19-2694; Rev B, 07/04

MAX3740A Evaluation Kit

Evaluates: MAX3740A

General Description

The MAX3740A evaluation kit (EV kit) is an assembled demonstration board that provides complete optical and electrical evaluation of the MAX3740A VCSEL driver.

The output of the evaluation kit can be interfaced to an SMA connector, which can be connected to a 50Ω-terminated oscilloscope. With slight modifications, the evaluation kit can also be used to evaluate the MAX3740A operation with a common-cathode VCSEL.

Features

- **Fully Assembled and Tested**
- **Single +3.3V Power Supply Operation**
- **Allows Optical and Electrical Evaluation**

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX3740AEVKIT	-40°C to +85°C	24 QFN

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2, C5, C9, C13, C15, C16, C17	8	0.1µF ±10% ceramic capacitors (0402)
C3	1	0.047µF ±10% ceramic capacitor (0402)
C4, C6, C7, C8, C11, C12	6	0.01µF ±10% ceramic capacitors (0402)
C10	1	Open
C14	1	10µF ±10% ceramic capacitor (0805)
C18	1	10µF ±10% tantalum capacitor (B Case)
D1	1	VCSEL laser and photodiode*
D2	1	LED, red T1 package
L1, L2, L3	3	600Ω ferrite beads (0603)
L4	1	1µH inductor (1008CS)
R1, R2	2	10kΩ potentiometers
R3	1	350Ω ±1% resistor (0402)
R4	1	2.49kΩ ±1% resistor (0402)
R5, R12	2	499Ω ±1% resistors (0402)
R6, R13	2	10kΩ ±5% resistors (0402)
R7	1	0Ω ±1% resistor (0402)*
R8	1	4.7kΩ ±1% resistor (0402)
R9, R11	2	49.9Ω ±1% resistors (0402)
R10, R26, R27, R34, R35, R36	6	Open
R14	1	20kΩ potentiometer
R15	1	50kΩ potentiometer

Component List (cont.)

DESIGNATION	QTY	DESCRIPTION
R16	1	500kΩ potentiometer
Q1, Q2	2	NPN transistors (SOT23)
Q3	1	MOSFET (SOT23)
JU1–JU8, JU10	9	2-pin headers, 0.1in centers
J1–J7	7	SMA connectors, round contacts
TP1–TP11, TP20, TP21	13	Test points
U1	1	MAX3740AETG (24QFN)
U2	1	MAX495ESA (8 SO)
None	9	Shunts
None	1	MAX3740A EV board
None	1	MAX3740A data sheet

** These components are not supplied but can be populated for VCSEL testing.*

Component Suppliers

SUPPLIER	PHONE	FAX
AVX	843-444-2863	843-626-3123
Coilcraft	847-639-6400	847-639-1469
Digi-Key	218-681-6674	218-681-3380
EF Johnson	402-474-4800	402-474-4858
Murata	415-964-6321	415-964-8165

Note: Please indicate that you are using the MAX3701 when ordering from these suppliers.

Quick Start

Electrical Evaluation

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 transistor Q1, which is controlled by an operational amplifier (U2). The APC test circuit, consisting of U2 and Q1, applies the simulated monitor diode current to the MD pin of the MAX3740. To ensure proper operation in the electrical configuration, set up the evaluation board as follows:

1) Place shunts on JU4 - JU8 and JU10 (see the *Adjustment and Control Description* section for details).
2) Remove shunts JU1 and JU2.
3) To enable the output connect TX_DISABLE to GND by placing a shunt on JU3.

   Note: When performing the following resistance checks, autoranging DMMs may forward bias the on-chip ESD protection and cause inaccurate measurements. To avoid this, manually set the DMM to a high range.

4) Adjust R15, the $R_{BIASSET}$ potentiometer, for 1.7kΩ resistance between TP4 (BIASSET) and ground.
5) Adjust R1, the R_{PWRSET} potentiometer, for 10kΩ resistance between TP2 (REF) and pin 1 (MD) of JU2.
6) Adjust R14, the $R_{PEAKSET}$ potentiometer, for 20kΩ resistance between TP10 (PEAKSET) and ground, to disable peaking.
7) Adjust R16, the R_{TC} potentiometer, for 0Ω resistance between TP7 (TC1) and TP8 (TC2), to disable temperature compensation.
8) Adjust R2, the R_{MODSET} potentiometer, for 10kΩ resistance between TP9 (MODSET) and ground.
9) Apply a differential input signal (250mV$_{P-P}$ to 2200mV$_{P-P}$) between SMA connectors J5 and J7 (IN+ and IN-).
10) Attach a high-speed oscilloscope with a 50Ω input to SMA connector J6 (OUT).
11) Connect a +3.3V supply between TP20 (V_{CC}) and TP21 (GND). Adjust the power supply until the voltage between TP11 and ground is +3.3V.
12) Adjust R1 (R_{PWRSET}) until desired laser bias current is achieved.

$$I_{BIAS} = \frac{V_{PIN1\_JU5}}{49.9\Omega}$$

13) The MD and BIAS currents can be monitored at TP1 (V_{PWRMON}) and TP3 ($V_{BIASMON}$) using the equations below:

$$I_{MD} = \frac{V_{PWRMON}}{2 \times R_{PWRSET}}$$

$$I_{BIAS} = \frac{9 \times V_{BIASMON}}{350\Omega}$$

Note: If the voltage at TP1 exceeds V_{PMTH} (0.8V typ) or TP3 exceeds V_{BMTH} (0.8V typ), the FAULT signal will be asserted and latched.

14) Adjust R2 until the desired laser modulation current is achieved.

$$I_{MOD} = \frac{\text{Signal Amplitude (V)}}{50\Omega}$$

15) Adjust R14 ($R_{PEAKSET}$) until the desired amount of peaking is achieved.

Optical Evaluation

For optical evaluation of the MAX3740A, configure the evaluation kit as follows:

1) Place shunts on JU2, JU6, JU7, JU8 and JU10 (See the *Adjustment and Control Description* section for details).
2) Remove components L2 and C9. Remove the shunts from JU1, JU4 and JU5.
3) Install a 0Ω resistor at R7 to connect the anode of the VCSEL to the output.
4) To enable the output connect TX_DISABLE to GND by placing a shunt on JU3.
5) Connect a common cathode VCSEL as shown in Figure 1. Keep leads short to reduce reflection.

   Note: When performing the following resistance checks, autoranging DMMs may forward bias the on-chip ESD protection and cause inaccurate measurements. To avoid this, manually set the DMM to a high range.

6) Adjust R15, the $R_{BIASSET}$ potentiometer, for 1.7kΩ resistance between TP4 (BIASSET) and ground.
7) Adjust R1, the R_{PWRSET} potentiometer, for 10kΩ resistance between TP2 (REF) and pin 1 (MD) of JU2.
8) Adjust R14, the $R_{PEAKSET}$ potentiometer, for 20kΩ resistance between TP10 (PEAKSET) and ground, to disable peaking.
9) Adjust R16, the R_{TC} potentiometer, for 0Ω resistance between TP7 (TC1) and TP8 (TC2), to disable temperature compensation.

10) Adjust R2, the R_{MODSET} potentiometer, for 10kΩ resistance between TP9 (MODSET) and ground.
11) Apply a differential input signal (250mV$_{P-P}$ to 2200mV$_{P-P}$) between SMA connectors J5 and J7 (IN+ and IN-).
12) Attach the VCSEL fiber connector to an optical/electrical converter.
13) Connect a +3.3V supply between TP20 (V_{CC}) and TP21 (GND). Adjust the power supply until the voltage between TP11 and ground is +3.3V.
14) Adjust R1 (R_{PWRSET}) until desired average optical power is achieved.
15) The MD and BIAS currents can be monitored at TP1 (V_{PWRMON}) and TP3 ($V_{BIASMON}$) using the equations below:

$$I_{MD} = \frac{V_{PWRMON}}{2 \times R_{PWRSET}}$$

$$I_{BIAS} = \frac{9 \times V_{BIASMON}}{350\Omega}$$

Note: If the voltage at TP1 exceeds V_{PMTH} (typical 0.8V) or TP3 exceeds V_{BMTH} (typical 0.8V), the FAULT signal will be asserted and latched.

16) Adjust R2 (R_{MODSET}) until the desired optical amplitude is achieved. Optical amplitude can be observed on an oscilloscope connected to an optical/electrical converter. VCSEL overshoot and ringing can be improved by appropriate selection of R10 and C10, as described in the Design Procedure section of the MAX3740 data sheet.

Adjustment and Control Description (see Quick Start first)

COMPONENT	NAME	FUNCTION
D2	Fault Indicator	The LED is illuminated when a fault condition has occurred (refer to the *Detailed Description* section of the MAX3740 data sheet).
JU1	COMP	Enables/disables the APC circuit. Remove the shunt to enable the APC circuit.
JU2	PHOTODIODE	Installing a shunt connects the photodiode of the VCSEL to the MD pin. Used when a VCSEL is installed.
JU3	TX_DISABLE	Enable/disable the output currents. Install a shunt to enable output currents.
JU4	IPD	Determines the gain of the photodiode emulator. When JU4 is open, the gain is 0.02A/A. When JU4 is shunted, the gain is 0.12A/A.
JU5	APCOPEN	Installing a shunt connects the electrical output of the part to the emulation circuit.
JU6	FAULT	Installing a shunt enables the external fault-indicator circuit.
JU7	SQUELCH	Installing a shunt enables the squelch function.
JU8	POWER	Installing a shunt provides power to the part.
JU10	VCCEXT	Installing a shunt provides power to the emulation and fault-indicator circuits.
R1	RPWRSET	Adjusts transmit optical power to be maintained by the APC loop.
R2	RMODSET	Adjusts the laser modulation current.
R14	RPEAKSET	Adjusts the peaking for the falling edge of the VCSEL.
R15	RBIASSET	In a closed-loop configuration: adjusts the maximum bias current available to the APC. In an open-loop configuration: adjusts the bias level of the output.
R16	RTC	Adjusts the temperature compensation of the modulation current.

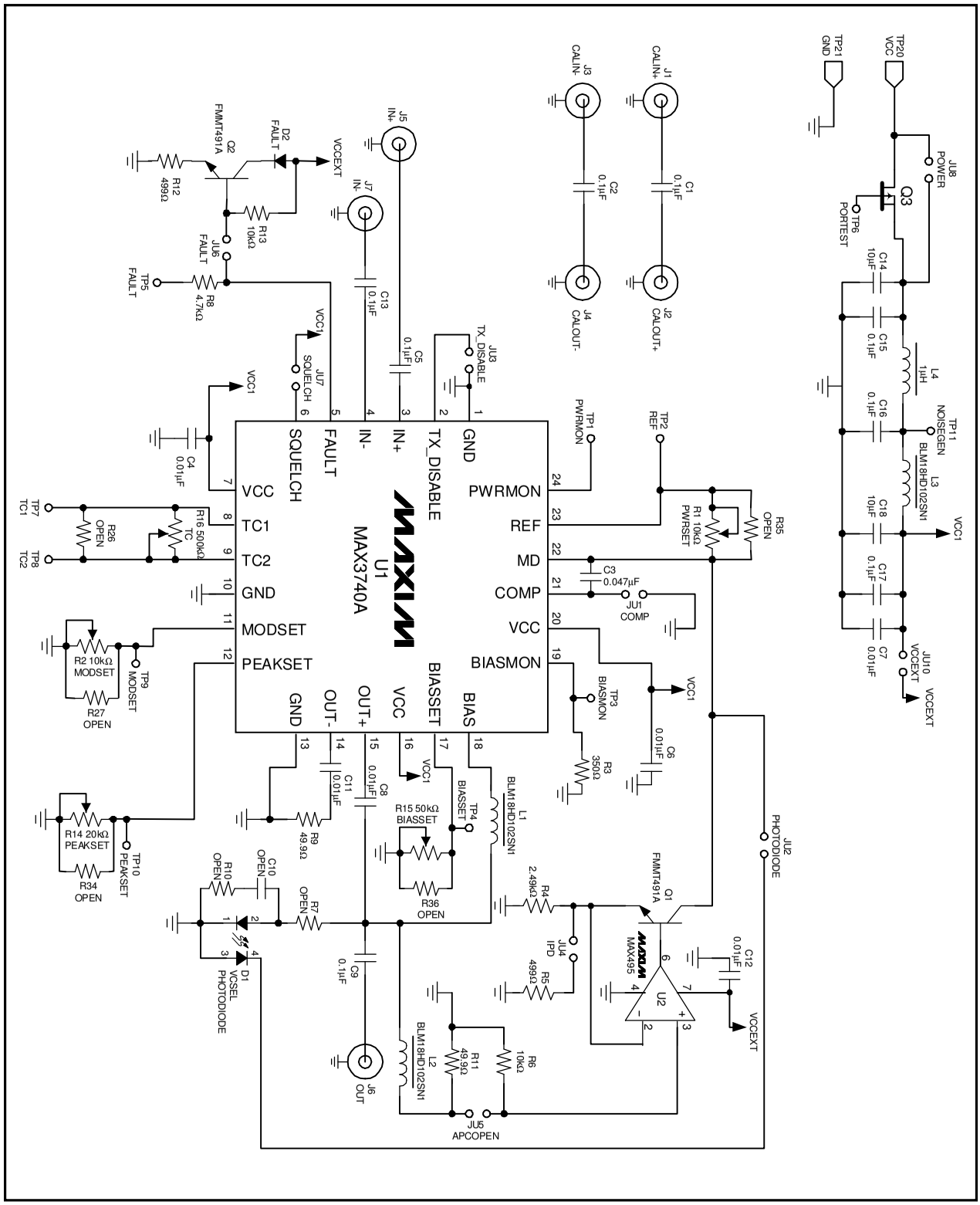

Figure 1. MAX3740A EV Kit Schematic Diagram

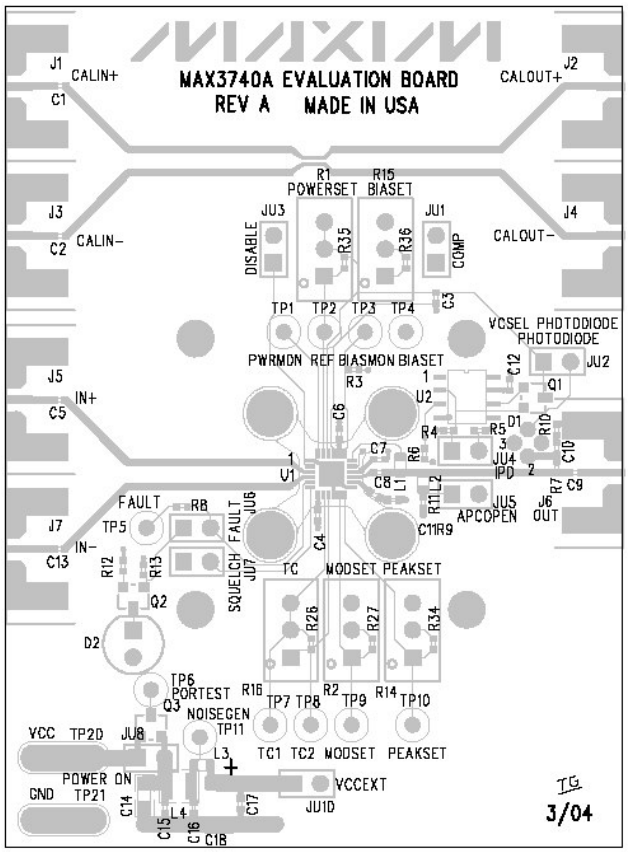

Figure 2. MAX3740A EV Kit Component Placement Guide - Component Side

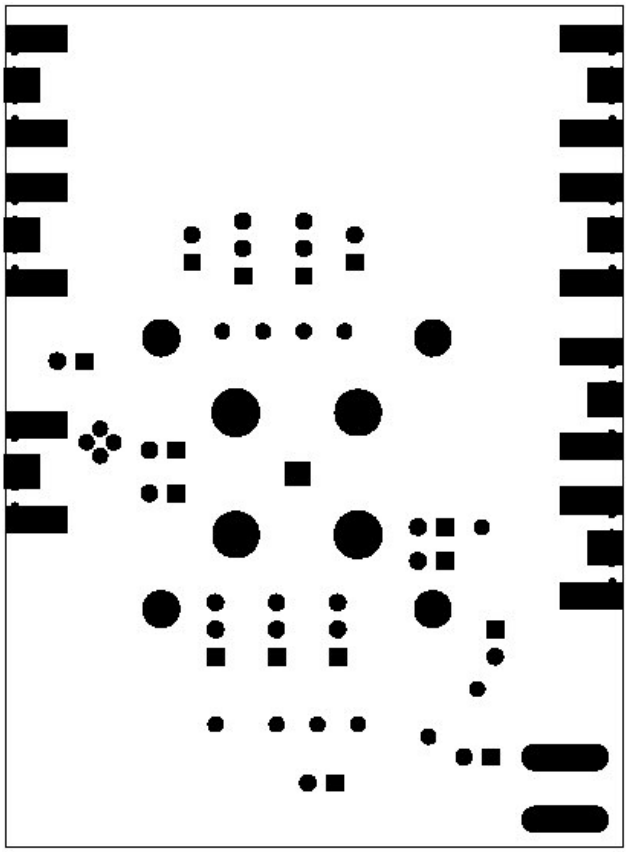

Figure 3. MAX3740A EV Kit PC Board Layout - Solder Side

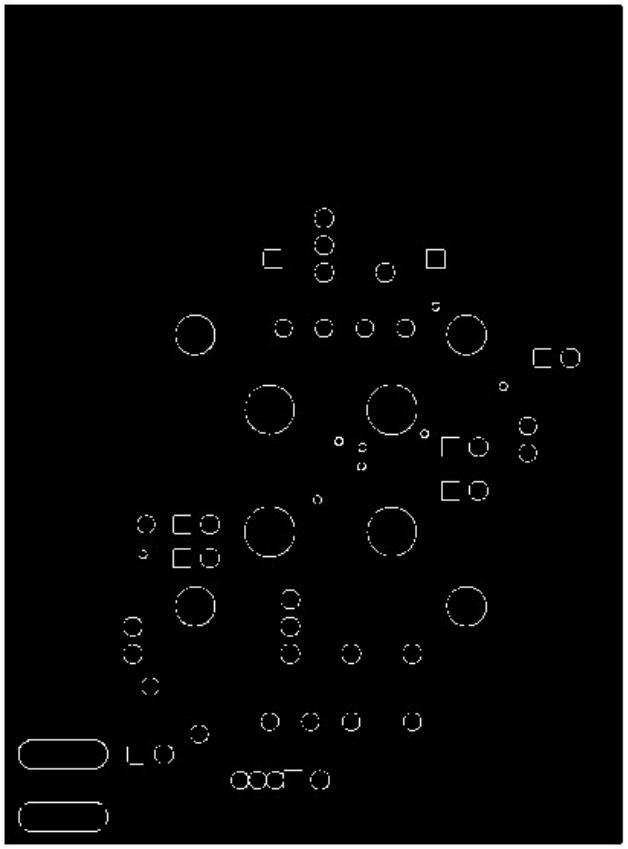

Figure 4. MAX3740A EV Kit PC Board Layout - Ground Plane

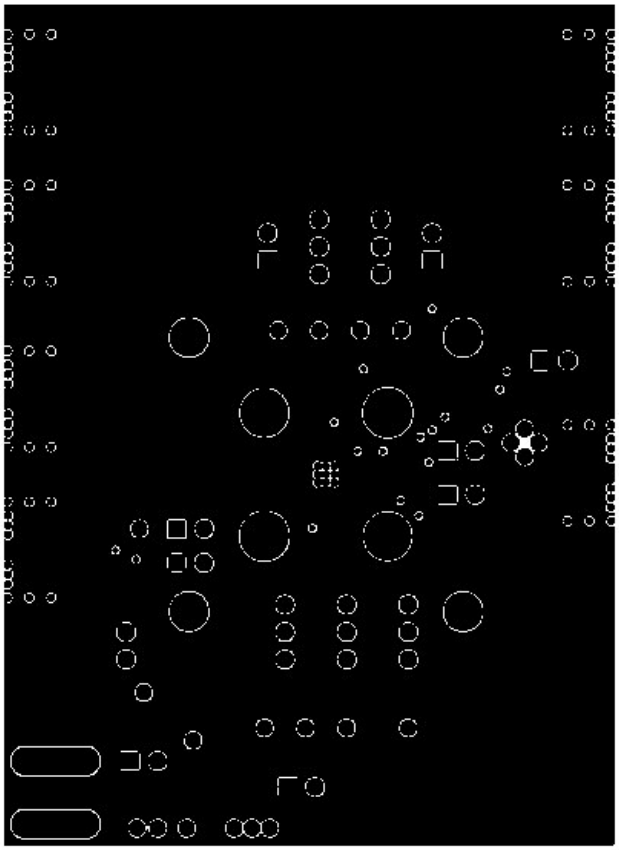

Figure 5. MAX3740A EV Kit PC Board Layout - Power Plane

Mouser Electronics

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MAX3740AEVKIT