



# MAX3656 Evaluation Kit

## General Description

The MAX3656 evaluation kit (EV kit) is an assembled demonstration board that provides optical evaluation of the MAX3656 155Mbps to 2.5Gbps burst-mode laser driver. The evaluation board allows connection with coaxial laser packages as well as BIDI packages.

## EV Kit Contents

### ◆ MAX3656 EV Kit Board

## Features

- ◆ Fully Assembled and Tested
- ◆ Adjustable Laser Bias Current
- ◆ Adjustable Laser Modulation Current
- ◆ Single +3.3V Power-Supply Operation

## Ordering Information

PART	TYPE
MAX3656EVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

## Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	1 $\mu$ F $\pm$ 10% ceramic capacitor (0402) Murata GRM155R61A105KE15D
C2	1	1000pF $\pm$ 10% ceramic capacitor (0402) Murata GRM155R71H102KA01D
C3, C10–C15	7	0.1 $\mu$ F $\pm$ 10% ceramic capacitors (0402) Murata GRM155R61A104KA01D
C19	1	10 $\mu$ F $\pm$ 10% tantalum capacitor (B case) AVX TAJB106K010RNJ
C20	1	0.1 $\mu$ F $\pm$ 10% ceramic capacitor (0603) Murata GRM188R71H104KA93D
C21	1	0.01 $\mu$ F $\pm$ 10% ceramic capacitor (0603) TDK C1005X8R1E103K
C24	1	27pF $\pm$ 5% ceramic capacitor (0402) Murata GRM1555C1H270JZ01D
D2	1	Green LED, SMD Panasonic LNJ311G8PRA
D3, D4	2	Diodes Panasonic MA27P0100L
D5	0	Laser, user supplied
J18, J20, TP1, TP2	4	Test points Keystone 5000
J23–J26	4	SMA connectors, edge mount, tab contact Johnson 142-0701-851

DESIGNATION	QTY	DESCRIPTION
JP26, JP28, JP30, JP32, JP33	5	3-pin headers, 0.1in center Sullins PEC36SAAN
JP26, JP28, JP30, JP32, JP33	5	Shunts Sullins SSC02SYAN
L1	1	10nH $\pm$ 5% inductor (0402) Murata LQG15HS10NJ02
Q1	1	npn transistor Zetex FMMT491ATA
R1	1	15 $\Omega$ $\pm$ 5% resistor (0402)
R2, R3	2	10 $\Omega$ $\pm$ 5% resistors (0402)
R12, R126	2	5.6 $\Omega$ $\pm$ 5% resistors (0402)
R43	1	200 $\Omega$ $\pm$ 5% resistor (0603)
R59, R79, R90	3	50k $\Omega$ variable resistors Bourns 3296W-1-503LF
R61, R82, R118	0	Not installed, resistors (0603)
R88	1	4.3k $\Omega$ $\pm$ 5% resistor (0603)
R91, R92, R94, R95, R97, R98, R100, R101	0	Not installed, resistors (0402)
R103, R104	2	100 $\Omega$ $\pm$ 1% resistors (0402)
R113–R116	4	0 $\Omega$ $\pm$ 5% resistors (0402)
R119	1	3k $\Omega$ $\pm$ 5% resistor (0603)
R120	1	1.5k $\Omega$ $\pm$ 5% resistor (0603)
R121	1	75 $\Omega$ $\pm$ 5% resistor (0402)
U1	1	Burst-mode laser driver (24 TQFN-EP*) Maxim MAX3656ETG+
—	1	PCB: MAX3656 EVALUATION BOARD+, Rev D

\*EP = Exposed pad.

Evaluates: MAX3656



# MAX3656 Evaluation Kit

## Quick Start

To evaluate the MAX3656 with a laser diode, configure the EV kit as follows:

- 1) Pull shunts off all jumpers (JP33, JP30, JP32, JP26, and JP28).
- 2) Set R<sub>APCSET</sub> to 20k $\Omega$  by adjusting the APCSET variable resistor R79 until the measured resistance between the VAR pin of jumper JP33 and GND is 20k $\Omega$ . Then install a shunt on the VAR side of jumper JP33.
- 3) Set R<sub>MODSET</sub> to 20k $\Omega$  by adjusting the MODSET variable resistor R59 until the measured resistance between the VAR pin of jumper JP30 and GND is 20k $\Omega$ . Then install a shunt on the VAR side of jumper JP30.
- 4) Set R<sub>BIASMAX</sub> to 7k $\Omega$  by adjusting the BIASMAX variable resistor R90 until the measured resistance between the VAR pin of jumper JP32 and GND is 7k $\Omega$ . Then install a shunt on the VAR side of jumper JP32.
- 5) Connect the  $\overline{\text{EN}}$  pin to GND by installing a shunt on the GND side of jumper JP26.
- 6) Connect the LONGB pin to GND by installing a shunt on the GND side of jumper JP28.
- 7) Solder a laser to edge connection D5. See Figure 1 for a view of how the laser should be mounted on the EV kit. Be sure to keep the laser leads as short as possible to minimize parasitic inductance.
- 8) Connect a differential data source to IN+ (J26) and IN- (J25) and a differential burst-enable source to BEN+ (J24) and BEN- (J23). Make sure the differential signals are between 200mV<sub>P-P</sub> and 1600mV<sub>P-P</sub> and the common-mode is between (V<sub>CC</sub> - 1.49V) and (V<sub>CC</sub> - V<sub>IN</sub>/4). See the *Applications Information* section for more options.
- 9) Attach a +3.3V power supply to J18 (+3.3V) and J20 (GND). Set the current limit to 250mA.
- 10) Connect the output of the user-supplied laser to an optical-to-electrical converter that has the appropriate bandwidth (filter) for the intended application.

- 11) Turn on the power supply and adjust APCSET (R79) for the desired average optical power, then adjust MODSET (R59) for the desired extinction ratio.

**Note:** The APC loop is functional when the  $\overline{\text{FAIL}}$  indicator, green LED D2, is on. The LED is off if the BIASMAX is set too low, the monitor diode (MD) pin is not connected, or the modulation current is set too high.

- 12) If the eye diagram contains too much overshoot or the rise/fall times are too slow, experimentally adjust the values of the RL peaking network (R3, L1) and RC shunt network (R121, C24) to better match the characteristics of the laser.

## Applications Information

### Continuous Mode Operation

For continuous mode operation, switch the differential burst-enable input (BEN $\pm$ ) to a constant high in one of two ways:

- Remove resistor R103. Install a 1k $\Omega$  resistor on R101 and 3k $\Omega$  resistors on R91, R92, and R100.
- Connect a +2.3V supply to BEN+ and a +1.7V supply to BEN- (or a differential 0.6V supply between BEN+ and BEN-).

### LVPECL Input Terminations

If needed, an LVPECL Thevenin equivalent load termination of 50 $\Omega$  to (V<sub>CC</sub> - 2V) can be created by doing the following:

- Remove resistors R103 and R104.
- Solder 130 $\Omega$  resistors on R92, R94, R98, and R101.
- Solder 82 $\Omega$  resistors on R91, R95, R97, and R100.

For more information, refer to Application Note 291: *HFAN-01.0: Introduction to LVDS, PECL, and CML*.

### LVC MOS Burst Enable

To drive the burst-enable input (BEN+) with single-ended LVC MOS levels, do the following:

- Remove resistors R103 and R114.
- Solder 3k $\Omega$  resistor on R114.
- Solder 5k $\Omega$  resistors on R101 and R92.
- Solder 9k $\Omega$  resistor on R91.

# MAX3656 Evaluation Kit

Evaluates: MAX3656

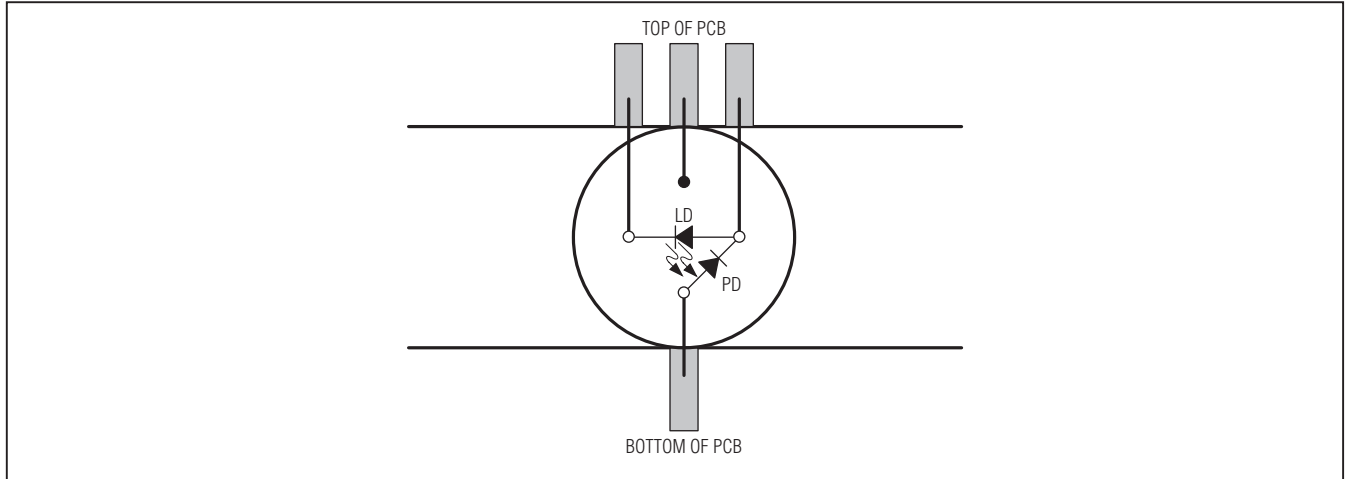


Figure 1. Laser Attachment

**Table 1. Adjustment and Control Descriptions**

COMPONENT	NAME	FUNCTION
JP33	APCSET SELECT	This jumper connects a fixed resistance (R82, not installed) or a variable resistance (R120 + R79) between the APCSET pin and GND.
R79	APCSET RESISTOR	This 50k $\Omega$ variable resistor, in addition to a 1.5k $\Omega$ series resistor (R120), sets the external resistance between the APCSET pin and GND when a shunt is installed on the VAR side of jumper JP33. Turning the variable resistor clockwise increases the average optical power.
JP30	MODSET SELECT	This jumper connects a fixed resistance (R61, not installed) or a variable resistance (R119 + R59) between the MODSET pin and GND.
R59	MODSET RESISTOR	This 50k $\Omega$ variable resistor, in addition to a 3k $\Omega$ series resistor (R119), sets the external resistance between the MODSET pin and GND when a shunt is installed on the VAR side of jumper JP30. Turning the variable resistor clockwise increases the modulation current and extinction ratio.
JP32	BIASMAX SELECT	This jumper connects a fixed resistance (R118, not installed) or a variable resistance (R88 + R90) between the BIASMAX pin and GND.
R90	BIASMAX RESISTOR	This 50k $\Omega$ variable resistor, in addition to a 4.3k $\Omega$ series resistor (R88), sets the external resistance between the BIASMAX pin and GND when a shunt is installed on the VAR side of jumper JP32. Turning the variable resistor clockwise increases the maximum bias current.
JP26	$\overline{\text{EN}}$	This jumper is used to connect the $\overline{\text{EN}}$ pin to V <sub>CC</sub> (driver disabled) or to GND (driver enabled).
JP28	LONGB	This jumper is used to connect the LONGB pin to V <sub>CC</sub> (burst on-time > 1.2 $\mu$ s) or to GND (burst on-time $\leq$ 1.2 $\mu$ s).
D2	$\overline{\text{FAIL}}$	The APC loop is functional when the LED is on. The LED is off if the BIASMAX is set too low, the monitor diode (MD) pin is not connected, or the modulation current is set too high.

# MAX3656 Evaluation Kit

Evaluates: MAX3656

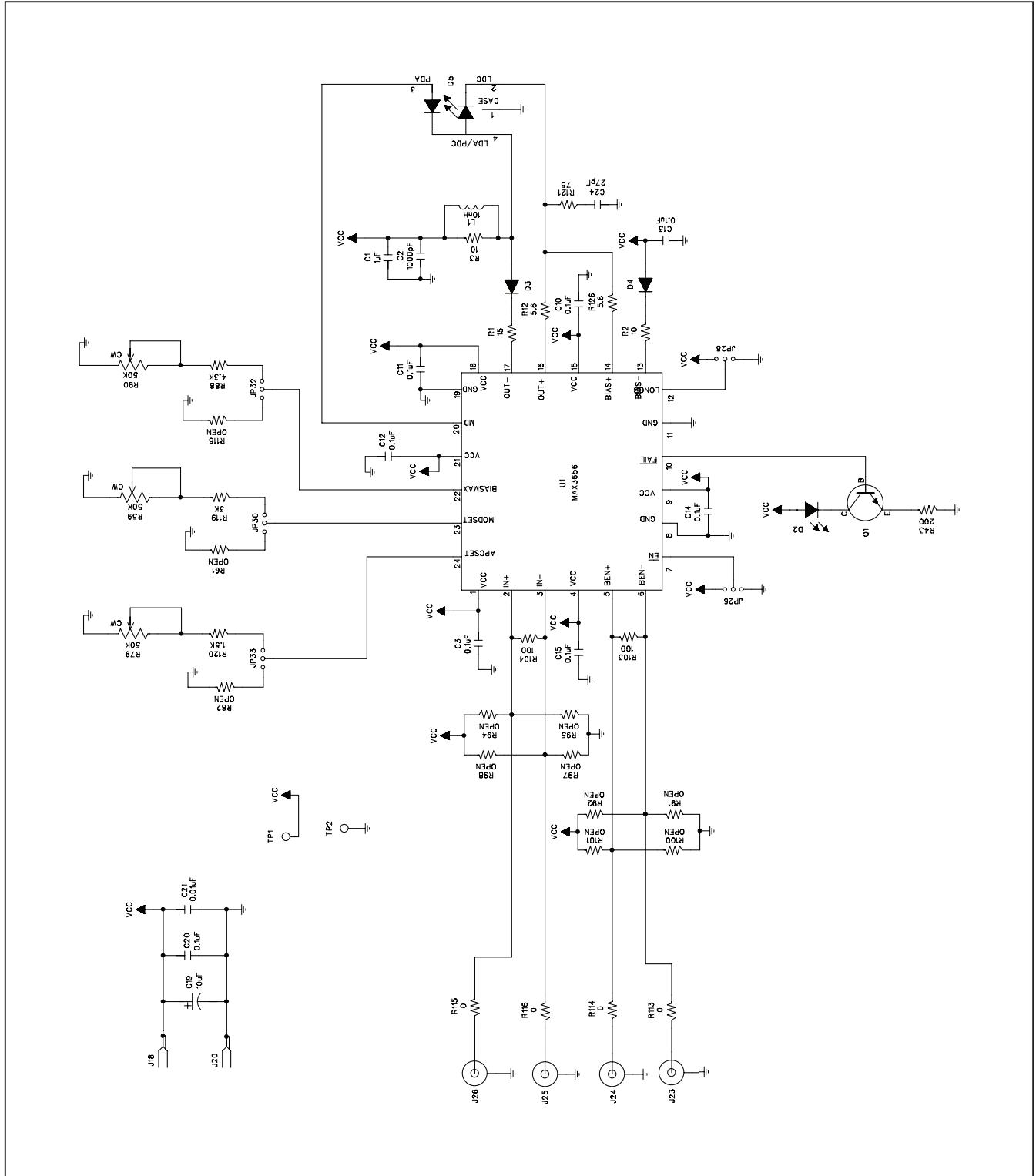


Figure 2. MAX3656 EV Kit Schematic

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Evaluates: MAX3656

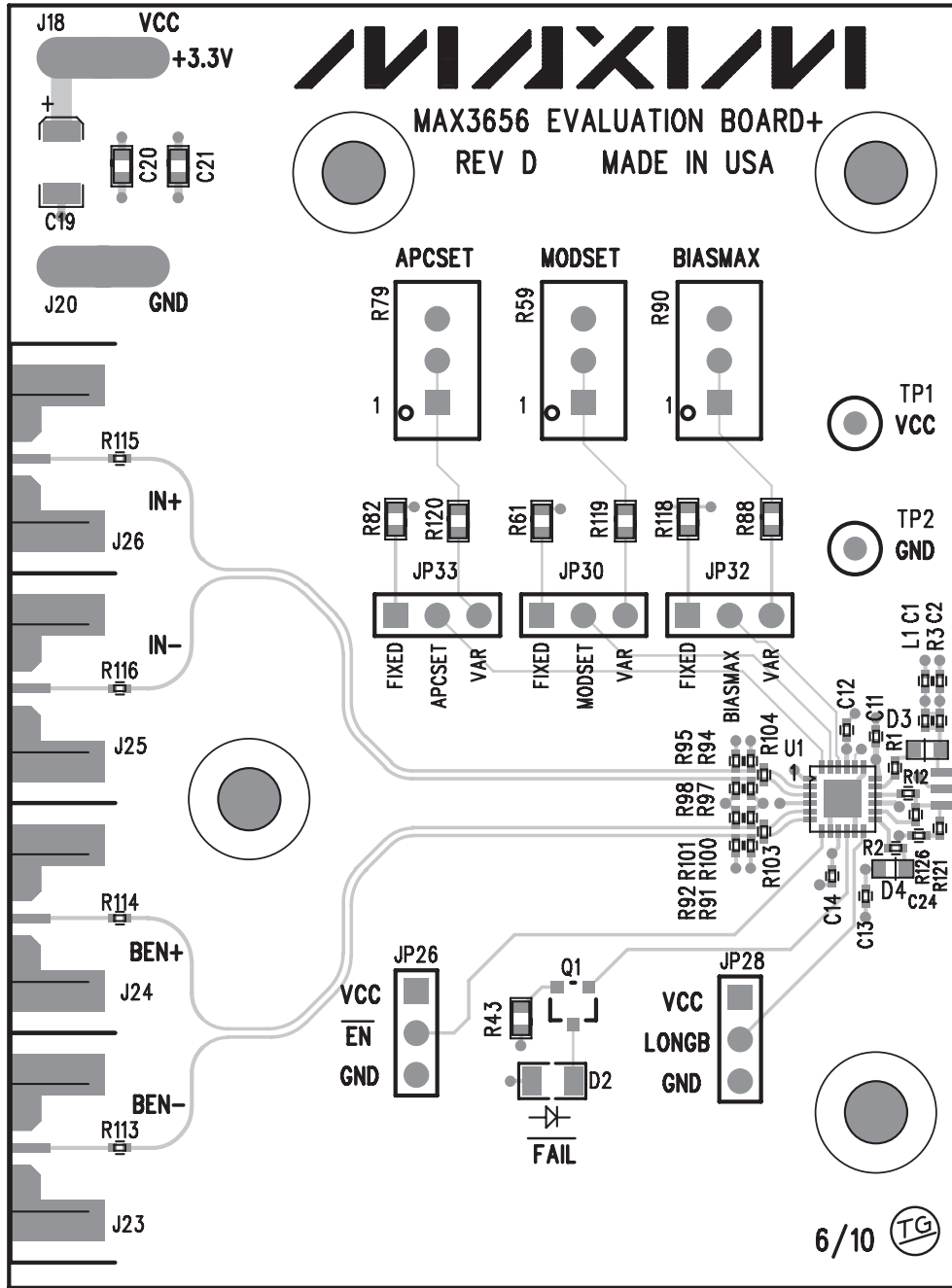


Figure 3. MAX3656 EV Kit Component Placement Guide—Component Side

# MAX3656 Evaluation Kit

Evaluates: MAX3656

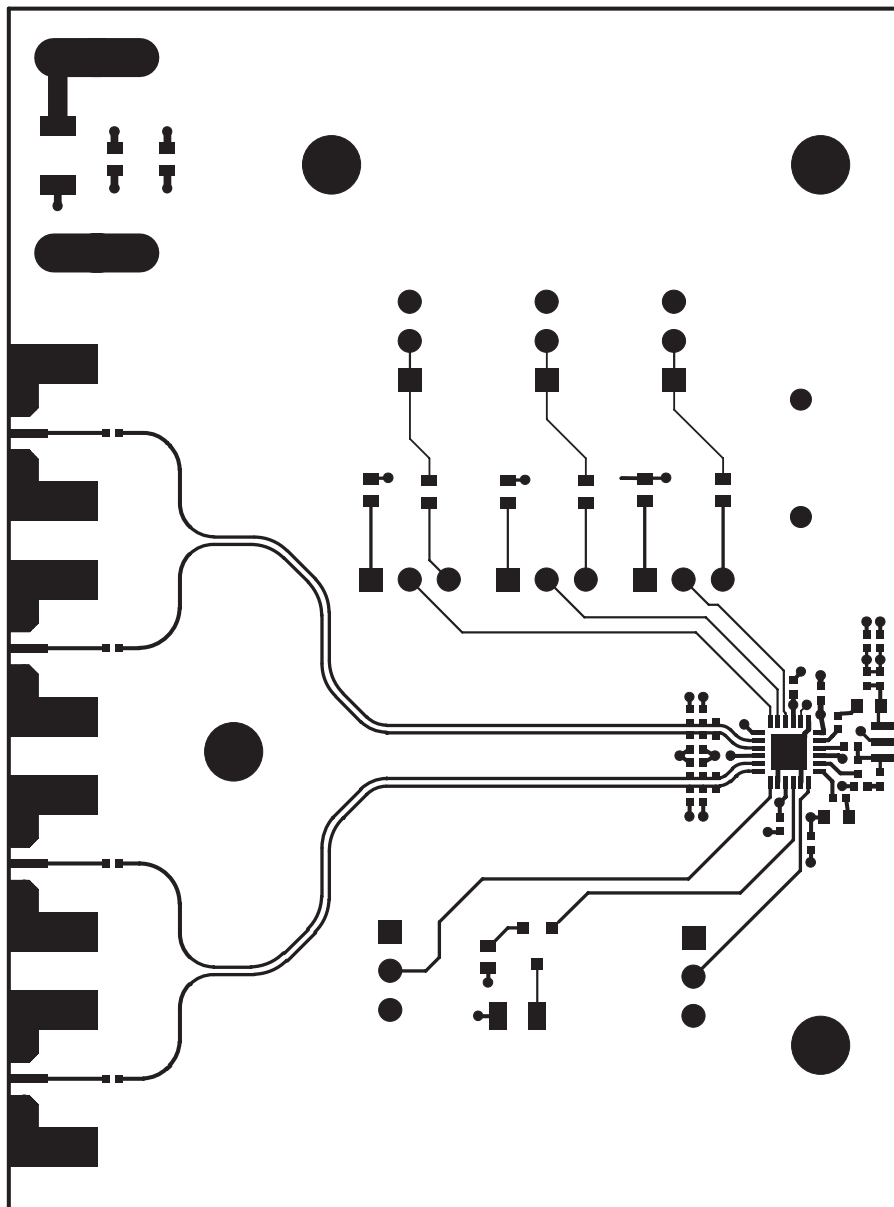


Figure 4. MAX3656 EV Kit PCB Layout—Component Side

# MAX3656 Evaluation Kit

Evaluates: MAX3656

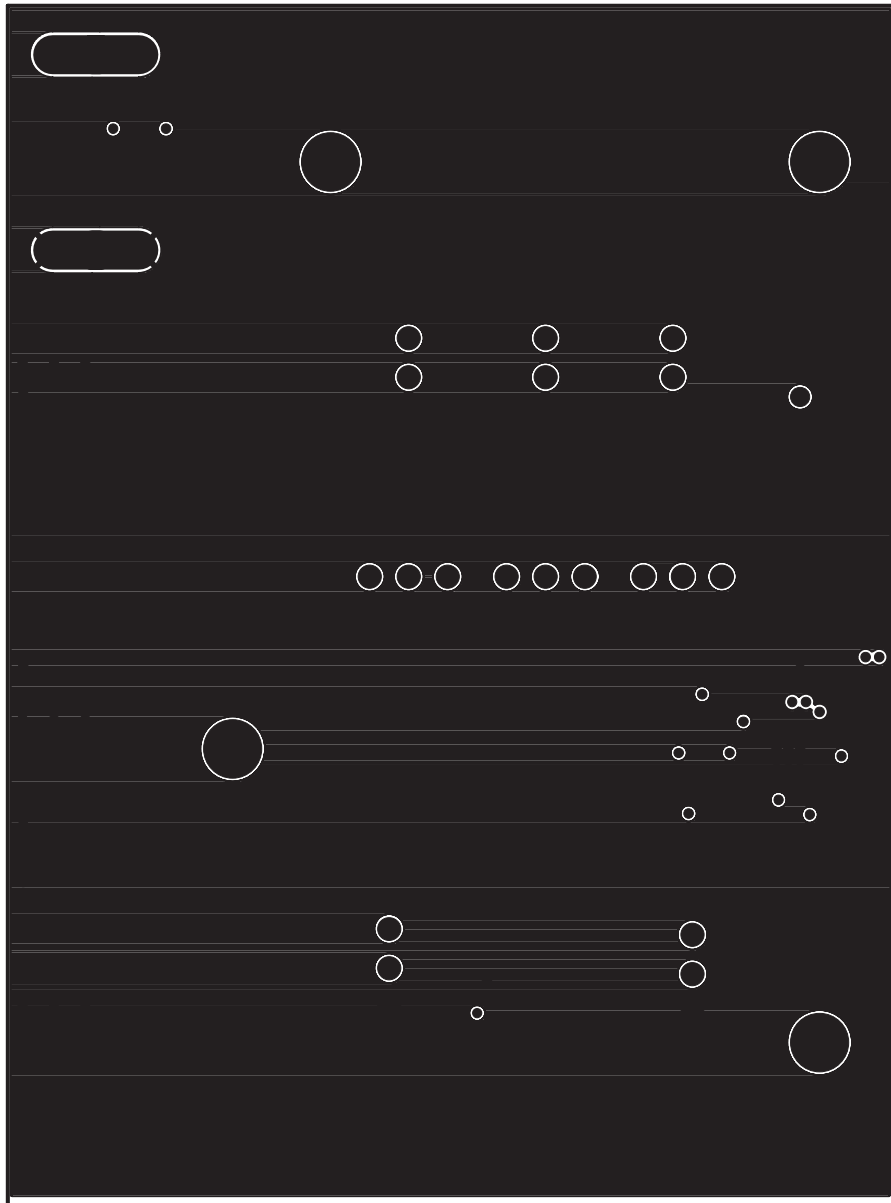


Figure 5. MAX3656 EV Kit PCB Layout—Ground Plane

# MAX3656 Evaluation Kit

Evaluates: MAX3656

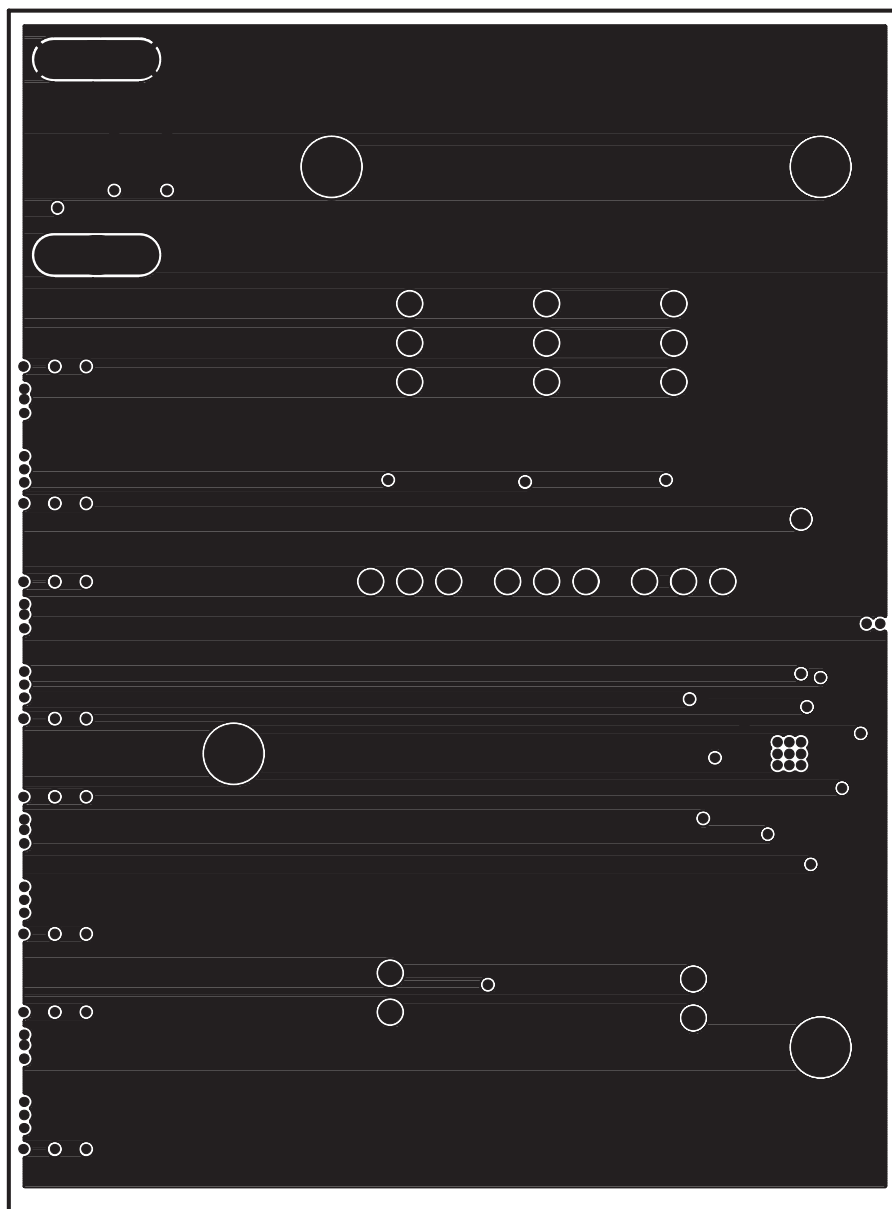


Figure 6. MAX3656 EV Kit PCB Layout—Power Plane



# MAX3656 Evaluation Kit

Evaluates: MAX3656

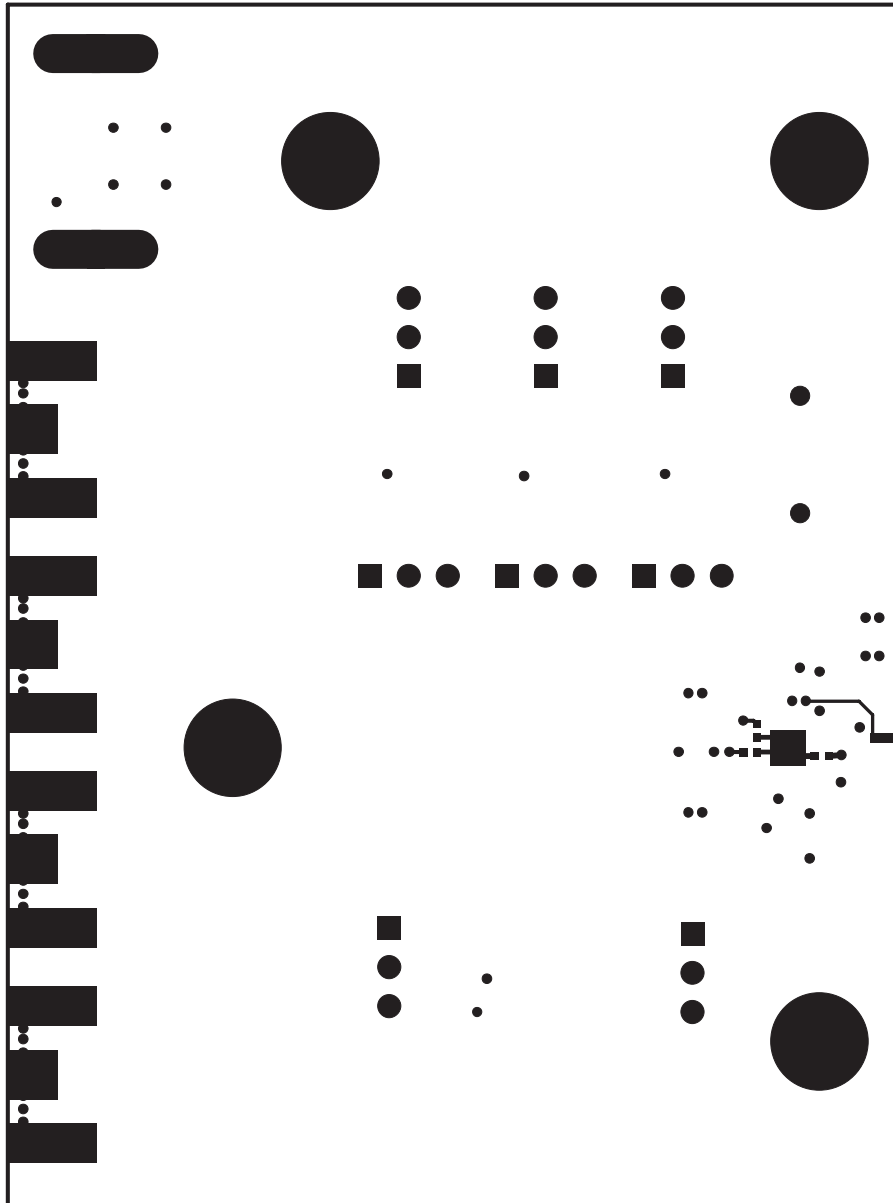


Figure 7. MAX3656 EV Kit PCB Layout—Solder Side

# MAX3656 Evaluation Kit

Evaluates: MAX3656

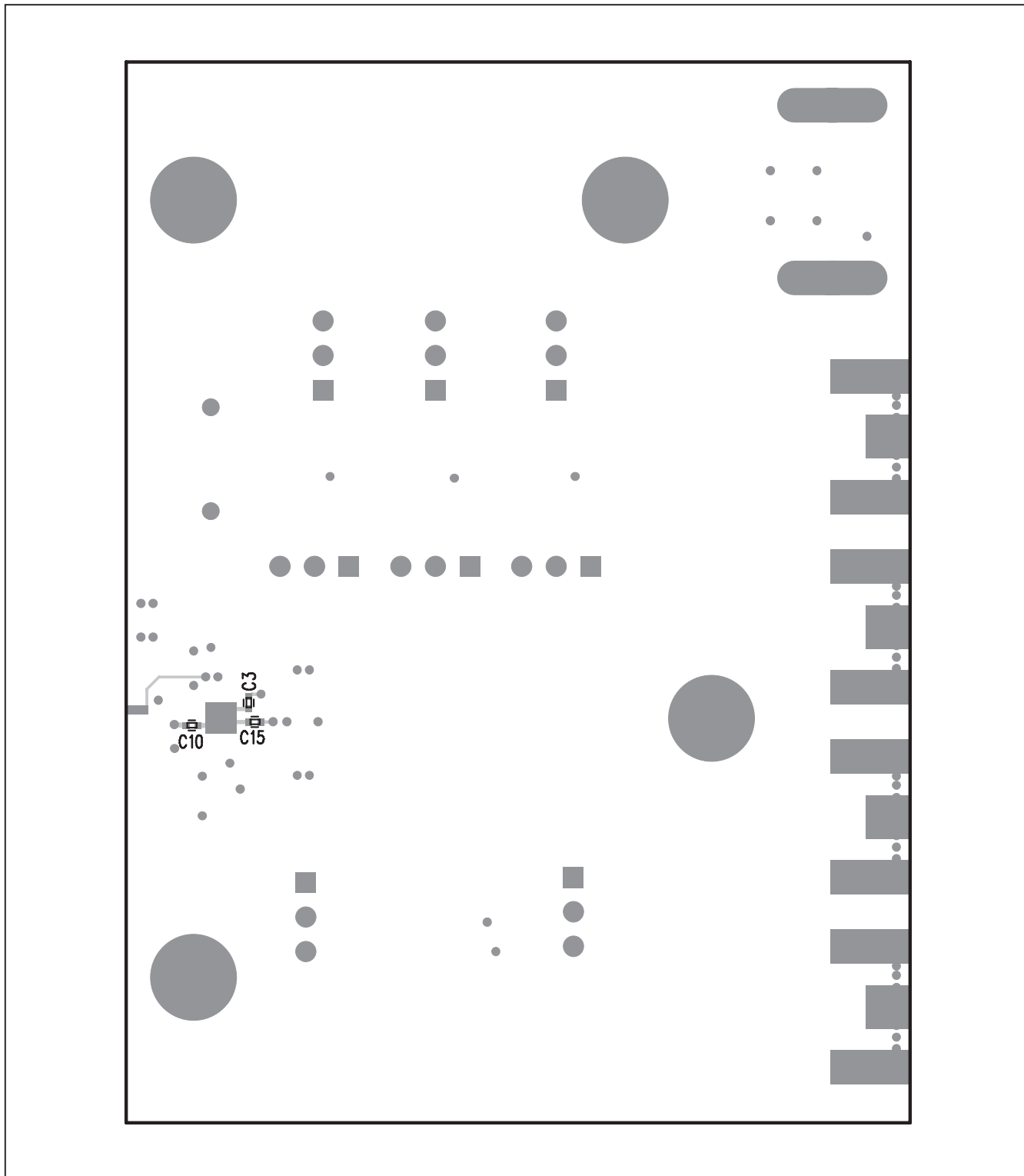


Figure 8. MAX3656 EV Kit Component Placement Guide—Solder Side

# MAX3656 Evaluation Kit

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/03	Initial release	—
1	10/04	Corrected the electrical and optical component list, corrected the quick start steps, added text about diodes to OUT- and BIAS-, corrected the schematics and replaced the layout figures	1-4, 7-11
2	8/10	Redesigned the EV kit to work up to 2.5Gbps	All

Evaluates: MAX3656

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