19-2363; Rev 0; 4/02

MAX3850 Evaluation Kit

Evaluates: MAX3850

General Description

The MAX3850 evaluation kit (EV kit) is an assembled demonstration board that provides optical or electrical evaluation of the MAX3850.

The EV kit is composed of two independent electrically isolated 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 Operation**
- **Input Termination Provided On-Board**
- **Independent Electrical Monitoring of Modulation and Bias Currents**
- **Supports Optical and Electrical Evaluation**

Component Suppliers

SUPPLIER	PHONE	FAX
AVX	843-444-2863	803-626-3123
Coilcraft	847-639-6400	847-639-1469
Murata	814-237-1431	814-238-0490
Zetex	516-543-7100	516-864-7630

Note: *Please indicate that you are using the MAX3850 when ordering from these suppliers.*

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX3850EVKIT	-40°C to +85°C	32 QFN

Electrical Component List

DESIGNATION	QTY	DESCRIPTION
C7	1	0.5pF ±0.1pF, 10V min, ceramic capacitor (0402)
C8	1	1.0pF ±0.1pF, 10V min, ceramic capacitor (0402)
C24, C25, C28, C32	4	0.01µF ±10%, 10V min, ceramic capacitors (0402)
C26, C27, C29, C30, C33	5	0.1µF ±10%, 10V min, ceramic capacitors (0402)
C40	1	10µF ±20%, 10V min, tantalum capacitor (case B)
C41, C45	2	0.01µF ±10%, 10V min, ceramic capacitors (0603)
C42	1	0.1µF ±10%, 10V min, ceramic capacitor (0603)
C43	1	1000pF ±10%, 10V min, ceramic capacitor (0402)
D3	1	LED red T1 pkg Digi-Key P363-ND
J5–J9	5	SMA connectors, edge mount
JU4, JU5	2	1 × 2-pin headers, 0.1in centers
JU4, JU5	2	Shunts Digi-Key
L9	1	220nH inductor Coilcraft 1008HS-221TKBC
Q2	1	FMMT591A SOT-23 Zetex “91A” marking

DESIGNATION	QTY	DESCRIPTION
R4, R17, R44	3	30.1Ω ±1% resistors (0402)
R5, R22	2	1.5kΩ ±1% resistors (0402)
R6	1	DO NOT INSTALL (0603)
R23	1	1kΩ ±1% resistor (0402)
R28, R32	2	100Ω ±1% resistors (0402)
R34	1	110Ω ±1% resistor (0603)
R37, R43	2	392Ω ±1% resistors (0402)
R38	1	49.9Ω ±1% resistor (0402)
R40	1	100kΩ variable resistor Bourns 3296W-104-ND Digi-Key
R41	1	50kΩ variable resistor Bourns 3296W-104-ND Digi-Key
R42	1	200kΩ variable resistor Bourns 3296W-104-ND Digi-Key
R46	1	15Ω ±1% resistor (0603)
R47	1	1.5kΩ ±1% resistor (0603)
R49	1	75Ω ±1% resistor (0402)
TP2, TP3, TP8, TP10–TP13, TP17, TP18, TP21, TP22	11	Test points
U2	1	MAX3850EGJ 32 QFN
U3	1	MAX495ESA 8-pin SO

Optical Component List

DESIGNATION	QTY	DESCRIPTION
C1–C4, C17, C38	6	0.01µF ±10%, 10V min, ceramic capacitors (0402)
C5, C10–C13	5	0.1µF ±10%, 10V min, ceramic capacitors (0402)
C6	1	1000pF ±10%, 10V min, ceramic capacitor (0402)
C16	1	0.1µF ±10%, 10V min, ceramic capacitor (0603)
C19	1	10µF ±20%, 10V min, tantalum capacitor (Case B)
C20, C22, C36	3	0.01µF ±10%, 10V min, ceramic capacitors (0603)
C35	1	8.2pF ±10%, 10V min, ceramic capacitor (0402)
D1	1	LED red T1 pkg Digi-Key 363-ND
J1–J4	4	SMA connectors, edge mount
JU1, JU2	2	1 × 2-pin headers, 0.1in centers
JU1, JU2	2	Shunts Digi-Key
L2	1	Ferrrite bead Murata BLM18HG601SN1
L4	1	220nH inductor Coilcraft 1008HS-221TKBC

DESIGNATION	QTY	DESCRIPTION
R1, R2	2	1.5kΩ ±1% resistors (0402)
R3	1	1kΩ ±1% resistor (0402)
R8, R12	2	100Ω ±1% resistors (0402)
R14	1	50kΩ variable resistor Bourns 3296W-503-ND Digi-Key
R15	1	200kΩ variable resistor Bourns 3296W-503-ND Digi-Key
R16	1	100kΩ variable resistor Bourns 3296W-503-ND Digi-Key
R18	1	110Ω ±1% resistor (0603)
R19, R35	2	392Ω ±1% resistors (0402)
R20	1	11Ω ±1% resistor (0402)
R21, R36	2	49.9Ω ±1% resistors (0402)
R27	1	16.2Ω ±1% resistor (0402)
TP1, TP4, TP5, TP6, TP14, TP15, TP16, TP19, TP20	9	Test points
U1	1	MAX3850EGJ 32-pin QFN
U4	1	User-supplied laser diode
None	1	MAX3850 data sheet
None	1	MAX3850 EV kit circuit board, rev B
None	1	MAX3850 EV kit data sheet

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 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 monitor diode current (the laser bias current divided by a factor of 100) to the MD pin of the MAX3850. To ensure proper operation of 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 output.

   Note: When performing the following resistance checks, manually set the ohmmeter to a high resistance range to avoid forward biasing the on-chip ESD-protection diodes.
3) Adjust R41, the MODSET potentiometer, for 10kΩ resistance between test point 3 and ground.
4) Adjust R42, the BIASMAX potentiometer, for 10kΩ resistance between test point 2 and ground.
5) Adjust R40, the APCSET potentiometer, for 10kΩ resistance between 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 R40 until the desired laser bias current is achieved.

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

Note: The APC function can only subtract from the maximum programmed bias current (set by the BIASMAX resistor, R42). If an APC failure flags before the desired bias current is achieved, increase the maximum bias current by tuning R42 counterclockwise.

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

$$I_{MOD} = \frac{\text{Signal amplitude (V)}}{15\Omega}$$

Note: Because DC voltage at the output is approximately $V_{CC}/2$, an SMA attenuator might be required.

Optical Evaluation

For optical evaluation of the MAX3850, configure the evaluation board 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 output.
3) The EV kit is designed to allow connection of various laser/monitor diode pin configurations. Connect a TO-header style laser with monitor diode (Figure 1) as follows:

- Keeping its leads as short as possible, connect the laser diode to two of the three pads in the cut-out 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, which 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) initially are 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.

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 transition. Remove shunt to enable the clock input.
JU2	JU5	Output Disable	Enables/disables the output currents. Shunting disables the output currents. Remove shunt for normal operation.
None	J9	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, R42 or R15 adjusts the laser bias current. In closed-loop operation, R40 or R16 adjusts the maximum laser bias current.
R16	R40	APC	For closed-loop operation, R40 or R16 adjusts the monitor diode current level.
TP1	TP10	Fail Indicator	TTL low level indicates a failure in the APC loop.
D1	D3	Fail Indicator	Refer to the *Design Procedure* section of the MAX3850 data sheet. Set APC current, then increase bias current until the LED goes off (the LED is illuminated when the APC loop is open, and off when the APC loop is closed).

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

4) Adjust R14, the MODSET potentiometer, for maximum resistance between test point 5 and ground.
5) Adjust R15, the BIASMAX potentiometer, for maximum resistance between test point 4 and ground.
6) Adjust R16, the APCSET potentiometer, for desired optical power. (Refer to the *Design Procedure* section of the MAX3850 data sheet. Note that R3 adds 1kΩ to the total resistance.)
7) Apply a differential input signal (max amplitude ≤ 800mV per side) to J1 and J2 (DATA+ and DATA-).
8) Apply a differential clock signal (max amplitude ≤ 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) no longer is 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.

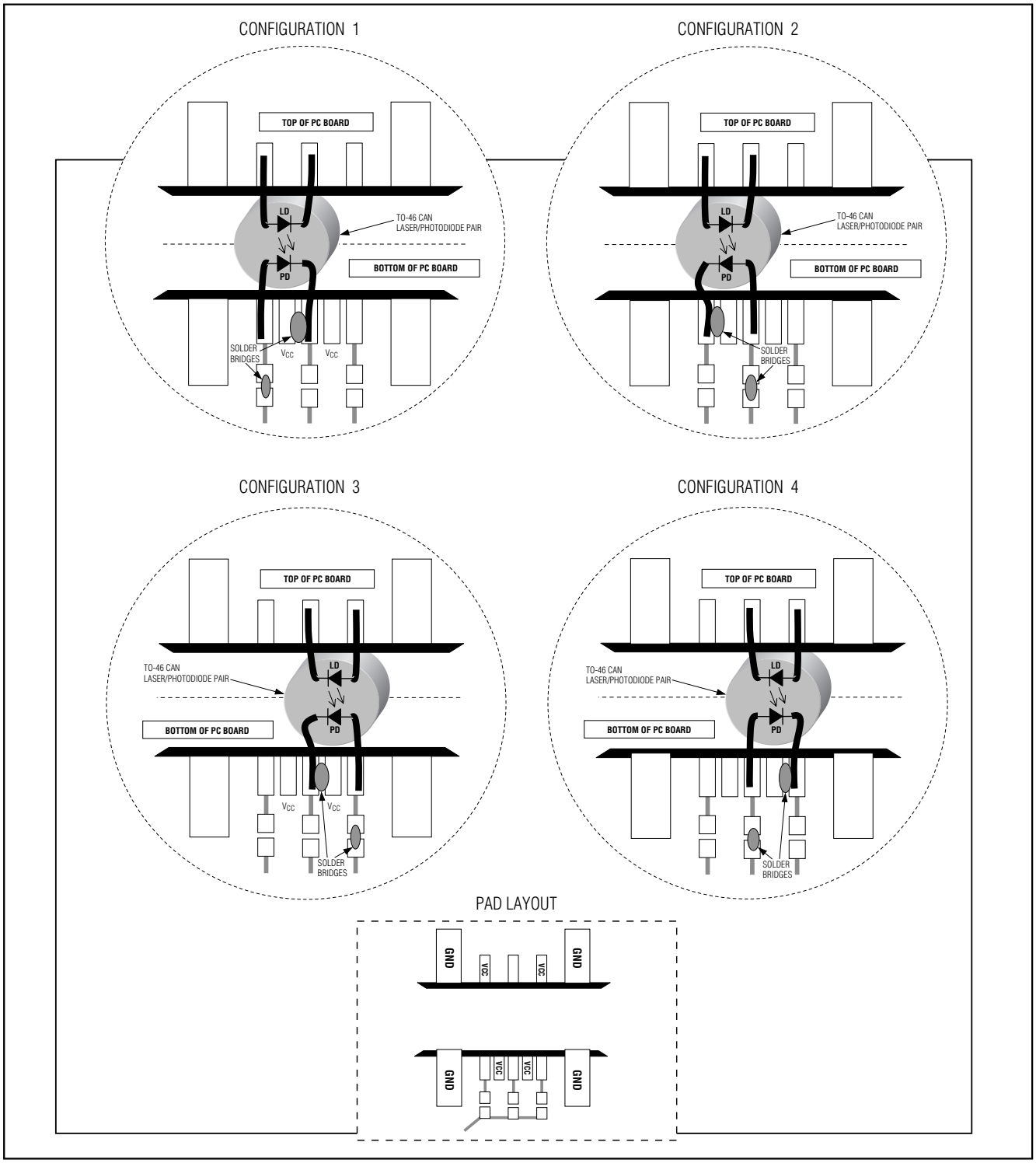

Figure 1. Attachment of Laser/Monitor Diode to the MAX3850 EV Kit

MAX3850 Evaluation Kit

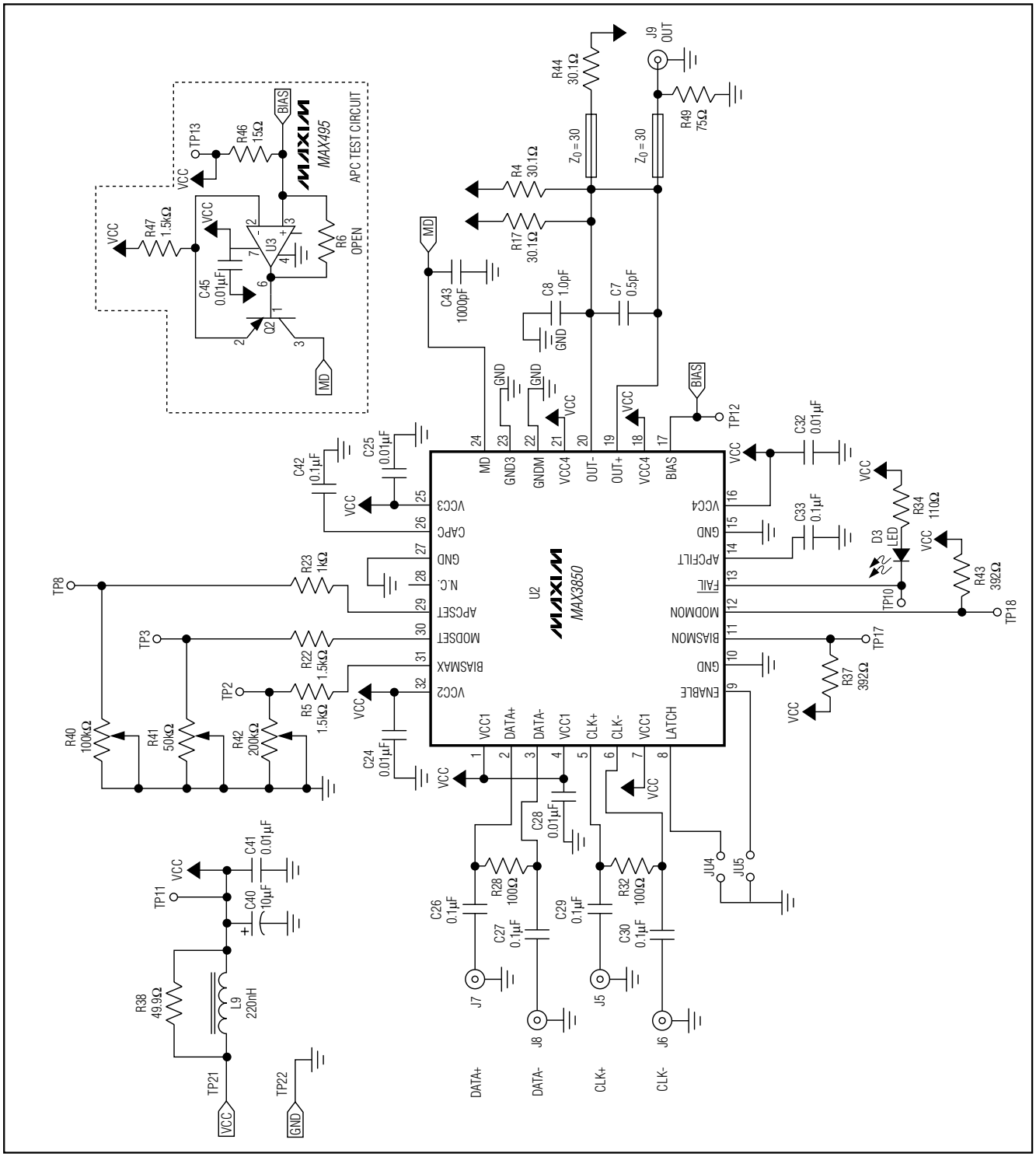

Figure 2. MAX3850 EV Kit Electrical Configuration Schematic

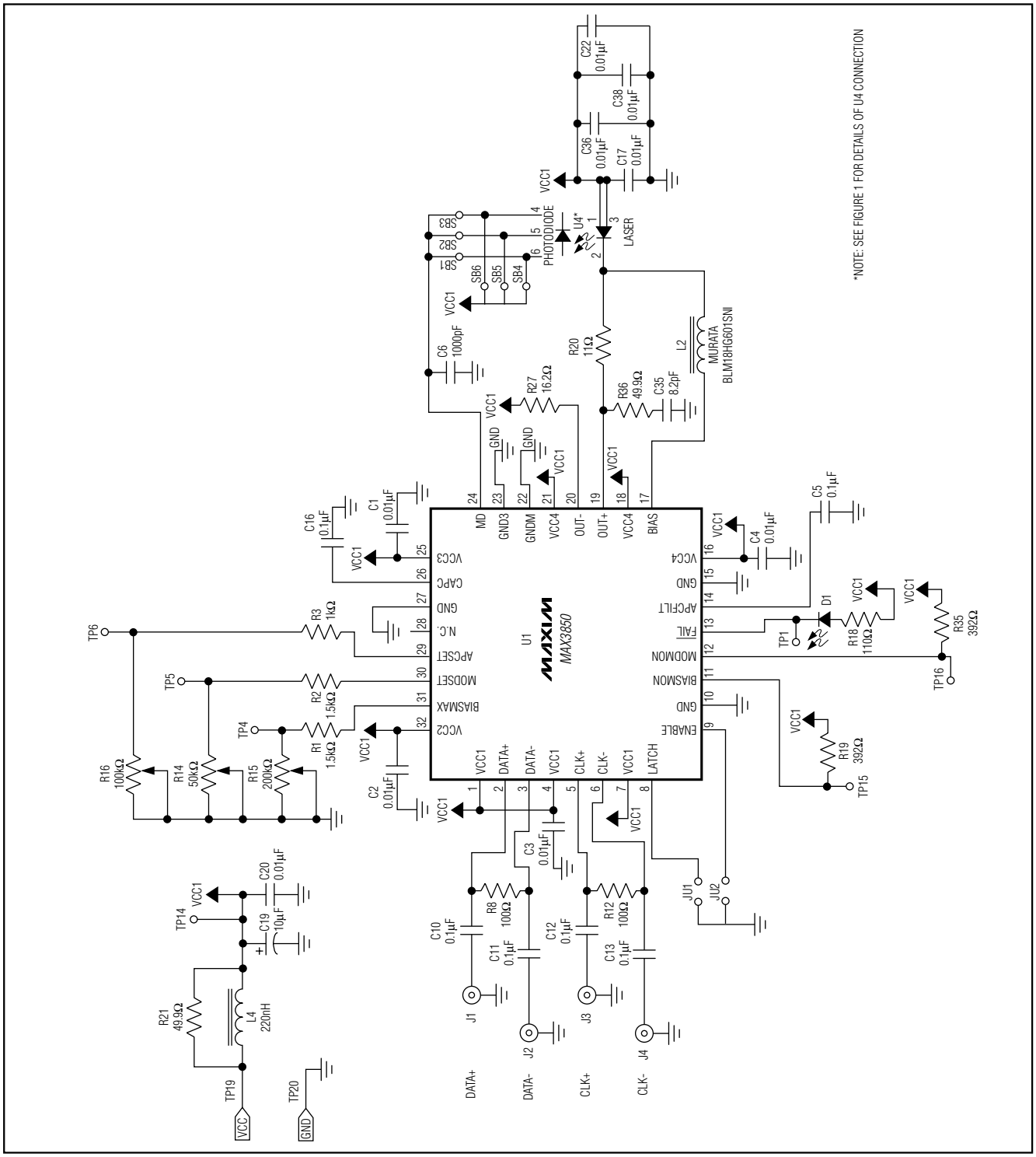

Figure 3. MAX3850 EV Kit Optical Configuration Schematic

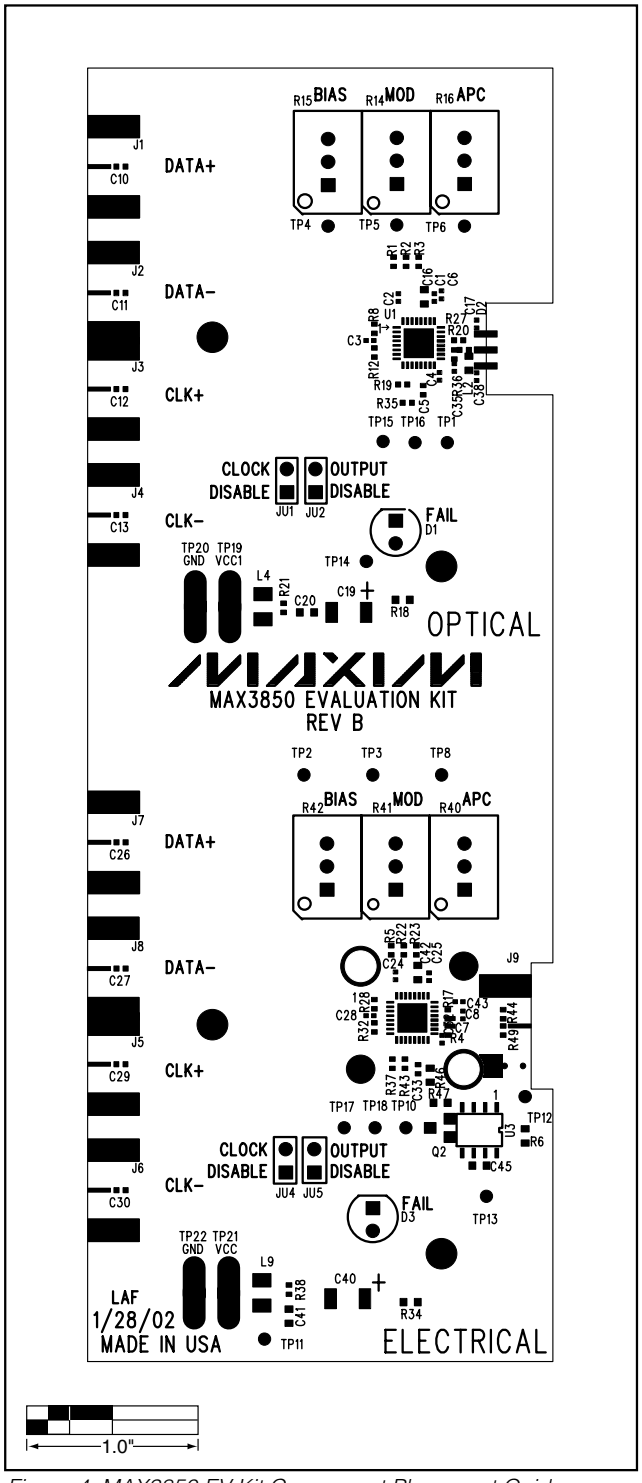

Figure 4. MAX3850 EV Kit Component Placement Guide—Component Side

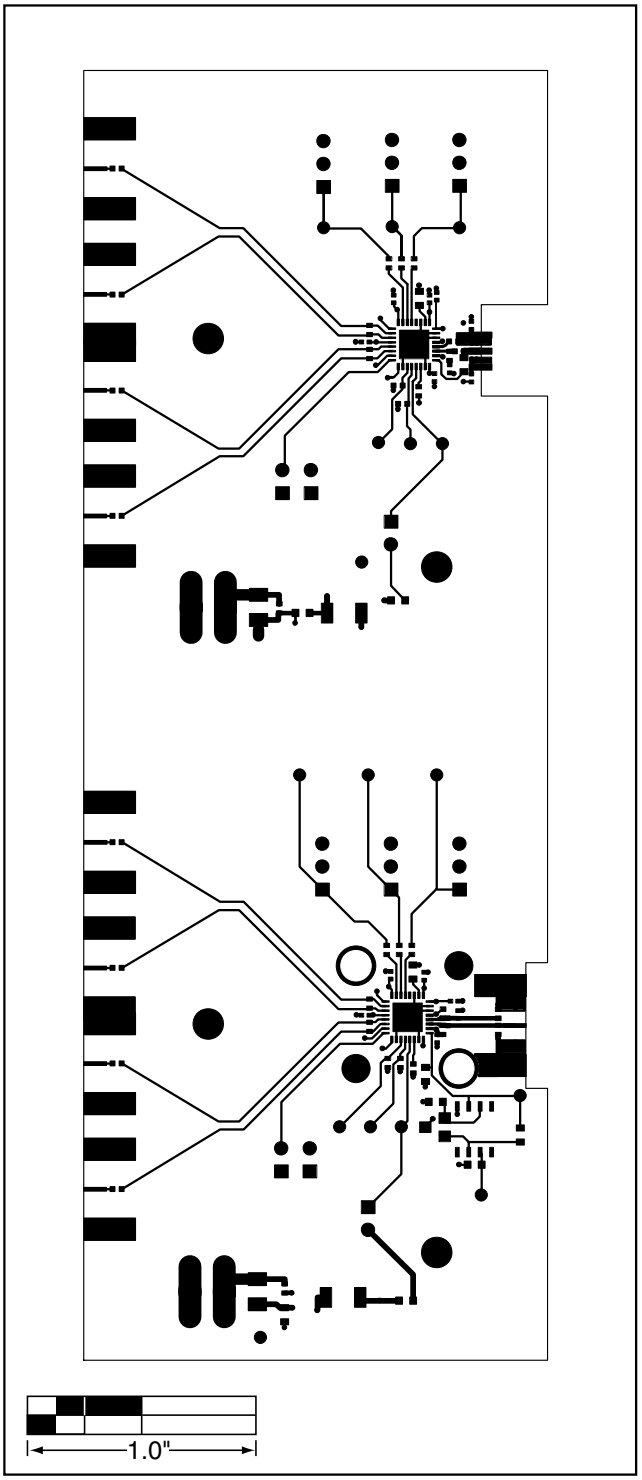

Figure 5. MAX3850 EV Kit PC Board Layout—Component Side

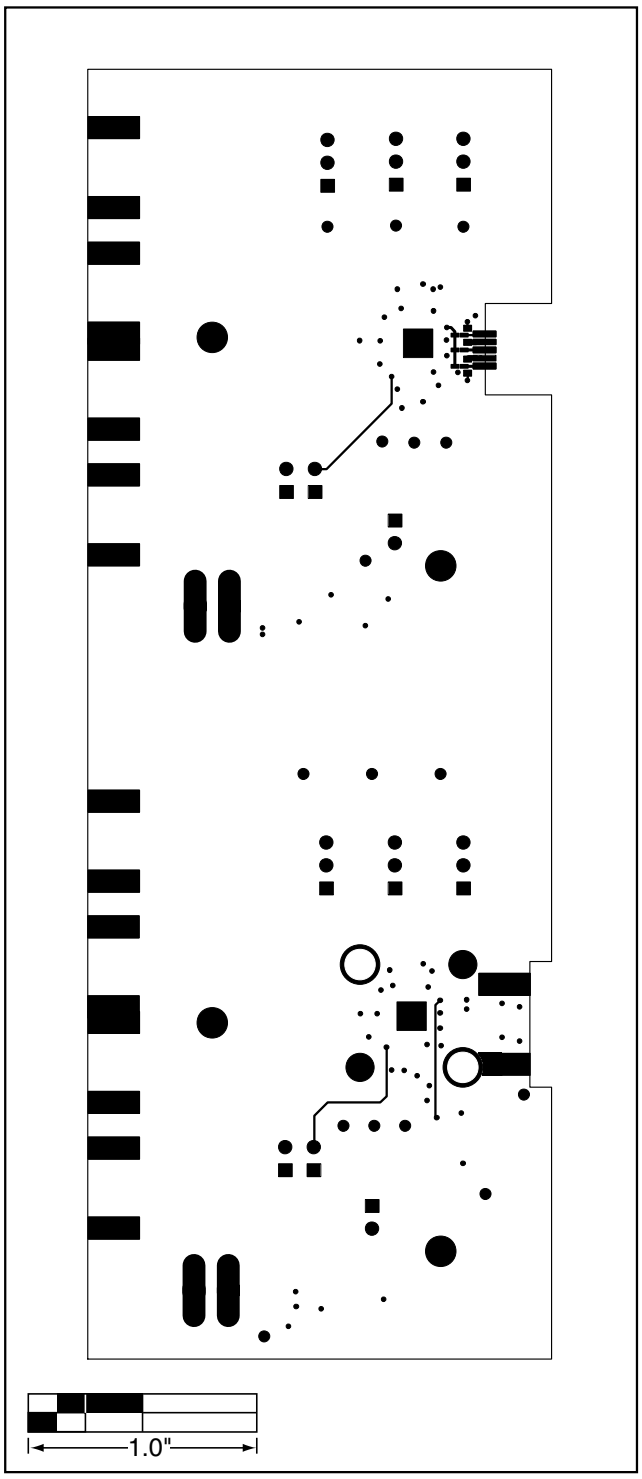

Figure 6. MAX3850 EV Kit PC Board Layout—Solder Side

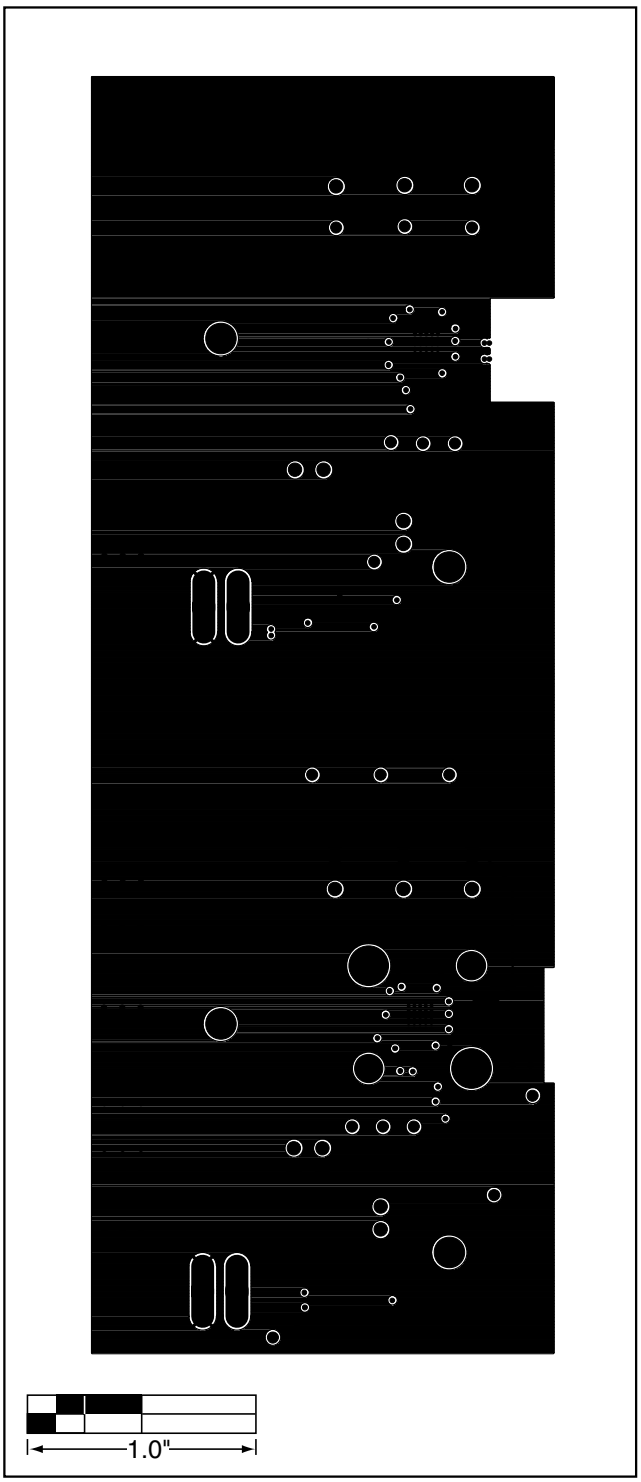

Figure 7. MAX3850 EV Kit PC Board Layout—Ground Plane

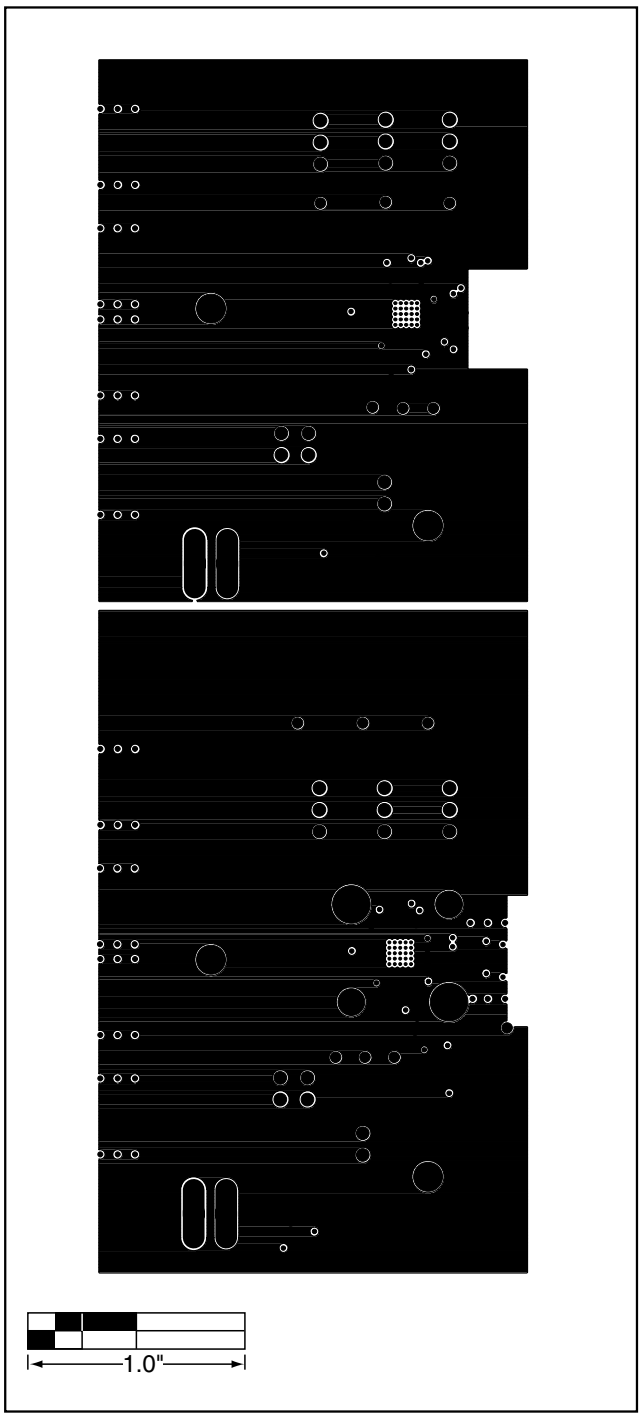

Figure 8. MAX3850 EV Kit PC Board Layout—Power Plane

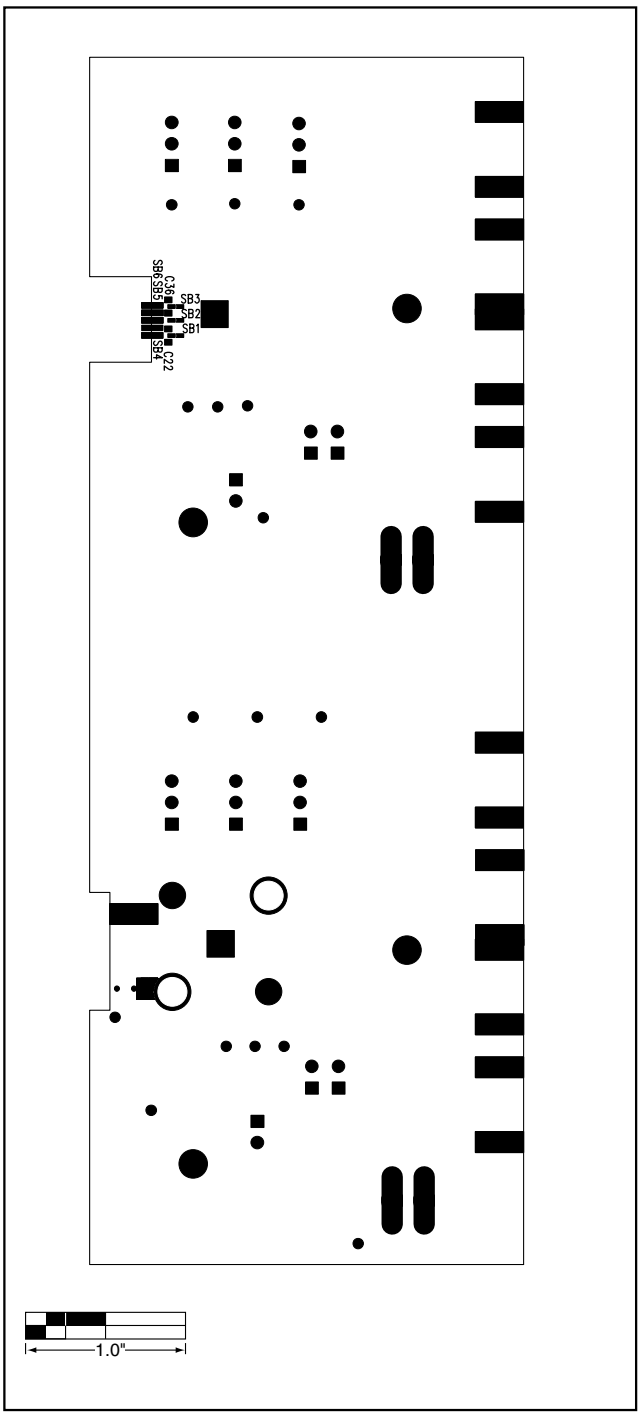

Figure 9. MAX3850 EV Kit Component Placement Guide—Solder Side