19-4354; Rev 0; 10/08

MAX17108 Evaluation Kit

Evaluates: MAX17108

General Description

The MAX17108 evaluation kit (EV kit) is a fully assembled and tested surface-mount PCB that evaluates the MAX17108 10-channel, high-voltage level-shifting scan driver for active-matrix, thin-film transistor (TFT) liquid-crystal display (LCD) applications.

The EV kit operates from a DC supply voltage of +6V to +20V for the MAX17108 AVDD input. The EV kit also requires a +12V to +38V power supply and a -14V to -4V negative power supply for the MAX17108 level-shifting scan-driver circuitry. A PCB pad is provided to monitor the output of an independent op amp, which is configured to half the AVDD input voltage and is capable of providing up to 200mA of short-circuit current.

Features

- **+6V to +20V AVDD Input Voltage Range**
- **+12V to +38V GON_ Input Voltage Range**
- **-14V to -4V GOFF Input Voltage Range**
- **Resistor-Adjustable LDO Regulator for Logic Inputs**
- **Demonstrates 10 High-Voltage Level-Shifting Scan Drivers**
- **Lead-Free and RoHS Compliant**
- **Fully Assembled and Tested**

Ordering Information

PART	TYPE
MAX17108EVKIT+	EV Kit

+Denotes lead-free and RoHS compliant.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C88, C89, C90	0	Not installed, ceramic capacitors (1206)
C2	1	1µF ±10%, 25V X5R ceramic capacitor (0603) Murata GRM188R61E104K
C3, C4	0	Not installed, ceramic capacitors (0603)
C5, C6, C7	3	1µF ±10%, 50V X7R ceramic capacitors (0805) Murata GRM21BR71H105K
C8–C13	6	1000pF ±5%, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H102J
C14–C25	12	1800pF ±5%, 50V C0G ceramic capacitors (0603) Murata GRM1885C1H182J
C26–C31	6	680pF ±5%, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H681J
C32–C37	6	220pF ±5%, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H221J

DESIGNATION	QTY	DESCRIPTION
C38–C43, C62, C64, C65, C66, C68, C70, C72, C73, C74, C76	16	100pF ±5%, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H101J
C44–C49, C67, C75	8	10pF ±5%, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H100J
C50–C55	6	51pF ±5%, 50V C0G ceramic capacitors (0603) Murata GRM1885C1H510J
C56–C61	6	4pF ±0.25pF, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H4R0C
C63, C69, C71, C77	4	12pF ±5%, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H120J
C78, C79, C84, C85	4	1.5pF ±0.25pF, 50V C0G ceramic capacitors (0402) Murata GRM155C1H1R5C
C80–C83	4	3pF ±0.25pF, 50V C0G ceramic capacitors (0402) Murata GRM1555C1H3R0C

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
C86	1	0.1µF ±10%, 25V X5R ceramic capacitor (0603) Murata GRM188R61E104K
C87	1	10µF ±20%, 6.3V X5R ceramic capacitor (0603) Murata GRM188R60J106M
GND	1	Miniature black test point
JU1, JU12–JU21	11	3-pin headers
JU2–JU11	10	2-pin headers
LDO_OUT, TP1–TP10	11	Miniature red test points
R1, R2	2	100kΩ ±1% resistors (0402)
R3, R8, R13, R18, R23, R28	6	64.9Ω ±1%, 1/2W resistors (2010)
R4, R9, R14, R19, R24, R29	6	64.9Ω ±1%, 1/4W resistors (1206)
R5, R10, R15, R20, R25, R30	6	64.9Ω ±1% resistors (0603)
R6, R11, R16, R21, R26, R31	6	124Ω ±1% resistors (0603)
R7, R12, R17, R22, R27, R32	6	249Ω ±1% resistors (0603)
R33–R38	6	178Ω ±1% resistors (0603)
R39–R44	6	10Ω ±5% resistors (0603)
R45–R54	10	100kΩ ±5% resistors (0603)
R55	1	100kΩ ±1% resistor (0603)
R56	1	100kΩ single-turn potentiometer
R57	1	30.1kΩ ±1% resistor (0603)
SW1	1	10-position DIP switch
U1	1	10-channel scan driver with op amp (28 TQFN-EP*) Maxim MAX17108ETI+
U2	1	Adjustable LDO regulator (8 TDFN-EP*) Maxim MAX6771TALD2+ (Top Mark +BEG)
—	21	Shunts (JU1–JU21)
—	1	PCB: MAX17108 Evaluation Kit+

**EP = Exposed pad.*

Component Supplier

SUPPLIER	PHONE	WEBSITE
Murata Mfg. Co., Ltd.	770-36-1300	www.murata.com

Note: *Indicate that you are using the MAX17108 when contacting this component supplier.*

Quick Start

Required Equipment

Before beginning, the following equipment is needed:

- -12V to -4V, 500mA DC power supply
- +6V to +20V, 250mA DC power supply
- +12V to +38V, 1A DC power supply
- Two voltmeters

Procedure

The MAX17108 EV kit is fully assembled and tested. Follow the steps below to verify board operation. **Caution: Do not turn on the power supplies until all connections are completed.**

1) Verify that a shunt is installed across pins 1-2 of jumper JU1 (GON2 = GON1).
2) Verify that shunts are installed across jumpers JU2–JU11 (RC loads connected at scan driver outputs).
3) Verify that shunts are installed across pins 2-3 of jumpers JU12–JU21 (DC voltage applied at inputs).
4) Verify that all positions of the SW1 DIP switch are in the on position (logic-high DC voltage at inputs).
5) Connect a voltmeter to the LDO_OUT and GND test points.
6) Connect a voltmeter to the VCOM and GND PCB pads.
7) Connect the negative terminal of the negative power supply to the GOFF PCB pad. Connect the ground terminal of the negative power supply to the PGND pad.

8) Connect the +6V to +20V power-supply positive terminal to the AVDD PCB pad. Connect the power-supply ground terminal to the PGND pad.
9) Connect the +12V to +38V power-supply positive terminal to the GON1 PCB pad. Connect the power-supply ground terminal to the PGND pad.
10) Enable the GOFF negative power supply and set it to -12V.
11) Enable the AVDD positive power supply and set it to +12V.
12) Enable the GON1 positive power supply and set it to +20V.
13) Adjust potentiometer R56 until the voltmeter at LDO_OUT reads +3.3V.
14) Verify that the output of the high-speed op amp (VCOM) is +6V.
15) Verify that test points TP1–TP10 outputs are +20V.

Detailed Description of Hardware

The MAX17108 evaluation kit (EV kit) is a fully assembled and tested surface-mount PCB that evaluates the MAX17108 10-channel, high-voltage level-shifting scan drivers for thin-film transistor (TFT) liquid-crystal display (LCD) applications. The EV kit requires two positive power supplies and one negative power supply. AVDD requires a +6V to +20V power supply that provides up to 250mA of current. A +12V to +38V power supply that provides up to 1A of current is required when powering both the GON1 and GON2 inputs. The GON1 and GON2 inputs can also be powered using separate power supplies that provide up to 500mA each of current. GOFF requires a -12V to -4V power supply that provides up to 500mA of current.

The MAX17108 logic level to high-voltage level-shifting scan drivers can buffer 10 logic inputs (A1–A10) and shift them to a desired level (Y1–Y10) for driving TFT-LCD row logic. GON1 supplies the high-voltage levels at the MAX17108 buffers Y1–Y6, Y9, and Y10 when its respective input is a logic-high. GON2 supplies the high-voltage levels at the MAX17108 buffers Y7 and Y8 when its respective input is a logic-high. GOFF supplies the low-voltage level at all of the scan-driver outputs when their input is a logic-low. DIP switch SW1 is used to set a DC logic-high level at A1–A10 inputs for testing purposes, by using a high-voltage input LDO regulator U2 (MAX6771) and potentiometer R56.

Jumper JU1 is provided for evaluation of the MAX17108 EV kit when utilizing one power source for the MAX17108 GON1 and GON2 power inputs. See the *Power Supplies Configuration* section for proper configuration of jumper JU1. Jumpers JU2–JU11 are provided to connect RC loads at the MAX17108Y 1–Y10 outputs.

The MAX17108 VCOM amplifier output is configured as a unity-gain buffer and is set to half the voltage applied at the AVDD PCB pad, using resistors R1 and R2. To reconfigure VCOM to other voltages, replace resistor R1. The VCOM output can be monitored using the EV kit VCOM and GND PCB pads.

Power Supplies Configuration

The MAX17108EV kit requires two positive power supplies and one negative power supply for proper evaluation of the EV kit. AVDD requires a +6V to +20V power supply that provides up to 250mA of current. GON1 and GON2 each require a +12V to +38V power supply providing up to 500mA of current. GOFF requires a -12V to -4V power supply that provides up to 500mA of current.

Jumper JU1 configures the input power source for GON2. Install a shunt across pins 1-2 of jumper JU1 to select GON1 as the input power source for GON2. Install a shunt across pins 2-3 of jumper JU1 to apply an external power source at the GON2 and PGND PCB pads. Buffers Y7 and Y8 output the voltage applied at the GON2 PCB pad. See Table 1 for proper jumper JU1 configuration.

Table 1. GON2 Power Source Selection (JU1)

SHUNT POSITION	GON2 IC PIN
1-2	Connected to GON1
2-3	Connected to external power source at GON2 and PGND PCB pads

Additional surface-mount 1206 PCB pads are provided for adding additional bulk capacitance at C1, C88, C89, and C90 when interfacing long wires to the EV kit's AVDD, GON1, GON2, and GOFF power-supply inputs.

Output Load Connection

The MAX17108 EV kit provides resistor/capacitor loads for each output channel to mimic TFT-LCD panel load models for easy evaluation of the EV kit. Install shunts across jumpers JU2–JU11 to connect the RC loads to the MAX17108 scan-driver outputs. **Place a scope probe across the shunts installed at jumpers JU2–JU11 and PGND for proper evaluation of the MAX17108 buffers (Y1–Y10), when applying a square-wave signal at the SIGNAL_IN PCB pad.** Test points TP1–TP10 can be used to monitor the loaded buffer outputs when applying static DC voltages at the A_ inputs.

Table 2. Output Load Connection (JU2–JU11)

SHUNT POSITION	MAX17108 Y1–Y10 OUTPUTS	EV KIT FUNCTION
Installed	Connected to RC loads	Outputs monitored at shunts
Not installed	Disconnected from RC load	No-load condition for scan drivers

Inputs (A_) Logic-Level Selection (JU12–JU21)

Jumpers JU12–JU21 configure the MAX17108 EV kit's A1–A10 inputs to accept either a DC voltage or square-wave input signal. Install a shunt across pins 1-2 of the individual channels to use the square-wave signal applied at the SIGNAL_IN and GND PCB pads to drive the inputs. The square-wave signal should have a +2V to +5.5V logic-high level. **Place scope probes across the shunts installed at jumpers JU2–JU11 and PGND for proper evaluation of the MAX17108 scan driver outputs (Y1–Y10), when applying a square-wave signal at the SIGNAL_IN PCB pad.**

Table 3. Logic Input Configuration (JU12–JU21)

SHUNT POSITION	SW1 POSITION	A_ INPUT LOGIC LEVEL
1-2	X	Square wave applied at SIGNAL_IN PCB pad
2-3	Off	Low
	On	High

X = Don't care.

Install a shunt across pins 2-3 of the individual channels to configure the inputs to static logic-low or logic-high DC levels. DIP switch SW1 sets the buffer inputs to a logic-high level using the output of LDO regulator (U2) and potentiometer R56. The LDO regulator output voltage can be adjusted from +2.2V to +5.3V using R56 and can be monitored by probing test point LDO_OUT. Rotate potentiometer R56 clockwise to decrease the LDO output voltage and vice versa. Set DIP switch SW1 to the on position to place a logic-high voltage at the inputs. Set switch SW1 to the off position to place a logic-low voltage at the inputs. See Table 3 for proper JU12–JU21 jumper configurations.

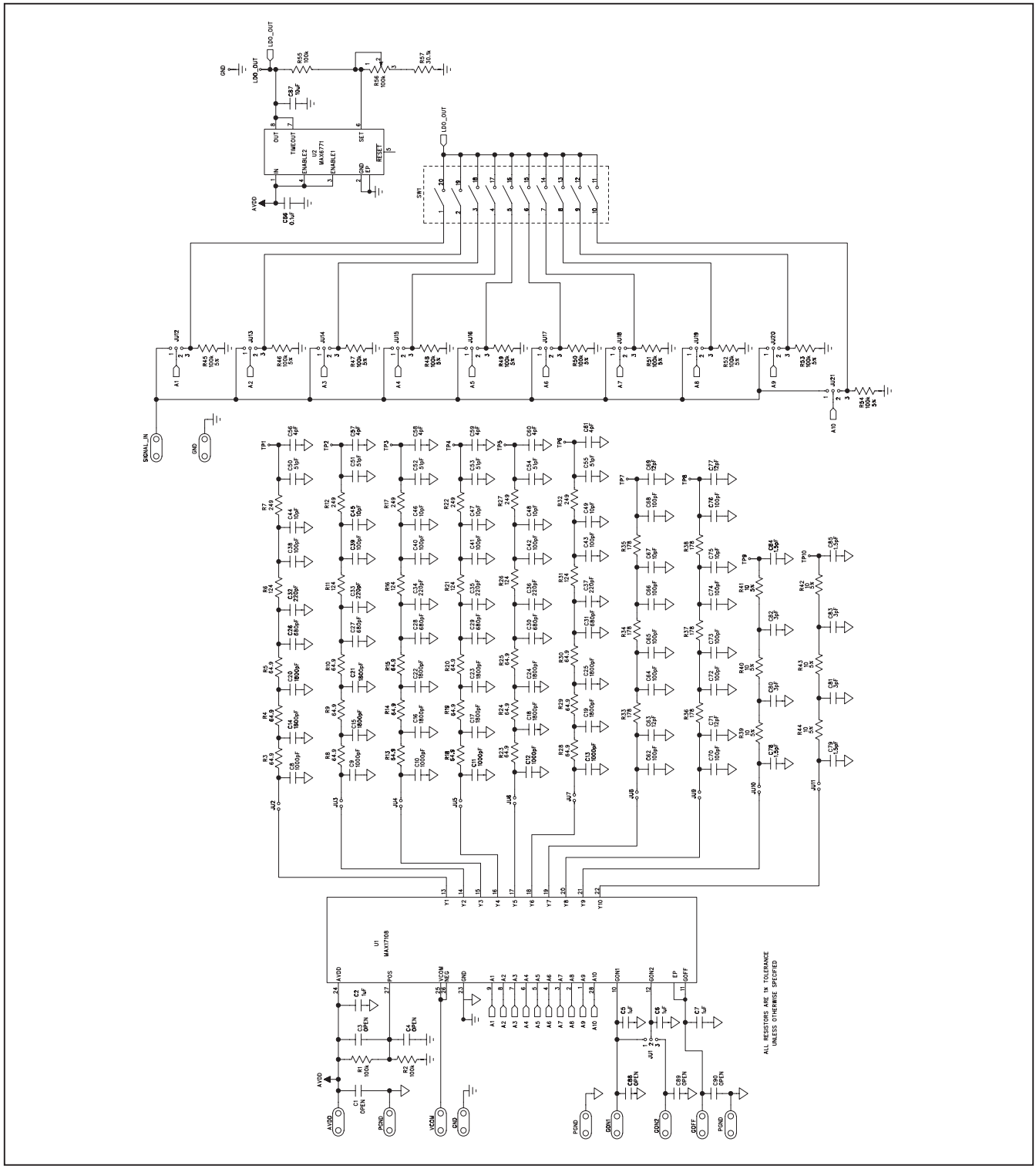

Figure 1. MAX17108 EV Kit Schematic

MAX17108 Evaluation Kit

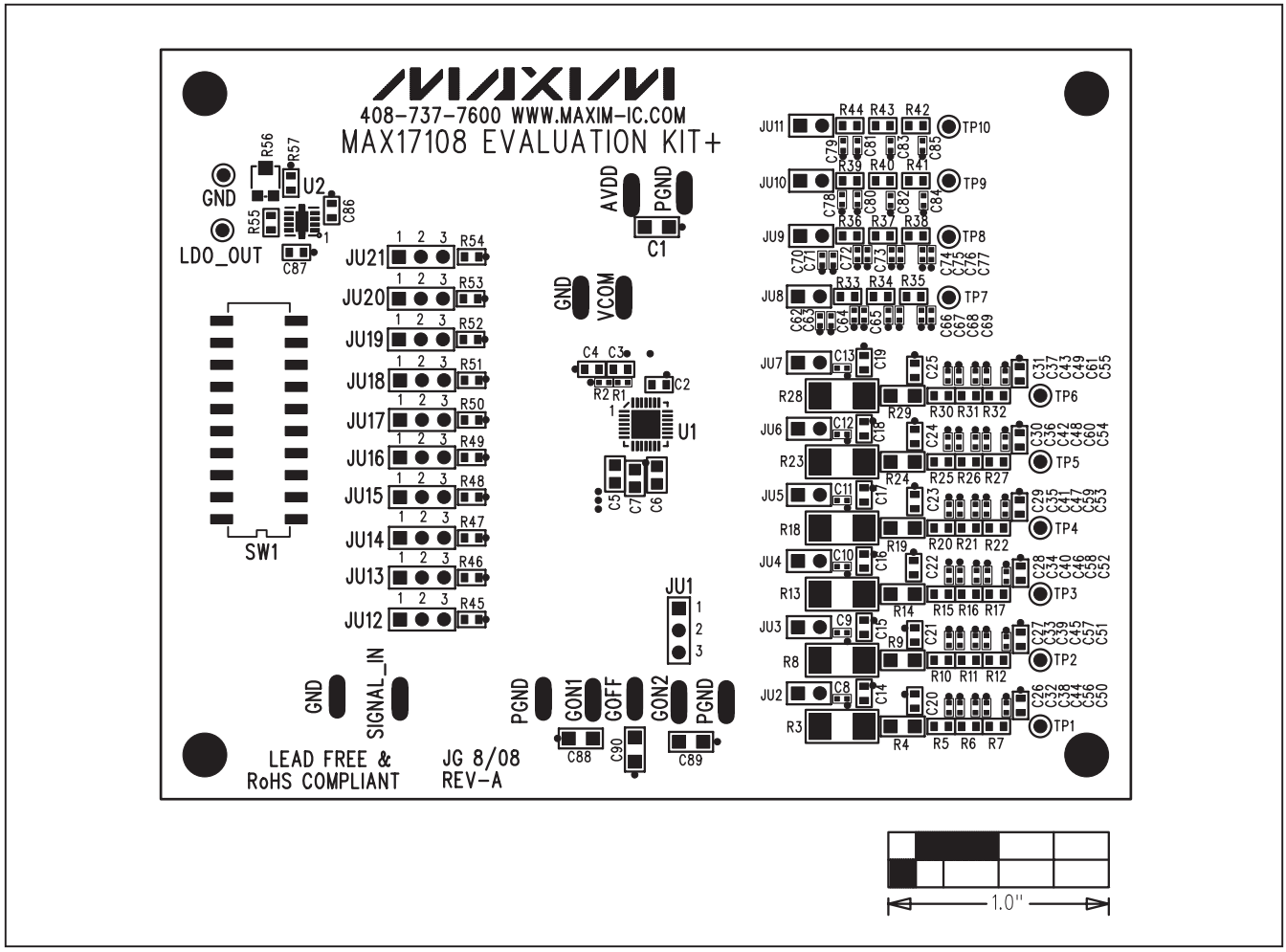

Figure 2. MAX17108 EV Kit Component Placement Guide—Component Side

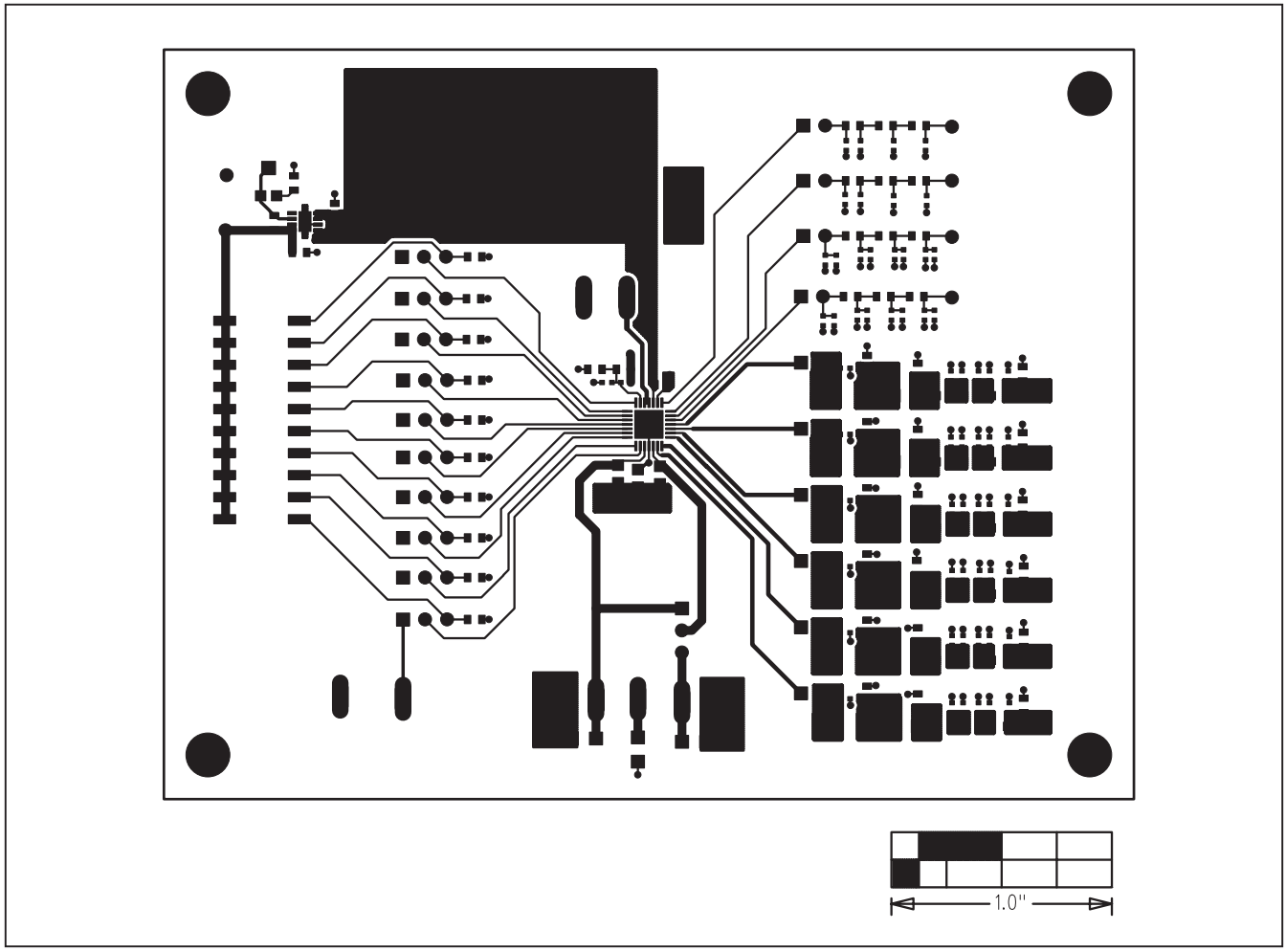

Figure 3. MAX17108 EV Kit PCB Layout—Component Side

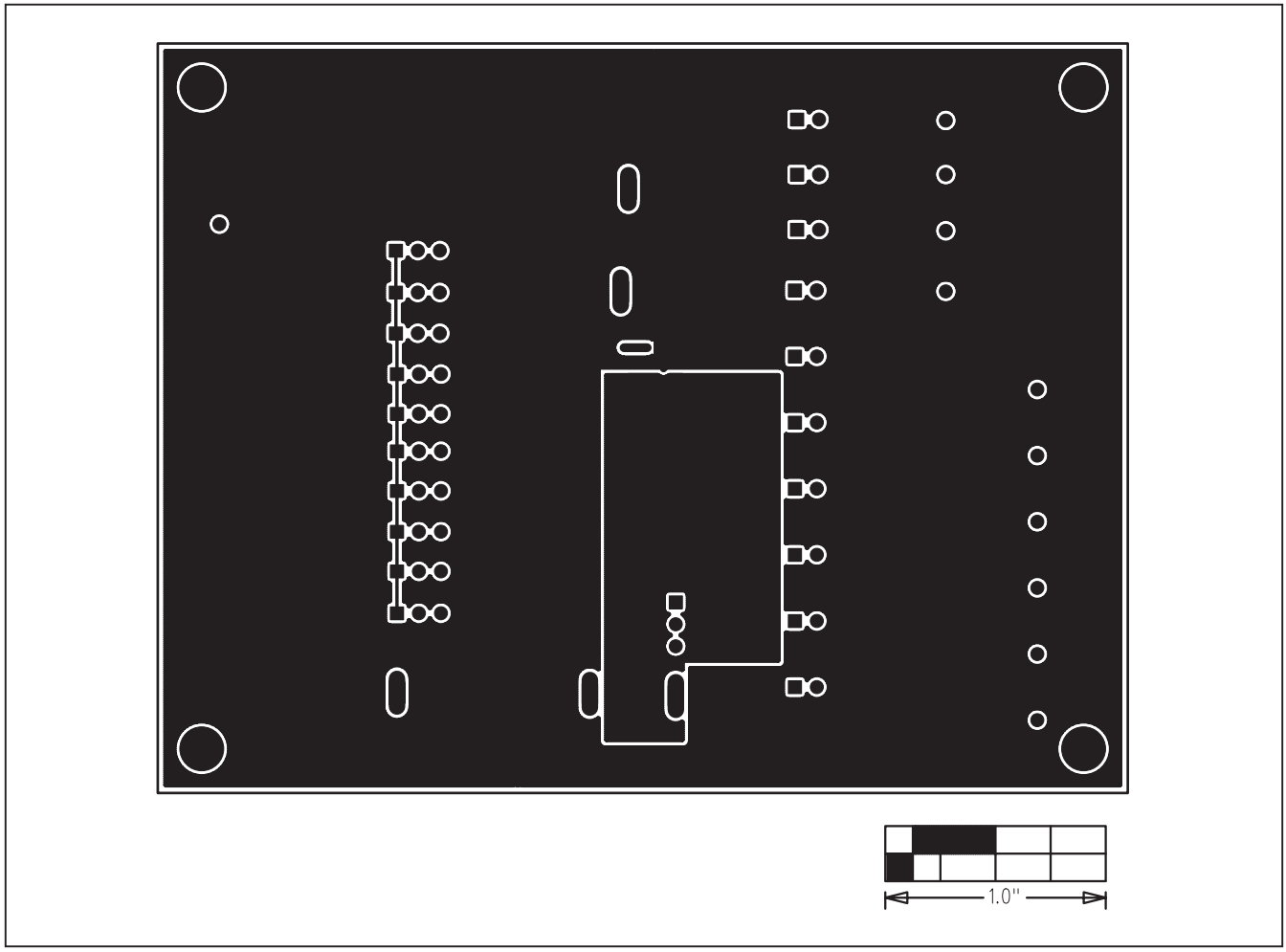

Figure 4. MAX17108 EV Kit PCB Layout—Solder Side

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