

MAX17608 Evaluation Kit

Evaluates: MAX17608 – 4.5V to 60V, 1A, OV, UV, Reverse-Voltage Protector with Forward/Reverse Current Limit

General Description

The MAX17608 evaluation kit (EV kit) is a fully assembled and tested circuit board that demonstrates the MAX17608 4.5V to 60V, 1A, OV, UV, reverse-voltage protector with forward/reverse current-limit in a 12-pin TDFN-EP package. The EV kit can be configured to demonstrate adjustable overvoltage, undervoltage, different current-limit types, and different current-limit thresholds.

Features

- 4.5V to 60V Operating-Voltage Range
- Features a TVS Diode across the Input and Schottky Diode across the Output Terminals
- Evaluates UVLO, OVLO, Three Current-Limit Types, and Current-Limit Threshold
- UVLO programmed to 4.5V
- OVLO programmed to 36V
- Jumper-Configurable Current-Limit (Selected as 0.1A by default)
- Current-Limit Mode Set To Autoretry by default
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

Quick Start

Recommended Equipment

- MAX17608 EV kit
- 60V DC power supply
- Multimeters
- Adjustable load (0A-1.5A)
- USB-A male to USB-B male cable or 5V DC power supply

Equipment Setup and Test Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation.

Caution: Do not turn on the power supply until all connections are completed.

- 1) Verify that all jumpers are in their default positions.
- 2) Connect the USB cable to J1 from a computer or connect a 5V-DC power supply to TP3.
- 3) Verify that LED1 is on.
- 4) Set the 60V DC power supply to 5V and connect to IN (J2/TP6). Verify that OUT (J3/TP8) is 5V.
- 5) Gradually increase the DC power-supply voltage and verify that OUT voltage goes down and $\overline{UV\overline{OV}}$ goes low when input reaches approximately 36V.
- 6) Gradually decrease the DC power-supply voltage and verify that OUT comes back and $\overline{UV\overline{OV}}$ goes high when the input reaches approximately 34.8V.
- 7) Set the DC power-supply voltage to 24V and connect the adjustable load between OUT and GND terminals and a multimeter in series to measure the current. Gradually increase the load current and verify that the OUT goes down and \overline{FLAG} goes low when the load current increases above 0.1A.
- 8) The jumper JU1 can be configured to change the current limit as given in [Table 2](#). Verify various current limit operations by repeating step 7.

CAUTION: When applying a negative input to V_{IN} , the negative input test should be performed when the output capacitors are fully discharged and V_{BUS} is not supplied.

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Detailed Description

The EV kit circuit can be configured to evaluate user-defined UVLO and OVLO thresholds using resistor-dividers. The overcurrent threshold is determined by external resistors connected to the SET1 pin and is jumper-configurable through jumper JU1. Using jumper JU4, the EV kit circuit can be configured to evaluate different current limit types (Autoretry, Continuous, and Latch-off). LED1 on the EV kit indicates availability of logic power for annunciation signals (\overline{UVOV} and \overline{FLAG}) and EN.

The EV kit provides on-board output capacitors to enable a demonstration of the MAX17608 protection features.

Input-Power Supply

The EV kit is powered by a user-supplied 4.5V to 60V power supply connected between TP6 (INPUT POWER) and GND.

Enable

To enable the device, connect a USB-A male connector from the computer to the USB-B female connector, J1, or an external 5V supply to TP3 and GND. This provides 5V to V_{BUS} and to the EN pin (JU5 connects V_{BUS} to EN by default). Choose the JU5 setting to enable or disable operation of the MAX17608 (see [Table 1](#)).

UVLO/OVLO Threshold

Ensure jumper JU2 is installed to use the UVLO/OVLO resistive dividers.

Table 1. Enable (JU5)

| JUMPER | SHUNT POSITION | DESCRIPTION | MAX17608 STATUS |
|--------|----------------|-------------------------------|-----------------|
| JU5 | 1-2* | EN pin connected to V_{BUS} | ON |
| | 2-3 | EN pin connected to GND | OFF |
| | Open | EN pin floating | ON |

*Default position.

Table 2. Current-Limit Threshold (JU1)

| JUMPER | SHUNT POSITION | DESCRIPTION |
|--------|----------------|--------------------------|
| JU1 | 1-2* | Current limit 0.1A |
| | 3-4 | Current limit 0.5A |
| | 5-6 | Current limit 1.0A |
| | 7-8 | Current limit adjustable |

*Default position.

The UVLO threshold for input voltage is set through the R9, R10 resistive divider. Use the following equation to calculate the value of R10 for a required undervoltage threshold level:

$$R10 = \frac{R9}{\left(\frac{V_{UVLO}}{V_{REF}} - 1\right)}$$

where R9 can be chosen as 2.2M Ω , V_{REF} is 1.5V, and V_{UVLO} is the required undervoltage protection threshold.

The OVLO threshold for input voltage is set through the R11, R12 resistive divider. Use the following equation to calculate the value of R12 for a required overvoltage threshold level:

$$R12 = \frac{R11}{\left(\frac{V_{OVLO}}{V_{REF}} - 1\right)}$$

where R11 can be chosen as 2.2M Ω , V_{REF} is 1.5V, and V_{OVLO} is the required overvoltage protection threshold.

Current-Limit Threshold

The EV kit features a jumper (JU1) to select the current-limit threshold. Install a jumper as shown in [Table 2](#) to change the current-limit threshold.

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Current-Limit Type Select

The EV kit features jumper JU4 to select different current-limit responses. See [Table 3](#) for jumper settings.

Output-Load Capacitor

Use JU6 to connect the OUT pins to the OUT test point (TP8). Use jumper JU7 to connect output to 330 μ F capacitors. See [Table 4](#) for jumper settings

Table 3. Current-Limit Type Select (JU4)

| JUMPER | SHUNT POSITION | DESCRIPTION |
|--------|----------------|-------------|
| JU4 | 1-2 | Latch-off |
| | 2-3 | Continuous |
| | Open* | Autoretry |

*Default position.

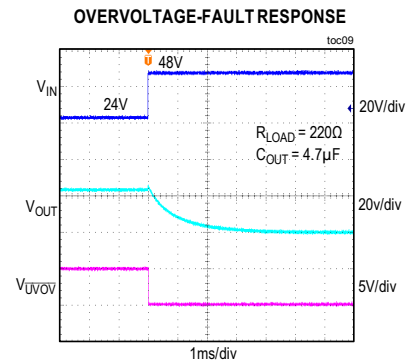
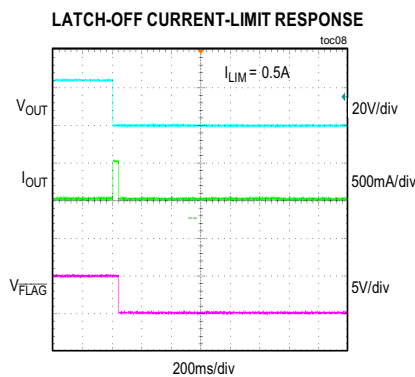
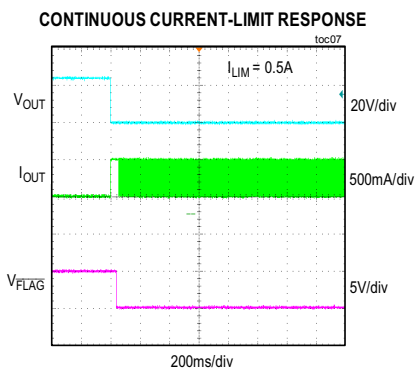
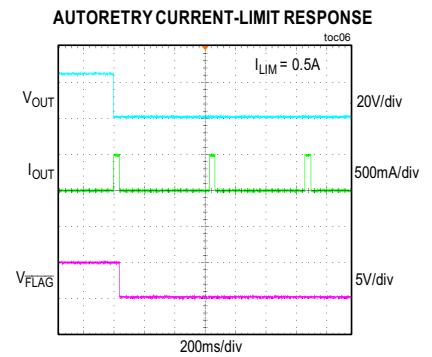
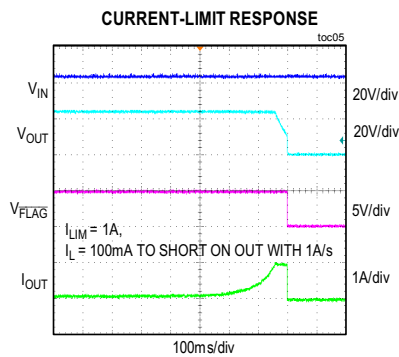
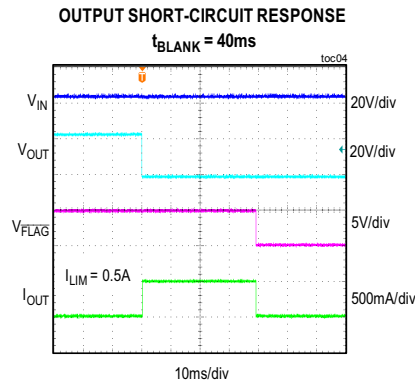
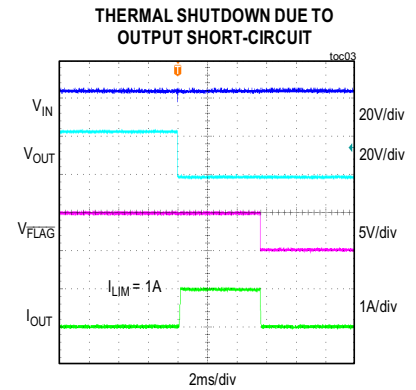
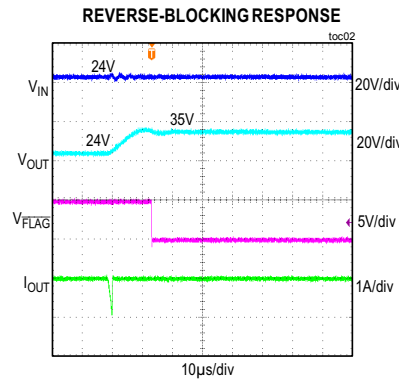
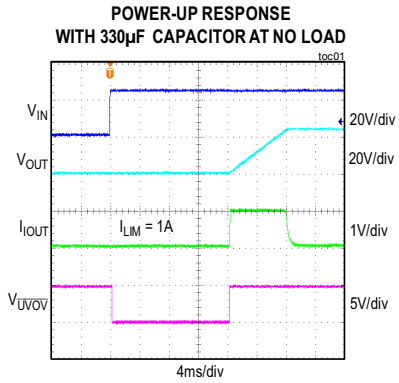
Table 4. Output Load Capacitor (JU7)

| JUMPER | SHUNT POSITION | DESCRIPTION |
|--------|----------------|---------------------------------|
| JU7 | Installed | OUT connected to C4 and C5. |
| | Not installed* | OUT not connected to C4 and C5. |

*Default position.

MAX17608 EV Kit Performance Report

($V_{IN} = 24V$, unless otherwise noted.)



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Component Suppliers

| SUPPLIER | WEBSITE |
|---|--|
| Bourns, Inc. | www.bourns.com |
| Fairchild Semiconductor | www.fairchildsemi.com |
| FCI Electronics Interconnection Solutions | www.fciconnect.com |
| Lite-On, Inc. | www.us.liteon.com |
| Lumex Inc. | www.lumex.com |
| Murata Americas | www.murata.com |
| Panasonic Corp. | www.panasonic.com |
| Phoenix Contact, Inc. | www.phoenixcontact.com |
| STMicroelectronics | www.us.st.com |
| TDK Corp. | www.component.tdk.com |

Note: Indicate that you are using the MAX17608 when contacting these component suppliers.

Ordering Information

| PART | TYPE |
|----------------|--------|
| MAX17608EVKIT# | EV Kit |

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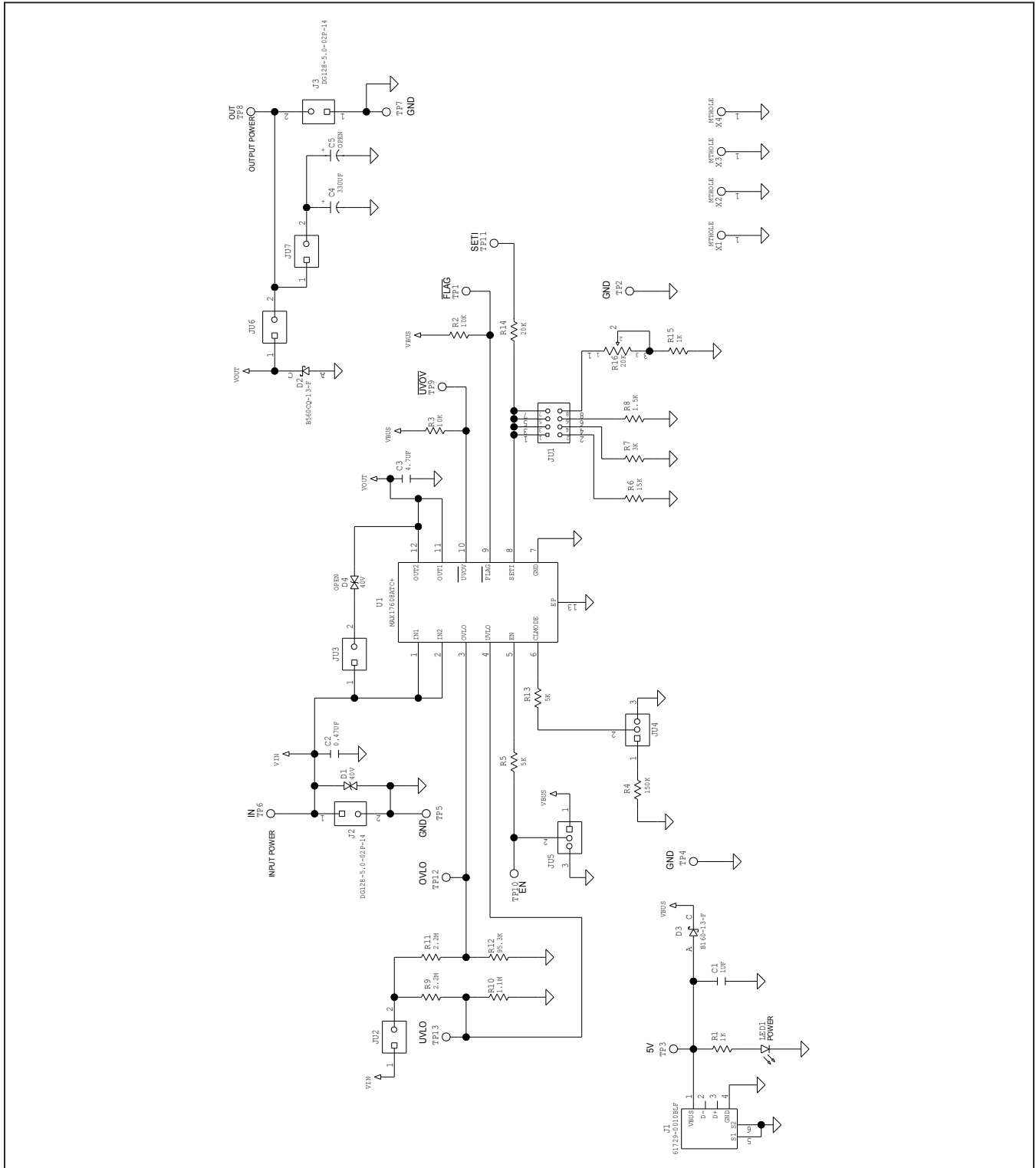
MAX17608 EV Kit Bill of Materials

| PART REFERENCE | QTY | DESCRIPTION | MANUFACTURER PART NUMBER |
|---------------------|-----|---|-------------------------------------|
| C1 | 1 | 1µF 10%, 25V X7R ceramic capacitors (0603) | Murata GRM188R61E105KA12 |
| C2 | 1 | 0.47µF 10%, 100V X7R ceramic capacitors (0805) | Murata GRM21BR72A474KA73L |
| C3 | 1 | 4.7µF 10%, 100V X7R ceramic capacitors (1210) | Murata GRM32ER72A475KE14 |
| C4 | 1 | 330µF 20%, 50V aluminium (10mm) | Panasonic EEU-EB1H331 |
| D1 | 1 | TVS Diode, 600W (SMB) | Bourns SMBJ40CA |
| D2 | 1 | Power Schottky Diode, 60V, 5A (SMC) | Diodes Incorporated B560CQ-13-F |
| D3 | 1 | Power Schottky Diode, 60V, 1A (SMA) | Diodes Incorporated B160-13-F |
| J1 | 1 | USB B connector | FCI Connect 61729-0010BLF |
| J2, J3 | 2 | 2-Pin Green PC Terminal Block | Degson Electronics DG128-5.0-02P-14 |
| JU1 | 1 | 2x4 Dual-Row Header, 0.1in centers, cut to fit | Sullins Connector PBC04DAAN |
| JU2, JU3, JU6, JU7 | 4 | 2-Pin Single-Row Header, 0.1in centers, cut to fit | Molex Connector 22-28-4023 |
| JU4, JU5 | 2 | 3-Pin Single-Row Header, 0.1in centers, cut to fit | Sullins Connector PEC03SAAN |
| LED1 | 1 | Green LED (1206) | Kingbright APT3216SGC |
| R1 | 1 | 1k ohm 1% resistors (0603) | - |
| R2, R3 | 2 | 10k ohm 1% resistors (0402) | - |
| R4 | 1 | 150k ohm 5% resistor (0402) | - |
| R5, R13 | 2 | 5k ohm 0.1% resistors (0402) | - |
| R6 | 1 | 15k ohm 1% resistors (0402) | - |
| R7 | 1 | 3k ohm 1% resistors (0402) | - |
| R8 | 1 | 1.5k ohm 1% resistors (0402) | - |
| R9, R11 | 2 | 2.2M ohm 5% resistors (0402) | - |
| R10 | 1 | 1.1M ohm 1% resistors (0402) | - |
| R12 | 1 | 95.3k ohm 1% resistors (0402) | - |
| R14 | 1 | 20k ohm 1% resistors (0402) | - |
| R15 | 1 | 1k ohm 1% resistors (0402) | - |
| R16 | 1 | 20k ohm Trimmer Potentiometers | Bourns 3296W-1-203LF |
| TP1, TP9, TP11-TP13 | 5 | White Test Point | Keystone Electronics Corp 5002 |
| TP2, TP4, TP5, TP7 | 4 | Black Test Point | Keystone Electronics Corp 5001 |
| TP3, TP6, TP8 | 3 | Red Test Point | Keystone Electronics Corp 5000 |
| TP10 | 1 | Green Test Point | Keystone Electronics Corp 5116 |
| U1 | 1 | 4.5V to 60V, 1A, OV, UV, Reverse Voltage Protector with Forward/Reverse Current Limit (12-pin TDFN-EP, 3mmx3mm) | MAX17608ATC+ |
| C5 | 0 | Not Installed; 330µF 20%, 50V aluminium (10mm) | Panasonic EEU-EB1H331 |
| D4 | 0 | Not Installed; TVS Diode, 600W (SMB) | Bourns SMBJ40CA |
| PCB | 1 | PCB: MAX17608 Evaluation Kit | - |

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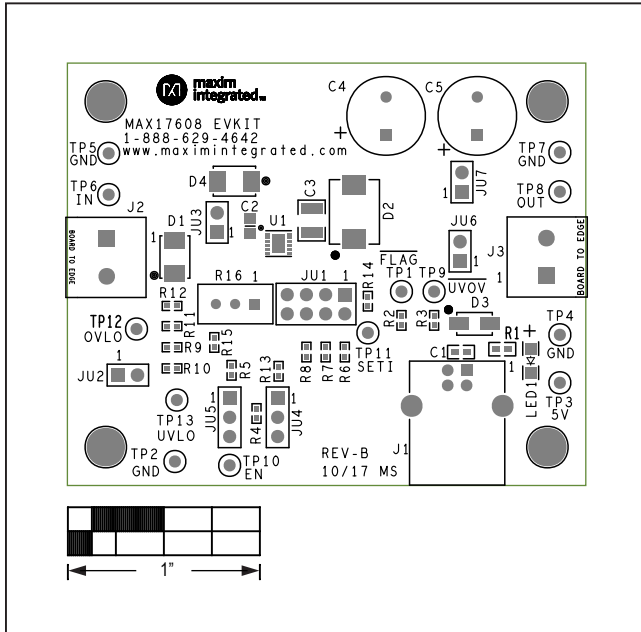
MAX17608 EV Kit Schematic



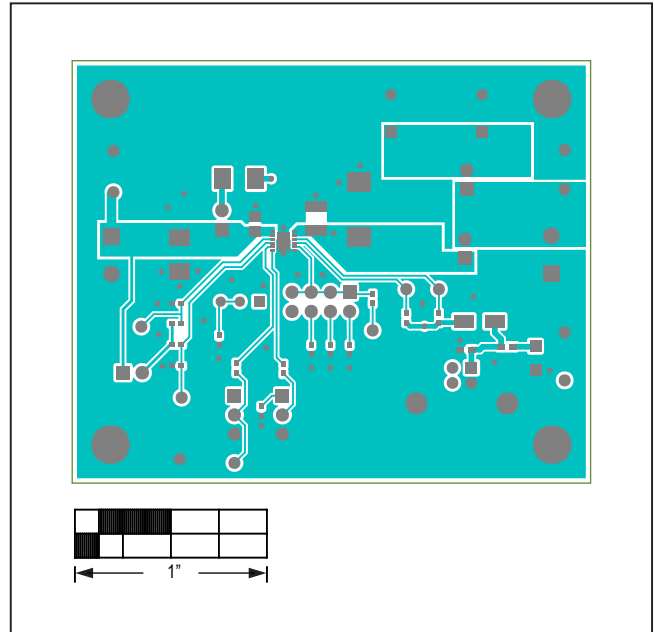
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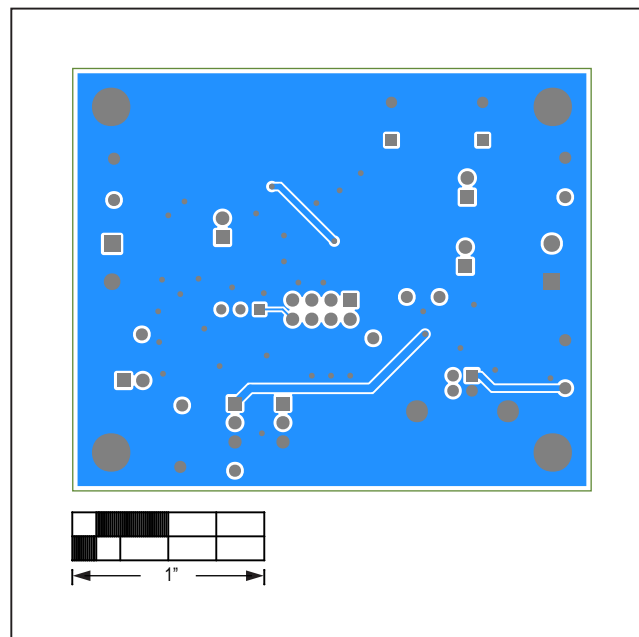
MAX17608 EV Kit PCB Layout



MAX17608 EV Kit PCB Layout—Top Silkscreen



MAX17608 EV Kit PCB Layout—Top Layer



MAX17608 EV Kit PCB Layout—Bottom Layer

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Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|-----------------|---------------|-----------------|---------------|
| 0 | 1/18 | 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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Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.