latest literature, visit www.maxim-ic.com or phone 1-800-998-8800. For small orders, phone 1-800-835-8769.

Optical Component List

DESIGNATION	QTY	DESCRIPTION
C1–C4, C17, C38	6	0.01µF ±10% ceramic capacitors (0402)
C5, C8, C9, C15, C18, C35	6	Do not install.
C6	1	1000pF ±10% ceramic capacitor (0402)
C7	1	0.056µF ±10% ceramic capacitor (0603)
C10–C13, C23	5	0.1µF ±10% ceramic capacitors (0603)
C16	1	0.22µF ±10% ceramic capacitor (0805)
C19	1	10µF ±20% tantalum (16V) capacitor AVX TAJC106M016
C20, C22, C36	3	0.01µF ±10% ceramic capacitors (0603)
D1	1	LED Digi-Key P363-ND
J1–J4	4	SMA edge-mount connectors EFJohnson 142-0701-801 or Digi-Key J502-ND
JU1, JU2	2	2-pin headers (0.1in center) Digi-Key S1012-36-ND
JU1, JU2	2	Shunts Digi-Key S9000-ND
L1	1	1kΩ ferrite bead (0805) Murata BLM21A102S
L2	1	600Ω ferrite bead (0603) Murata BLM11HA601SPT
L3	1	0Ω resistor (0603)
L4	1	1.2µH Inductor Coilcraft 1008LS-122XKBC
L5, L6	2	600Ω ferrite beads (0603) Murata BLM11A601SPT
R1, R2	2	1.5kΩ ±1% resistors (0603)
R3	1	1.0kΩ ±1% resistor (0603)
R6, R7, R10, R11	4	84.5Ω ±1% resistors (0402)
R8, R9, R12, R13	4	124Ω ±1% resistors (0402)
R14	1	50kΩ variable resistor Bournes or Digi-Key 3296W-503-ND
R15	1	200kΩ variable resistor Bournes or Digi-Key 3296W-204-ND
R16	1	100kΩ variable resistor Bournes or Digi-Key 3296W-104-ND
R18	1	110Ω ±1% resistor (0603)
R19	1	Do not install.
R20	1	27.4Ω ±1% resistor (0402)
R21	1	49.9Ω ±1% resistor (0402)
R27	1	24.9Ω ±1% resistor (0402)
R35, R48	2	0Ω resistors (0603)
R36	1	43.2Ω ±1% resistor (0402)
TP1, TP4, TP5, TP6, TP14, VCC, GND	7	Test points Digi-Key 5000K-ND
TP15, TP16	2	Do not install.
U1	1	MAX3867ECM (48-pin TQFP)

Component Suppliers

SUPPLIER	PHONE	FAX
AVX	803-946-0690	803-626-3123
Coilcraft	847-639-6400	847-639-1469
Digi-Key	218-681-6674	218-681-3380
EFJohnson	402-474-4800	402-474-4858
Murata	814-237-1431	814-238-0490
Zetex	516-543-7100	516-864-7630

Quick Start

Electrical Evaluation

In the electrical configuration, an automatic power control (APC) test circuit is included to emulate a semiconductor laser with a monitor photodiode. Monitor diode (MD) current is provided by Q2, which is controlled by an operational amplifier (U3). The APC test circuit, consisting of U3 and Q2, applies the simulated MD current (the laser bias current divided by 100) to the MD pin of the MAX3867. To ensure proper operation in the electrical configuration, set up the evaluation board as follows:

1) If data is to be latched, remove the shunt from JU4 to enable the input clock; otherwise, leave the shunt in place.

2) Remove the shunt from JU5 to enable the outputs.

Note: When performing the following resistance checks, manually set the ohmmeter to a high range to avoid forward biasing the on-chip ESD protection diodes.

3) Adjust R41, the MOD potentiometer, for 10kΩ resistance between pins 1 and 3 (test point 3 and ground).
4) Adjust R42, the BIAS potentiometer, for 10kΩ resistance between pins 1 and 3 (test point 2 and ground).
5) Adjust R40, the APC potentiometer, for 10kΩ resistance between pins 1 and 3 (test point 8 and ground).
6) Apply a differential input signal (max amplitude ≤800mV per side) to J7 and J8 (DATA+ and DATA-).
7) If the latch is enabled, apply a differential clock signal (max amplitude ≤800mV per side) to J5 and J6 (CLK+ and CLK-).
8) Attach a high-speed oscilloscope with 50Ω inputs to J9.
9) Power up the board with a +3.3V supply.
10) Adjust R42 until the desired laser bias current is achieved:

$$I_{BIAS} = \frac{V_{TP13} - V_{TP12}}{15\Omega}$$

11) Adjust R41 until the desired laser modulation current is achieved:

$$I_{MOD} = \frac{\text{Signal Amplitude (Volts)}}{25\Omega}$$

Optical Evaluation

For optical evaluation of the MAX3867, configure the EV kit as follows:

1) If data is to be latched, remove the shunt from JU1 to enable the input clock; otherwise, leave the shunt in place.
2) Remove the shunt from JU2 to enable the outputs.
3) The EV kit is designed to allow connection of a variety of possible laser/monitor diode pin configurations. Connect a TO-header-style laser with MD (Figure 1) as follows:
   - Keeping its leads as short as possible, connect the laser diode to two of the three pads in the cutout portion on the top (component) side of the PC board. Solder the laser diode cathode to the center pad, and solder the anode to either of the other two pads (they are both connected to V_{CC}).
   - Connect the monitor photodiode to two of the five pads on the bottom (solder) side of the PC board, directly below the laser diode pads. Three of these pads (the middle and outside positions) are initially not connected. The other two pads are connected to V_{CC}. Solder the anode and cathode of the monitor photodiode to any two of the three pads that are not connected. Then connect the anode to the MD pin by shorting the corresponding solder jumper (Figure 1). Connect the cathode to V_{CC} by using solder to bridge to an adjacent V_{CC} pad.

Note: When performing resistance checks, manually set the ohmmeter to a high range to avoid forward biasing the on-chip ESD protection diodes.

4) Adjust R14, the MOD potentiometer, for maximum resistance between pins 1 and 3 (test point 5 and ground).
5) Adjust R15, the BIAS potentiometer, for maximum resistance between pins 1 and 3 (test point 4 and ground).
6) Adjust R16, the APC potentiometer, for desired optical power. (Refer to the *Design Procedure* section of the MAX3867 data sheet.)
7) Apply a differential input signal (≤800mV per side) to J1 and J2 (DATA+ and DATA-).
8) Apply a differential clock signal (≤800mV per side) to J3 and J4 (CLK+ and CLK-).
9) Attach the laser diode fiber connector to an optical/electrical converter.
10) Power up the board with a +3.3V supply.
11) Adjust R15 until the LED (D1) is no longer illuminated. Optical power can be observed on an oscilloscope connected to an optical/electrical converter.
12) Adjust R14 until the desired optical amplitude is achieved. Optical amplitude can be observed on an oscilloscope connected to an optical/electrical converter.

Adjustment and Control Descriptions (see Quick Start first)

COMPONENT		NAME	FUNCTION
OPTICAL	ELECTRICAL		
JU1	JU4	CLOCK DISABLE	Enables/disables the clock input. Shunt for direct data transmission. Remove shunt to enable clock input.
JU2	JU5	OUTPUT DISABLE	Enables/disables the output currents. Shunt to disable the part. Remove shunt for normal operation.
—	J8	Electrical Output SMA	Electrical Output
R14	R41	MOD	Adjusts the laser modulation current.
R15	R42	BIAS	Adjusts the laser bias current. In open-loop mode, R15 or R42 adjusts the laser bias current. In closed-loop operation, R15 or R42 adjusts the maximum laser bias current.
R16	R40	APC	For closed-loop operation, R16 or R40 adjusts the MD current level.
TP1	TP10	Fail Indicator	TTL low level indicates a failure in the APC loop.
D1	D3	Fail Indicator	Refer to the *Design* section of the MAX3867 data sheet. Set APC current, then increase bias current until LED goes off (LED is illuminated when the APC loop is open, and off when the APC loop is closed).

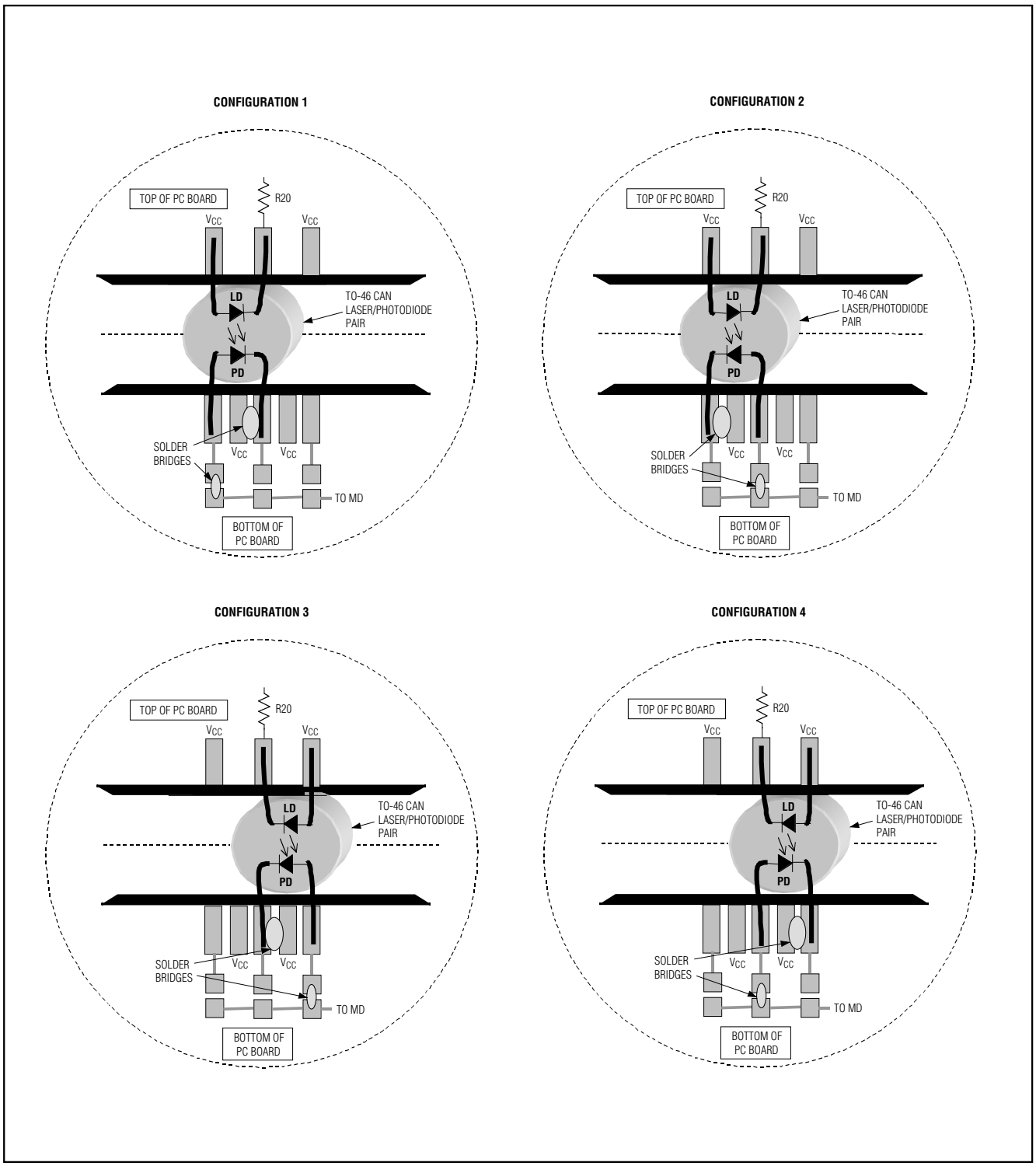

Figure 1. Attachment of Laser Diode/Monitor Diode to MAX3867 EV Kit

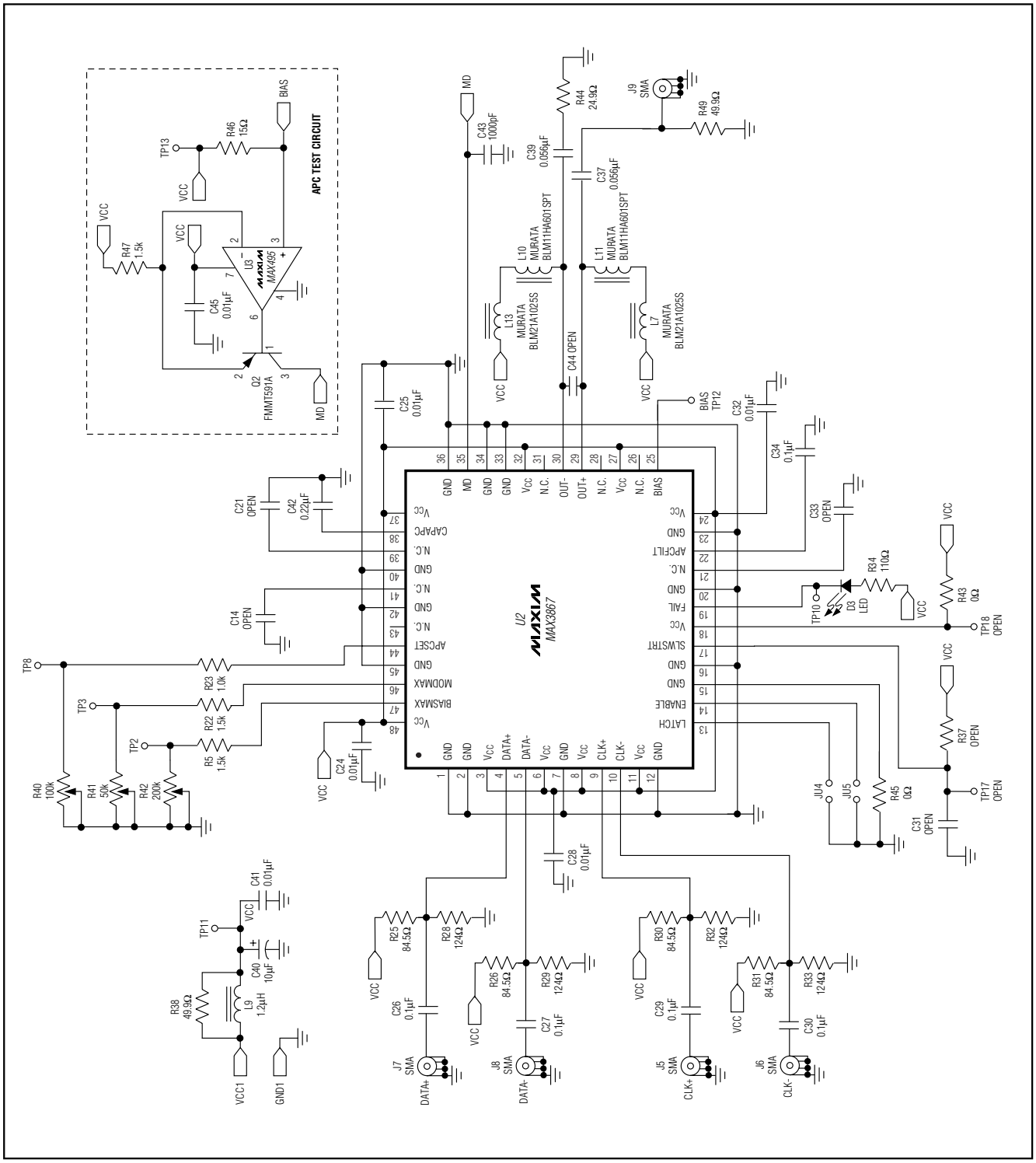

Figure 2. MAX3867 EV Kit Schematic—Electrical Configuration

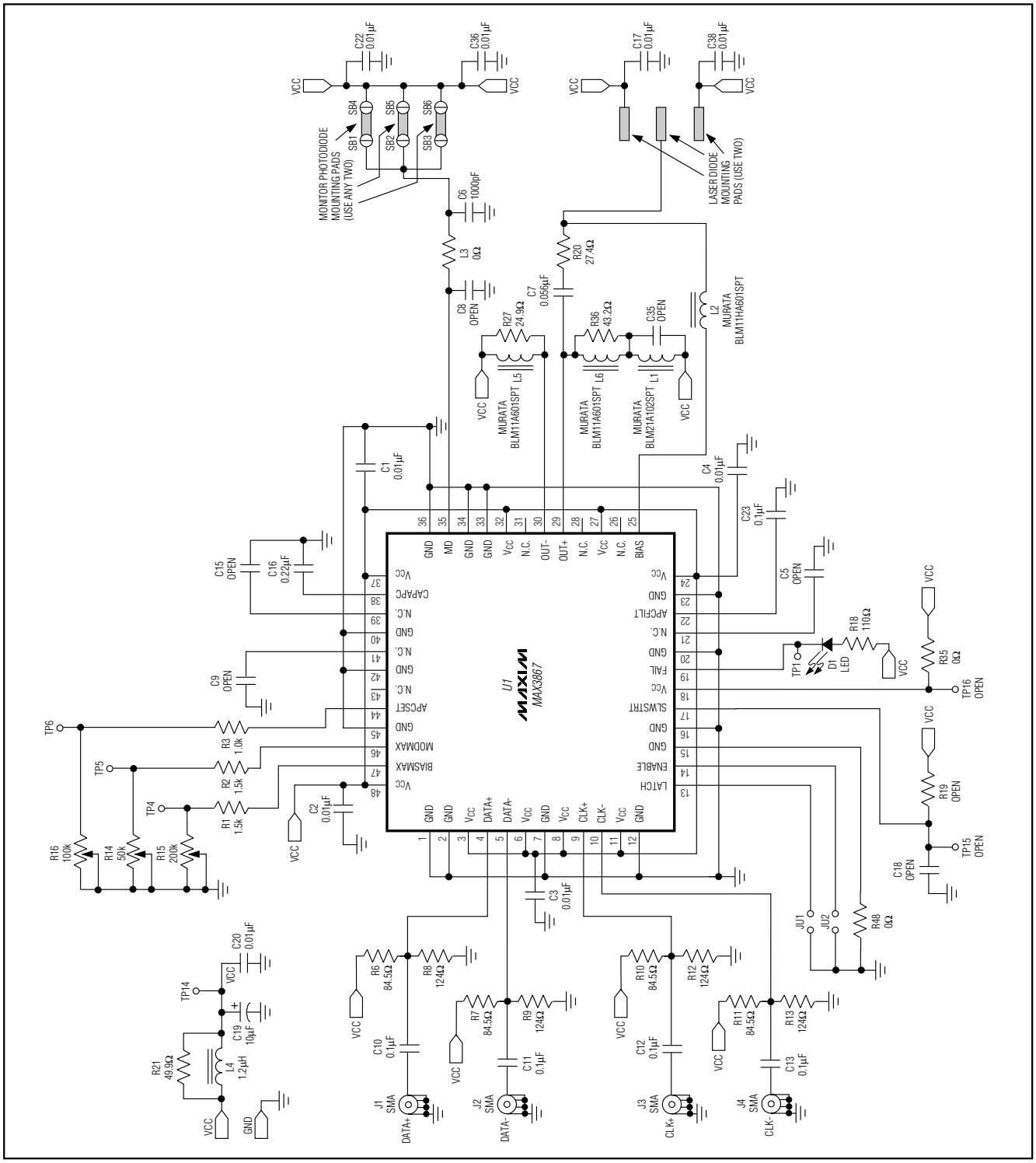

Figure 3. MAX3867 EV Kit Schematic—Optical Configuration

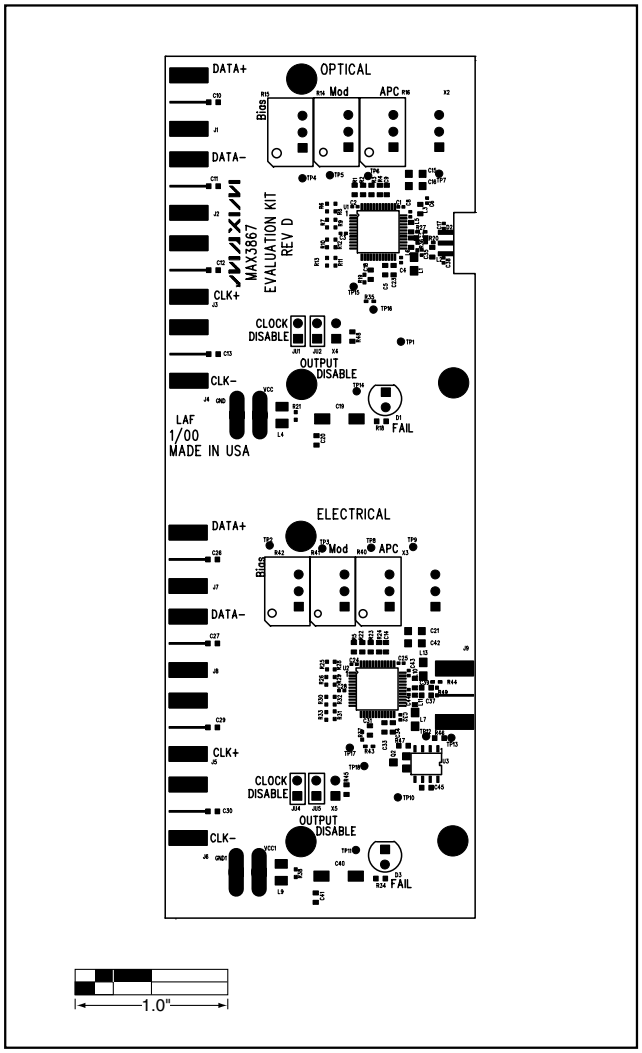

Figure 4. MAX3867 EV Kit Component Placement Guide—Component Side

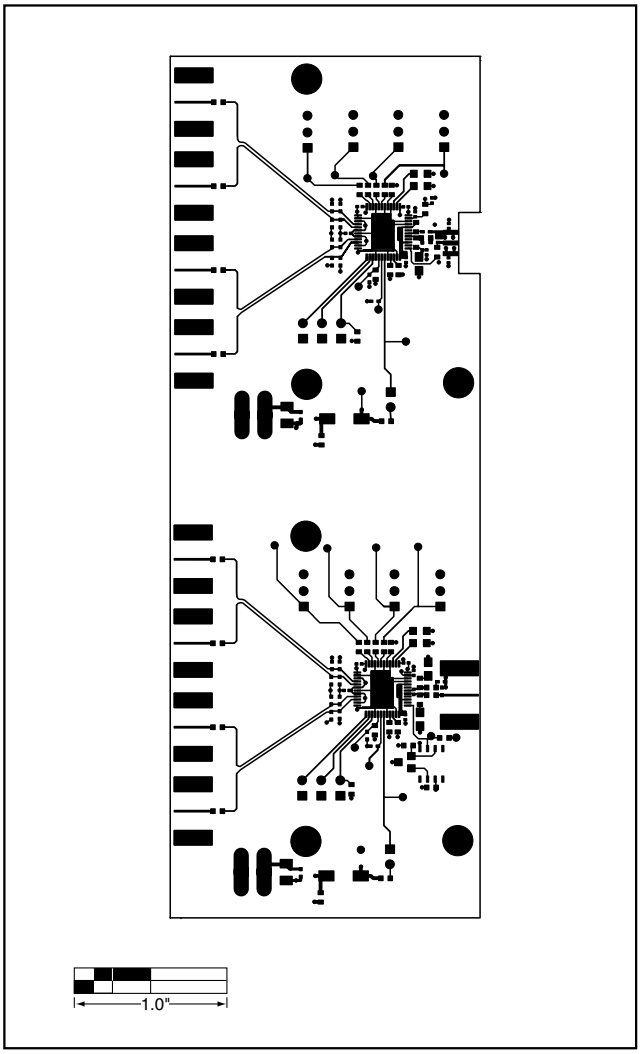

Figure 5. MAX3867 EV Kit PC Board Layout—Component Side

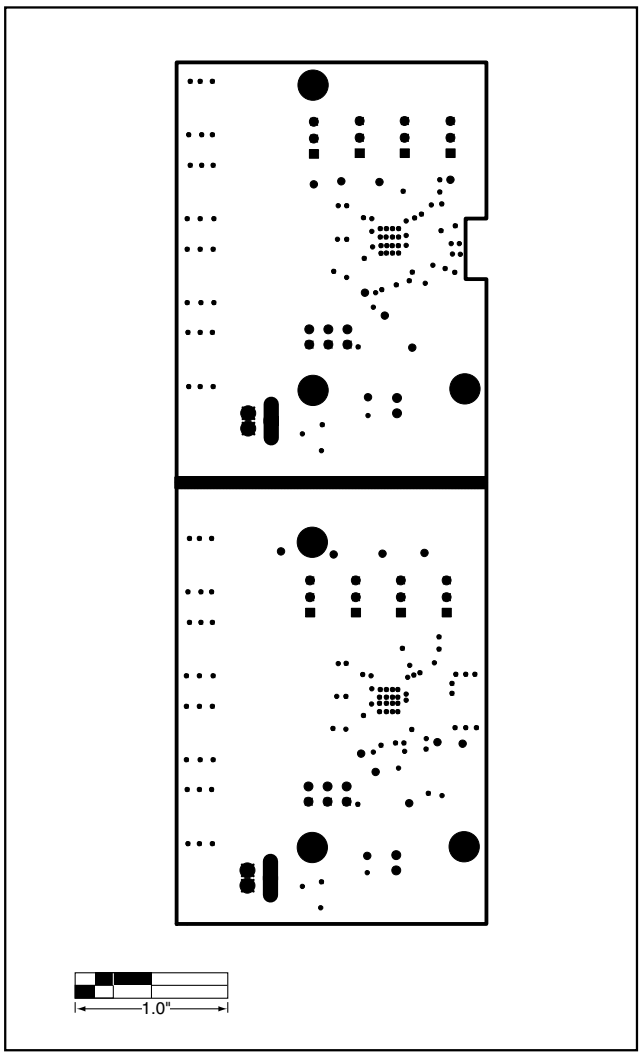

Figure 6. MAX3867 EV Kit PC Board Layout—Ground Plane

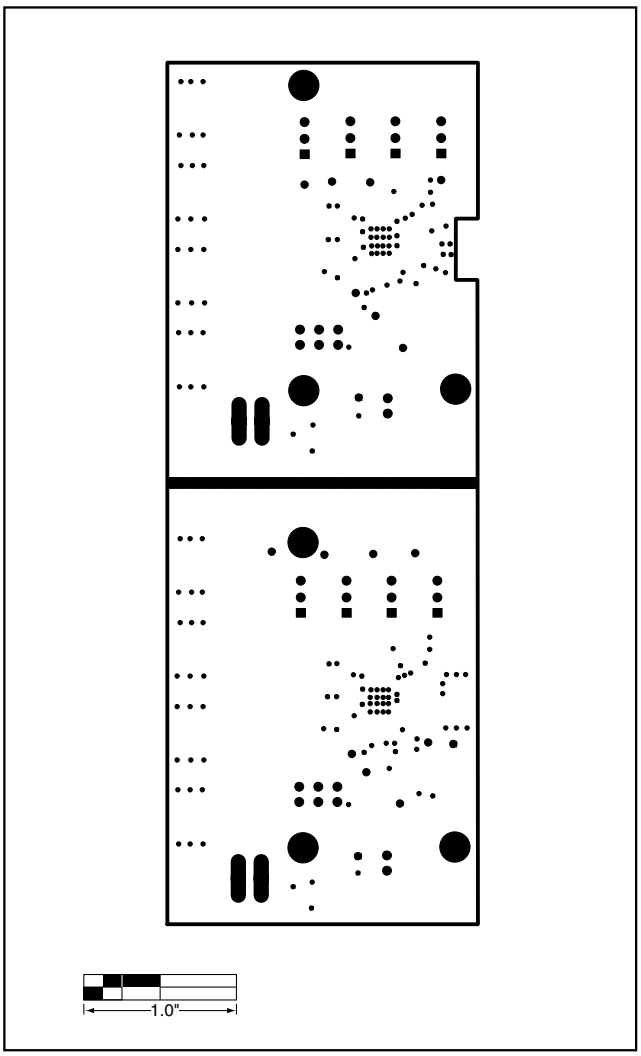

Figure 7. MAX3867 EV Kit PC Board Layout—Power Plane

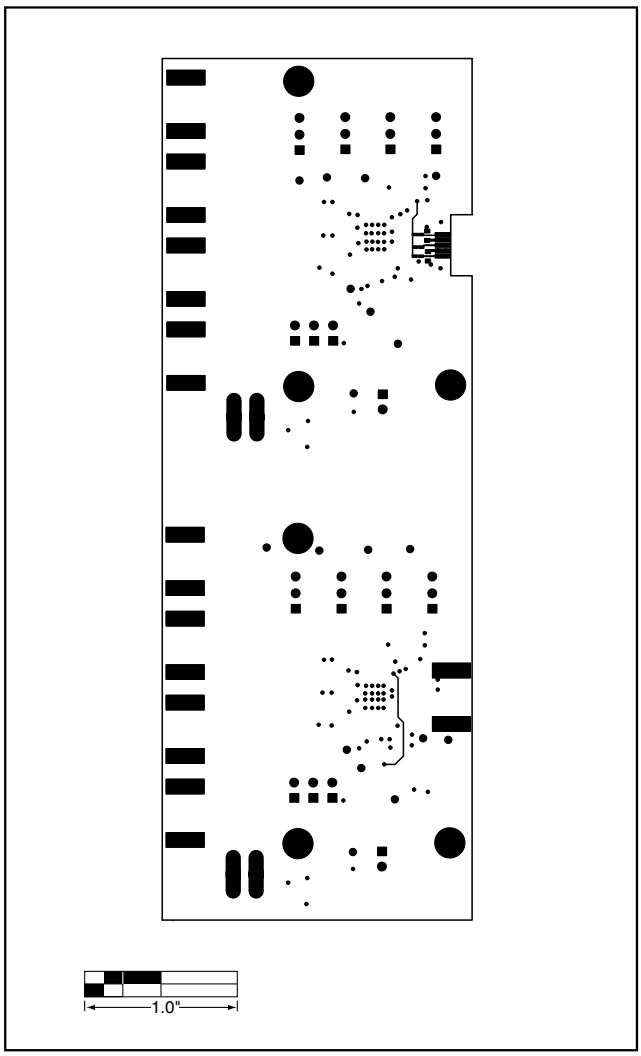

Figure 8. MAX3867 EV Kit PC Board Layout—Solder Side

NOTES

NOTES

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