19-2159; Rev 0; 9/01

MAXIM

MAX3273 Evaluation Kit

Evaluates: MAX3273

General Description

The MAX3273 evaluation kit (EV kit) is an assembled demonstration board that provides optical and electrical evaluation of the MAX3273.

The EV kit is composed of two independent sections, one optical and one electrical, on the PC board. The output of the electrical evaluation section is interfaced to an SMA connector that 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**
- **Single 3.3V Power-Supply Operation**
- **Input Termination Provided On-Board**
- **Enables Optical and Electrical Evaluation**

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX3273EVKIT	-40°C to +85°C	24 QFN*

**Exposed pad*

Electrical Evaluation Component List

DESIGNATION	QTY	DESCRIPTION
C13, C40	2	10µF ±20% tantalum capacitors AVX TAJC106K016
C14, C18, C21, C23, C24	5	0.1µF ±10% ceramic capacitors (0402)
C15, C16, C31, C32, C37, C45	6	0.01µF ±10% ceramic capacitors (0402)
C27, C28	2	0.056µF ±10% ceramic capacitors (0603)
C30	1	470pF ±10% ceramic capacitor (0402)
C41	1	0.01µF ±10% ceramic capacitor (0603)
D3	1	LED, red T1 package
D4	1	Diode DIO-S1A
J5–J9	5	SMA connectors (tab contact) EFJohnson 142-0701-851
JU4, JU5, JU9–JU13, JU18–JU20	10	1 × 2-pin headers (0.1in centers)
JU7, JU8	2	1 × 3-pin headers (0.1in centers)

DESIGNATION	QTY	DESCRIPTION
L6	1	33µH power inductor Coilcraft DO1608C-333
L7, L12	2	Ferrite beads (0805) Murata BLM21A102S
L9	1	1.2µH inductor Coilcraft 1008CS-122XKBC
L10, L11	2	Ferrite beads (0603) Murata BLM11HA601SG
R4	1	1kΩ ±1% resistor (0603)
R5	1	681Ω ±1% resistor (0603)
R12	1	500kΩ variable resistor
R13, R37	2	100kΩ variable resistors
R17	1	110Ω ±1% resistor (0603)
R22, R38	2	49.9Ω ±1% resistors (0402)
R23, R25	2	Open
R26	1	2kΩ ±1% resistor (0402)
R28, R30	2	100Ω ±5% resistors (0201)
R29	1	0Ω resistor (0402)
R46	1	5.11Ω ±1% resistor (0603)
R47	1	392Ω ±1% resistor (0603)

For pricing, delivery, and ordering information, please contact Maxim/Dallas Direct! at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

Electrical Evaluation Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R51	1	24.9Ω ±1% resistor (0402)
Q2	1	PNP transistor (SOT23) Zetex FMMT591A
U3	1	MAX495ESA (8 SO)
U4	1	MAX3273EGG (24 QFN)
VCC1, GND1, TP2, TP3, TP8, TP10–TP13, TP22	10	Test points

DESIGNATION	QTY	DESCRIPTION
None	10	Shunts
None	1	MAX3273 evaluation kit
None	1	MAX3273 data sheet

Optical Evaluation Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C9, C10, C11, C17, C38	7	0.01µF ±10% ceramic capacitors (0402)
C3–C6	4	0.1µF ±10% ceramic capacitors (0402)
C7	1	0.056µF ±10% ceramic capacitor (0402)
C8	1	470pF ±10% ceramic capacitor (0402)
C12	1	Open, user-supplied (0402)*
C19	1	10µF ±20% tantalum capacitor AVX TAJB106K016
C20, C22	2	0.01µF ±10% ceramic capacitors (0603)
C36	1	100pF ±5% ceramic capacitor (0603)
D1	1	LED, red T1 package
D2	1	Open, user-supplied laser diode
J1–J4	4	SMA connectors (tab contact) EFJohnson 142-0701-801
JU2, JU3	2	1 × 3-pin headers (0.1in centers)

DESIGNATION	QTY	DESCRIPTION
JU6, JU14–JU17	5	1 × 2-pin headers (0.1in centers)
L1	1	33µH power inductor Coilcraft DO1608C-333
L2, L3, L5	3	Ferrite beads (0603) Murata BLM11HA601SG
L4	1	1.2µH inductor Coilcraft 1008CS-122XKBC
R1	1	1kΩ ±1% resistor (0603)
R2	1	500kΩ variable resistor
R3	1	75Ω ±1% resistor (0402)
R6	1	24.9Ω ±1% resistor (0402)
R7	1	2kΩ ±1% resistor (0402)
R8	1	0Ω resistor (0402)
R9, R14	2	100kΩ variable resistors
R10, R11	2	100Ω ±5% resistors (0201)
R15	1	681Ω ±1% resistor (0603)
R16	1	110Ω ±1% resistor (0603)
R18	1	Open, user-supplied (0402)*
R20	1	20Ω ±1% resistor (0402)
R21	1	49.9Ω ±1% resistor (0402)

**These components are part of the compensation network, which can reduce overshoot and ringing. Parasitic series inductance introduces a zero into the laser's frequency response. R18 and C12 add a pole to cancel this zero. Starting values for most coaxial lasers is R18 = 75Ω in series with C12 = 3.3pF. These values should be experimentally adjusted until the output waveform is optimized.*

Optical Evaluation Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U1	1	MAX3273EGG (24 QFN)
VCC2, GND2, TP1, TP4–TP7, TP9, TP14	9	Test points
None	8	Shunts
None	1	MAX3273 evaluation kit
None	1	MAX3273 data sheet

Component Suppliers

SUPPLIER	PHONE	FAX
AVX	803-946-0690	803-626-3123
Coilcraft	847-639-6400	847-639-1469
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 current is provided by Q2, which is controlled by an operational amplifier (U3). The APC test circuit consists of U3 and Q2, and applies the emulated monitor diode current (the laser bias current divided by a factor of 77) to the MD pin of the MAX3273. To ensure proper operation in the electrical configuration, set up the evaluation board as follows:

1) Place shunts on JU5, JU9–JU12, JU18, and JU20.
2) If the EV kit is to be used in open loop (no APC), place a shunt on JU4. (Refer to the *Design Procedure* section of the MAX3273 data sheet.)
3) If data is to be latched, place the shunt across pin 1 (VCC, square pad) and pin 2 (LATCH) of JU7 to enable the input clock; otherwise leave open.
4) To enable the outputs, place a shunt across pin 2 ($\overline{EN}$) and pin 3 (GND) of JU8.

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.

5) Adjust R37, the R_{MODSET} potentiometer, for 10kΩ resistance between TP10 and ground.
6) Adjust R12, the $R_{BIASMAX}$ potentiometer, for 10kΩ resistance between TP2 and ground.
7) Adjust R13, the R_{APCSET} potentiometer, for 10kΩ resistance between TP3 and ground.
8) Apply a differential input signal (200mV$_{P-P}$ to 1600mV$_{P-P}$) between J7 and J8 (DATA+ and DATA-).
9) If the latch is enabled, apply a differential clock signal (200mV$_{P-P}$ to 1600mV$_{P-P}$) between J5 and J6 (CLK+ and CLK-).
10) Attach a high-speed oscilloscope with a 50Ω input to J9.
11) Power-up the board and adjust the power supply until the voltage between TP11 and ground is +3.3V (VCC).
12) Adjust R12 until the desired laser bias current is achieved.

$$I_{BIAS} = \frac{V_{TP13} - V_{TP22}}{5.11\Omega}$$

13) Adjust R37 until the desired laser modulation current is achieved.

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

Optical Evaluation

For optical evaluation of the MAX3273, configure the evaluation kit as follows:

1) Place shunts on JU15, JU16, and JU17.
2) If the EV kit is to be used in open loop (no APC), place a shunt on JU14. (Refer to the Design Procedure section of the MAX3273 data sheet.)
3) If data is to be latched, place the shunt across pin 1 (VCC, square pad) and pin 2 (latch) of JU2 to enable the input clock; otherwise leave open.
4) To enable the outputs, place a shunt across pin 2 (EN) and pin 3 (GND) of JU3.
5) 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 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 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 VCC).

Adjustment and Control Descriptions (see Quick Start first)

COMPONENT		NAME	FUNCTION
OPTICAL	ELECTRICAL		
JU2	JU7	LATCH	Enables/disables the latching function from the clock input. Active high (shunt across pin 1 and pin 2 of JU2 or JU7 to enable latch).
JU3	JU8	$\overline{EN}$	Enables/disables the output currents. Active low (shunt across pin 2 and pin 3 of JU3 or JU8 to enable output currents).
JU14	JU4	Open Loop	Shunt JU4 or JU14 to operate in open-loop mode.
R9	R37	R_{MODSET}	Adjusts the laser modulation current.
R2	R12	$R_{BIASMAX}$	Adjusts the laser bias current. In open-loop mode, R2 or R12 adjusts the operating laser bias current. In closed-loop operation, R2 or R12 adjusts the maximum laser bias current limit.
R14	R13	R_{APCSET}	For closed-loop operation, R13 or R14 adjusts the monitor diode current level.
TP9	TP8	Fail Indicator	TTL low level indicates a failure in the APC loop or open-loop operation.
D1	D3	Fail Indicator	Set APC current, and 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). Refer to the *Design Procedure* section of the MAX3273 data sheet.

- 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 VCC. 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 VCC by using solder to bridge to an adjacent VCC pad.

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.

6) Adjust R9, the RMODSET potentiometer, for 10kΩ resistance between TP4 and ground.
7) Adjust R2, the RBIASMAX potentiometer, for 10kΩ resistance between TP1 and ground.
8) Adjust R14, the RAPCSET potentiometer, for 10kΩ resistance between TP7 and ground. (Refer to the Design Procedure section of the MAX3273 data sheet.)
9) Apply a differential input signal (200mVp-p to 1600mVp-p) between J1 and J2 (DATA+ and DATA-)
10) If the latch is enabled, apply a differential clock signal (200mVp-p to 1600mVp-p) between J3 and J4 (CLK+ and CLK-).
11) Attach the laser diode fiber connector to an optical/electrical converter.
12) Power-up the board and adjust the power supply until the voltage between TP14 and ground is +3.3V (VCC).
13) Adjust R2 until the LED, D1, is no longer illuminated.
14) Adjust R9 until the desired optical amplitude is achieved. Optical amplitude can be observed on an oscilloscope connected to an optical/electrical converter.

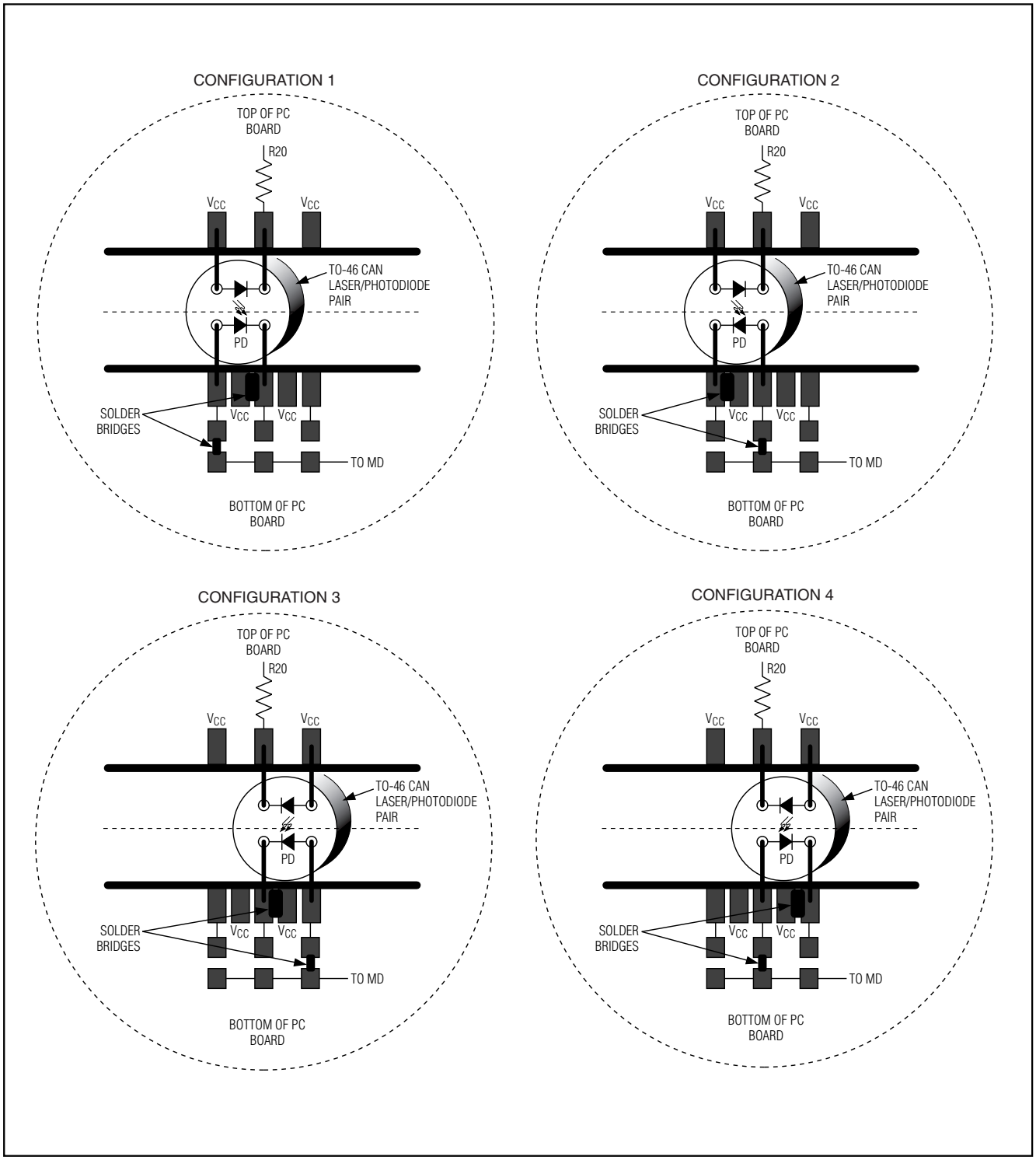


Figure 1. Attachment of Laser Diode/Monitor Diode to MAX3273 EV Kit

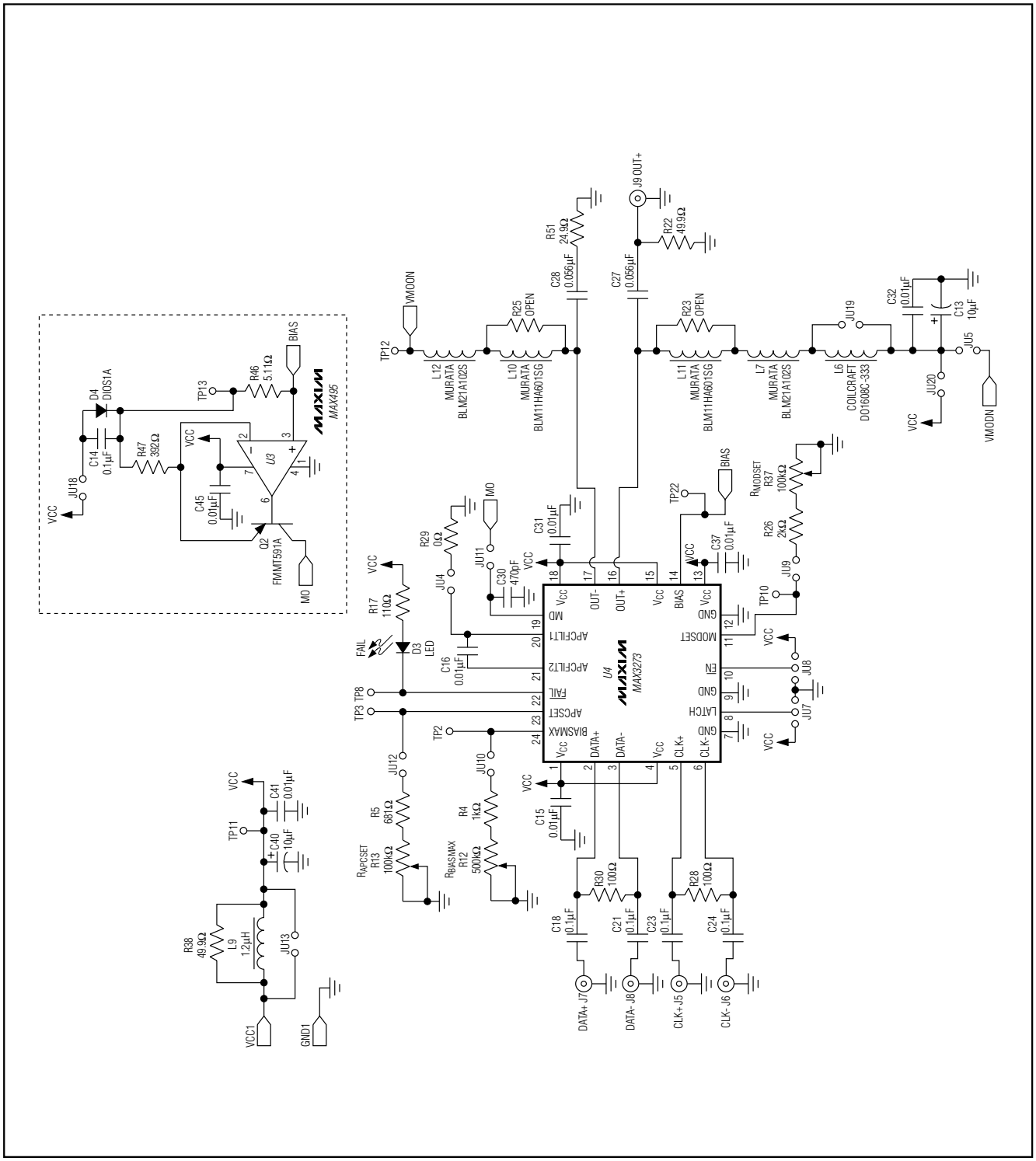


Figure 2. MAX3273 EV Kit Schematic—Electrical Configuration

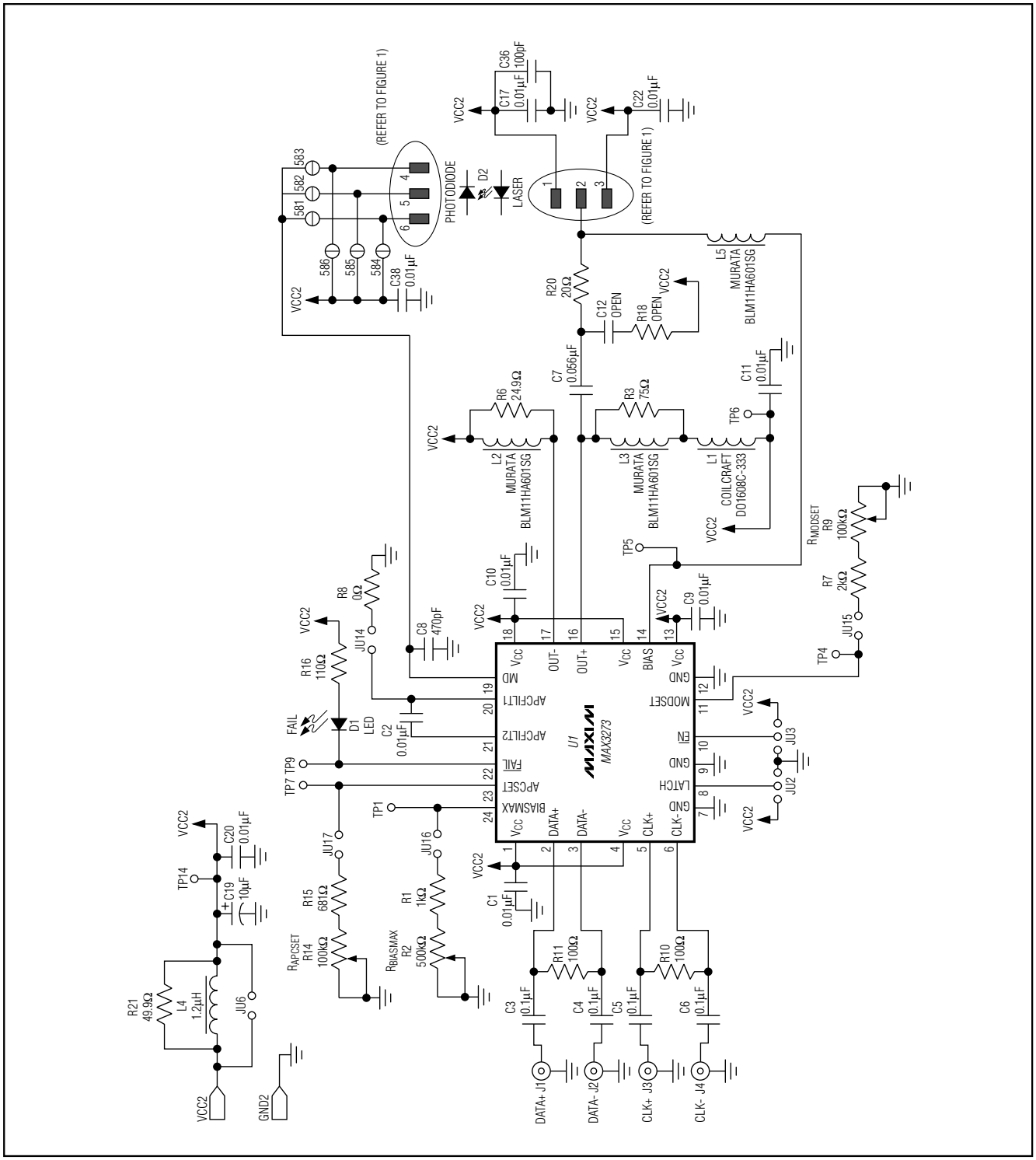


Figure 3. MAX3273 EV Kit Schematic—Optical Configuration

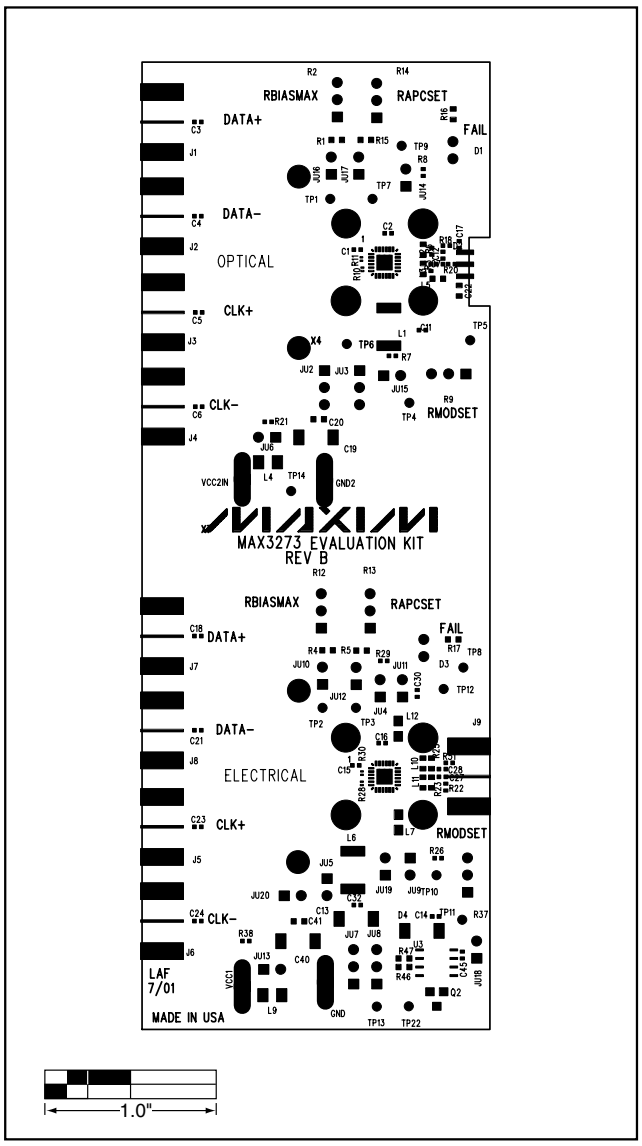


Figure 4. MAX3273 EV Kit Component Placement Guide—Component Side

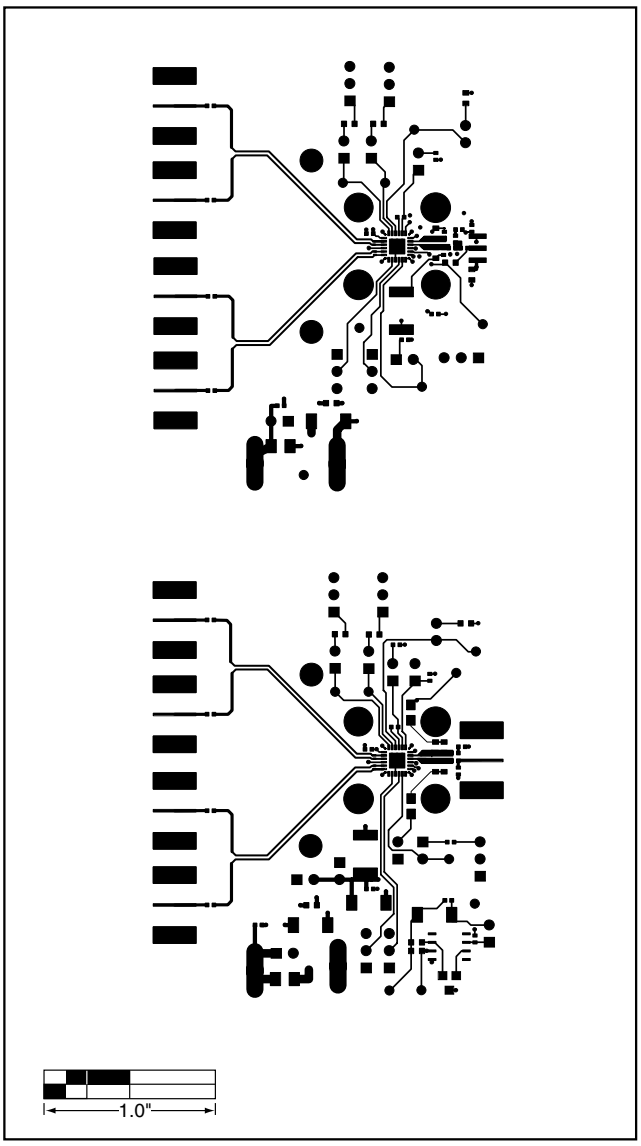


Figure 5. MAX3273 EV Kit PC Board Layout—Component Side

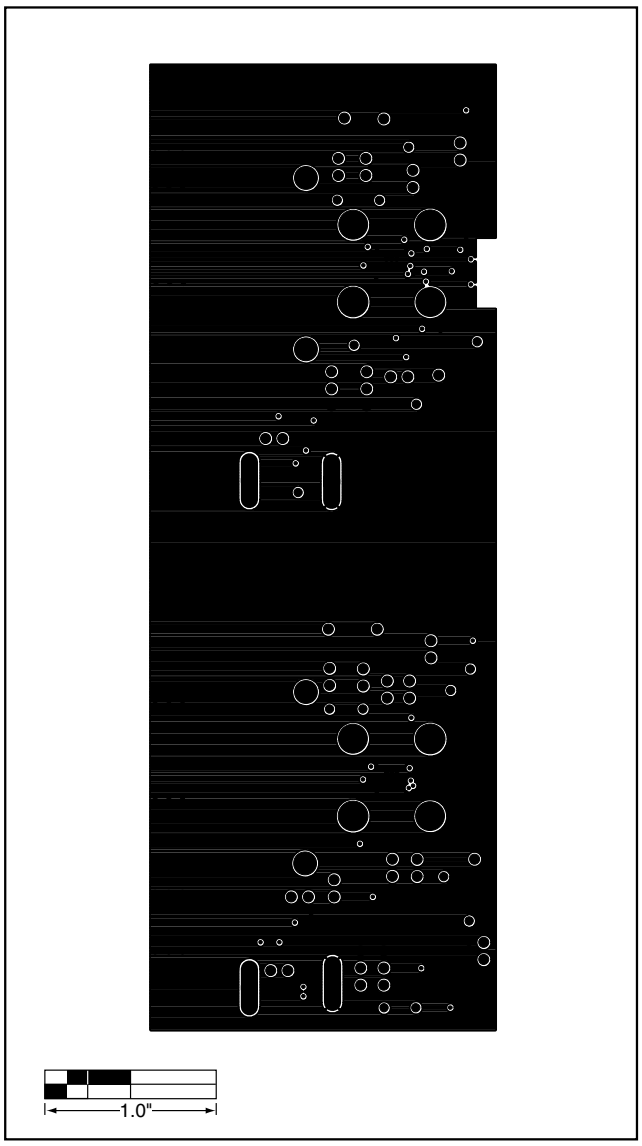


Figure 6. MAX3273 EV Kit PC Board Layout—Ground Plane

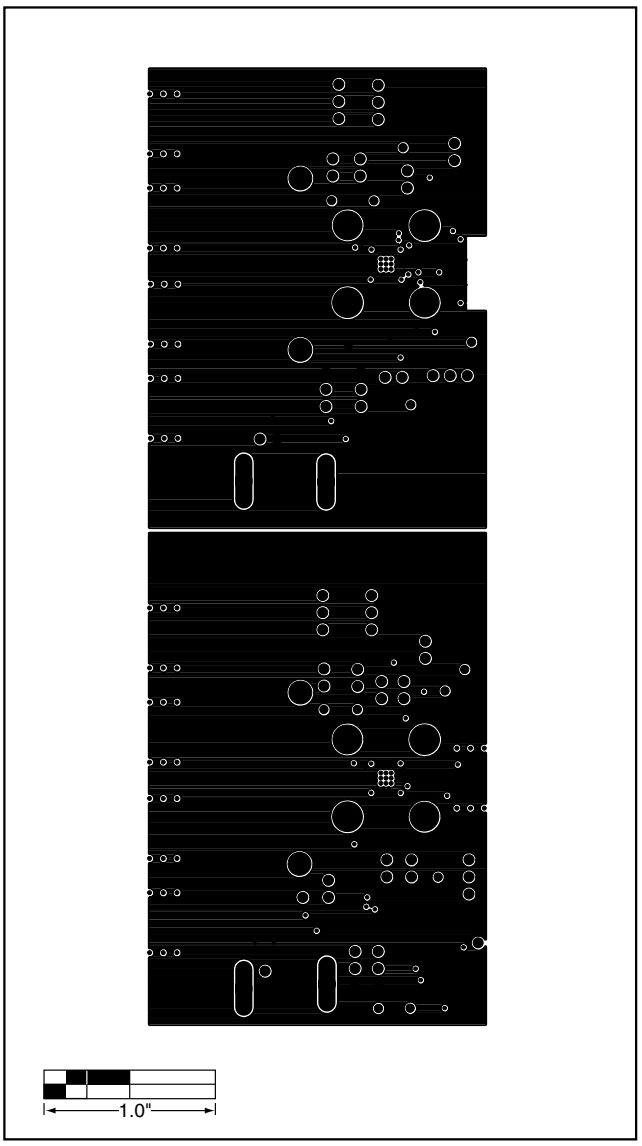


Figure 7. MAX3273 EV Kit PC Board Layout—Power Plane

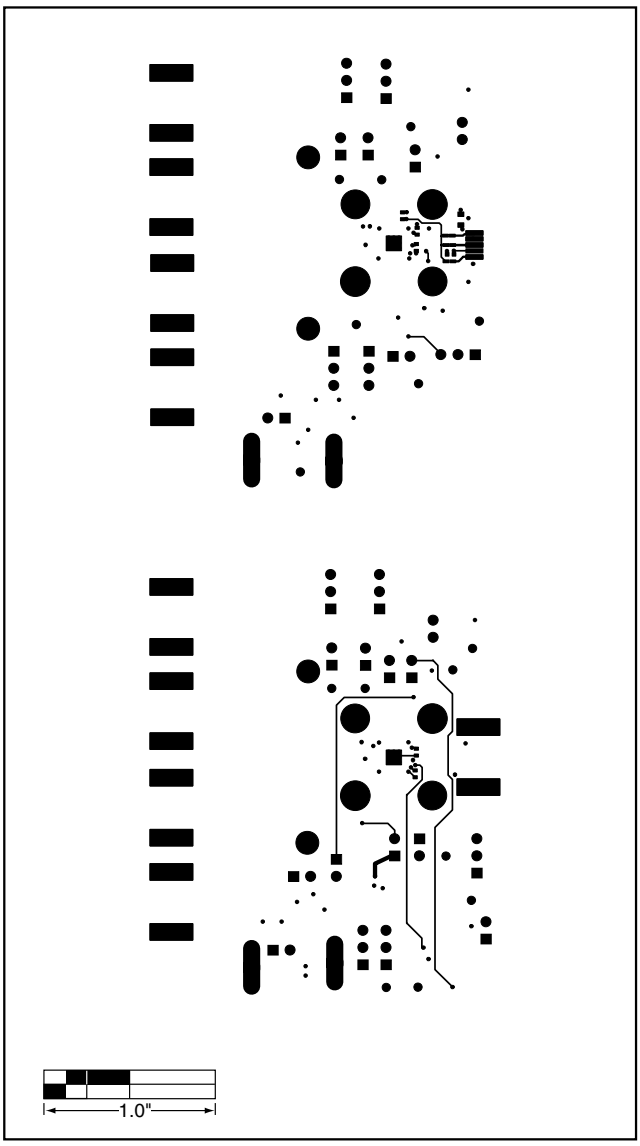


Figure 8. MAX3273 EV Kit PC Board Layout—Solder Side

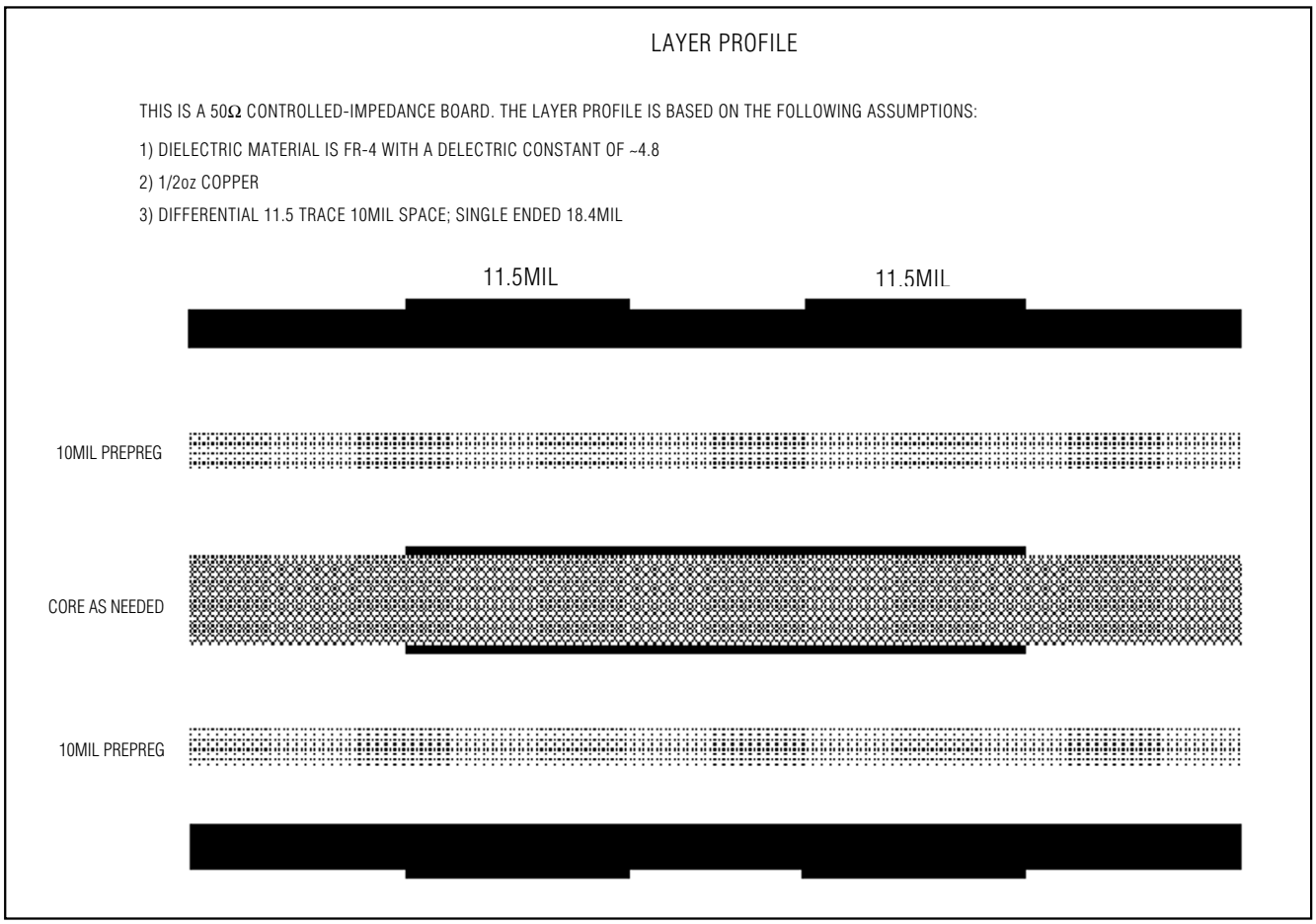


Figure 9. MAX3273 EV Kit PC Board Layer Profile

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

© 2001 Maxim Integrated Products Printed USA MAXIM is a registered trademark of Maxim Integrated Products.