

# MAXIM

## MAX3668 Evaluation Kit

### General Description

The MAX3668 evaluation kit (EV kit) is an assembled, surface-mount demonstration board that provides easy optical or electrical evaluation of the MAX3668. Although the MAX3668 evaluation kit is shipped in the electrical configuration, this data sheet also provides configuration instructions for optical operation.

### 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 |

**Note:** Please indicate that you are using the MAX3668 when contacting these component suppliers.

### Component List for Electrical Configuration

| DESIGNATION      | QTY | DESCRIPTION  |
|------------------|-----|--|
| C1, C17          | 2   | 0.01 $\mu$ F, 10% ceramic capacitors (0402)                    |
| C2, C6, C20      | 3   | 0.01 $\mu$ F, 10% ceramic capacitors (0603)                    |
| C3               | 1   | 0.1 $\mu$ F, 10%, 25V min ceramic capacitor (0603)             |
| C4, C7, C10, C11 | 4   | 1 $\mu$ F ceramic capacitors (0805)                            |
| C8               | 1   | 100pF, 10% ceramic capacitor (0402)                            |
| C16              | 1   | 0.1 $\mu$ F, 10%, 25V min ceramic capacitor (0805)             |
| C19              | 1   | 10 $\mu$ F, 10%, 16V min tantalum capacitor<br>AVX TAJC106K016 |
| C21              | 1   | 5pF, 10% ceramic capacitor (0402)                              |
| CR1              | 1   | LED  |
| J1, J2, J5       | 3   | SMA connectors (edge mount)                                    |
| L3               | 1   | 3.3 $\mu$ H inductor<br>Coilcraft 1008CS-332XKBC               |
| P1               | 1   | 2-pin header (0.1" center)                                     |
| P1               | 1   | Shunt  |
| Q1               | 1   | PNP transistor<br>Zetex FMMT591                                |
| R1, R2, R3       | 3   | 1k $\Omega$ $\pm$ 5% resistors (0603)                          |
| R5               | 1   | 12.3 $\Omega$ $\pm$ 1% resistor (0402)                         |
| R6, R7           | 2   | 84.5 $\Omega$ $\pm$ 1% resistors (0603)                        |
| R8, R9           | 2   | 124 $\Omega$ $\pm$ 1% resistors (0603)                         |
| R10, R11         | 2   | 20 $\Omega$ $\pm$ 1% resistors (0603)                          |

### Features

- ♦ Fully Assembled and Tested
- ♦ +3.3V to +5.0V Operation
- ♦ Input Termination Provided On-Board
- ♦ Independent Electrical Monitoring of Modulation and Bias Currents

### Ordering Information

| PART         | TEMP. RANGE    | IC PACKAGE |
|--------------|----------------|------------|
| MAX3668EVKIT | -40°C to +85°C | 32 TQFP    |

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| DESIGNATION                             | QTY | DESCRIPTION                            |
|---|-----|--|
| R12                                     | 1   | 10 $\Omega$ $\pm$ 1% resistor (0402)   |
| R13, R20, R22, R25                      | 4   | 0 $\Omega$ resistors (0603)            |
| R14, R15, R16                           | 3   | 50k $\Omega$ variable resistors        |
| R18                                     | 1   | 110 $\Omega$ $\pm$ 5% resistor (0603)  |
| R21                                     | 1   | 10 $\Omega$ $\pm$ 5% resistor (0603)   |
| R23                                     | 1   | 15 $\Omega$ $\pm$ 5% resistor (0805)   |
| R24                                     | 1   | 1.5k $\Omega$ $\pm$ 5% resistor (0603) |
| VCC, GND, TP1, TP4, TP5, TP6, TP9, TP10 | 8   | Test points                            |
| U1                                      | 1   | MAX3668EHJ (32 TQFP)                   |
| U3                                      | 1   | MAX495CSA (8-pin SO)                   |

### Component Modifications for Optical Configuration

| DESIGNATION | QTY | DESCRIPTION                          |
|-------------|-----|--------------------------------------|
| J5          | 1   | Remove                               |
| L2          | 1   | Ferrite bead<br>Murata BLM11HA601SG  |
| R5          | 1   | Remove                               |
| R13         | 1   | Remove                               |
| R19         | 1   | 20 $\Omega$ $\pm$ 5% resistor (0402) |
| R20         | 1   | 5 $\Omega$ $\pm$ 5% resistor (0402)  |
| R22         | 1   | Remove                               |
| R23         | 1   | Remove                               |
| U2          | 1   | User-supplied laser diode            |



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## Quick Start

### Electrical Setup (Default)

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 Q1, which is controlled by an operational amplifier (U3). The APC test circuit, consisting of U3 and Q1, applies the simulated monitor-diode current (the ratio  $I_{BIAS} / I_{MD}$  is  $R_{24} / R_{23} = 100$ ) to the MD pin of the MAX3668. To ensure proper operation in the electrical configuration, set up the evaluation board as follows:

- 1) Verify inductor L2 is not installed.
- 2) Remove the shunt from P1 to enable the output.  
**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 R14, the MOD potentiometer, for 10k $\Omega$  resistance between pins 2 and 3 (test point 5 and ground).
- 4) Adjust R15, the BIAS potentiometer, for 10k $\Omega$  resistance between pins 2 and 3 (test point 4 and ground).
- 5) Adjust R16, the APC potentiometer, for 10k $\Omega$  resistance between pins 2 and 3 (test point 6 and ground).

- 6) Power-up the board with a +3.3V supply.
- 7) Apply a differential input signal (max amplitude  $\leq 800\text{mV}$  per side) to J1 and J2 (DATA+ and DATA-).
- 8) Attach a high-speed oscilloscope with 50 $\Omega$  inputs to J5.
- 9) Adjust R<sub>BIAS</sub> (R15) and R<sub>APC</sub> (R16) until the desired laser-bias current is achieved (see note in the *Applications* section of the MAX3668 data sheet).
- 10) Adjust R<sub>MOD</sub> (R14) until the desired laser-modulation current is achieved.

### Optical Setup

For optical operation, the electrical APC test circuit must be disabled. For optical evaluation of the MAX3668, configure the EV kit as described in *Component Modifications for Optical Configuration*.

- 1) Remove the shunt from P1 to enable the output.
- 2) Connect a TO-style header laser and monitor diodes (Figure 1) as follows:
  - Keeping the leads to the laser diode as short as possible, connect the laser diode on the component side of the board between R20 and C17 (V<sub>CC</sub>) with the cathode connected to R20 and the anode connected to V<sub>CC</sub>.

## Adjustment and Control Descriptions (see Quick Start first)

| COMPONENT | NAME                  | FUNCTION   |
|-----------|-----------------------|--|
| P1        | OUTPUT DISABLE        | Enable/Disable the Output Currents. Shunting disables the part. Remove shunt for normal operation.   |
| J5        | Electrical Output SMA | Electrical Output. Remove for optical operation.   |
| R14       | MOD                   | Laser Modulation Current Adjustment  |
| R15       | BIAS                  | Laser Bias Current Adjustment. In open-loop mode, R15 adjusts the laser-bias current. In closed-loop operation, R15 adjusts the maximum laser-bias current.  |
| R16       | APC                   | Automatic Power Control Adjustment. For closed-loop operation, R16 adjusts the monitor-diode current level.  |
| TP1       | Fail Indicator        | TTL Low Level. Indicates a failure in the APC loop.  |
| CR1       | Fail Indicator        | Refer to the <i>Design</i> section of the MAX3668 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). |

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- Connect the monitor diode on the underside of the board with the anode connected to the MD pin of the MAX3668 (underneath the laser-diode cathode) and the cathode connected to  $V_{CC}$  (underneath the laser-diode anode).

**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 2 and 3 (test point 5 and ground).
- 5) Adjust R15, the BIAS potentiometer, for maximum resistance between pins 2 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 MAX3668 data sheet.)
- 7) Power-up the board with a +3.3V supply.
- 8) Apply a differential input signal ( $\leq 800\text{mV}$  per side) to J1 and J2 (DATA+ and DATA-).
- 9) Attach the laser diode output to an optical/electrical converter.
- 10) Adjust R15 until the LED, CR1, is no longer illuminated. Laser power can be monitored at the laser diode with an optical/electrical converter (see note in the *Applications Information* section of the MAX3668 data sheet).

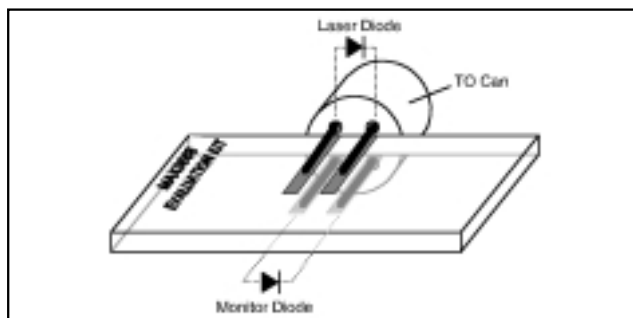


Figure 1. Attachment of Laser Diode/Monitor Diode to MAX3668 EV Kit

- 11) Adjust R14 until the desired optical amplitude is achieved. Optical amplitude can be observed on an oscilloscope connected to an optical/electrical converter.

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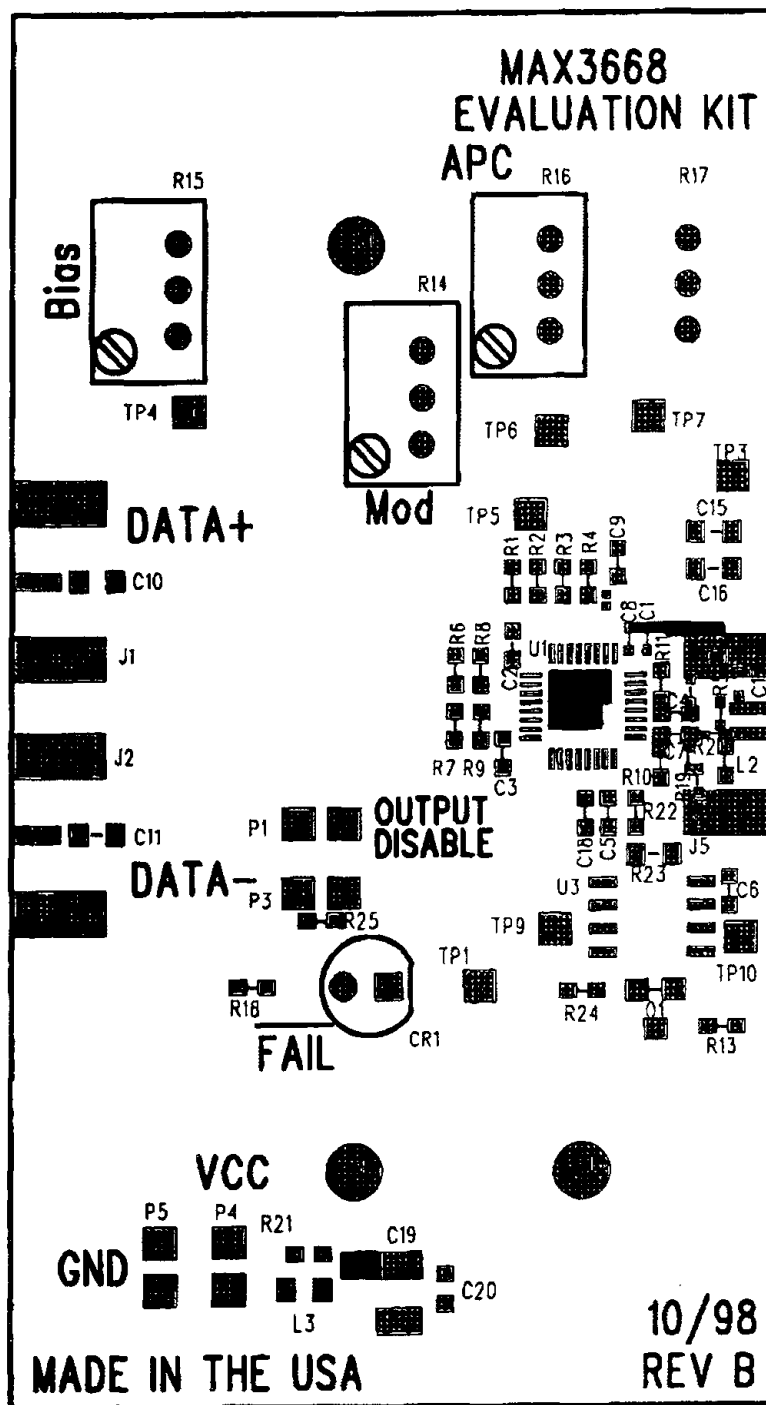


Figure 2. Expanded View of Component Placement

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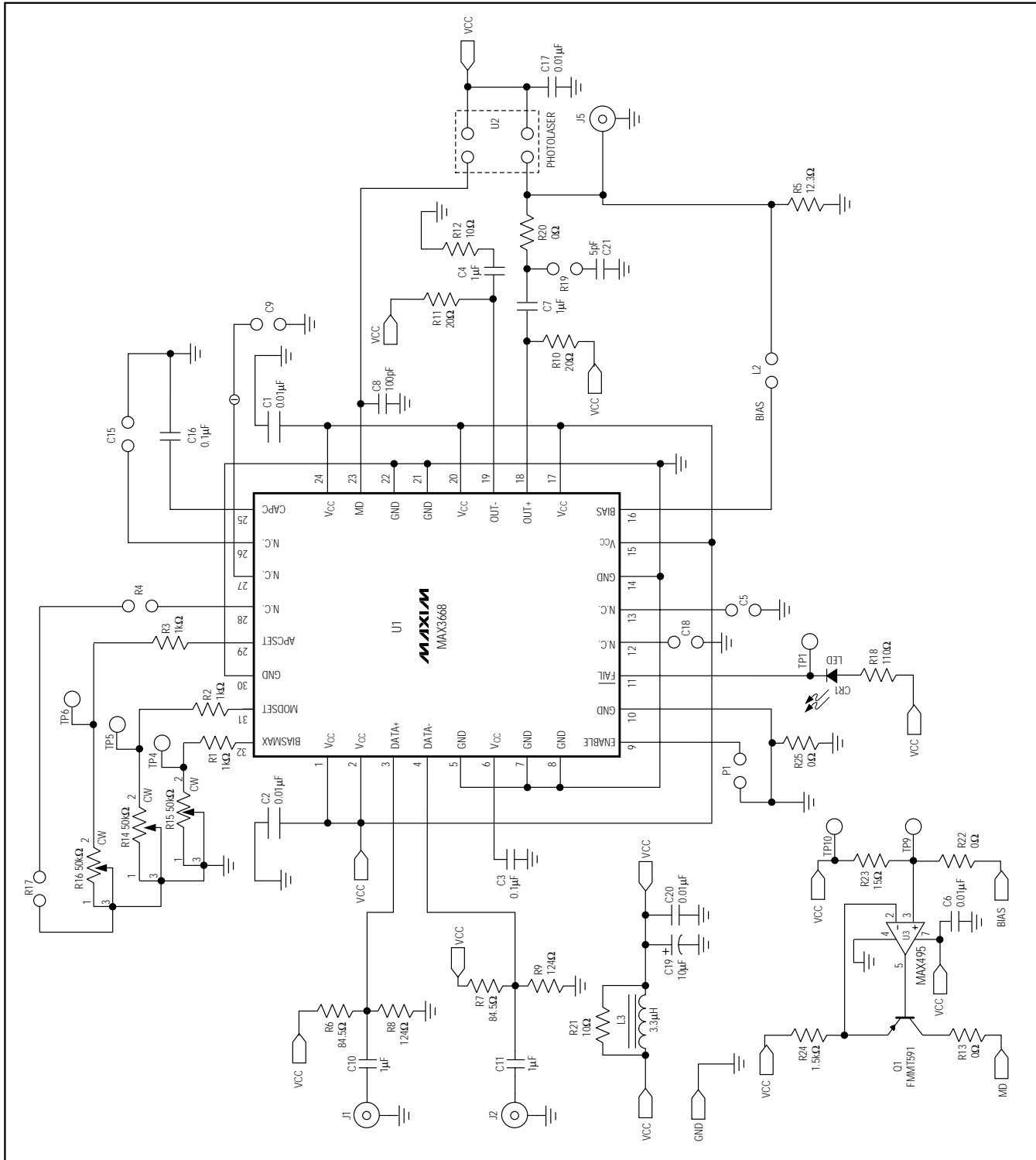


Figure 3. MAX3668 EV Kit Schematic—Electrical Configuration

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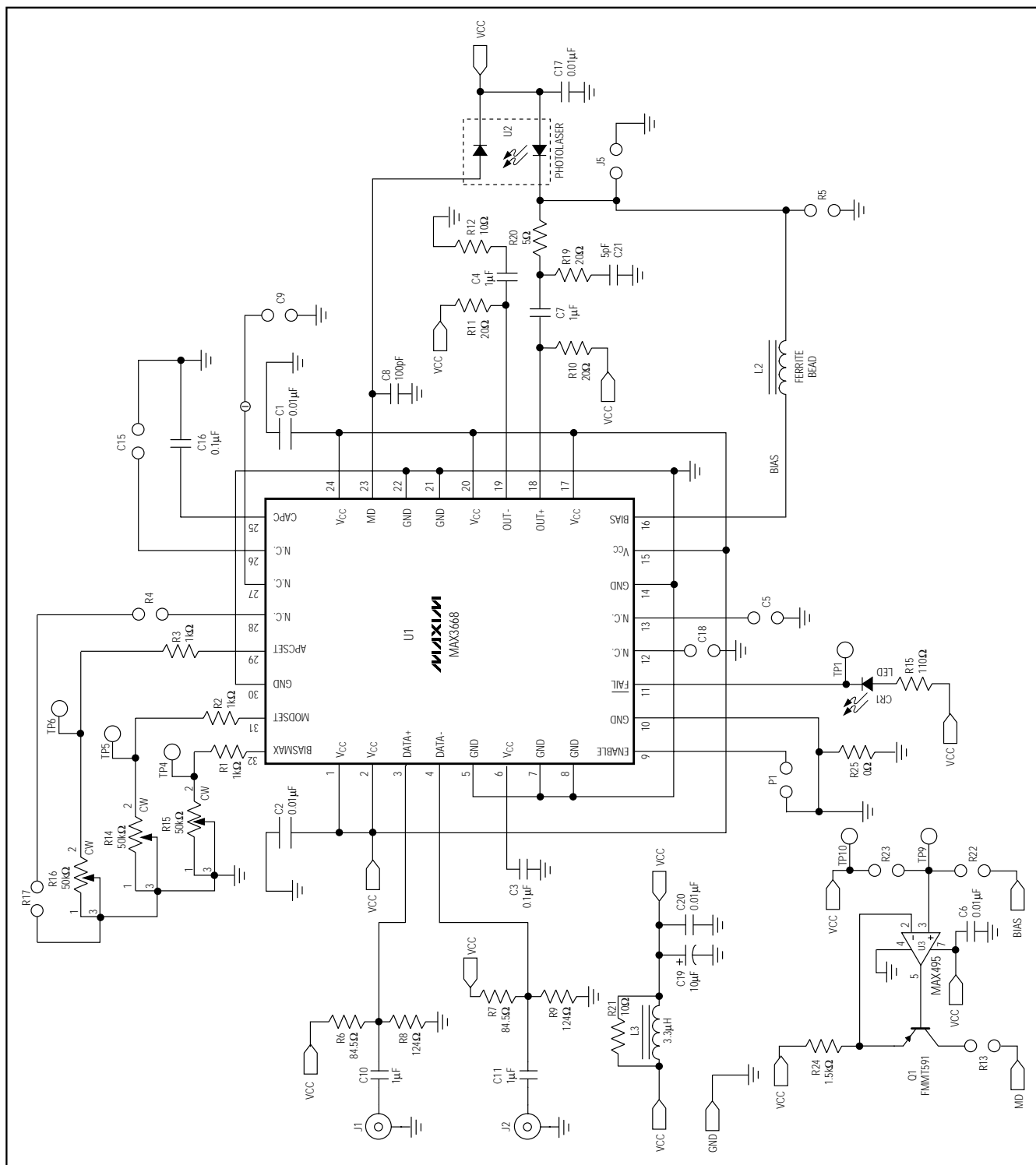


Figure 4. MAX3668 EV Kit Schematic—Optical Configuration

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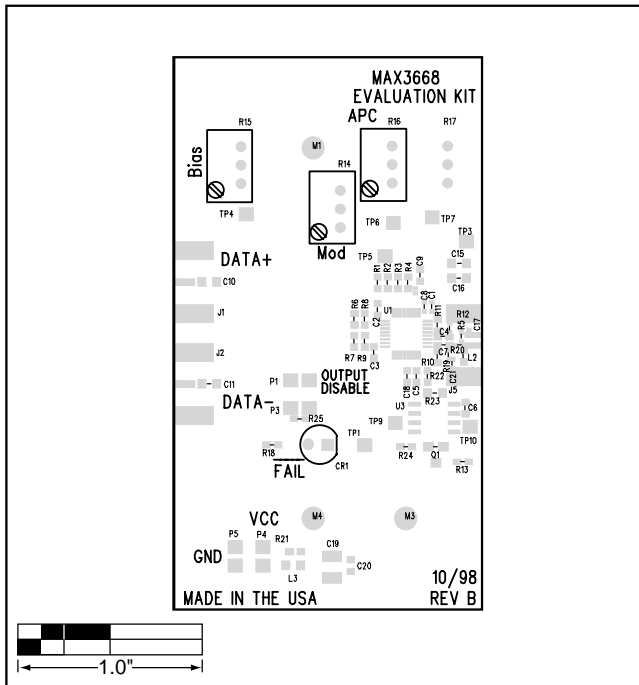


Figure 5. MAX3668 EV Kit Component Placement Guide—Component Side

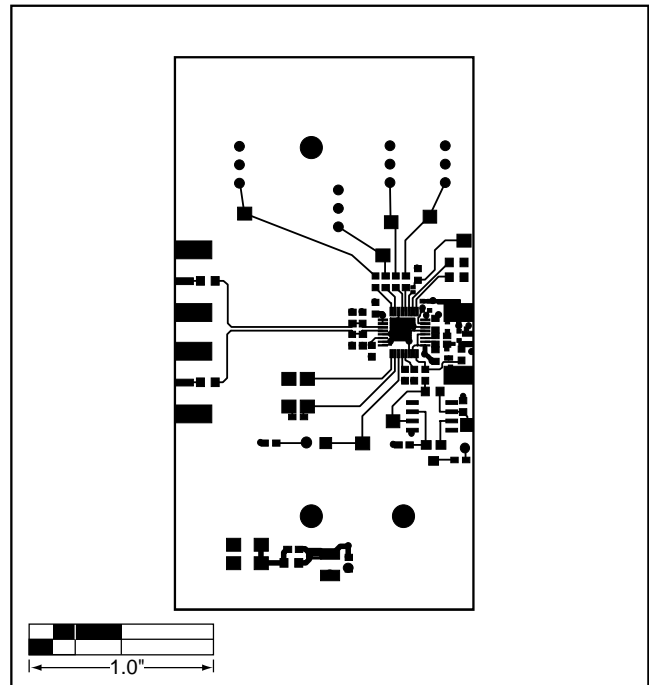


Figure 6. MAX3668 EV Kit PC Board Layout—Component Side

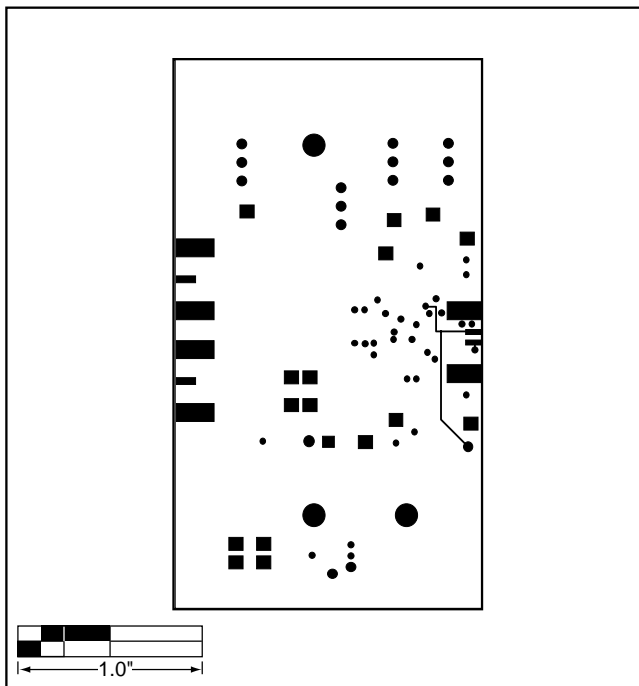


Figure 7. MAX3668 EV Kit PC Board Layout—Solder Side

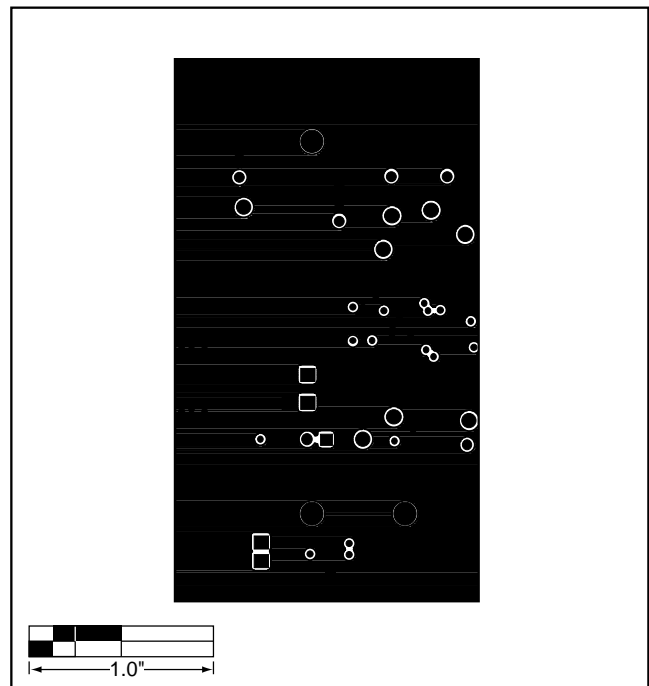


Figure 8. MAX3668 EV Kit PC Board Layout—Ground Plane

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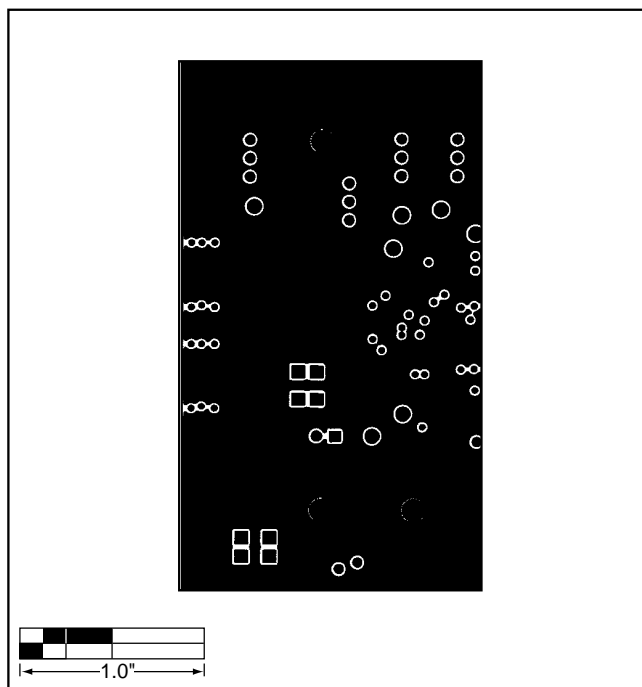


Figure 9. MAX3668 EV Kit PC Board Layout—Power Plane

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