

General Description

The MAX3949 evaluation kit (EV kit) is a fully tested and assembled demonstration board that provides optical evaluation of the MAX3949 AC-coupled, 1Gbps to 11.3Gbps laser driver. The controlling software communicates with the EV kit through the USB port and provides simplified control of all functions of the IC. The EV kit can be fully powered by the USB port or the user can choose to power the IC by a single external 3.3V supply, while the USB port supplies the on-board microcontroller. The flexible connection on the evaluation board allows attachment of lasers incorporating flex cables.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C3–C5, C8, C16	6	0.01µF ±10% ceramic capacitors (0402)
C2, C10, C14, C28	0	Not installed, ceramic capacitors (0201)
C6, C9	0	0.5pF ±0.1pF ceramic capacitors (0402)
C7, C12, C24, C29, C33	5	0.1µF ±20% ceramic capacitors (0204)
C11, C13, C15	3	10µF ±10% ceramic capacitors (0805)
C21, C22	2	33pF ±10% ceramic capacitors (0402)
C25–C27, C49, C52	5	0.1µF ±10% ceramic capacitors (0402)
C34, C55	2	1µF ±10% ceramic capacitors (0603)
C35, C37, C38	3	4.7µF ±10% ceramic capacitors (0805)
D6	1	Green LED
J1, J2	2	Edge-mount SMA connectors
J3, J4, TP1–TP4, TP6–TP15	16	Test points
J5–J7, J9, J10	5	2-pin headers, 0.1in centers
J8	1	Mini-USB, type B connector
L1	1	22µF, ±20% inductor Taiyo Yuden CBC3225T220M
L2, L3	2	18nH ±2% inductors (0402)
L4, L6	2	Ferrite beads (0402) Murata BLM15GG471

Features

- Drives Differentially Connected Lasers
- Software Control of the IC
- Power Supplied through the USB or External Connection
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

DESIGNATION	QTY	DESCRIPTION
L5, L10, L14	3	10µH ±10% inductors (0603)
R1	1	1.00kΩ ±1% resistor (0402)
R2, R7, R8, R12	0	Not installed, resistors (0201)
R3	1	680Ω ±5% resistor (0402)
R4, R31, R51, R53	4	10kΩ ±5% resistors (0402)
R5, R6	2	20Ω ±5% resistors (0402)
R10	1	100Ω ±5% resistor (0402)
R15, R50	2	4.7kΩ ±5% resistors (0402)
R18, R52, R55, R66, R73	5	51Ω ±5% resistors (0402)
R24	1	1.5kΩ ±5% resistor (0402)
SW1	1	SPDT switch
U1	1	1Gbps to 11.3Gbps, SFP+ laser driver (16 TQFN-EP*) Maxim MAX3949ETE+
U2	1	Low-noise LDO regulator (8 TDFN) Maxim MAX8902AATA+
U6	0	Not installed, user-supplied TOSA
U10	1	Microcontroller (28 SO) Microchip PIC16C745-I/SO
Y2	1	6MHz crystal ECS Inc. ECS-60-32-5PXDN
—	1	PCB: MAX3949 EVALUATION BOARD REV A

*EP = Exposed pad.

Quick Start

Required Equipment

- MAX3949 EV kit
- Windows® PC
- Oscilloscope

Note: In the following sections, software-related items are identified by **bold** text. Text in **bold and underlined** refers to items from the Windows operating system.

Procedure

- 1) Solder a laser to U6. See Figure 1 for more information about the laser connection.
- 2) Set SW1 to the desired power-supply option (USB or external supply).
- 3) If an external power supply is used, set the voltage to 3.3V, the current limit to 300mA, and connect the supply to the board.
- 4) Get the latest version of the EV kit software (MAX3949Rev1.ZIP) by contacting Maxim customer support at support.maximintegrated.com. After receiving the file, unzip it to a local folder and run the installation executable (setup.EXE). Installation requires administrative rights and can also require Internet access to download the necessary drivers.
- 5) After installation is complete, follow this path to start the program: **Start** → **All Programs** → **Maxim Integrated Products** → **MAX3949 EV Kit GUI**.
- 6) Connect the computer to the EV kit with a USB cable (A-male to Mini-B-Male). LED D6 should illuminate,

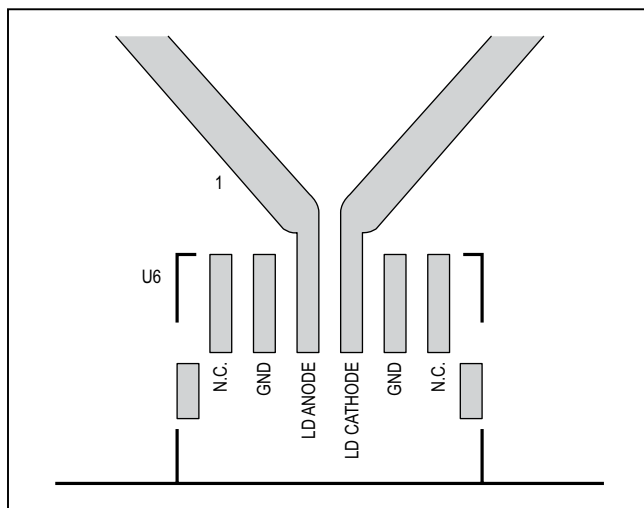


Figure 1. TOSA Connection

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indicating that USB power is detected. Press the **USB Connect** button in the software to initiate communication to the EV kit. The **Status** indicator turns green when communication is established.

- 7) Connect a 50Ω source to TIN- and TIN+ (J1 and J2). Set the source differential amplitude to 500mV_{P-P}.
- 8) Connect the output from the TOSA to an optical receiver (optical-to-electrical converter or optical input head on an oscilloscope).
- 9) All device controls are available in the software. Fault and warning indicators are displayed on the right side of the graphical user interface (GUI) window. When a hard fault has occurred, the part goes into latched shutdown. The source of the fault should be removed and the **DISABLE** checkbox should be toggled to reset the part.
- 10) The registers contain a default setting and can be read using the **Tx Read All** button. For detailed register functions, refer to the MAX3949 IC data sheet.
- 11) To enable the part, the **DISABLE** checkbox should be toggled (check then uncheck) and the **TX Enable** checkbox should be checked. After doing this, press the **TX Read All** button twice and check to see if any faults are indicated. If everything is set up properly, all fault indicators should be green.
- 12) The **Tx De-emphasis Control** can be used to adjust the eye diagram. After choosing a new setting, press the **Tx De-emphasis Control LOAD** button followed by the **IMod LOAD** button. This loads the new pre-emphasis setting to the modulation current driver.

Detailed Description of Software

Graphical User Interface (GUI)

The MAX3949 EV kit GUI consists of three main blocks: bias and modulation control, data path adjustments, and fault indicators.

Bias and Modulation Control

For bias and modulation current there are three controls: set current, set maximum, and increment. The left-side data-entry boxes allow the user to write to the SET_IBIAS or SET_IMOD register directly, as long as that value is below the value loaded in the IBIASMAX and IMODMAX registers. The middle data-entry boxes allow the user to write to the IBIASMAX and IMODMAX registers. The right-side data-entry boxes allow the user to increment or decrement the bias and modulation current registers over a ±15 LSB range by writing to the BIASINC and MODINC registers. The appropriate **LOAD** button must be pressed

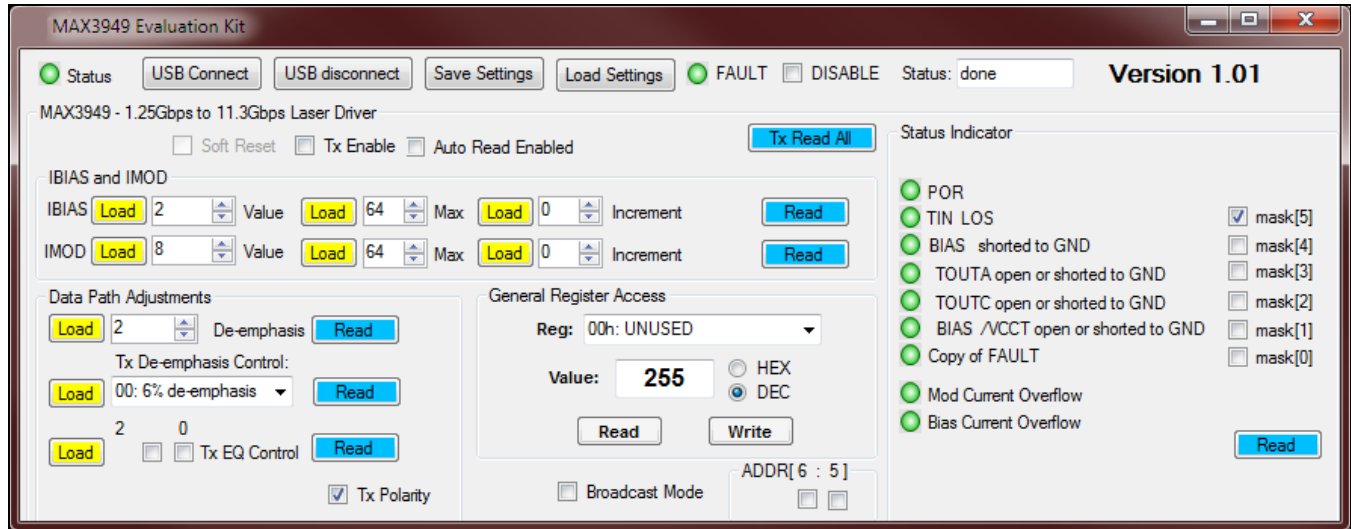


Figure 2. MAX3949 EV Kit Software

to initiate a register write. The **READ** buttons read and display the values held in the SET_IBIAS/SET_IMOD, IBIASMAX/IMODMAX, and BIASINC/MODINC registers.

Data Path Adjustments

This group box allows control of deemphasis, the input equalization, and data polarity. The **Tx De-emphasis Control** has a drop-down list with four options for setting the TXDE_MD register. When manual control is selected, the **De-emphasis** drop-down list becomes available to write values to the SET_TXDE register. The **Tx EQ Control** checkboxes lets the user set the two SET_TXEQ bits, checked for a 1 and unchecked for a 0. When the **Tx Polarity** checkbox is checked, the TOUT+ pin sinks current when TIN+ is high (typical setup). The output polarity is inverted if the checkbox is left unchecked.

Fault Indicators

Along the right-hand side of the GUI are fault indicators that show the status of the TXSTAT1 and TXSTAT2 registers. Hard faults disable the part and require a toggling

of the **DISABLE** checkbox to restart the part (once the source of the fault has been removed). The hard faults can be masked by checking the appropriate checkbox beside the fault indicator. Soft faults operate as warnings but do not disable the part. Automatic updating of the fault monitors can be enabled by checking the **Auto Read Enabled** checkbox.

Output Network

The output network has multiple components to improve the optical eye diagram. The RC shunts on the laser’s anode and cathode (R7, C10, R2, and C14) affect the S22 of the IC and are placed very close to the output pins, TOUTA and TOUTC. The RC shunts near the TOSA (R12, C2, R8, and C28) help compensate for the mismatch in impedance where the TOSA solders to the PCB. For many TOSAs, RC shunts are only needed at the TOSA side of the connection. Typically, RC values of 82Ω and 0.4pF on R8, R12, C28, and C2 are good starting values.

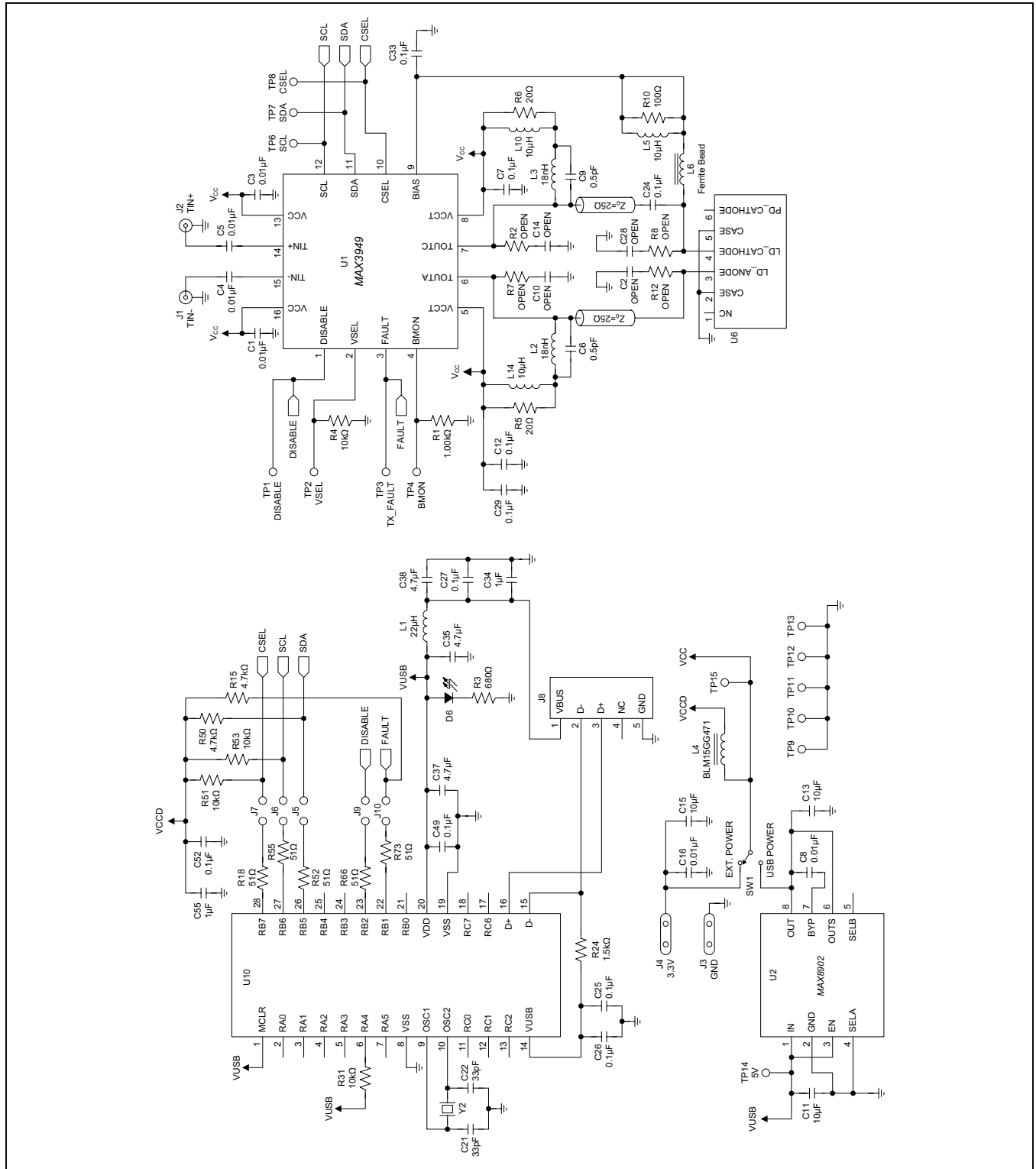


Figure 3. MAX3949 EV Kit Schematic

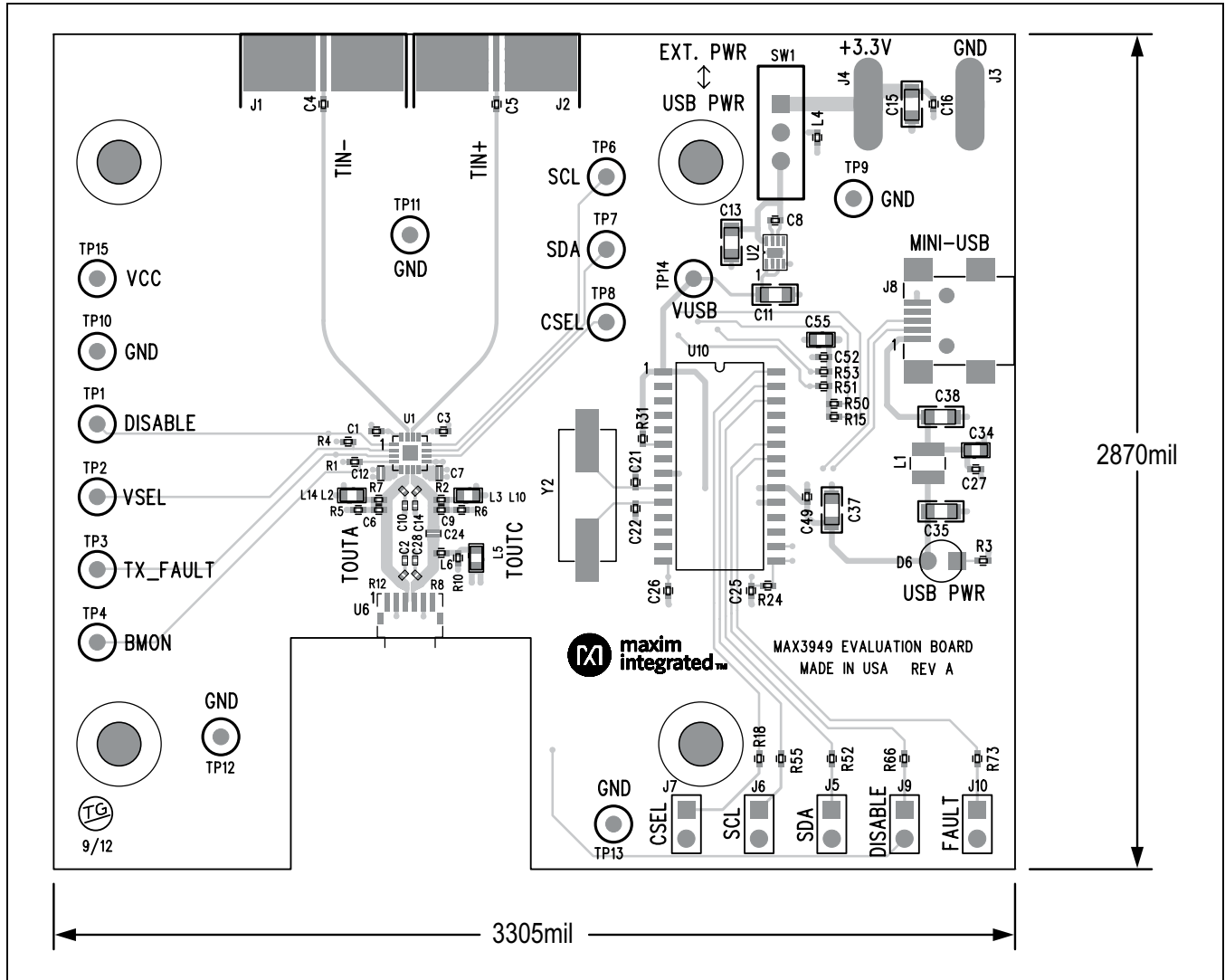


Figure 4. MAX3949 EV Kit Component Placement Guide—Component Side

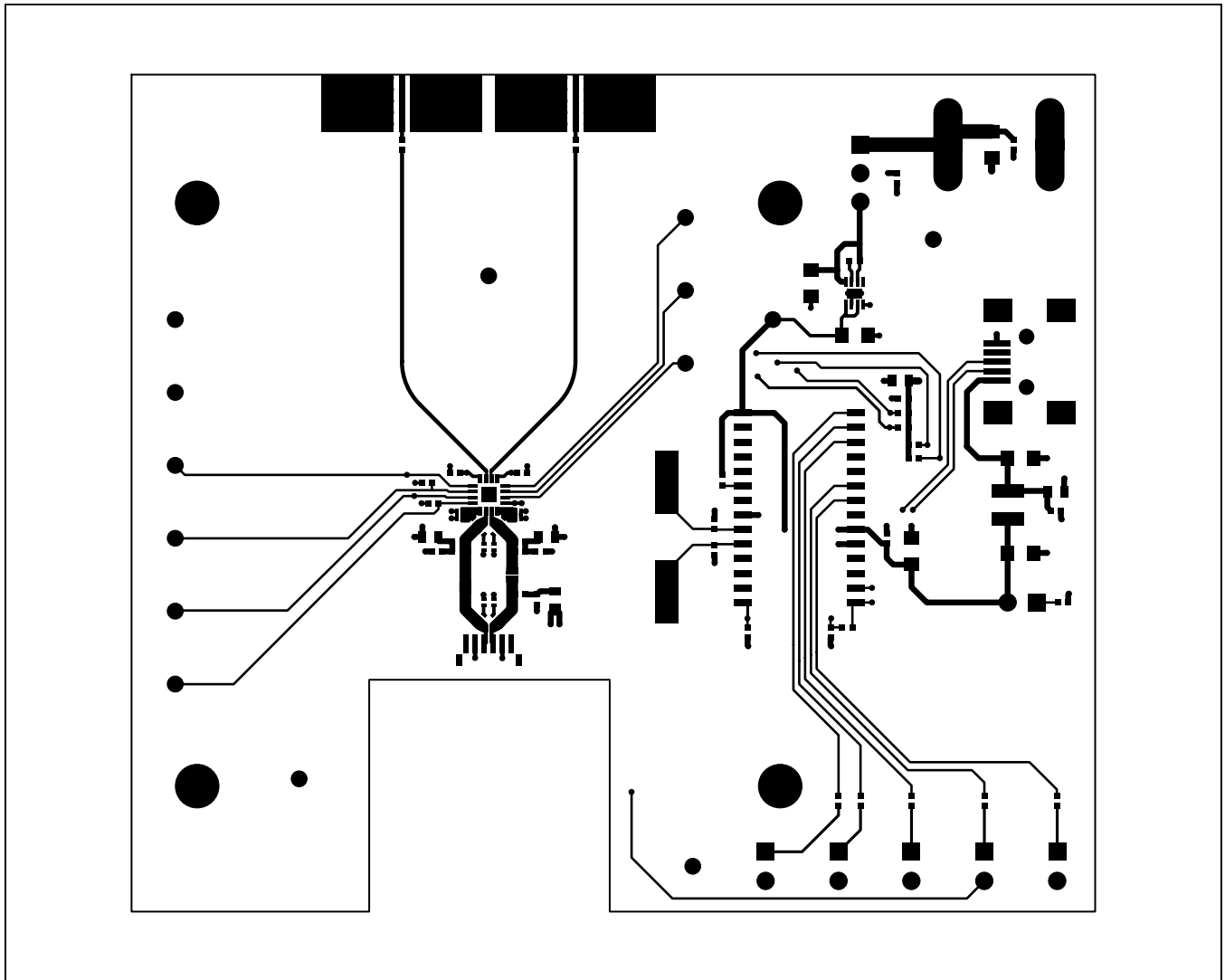


Figure 5. MAX3949 EV Kit PCB Layout—Top Side

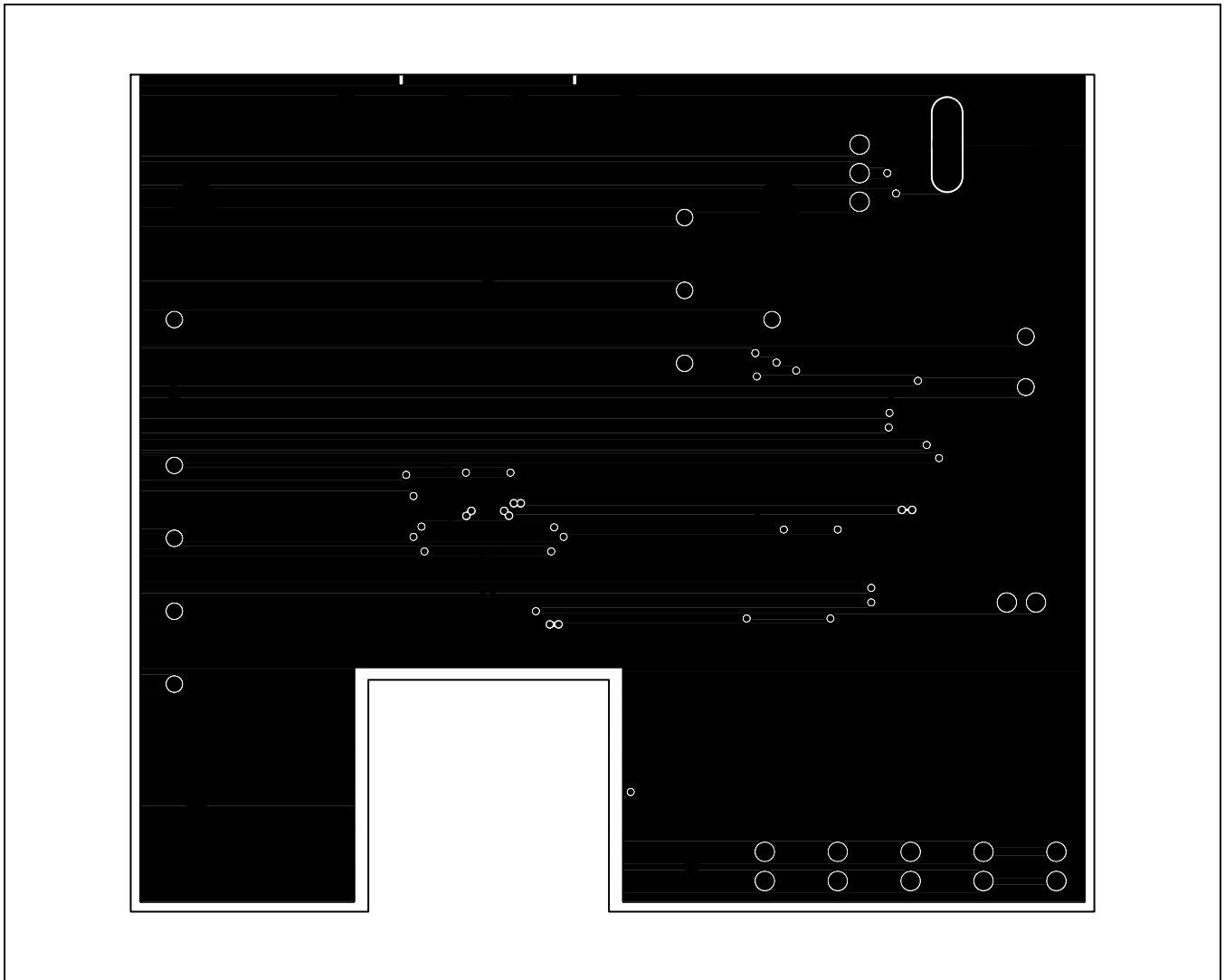


Figure 6. MAX3949 EV Kit PCB Layout—Ground Plane

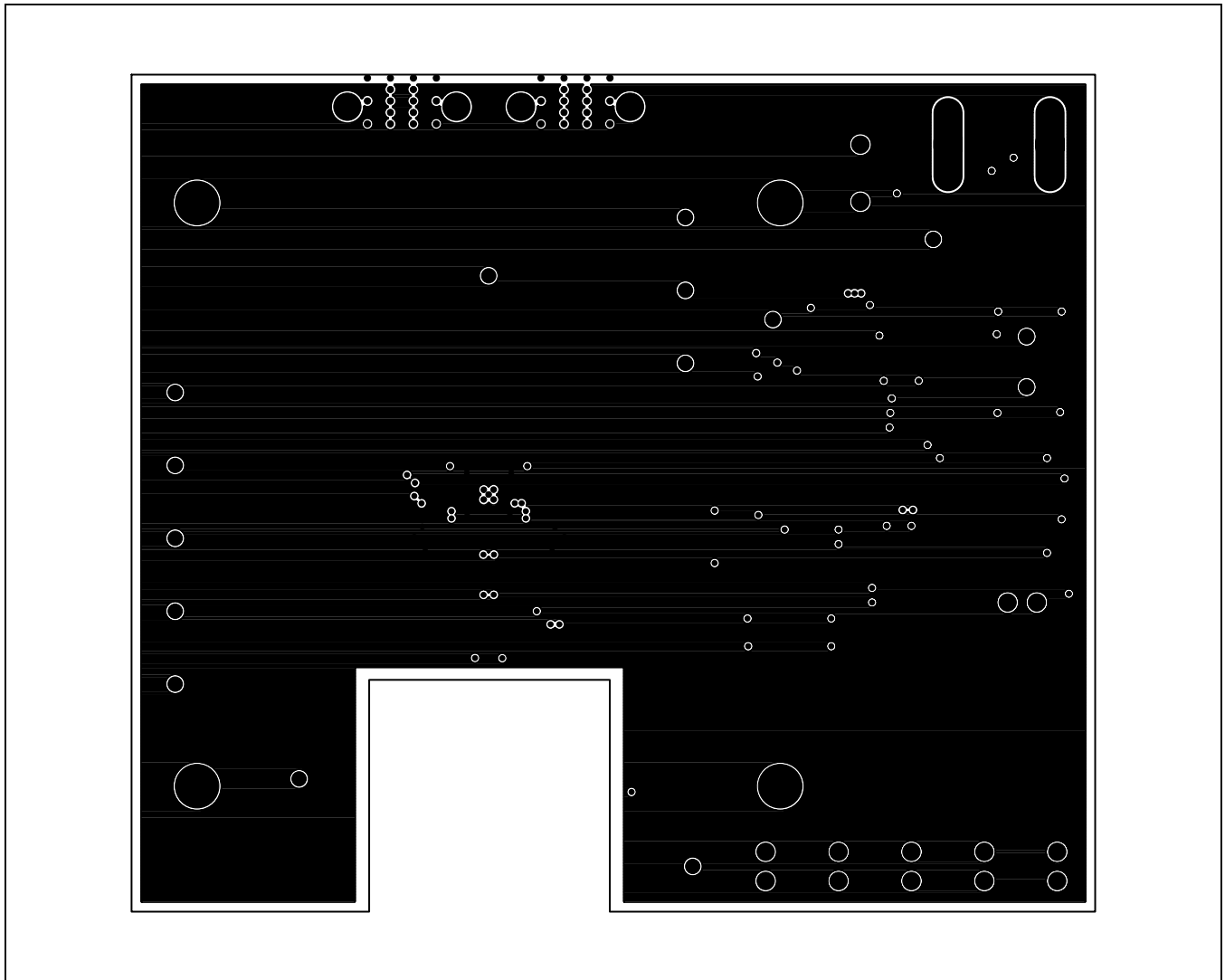


Figure 7. MAX3949 EV Kit PCB Layout—Power Plane

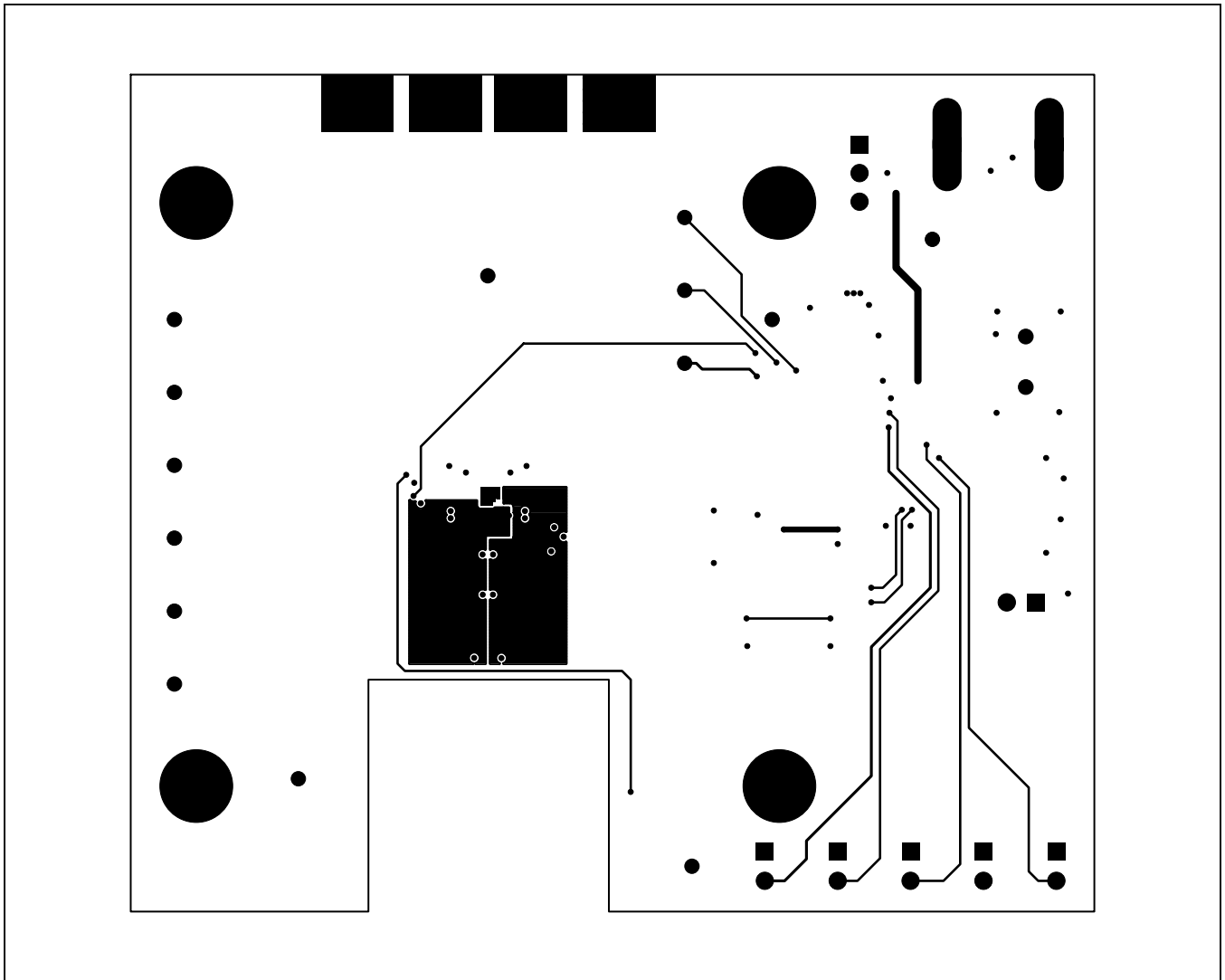


Figure 8. MAX3949 EV Kit PCB Layout—Solder Side

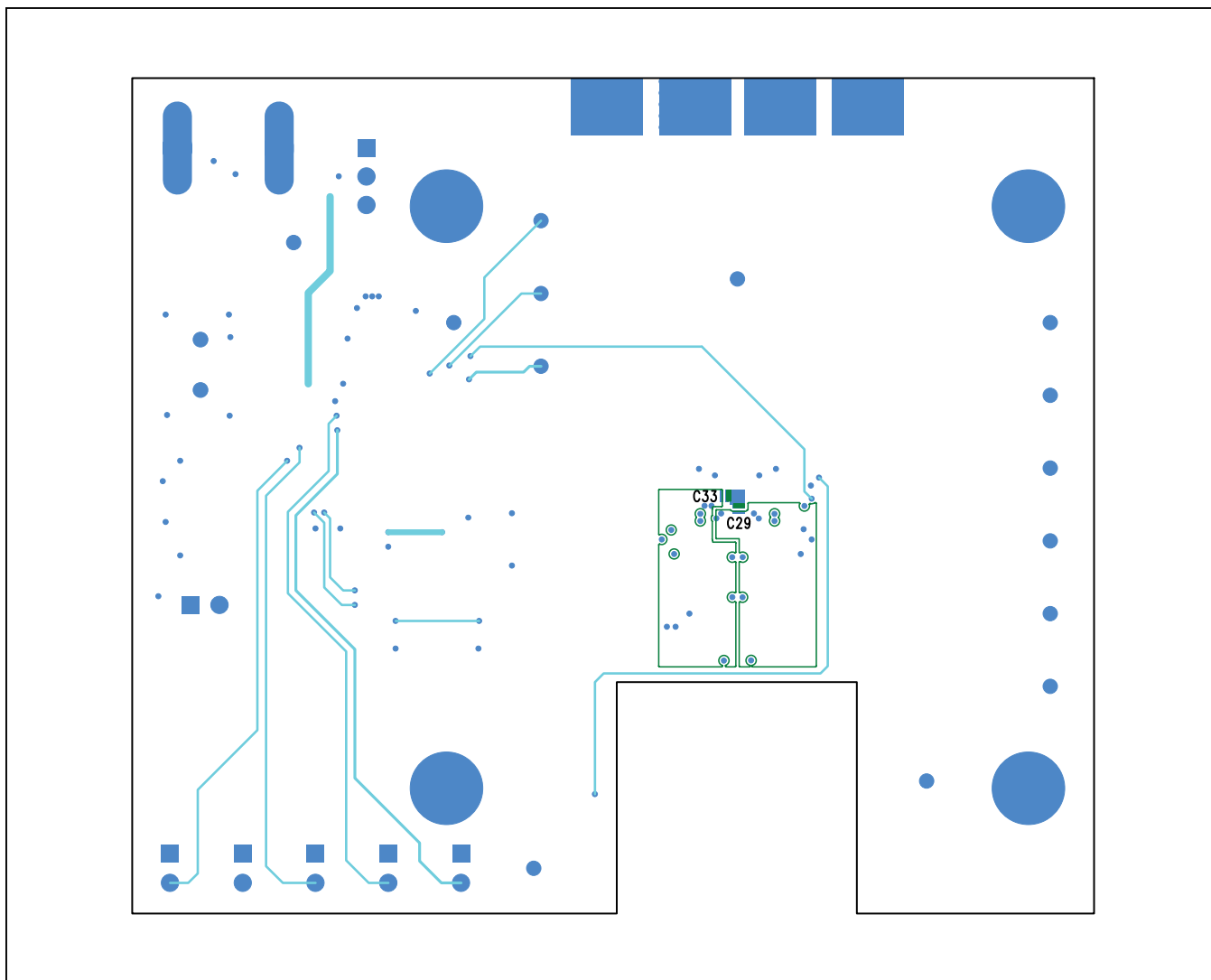


Figure 9. MAX3949 EV Kit Component Placement Guide—Solder Side

Ordering Information

PART	TITLE
MAX3949EVKIT#	EV Kit

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/12	Initial release	—

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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