19-1110; Rev 0; 8/96

MAXIM

# MAX3962 Evaluation Kit

Evaluates: MAX3962

## General Description

The MAX3962 evaluation kit (EV kit) simplifies evaluation of the MAX3962 LAN LED driver. The load for the MAX3962 can be a user-supplied, light-emitting diode (LED) or a resistive load that emulates an LED. The MAX3962 EV kit provides controls for easy adjustment of modulation and peaking currents. It also provides controls for adjusting the modulation-current temperature coefficient and output pulse width. Signal inputs can be single-ended or differential, and can be AC or DC coupled as needed.

The MAX664 is used to implement a PECL termination for the input signal.

## Features

- ♦ **Tests MAX3962 with Inductive Electrical Load or LED**
- ♦ **PECL Termination Provided**
- ♦ **Easy Adjustment of Modulation and Peaking Currents**
- ♦ **Single-Ended or Differential Input**
- ♦ **Adjustment of Modulation-Current Temperature Coefficient**
- ♦ **Output Pulse-Width Adjustment**
- ♦ **Fully Assembled and Tested**

## Component Suppliers

| SUPPLIER | PHONE | FAX |
|---|---|---|
| AVX | (803) 946-0690 | (803) 626-3123 |
| Central Semiconductor | (516) 435-1110 | (516) 435-1824 |
| Zetex USA | (516) 543-7100 | (516) 864-7630 |

## Ordering Information

| PART | TEMP. RANGE | BOARD TYPE |
|---|---|---|
| MAX3962EVKIT-SO | 0°C to +70°C | Surface Mount |

## Component List

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| C1, C4 | 2 | 10µF, ±10%, 16V tantalum capacitors AVX TAJB106K |
| C2 | 1 | 1µF, ±10%, 16V tantalum capacitor AVX TAJB105K |
| C3 | 1 | 0.022µF, 25V ceramic capacitor |
| C5, C8 | 2 | 0.1µF, 25V ceramic capacitors |
| C6, C7, C11, C13, C15, C17, C18 | 7 | 1000pF, 25V ceramic capacitors |
| C10 | 1 | 100pF, 25V ceramic capacitor |
| C12, C14 | 2 | 0.22µF, 16V ceramic capacitors |
| D1 | 1 | User-supplied, light-emitting diode |
| D2 | 1 | Switching diode Central Semiconductor CMPD7000BK |
| J2, J3, J5, J6 | 4 | SMA connectors, edge mount |
| JP4–JP10 | 7 | 2-pin headers |
| Q1 | 1 | PNP transistor Zetex FMMT591A |

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| R1 | 1 | 0Ω resistor |
| R2, R3 | 2 | 15Ω, 1% resistors |
| R4, R5 | 2 | 10kΩ, 1% resistors |
| R6, R10, R17, R18, R19 | 5 | 100kΩ potentiometers |
| R7, R8 | 2 | 453Ω, 1% resistors |
| R11, R12 | 2 | 49.9Ω, 1% resistors |
| R13 | 1 | 221Ω, 1% resistor |
| R14 | 1 | 1.5kΩ, 1% resistor |
| R15 | 1 | 4.75kΩ, 1% resistor |
| R16 | 1 | 2kΩ, 1% resistor |
| R20 | 1 | 121Ω, 1% resistor |
| TP2, TP6, TP7, TP8 | 4 | Test points |
| U1 | 1 | MAX3962CEI |
| U2 | 1 | MAX664CSA |
| None | 4 | Shunts |

## Quick Start

The MAX3962 EV kit is fully assembled and tested. Follow the steps below to verify board operation:

1) Verify that shunts are installed on JP8 and JP10. Verify that shunts are removed from JP4, JP5, JP6, JP7, and JP9. Verify solder shorts across SB26 and SB19.
2) Turn R17, R18, and R19 fully counter-clockwise.
3) Connect differential signal inputs to VIN+ and VIN-. The signal should resemble a square wave, with a data rate between 100Mbps and 300Mbps. Signal amplitude should be 0.5V to 1.0V per input. The EV kit inputs are AC terminated to 50Ω.
4) Connect outputs IOUT+ and IOUT- with matched cables to an oscilloscope with 50Ω inputs.
5) Connect a +3.3V power supply to the user pad labeled VCC, adjacent to C1. Set the current limit above 200mA.
6) Connect the power-supply ground to the user pad marked GND.
7) Adjust the oscilloscope vertical gain of both channels to ≈10mV/div. Set the oscilloscope to display the differential signal (IOUT+ - IOUT-).
8) Adjust MOD (R17) until a waveform is observed.

## Detailed Description

### Adjustments and Controls

***Jumper JP1***

Cut JP1 to measure power-supply current or to inject noise on the supply via J1 (J1 is not installed).

***Jumpers JP2 (VIN+) and JP3 (VIN-)***

Cut JP2 and JP3 to measure VIN+ and VIN- input bias current. Cut JP3 if connecting $V_{BB}$ to VIN- for single-ended operation.

***Jumper JP4 (Disable)***

Install JP4 to disable the data input. The MAX3962 output is forced low when JP4 is installed.

***Jumper JP5 (Pulse-Width-Adjust Enable)***

Install a shunt on JP5 if output pulse-width adjustment is desired.

***Jumpers JP6, JP7, and JP8 (TC Programming)***

The MAX3962 has a programmable modulation-current temperature coefficient (TC). Use Table 1 to select the desired TC. Refer to the MAX3962 data sheet for more information.

***Jumper JP9 (TP)***

Install a shunt on JP9 for DC testing of overshoot and undershoot current. Overshoot current flows into the cathode if the input is high. Undershoot current is sourced from the cathode if the input is low. Do not install a shunt on JP4 (disable) if JP9 is shunted.

**Table 1. Modulation-Current TC Programming Mode**

| MODE | JP6 | JP7 | JP8 |
|---|---|---|---|
| Minimum TC: 2100ppm/°C | Short | Open | Open |
| Variable TC: 2100ppm/°C–13,000ppm/°C (using R10) | Open | Short | Open |
| Nominal TC: 7300ppm/°C | Open | Open | Short |
| Maximum TC: 14,500ppm/°C | Open | Open | Open |

***Jumper JP10 (Input Termination Voltage)***

The input termination voltage ($V_{TT}$) is selectable with jumper JP10. Short JP10 to set $V_{TT}$ = $V_{CC}$ - 1.3V when using AC-coupled inputs. Remove JP10 to set $V_{TT}$ = $V_{CC}$ - 2.0V when using DC-coupled inputs. The inputs can be DC coupled by shorting C12 and C14.

***SB19 (Internal Compensation)***

Short SB19 with solder to connect the internal compensation network to the LED cathode. Refer to the MAX3962 data sheet for more information about the compensation network. External compensation can be added at R9 and C16, if desired.

***SB26 (LV, Low-Voltage Configuration)***

For maximum modulation current when using a 5V supply, remove solder from SB26 to disconnect the LV pin. For more information, refer to the *Output Drivers* section in the MAX3962 data sheet.

*SB19 and SB26 are low-inductance jumpers implemented as gaps in the traces connecting pins 19 and 26 (respectively). These jumpers can be shorted and opened with a soldering iron.*

***Output Pulse-Width Adjustment***

R6 adjusts the output pulse width if JP5 is installed.

***Variable TC Adjustment***

R10 adjusts the modulation-current TC if properly enabled (Table 1).

***Modulation-Current Adjustment***

R17 adjusts the modulation current.

***Overshoot-Current Adjustment***

R18 adjusts the overshoot current.

***Undershoot-Current Adjustment***

R19 adjusts the undershoot current.

### Output Measurements

***Resistive Load***

When using an oscilloscope with 50Ω inputs, the output current is ($V_{IOUT+}$ - $V_{IOUT-}$)1.333.

***LED Load***

Before installing a user-supplied LED, modify the EV kit as follows:

1) Remove C5, C13, R2, R3, and D2.
2) The EV kit provides convenient sockets for installing an LED (D1). Connect the LED anode to the MAX3962's anode pin. Connect the LED cathode to the MAX3962's cathode pin. Two ground sockets are provided adjacent to D1.
3) Trim the LED leads to reduce inductance.
4) Turn R17, R18, and R19 fully counter-clockwise.
5) Apply power and adjust R17 to obtain an output waveform.
6) Adjust R18 and R19 to optimize the optical waveform.

### DC Measurements

To measure DC output current, install an ammeter across D1. To measure undershoot and overshoot currents, install a shunt on JP9.

### Input Connections

The MAX3962 EV kit inputs can be driven with either a single-ended signal generator or a differential signal generator.

When using a single-ended generator with a DC-coupled input (C12 shorted), cut JP3 and connect VIN- to $V_{BB}$.

### Layout Considerations

The MAX3962 uses a four-layer board with separate power and ground planes. The signal inputs use 50Ω transmission lines. The VCCOUT pin is bypassed close to the package to reduce noise on the power supply. The VEEOUT pin connects to the ground plane with a short trace and multiple vias. The electrical path from anode to cathode, through the LED, is kept as short as possible to reduce inductance.

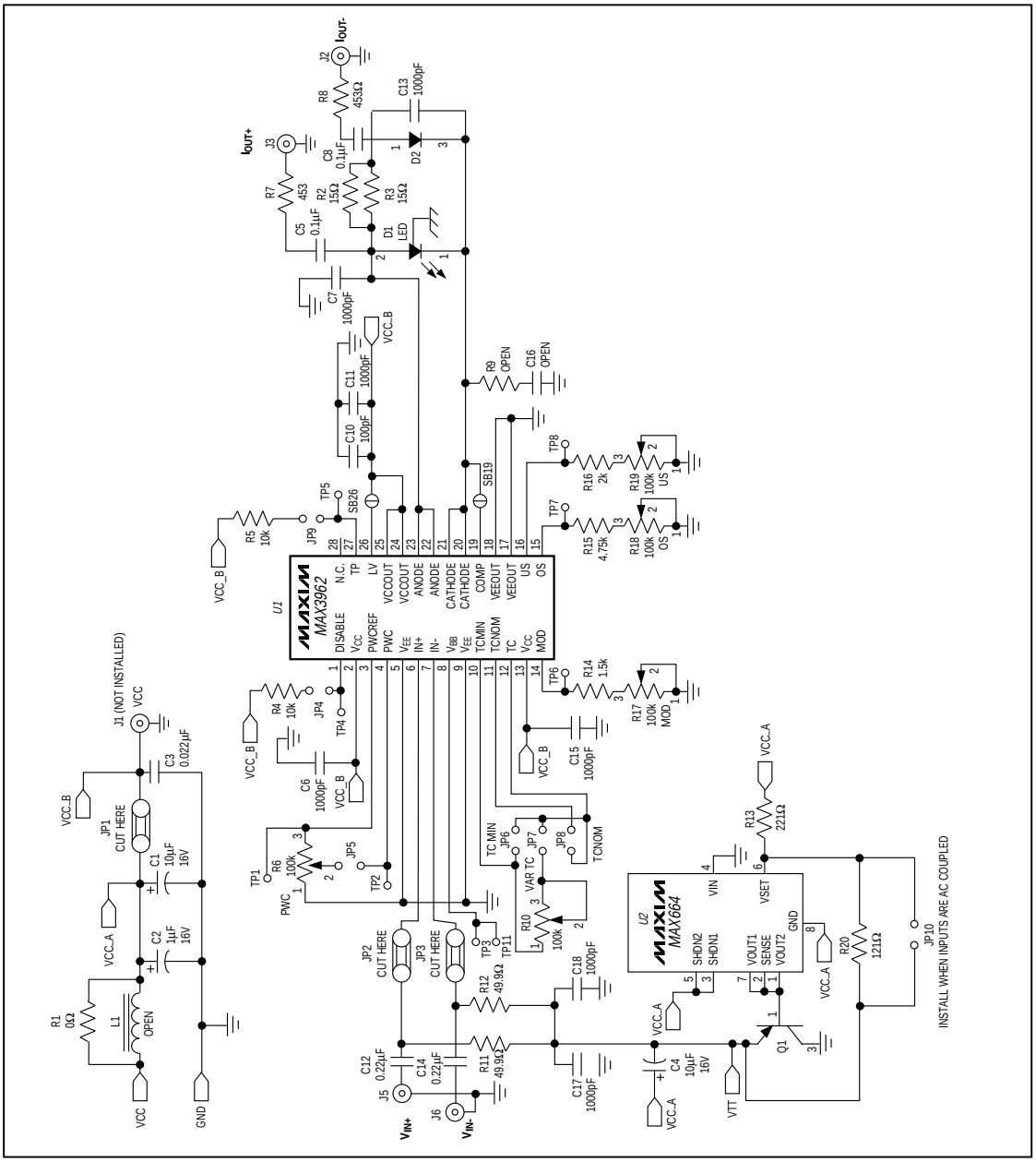


*Figure 1. MAX3962 EV Kit Schematic*

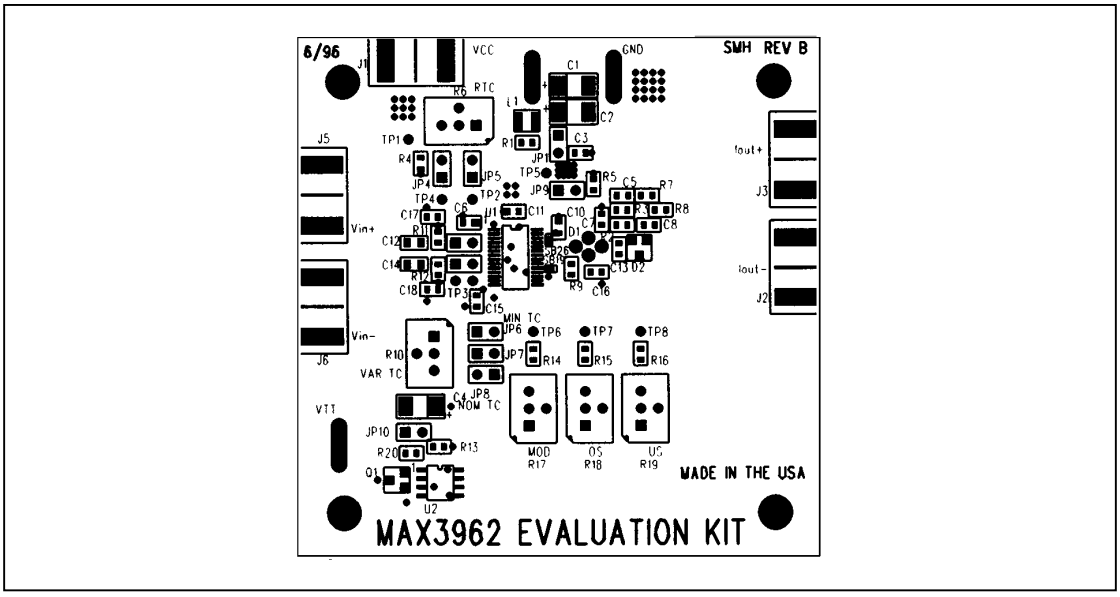


*Figure 2. MAX3962 EV Kit Component Placement Guide—Component Side*

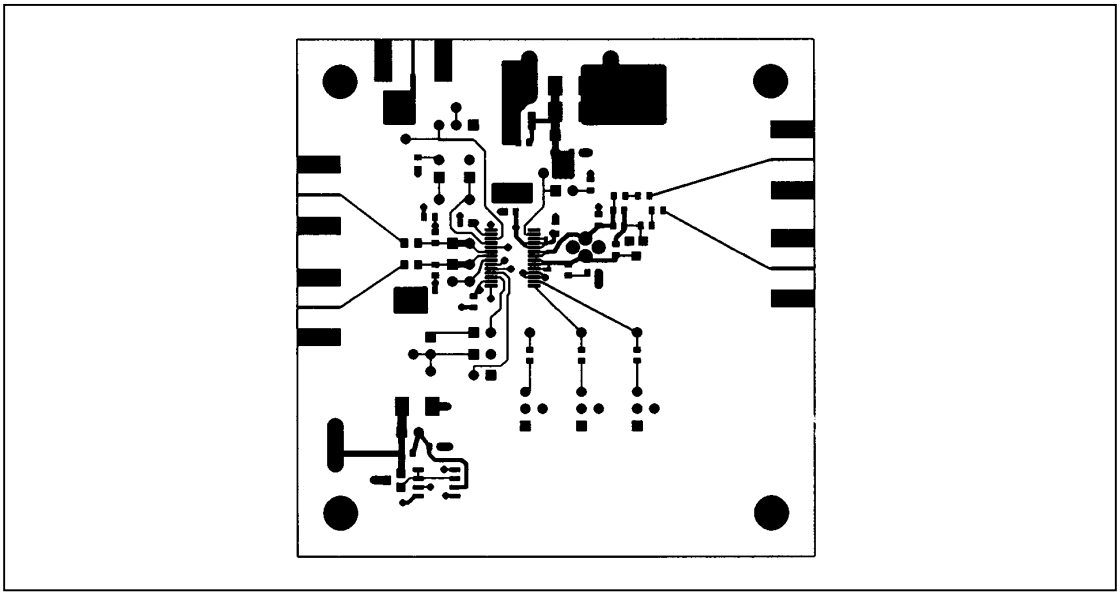

*Figure 3. MAX3962 EV Kit PC Board Layout*

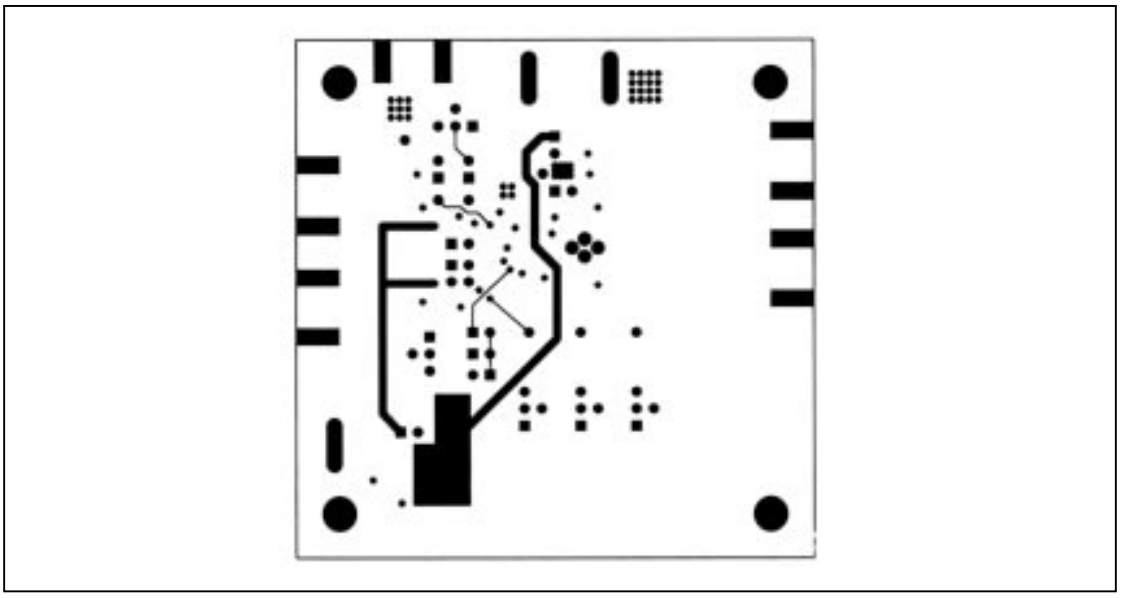

*Figure 4. MAX3962 EV Kit PC Board Layout—Solder Side*

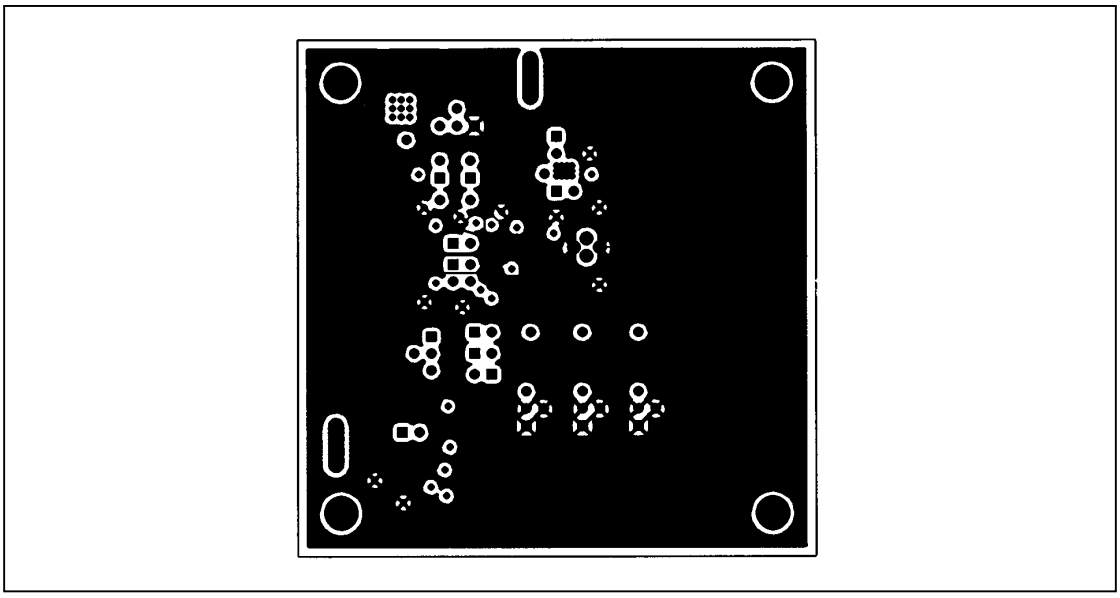

*Figure 5. MAX3962 EV Kit PC Board Layout—Ground Plane*

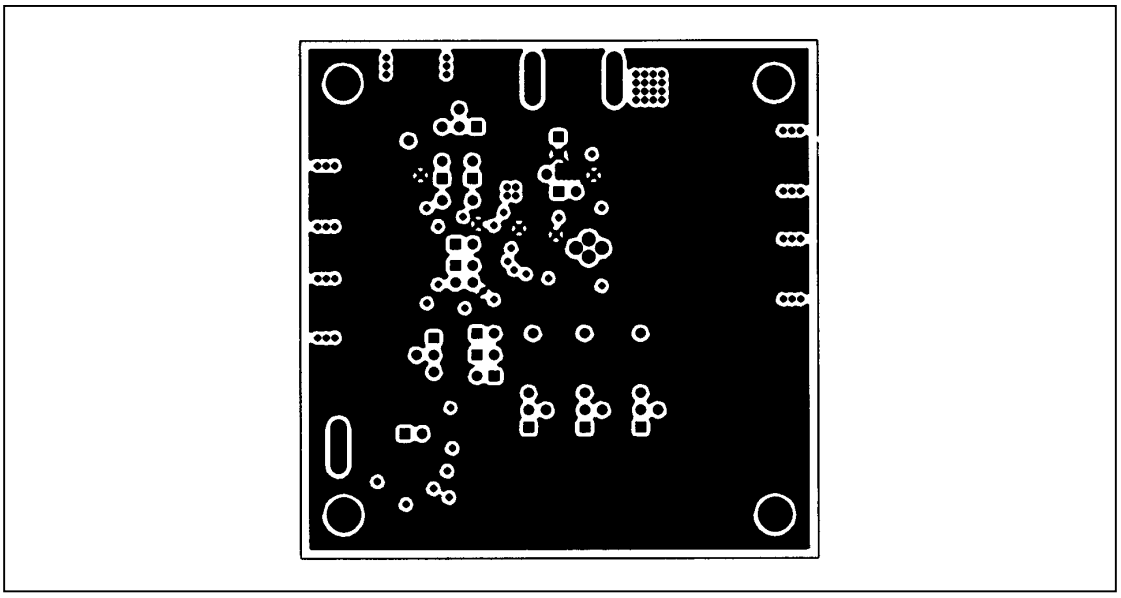

*Figure 6. MAX3962 EV Kit PC Board Layout—Power Plane*