AP72250CJ12
EVB User Guide

DESCRIPTION

The AP72250 is a synchronous boost converter with a minimum 1V input startup voltage and can operate in a wide input voltage range of 0.6V to 5.5V. The device fully integrates a 20mΩ high-side power MOSFET and a 26mΩ low-side power MOSFET to provide high-efficiency step-up DC-DC conversion.

The AP72250 device is easily used by minimizing the external component count due to its adoption of peak current mode control, allowing it to handle wide input-to-output ratios. It also achieves outstanding performance in line and load transient responses and seamless transitions between boost and pass-through modes.

This device is available in a small 1.75mm x 1.35mm, 12 balls WLCSP package.

FEATURES

- V_{IN} 0.6V to 5.5V
- Minimum Input Startup Voltage: 1V
- Output Voltage (VOUT): 1.7V to 5.5V
- 4.7A Switching Current
- 0.8V ± 1% Reference Voltage
- 20μA Low Quiescent Current (Pulse Frequency Modulation)
- 900kHz Switching Frequency
- Up to 89% Efficiency at 5mA Light Load
- Selectable Operation Mode
  - Pulse Frequency Modulation (PFM)
  - Ultrasonic Mode (USM)
  - Forced Pulse Width Modulation (FPWM)
- Power-Good Indicator with 5MΩ Internal Pull-up Resistor
- Protection Circuitry
  - Undervoltage Lockout (UVLO)
  - Peak Current Limit
  - Negative (Valley) Current Limit
  - Output Short Circuit Protection (SCP)
  - Thermal Shutdown

APPLICATIONS

- Low Voltage power cells
- Portable consumer devices
- Supercapacitor charge storages
- USB power supplies
- Power banks
- Industrial metering equipment

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TYPICAL APPLICATIONS CIRCUIT

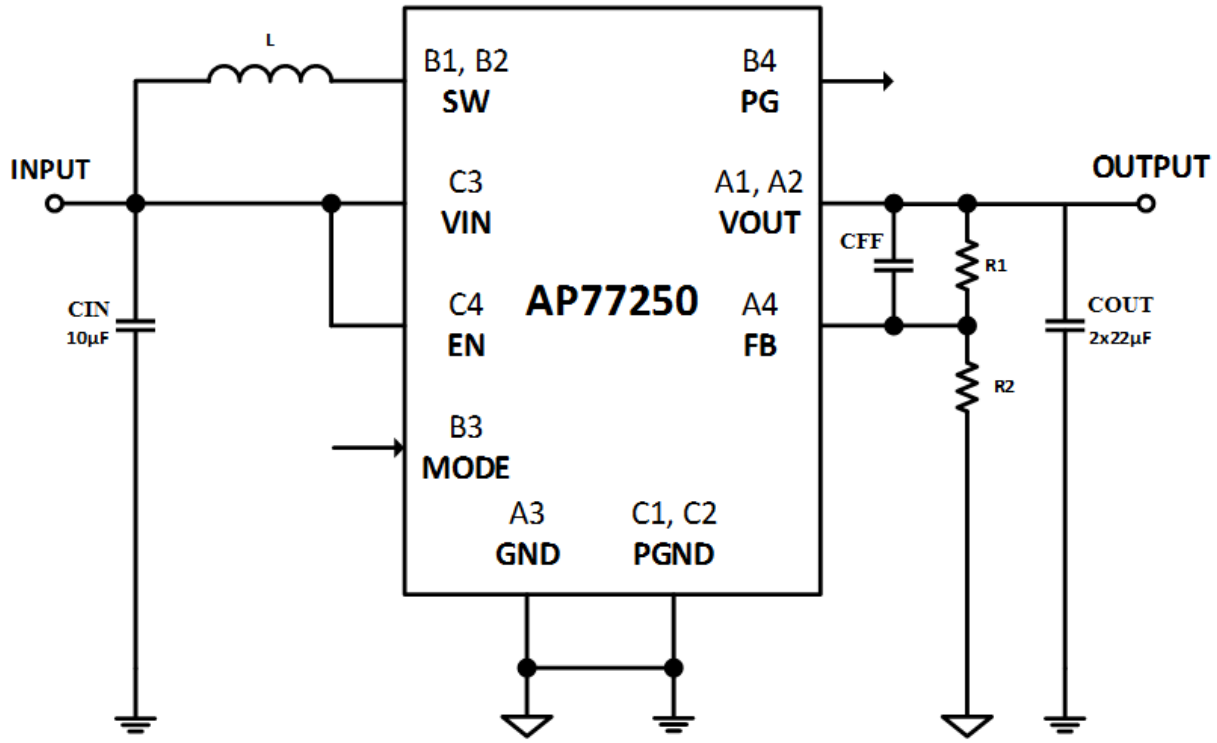

Figure 1. Typical Application Circuit

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
VIN	Supply Voltage	-0.3 to +6.0 (DC)	V
VOUT	Output Pin Voltage	-0.3 to +6.0 (DC)	V
V_{SW}	Switch Node Voltage	-1.0 to +6.0 (DC)	V
V_{SW}	Switch Node Voltage	-2.5 to +10.0 (20ns)	V
V_{EN}	Enable Pin Voltage	-0.3 to +6.0	V
V_{FB}	Feedback Voltage	-0.3 to +2.5	V
T_J	Junction Temperature	+160	°C
T_L	Lead Temperature	+260	°C
HBM	Human Body Mode	2000	V
CDM	Charged Device Model	1500	V

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RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
VIN	Supply Voltage	0.6	5.5	V
VOUT	Output Voltage	1.7	5.5	V
T_A	Operating Ambient Temperature	-40	+85	°C
T_J	Operating Junction Temperature	-40	+125	°C

EVALUATION BOARD

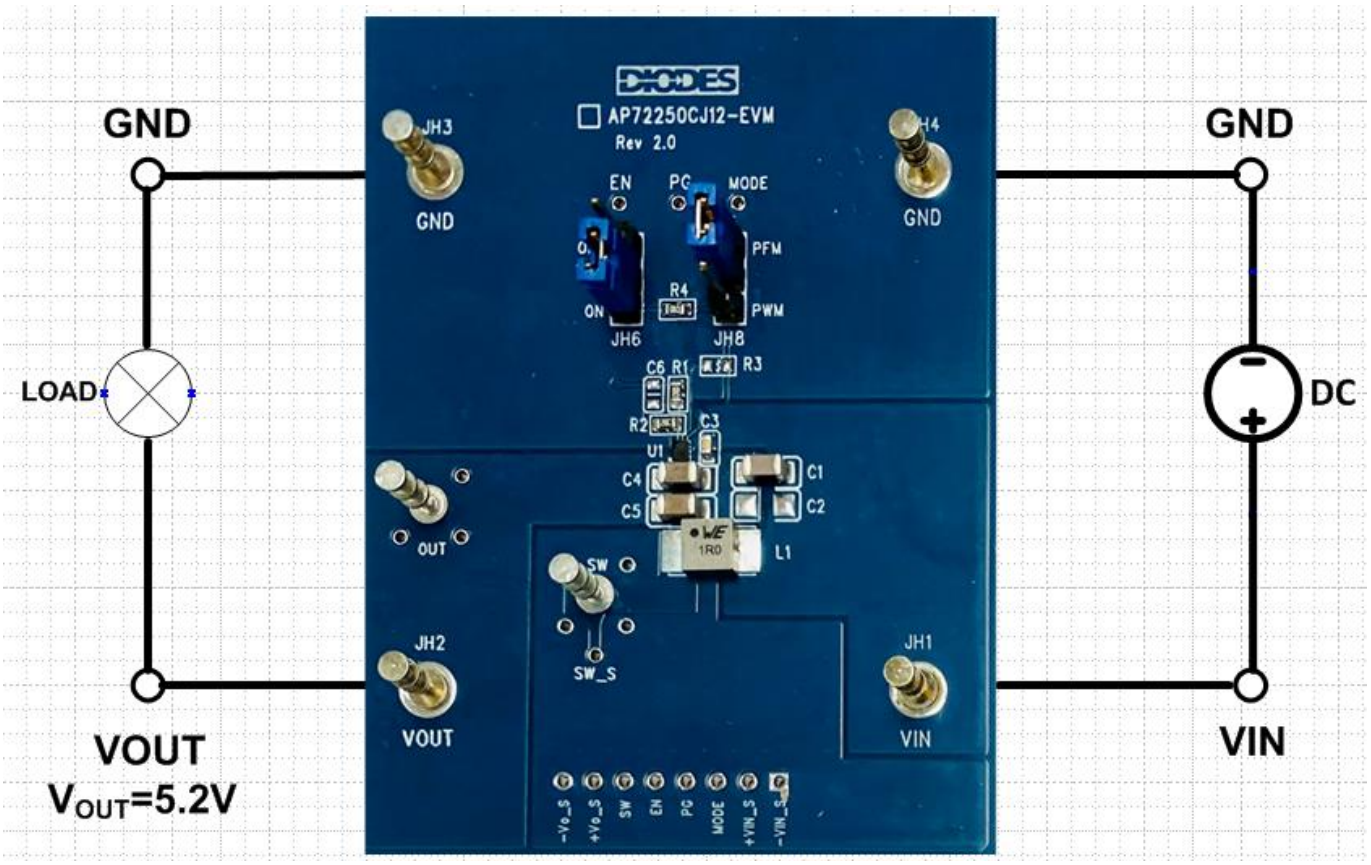

Figure 2. AP72250CJ12-EVM

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QUICK START GUIDE

The AP72250CJ12-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP72250CJ12, follow the procedure below:

1. Connect a power supply to the input terminals V_{IN} and GND. Set V_{IN} to 3.6V.
2. Connect the positive terminal of the electronic load to V_{OUT} and negative terminal to GND.
3. For Enable, place a jumper at JH6 to “ON” position to connect EN pin to V_{IN} through 100KΩ resistor to enable IC. Jump to “OFF” position to disable IC.
4. The evaluation board should now power up with a 5.2V output voltage.
5. Check for the proper output voltage of 5.2V (±1%) at the output terminals V_{OUT} and GND. Measurement can also be done with a multimeter with the positive and negative leads between V_{OUT} and GND.
6. Set the load to 2A through the electronic load. Check for the stable operation of the SW signal on the oscilloscope. Measure the switching frequency.

MEASUREMENT/PERFORMANCE GUIDELINES:

1) When measuring the output voltage ripple, maintain the shortest possible ground lengths on the oscilloscope probe. Long ground leads can erroneously inject high frequency noise into the measured ripple.

2) For efficiency measurements, connect an ammeter in series with the input supply to measure the input current. Connect an electronic load to the output for output current.

EVALUATION BOARD SCHEMATIC

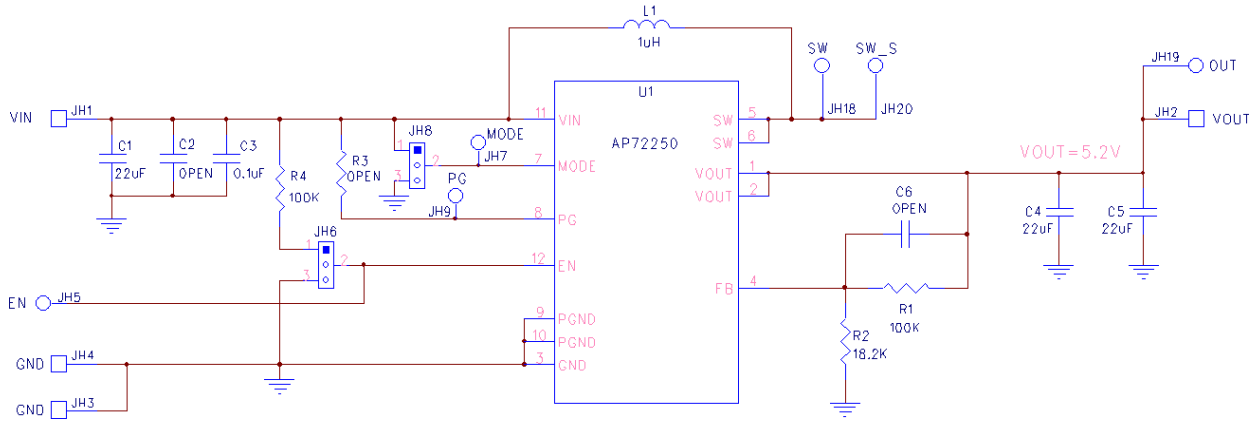

Figure 3. AP72250CJ12-EVM Schematic

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PCB TOP LAYOUT

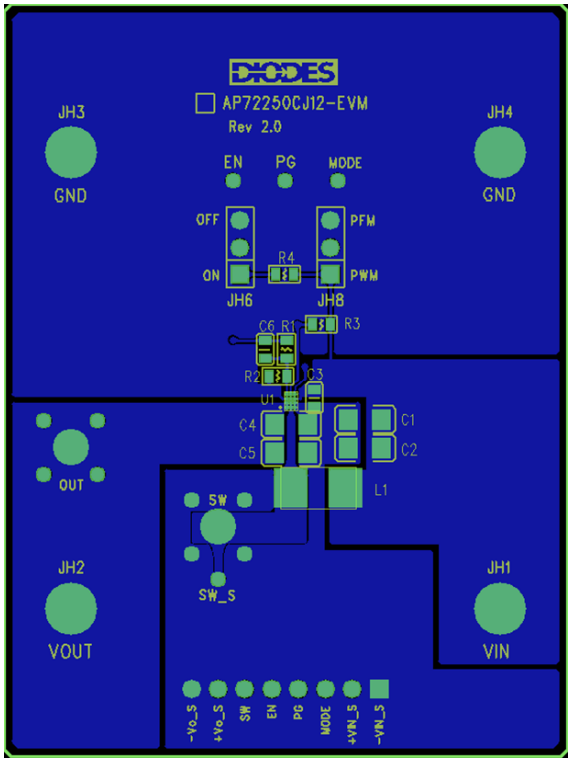

Figure 4. AP72250CJ12-EVM – Top Layer

PCB BOTTOM LAYOUT

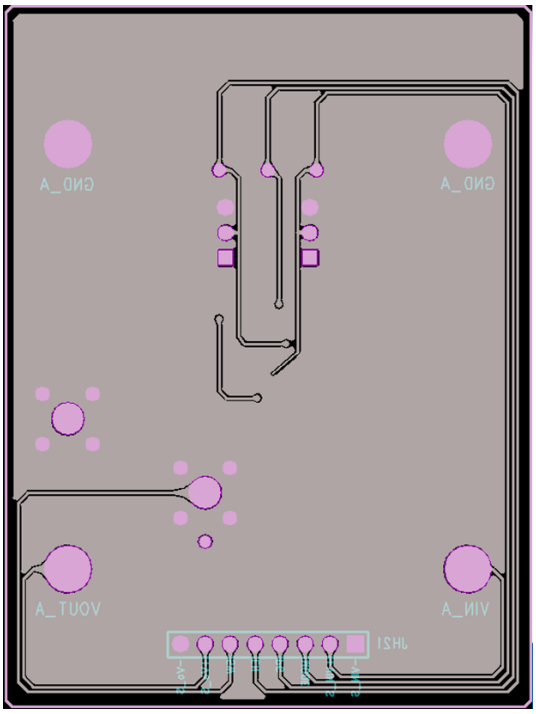

Figure 5. AP72250CJ12-EVM – Bottom Layer

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BILL OF MATERIALS for AP72250CJ12-EVM

Ref	Value	Description	Qty	Size	Vendor Name	Manufacturer PN
C1, C4, C5	22µF	Ceramic Capacitor, 25V, X6S	3	1206	Murata	GRM31CC81E226KE11L
C3	0.1µF	Ceramic Capacitor, 25V, X7R, 10%	1	0603	Kemet	C0603C104K3RACTU
L1	1µH	DCR=15mΩ, Ir=7.2A	1	4.1x4.1x 2.1mm	Wurth Electronics	78438356010
R1, R4	100KΩ	Film Resistor, 1%	2	0603	Yageo	RC0603FR-07100KL
R2	18.2KΩ	Film Resistor, 1%	1	0603	Yageo	RC0603FR-0718K2L
JH6, JH8		PCB Header, 40 POS	2	1X3	3M	2340-611TG
JH1, JH2, JH3, JH4	1598	Terminal Turret Triple 0.094" L (Test Points)	4	Through -Hole	Keystone Electronics	1598-2
U1	AP72250	Synch DC-DC Boost Converter	1	12-balls WLCSP	Diodes Incorporated (Diodes)	AP72250CJ12

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TYPICAL PERFORMANCE CHARACTERISTICS

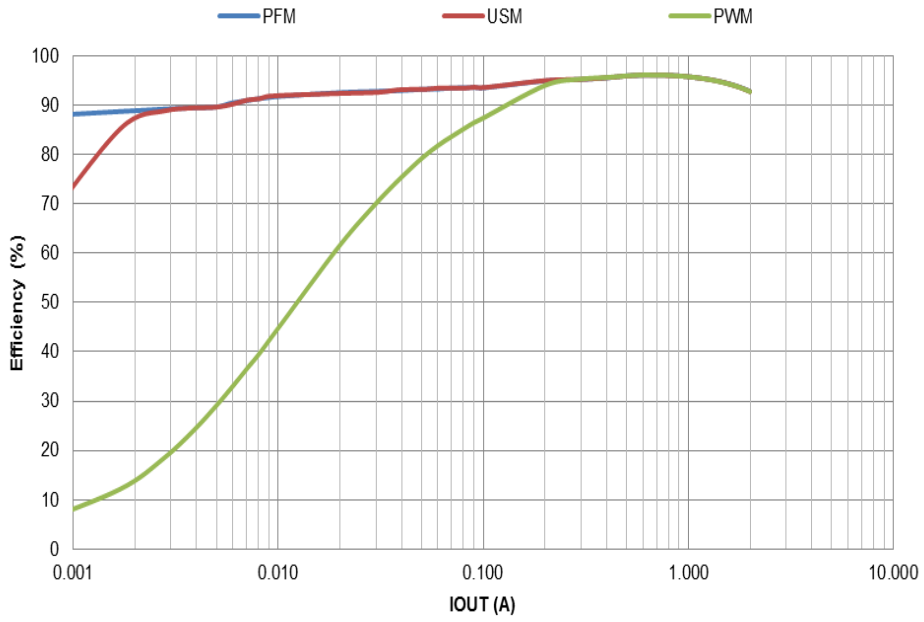

Figure 6. Efficiency vs. Output Current, VIN = 3.6V, VOUT = 5.2, L = 1.0µH

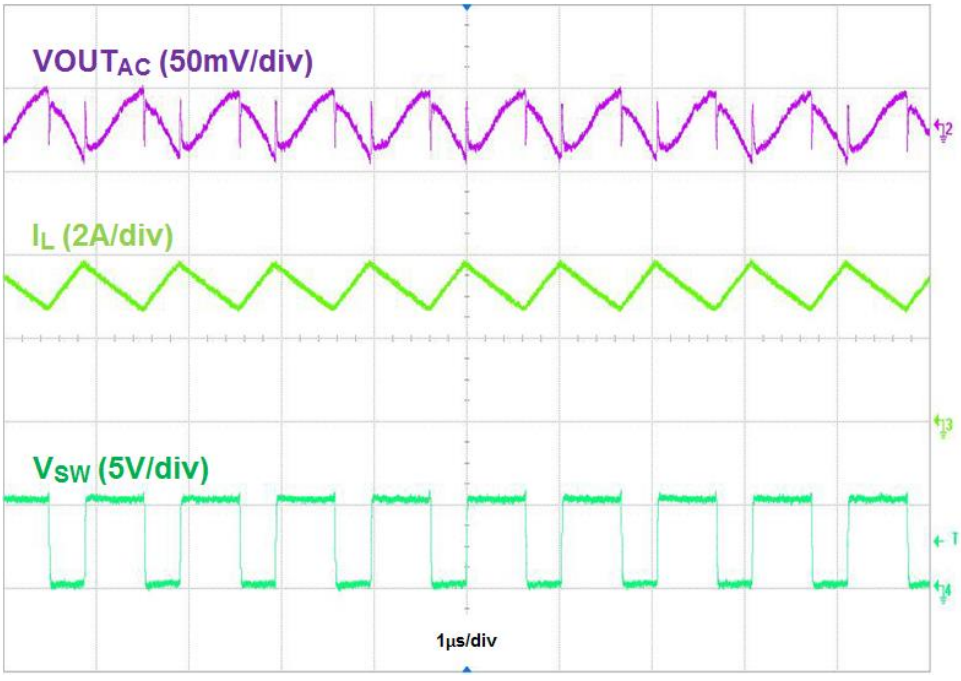

Figure 7. Output Voltage Ripple, VIN = 3.6V, VOUT = 5.2V, IOUT = 2A, , L = 1.0µH

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