

MAX25202 Evaluation Kit

Evaluates: MAX25202

General Description

The MAX25202 evaluation kit (EV kit) is a fully assembled and tested application circuit that simplifies the evaluation of the MAX25202 400kHz, 36V boost controller. All installed components are rated for the automotive temperature range. Various test points and jumpers are included for evaluation.

The standard EV kit comes with the installed MAX25202 (24V, 400kHz) and can also be used to evaluate other MAX25202 variants with minimal component changes shown in the MAX25202 EV Kit Bill of Materials.

Benefits and Features

- 4.5V to 36V Input Supply Range
- Input Voltage Range Extended Down to 2V after Initial Startup
- Boost Output Voltages Adjustable between 4.5V and 60V via External Resistors
- Boost Fixed Output Voltage Available with Minor Component Changes
- $\pm 2\%$ Output Voltage Accuracy
- Frequency-Synchronization Input
- Enable Input
- Voltage-Monitoring PGOOD Output
- Jumpers and Test Points on Key Nodes for Simplified Evaluation
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

Quick Start

Required Equipment

- MAX25202 EV kit
- 30V, 25A DC power supply (PS1)
- One voltmeter (VM1)
- One electronic load, 200W capable (EL1)

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 as shown in [Table 1](#).
- 2) Preset the output voltage of PS1 to 14V. Disable PS1 output.
- 3) Turn off the EL1 and preset the load to 8A.
- 4) Connect the positive terminal of EL1 to the OUT screw terminal; connect the negative terminal of EL1 to GND2 screw terminal.
- 5) Connect the positive terminal of PS1 to the SUP screw terminal; connect the negative terminal of PS1 to GND1 screw terminal.
- 6) Connect the positive terminal of VM1 to the OUT test point loop; connect the negative terminal of VM1 to the GND2 test point loop.
- 7) Enable the power supply output.
- 8) Enable the electronic load EL1.
- 9) Verify that the voltmeter on OUT measures approximately 24V.

Table 1. Default Jumper Settings

JUMPER	SHUNT POSITION	FUNCTION
J1	1-2	Boost controller enabled
J2	1-2	FSYNC is pulled to VBIAS enabling forced-pulse-width modulation (FPWM) mode
J3	Installed	PGOOD is pulled up to VBIAS when OUT is in regulation
J4	1-2	OUT is shorted around the 20Ω resistor in the feedback network used for frequency analysis

Detailed Description

The MAX25202 EV kit provides a fully developed and proven layout for evaluating all variants of the MAX25202 family of current-mode-controlled boost controller ICs. The controller accepts supply voltages as high as 36V and supply transients up to 42V.

Switching Frequency and External Synchronization

The IC can operate in two modes: forced-PWM or skip mode. Skip mode offers improved efficiency over PWM during light-load conditions. When FSYNC is pulled low, the device operates in skip mode for light loads, and in PWM mode for larger loads. When FSYNC is pulled high, the device is forced to operate in PWM across all load conditions.

The FSYNC pin can be used to synchronize the switching frequency of the IC to an external clock source by applying an external clock signal ranging from 220kHz to 2.2MHz. The device is forced to operate in PWM mode when FSYNC is connected to a clock source.

Boost Output Monitoring (PGOOD)

The EV kit provides an output test point (PGOOD) to monitor the status of the boost output voltage at OUT. The PGOOD pin goes to a state of high impedance and pulls high through a pullup resistor when the boost output voltage rises above 94.5% (typ) of its regulation voltage.

PGOOD pulls low when the output voltage drops below 92.5% (typ) of its nominal regulated voltage.

To obtain logic signals, pull up PGOOD to BIAS by installing the shunt on jumper J3.

The EV kit also provides an LED to monitor PGOOD visually. The LED illuminates when PGOOD is low, implying the converter has fallen out of regulation.

Setting the Output Voltage in the Boost Converter

The EV kit comes assembled to provide 24V regulation on OUT. To adjust the output voltage, remove and replace appropriate resistors in positions R9 and R10 according to the following equation:

$$R9 = R10 \left[\left(\frac{V_{OUT1}}{V_{FB}} \right) - 1 \right]$$

Evaluating Other Variants

The MAX25202EVKIT# comes installed with the synchronous boost variant (MAX25202ATEA/VY+).

Maxim Integrated offers additional variations of the MAX25202 including spread-spectrum options. See the MAX25202 IC datasheet for part variant details and contact the factory to request any additional variants.

Ordering Information

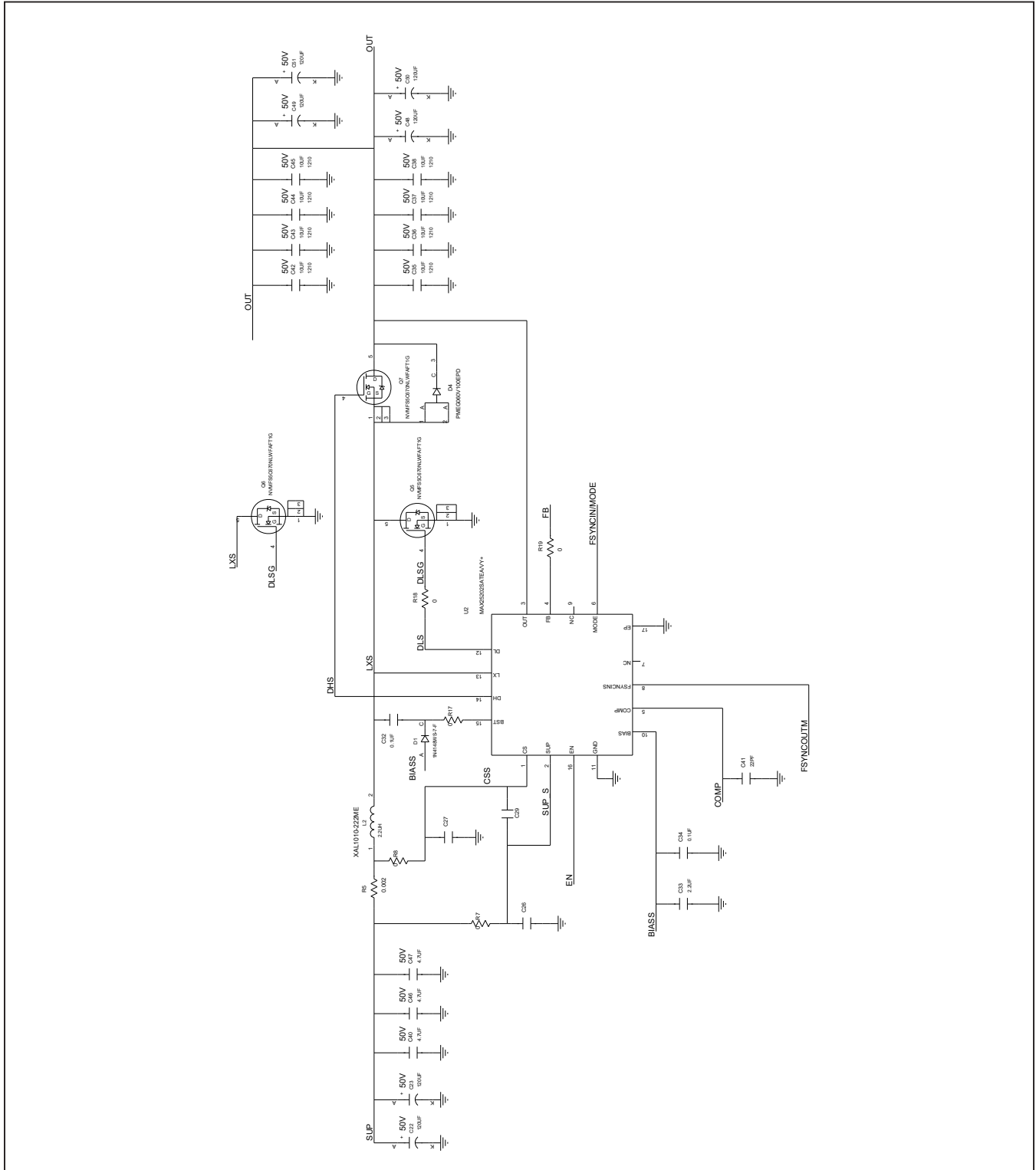
PART	TYPE
MAX25202EVKIT#	24V/400kHz EV Kit

#Denotes RoHS compliant.

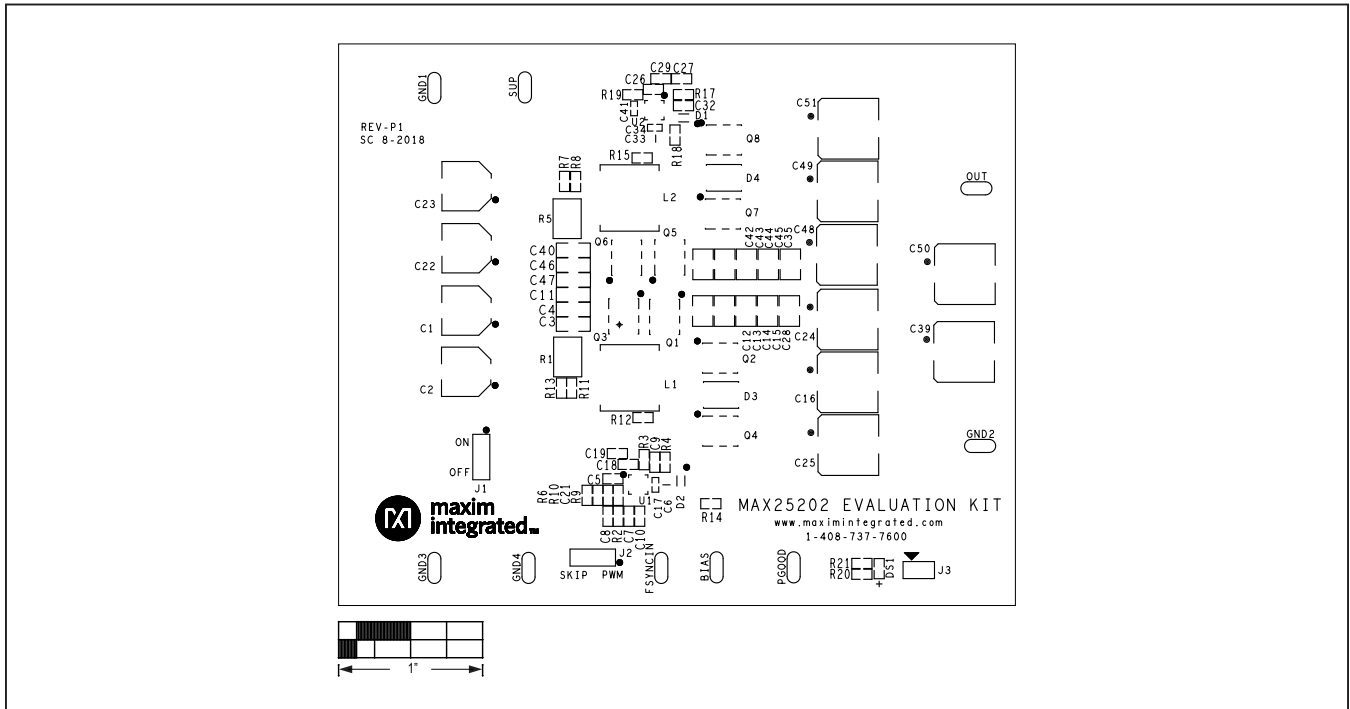
MAX25202 EV Kit Bill of Materials

ITEM	QTY	REF DES	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	9	BIAS, FSYNIN, GND1-GND4, OUT, PGOOD, SUP	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG	
2	2	C1, C22	EEE-FP1H101AP	PANASONIC	100UF	CAP; SMT (CASE_F); 100UF; 20%; 50V; ALUMINUM-ELECTROLYTIC	
3	6	C3, C4, C11, C40, C46, C47	CGA5L3X7R1H475K160AB	TDK	4.7UF	CAPACITOR; SMT (1206); CERAMIC CHIP; 4.7UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
		C5, C19, C26, C27			0.015uF		
4	2	C6, C33	CGA4J3X7R1H225K125AB	TDK	2.2UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 2.2UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
5	1	C7	CGA3E2C0G1H100D080AA	TDK	10PF	CAP; SMT (0603); 10PF; +/-0.50PF; 50V; COG; CERAMIC CHIP; AUTO	
6	1	C8			0.012UF		
7	2	C9, C32	CGA3E3X7S2A104K080AB	TDK	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 100V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7S	
8	1	C10	GCM188R71H473KA55; CGA3E2X7R1H473K080AA	MURATA;TDK	0.047UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.047UF; 50V; TOL=10%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC=X7R; NOTE: AUTOMOTIVE PART ONLY	
9	6	C16, C24, C25, C48, C49, C51	EEH-ZC1H121P	PANASONIC	120UF	CAP; SMT (CASE_G); 120UF; 20%; 50V; ALUMINUM-ELECTROLYTIC	
		C39, C50			DNI		
10	2	C17, C34	CGA2B1X7R1C104K050BC; GCM155R71C104KA55	TDK;MURATA	0.1UF	CAPACITOR; SMT (0402); CERAMIC CHIP; 0.1UF; 16V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO	
		C18, C29			4700pF		
11	1	C41	GCM1555C1H220JA16	MURATA	22PF	CAPACITOR; SMT (0402); CERAMIC CHIP; 22PF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=COG; NOTE: AUTOMOTIVE PART ONLY	
12	2	D1, D2	1N4148WS-7-F	DIODES INCORPORATED	1N4148WS-7-F	DIODE; SWT; SMT (SOD-323); PIV=75V; IF=0.3A	
13	1	DS1	LTST-C190KRKT	LITE-ON ELECTRONICS INC.	LTST-C190KRKT	DIODE; LED; ULTRA BRIGHT AlInGaP CHIP LED; RED; SMT; VF=2V; IF=0.025A	
14	2	J1, J2	PBC03SAAN	SULLINS	PBC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC	
15	1	J3	TSW-102-07-T-S	SAMTEC	TSW-102-07-T-S	CONNECTOR; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 2PINS; -55 DEGC TO +105 DEGC	
16	2	L1, L2	XAL1060-222ME	COILCRAFT	2.2UH	INDUCTOR; SMT; COMPOSITE; 2.2UH; 20%; 20A; NOTE: SET TO OBSOLETE FOR FOOTPRINT CORRECTION BASED ON LATEST DATASHEET	
17	4	MH1-MH4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON	
18	6	Q1-Q3, Q5-Q7	DMTH6009LPS	DIODES INCORPORATED	DMTH6009LPS	TRAN; NCH; ENHANCEMENT MODE MOSFET; POWERDI5060-8; PD=(2.8W); I(1.1.76A); V-(60V)	
		Q4, Q8			DNI		
19	2	R1, R5	PML100HZPJV1L5	ROHM SEMICONDUCTOR	0.0015	RES; SMT (1225); 0.0015; 5%; +/-100PPM/DEGC; 2W	
20	1	R2			39k		
21	1	R19	CRCW06030000ZS; MCR03EZPJ000;ERJ-3GEY0R00	VISHAY DALE;ROHM;PANASONIC	0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.10W; THICK FILM	
	8	R3, R4, R7, R8, R13, R11, R17, R18			1		
22	1	R9	CRCW0603115KFK	VISHAY	115K	RES; SMT (0603); 115K; 1%; +/-100PPM/DEGC; 0.1W	
23	1	R10	CRCW06034K99FK;ERJ-3EKF4991V	VISHAY DALE;PANASONIC	4.99K	RESISTOR; 0603; 4.99K; 1%; 100PPM; 0.10W; THICK FILM	
24	1	R14	CRCW060320R0FK; ERJ-3EKF20R0V	VISHAY DALE;PANASONIC	20	RESISTOR; 0603; 20 OHM; 1%; 100PPM; 0.10W; THICK FILM	
25	1	R20	CRCW06031K00FK;ERJ-3EKF1001V	VISHAY DALE;PANASONIC	1K	RESISTOR; 0603; 1K; 1%; 100PPM; 0.10W; THICK FILM	
26	1	R21	CRCW060310K0FK;ERJ-3EKF1002	VISHAY DALE;PANASONIC	10K	RESISTOR; 0603; 10K; 1%; 100PPM; 0.10W; THICK FILM	
27	3	SU1-SU3	SNT-100-BK-G	SAMTEC	SNT-100-BK-G	TEST POINT; SHUNT AND JUMPER; STR; TOTAL LENGTH=6.10MM; BLACK; INSULATION=GLASS FILLED POLYESTER; CONTACT=PHOSPHOR BRONZE	
28	1	U1	MAX25202MATEA/VY+	MAXIM	MAX25202MATEA/VY+	EVKIT PART - IC; MAX25202MATEA/VY+; 16L WETQFN; PACKAGE OUTLINE DRAWING: 21-100108; LAND PATTERN NUMBER: 90-100046; PACKAGE CODE: T1633Y+4C	
29	1	U2	MAX25202SATEA/VY+	MAXIM	MAX25202SATEA/VY+	EVKIT PART - IC; MAX25202SATEA/VY+; 16L WETQFN; PACKAGE OUTLINE DRAWING: 21-100108; LAND PATTERN NUMBER: 90-100046; PACKAGE CODE: T1633Y+4C	
30	1	PCB	MAX25202EVK	MAXIM	PCB	PCB;MAX25202EVK	
TOTAL	78						

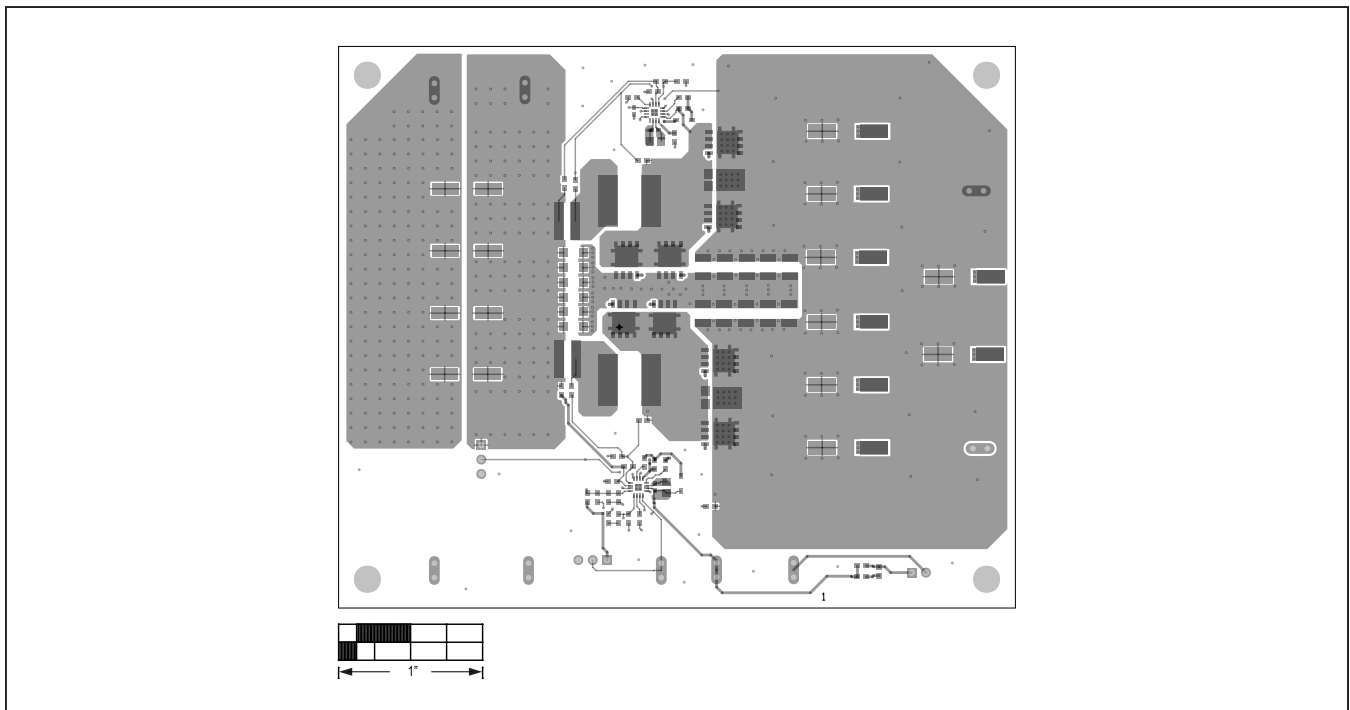
MAX25202 EV Kit Schematic (continued)



MAX25202 EV Kit PCB Layouts

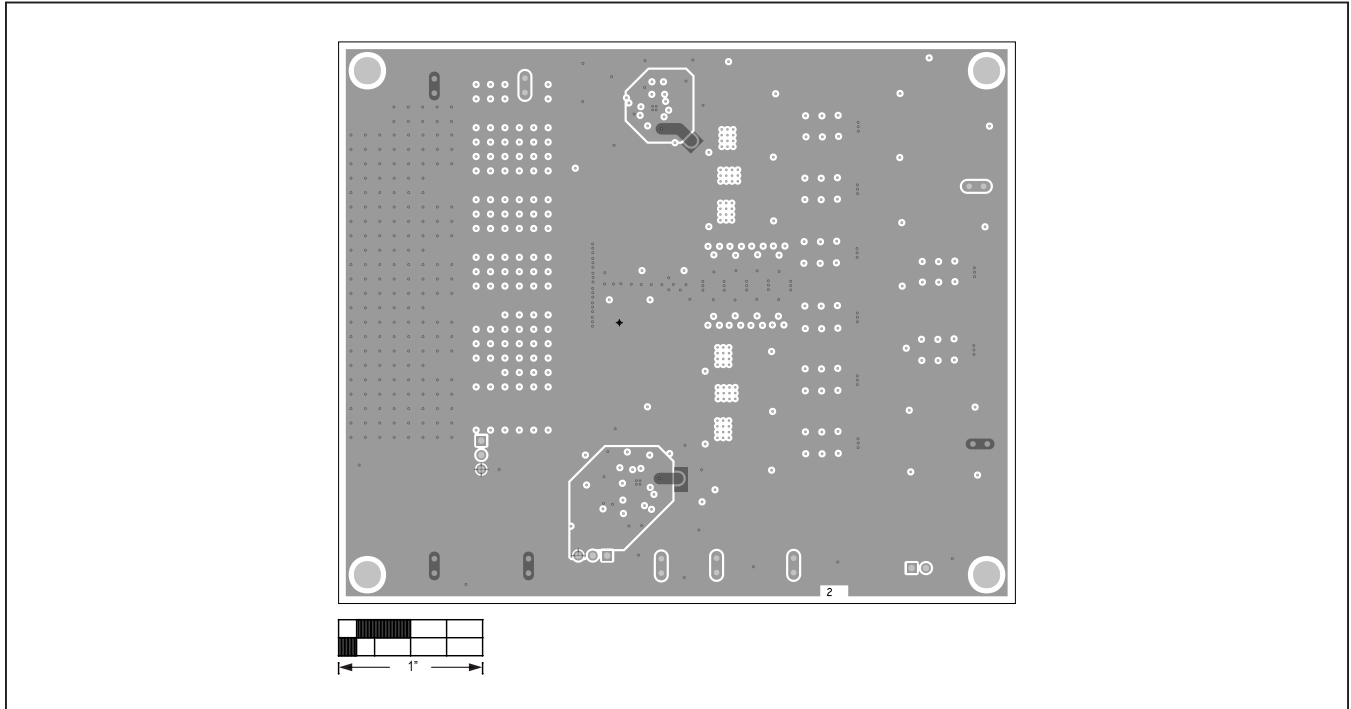


MAX25202 EV Kit—Silkscreen Top

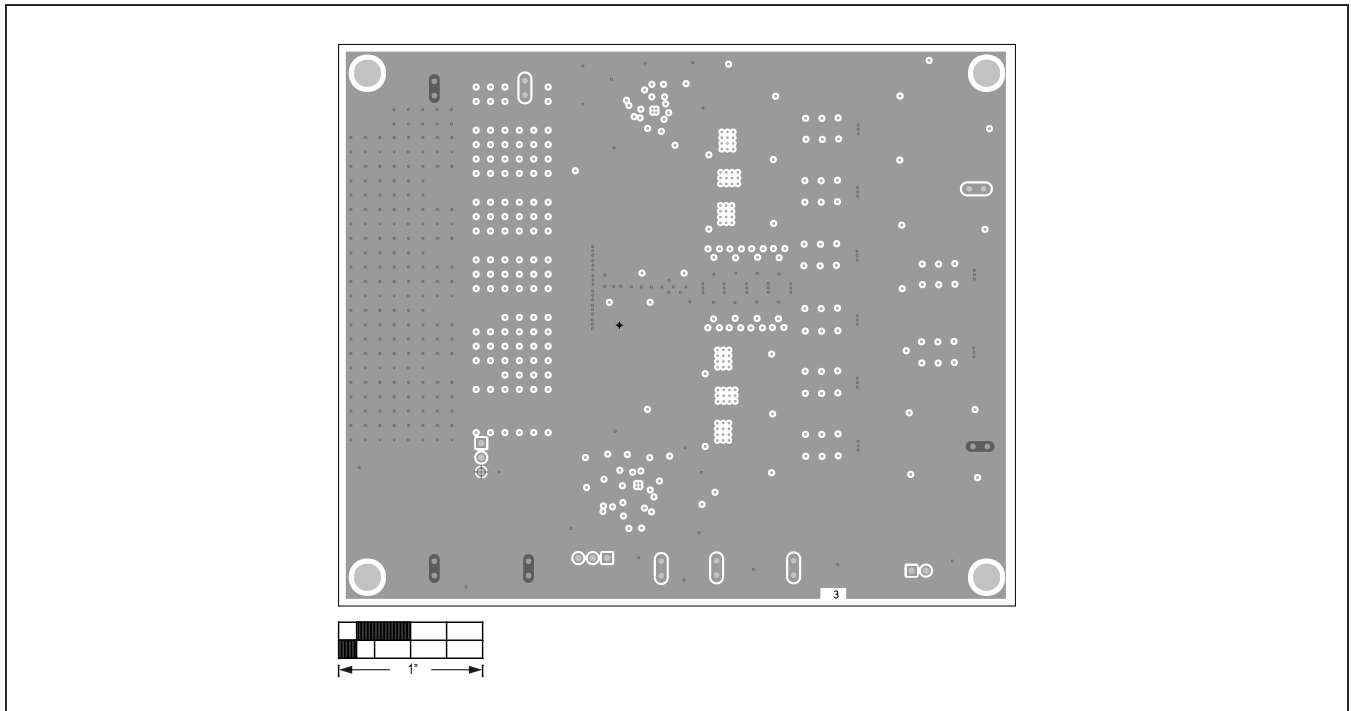


MAX25202 EV Kit Component Placement—Top View

MAX25202 EV Kit PCB Layouts (continued)

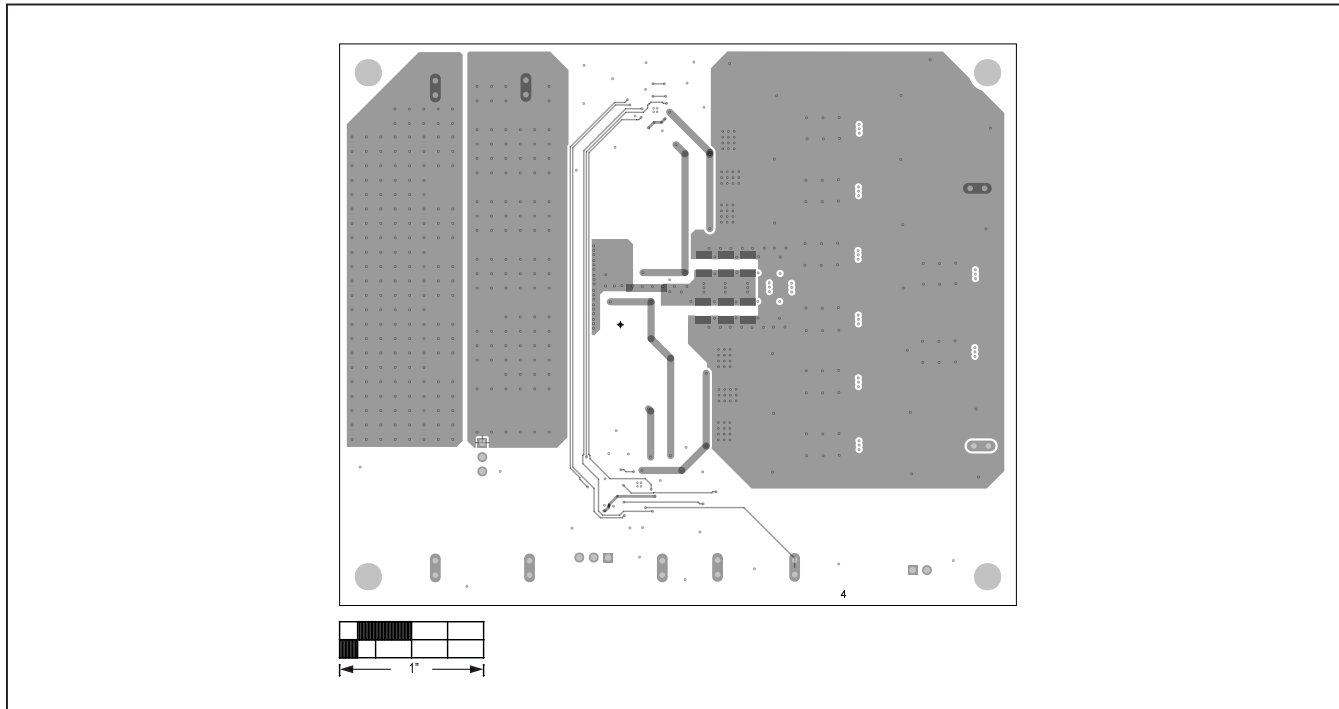


MAX25202 EV Kit PCB Layout—Internal Layer 2

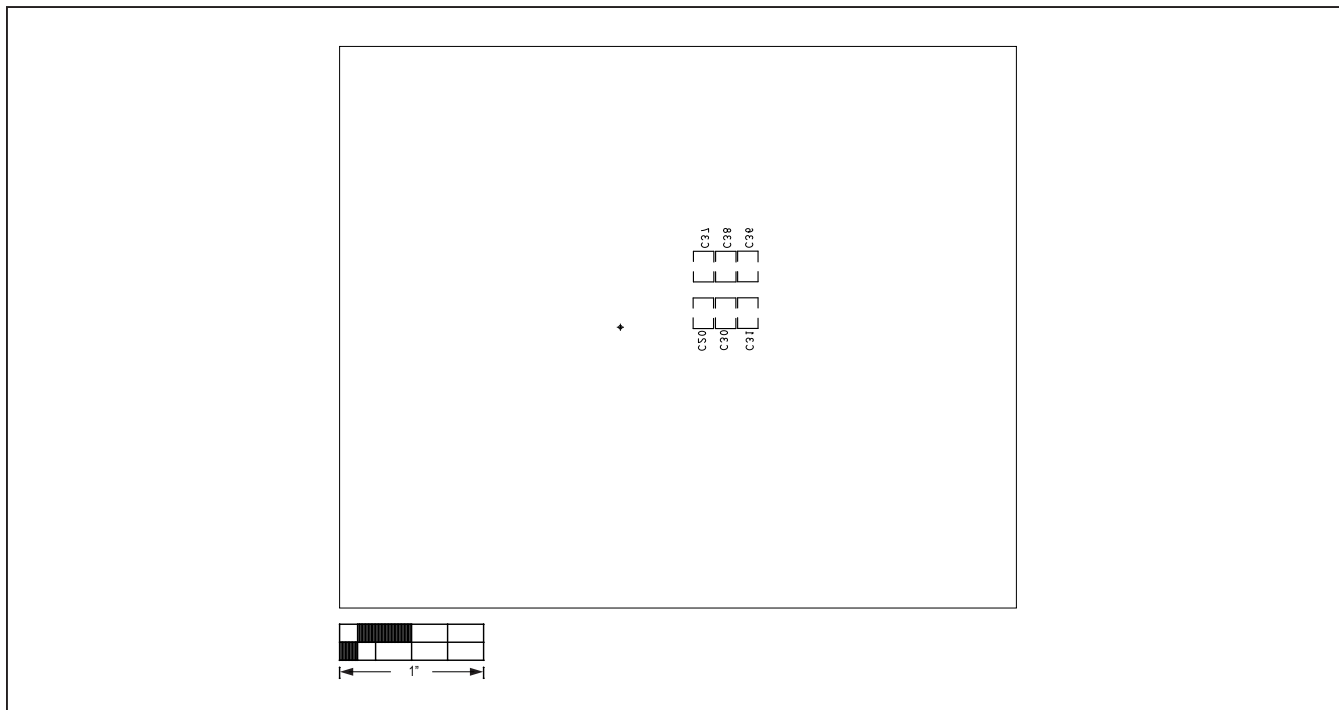


MAX25202 EV Kit PCB Layout—Internal Layer 3

MAX25202 EV Kit PCB Layouts (continued)



MAX25202 EV Kit Component Placement—Bottom View



MAX25202 EV Kit—Silkscreen Bottom