

MAX25207 Evaluation Kit

Evaluates: MAX25207

General Description

The MAX25207 evaluation kit (EV kit) provides a proven design to evaluate the MAX25207 automotive 2.2MHz synchronous step-down controllers with bypass mode. The default EV kit delivers 7A with input voltages up to 60V, but it can be configured to deliver up to 20A. The output voltage quality can be monitored by observing the PGOOD signal.

Features

- +3.5V to +60V Input Supply Range
- Output Voltage: 14V in Buck Mode (Follows Input in Bypass Mode)
- Output Current: 7A (Configurable to 20A)
- Switching Frequency: 440kHz
- Forced-PWM Mode of Operation
- Spread-Spectrum Control
- Enable Input
- Voltage Monitoring PGOOD Output
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

Quick Start

Required Equipment

- MAX25207 EV kit
- DC power supply: 3.5V to 60V, 10A
- 1 digital multimeter (DMM)
- Electronic load capable of sinking 7A at 14V
- Oscilloscope

Procedure

The MAX25207 EV kit is fully assembled and tested. Use the following steps to verify board operation.

- 1) Verify that all jumpers are in their default configurations according to [Table 1](#).
- 2) Connect the power supply across SUP and PGND connectors.
- 3) Connect the positive and negative terminals of an electronic load across VOUT and PGND connectors.
- 4) Connect the multimeter across VOUT and PGND.
- 5) Set the power-supply voltage to 24V and current limit to 10A.
- 6) Turn on the power supply.
- 7) Verify that VOUT is approximately 14V using a digital multimeter.
- 8) Use oscilloscope to observe switching node of the inductor. It should show 440kHz switching frequency in buck mode.
- 9) Decrease the power supply voltage to 13V.
- 10) Verify that VOUT is approximately 13V using a digital multimeter.
- 11) Use oscilloscope to observe switching node of the inductor. It should show 100% duty cycle in bypass mode.
- 12) Set the power supply voltage to 24V.
- 13) Set the electronic load to the desired current at or below 6A.
- 14) Turn on the electronic load.
- 15) Verify that the voltage across VOUT and GND pads is 14V.
- 16) Decrease the power supply voltage to 13V.
- 17) Verify that VOUT is approximately 13V.

Detailed Description of Hardware

The EV kit comes installed with the MAX25207 controller IC with an external resistor divider to set the output voltage to 14V. To optimize efficiency, refer to the MAX25206/7/8 IC datasheet.

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 high impedance when the output voltage is in regulation or in bypass mode.

ENBK Function

The controller automatically transitions between buck and bypass modes of operation depending on the VBYP threshold programming. To force buck operation, set ENBK = HIGH using the jumper setting.

Alternate BOM Configuration

The board can be configured using alternate BOM to create a 20A design. See [Component List](#) for alternate BOM.

Table 1. Default Jumper Settings

JUMPER	DEFAULT SHUNT POSITION	FUNCTIONS
ENABLE	1-2	Buck enabled
SPS	2-3	No spread spectrum
SYNC	1-2	FPWM mode
ENBK	2-3	Automatic transition between bypass and buck

Ordering Information

PART	TYPE
MAX25207EVKIT#	EV Kit

#Denotes RoHS compliance.

Component List

MAX25207EVKIT# DEFAULT: 14V_{OUT}, 440kHz, 7A

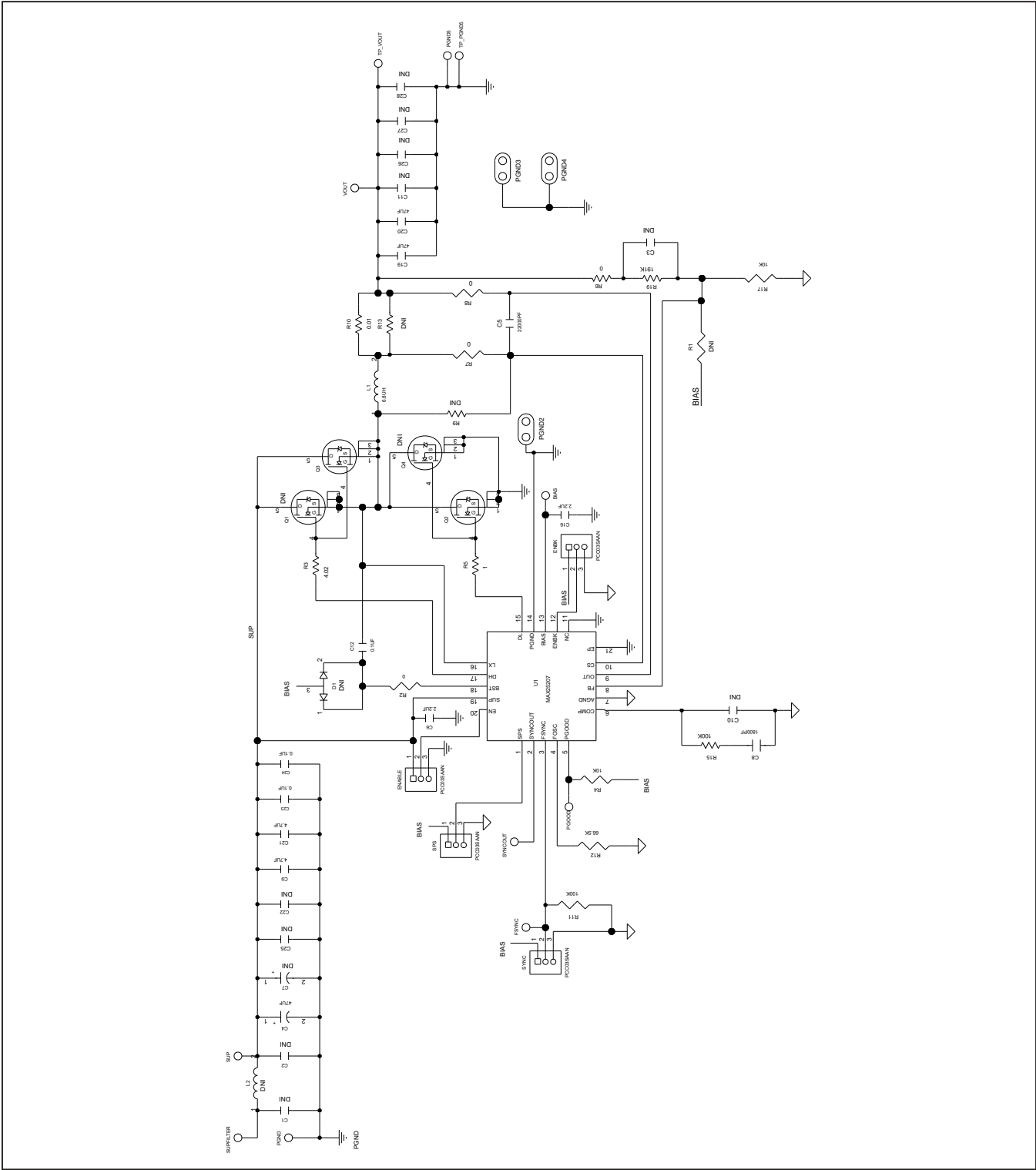
REFERENCE DESIGNATOR	QTY	DESCRIPTION	MFG PART #
C4	1	47μF ±20% 100V Aluminum-Electrolytic Capacitor (CASE_H13)	EEV-TG2A470Q
C5	1	22000PF ±5% 50V Ceramic Capacitor (0402)	GCM155R71H223JA55
C6	1	2.2μF ±10% 100V X7R Ceramic Capacitor (1210)	GRM32ER72A225KA35;CGA6N3X7R2A225K230AB; CC1210KKX7R0BB225;HMK325B7225KM
C8	1	1800pF ±5% 50V X7R Ceramic Capacitor (0402)	GRM155R71H182JA01
C9, C21	2	4.7μF ±10% 100V X7R Ceramic Capacitor (1210)	CNA6P1X7R2A475K250AE
C12, C23, C24	3	0.1μF ±10% 100V X7R Ceramic Capacitor (0603)	CC0603KRX7R0BB104;GRM188R72A104KA35; GCJ188R72A104KA01;HMK107B7104KA;06031C104KAT2A
C16	1	2.2μF ±10% 10V X7R Ceramic Capacitor (0603)	GRM188R71A225KE15;CL10B225KP8NNN; C1608X7R1A225K080AC
C19, C20	2	47μF ±20% 25V X7R Ceramic Capacitor (2220)	CGA9N3X7R1E476M230KB
L1	1	6.8μH ±20% 18.5A Composite Inductor	XAL1010-682ME
Q2, Q3	2	N-Channel 80V Surface Mount SO-8L (6.15mmx5.13mm)	SQJA84EP-T1_GE3
R2, R6-R8	4	0Ω Resistor (0402)	CRCW04020000Z0EDHP; RCS04020000Z0
R3	1	4.02Ω Resistor (0402)	CRCW04024R02FKED
R4, R17	2	10kΩ Resistor (0402)	CRCW040210K0FK;RC0402FR-0710KL
R5	1	1Ω Resistor (0402)	CRCW04021R00FK
R10	1	0.01Ω Resistor (2512)	PMR100HZPFU10L0
R11	1	100kΩ Resistor (0402)	TNPW0402100KBE
R12	1	66.5kΩ Resistor (0402)	ERJ-2RKf6652
R15	1	100kΩ Resistor (0603)	TNPW0603100KBYEN
R19	1	191kΩ Resistor (0402)	CRCW0402191KFK
U1	1	VERSATILE AUTOMOTIVE 60V 2.2MHZ BUCK CONTROLLER	MAX25207ATPA/VY+

Component List (continued)

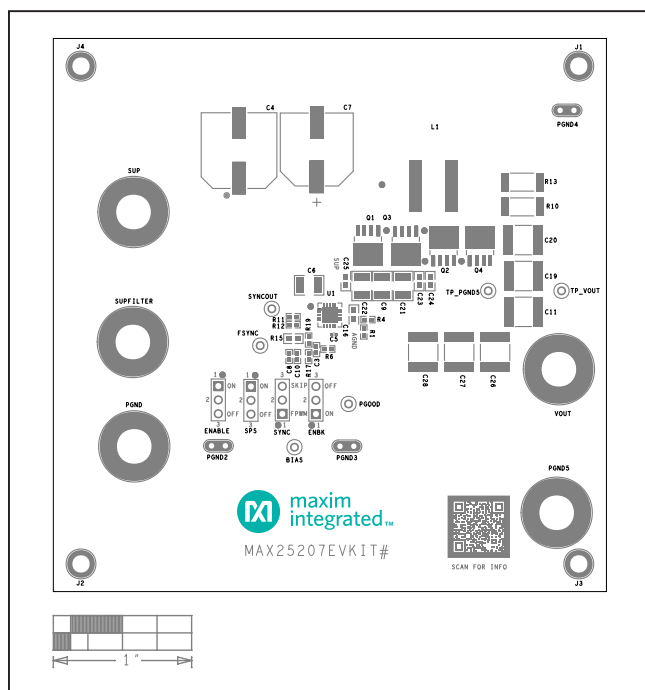
ALTERNATE CONFIGURATION: 14V_{OUT}, 440kHz, 20A (40V MAX INPUT)

REFERENCE DESIGNATOR	QTY	DESCRIPTION	MFG PART #
C4	1	47μF ±20% 100V Aluminum-Electrolytic Capacitor (CASE_H13)	EEV-TG2A470Q
C5	1	22000PF ±5% 50V Ceramic Capacitor (0402)	GCM155R71H223JA55
C6	1	2.2μF ±10% 100V X7R Ceramic Capacitor (1210)	GRM32ER72A225KA35; CGA6N3X7R2A225K230AB; CC1210KKX7R0BB225; HMK325B7225KM
C7	1	240μF ±20% 63V Aluminum-Electrolytic Capacitor (CASE_KE0)	EMHS630ARA241MKE0S
C8	1	1800pF ±5% 50V X7R Ceramic Capacitor (0402)	GRM155R71H182JA01
C9, C21, C22	3	4.7μF ±10% 100V X7R Ceramic Capacitor (1210)	CNA6P1X7R2A475K250AE
C10	1	8.2pF ±0.25% 50V X7R Ceramic Capacitor (0402)	GRM155R71H182JA01
C11, C19, C20, C26-28	6	47μF ±20% 25V X7R Ceramic Capacitor (2220)	CGA9N3X7R1E476M230KB
C12, C23, C24, C25	4	0.1μF ±10% 100V X7R Ceramic Capacitor (0603)	CC0603KRX7R0BB104; GRM188R72A104KA35; GCJ188R72A104KA01; HMK107B7104KA; 06031C104KAT2A
C16	1	2.2μF ±10% 10V X7R Ceramic Capacitor (0603)	GRM188R71A225KE15; CL10B225KP8NNN; C1608X7R1A225K080AC
L1	1	2μH ±20% 26.3A Composite Inductor	XAL1580-202ME
Q1-Q4	4	MOSFET N-CH 40V 21A 78A 5DFN	NVMF55C460NLAFT1G
R2, R6-R8	4	0Ω Resistor (0402)	CRCW04020000Z0EDHP; RCS04020000Z0
R3	1	2Ω Resistor (0402)	CRCW04022R0FK; CRCW04022R00FK
R4, R17	2	10kΩ Resistor (0402)	CRCW040210K0FK; RC0402FR-0710KL
R5	1	0.51Ω Resistor (0402)	ERJ-2BQFR51
R10, R13	2	0.006Ω Resistor (2512)	PMR100HZPFU6L00
R11	1	100kΩ Resistor (0402)	TNPW0402100KBE
R12	1	66.5kΩ Resistor (0402)	ERJ-2RKF6652
R15	1	100kΩ Resistor (0603)	TNPW0603100KBYEN
R19	1	191kΩ Resistor (0402)	CRCW0402191KFK
U1	1	VERSATILE AUTOMOTIVE 60V 2.2MHZ BUCK CONTROLLER	MAX25207ATPA/VY+

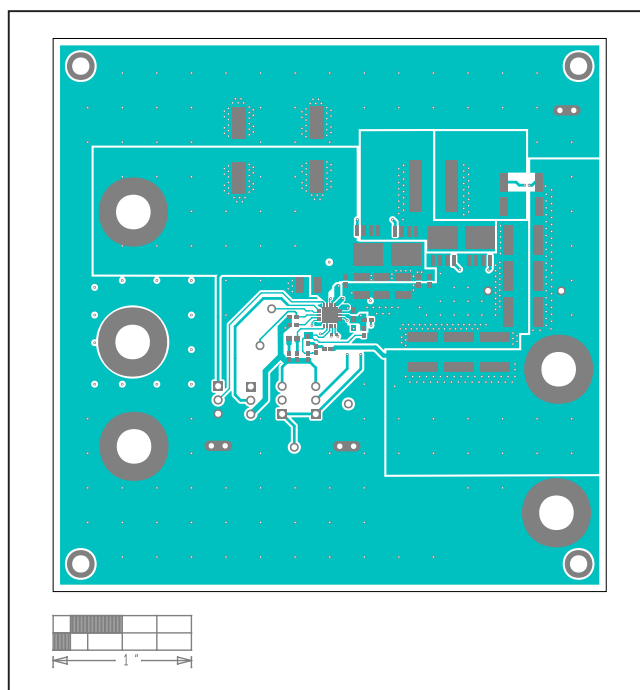
MAX25207 EV Kit Schematic



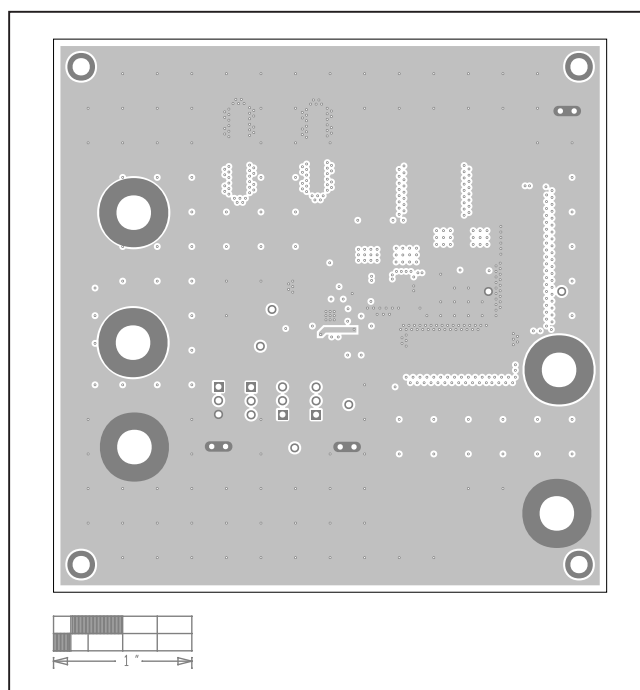
MAX25207 EV Kit PCB Layouts



MAX25207 EV Kit Component Placement Guide—Top Silkscreen

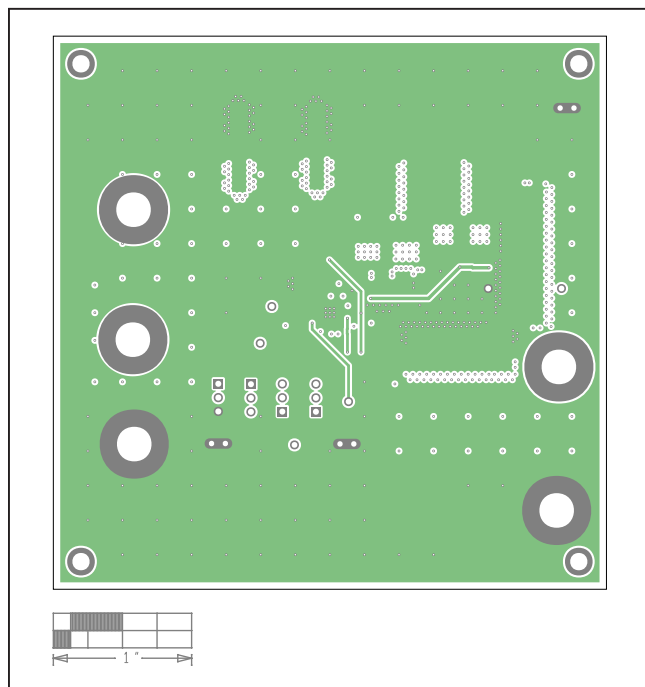


MAX25207 EV Kit PCB Layout—Top Layer

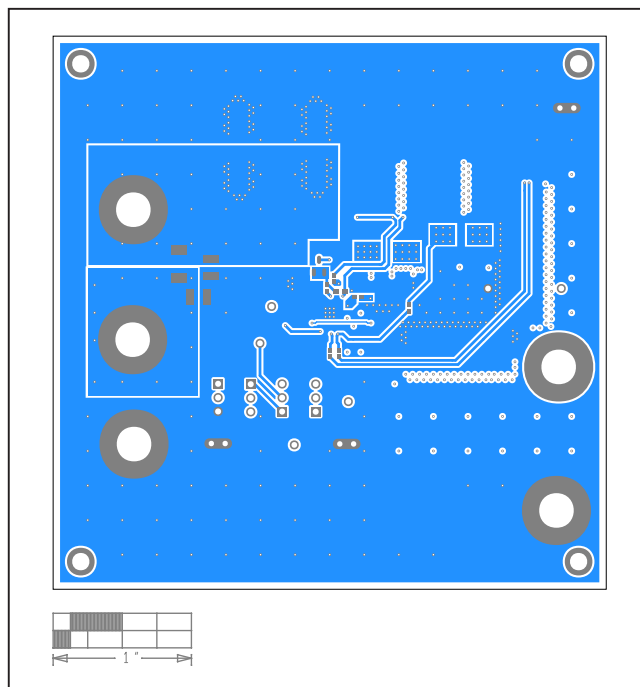


MAX25207 EV Kit PCB Layout—Internal Layer 2

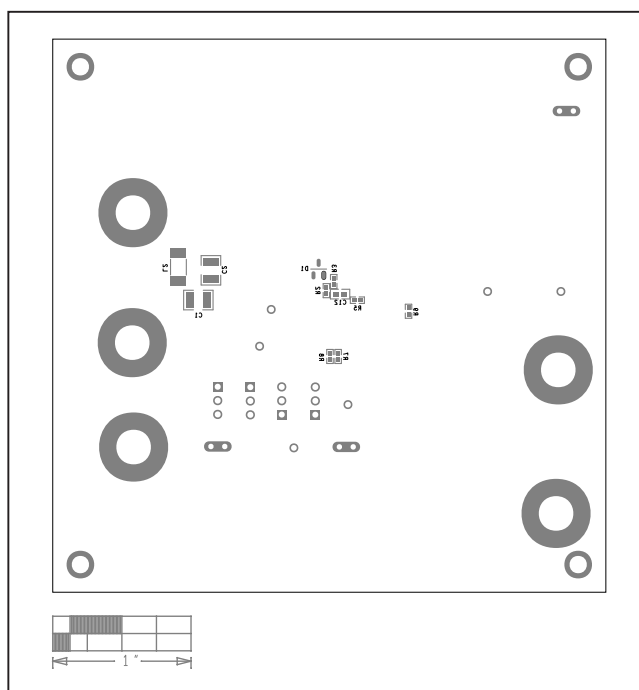
MAX25207 EV Kit PCB Layouts (continued)



MAX25207 EV Kit PCB Layout—Internal Layer 3



MAX25207 EV Kit PCB Layout—Bottom Layer



MAX25207 EV Kit Component Placement Guide—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/20	Initial release	—

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