Click here to ask an associate for production status of specific part numbers.

Evaluates: MAX20039/MAX20040, MAX26039/MAX26040

MAX20040 Evaluation Kit

General Description

The MAX20040 evaluation kit (EV kit) is a fully assembled and tested application circuit for the MAX20040, which is a small, synchronous buck-boost converter family with integrated high-side and low-side switches. Each EV kit is designed to deliver up to 1.2A with input voltages from +4.5V to +36V, while using only 52µA quiescent current at no load. Input voltage can be lowered to +2V after regulation. Output-voltage quality can be monitored by observing the PGOOD signal.

Benefits and Features

- +2V to +36V Input Supply Range
- Delivers up to 1.2A Output Current (MAX20040)
- Frequency-Synchronization Input
- Enable Input
- Voltage-Monitoring PGOOD Output
- Enable or Disable Spread Spectrum
- Proven PCB Layout
- Fully Assembled and Tested

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

Quick Start

Required Equipment

- MAX20040 EV kit
- 2V to 36V, 3A power supply capable of providing 3A at 2V input
- Digital multimeter (DMM)
- Oscilloscope
- Electronic load capable of sinking 1.2A

Procedure

Each 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 according to Table 1.
2) Connect the positive and negative terminals of the power supply to the SUP and GND1 test pads, respectively.
3) Set the power-supply voltage to 14V and current limit to 3A.
4) Turn on the power supply.
5) Verify using the DMM that OUT is approximately 5V.
6) Verify that switching frequency is approximately 400kHz by monitoring inductor switching voltage with the oscilloscope.

Additional Evaluation

7) Connect the positive and negative terminals of the electronic load to OUT and GND, respectively.
8) Set the electronic load to the desired current at or below 1.2A, or use an equivalent resistive load with an appropriate power rating.
9) Turn on the power supply and electronic load.
10) Verify that the voltage across the VOUT and GND PCB pads is 5V ±2%.

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One Analog Way, Wilmington, MA 01887 U.S.A. | Tel: 781.329.4700 |

Detailed Description of Hardware

The MAX20040 EV kit provides a proven layout for the MAX20040 synchronous buck regulator. The device accepts input voltages as high as +36V and delivers up to 1.2A. The EV kit can handle an input supply transient up to +40V. Various test points are included for evaluation.

External Synchronization

The device can operate in two modes, forced-PWM (FPWM) or skip mode. Skip mode has better efficiency for light-load conditions. When SYNC is pulled low, the device operates in skip mode for light loads and FPWM mode for larger loads. When SYNC is pulled high, the device is forced to operate in FPWM mode across all load conditions. SYNC can be used to synchronize with other supplies if a clock source is present. The device 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 low impedance when the output voltage is in regulation. PGOOD is high impedance when the output voltage drops below 93% (typ) of its nominal regulated voltage. To obtain a logic signal, pull up PGOOD to BIAS by installing shunts on jumpers PU and LED.

Evaluating Other Output Voltages and Devices

The EV kit comes installed with a +5V MAX20040B (1.2A) device, with a switching frequency of 400kHz. For +5V, 2.2MHz operation, see the appropriate component changes in the *MAX20040 EV Kit Bill of Materials*. Other output voltages can require the IC (U1) to be uninstalled and reinstalled with the correct part number as well as other component changes. Refer to the MAX20039/MAX20040 and MAX26039/MAX26040 IC data sheets for details.

Table 1. Default Jumper Settings

JUMPER	DEFAULT SHUNT POSITION	FUNCTIONS
EN	1-2 (ON-middle)	Buck-boost enabled
SPS	2-3 (middle-OFF)	Spread spectrum disabled
PGOOD PU	1-2	PGOOD pulls up to V_{BIAS} when OUT is in regulation
SYNC	1-2 (FPWM-middle)	Forced-PWM mode

Ordering Information

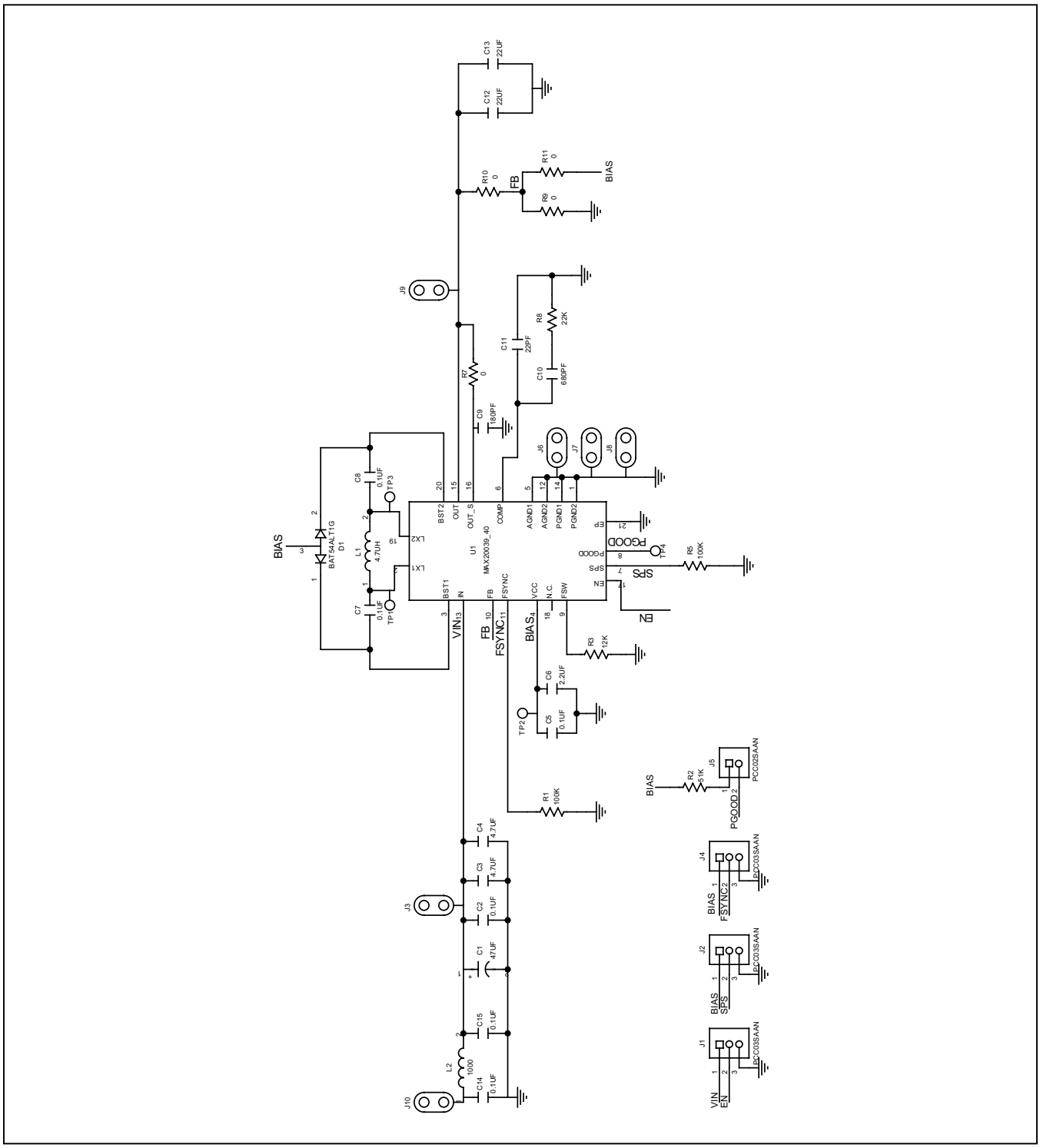
PART	TYPE
MAX20040EVKIT#	EV Kit

#Denotes RoHS compliant.

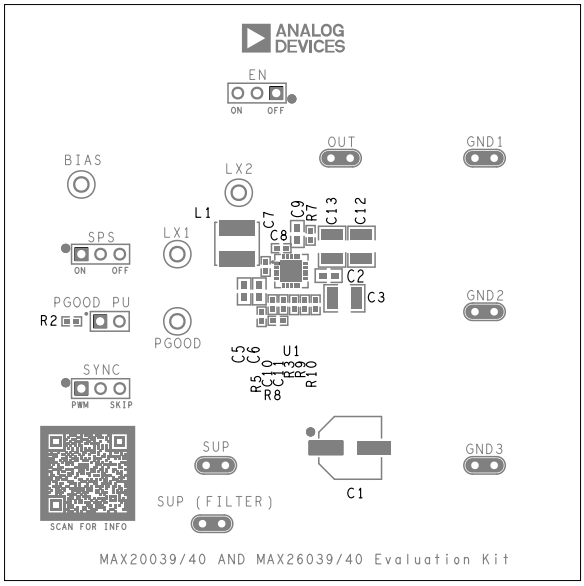
MAX20040 EV Kit Bill of Materials

ITEM	REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	C1	1	EEE-FK1H470P	PANASONIC	47UF	CAP; SMT (CASE_E); 47UF; 20%; 50V; ALUMINUM-ELECTROLYTIC
2	C2	1	GCJ188R71H104KA12; GCM188R71H104K	MURATA; MURATA	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 50V; X7R; CERAMIC
3	C3, C4	2	GRM32ER71H475KA88; CNC6P1X7R1H475K250AE	MURATA; TDK	4.7UF	CAP; SMT (1210); 4.7UF; 10%; 50V; X7R; CERAMIC
4	C5	1	GCM188R71C104KA37; GRM188R71C104KA01	MURATA; MURATA	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 16V; X7R; CERAMIC;
5	C6	1	C0603C225K4PAC; GRM188R61C225KE15	KEMET; MURATA	2.2UF	CAP; SMT (0603); 2.2UF; 10%; 16V; X5R; CERAMIC;
6	C7, C8, C14, C15	4	C1005X7R1H104K050BB; GRM155R71H104KE14	TDK; MURATA	0.1UF	CAP; SMT (0402); 0.1UF; 10%; 50V; X7R; CERAMIC
7	C9	1	C0603C181K5GAC	KEMET	180PF	CAP; SMT (0603); 180PF; 10%; 50V; C0G; CERAMIC
8	C10	1	GRM1555C1H681GA01; C1005C0G1H681G050	MURATA; TDK	680PF	CAP; SMT (0402); 680PF; 2%; 50V; C0G; CERAMIC
9	C11	1	C0402C220J3GAC	KEMET	22PF	CAP; SMT (0402); 22PF; 5%; 25V; C0G; CERAMIC
10	C12, C13	2	GRM32ER71E226KE15; CL32B226KAJNFN	MURATA; SAMSUNG	22UF	CAP; SMT (1210); 22UF; 10%; 25V; X7R; CERAMIC
11	D1	1	BAT54ALT1G	ON SEMICONDUCTOR	BAT54ALT1G	DIODE; SCH; SMT (SOT-23); PIV=30V; IF=0.2A; COMMON ANODE
12	J1, J2, J4	3	PCC03SAAN	SULLINS	PCC03SAAN	CONNECTOR; MALE; THROUGH HOLE;
13	J3, J6-J10	6	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE
14	J5	1	PCC02SAAN	SULLINS	PCC02SAAN	CONNECTOR; MALE; THROUGH HOLE
15	L1	1	XAL5030-472ME	COILCRAFT	4.7UH	INDUCTOR; SMT; COMPOSITE CORE; 4.7UH; TOL=+/-20%; 5.9A
16	L2	1	742792116	WURTH ELECTRONICS INC.	500	INDUCTOR; SMT (1206); FERRITE-BEAD; 500; TOL=+/-25%; 2.5A
17	R1, R5	2	ERJ-2GEJ104	PANASONIC	100K	RES; SMT (0402); 100K; 5%; +/-200PPM/DEGC; 0.1000W
18	R2	1	ERJ-2RKF5102	PANASONIC	51K	RES; SMT (0402); 51K; 1%; +/-100PPM/DEGC; 0.1000W
19	R3	1	CRCW040212K0FK; MCR01MZPF1202	VISHAY DALE; ROHM SEMICONDUCTOR	12K	RES; SMT (0402); 12K; 1%; +/-100PPM/DEGC; 0.0630W
20	R7, R9-R11	4	ERJ-2GE0R00	PANASONIC	0	RES; SMT (0402); 0; JUMPER; JUMPER; 0.1000W
21	R8	1	CRCW040222K0FK	VISHAY DALE	22K	RES; SMT (0402); 22K; 1%; +/-100PPM/DEGC; 0.0630W
22	TP1-TP4	4	5007	KEYSTONE	N/A	TEST POINT; WHITE;
23	U1	1	MAX20040BATPA/VY+	Analog Devices	MAX20039_40	EVKIT PART - IC; MAX20039_40; TQFN20-EP
24	PCB	1	MAX20039AE13	Analog Devices	PCB	PCB:MAX20039AE13

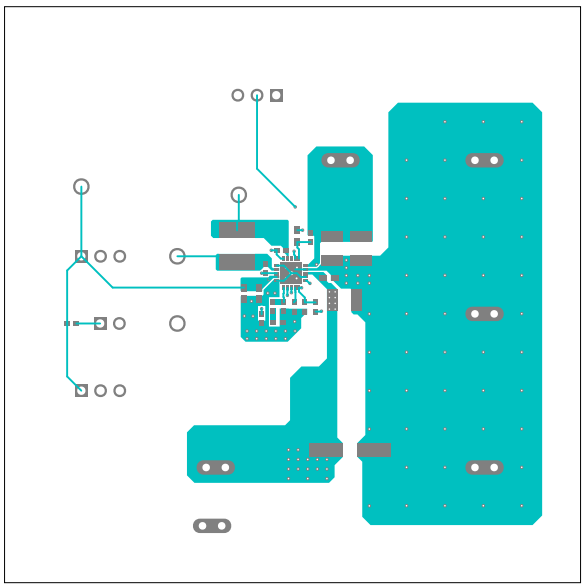
MAX20040 EV Kit Schematic



MAX20040 EV Kit PCB Layout Diagrams

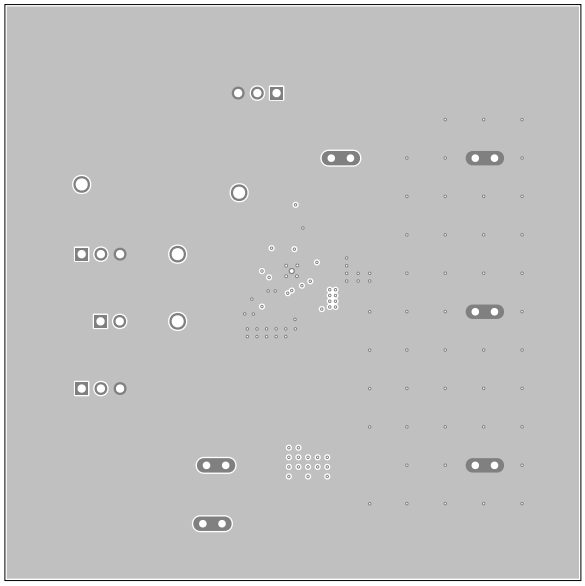


MAX20040 EV Kit Component Guide—Solder Mask Top

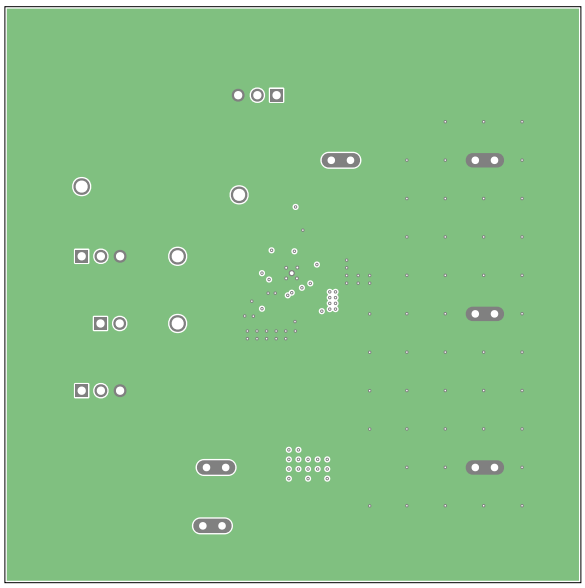


MAX20040 EV Kit PCB Layout—Top Layer

MAX20040 EV Kit PCB Layout Diagrams (continued)

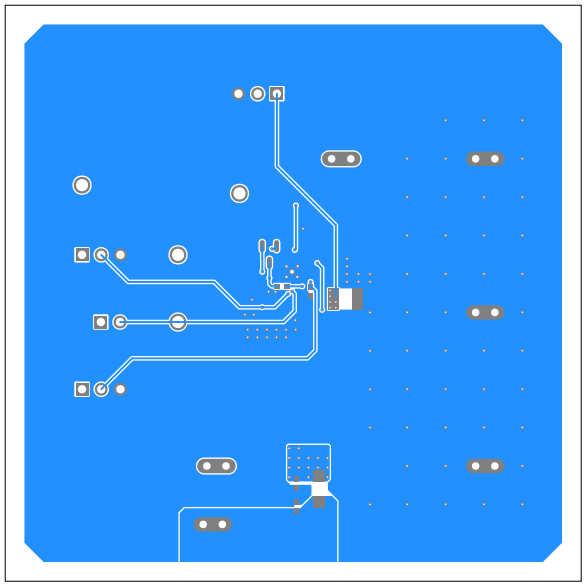


MAX20040 EV Kit PCB Layout—Inner Layer 1

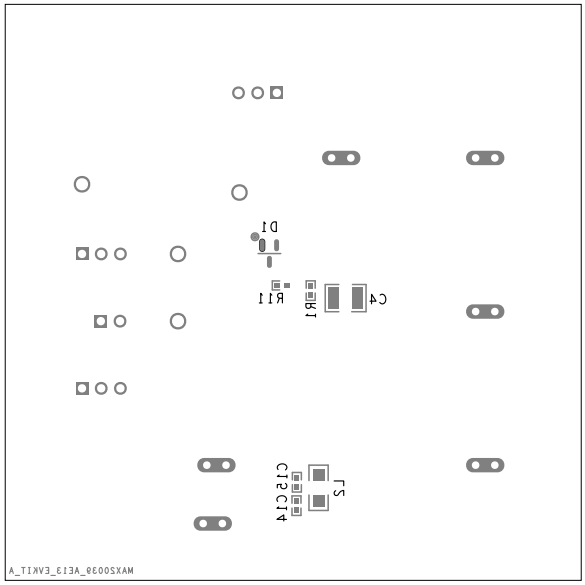


MAX20040 EV Kit PCB Layout—Inner Layer 3

MAX20040 EV Kit PCB Layout Diagrams (continued)



MAX20040 EV Kit PCB Layout—Bottom Layer



MAX20040 EV Kit PCB Layout—Solder Mask (Bottom)

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	7/18	Initial release	—
1	12/18	Updated *Detailed Description of Hardware* and *MAX20040 EV Kit Bill of Materials*	2, 3
2	10/20	Updated *MAX20040 EV Kit Schematic*	4
3	3/24	Added MAX26039/MAX260040; updated *Detailed Description of Hardware*, *MAX20040 EV Kit Bill of Materials*, *MAX20040 EV Kit Schematic*, and *MAX20040 EV Kit PCB Layout Diagrams*	All