19-1790; Rev 0; 9/00

MAXIM

MAX3864 Evaluation Kit

Evaluates: MAX3864

General Description

The MAX3864 evaluation kit (EV kit) simplifies evaluation of the MAX3864 transimpedance preamplifier.

The EV kit includes a circuit that emulates the high-speed, current input signal that would be produced by a photodiode.

The MAX3864 EV kit is fully assembled and tested.

Features

- ♦ **Fully Assembled and Tested**
- ♦ **Includes Photodiode Emulation Circuit**

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX3864EVKIT-SO	-40°C to +85°C	8 SO

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C4, C7	4	1000pF ±10%, 25V (min) ceramic capacitors (0603) Murata GRM39X7R102K050A
C10, C11	2	1000pF ±10%, 25V (min) ceramic capacitors (0805) Murata GRM40X7R102K050A
C3, C5, C6, C12–C17	9	0.1µF ±10%, 25V (min) ceramic capacitors (0603) Murata GRM39X7R104K016A
C8, C9	2	33µF ±10%, 25V (min) tantalum capacitors AVX TAJE336K025
R1, R9	2	200Ω ±5% resistors (0603)
R2, R10	4	510Ω ±5% resistors (0402) **Note: R2 and R10 = two 510Ω resistors in series**
R3, R11	2	51Ω ±5% resistors (0603)
R4, R12	2	1kΩ ±5% resistors (0603)
R5	1	1kΩ variable resistor Bourns or Digi-Key 3296W-102-ND
R6	1	5kΩ ±5% resistor (0805)
R7	1	10kΩ variable resistor Bourns or Digi-Key 3296W-103-ND
R8	1	10kΩ ±5% resistor (0805)
L1, L2	2	Ferrite beads Murata BLM11A601S
U1	1	MAX3864ESA 8-pin SOIC
U2	1	CMPT3906 PNP Transistor Central Semiconductor
U3	1	MAX400CSA 8-pin SOIC

Component List

DESIGNATION	QTY	DESCRIPTION
U4, U5	2	User-supplied optical modules
J1–J5	5	SMA connectors (edge mount) E.F. Johnson 142-0701-801 or Digi-key J502-ND
VCC, +15V, GND	3	Test points Digi-key 5000-ND
JU1	1	2-pin header (0.1in centers) Digi-Key S1012-36-ND
JU2	1	470pF capacitor (0805) Murata GRM40COG471J050A
None	1	Shunt for JU1 Digi-Key S9000-ND
None	1	MAX3864 EV kit (Rev. A) circuit board
None	1	MAX3864 data sheet
None	1	MAX3864 EV kit data sheet

Component Suppliers

SUPPLIER	PHONE	FAX
AVX	843-444-2863	843-626-3123
Central Semiconductor	516-435-1110	516-435-1824
Murata	415-964-6321	415-964-8165

Note: *Please indicate that you are using the MAX3864 when contacting these component suppliers.*

MAX3864 Evaluation Kit

Quick Start

1) Remove shunt from jumper JU1.
2) Connect a +3.3V supply to the VCC terminal and ground to the GND terminal.
3) Connect OUT+ and OUT- to the 50Ω inputs of a high-speed oscilloscope.
4) Connect a signal source to INPUT. Set the signal amplitude to 50mVp-p (this may require some attenuation between the source and the MAX3864 EV kit.) The signal should have a data rate between 1000Mbps and 2500Mbps.
5) The differential signal at the oscilloscope should be between 75mVp-p and 150mVp-p.

Detailed Description

The MAX3864 is designed to accept a DC-coupled input from a high-speed photodiode, with a total amplitude of 10µA to 2mA. Unfortunately, high-speed current sources are not common laboratory equipment. Also, because the MAX3864 provides a DC bias for the photodiode, it cannot be DC-coupled to signal sources. To allow characterization without a photodiode, the MAX3864 EV kit provides a simple circuit that emulates a photodiode using common voltage output signal sources.

The connector at INPUT is terminated with 50Ω to ground. This voltage is then AC-coupled to a resistance in series with the MAX3864 input, creating an input current. U2 and U3 form a simple DC current source that is used to apply a DC offset to the input signal.

The values of the series resistive elements, R1 and R2, have been carefully selected not to change the bandwidth of the transimpedance amplifier. Surface-mount resistors have parasitic capacitance that reduces their impedance at frequencies above 1GHz. The user should carefully evaluate any changes to R1 and R2. Table 1 shows the recommended resistor values.

Table 1. Recommended Resistor Values

EVALUATION KIT	R1, R9	R2, R10
MAX3864EVKIT-SO	200Ω (0402)	1020Ω (composed of two 510Ω (0402) resistors)

Photodiode Emulation

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

1) Select the desired average optical power (P_{AVE}) and extinction ratio (r_e).
2) Calculate the average current (I_{AVE}), and adjust R7 and R5 to obtain it.

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

ρ = photodiode responsivity in A/W

P_{AVE} in dBm

I_{AVE} in Amps

3) Calculate the AC signal current, and adjust the signal generator to obtain it.

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

I_{INPUT} in Amps

Table 2. Connections, Adjustments, and Control

CONTROL	DESCRIPTION
VCC	Supply Voltage Connection (3.0V to 5.5V, 100mA current limit)
+15V	Supply Voltage Connection for Photodiode Emulator Circuit (+15V, 25mA)
GND	Connection for Ground
JU1	When shunted, the photodiode emulation circuit is active. This is a convenient location to measure the emulated photodiode current.
R5	Potentiometer. Fine adjustment of the DC current input.
R7	Potentiometer. Coarse adjustment of the DC current input.
OUT+, OUT-	Connections for the MAX3864 Output Signal
INPUT	Input Connection for a Signal Generator

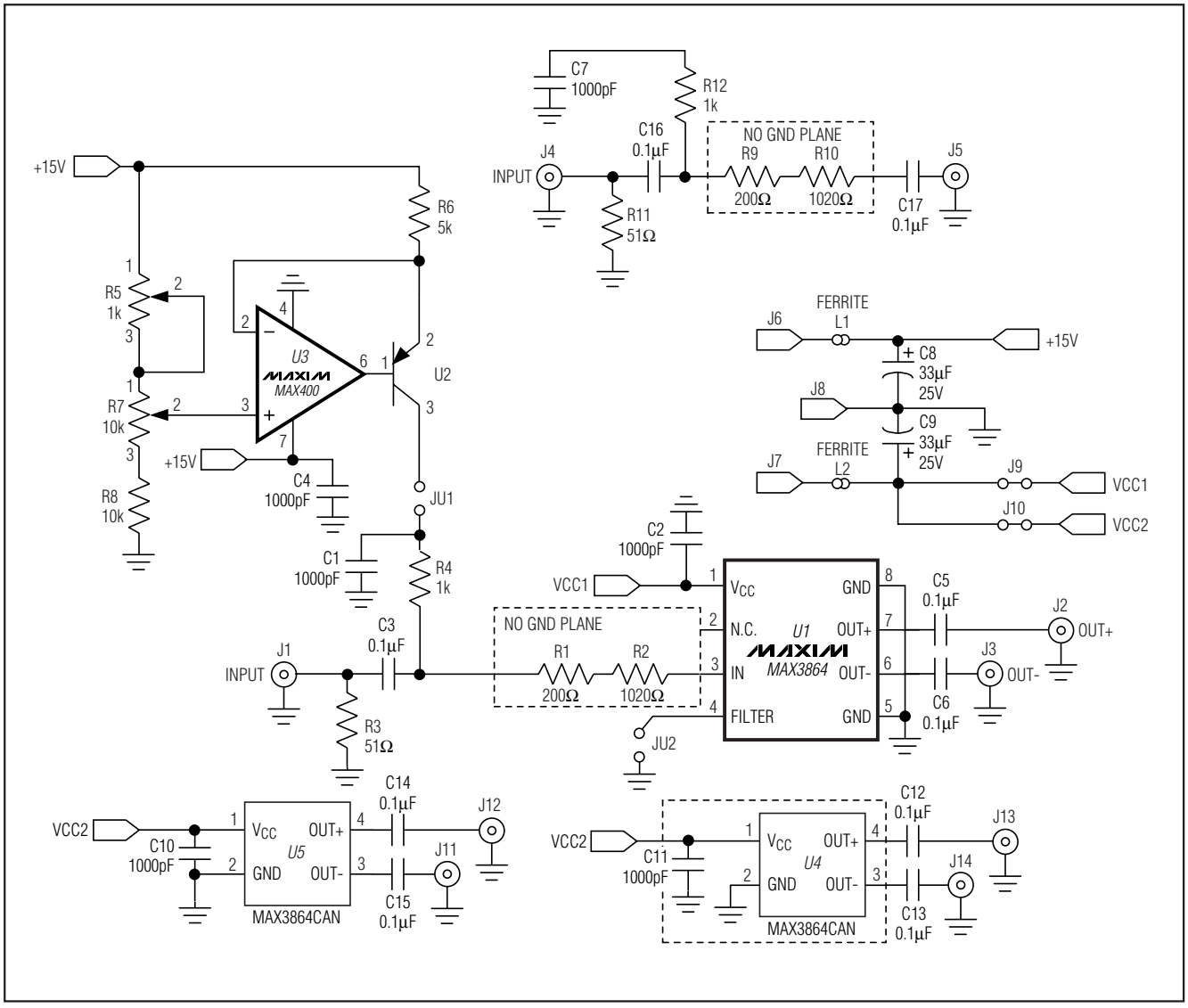

Figure 1. MAX3864 EV Kit Schematic

For example:

1) Emulate a signal with an average power of -20dBm and an extinction ratio of 10.
2) -20dBm optical power will produce 10µA of average input current (assume photodiode responsivity of 1A/W). Install a current meter at JU1. Adjust R7 and R5 until the current is 10µA.
3) The signal amplitude is $2I_{AVE}(r_e - 1) / (r_e + 1)$ = 16µA. To generate this current through the 2200Ω input resistors, set the signal source to produce an output level of 16µA × 1220Ω = 20mVp-p.

MAX3864 Evaluation Kit

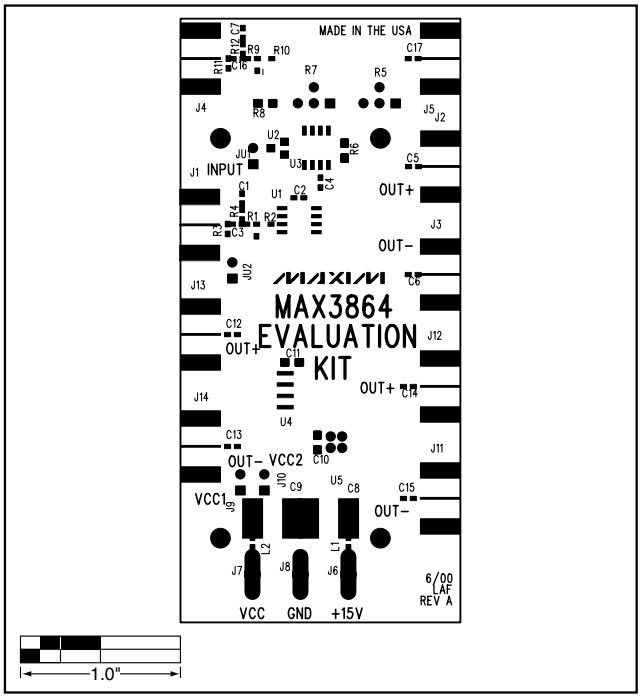

Figure 2. MAX3864 EV Kit Component Placement Guide

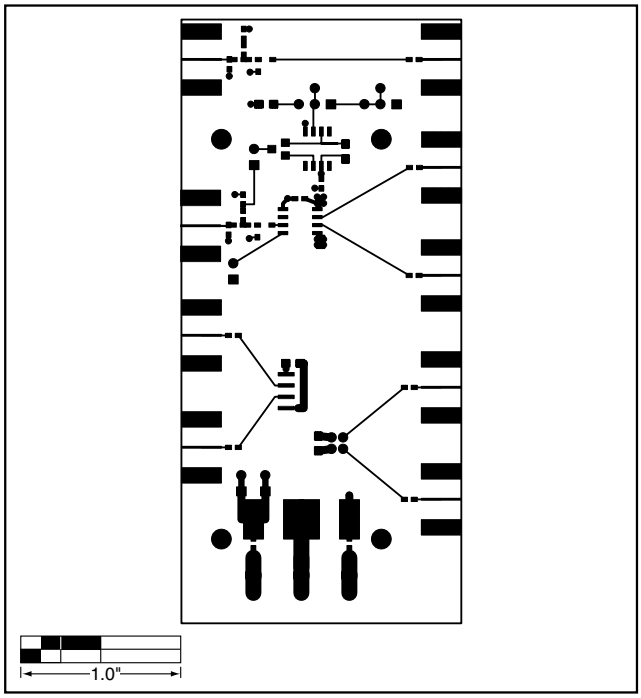

Figure 3. MAX3864 EV Kit PC Board Layout—Component Side

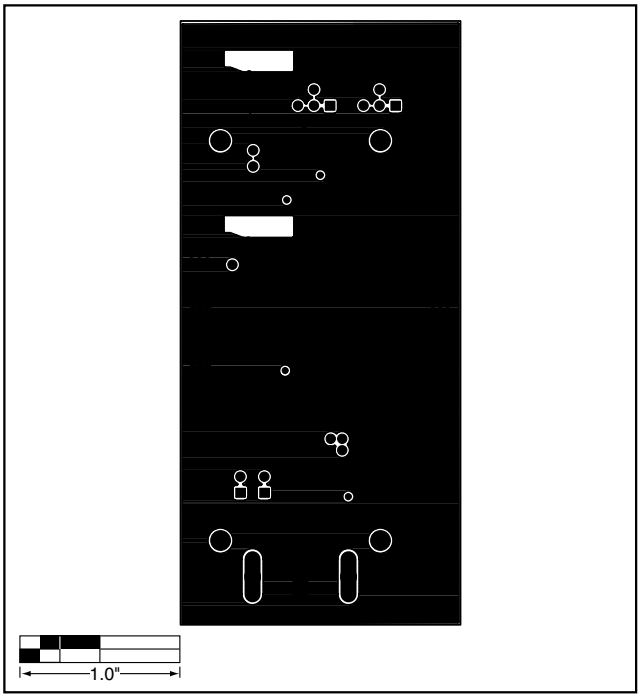

Figure 4. MAX3864 EV Kit PC Board Layout—Ground Plane

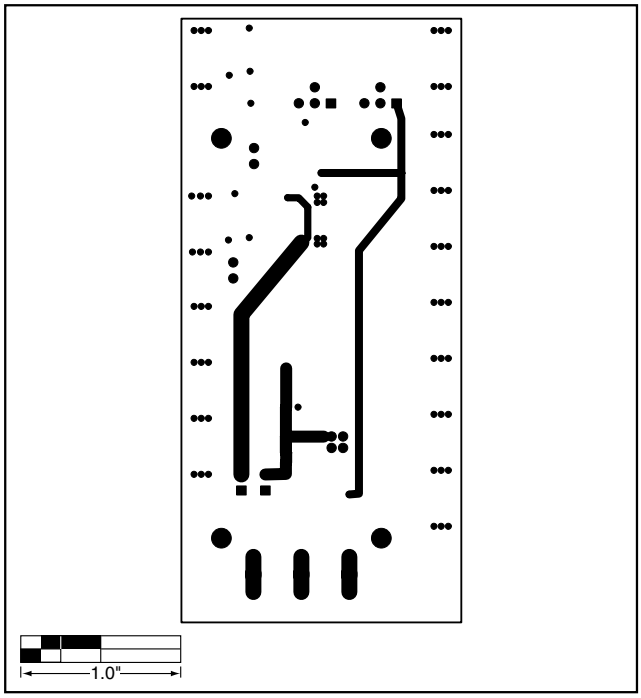

Figure 5. MAX3864 EV Kit PC Board Layout—Power Plane

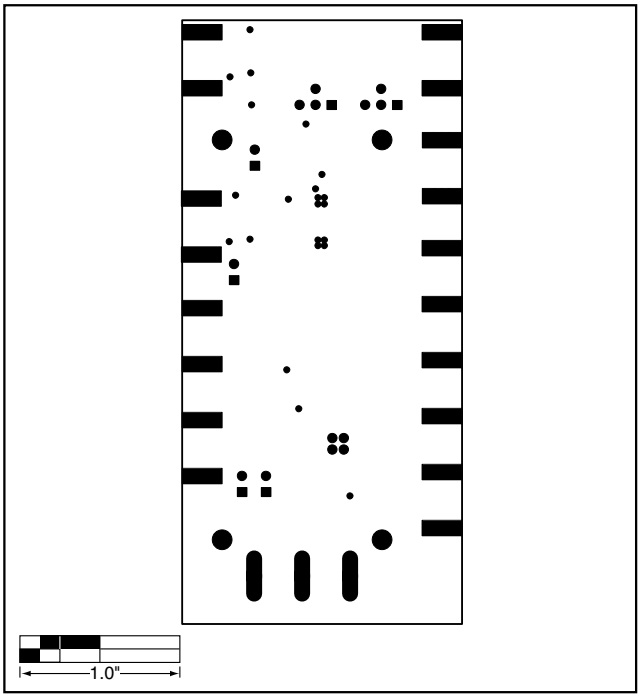

Figure 6. MAX3864 EV Kit PC Board Layout—Solder Side

NOTES