

MAX17615 Evaluation Kit

Evaluates: MAX17615 4.25V to 60V, 250mA Current Limiter with Overvoltage, Undervoltage, and Reverse Protection

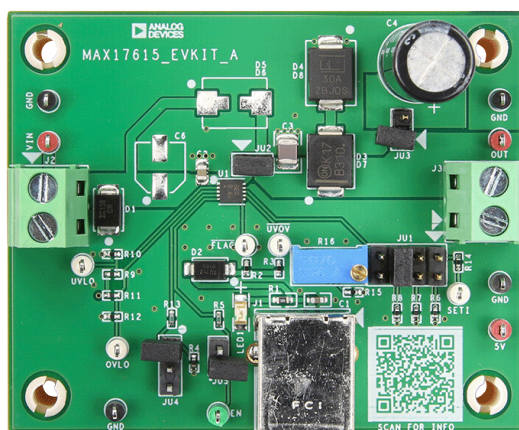
General Description

The MAX17615 evaluation kit (EV kit) is a fully assembled and tested circuit board that demonstrates the MAX17615, a 4.25V to 60V, 250mA, current-limiter with overvoltage (OV), undervoltage (UV), and reverse protection in a 10-pin TDFN package. The EV kit can be configured to demonstrate adjustable overvoltage, undervoltage, different current-limit types, different current-limit thresholds and input and output reverse voltage protection.

Features

- 4.25V to 60V Operating-Voltage Range
- Features a TVS Diode across the Input Terminals
- Features a Schottky Diode and a TVS Diode across the Output Terminals
- Evaluates Undervoltage Lockout (UVLO), Overvoltage Lockout (OVLO), Three Current-Limit Types, and Current-Limit Threshold
- UVLO Programmed to 4V
- OVLO Programmed to 39.6V
- Jumper-Configurable Current-Limit (Selected as 250mA by Default)
- Current-Limit Mode Set to Autoretry by Default
- Proven PCB Layout
- Fully Assembled and Tested

MAX17615 EV Kit Photo



[Ordering Information](#) appears at end of data sheet.

Quick Start

Required Equipment

- MAX17615 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 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. Connect a 5V DC power supply to IN. Verify that OUT is 5V.
5. Gradually increase voltage on the DC power supply and verify that the OUT voltage goes down and \overline{UVLO} goes low when the input reaches approximately 39.6V.
6. Gradually decrease voltage on the DC power supply and verify that OUT comes back and \overline{UVLO} goes high when the input reaches approximately 38.2V.
7. Set the DC power-supply voltage to 24V, then connect the adjustable load between the OUT and GND terminals and a multimeter in series to measure the current. Gradually increase the load current and verify that OUT goes down and \overline{FLAG} goes low when the load current increases above 250mA.
8. The jumper JU1 can be configured to change the current limit as shown in [Table 2](#). Verify various current limit operations by repeating step 7.

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Detailed Description

The MAX17615 EV kit is a fully assembled and tested circuit board that demonstrates the MAX17615, a 4.25V to 60V, 250mA current limiter with OV, UV, reverse protection IC in a 10-pin surface-mount TQFN package.

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, Latch-off, and Continuous). LED1 on the EV kit indicates availability of logic power for annunciation signals (UVOV and FLAG).

The EV kit provides an on-board output electrolytic capacitor (C4) to enable a demonstration of the MAX17615 protection features while charging a large capacitor.

Input-Power Supply

The EV kit is powered by a user-supplied 4.25V to 60V power supply connected between J2/TP6 (INPUT POWER) and GND. The EV kit features a 40V TVS diode (D1) at the input terminals which limit input surge voltage to a maximum of 65V and enhance protection.

Enable

The EN pin is internally pulled to 1.6V to have an always ON option when it is left open. Choose the JU5 setting to enable or disable operation of the MAX17615 (see [Table 1](#)).

Table 1. EN (JU5)

JUMPER	SHUNT POSITION	DESCRIPTION	MAX17615 STATUS
JU5	Open*	EN pin floating	ON
	1-2	EN pin connected to GND	OFF

*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:

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

where R9 can be chosen as 2.2MΩ

$V_{UVLOR} = 1.5V$

V_{UVLO} = Input supply voltage at which the device exits the UVLO condition.

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:

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

where R11 can be chosen as 2.2MΩ

$V_{OVLOR} = 1.5V$

V_{OVLO} = Input supply voltage at which the device enters the OVLO condition.

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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.

Use the following equation to calculate the SET1 resistance for a desired current limit:

$$R_{SET1} (k\Omega) = \frac{300}{I_{LIM} (mA)}$$

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

Current-Limit Type Select

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

Output Load Capacitor

Use JU2 to connect the OUT pins to OUT test point (TP8). Use jumper JU3 to connect output to a 330µF capacitor. See [Table 4](#) for jumper settings.

Table 4. Output Load Capacitor (JU3)

JUMPER	SHUNT POSITION	DESCRIPTION
JU3	Installed	OUT connected to C4
	Not installed*	OUT not connected to C4

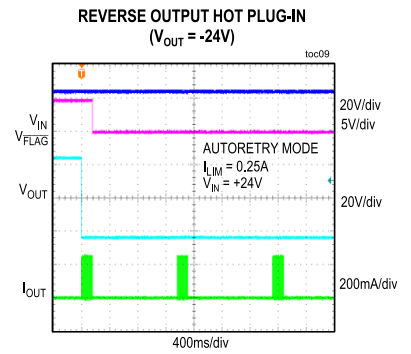
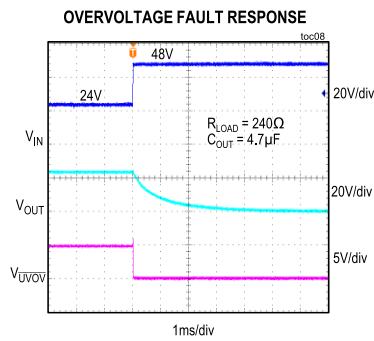
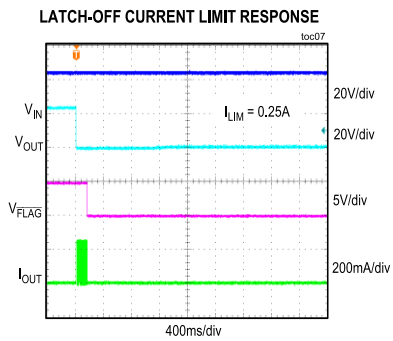
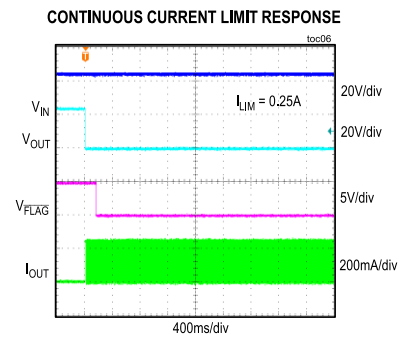
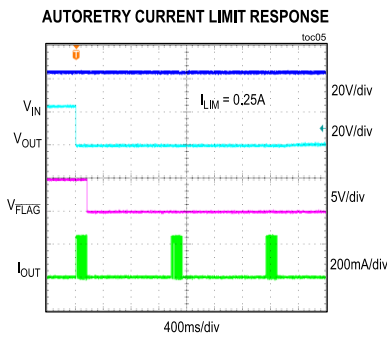
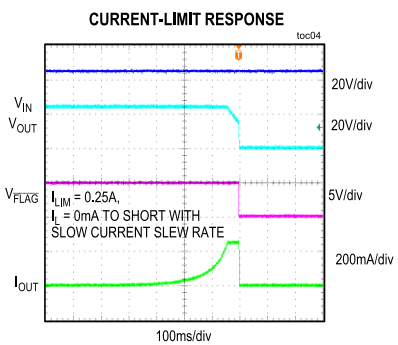
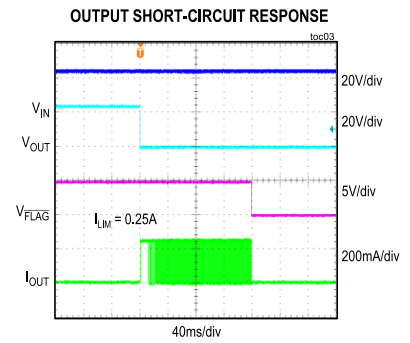
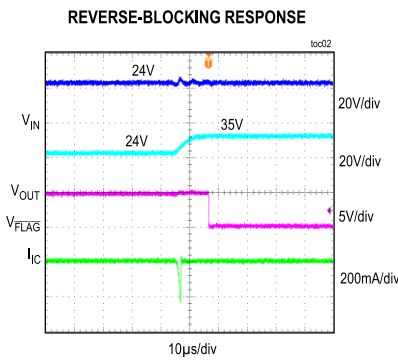
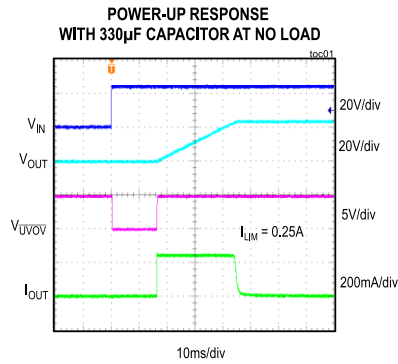
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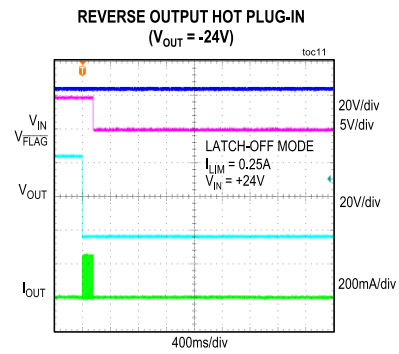
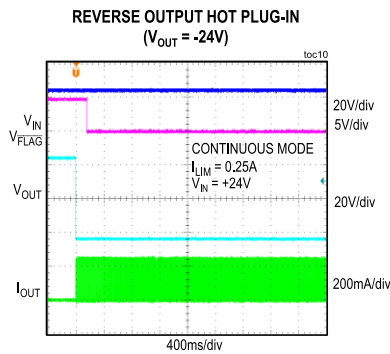
MAX17615 EV Kit Typical Operating Characteristics

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



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Component Suppliers

SUPPLIER	WEBSITE
Bourns Inc.	www.bourns.com
FCI Electronics Interconnection Solutions	www.fciconnect.com
KEMET Corporation	www.kemet.com
Murata Americas	www.murata.com
Panasonic Corp.	www.panasonic.com
ON Semiconductor	www.onsemi.com
Diode Incorporated	www.diodes.com
Littlefuse	www.littelfuse.com
SullinsCorp Connector Solutions	www.sullinscorp.com
Keystone Electronics Corp	www.keyelco.com
Molex Electronic Solutions	www.molex.com
Nichicon Corporation	www.nichicon.co.jp
Degson	www.degson.com
Kingbright Electronic Co	www.kingbright.com

Note: Indicate that you are using the MAX17615 when contacting these component suppliers.

Ordering Information

PART	TYPE
MAX17615EVKIT#	EV Kit

#Denotes RoHS-compliant.

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MAX17615 EV Kit Bill of Materials

PART REFERENCE	QTY	DESCRIPTION	MANUFACTURER PART NUMBER
C1	1	1 μ F 10%, 50V X5R ceramic capacitors (0603)	Murata GRM188R61H105KAAL
C2	1	0.47 μ F 10%, 100V X7R ceramic capacitors (0805)	Murata GRM21BR72A474KA73
C3	1	4.7 μ F 10%, 100V X7R ceramic capacitors (1210)	Kemet C1210C475K1R2C, Murata GRM32ER72A475KE14
C4	1	330 μ F 20%, 63V aluminium (10mm)	Nichicon UHW1J331MPD1TD
D1	1	TVS Diode, 600W (SMB)	Bourns SMBJ40CA
D2	1	Power Schottky Diode, 60V, 1A (SMA)	Diodes Incorporated B160-13-F
D3	1	Power Schottky Diode, 100V, 3A (SMC)	ON Semiconductor NRVBS3100T3G
D4	1	TVS Diode, 1500W (SMC)	Littlefuse 1.5SMC30A
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	2	2-Pin Single-Row Header, 0.1in centers, cut to fit	Molex Connector 22-28-4023
JU4	1	3-Pin Single-Row Header, 0.1in centers, cut to fit	Sullins Connector PEC03SAAN
JU5	1	2-Pin Single-Row Header, 0.1in centers, cut to fit	Sullins Connector PEC02SAAN
LED1	1	Green LED (1206)	Kingbright APT3216SGC
R1	1	1k ohm 1% resistors (0603)	-
R2, R3	2	499k ohm 1% resistors (0402)	-
R4	1	150k ohm 1% 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	1.3M ohm 1% resistors (0402)	-
R12	1	86.6k 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

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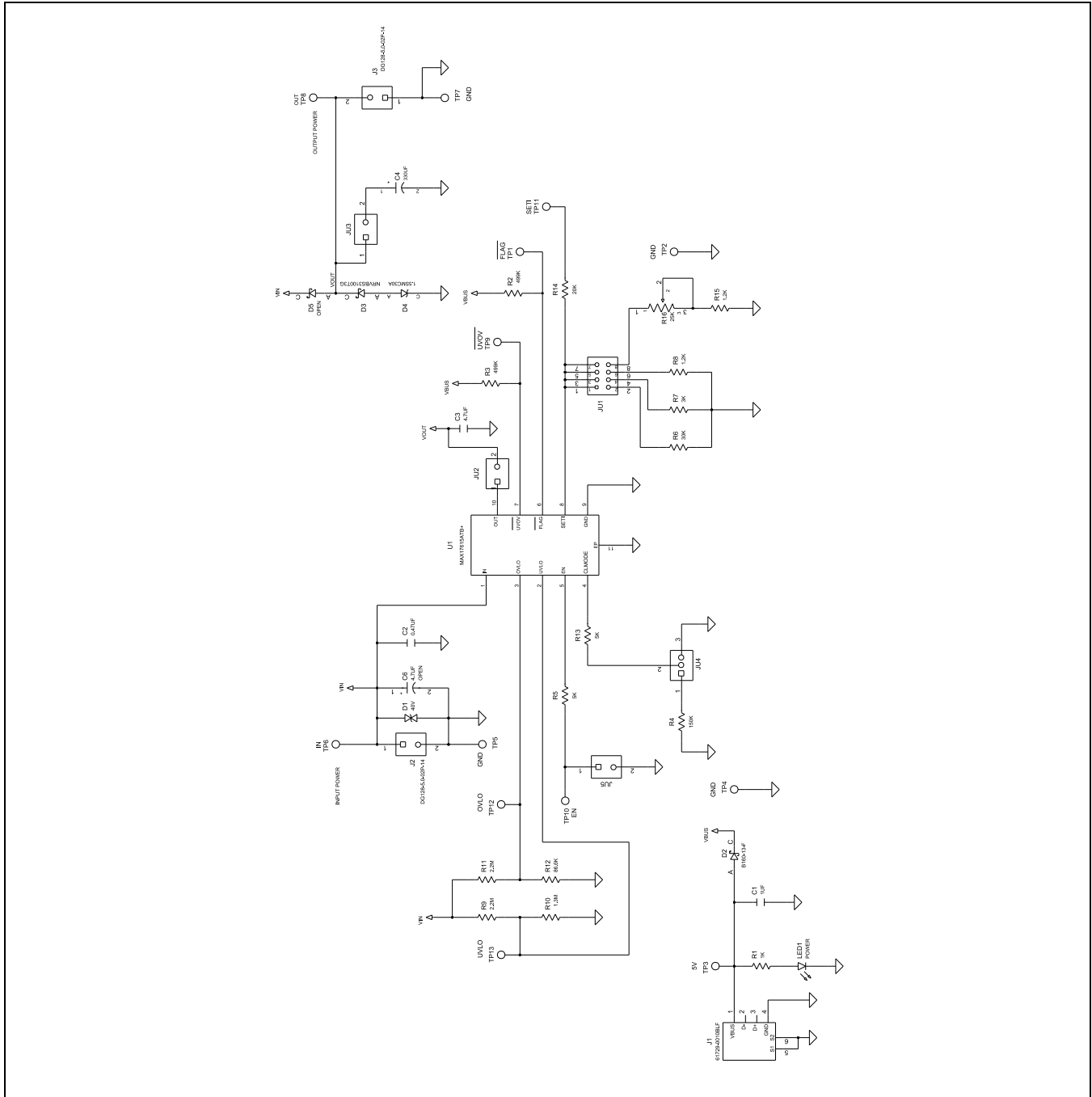
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U1	1	4.25V to 60V, 250mA, Current-Limiter with OV, UV and Reverse Protection (10-pin TDFN, 3mmx3mm)	MAX17615ATB+
C6	0	Not Installed; 4.7 μ F 20%, 80V aluminium	Panasonic EEE-FK1K4R7P, Cornell Dubilier AFK475M80D16T-F
D5	0	Not installed; Power Schottky Diode, 60V, 5A (SMC)	Diodes Incorporated B540CQ-13-F
D6-D8	0	Power Schottky Diode, 50V, 1A (SMA)	ON Semiconductor MURA105T3G
PCB	1	PCB: MAX17615 Evaluation Kit	-

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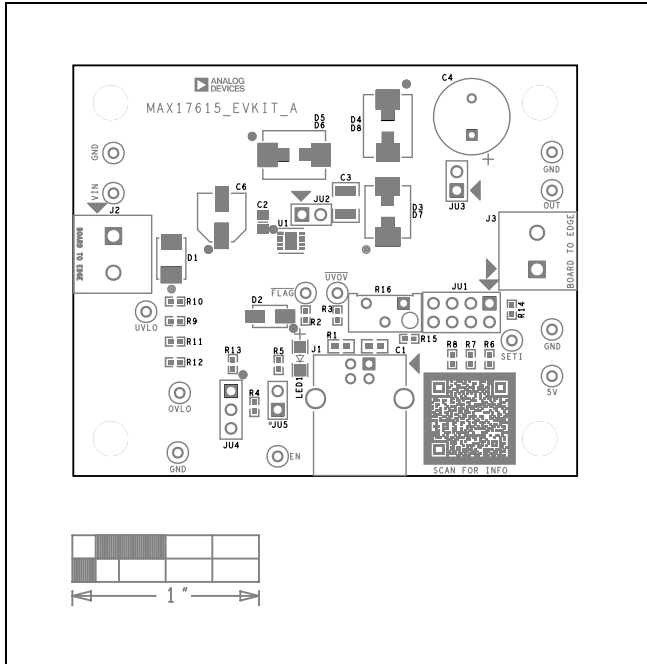
MAX17615 EV Kit Schematic



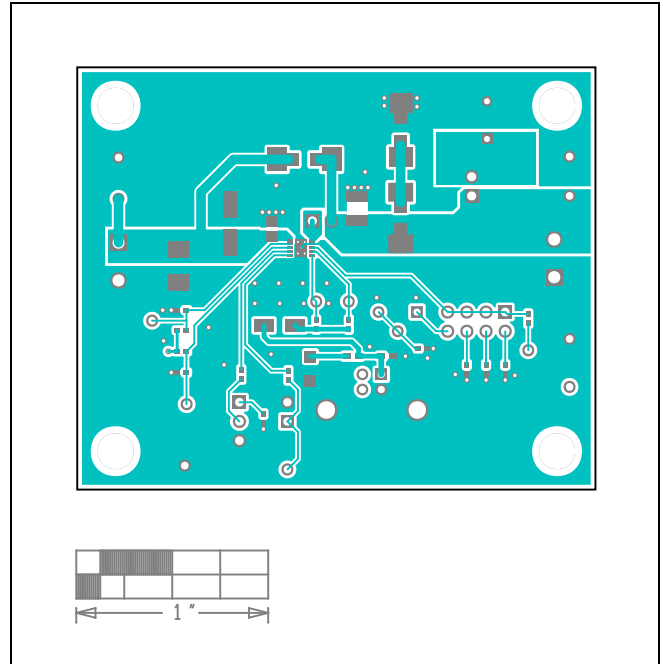
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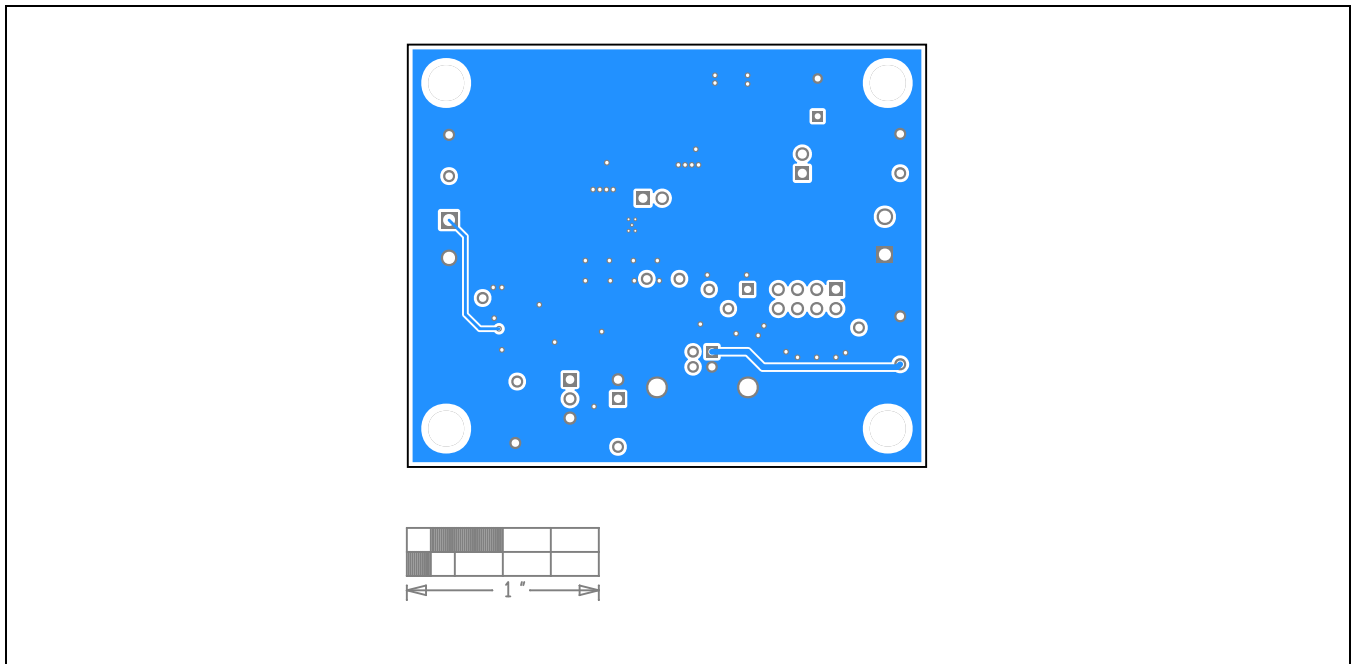
MAX17615 EV Kit PCB Layout



MAX17615 EV Kit PCB Layout—Top Silkscreen



MAX17615 EV Kit PCB Layout—Top Layer



MAX17615 EV Kit PCB Layout—Bottom Layer

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Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/22	Initial release	—

