19-1622; Rev 0; 1/00

MAX3665 Evaluation Kit

Evaluates: MAX3665

General Description

The MAX3665 evaluation kit (EV kit) simplifies evaluation of the MAX3665 transimpedance preamplifier. The EV kit includes a circuit that emulates the zero-to-peak current input signal that would be produced by a photodiode. It also includes a calibration circuit that allows accurate bandwidth measurements.

The MAX3665 EV kit is fully assembled and tested.

Features

- **Fully Assembled and Tested**
- **Includes Photodiode Emulation Circuit**
- **Calibration Circuit for Accurate Bandwidth Measurements**

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX3665EVKIT	-40°C to +85°C	8 µMAX

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C4, C7, C10, C11	6	1000pF ±10%, 25V min ceramic capacitors
C3, C5, C6, C12–C16	8	0.1µF 10%, 10V min ceramic caps
C8, C9	2	33µF ±10%, 16V min tantalum caps AVX TAJC336K016
C17, C20, C23	3	5pF ±0.1pF, 50V capacitors
C18, C19, C21	3	4pF ±0.1pF, 50V capacitors
J1–J5	5	SMA connectors (edge mount)
J11–J14	4	Open
JU1, JU2	2	2-pin headers (0.1in centers)
L1, L2	2	Ferrite beads Murata BLM11HA601S
L3–L8	6	22nH ±5% inductors
R1, R9	2	2kΩ ±1% resistors
R2, R4, R10, R12	4	1kΩ ±1% resistors
R3, R11	2	49.9Ω ±5% resistors
R5	1	1kΩ potentiometer
R6, R8	2	10kΩ ±5% resistors
R7	1	10kΩ potentiometer
U1	1	MAX3665EUA (8-pin µMAX)
U2	1	CMPT3906 PNP transistor
U3	1	MAX400CSA (8-pin SO)
U4, U5	0	User-supplied optical modules
VCC, +15V, GND	3	Test points
None	2	Shunts for JU1, JU2
None	1	MAX3665 evaluation kit (rev B) circuit board
None	1	MAX3665 data sheet

Component Suppliers

SUPPLIER	PHONE	FAX
AVX	843-444-2863	843-626-3123
Central Semiconductor	516-435-1110	516-435-1824
Murata	770-684-7821	–
Zetex	516-543-7100	516-864-7630

Note: *Please indicate that you are using the MAX3665 when contacting these component suppliers.*

Quick Start

1) Connect a signal source to INPUT. Set the signal amplitude to 50mVp-p (this may require some attenuation between the source and the MAX3665 EV kit). The signal should have a data rate up to 622Mbps.
2) Connect OUT+ and OUT- to the 50Ω inputs of a high-speed oscilloscope.
3) Remove shunts from jumpers JU1 and JU2.
4) Connect a +3.3V or +5.0V supply to the VCC terminal and ground to the GND terminal.
5) The differential signal at the oscilloscope should be between 100mVp-p and 150mVp-p.

Detailed Description

The MAX3665 is designed to accept a DC-coupled input from a photodiode with an amplitude up to 450µA peak-to-peak. Because the MAX3665 provides a DC bias for the photodiode, it cannot be DC-coupled to signal sources. To allow characterization without a photodiode, the MAX3665 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 MAX3665's 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 so as 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 using the calibration network provided on the EV kit.

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_{AVG} in dBm) and extinction ratio (r_e).
2) Calculate the average current (I_{AVE} in Amps) as follows, and adjust R7 and R5 to obtain it:

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

where ρ = 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:

$$I_{INPUT} = 2 \cdot I_{AVG}(r_e - 1) / (r_e + 1)$$

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 $I_{AVG}(r_e - 1) / (r_e + 1)$ = 16µA. To generate this current through the 3000Ω input resistors, set the signal source to produce an output level of 16µA · 3000Ω = 48mVp-p.

Noise Measurement

Remove R2 before attempting noise measurements to minimize input capacitance. With R2 removed, the total capacitance at the IN pin is approximately 0.5pF. Refer to the MAX3665 data sheet for more information.

Table 1. Connections, Adjustments, and Control

CONTROL	DESCRIPTION
VCC	Supply Voltage Connection (+3.3V or +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.
JU2	Test Pin. Shunting JU2 disables the MAX3665 DC cancellation amplifier.
R5	Potentiometer. Fine adjustment of the DC current input.
R7	Potentiometer. Coarse adjustment of the DC current input.
OUT+, OUT-	Connections for the MAX3665 Output Signal
INPUT	Input Connection for a Signal Generator

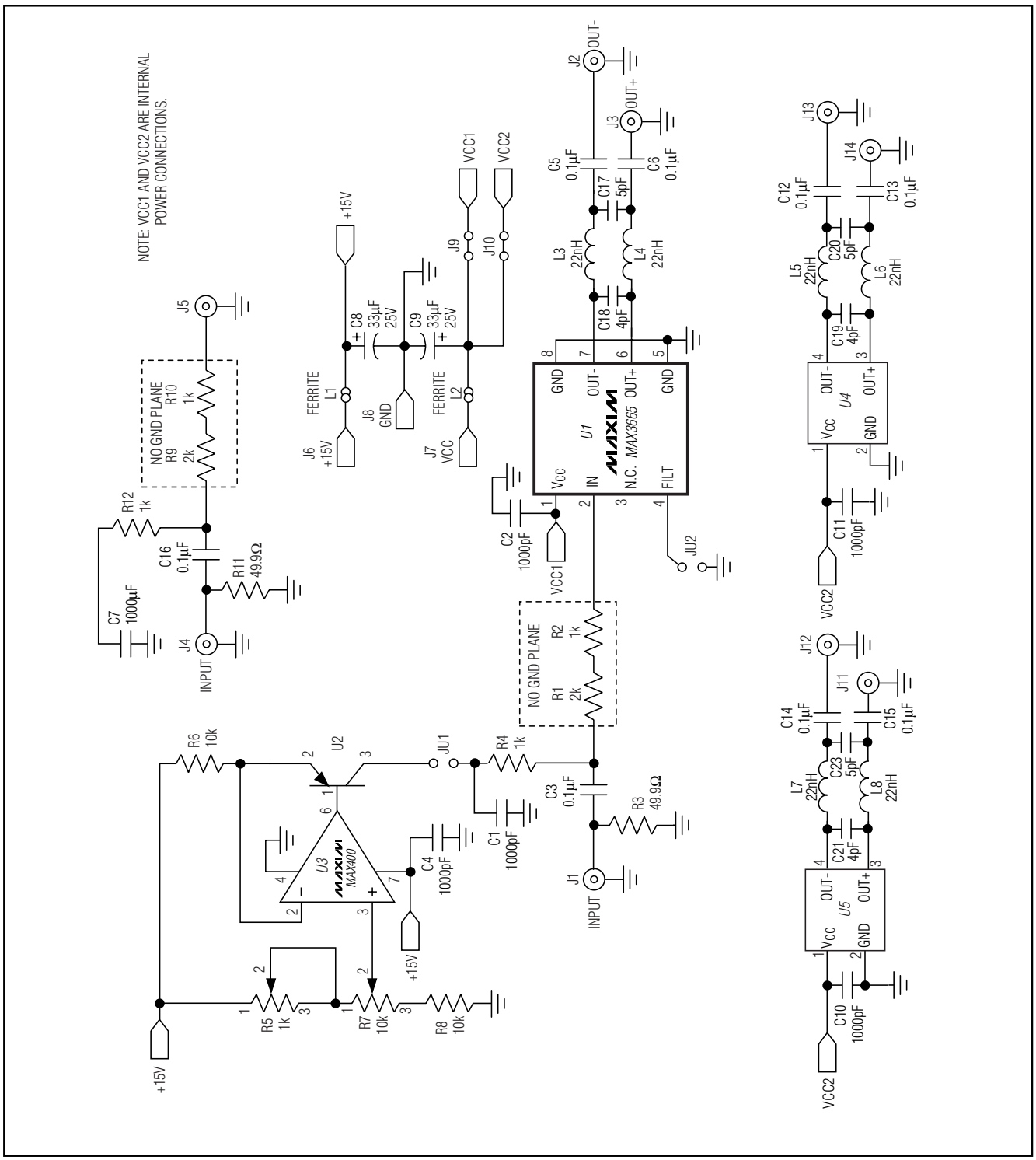

Figure 1. MAX3665 EV Kit Schematic

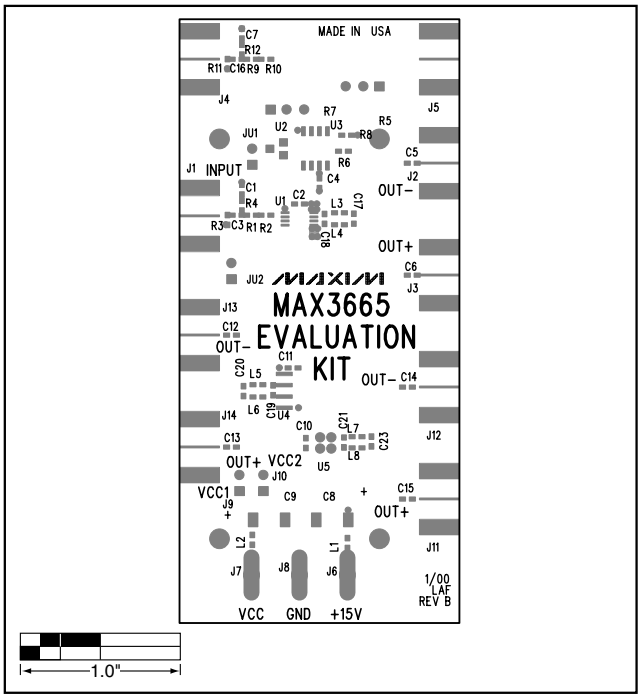

Figure 2. MAX3665 EV Kit Component Placement Guide

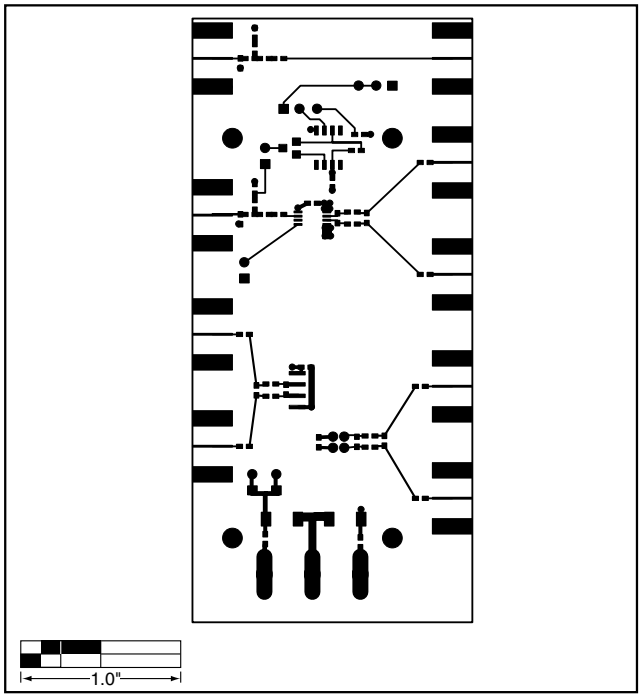

Figure 3. MAX3665 EV Kit PC Board Layout—Component Side

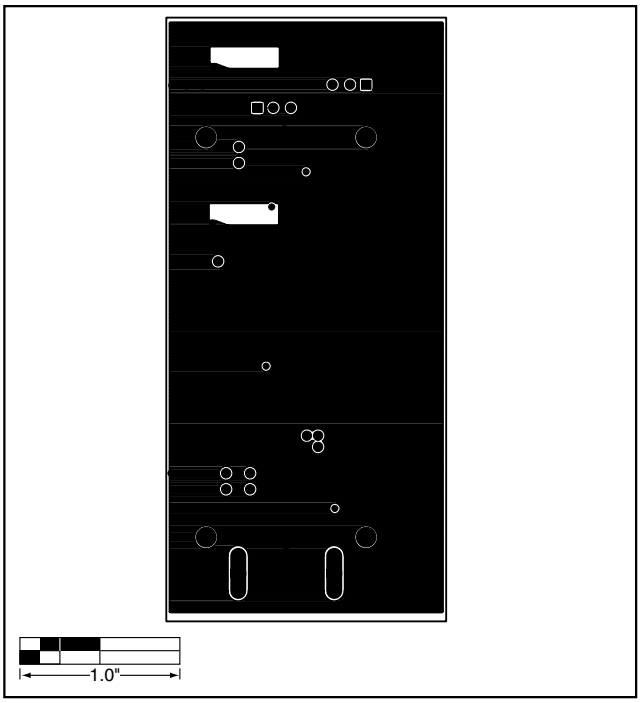

Figure 4. MAX3665 EV Kit PC Board Layout—Ground Plane

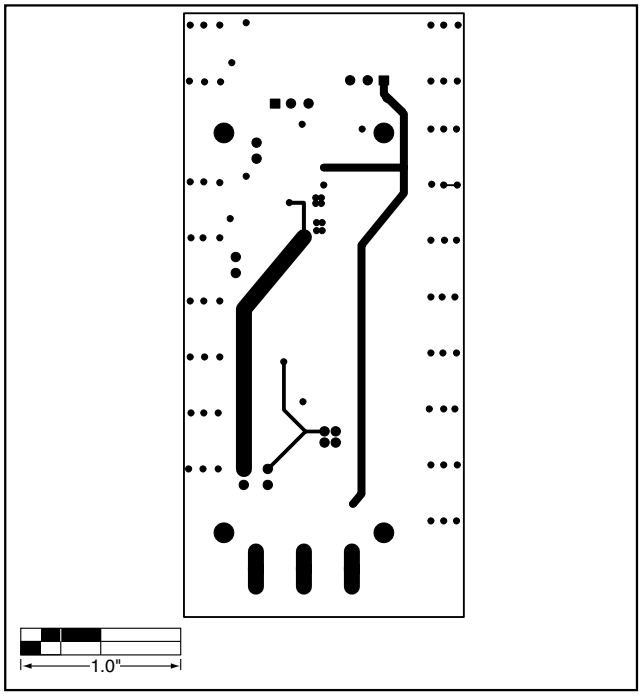

Figure 5. MAX3665 EV Kit PC Board Layout—Power Plane

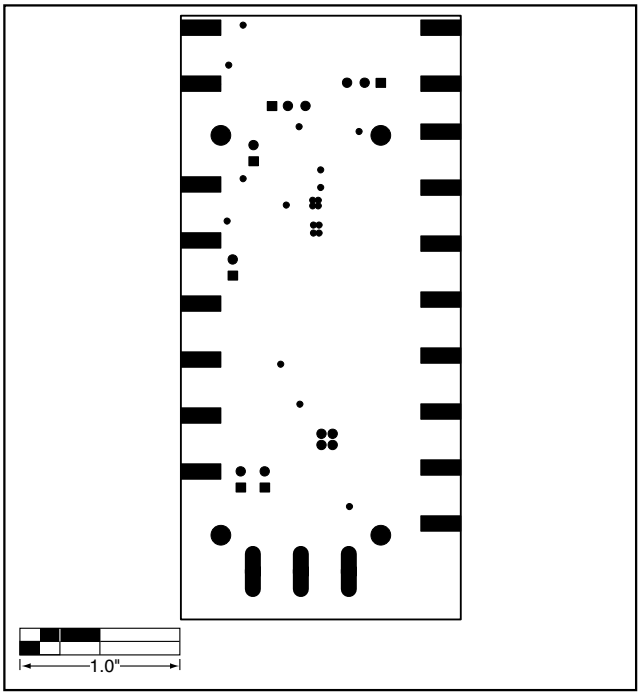

Figure 6. MAX3665 EV Kit PC Board Layout—Solder Side

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