

# MAXIM

## MAX731 Evaluation Kit

MAX731 EV Kit

### General Description

The MAX731 evaluation kit (EV kit) facilitates assembly and evaluation of Maxim's MAX731 +5V step-up current-mode DC-DC converter.

The EV kit includes all needed components (unassembled) and a printed circuit board. When completed, the EV kit is a working DC-DC step-up converter with +5V output voltage at 200mA.

Typical full-load efficiencies are 82% to 87%. The MAX731 uses current-mode pulse-width modulation (PWM) to provide precise output regulation and low subharmonic noise. Typical no-load supply current is 2mA.

The MAX731 features cycle-by-cycle current limiting, overcurrent limiting, external shutdown, and programmable soft-start protection.

The EV kit components are suitable for through-hole mounting to make construction and evaluation easy. Refer to the MAX731 data sheet for detailed electrical and operating specifications.

### Component List

DESIGNATION	QTY	DESCRIPTION	SOURCE
IC1	1	MAX731CPA	Maxim
None	1	Printed circuit board	Maxim
C1, C7	2	0.1 $\mu$ F ceramic capacitors	
C2, C8	2	150 $\mu$ F, 25V electrolytic capacitors MAXC001	Maxim
C3	1	4.7 $\mu$ F capacitor	
C4, C5, C6	3	0.15 $\mu$ F ceramic capacitors	
D1	1	Schottky diode 1N5817	Motorola
R1	1	1/4W, 5% 10k $\Omega$ resistor	
J2	1	Jumper	
L1	1	22 $\mu$ H inductor	Sumida RCH-110-220M Coilcraft PCH-27-223 Wilco ITS220

Sumida USA	(708) 956-0666	FAX (708) 956-0702
Sumida Japan	03-3607-5111	FAX 03-3607-5428
Coilcraft USA	(708) 639-6400	FAX (708) 639-1469
Coilcraft Taiwan	8862-268-2146	FAX 8862-268-2092
Wilco	(317) 293-9300	FAX (317) 293-9462

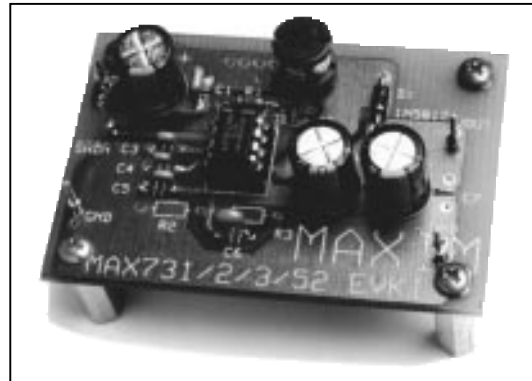
### Features

- ◆ Load Currents Guaranteed to 200mA with No External MOSFET
- ◆ Step-Up from a 2.0V Input
- ◆ 170kHz High-Frequency Current-Mode PWM
- ◆ 82% to 87% Typical Efficiencies at Full Load
- ◆ Overcurrent and Soft-Start Protection
- ◆ Shutdown Capability

### Ordering Information

PART	TEMP. RANGE	BOARD TYPE
MAX731EVKIT-DIP	0°C to +70°C	Through Hole

### EV Kit



### Terminal Description

TERMINAL NAME	FUNCTION
V <sub>IN</sub>	Positive Input. Connect to positive terminal of voltage power supply.
SHDN	SHUTDOWN – active low. Ground to power down; ties to V <sub>IN</sub> for normal operation. Output power FET is held off when SHDN is low.
GND	Circuit Ground. Connect to negative terminal of input voltage supply. This is also the output voltage negative terminal.
V <sub>OUT</sub>	Positive Output. Connect to load.

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### Operating Principle

This switch-mode regulator uses a current-mode pulse-width modulation (PWM) controller as a simple boost regulator to convert an unregulated 2.0V DC voltage to a higher output. The current-mode PWM architecture provides cycle-by-cycle current limiting and excellent load-transient response. For detailed description, see the MAX731/MAX752 data sheet.

### Assembly Instructions

**CAUTION: Observe the following safety measures.**

1. Do not apply power until all components are installed.
2. Do not solder or work on circuit while power is applied.
3. Never apply more than the maximum supply voltage to  $V_{IN}$ .

The EV kit is shipped unassembled. You will need the following tools for assembly:

1. Long-nose pliers
2. Wire cutters
3. 30W soldering iron and rosin-core solder
4. Hook-up wire (#18-22AWG) for the input and output connections

**CAUTION: Using a high-wattage soldering iron or acid-core solder may damage the board and components.**

Install the components as shown in Figure 1 and solder them in place. Observe polarity on the capacitors, diode, and IC. Keep all leads short. Inspect the completed board for cleanliness, shorts, and solder splashes.

A socket may be added for IC1, but it may degrade performance with high load currents. In general, sockets are not recommended.

The printed circuit board accommodates a variety of

inductors. When installing the inductors, make sure one end is connected on the trace leading to  $V_{IN}$ . The other inductor terminal connects to the same trace as diode D1.

Only one of the jumpers must be installed; install J2 for the MAX731.

Examine the board for parts incorrectly inserted before applying power. Verify that the electrolytic capacitors' positive terminal aligns with the plus (+) sign on the printed circuit board. The cathode band on D1 must be as indicated on the board legend.

### Testing

When testing, use an adjustable bench power supply as a source ( $V_{IN}$ ). Start with no load, then add a resistive load before connecting to the actual circuit. This procedure minimizes the chances of damaging the device and ensures that accurate data is collected in an orderly manner.

The bench power supply should have a 3A to 6A capability, and its current limiting should be set to prevent interaction with the EV kit's peak currents.

The input voltage range is 2.0V to 5.0V. The maximum load current is 200mA.

### Shutdown

The DC-DC converter operates only if **SHDN** is connected to  $V_{IN}$ . Even with **SHDN** grounded, however, there is a DC path from  $V_{IN}$  to  $V_{OUT}$ , and  $V_{OUT}$  will be one diode drop lower than  $V_{IN}$ . This is due to the basic topography of step-up converters, and would be the case even with IC1 removed from the circuit. Some current ( $V_{IN}/10k\Omega$ ) also flows from  $V_{IN}$  to **SHDN**, due to R1.

### Internal Reference

The +1.23V bandgap reference supplies up to 100 $\mu$ A at VREF. A 4.7 $\mu$ F reference bypass capacitor is recommended for the MAX731.

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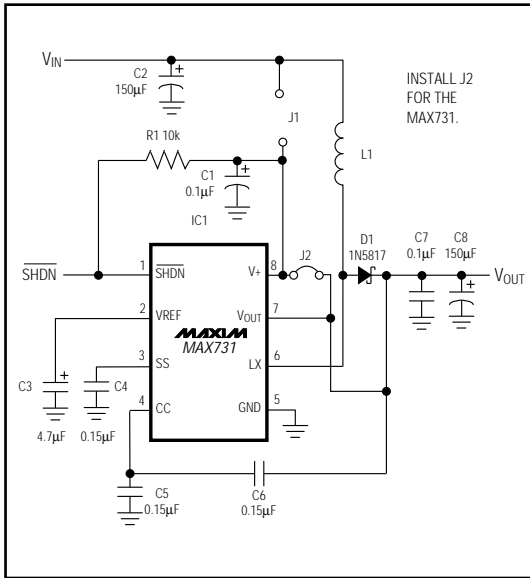


Figure 1a. EV Kit Schematic

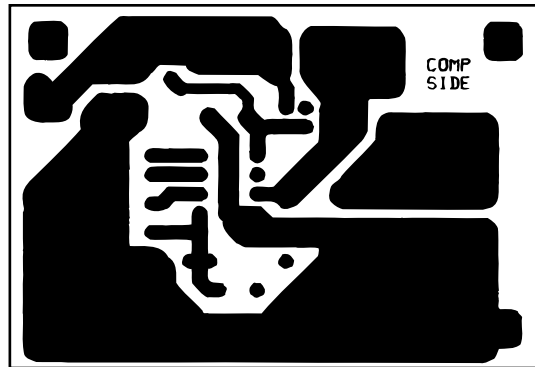


Figure 1c. DIP PC Layout, Component Side (1X scale)

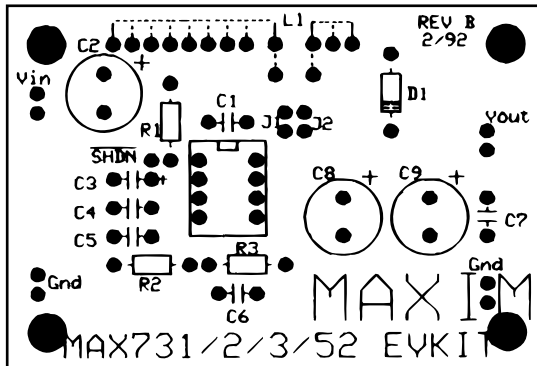


Figure 1b. DIP PC Layout, Through-Hole Placement (1X scale)

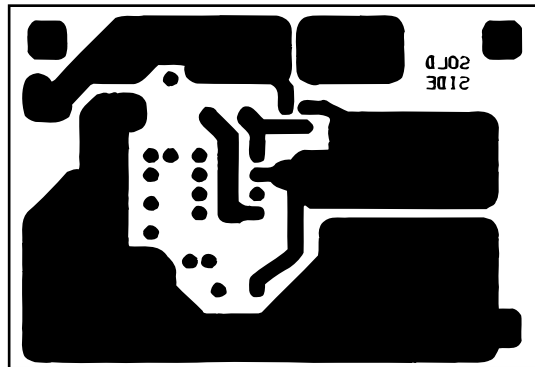


Figure 1d. DIP PC Layout, Solder Side (1X scale)

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