*Click **here** for production status of specific part numbers.*

MAX20006E/MAX20008E Evaluation Kit

Evaluate: MAX20004E/MAX20006E/MAX20008E

General Description

The MAX20006E/MAX20008E evaluation kits (EV kits) demonstrate the MAX20006E/MAX20008E high-voltage, current-mode, synchronous step-down converters with low operating current. The EV kits operate over a wide 3.5V-to-36V input range. The output is set for 5V in the default configuration, but can be adjusted between 1V and 5V with appropriate components. The MAX20006E/MAX20008E current limit supports a nominal output current of 6A or 8A, respectively.

The EV kit switching frequency is set for 2.1MHz (MAX20006EEVKIT#) or 400kHz (MAX20008EEVKIT#) in the default configuration. The switching frequency is fixed internally and can be synchronized to an external signal within the specified range. The EV kits can be set for fixed-frequency (PWM mode) or pulse-skipping (SKIP mode) for light load efficiency through the provided on-board jumper.

Benefits and Features

- 3.5V to 36V Input Supply Range
- 15µA No-Load Quiescent Current in Skip Mode
- High-Efficiency Synchronous DC-DC Converter with Integrated FETs
- External Frequency Synchronization (SYNC) Input
- Internal Soft-Start
- Fixed 3.3V/5.0V/3.9V Output or Resistor Programmable 1V to 5V Output
- Low Dropout (98% Effective Duty Cycle Operation)
- ±2% Output Voltage Accuracy
- RESET Output
- Proven PCB Layout
- Fully Assembled and Tested

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

Quick Start

Required Equipment

- MAX20006E/MAX20008E EV kit
- 14V, 4A DC power supply
- Electronic load capable of 8A
- Digital voltmeter (DVM)

Procedure

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

1) Verify that all jumpers are in their default positions, as shown in Table 1.
2) Connect the 14V power supply between the V_{IN} and nearest GND input terminals on the EV kit.
3) Connect the electronic load between the V_{OUT} and nearest GND output terminals on the EV kit and set for 6A (MAX20006EEVKIT#) or 8A (MAX20008EEVKIT#).
4) Connect the DVM between the V_{OUT} and nearest GND output terminals on the EV kit.
5) Set the power supply to 14V and 4A current limit. Turn on the power supply.
6) The voltmeter should display an output voltage of 5V ±2%.
7) Turn on the electronic load and verify that the output voltage is 5V.

Table 1. Default Jumper Settings

JUMPER	SHUNT POSITION	FUNCTION
JU1, EN	Middle-ON	Buck controller enabled
JU3, SS	Middle-OFF	Spread spectrum disabled
JU2, SYNC	Middle-PWM	PGOOD is pulled up by V_{BIAS} when OUT is in regulation

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Detailed Description

The MAX20006E/MAX20008E EV kits come fully assembled and tested. The MAX20006EVKIT# is populated with the MAX20006EAFOA/VY+, and the MAX20008EEVKIT# is populated with the MAX20008EAFOD/VY+. Other converters in the family can be tested on the same EV kit, but changing the IC or the output voltage may also require changing other components. Consult the IC data sheet for guidance on selecting the proper ICs and external components.

Switching Frequency/External Synchronization

The IC can operate in either forced-PWM mode or in SKIP mode. Place a shunt in the middle-FPWM position on JU2 to select forced-PWM mode at the internally-programmed frequency. Removing the shunt from JU2 or placing a shunt in the middle-skip position on jumper JU2 causes the IC to enter SKIP mode for maximum light load efficiency. With a shunt in the middle-skip position on jumper JU2, the switching frequency can be synchronized to an appropriate external signal applied to the SYNC input terminal.

$\overline{\text{RESET}}$ Output

The EV kit provides a $\overline{\text{RESET}}$ output to monitor the status of the device output. The $\overline{\text{RESET}}$ output is an open-drain output from the IC with an external pullup resistor to V_{OUT} on the EV kits. Refer to the IC data sheet for details on the $\overline{\text{RESET}}$ functionality.

Setting the Output Voltage in Buck Converters

Populating R5 with a 0Ω jumper connects FB to BIAS for a fixed 3.9V or 5V (EV kit default output), or a fixed 3.3V output voltage, depending on the IC version. To set the output to other voltages between 1V and 5V, remove R9, populate R3 with a 0Ω jumper, and populate R1/R2/C17 with the appropriate values. Other component modifications might also be required. Refer to the IC data sheet for details on setting the output voltage.

Table 2. Component List

Parts Common to All Variants

PART	QTY	DESCRIPTION	MANUFACTURER	PART#
GND, V_{IN}, VOUT, GND	4	BANANA JACK UNINSULATED THREADED EXTERNAL NUT	POMONA	3267
GND, V_{IN}, SYNC, RESET, VOUT, GND	6	WIRE LOOP		
C1, C2, C6, C7, C12, C13, C14, C16	8	CAP CER 0.1µF 100V X7R 0603	MURATA	GRJ188R72A104KE11D
C3, C4	2	CAP CER 4.7µF 35V X7R 0805	TDK	CGA4J1X7R1V475K125AC
C5	1	CAP ALUM 330µF 20% 35V SMD	PANASONIC	EEE-FK1V331P
C15	1	CAP CER 2.2µF 10V X7R 0603	TDK	C1608X7R1A225K080AC
C17	NP			
C18, C19	NP	10000pF FT CAP 50V 1A 0603	TDK	YFF18AC1H103MT0Y0N
FB1	1	FERRITE CHIP 60Ω 6A 1806	MURATA	BLM41PG600SH1L
JU1, JU2, JU3	3	3-PIN HEADER 0.100” 40POS CUT TO FIT	TE CONNECTIVITY	4-103327-0
L2	1	INDUCTOR 1µH SMD	TDK	SPM5030T-1R0M-HZ
R1, R2, R3, R8	NP			
R4, R6, R7	2	RES SMD 100KΩ 1% 1/10W 0603	PANASONIC	ERJ-3EKF1003V
R5	2	RES SMD 0Ω JUMPER 1/10W 0603	PANASONIC	ERJ-3GEY0R00V

MAX20006EEVKIT variant (3.9V 2.1MHz 6A)

PART	QTY	DESCRIPTION	MANUFACTURER	PART#
C8, C9, C10, C11, C22	5	CAP CER 10µF 10V X7R 0805	MURATA	GCM21BR71A106KE21
C20, C21, C23	NP	CAP CER 10µF 10V X7R 0805	MURATA	GCM21BR71A106KE21
L1	1	INDUCTOR 1µH SMD	TDK	SPM5030T-1R0M-HZ
U1	1	IC STEP-DOWN CONVERTER 17L-FCQFN	MAXIM	MAX20006EAFOA/VY+

MAX20008EEVKIT variant (5V 400kHz 8A)

PART	QTY	DESCRIPTION	MANUFACTURER	PART#
C8, C9, C10, C11, C22, C20, C21, C23	8	CAP CER 10µF 10V X7R 0805	MURATA	GCM21BR71A106KE21
L1	1	INDUCTOR 4.7µH SMD	TDK	SPM6545VT- 4R7M-D
U1	1	IC STEP-DOWN CONVERTER 17L-FCQFN	MAXIM	MAX20008EAFOD/VY+

Component Suppliers

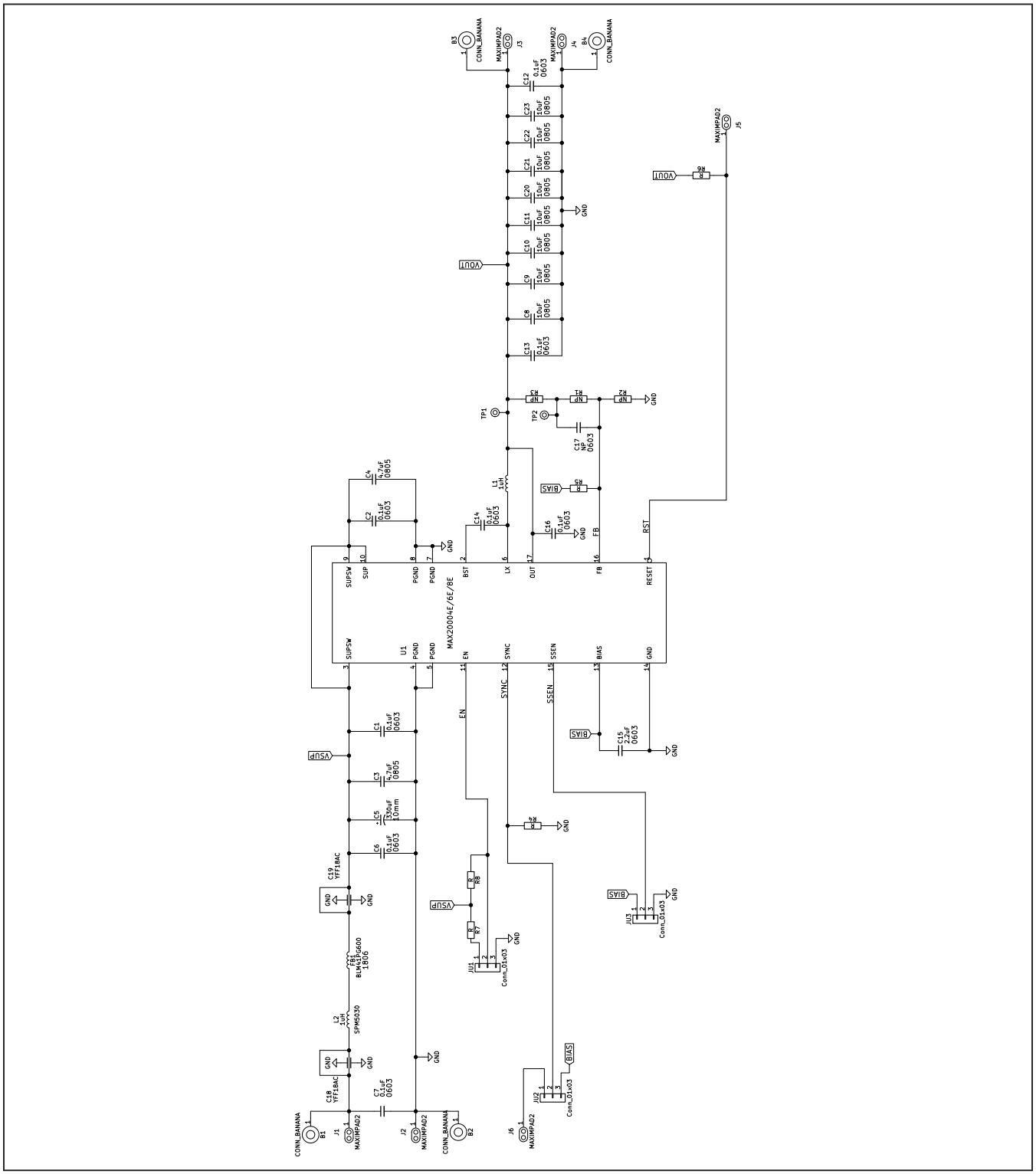
SUPPLIER	PHONE	WEBSITE
TDK	(516) 535-2600	https://en.tdk.eu/
Panasonic	1-800-344-2112	https://na.industrial.panasonic.com/
TE Connectivity	+1 800 522 6752	https://www.te.com/usa-en/home.html
Murata	+1 770 436 1300	https://www.murata.com/en-us
Pomona	NA	https://www.pomonaelectronics.com/

Note: *Indicate that you are using the MAX20006E when contacting these component suppliers.*

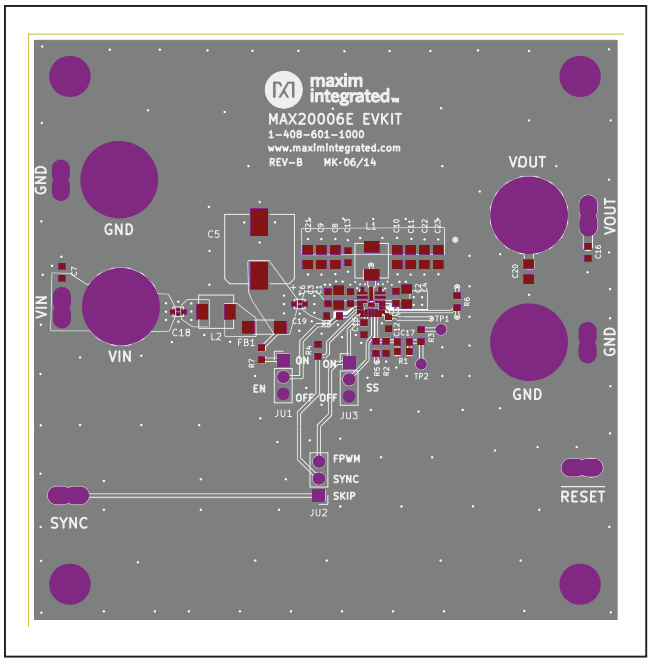
Ordering Information

PART	TYPE
MAX20006EEVKIT#	5V output, 2.1MHz, 6A EV kit
MAX20008EEVKIT#	5V output, 400kHz, 8A EV kit

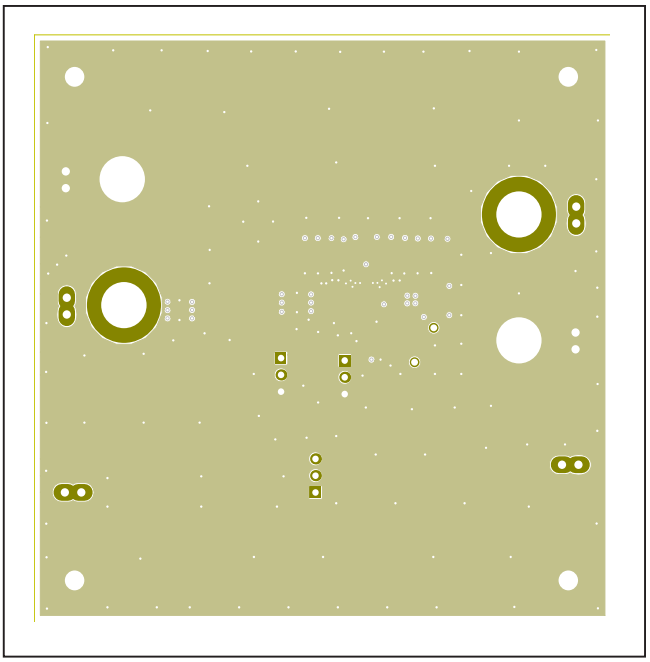
MAX20006E/MAX20008E EV Kit Schematic



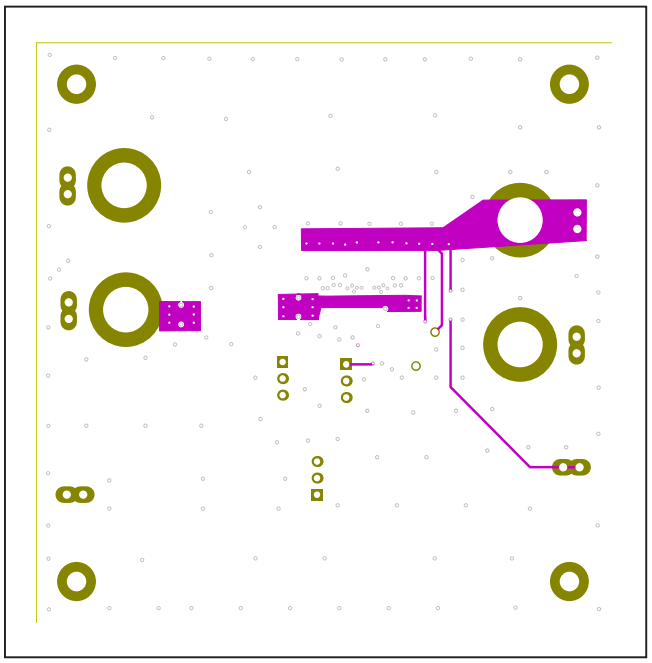
MAX20006E/MAX20008E EV PCB Layouts



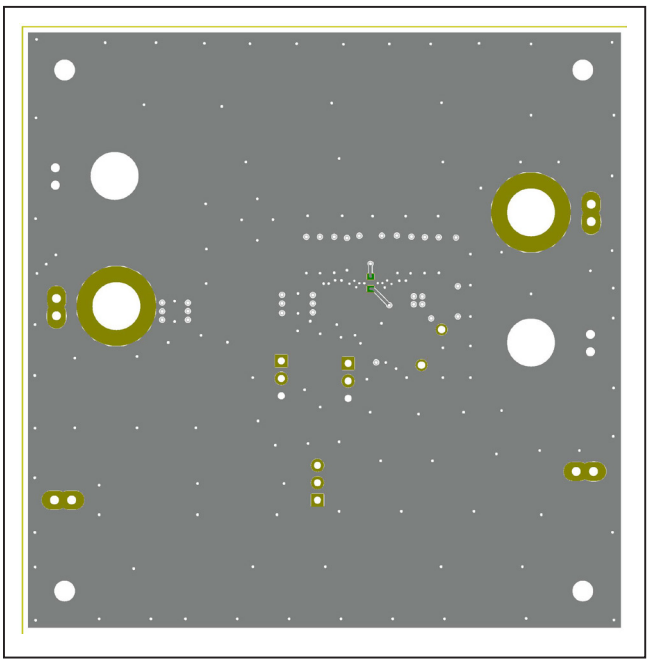
MAX20006E/MAX20008E EV Kit Component Placement - Top



MAX20006E/MAX20008E EV Kit PCB Layout - Internal Layer 2



MAX20006E/MAX20008E EV Kit PCB Layout - Internal Layer 3



MAX20006E/MAX20008E EV Kit Component Placement - Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/19	Initial release	—
1	6/20	Added to *Evaluate header* on each page - MAX20004E. *General Description* - output changed from 3.9V to 5V. *Quick Start Procedure* - 6) and 7) removed text from each. *Detailed Description* - changed from MAX20006EAFOD/VY+ to MAX20006EAFOA/VY+. *Table 2. MAX2006EEVKIT variant* - row U1 Part# changed - from MAX20006EAFOD/VY+ to MAX20006EAFOA/VY+. *Ordering Information* - Part MAX20006EEVKIT# changed 3.9V output to 5V.	1, 2, 3

