

## MAX17612A Evaluation Kit

**Evaluates: MAX17612A  
4.5V to 60V, 250mA, Current-Limiter  
with OV, UV, and Reverse Protection**

### General Description

The MAX17612A evaluation kit (EV kit) is a fully assembled and tested circuit board that demonstrates the MAX17612A 4.5V to 60V, 250mA, current-limiter with OV, UV, and reverse protection in a 10-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 250mA 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

- MAX17612A EV kit
- 60V DC power supply
- Multimeters
- Adjustable load (0A–1A)
- 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 UVOV goes low when input reaches approximately 36V.
- 6) Gradually decrease the DC power-supply voltage and verify that OUT comes back and UVOV 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 FLAG goes low when the load current increases above 250mA.
- 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 ( $\overline{\text{UVOV}}$  and  $\overline{\text{FLAG}}$ ) and EN.

The EV kit provides on-board output capacitors to enable a demonstration of the MAX17612A protection features.

### Input-Power Supply

The EV kit is powered by a user-supplied 4.5V to 60V power supply connected between J2/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  $V_{\text{BUS}}$  and to the EN pin (JU5 connects  $V_{\text{BUS}}$  to EN by default). Choose the JU5 setting to enable or disable operation of the MAX17612A (see [Table 1](#)).

**Table 1. Enable (JU5)**

| JUMPER | SHUNT POSITION | DESCRIPTION                          | MAX17612A STATUS |
|--------|----------------|--------------------------------------|------------------|
| JU5    | 1-2*           | EN pin connected to $V_{\text{BUS}}$ | 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 10mA       |
|        | 3-4            | Current limit 100mA      |
|        | 5-6*           | Current limit 250mA      |
|        | 7-8            | Current limit adjustable |

\*Default position.

### UVLO/OVLO Threshold

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:

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

where R9 can be chosen as 2.2M $\Omega$ ,  $V_{\text{REF}}$  is 1.5V, and  $V_{\text{UVLO}}$  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:

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

where R11 can be chosen as 2.2M $\Omega$ ,  $V_{\text{REF}}$  is 1.5V, and  $V_{\text{OVLO}}$  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 $\mu$ 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. |

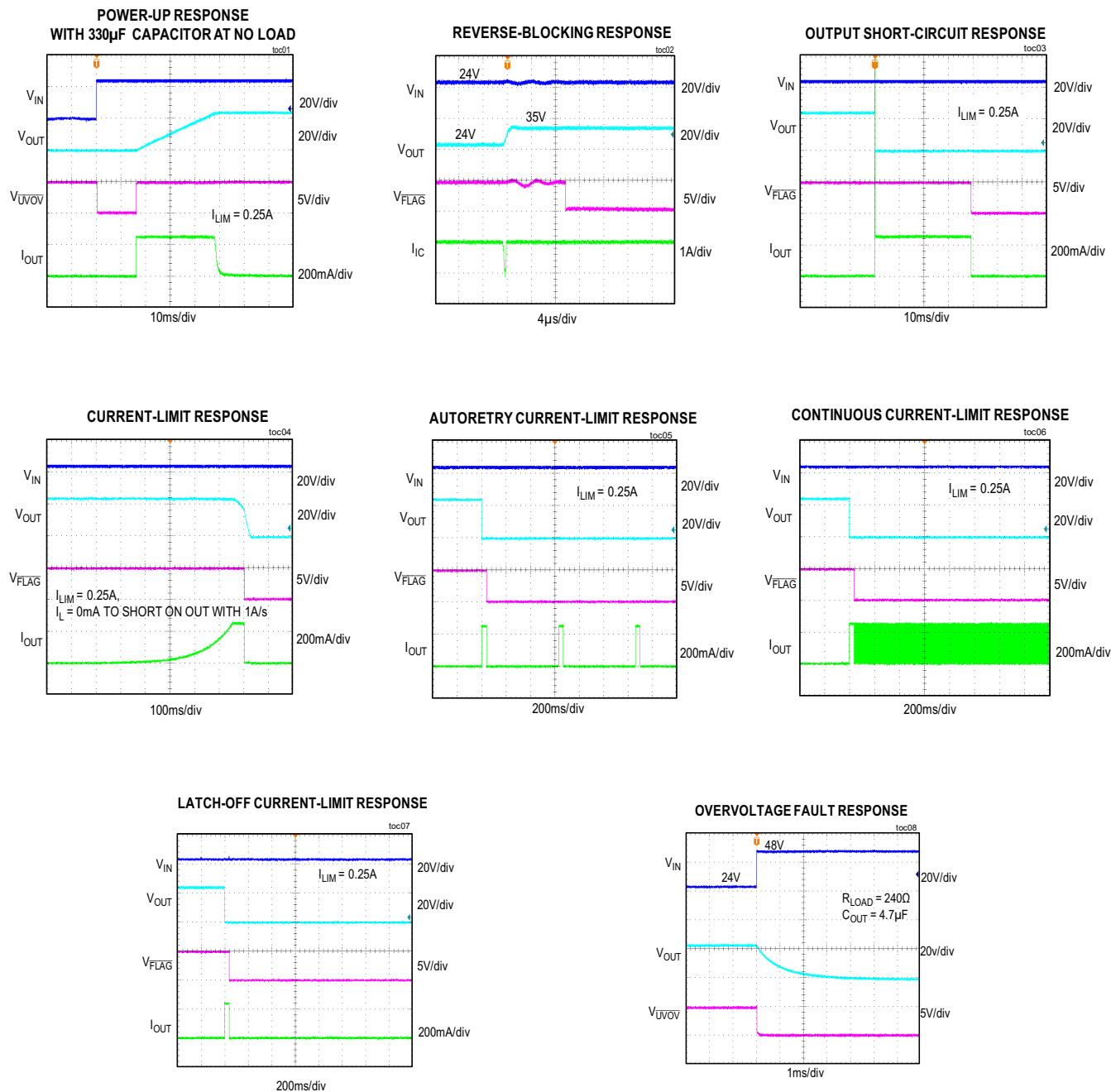
\*Default position.

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## MAX17612A EV Kit Performance Report

( $V_{IN} = 24V$ ,  $C_{IN} = 0.47\mu F$ ,  $C_{OUT} = 4.7\mu F$ , unless otherwise noted.)



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### Component Suppliers

| SUPPLIER                                  | WEBSITE                                                          |
|-------------------------------------------|------------------------------------------------------------------|
| Bourns, Inc.                              | <a href="http://www.bourns.com">www.bourns.com</a>               |
| FCI Electronics Interconnection Solutions | <a href="http://www.fciconnect.com">www.fciconnect.com</a>       |
| Murata Americas                           | <a href="http://www.murata.com">www.murata.com</a>               |
| Panasonic Corp.                           | <a href="http://www.panasonic.com">www.panasonic.com</a>         |
| Kemet Electronics Components              | <a href="http://www.kemet.com">www.kemet.com</a>                 |
| Diodes Incorporated                       | <a href="http://www.diodes.com">www.diodes.com</a>               |
| Degson Electronics                        | <a href="http://www.degson.com">www.degson.com</a>               |
| SullinsCorp Connector Solutions           | <a href="http://www.sullinscorp.com">www.sullinscorp.com</a>     |
| Molex Electronic Solutions                | <a href="http://www.molex.com">www.molex.com</a>                 |
| Kingbright USA                            | <a href="http://www.kingbrightusa.com">www.kingbrightusa.com</a> |
| Keystone Electronics Corp                 | <a href="http://www.keyelco.com">www.keyelco.com</a>             |

**Note:** Indicate that you are using the MAX17612A when contacting these component suppliers.

### Ordering Information

| PART            | TYPE   |
|-----------------|--------|
| MAX17612AEVKIT# | EV Kit |

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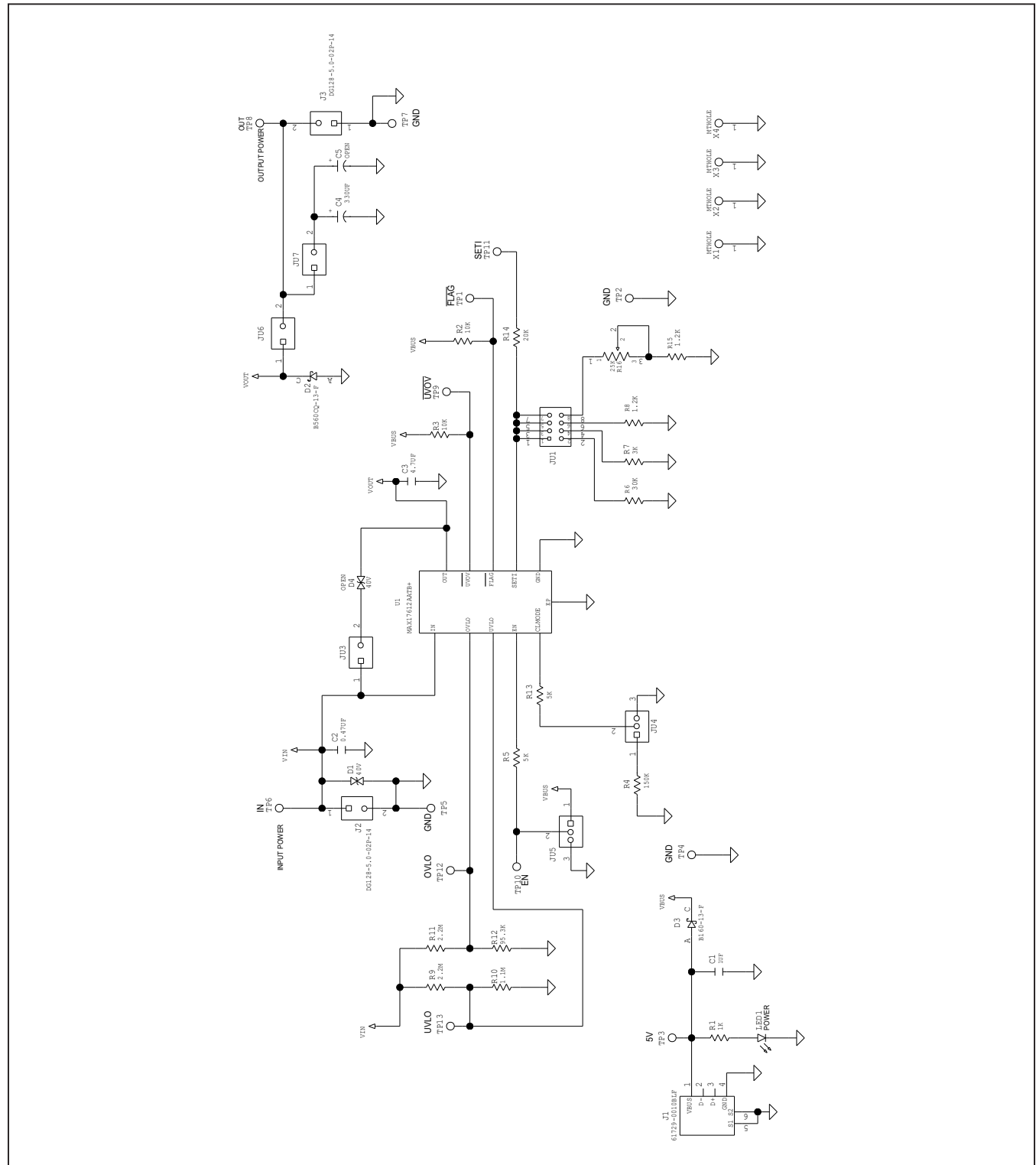
## MAX17612A EV Kit Bill of Materials

| PART REFERENCE      | QTY | DESCRIPTION                                                                                      | MANUFACTURER PART NUMBER                       |
|---------------------|-----|--------------------------------------------------------------------------------------------------|------------------------------------------------|
| C1                  | 1   | 1µF 10%, 50V X5R ceramic capacitors (0603)                                                       | Murata GRM188R61H105KAAL                       |
| C2                  | 1   | 0.47µF 10%, 100V X7R ceramic capacitors (0805)                                                   | Murata GRM21BR72A474KA73L                      |
| C3                  | 1   | 4.7µF 10%, 100V X7R ceramic capacitors (1210)                                                    | Kemet C1210C475K1R2C, 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                    |
| JU3, JU6, JU7       | 3   | 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   | 30k ohm 1% resistors (0402)                                                                      | -                                              |
| R7                  | 1   | 3k ohm 1% resistors (0402)                                                                       | -                                              |
| R8, R15             | 2   | 1.2k 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)                                                                      | -                                              |
| R16                 | 1   | 25k ohm Trimmer Potentiometers                                                                   | Bourns 3296Y-1-253LF                           |
| 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, 250mA, Current-Limiter with OV, UV and Reverse Protection (10-pin TDFN-EP, 3mmx3mm) | MAX17612AATB+                                  |
| 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: MAX17612A Evaluation Kit                                                                    | -                                              |

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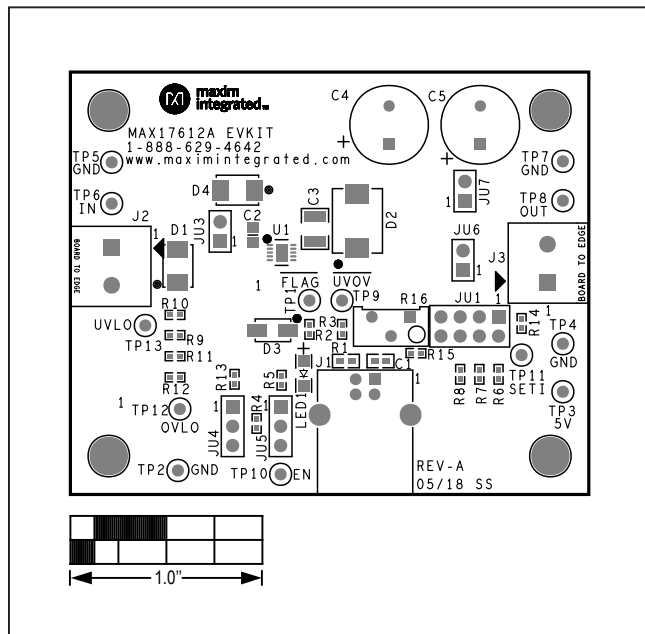
## MAX17612A EV Kit Schematic



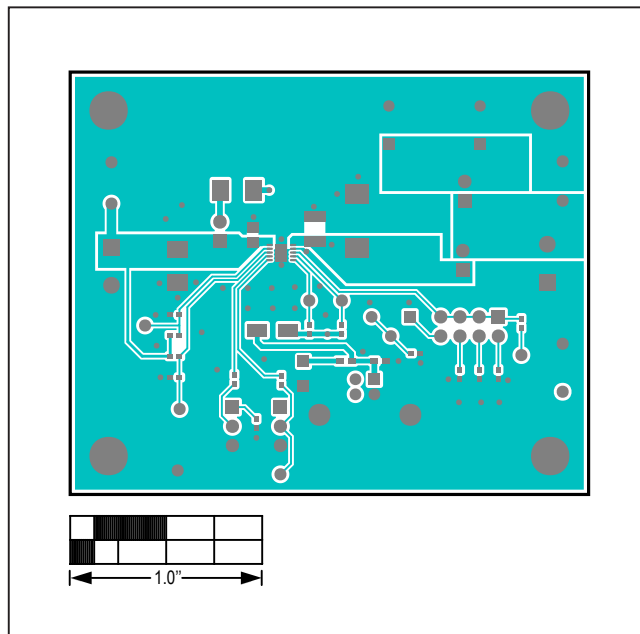
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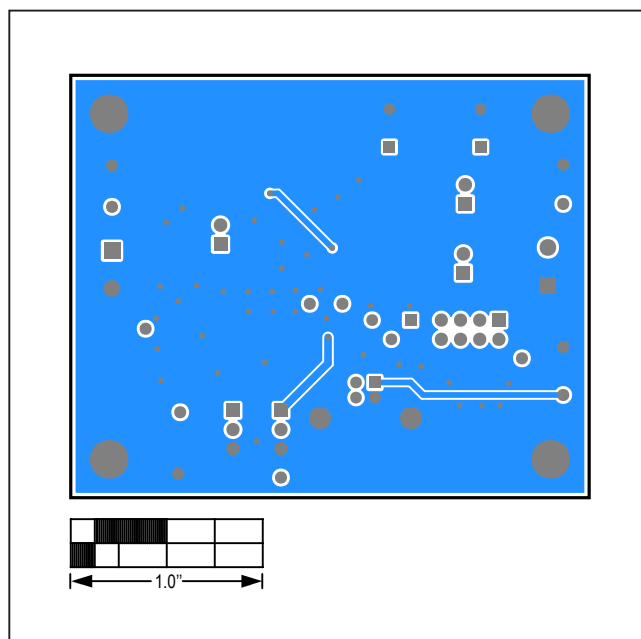
### MAX17612A EV Kit PCB Layout



MAX17612A EV Kit PCB Layout—Top Silkscreen



MAX17612A EV Kit PCB Layout—Top Layer



MAX17612A EV Kit PCB Layout—Bottom Layer



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### Revision History

| REVISION<br>NUMBER | REVISION<br>DATE | DESCRIPTION                                    | PAGES<br>CHANGED |
|--------------------|------------------|------------------------------------------------|------------------|
| 0                  | 7/18             | Initial release                                | —                |
| 1                  | 8/18             | Updated TOC01 and the <i>Bill of Materials</i> | 4–6              |

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at <https://www.maximintegrated.com/en/storefront/storefront.html>.

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