

Evaluates: MAX26239, MAX26240

General Description

The MAX26240 evaluation kit (EV kit) is a fully assembled and tested application circuit that simplifies the evaluation of the MAX26240 2.1MHz, 36V buck-boost converter. All installed components are rated for the industrial temperature range. Various test points and jumpers are included for evaluation.

The standard EV kit comes with the MAX26240AFFAY+ installed (5V, 2.1MHz) and can also be used to evaluate other MAX26239 and MAX26240 variants with minimal component changes shown in the [MAX26240 EV Kit Bill of Materials](#).

Features and Benefits

- High-Voltage Step-Down Converters with Integrated Power FETs to Minimize Board-Area-Occupancy
- Seamless Transition across Buck and Boost Operating Regions
- 4.5V to 36V Input Supply Range
- Provides 5V Output up to 6A Output Current
- Output Voltages Adjustable Between 3.3V and 20V Through External Resistors
- $\pm 2\%$ Output Voltage Accuracy
- Skip-Mode Operation to Maximize Efficiency During Light Load Conditions
- Frequency-Synchronization Input
- Spread Spectrum Enable Input
- Buck-Boost Enable Input
- Voltage-Monitoring PGOOD Output
- Jumpers and Test Points on Key Nodes for Simplified Evaluation
- Proven PCB Layout
- Fully Assembled and Tested

Quick Start

Required Equipment

- MAX26240 EV Kit
- 15V, 10A DC Power Supply (PS)
- Voltmeter (VM)
- Electronic Load (EL)

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 power supply, PS to 14V. Turn off the PS.
3. Preset the electronic loads, EL to 3A. Turn off the EL.
4. Connect the positive terminal of EL to OUT; connect the negative terminal of EL to GND4.
5. Connect the positive terminal of PS to SUP; connect the negative terminal of PS to GND1.
6. Connect the positive terminal of VM to OUT; connect the negative terminal of VM to GND4/GND2.
7. Turn on the power supply.
8. Verify that the voltmeter on VOUT measures approximately 5V.
9. Enable the electronic loads, EL.
10. Verify that the voltmeter on VOUT measures approximately 5V.

[Ordering Information](#) appears at end of data sheet.

Table 1. Jumper Connection Guide

JUMPER	DEFAULT CONNECTION	FEATURE
JU1	1-2	Buck-boost converter enabled
JU2	1-2	Force-pulse-width-modulation (FPWM) mode selected
JU3	2-3	Spread spectrum disabled
JU4	1-2	PGOOD pull-up connected

Detailed Description

The MAX26240 EV kit provides a fully developed and proven layout for evaluating all variants of the MAX26239 and MAX26240 family of current-mode-controlled buck-boost converter ICs. Each converter accepts input supply voltages as high as 36V and input supply transients up to 40V.

Operation Modes

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

Switching Frequency and External Synchronization

The SYNC pin can be used to synchronize the switching frequency of the IC to an external source by applying an external clock signal. The device is forced to operate in PWM when SYNC is connected to a clock source.

Output Voltage Monitoring (PGOOD)

The EV kit provides output test points (PGOOD) to monitor the status of the buck-boost output voltage on OUT. PGOOD is high impedance when the output voltage rises above its 95% (typ) of regulation voltage. PGOOD pulls low when the respective output voltage drops below 93.5% (typ) of its nominal regulated voltage.

To obtain logic signals, pull PGOOD up to VCC by installing the shunts on jumpers on JU4.

Setting the Output Voltage in Buck Converters

The EV kit comes assembled to provide a fixed 5V output regulation on OUT. To externally adjust the voltage at OUT, remove R1 and place appropriate resistors in positions R7 and R8 according to the following equation:

$$R7 = R8 \left(\frac{V_{OUT}}{V_{FB}} - 1 \right)$$

where VFB = 0.8V (typ) and R8 is between 10kΩ and 50kΩ.

Evaluating Other Variants

The MAX26240EVKIT# comes installed with the 5V/2.1MHz variant (MAX26240AFFAY+).

Analog Devices offers additional variations including those that operate at lower switching frequency of 400kHz for more efficient performance. See [MAX26240 EV Kit Bill of Materials](#) to select components for evaluating 400kHz variants. Refer to the MAX26239/MAX26240 IC data sheet for part variant details and contact the factory to request additional variants of the MAX26239/MAX26240.

Ordering Information

PART	TYPE
MAX26240EVKIT#	5V Output, 2.1MHz EV Kit

#Denotes RoHS-compliant.

MAX26240 EV Kit Bill of Materials

REF DES	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
C1	EEH-ZC1H470	PANASONIC	47UF	CAP; SMT(CASE_F); 47UF; 20%; 50V; ALUMINUM-ELECTROLYTIC
C4	GRM188Z71C475KE21	MURATA	4.7UF	CAP; SMT (0603); 4.7UF; 10%; 16V; X7R; CERAMIC
C5-C7, C15, C18	C1005X7R1H104K050BB; GRM155R71H104KE14; C1005X7R1H104K050BE; UMK105B7104KV-FR	TDK; MURATA; TDK; TAIYO YUDEN	0.1UF	CAP; SMT (0402); 0.1UF; 10%; 50V; X7R; CERAMIC
C8	C0603C222K1RAC	KEMET	2.2nF	CAP; SMT (0603); 2200PF; 10%; 100V; X7R; CERAMIC
C9	06033C101MAT2A	AVX	100PF	CAP; SMT (0603); 100PF; 20%; 25V; X7R; CERAMIC
C14	GRM31CR71H475KA12; GRJ31CR71H475KE11; GXM31CR71H475KA10; UMK316AB7475KL; GRM31CR71H475KA12L	MURATA; MURATA; MURATA; TAIYO YUDEN; MURATA	4.7UF	CAP; SMT (1206); 4.7UF; 10%; 50V; X7R; CERAMIC
C10-C13	CGA6P3X7R1E226M250AB	TDK	22UF	CAP; SMT (1210); 22UF; 20%; 25V; X7R; CERAMIC; NOTE: PURCHASE DIRECT FROM THE MANUFACTURER
EN_TP, GND2, GND3, PGOOD, SUP_FILTER, SYNC	9020 BUSS	WEICO WIRE	MAXIMPAD	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
GND1, GND4, OUT, SUP	108-0740-001	EMERSON NETWORK POWER	108-0740-001	CONNECTOR; MALE; PANELMOUNT; BANANA JACK; STRAIGHT; 1PIN
J1-J3	PBC03SAAN	SULLINS	PBC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC
J4	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
L1	XAL7070-222ME	COILCRAFT	2.2UH	INDUCTOR; SMT; SHIELDED; 2.2UH; TOL=+/-20%; 17.8A
MH1-MH4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
R1	CRCW06030000Z0	VISHAY DALE	0	RES; SMT (0603); 0; JUMPER; JUMPER; 0.1000W
R2	CRCW060330K0FK	VISHAY DALE	30K	RES; SMT (0603); 30K; 1%; +/-100PPM/DEGC; 0.1000W
R5	CRCW060310K0JN; ERJ-3GEYJ103	VISHAY DALE; PANASONIC	10K	RES; SMT (0603); 10K; 5%; +/-200PPM/DEGC; 0.1000W
R6	CRCW060320R0FK; ERJ-3EKF20R0	VISHAY DALE; PANASONIC	20	RES; SMT (0603); 20; 1%; +/-100PPM/DEGC; 0.1000W
SU1-SU4	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

U1	MAX26240AFFAY+	ANALOG DEVICES	MAX26240	EVKIT PART - IC; AUTOMOTIVE 4.5V TO 36V WIDE VIN; 2.1MHZ; 3.0A; BUCK-BOOST CONVERTER; PACKAGE DRAWING NUMBER: 21- 100399; LAND PATTERN NUMBER: 90-100137; PACKAGE CODE: F222A4FY-1
VCC	5007	KEYSTONE	TEST POINT	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; WHITE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
PCB	MAX26240	ANALOG DEVICES	PCB	PCB:MAX25240

Do Not Populate Parts

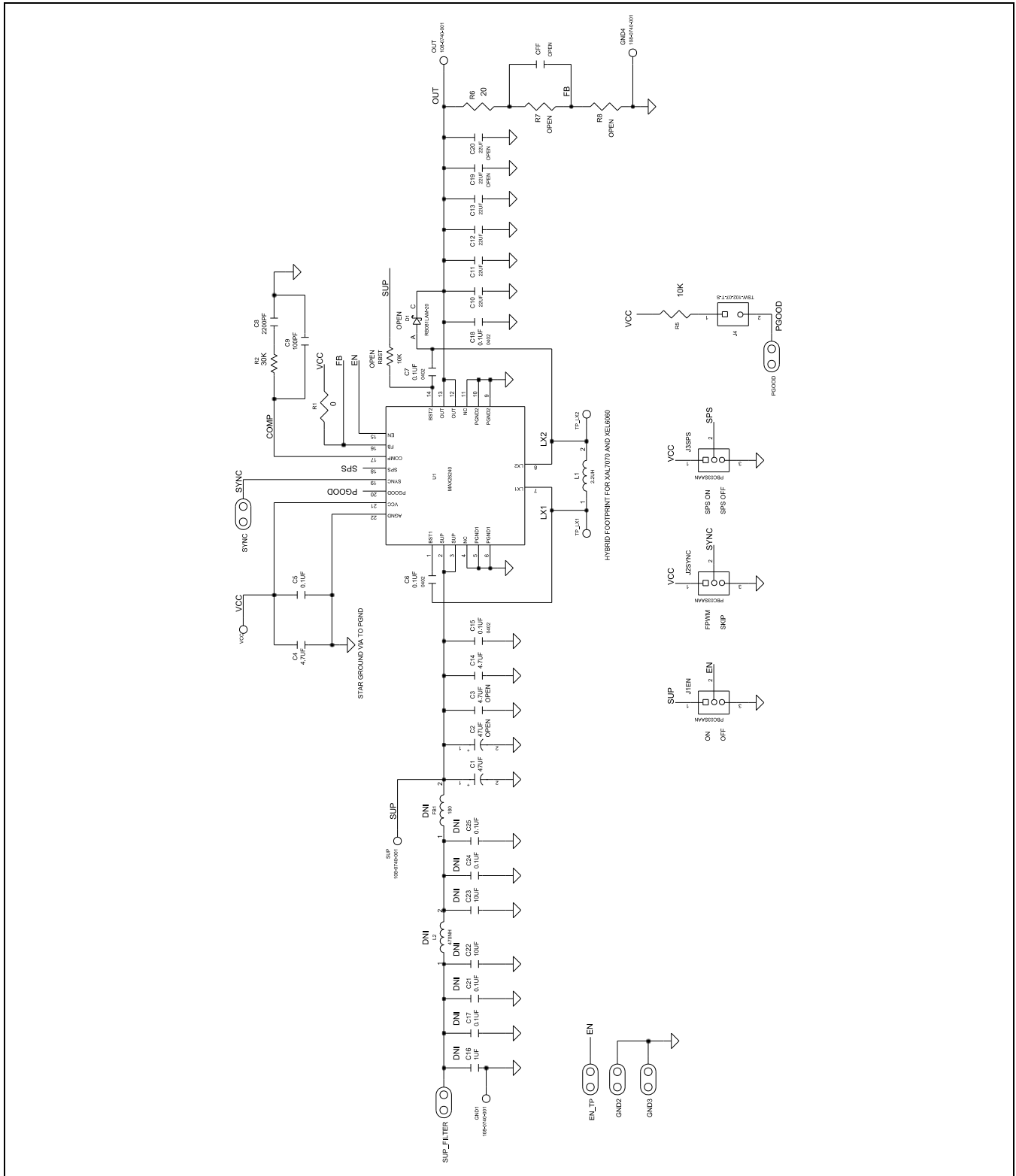
REF DES	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
C2	EEH-ZC1H470	PANASONIC	47UF	CAP; SMT(CASE_F); 47UF; 20%; 50V; ALUMINUM-ELECTROLYTIC
C3	GRM31CR71H475KA12; GRJ31CR71H475KE11; GXM31CR71H475KA10; UMK316AB7475KL; GRM31CR71H475KA12L	MURATA; MURATA; MURATA; TAIYOYUDEN; MURATA	4.7UF	CAP; SMT (1206);4.7UF;10%;50V; X7R; CERAMIC
C16	UMK107AB7105KA; CC0603KRX7R9BB105	TAIYO YUDEN; YAGEO	1UF	CAP; SMT (0603); 1UF; 10%; 50V; X7R; CERAMIC
C17, C21, C24, C25	C1005X7R1H104K050BB; GRM155R71H104KE14; C1005X7R1H104K050BE; UMK105B7104KV-FR	TDK; MURATA; TDK; TAIYO YUDEN	0.1UF	CAP; SMT (0402); 0.1UF; 10%; 50V; X7R; CERAMIC
C19, C20	CGA6P3X7R1E226M250AB	TDK	22UF	CAP; SMT (1210); 22UF; 20%; 25V; X7R; CERAMIC; NOTE: PURCHASE DIRECT FROM THE MANUFACTURER
C22, C23	GRM32ER71H106KA12; CL32B106KBJNNN; UMJ325KB7106KMH	MURATA; SAMSUNG ELECTRONICS; TAIYO YU	10UF	CAP; SMT (1210); 10UF; 10%; 50V; X7R; CERAMIC
CFF	06035C220JAT	AVX	22PF	CAP; SMT (0603); 22PF; 5%; 50V; X7R; CERAMIC
D1	RB081LAM-20	ROHM SEMICONDUCTOR	RB081LAM-20	DIODE; SCH; SMT (SOD-128); PIV=20V; IF=80A
FB1	74279224181	WURTH ELECTRONICS INC.	180	INDUCTOR; SMT; FERRITE-BEAD; 180 OHMS AT 100MHZ; TOL=+/- 25%; 10A; NOTE: PURCHASE DIRECT FROM THE MANUFACTURER
L2	IHLP2020BZERR47M01	VISHAY	470nH	INDUCTOR; SMT; SHIELDED; 470nH; 20%; 2.8A
R7	ERJ-3EKF2943	PANASONIC	294K	RES; SMT (0603); 294K; 1%; +/- 100PPM/DEGC; 0.1000W
R8	CRCW060321K0FK	VISHAY DALE	21K	RES; SMT (0603); 21K; 1%; +/- 100PPM/DEGC; 0.1000W

RBST	ERJ-6GEYJ103; RMCF0805JG10K0	PANASONIC; STACKPOLE ELECTRONICS	10K	RES; SMT (0805); 10K; 5%; +/- 200PPM/DEGC; 0.1250W
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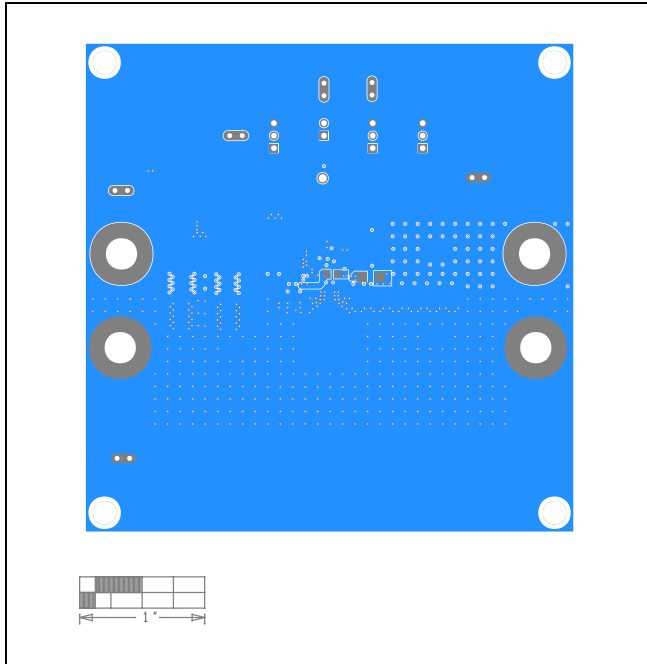
Changes Required for 400kHz Operation

REF DES	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
L1	XAL7070-472ME_	COILCRAFT	4.7UH	INDUCTOR; SMT; SHIELDED; 4.7UH; TOL=+/-20%; 13.6A
U1	MAX26240AFFBY+	ANALOG DEVICES	MAX26240	EVKIT PART - IC; AUTOMOTIVE 4.5V TO 36V WIDE VIN; 2.1MHZ; 3.0A; BUCK-BOOST CONVERTER; PACKAGE DRAWING NUMBER: 21-100399; LAND PATTERN NUMBER: 90-100137; PACKAGE CODE: F222A4FY-1

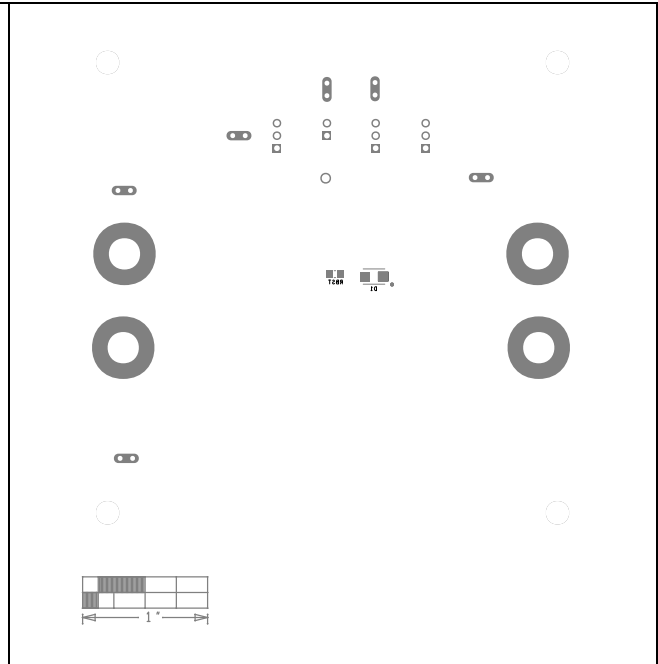
MAX26240 EV Kit Schematic



MAX26240 EV Kit PCB Layouts (continued)



MAX26240 EV Kit PCB Layout—Component Placement Bottom



MAX26240 EV Kit PCB Layout—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	12/23	Initial release	—

Notes

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