19-1645; Rev 0; 1/00

MAXIM

MAX3289 Longwave (Common Anode) Evaluation Kit

Evaluates: MAX3289/MAX3299

General Description

The MAX3289 evaluation kit (EV kit) is an assembled, surface-mount demonstration board that provides easy optical and electrical evaluation of the MAX3289 1.25Gbps laser driver or the MAX3299 2.5Gbps laser driver in the common-anode configuration. This configuration allows evaluation of the MAX3289/MAX3299 with long-wavelength laser diodes. Long-wavelength (1310nm and greater) laser diodes are typically packaged with the laser diode's anode connected to the photodetector's cathode.

Features

- ♦ **Drives Common-Anode Lasers**
- ♦ **Socket for Laser Insertion**
- ♦ **LED Fault Indicator**
- ♦ **Evaluates Either MAX3289 (installed) or MAX3299**
- ♦ **Adjustable Laser Bias Current**
- ♦ **Adjustable Laser Modulation-Current Temperature Coefficient**
- ♦ **Configured for Electrical Operation, No Laser Necessary**

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX3289EVKIT	0°C to +70°C	16 TSSOP-EP*

**Exposed Pad*

Component List

DESIGNATION	QTY	DESCRIPTION
C7, C9, C10, C15, C16, C21, C26, C44, C48, C49	10	0.01µF, 10V min ±10% X7R ceramic capacitors (0402)
C18	0	Open, user supplied (0402)**
C24	1	10µF, 16V ±10% tantalum capacitor AVX TAJC106K016
C33	1	0.01µF, 10V min ±10% X7R ceramic capacitor (0603)
C50	1	0.1µF, 10V min ±10% X7R ceramic capacitor (0603)
D2	0	Open, user supplied (laser diode and photodiode assembly, Figure 1)
L2	1	Ferrite bead, included but not installed Murata BLM11HA102SG
L3, L6	2	Ferrite beads Murata BLM11HA102SG
L7	1	Ferrite bead Murata BLM11HA601SG
JU2	1	3-pin header (0.1in centers)
JU10	1	2-pin header (0.1in centers) Digi-Key S1012-36-ND
J8, J9	2	Test points Mouser 151-203
TP1, TP2, TP11, TP12, TP13	5	Test points Mouser 151-203
R1	1	0Ω resistor (0402)
R6	1	115Ω ±1% resistor (0402)
R7, R14	2	100kΩ variable resistors Bourns Digi-Key 3296W-104-ND
R8	1	50kΩ variable resistor Bourns Digi-Key 3296W-503-ND
R15, R40	2	36Ω ±5% resistors (0603)
R16	1	18Ω ±5% resistor (0402)
R17	1	24.9Ω ±1% (0402)**
R19	1	49.9Ω ±1% resistor (0402)
R27	1	6.8Ω ±1% resistor (0402)
R39	1	1kΩ ±5% resistor (0402)
J11, J12, J16	3	SMA connectors (edgemount) EFJohnson 142-0701-801 or Digi-Key J502-ND
Q3	1	Zetex FMMT491A
Q7	1	Zetex FMMT591A
U1	2	Installed: MAX3289CUE (16-pin TSSOP-EP); included but not installed: MAX3299CUE (16-pin TSSOP-EP)
U6	1	MAX4322EUK (5-pin SOT23)

***These items are part of the compensation network that reduces overshoot and ringing. Parasitic series inductance introduces a zero into the laser's frequency response. R18 and C17 add a pole to cancel this zero. The optimal values depend upon the laser used. Maxim recommends C18 = 2pF and R17 = 24.9Ω as a starting point.*

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Electrical Quick Start with Simulated Photodiode Feedback

1) Short shunts SP9 and SP10 to use the photodiode emulator circuitry (see *Emulating a Photodiode During Electrical Evaluation*).
2) Make sure nothing is installed in the laser socket (Figure 1).
3) Ensure that R27 is installed.
4) Ensure that L2 is not installed.
5) Confirm that C18 is open. Since the laser is not installed, no compensation network is required.
6) Set the R14 (R_{SET}) potentiometer to midscale by turning the screw clockwise until a faint click is felt, then counterclockwise for 15 full revolutions (30 full revolutions in the 0 to 100kΩ range of the multiturn potentiometer). This sets the regulation point for the simulated photodiode current to 1.7V / 50kΩ = 34µA. The photodiode emulator circuit regulates the DC bias current into Q3 to 28 • 34µA ≅ 1mA.
7) Set the R8 (R_{MOD}) potentiometer to maximum resistance by turning the screw counterclockwise until a faint click is felt (30 full revolutions in the 0 to 50kΩ range of the multiturn potentiometer). This minimizes the modulation current.
8) Set the R7 (R_{TC}) potentiometer to maximum resistance by turning the screw counterclockwise until a faint click is felt (30 full revolutions in the 0 to 100kΩ range of the multiturn potentiometer). This minimizes the temperature coefficient of the modulation current.
9) Ensure there is no jumper on JU10 (FLTDLY). This enables the safety circuitry.
10) Attach a 50Ω characteristic impedance cable between the J16 SMA output connector and the input of the oscilloscope. Ensure the oscilloscope input is 50Ω terminated.
11) Attach differential sources to SMA connectors J11 and J12. Each source should have peak-to-peak amplitude between 100mV and 830mV.
12) Apply either +3.3V or +5V power to the board at the J8 (VCC) and J9 (GND) test points. Put a jumper across pins 1 and 2 of JU2. Set the current limit to 300mA.
13) While monitoring the voltage between TP2 and TP13, adjust R14 (R_{SET}) until the desired DC bias current is obtained. Turning the R14 potentiometer screw counterclockwise increases the DC bias current.
14) While monitoring the J16 SMA connector output on the oscilloscope, adjust R8 (R_{MOD}) until the desired modulation current is obtained. Turning the R8 potentiometer screw clockwise increases the modulation current.

Optical Quick Start with Photodiode Feedback

1) Ensure that SP9 and SP10 are open. This ensures that the photodiode emulator circuitry is not connected.
2) Remove R27.
3) Install L2.
4) Connect a laser to the board (Figure 1).
5) Set the R14 (R_{SET}) potentiometer to maximum resistance by turning the screw counterclockwise until a faint click is felt, then counterclockwise for 15 full revolutions (30 full revolutions in the 0 to 100kΩ range of the multiturn potentiometer). This sets the regulation point for the photodiode current to 1.7V / 50kΩ = 34µA. The resulting laser bias current depends upon the relationship between laser power and photodiode output current. **WARNING:** Consult your laser data sheet to ensure that 34µA of photodiode monitor current does not correspond to excessive laser power.
6) Set the R8 (R_{MOD}) potentiometer to maximum resistance by turning the screw counterclockwise until a faint click is felt (30 full revolutions in the 0 to 50kΩ range of the multiturn potentiometer). This minimizes the modulation current (AC drive applied to laser).
7) Set the R7 (R_{TC}) potentiometer to maximum resistance by turning the screw counterclockwise until a faint click is felt (30 full revolutions in the 0 to 100kΩ range of the multiturn potentiometer). This minimizes the temperature coefficient of the modulation current.
8) Attach a 50Ω SMA terminator to J16 to match the laser loading.
9) Ensure there is no jumper on JU10 (FLTDLY). This enables the safety circuitry.
10) Attach differential sources to SMA connectors J11 and J12. Each source should have peak-to-peak amplitude between 100mV and 830mV.
11) Apply either +3.3V or +5V power to the board at the J8 (VCC) and J9 (GND) test points. Put a jumper across pins 1 and 2 of JU2. Set the current limit to 300mA.
12) While monitoring the laser output, adjust R14 (R_{SET}) until the desired laser bias current is obtained. Turning the R14 potentiometer screw counterclockwise increases the laser bias current.

Table 1. Adjustment and Control Descriptions

DESIGNATION	NAME	FUNCTION
JU2	–	Placing a jumper between pins 1 and 2 of JU2 applies power to the upper prestuffed circuit. Placing a jumper between pins 2 and 3 of JU2 applies power to the lower unstuffed circuit.
JU10	FLTDLY	Placing a jumper on JU10 disables the laser driver safety features.
R7	R_{TC}	Potentiometer R7, in conjunction with potentiometer R8 (R_{MOD}), sets the temperature coefficient of the laser modulation current. Turn the potentiometer screw counterclockwise to increase resistance. The temperature coefficient decreases when the potentiometer screw turns counterclockwise.
R8	R_{MOD}	Potentiometer R8, in conjunction with potentiometer R7 (R_{TC}), sets the peak-to-peak amplitude of the laser modulation current. Turn the potentiometer screw counterclockwise to increase resistance. The laser modulation current amplitude decreases when the potentiometer screws turn counterclockwise.
R14	R_{SET}	Potentiometer R14 adjusts the desired laser DC-current bias point. Potentiometer R14 sets the resistance from MD to ground. MD regulates to 1.77V. Turn the potentiometer screw clockwise to increase resistance. The total range is 0 to 100kΩ. The laser average power increases when the potentiometer screws turn counterclockwise.
SP9, SP10	–	Short across these shunts with a bridge of solder when performing electrical evaluation.

13) While monitoring the laser output, adjust R8 (R_{MOD}) until the desired modulation current is obtained. Turning the R8 potentiometer screw clockwise increases the laser modulation current.

Detailed Description

Emulating a Photodiode During Electrical Evaluation

When evaluating the MAX3289/MAX3299 without a laser, the IC's DC bias circuitry operates using a photodiode emulator circuit. When shunts SP9 and SP10 are shorted, U6 (MAX4322), Q7, and R39 form a current-controlled current source that emulates the behavior of the photodiode in the laser assembly. R40 takes the place of the laser diode, and the photodiode emulator circuitry sources a current from the collector of Q7 that is a fraction of the current through R40. This simulates the behavior of a laser diode and photodiode assembly where a fraction of the laser light reflects onto the photodiode, which then outputs a small current proportional to the light emitted.

Evaluating the MAX3299

The MAX3289 longwave (common-anode) evaluation kit is shipped with the MAX3289 installed in the circuit. To evaluate the MAX3299, remove the MAX3289 from the board. The MAX3289 comes in an exposed-pad package. The exposed pad is an area of exposed metal lead frame underneath the 16-pin package that is soldered to a copper thermal pad. To remove the MAX3289 follow these steps:

1) Use solder wick to remove as much solder as possible from the MAX3289's leads.
2) Using a small metal pick, heat each lead and gently lift it from its pad, being careful not to damage the underlying trace.
3) Flip the board over and notice that there is a hole underneath the exposed pad of the MAX3289 in the middle of the thermal pad. Place the tip of a soldering iron into the hole in the thermal pad. The MAX3289 should fall away from the board.
4) Use solder wick to remove any residual solder around the thermal pad.

Once the MAX3289 has been removed, the MAX3299 may be mounted.

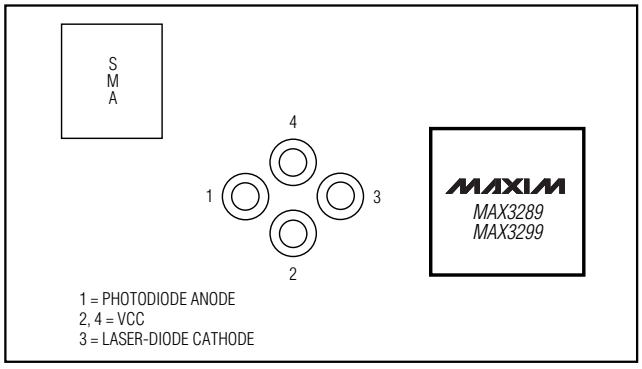

Figure 1. Optical Connection Diagram

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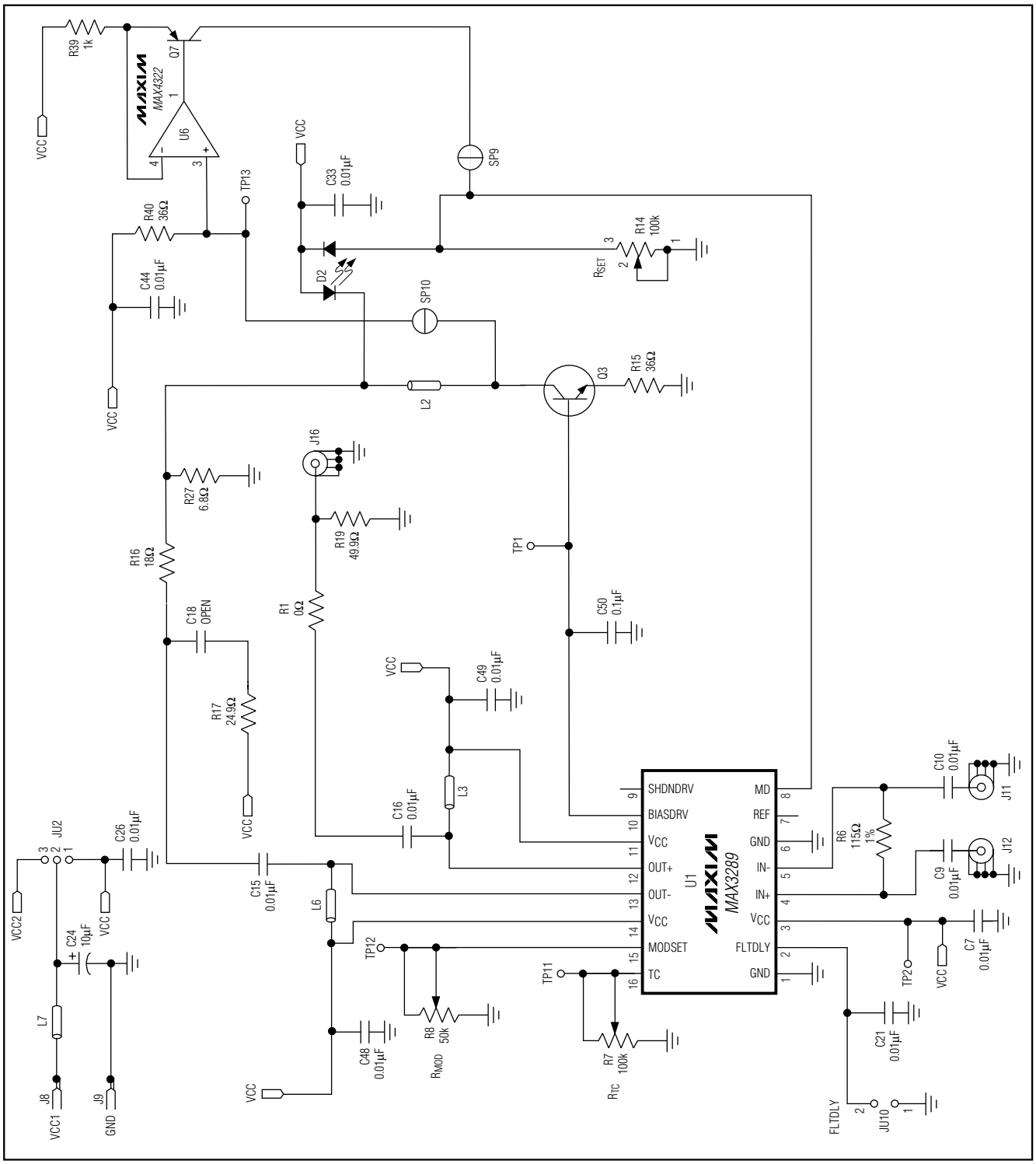

Figure 2. MAX3289 EV Kit Schematic

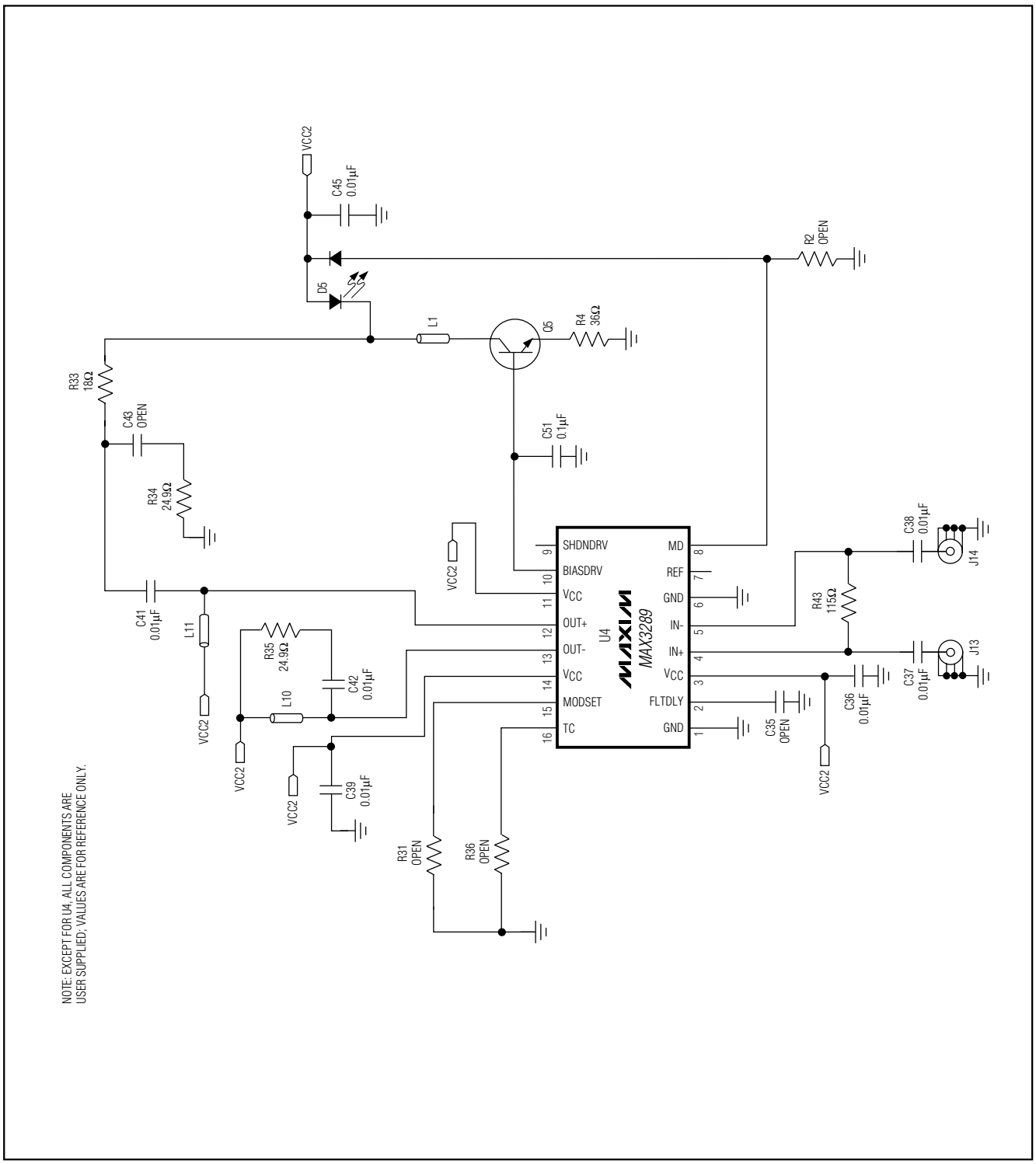

Figure 2. MAX3289 EV Kit Schematic (continued)

MAX3289 Longwave (Common Anode) Evaluation Kit

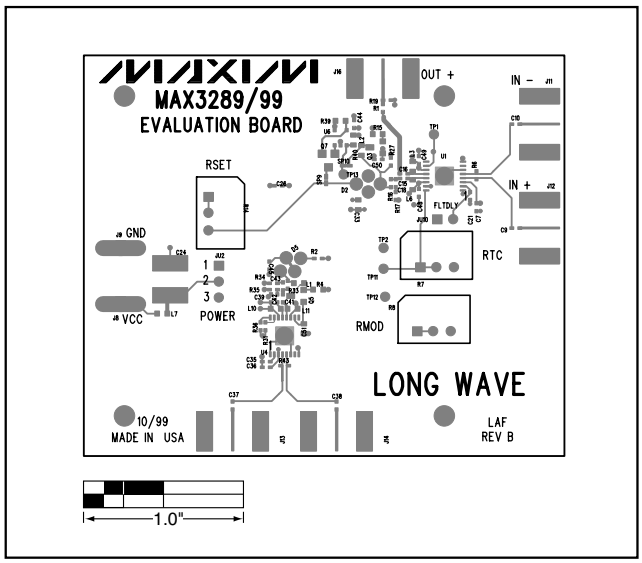

Figure 3. MAX3289 EV Kit Component Placement Guide—Component Side

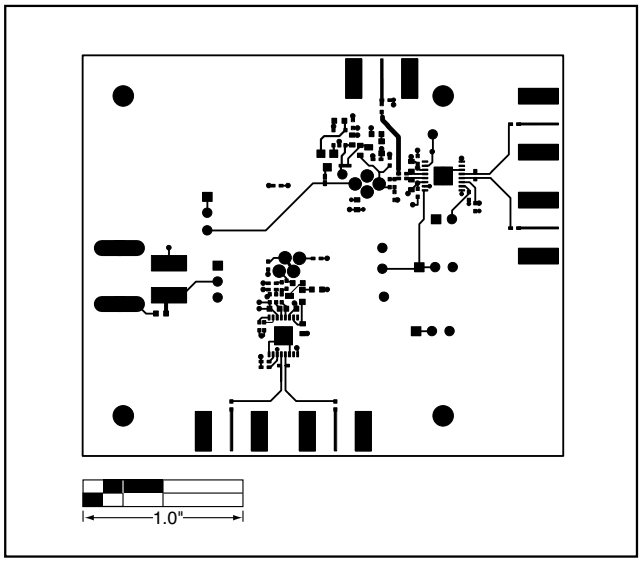

Figure 4. MAX3289 EV Kit PC Board Layout—Component Side

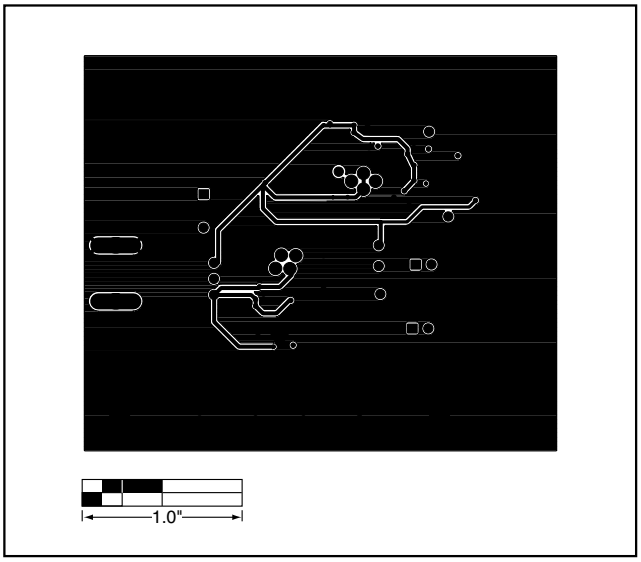

Figure 5. MAX3289 EV Kit PC Board Layout—Power Plane

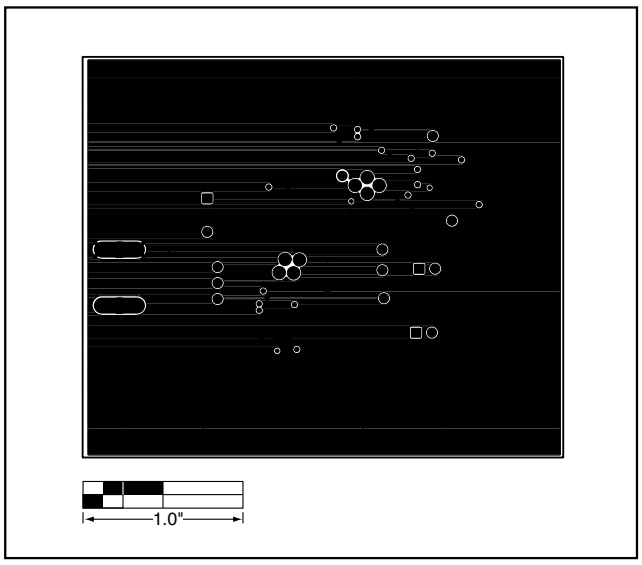

Figure 6. MAX3289 EV Kit PC Board Layout—Ground Plane

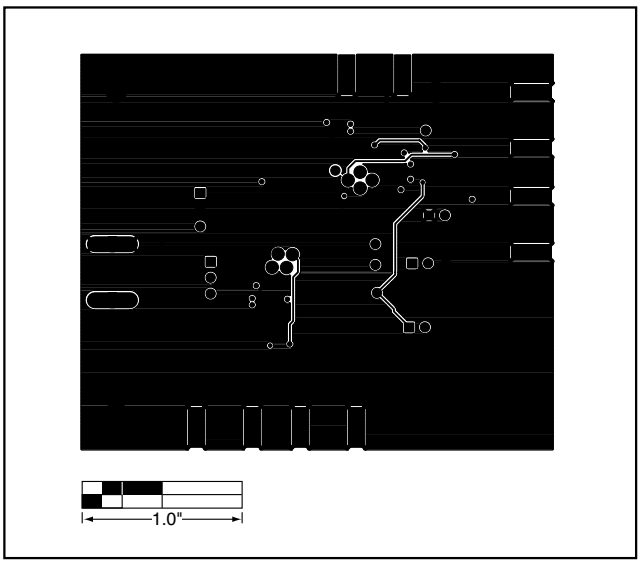

Figure 7. MAX3289 EV Kit PC Board Layout—Solder Side

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