Evaluation Board User Guide

MAX42410 Evaluation Kit

Evaluates: MAX42408/MAX42410

General Description

The MAX42410 evaluation kit (EV kit) provide a proven design to evaluate the MAX42410 synchronous buck converter with 10µA quiescent current. The EV kit comes with a MAX42410AFOB+ (1.5MHz) installed, as well as various test points and jumpers for evaluation. The EV kit output voltage is variable and is set to 3.3V. It can be easily configured to 0.8V to 6V (1.5MHz) or up to 10V (400kHz) with minimum component changes. The EV kit is designed to deliver up to 10A with input voltage 4.5V to 36V. The output voltage quality can be monitored by observing the PGOOD signal.

Benefits and Features

- Input Supply Range from 4.5V to 36V
- Adjustable output voltage from 0.8V to 6V (1.5MHz)
- Delivers Up to 8A/10A
- Frequency-Synchronization Input
- Enable Input
- Voltage Monitoring PGOOD Output Available
- Proven PCB Layout
- Fully Assembled and Tested

***Ordering Information* appears at end of data sheet.**

Quick Start

Required Equipment

- MAX42410 EV kit
- 36V, 10A DC power supply (PS)
- Appropriate resistive load, or an electronic load that can sink 10A
- Digital multimeter (DMM)
- Oscilloscope

Procedure

The EV kit is fully assembled and tested. Do the following steps to verify board operation:

1. Verify that all jumpers are in their default positions, as shown in *Table 1*.
2. Connect the positive and negative terminals of the power supply to the VSUP and GND test pads, respectively.
3. Set the power-supply voltage to 14V.
4. Turn on the power supply.
5. Using the DMM, verify the OUT is approximately 3.3V.
6. Verify that the switching frequency is approximately 1.5MHz by monitoring the inductor switching voltage with the oscilloscope.
7. Turn off the power supply.
8. Connect the positive and negative terminals of the electronic load to VOUT and GND2, respectively.
9. Set the electronic load to the required current at or below 10A or use an equivalent resistive load with an appropriate power rating.
10. Adjust current-limit on the power supply as necessary.
11. Turn on the power supply and electronic load.
12. Verify that voltage across the VOUT and GND2 PCB pads is 3.3V ± 2%.

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EV Kit Board Photos

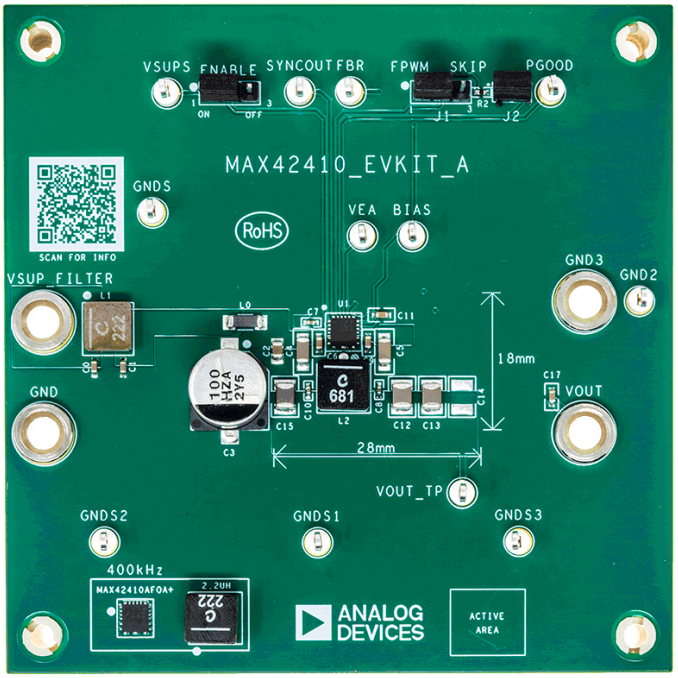


Figure 1. MAX42410 EV Kit Board Photo—Top

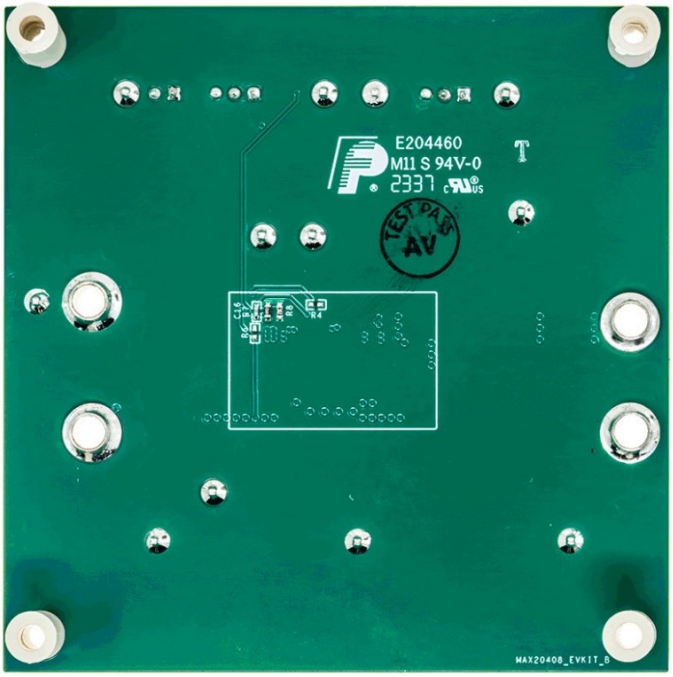


Figure 2. MAX42410 EV Kit Board Photo—Bottom

Detailed Description of Hardware

This MAX42410 EV kit data sheet must be used with the MAX42408/MAX42410 IC data sheet.

The MAX42410 EV kit provides a proven layout for the MAX42408/MAX42410 synchronous buck regulator IC. The IC accepts input voltages as high as 36V and delivers up to 10A. The EV kit can handle an input supply transient up to 42V. Various test points are included for evaluation.

External Synchronization

The IC can operate in two modes: forced pulse-width modulation (FPWM) or skip mode. Skip mode has better efficiency for light load conditions. When SYNC is pulled low, the IC operates in skip mode for light loads and FPWM mode for larger loads. When SYNC is pulled high, the IC is forced to operate in FPWM mode across all load conditions. SYNC can be used to synchronize with external clock if a clock source is present. The IC is forced to operate in FPWM mode when SYNC is connected to a clock source.

Buck Output Monitoring (PGOOD)

The EV kit provides a power-good output test point (PGOOD) to monitor the status of the buck output (OUT). PGOOD is pulled to high when the output is on regulation. It is pulled to ground when the output voltage drops below 7% (typ) of its nominal regulated voltage.

Programming Buck Output Voltage

The EV kit comes installed with MAX42410AFOB+ (1.5MHz), which provides an adjustable 0.8V to 6V output voltage. To program VOUT voltage, removing R5 and place appropriate resistors in the positions R7 and R8 according to the following equation:

Equation 1:

$$R7 = R8 \times [(V_{OUT}/V_{FB}) - 1]$$

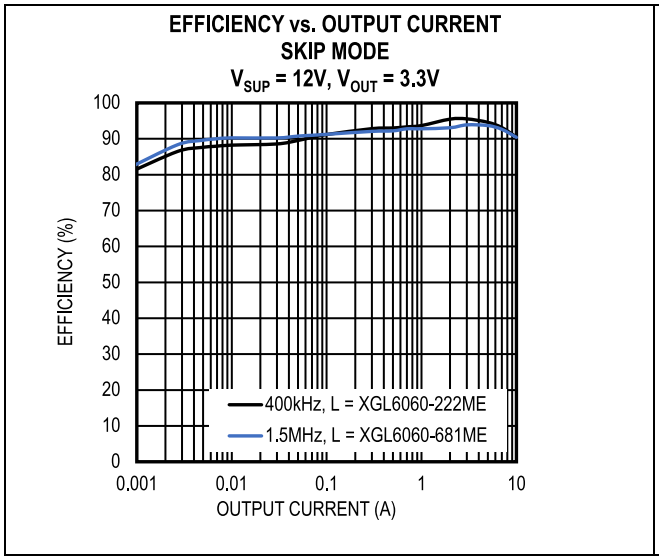
Where typically V_{FB} = 0.8V and R8 = 10kΩ.

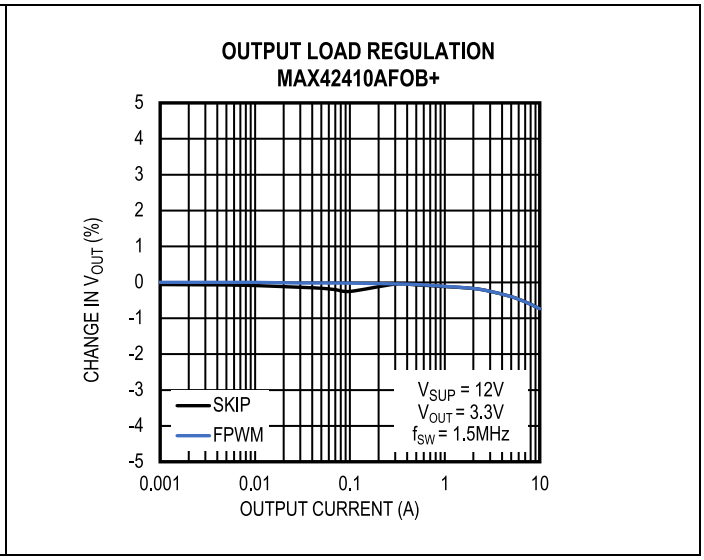
For C16 value, refer to the CFF (pF) column in *Table 2. Recommended Component Selection* of the MAX42408/MAX42410 IC data sheet.

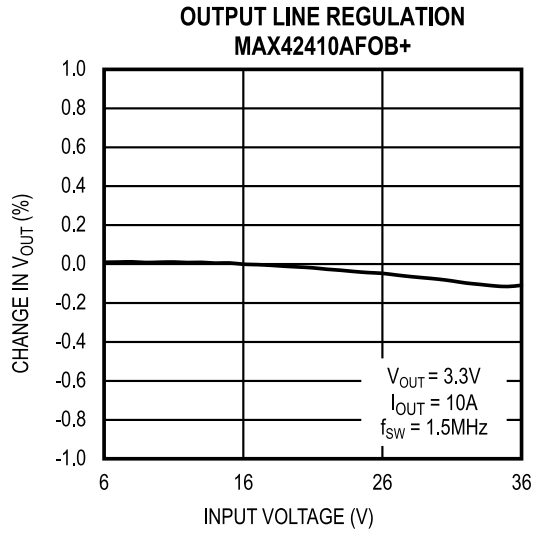
Evaluating Other Variants

The EV kit comes installed with a 1.5MHz, 10A variant (MAX42410AFOB+). A 400kHz, 10A (MAX42410AFOA+) variant is also available on the board together with a corresponding inductor for 3V to 5V output voltage. The other variants can be installed with minimal component changes.

Evaluation Data







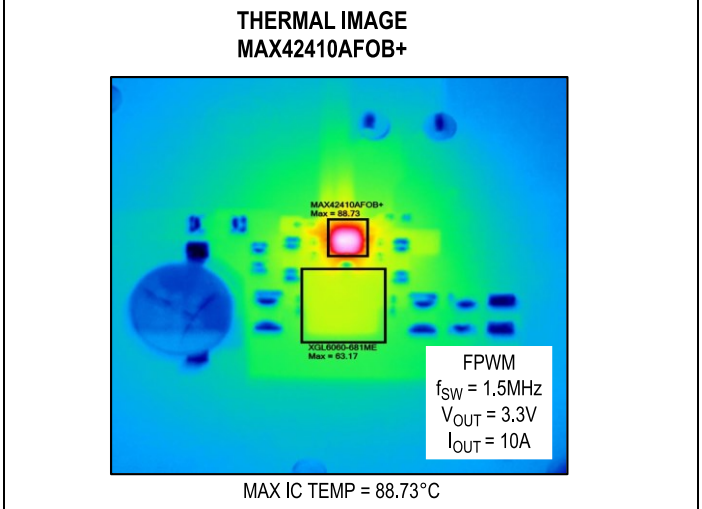


Table 1. Jumper Connection Guide

JUMPER	DEFAULT CONNECTION	FEATURE
ENABLE	1-2	Buck enabled
J1	1-2	Forced PWM
J2	Installed	PGOOD pulled up to BIAS.

Ordering Information

PART	TYPE
MAX42410EVKIT#	3.3V/1.5MHz EV kit

#Denotes RoHS-compliant.

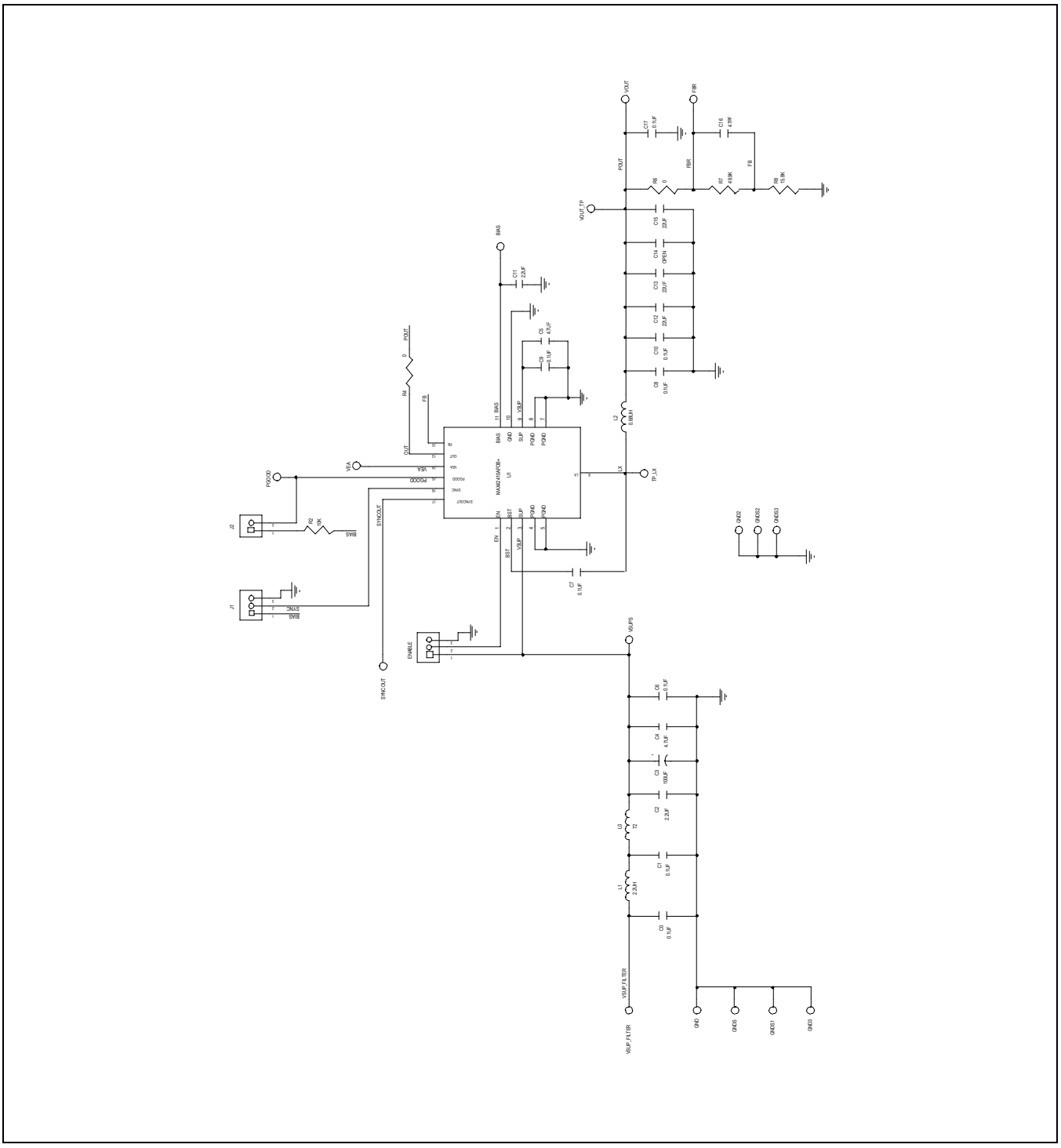
MAX42410 EV Kit Bill of Materials

PART	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
2.2UH	XGL6060-222ME	COILCRAFT	2.2UH	INDUCTOR; SMT; COMPOSITE; 2.2UH; 20%; 17.2A
BIAS, FBR, GND2, GNDS, GNDS1-GNDS3, PGOOD, SYNCOUT, VEA, VOUT_TP, VSUPS	5012	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; WHITE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
C0, C1	CC0603KRX7R0BB104	YAGEO	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 100V; X7R; CERAMIC
C2	CGA4J3X7R1H225M125AE	TDK	2.2UF	CAP; SMT (0805); 2.2UF; 20%; 50V; X7R; CERAMIC
C3	EEH-ZA1H101P	PANASONIC	100UF	CAP; SMT (CASE_G); 100UF; 20%; 50V; ALUMINUM-ELECTROLYTIC
C4, C5	CGA5L3X7R1H475K160AB	TDK	4.7UF	CAP; SMT (1206); 4.7UF; 10%; 50V; X7R; CERAMIC
C6, C9, C17	GCJ188R71H104KA12	MURATA	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 50V; X7R; CERAMIC
C7, C8, C10	CGA2B3X7R1H104M050BB	TDK	0.1UF	CAP; SMT (0402); 0.1UF; 20%; 50V; X7R; CERAMIC
C11	GRM188R71A225KE15	MURATA	2.2UF	CAP; SMT (0603); 2.2UF; 10%; 10V; X7R; CERAMIC
C12, C13, C15	GCM32ER71C226ME15	MURATA	22UF	CAP; SMT (1210); 22UF; 20%; 16V; X7R; CERAMIC
C16	04025C470KAT2A	AVX	47PF	CAP; SMT (0402); 47PF; 10%; 50V; X7R; CERAMIC
ENABLE, J1	PEC03SAAN	SULLINS	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
GND, GND3, VOUT, VSUP_FILTER	575-4	KEYSTONE	575-4	RECEPTACLE; JACK; BANANA; 0.203IN [5.2MM] DIA X 0.218IN [5.5MM] L; 0.203D/0.218L; NICKEL PLATED BRASS

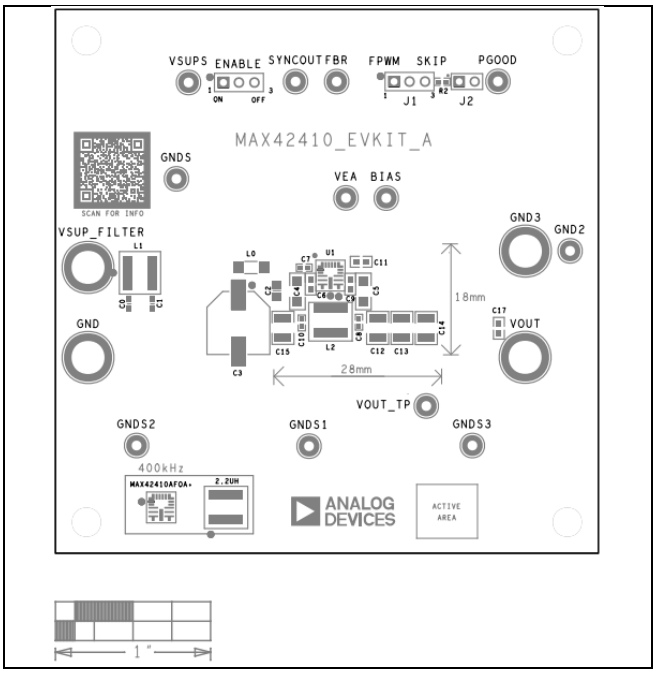
MAX42410 EV Kit Bill of Materials (continued)

PART	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
J2	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
L0	FBMJ4516HS720N	TAIYO YUDEN	72	INDUCTOR; SMT (1806); FERRITE-BEAD; 72 IMPEDANCE AT 100MHZ; 6A
L1	XEL6030-222ME	COILCRAFT	2.2UH	INDUCTOR; SMT; COMPOSITE; 2.2UH; 20%; 10A
L2	XGL6060-681ME	COILCRAFT	0.68UH	INDUCTOR; SMT; COMPOSITE; 0.68UH; 20%; 22.7A
MAX42410AFOA+	MAX42410AFOA+	ANALOG DEVICES, INC.	MAX42410AFOA+	EVKIT PART - IC; MAX42410AFOA+; FC2QFN17
R2	ERA-2AEB103	PANASONIC	10K	RES; SMT (0402); 10K; 0.10%; +/-25PPM/DEGK; 0.0630W
R4, R6	RC0402JR-070RL	YAGEO PHYCOMP	0	RES; SMT (0402); 0; 5%; JUMPER; 0.0630W
R7	CRCW060349K9FK	VISHAY DALE	49.9K	RES; SMT (0603); 49.9K; 1%; +/-100PPM/DEGC; 0.1000W
R8	AC0603FR-0715K8L	YAGEO	15.8K	RES; SMT (0603); 15.8K; 1%; +/-100PPM/DEGC; 0.1000W
U1	MAX42410AFOB+	ANALOG DEVICES, INC.	MAX42410AFOB+	EVKIT PART - IC; MAX42410AFOB+; FC2QFN17

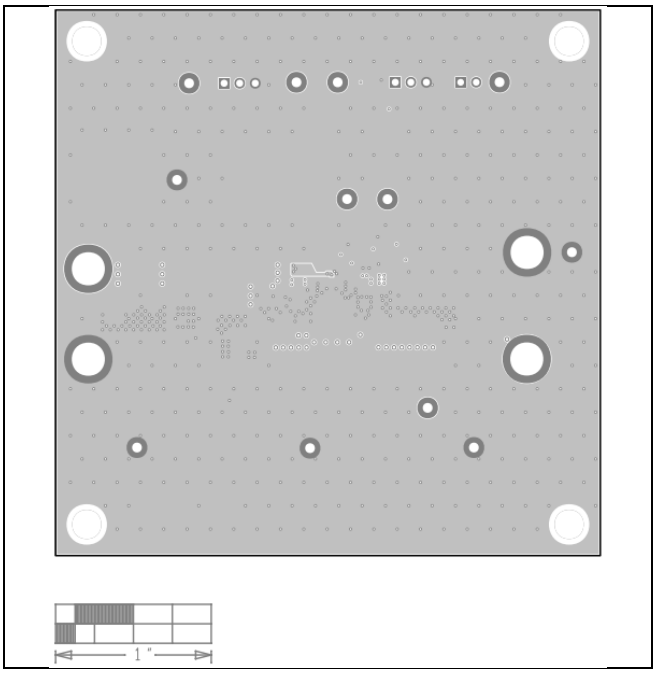
MAX42410 EV Kit Schematic



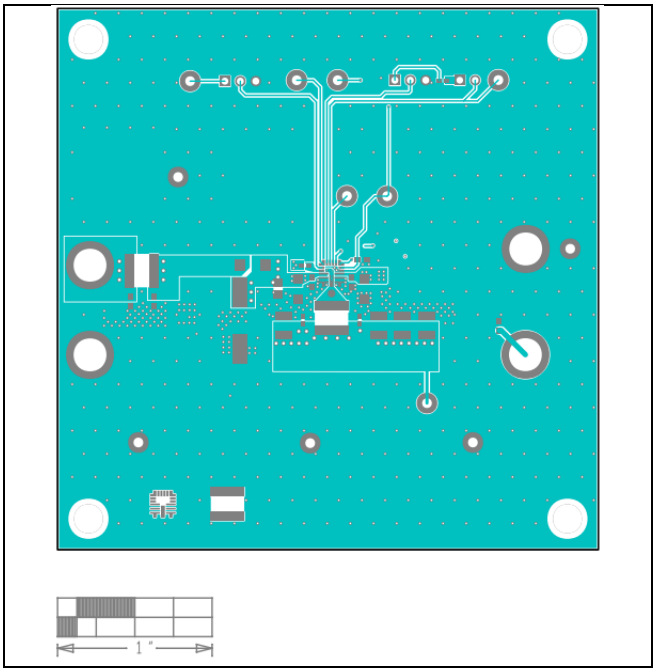
MAX42410 EV Kit PCB Layout



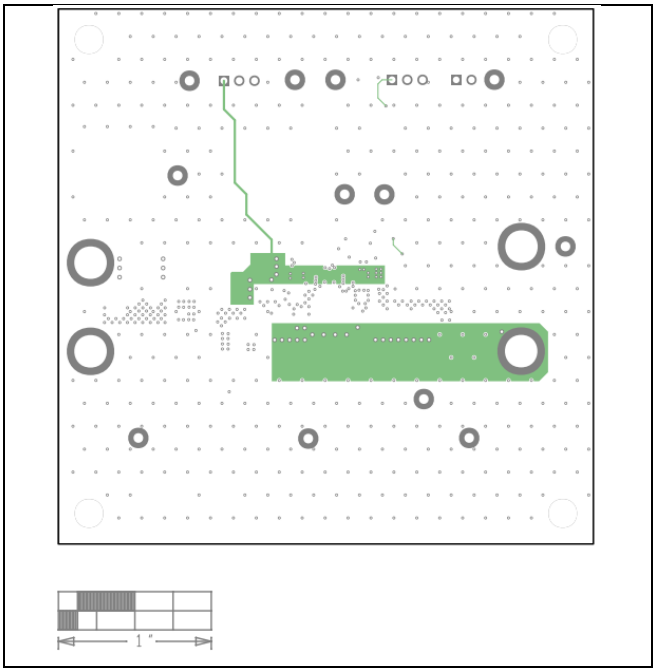
MAX42410 EV Kit Component Placement Guide—Top Silkscreen



MAX42410 EV Kit PCB Layout—Layer 2

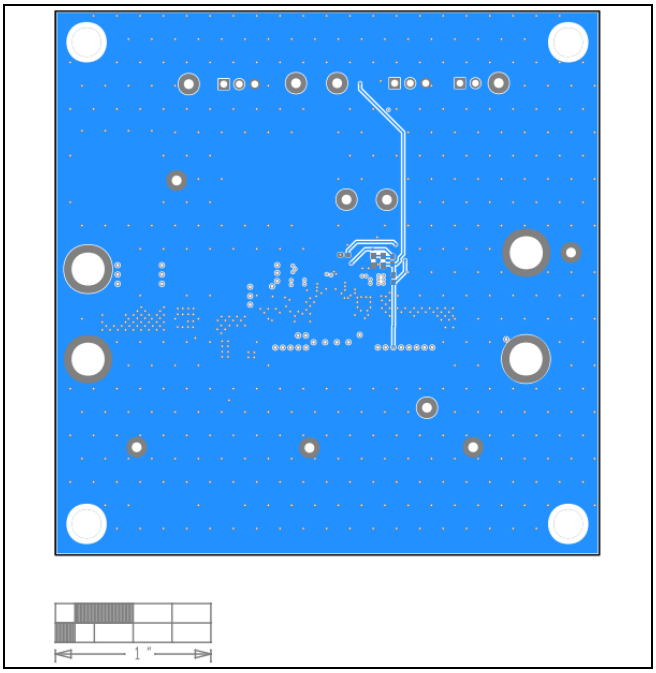


MAX42410 EV Kit PCB Layout—Top

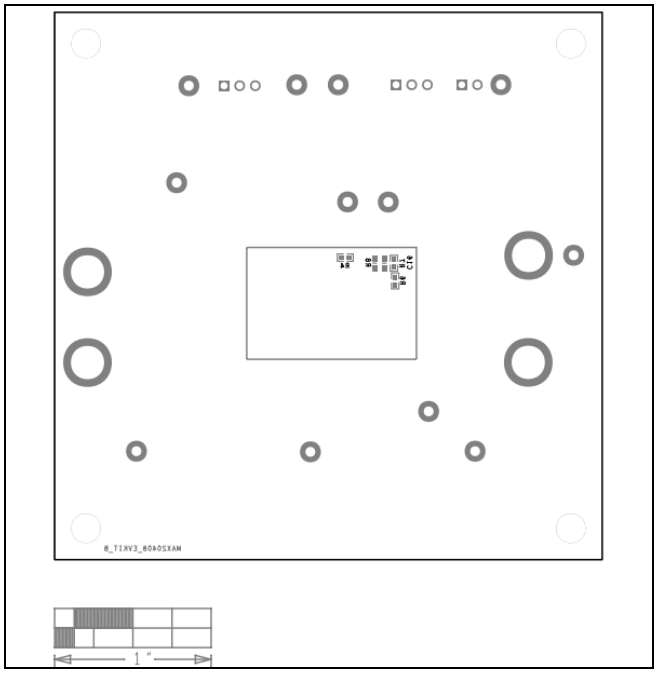


MAX42410 EV Kit PCB Layout—Layer 3

MAX42410 EV Kit PCB Layout (Continued)



MAX42410 EV Kit PCB Layout—Bottom



MAX42410 EV Kit Component Placement Guide—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/23	Initial release	—