

# MAXIM

## MAX3970 Evaluation Kit

**Evaluates: MAX3970**

### General Description

The MAX3970 evaluation kit (EV kit) is a fully assembled chip-on-board electrical demonstration kit that provides easy evaluation of the MAX3970 10.3Gbps, +3.3V transimpedance amplifier. Note that the MAX3970 EV kit provides an electrical interface to the IC, which is similar to, but not exactly the same as, a photodiode. The circuit used tends to increase bandwidth and jitter beyond what is expected for typical photodiode inputs.

### Features

- ◆ Easy +3.3V Electrical Evaluation of the MAX3970
- ◆ Fully Assembled and Tested
- ◆ EV Kit Designed for 50Ω Interfaces

### Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX3970EVKIT	0°C to +85°C	Dice

### Component Suppliers

SUPPLIER	PHONE	FAX
AVX	843-444-2863	803-626-3123
Murata	814-237-1431	814-238-0490

**Note:** Please indicate that you are using the MAX3970 when ordering from these suppliers.

### Component List

DESIGNATION	QTY	DESCRIPTION
C2, C4, C13	3	1000pF ±10% ceramic capacitors (0402)
C11, C12, C15, C16	4	0.01µF ±10% ceramic capacitors (0402)
C14	1	33µF ±10% tantalum capacitor
J1–J5	5	SMA connectors edge mount
JU1	1	2-pin header, 0.1in centers
L1	1	Ferrite bead (0603) Murata BLM11HA601SG (0603)
R1, R2, R4, R5	4	243Ω 1% resistors (0402)
R3, R6	2	49.9Ω 1% resistors (0402)
R7	1	10kΩ 1% resistor (0402)
TP1, TP2, VCC, GND	4	Test points
U1	1	MAX3970U/D
None	1	Shunt

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## Quick Start

- 1) Connect a signal source with 500mV<sub>p-p</sub> amplitude to the INPUT. Set the data rate for the signal source to 10.3Gbps.
- 2) Connect OUT+ (J2) and OUT- (J3) to the 50Ω inputs of a high-speed oscilloscope.
- 3) Remove the shunt from JU1.
- 4) Connect a +3.3V supply to the proper terminals and power up the EV kit.
- 5) The differential signal at the oscilloscope should be approximately 450mV<sub>p-p</sub>.

## Detailed Description

The MAX3970 accepts a DC-coupled input from a high-speed photodiode, at optical modulation amplitudes ranging from 40μA<sub>p-p</sub> to 2.0mA<sub>p-p</sub>. To facilitate characterization without a photodiode, the MAX3970 EV kit provides a simple circuit that emulates the photodiode using the signal voltage from a 50Ω source.

The connector at IN (J1) is terminated with 50Ω to ground. Signal voltage applied to the EV kit's input is AC-coupled to a resistance in series with the MAX3970's input, creating an input signal current. Photodiode DC current can be emulated by injecting DC current into the TEST pin (TP1). The TEST pin is connected to IN through an on-chip 1kΩ resistor.

## Photodiode Emulation

The following procedure can be used to emulate the high-speed current signal generated by a photodiode:

- 1) Select the desired optical power ( $P_{AVE}$  in dBm) and extinction ratio ( $r_e$ ).
- 2) Calculate the average current ( $I_{AVE}$  in amps) as follows:

$$I_{AVG} = \frac{10^{(P_{AVE}/10)}}{1000} \rho$$

where  $\rho$  is photodiode responsivity in A/W

- 3) Calculate the AC signal current ( $I_{INPUT}$  in amps) as follows, and adjust the signal generator to obtain it:

$$I_{INPUT} = 2I_{AVE} \frac{(r_e - 1)}{(r_e + 1)}$$

For example, to emulate a signal with an average power of -10dBm and an extinction ratio of 8:

- 1) -10dBm optical power will produce 85μA of average input current (assume a photodiode responsivity of 0.85A/W). Install a current meter between the TEST pin and a DC source. Adjust the source to provide 85μA.
- 2) The signal amplitude is  $2I_{AVE}(r_e - 1)/(r_e + 1) = 132\mu A$ . To generate this current through the two 243Ω series input resistors, set the signal source to produce an output level of 64mV<sub>p-p</sub>.

## Noise Measurements

Remove R1 before attempting noise measurements. With R1 removed, the total capacitance at the IN pin is approximately 0.2pF.

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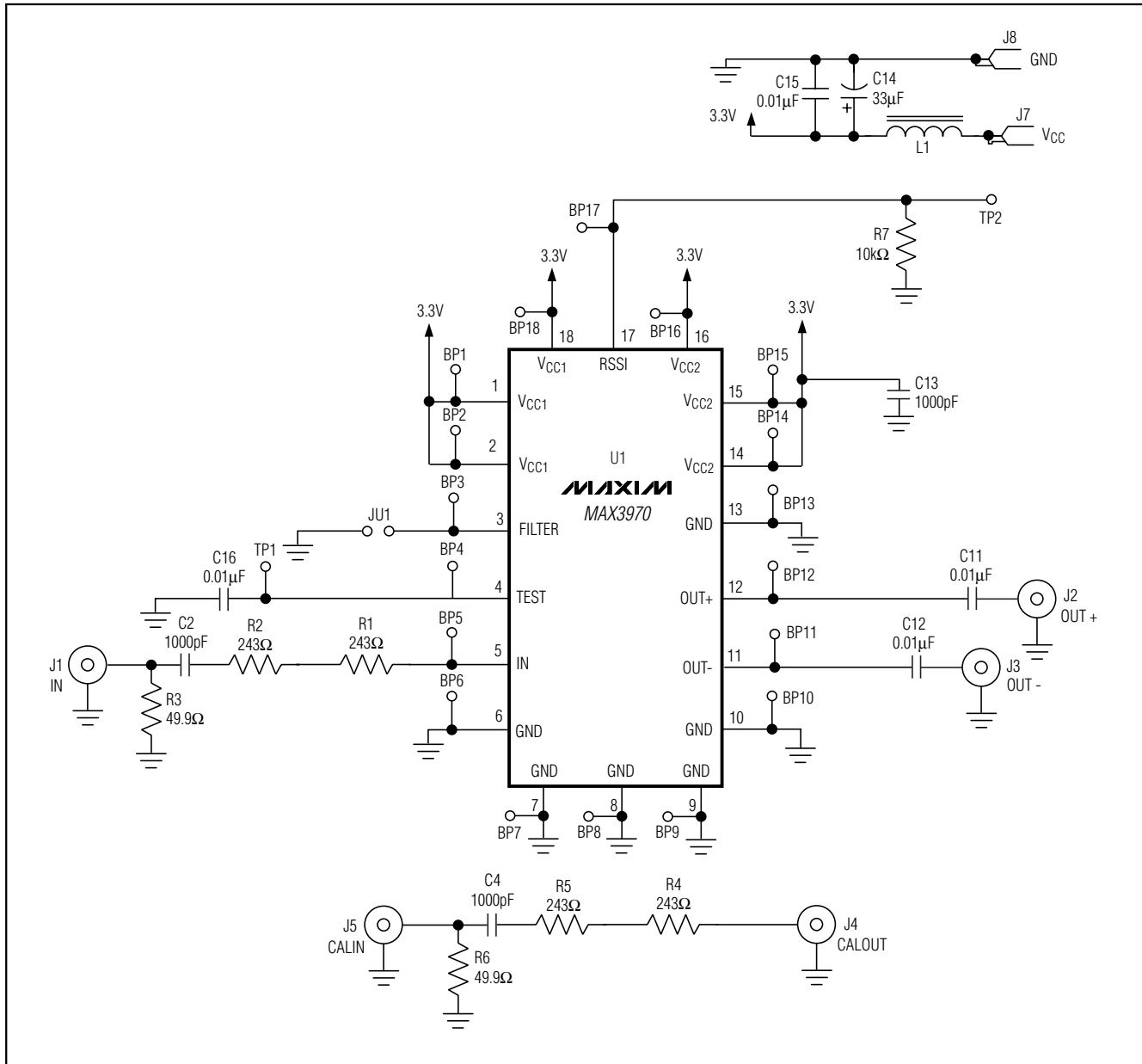


Figure 1. MAX3970 EV Kit Schematic

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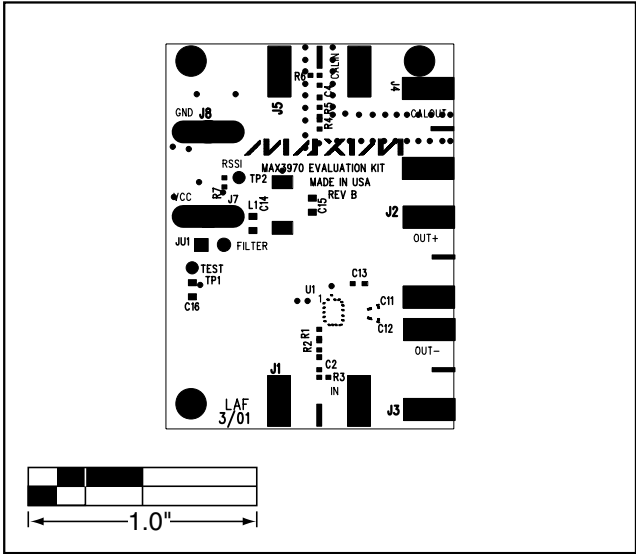


Figure 2. MAX3970 EV Kit Component Placement Guide—Component Side

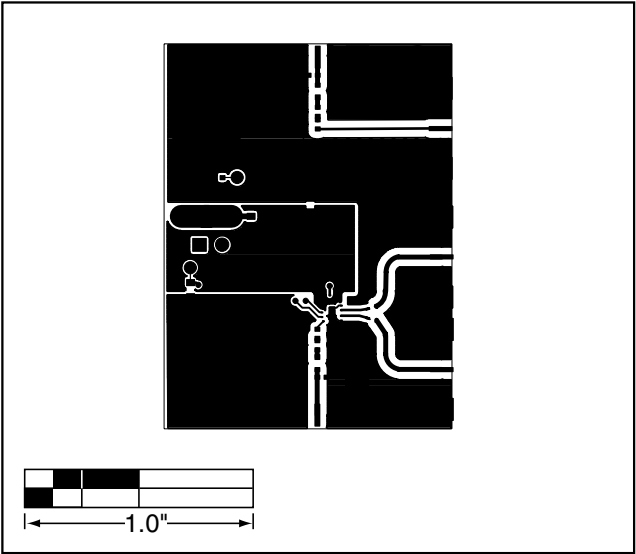


Figure 3. MAX3970 EV Kit PC Board Layout—Component Side

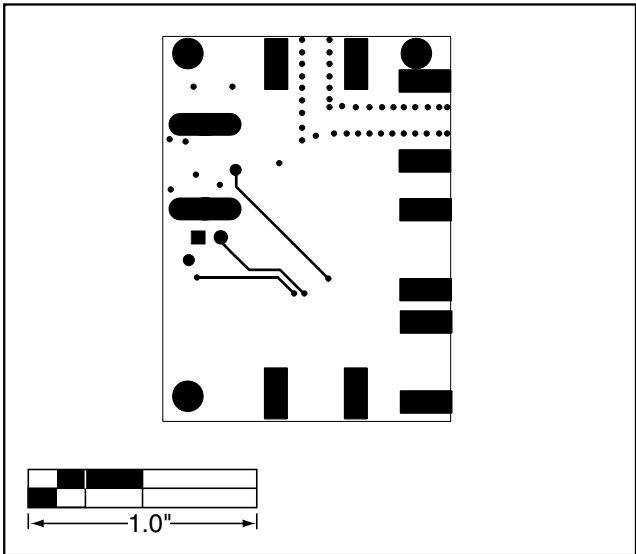


Figure 4. MAX3970 EV Kit PC Board Layout—Solder Side

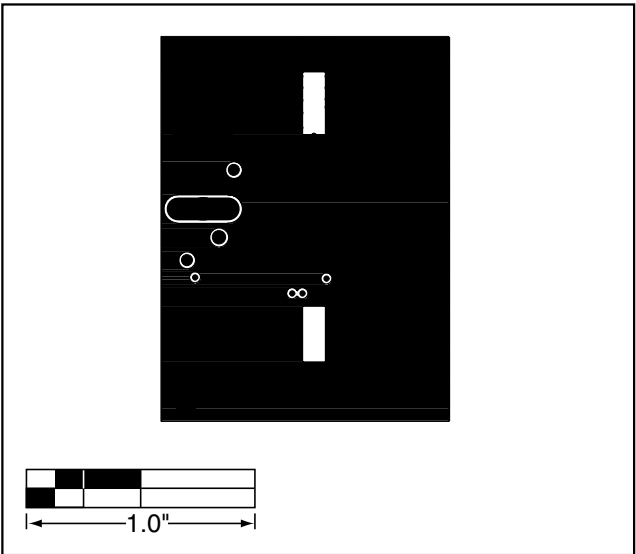


Figure 5. MAX3970 EV Kit PC Board Layout—Ground Plane

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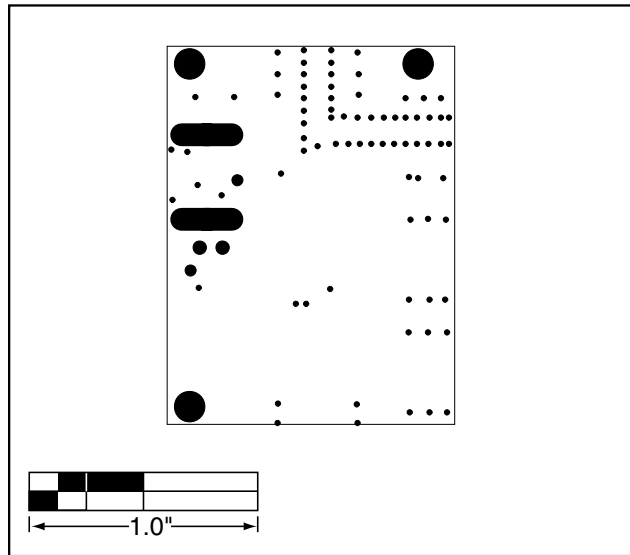


Figure 6. MAX3970 EV Kit PC Board Layout—Power Plane

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