Click here for production status of specific part numbers.

MAX25201 Evaluation Kit

Evaluates: MAX25200, MAX25201

General Description

The MAX25201 evaluation kit (EV kit) is a fully assembled and tested application circuit that simplifies the evaluation of the MAX25201 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 MAX25201 (24V, 400kHz) and can also be used to evaluate other MAX25201 variants with minimal component changes shown in the MAX25201 EV Kit Bill of Materials.

Benefits and Features

- 4.5V to 42V 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
- ±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

- MAX25201 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 4A.
4) Connect the positive terminal of EL1 to OUT; connect the negative terminal of EL1 to GND2.
5) Connect the positive terminal of PS1 to the SUP; connect the negative terminal of PS1 to GND1.
6) Connect the positive terminal of VM1 to OUT; connect the negative terminal of VM1 to GND6.
7) Enable the power supply output.
8) Enable the electronic load EL1.
9) Verify that the voltmeter on OUT measures approximately 24V.

319-100422; Rev 0; 8/19

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Table 1. Default Jumper Settings

JUMPER	SHUNT POSITION	FUNCTION
J1	1-2	Boost controller enabled
J2	1-2	FSYNC is pulled to V_{BIAS} enabling FPWM mode
J3	Installed	PGOOD is pulled up to V_{BIAS} 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 MAX25201 EV kit provides a fully developed and proven layout for evaluating all variants of the MAX2501 family of current-mode-controlled boost controller ICs. The controller accepts supply voltages as high as 36V and supply transients up to 40V.

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 respective boost output voltage rises above 94.5% (typ) of its regulation voltage. PGOOD pulls low when the respective 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:

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

where V_{FB} = 1V (typ) and R10 = 5kΩ.

Evaluating Other Variants

The MAX25201EVKIT# comes installed with the synchronous boost variant (MAX25201ATEA/VY+).

Maxim Integrated offers additional variations of the MAX25201 that include spread-spectrum options. See the MAX25201 IC Datasheet for part variant details and contact the factory to request any additional variants.

See the MAX25201 EV Kit Bill of Materials to select components for evaluating higher frequency configurations.

Ordering Information

PART	TYPE
MAX25201EVKIT#	24V/400kHz EV Kit

#Denotes RoHS compliant.

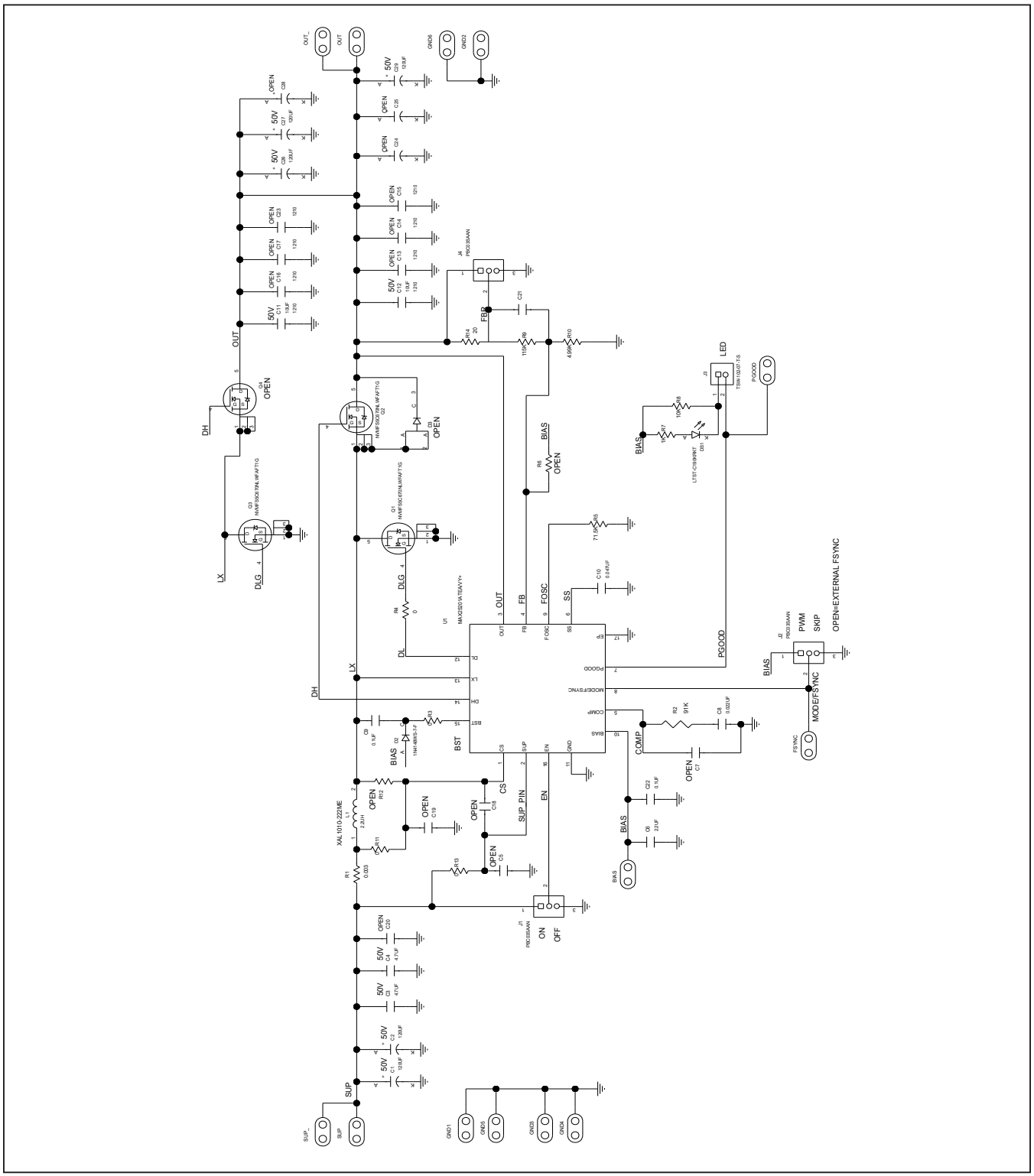
MAX25201 EV Kit Bill of Materials

DESIGNATION	QTY	DESCRIPTION	MFG PART #
C1, C2, C26, C27, C29	5	120uF ±20%, 50V Aluminum electrolytic capacitor (CASE_G)	PANASONIC EEH-ZC1H121P
C3, C4	2	4.7uF206 ±10%, 50V X7R ceramic capacitor (1)	TDK CGA5L3X7R1H475K160AB
C6	1	2.2uF ±10%, 50V X7R ceramic capacitor (0805)	TDK CGA4J3X7R1H225K125AB
C8	1	0.022uF ±10%, 100V X7R ceramic capacitor (0603)	TDK CGA3E2X7R2A223K080AA
C9	1	0.1uF ±10%, 100V X7S ceramic capacitor (0603)	TDK CGA3E3X7S2A104K080AB
C10	1	0.047uF ±10%, 50V X7R ceramic capcitor (0603)	MURATA GCM188R71H473KA55
C11, C12	2	10uF ±10%, 50V X7S ceramic capacitor (1210)	TDK CGA6P3X7S1H106K250AB
C22	1	0.1uF ±20%, 16V X7R ceramic capacitor (0402)	TDK CGA2B1X7R1C104K050BC
D2	1	Diode, 75V, 0.3A (SOD-323)	DIODES INCORPORATED 1N4148WS-7
DS1	1	LED Red, VF=2V,IF=0.025A (SMT)	LITE-ON ELECTRONICS INC. LTST-C190KRKT
L1	1	2.2uH ±20%, 20A composite inductor	COILCRAFT XAL1010-222ME
Q1, Q2, Q3	3	N-Channel FET, 60V, 71A, 61W, (SO-8FL)	ON SEMICONDUCTOR NVMFS5C670NLWFAFT1G
R1	1	0.0015 OHM ±5%, 2W metal film resistor (2512)	ROHM SEMICONDUCTOR PML100HZPJV1L5
R2	1	91k OHM ± 1%; thick film resistor (0603)	VISHAY DALE CRCW060391K0FK
R3, R4, R11, R13	4	0 OHM ± 0%; thick film resistor (0603)	VISHAY DALE CRCW06030000ZS
R5	1	71.5k OHM ±1%, thick film resistor (0603)	YAGEO PHYCOMP RC0603FR-0771K5L
R7	1	1k OHM ±1%, thick film resistor (0603)	VISHAY DALE CRCW06031K00FK
R8	1	10k OHM ±1%, thick film resistor (0603)	VISHAY DALE CRCW060310K0FK
R9	1	115kΩ ± 1%, thick film resistor (0603)	VISHAY CRCW0603115KFK
R10	1	4.99kΩ ± 1%, thick film resistor (0603)	VISHAY DALE CRCW06034K99FK
R14	1	20kΩ ± 1%, thick film resistor (0603)	VISHAY DALE CRCW060320R0FK
U1	1	36V Synchronous Boost Controller	MAX25201ATEA/VY+
-	1	PCB: MAX25201 Evaluation Kit	

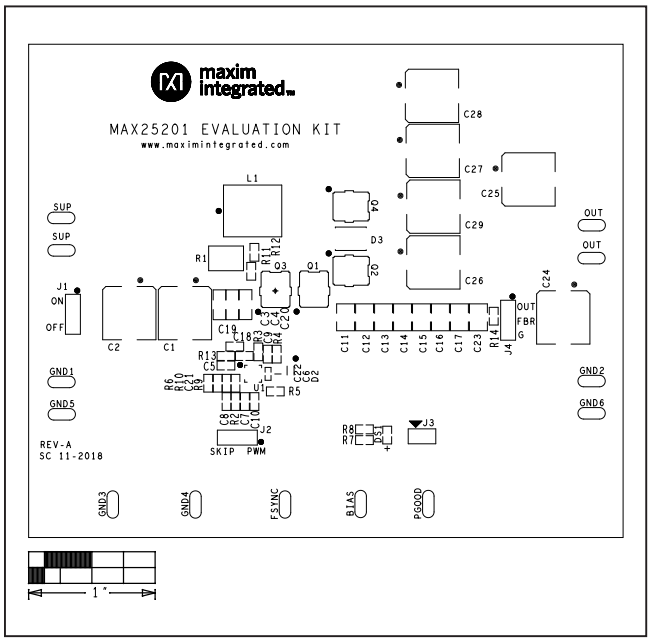
		CHANGES FOR 8V, 2.1MHz	
DESIGNATION	**QTY**	**DESCRIPTION**	**MFG PART #**
C1	0	Not Installed	
C2	1	100uF ±20%, 50V Aluminum electrolytic capacitor (CASE_G)	PANASONIC EEE-FP1H101AP
C5, C19	2	0.015uF ±10%, 50V X7R ceramic capacitor (0603)	GCM188R71H153KA37
C8, C18	2	4700pF ±5%, 25V C0G ceramic capacitor (0603)	TDK C1608C0G1E472J080AA
C11, C12, C13, C14, C15, C16	6	10uF ±10%, 50V X7S ceramic capacitor (1210)	TDK CGA6P3X7S1H106K250AB
L1	1	0.47uH ±20% Composite Inductor	WURTH ELECTRONICS INC. 744314047
R1	1	0.003Ω± 1%, 3W, metal foil resistor (2512)	SUSUMU CO LTD. KRL6432E-M-R003-F
R2	1	14.7kΩ± 1%, thick film resistor (0603)	VISHAY DALE CRCW060314K7FK
R3, R4, R11, R13	1	1.05Ω± 1%, thick film resistor (0603)	VISHAY DALE CRCW06031R05FKEA
R5	1	12.1KΩ± 1%, thick film resistor (0603)	VISHAY DALE CRCW06031212FK
R9	1	34.8kΩ ± 1%, thick film resistor (0603)	PANASONIC ERJ-3EKF3482

		CHANGES FOR MAX25200	
DESIGNATION	**QTY**	**DESCRIPTION**	**MFG PART #**
Q2	0	Not Installed	
D3	1	Schottky Diode, 60V, 10A (SOT1289)	Nexperia PMEG060V100EPD
U1	1	36V Asynchronous Boost Controller	MAX25200ATEA/VY+

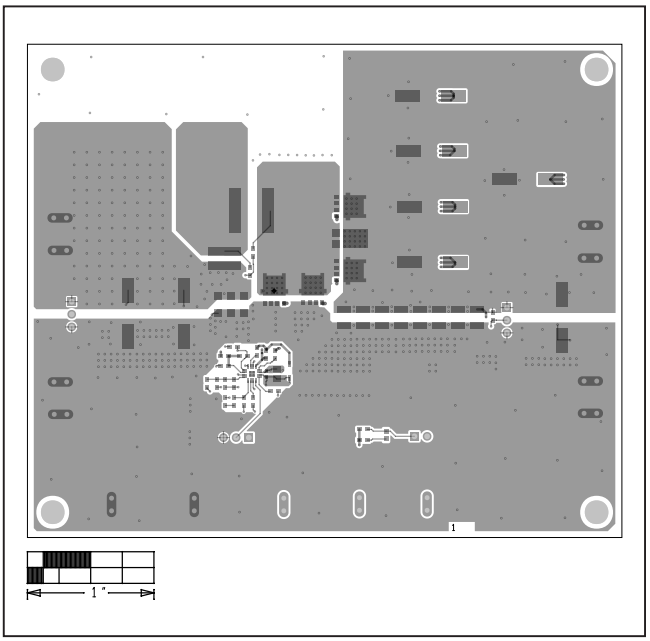
MAX25201 EV Kit Schematic



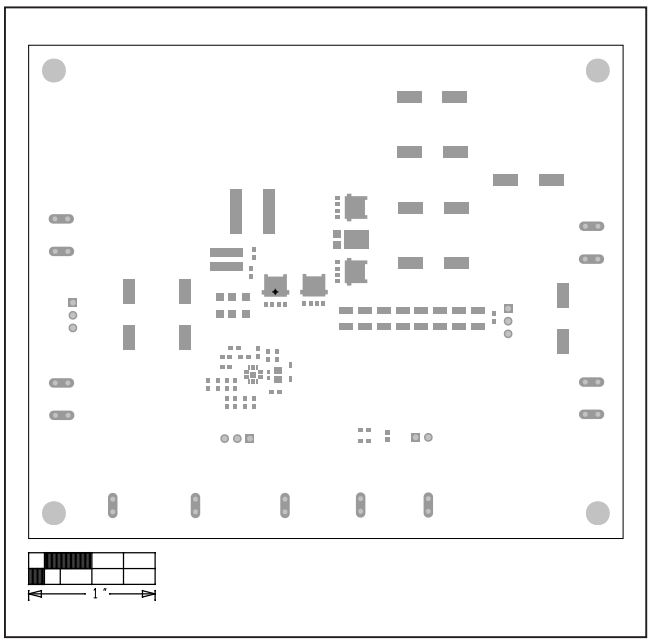
MAX25201 EV PCB Layouts



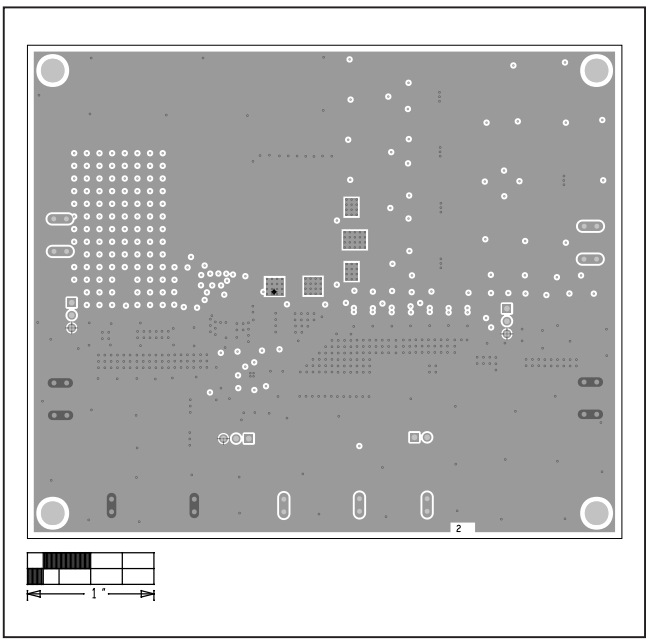
MAX25201 EV Kit Silkscreen Top



MAX25201 EV Kit Component Placement - Top

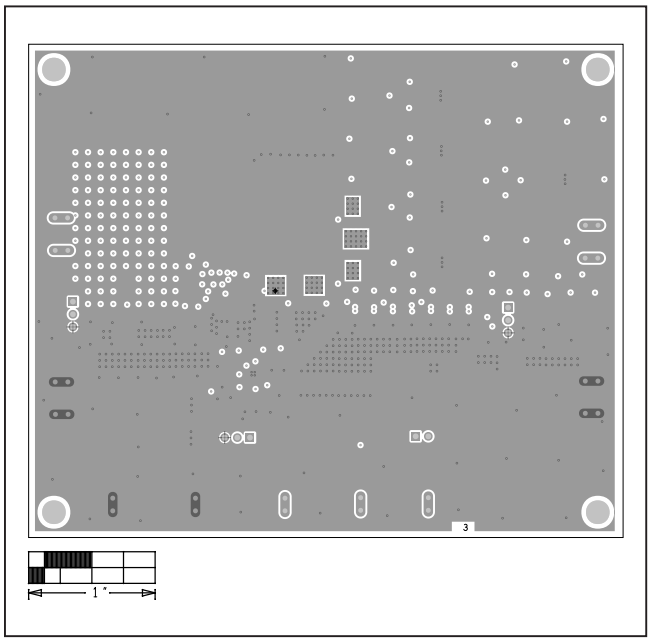


MAX25201 EV Kit Mask Top

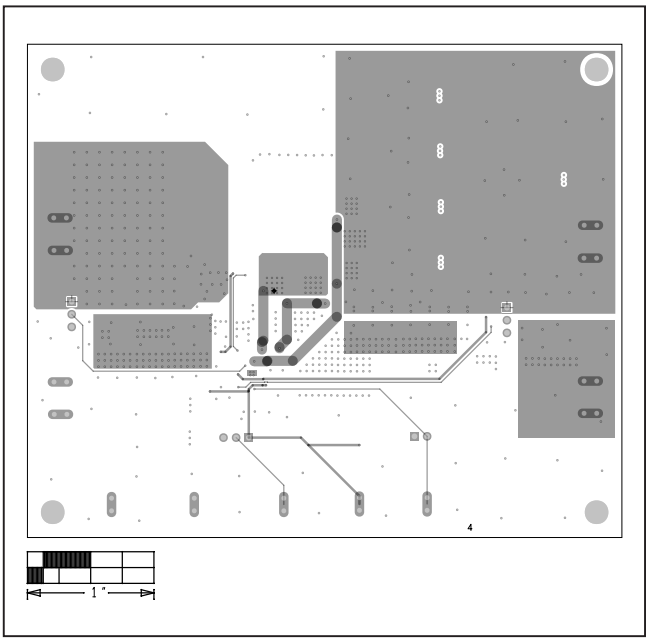


MAX25201 EV Kit PCB Layout - Internal Layer 2

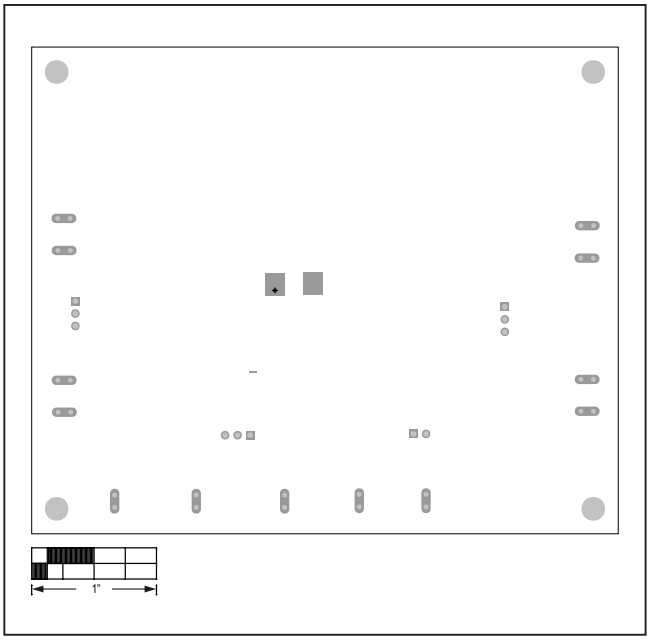
MAX25201 EV PCB Layouts (continued)



MAX25201 EV Kit PCB Layout - Internal Layer 3



MAX25201 EV Kit Component Placement - Bottom



MAX25201 EV Kit Mask Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/19	Initial release	—

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