

## **DESCRIPTION**

The AP62300/AP62301 is a 3A, synchronous buck converter with a wide input voltage range of 4.2V to 18V. The device fully integrates a 75mΩ high-side power MOSFET and a 45mΩ low-side power MOSFET to provide high-efficiency step-down DC-DC conversion.

The AP62300/AP62301 device is easily used by minimizing the external component count due to its adoption of Constant On-Time (COT) control to achieve fast transient response, easy loop stabilization, and low output voltage ripple.

The AP62300/AP62301 design is optimized for Electromagnetic Interference (EMI) reduction. The device has a proprietary gate driver scheme to resist switching node ringing without sacrificing MOSFET turn-on and turn-off times, which reduces high-frequency radiated EMI noise caused by MOSFET switching.

AP62300/AP62301 is available in a space-saving SOT563 package.

## **FEATURES**

- $V_{IN}$  Range: 4.2V -18V
- Output Voltage range: 0.8V to 7V
- 3A Continuous Output Current
- $0.8V \pm 1\%$  Reference Voltage ( $T_A = +25^\circ C$ )
- 155μA Low Quiescent Current
- 750kHz Switching Frequency
- Up to 83% Efficiency at 5mA Light Load
- Proprietary Gate Driver Design for Best EMI Reduction
- Protection Circuitry
  - Undervoltage Lockout (UVLO)
  - Cycle-by-Cycle Valley Current Limit
  - Thermal Shutdown
- Totally Lead-Free & Fully RoHS Compliant
- Halogen and Antimony Free. "Green" Device

## **APPLICATIONS**

- Flat Screen TV Sets and Monitors
- Set Top Boxes
- Consumer Electronics
- Network Systems
- General Purpose Point of Load

### TYPICAL APPLICATIONS CIRCUIT

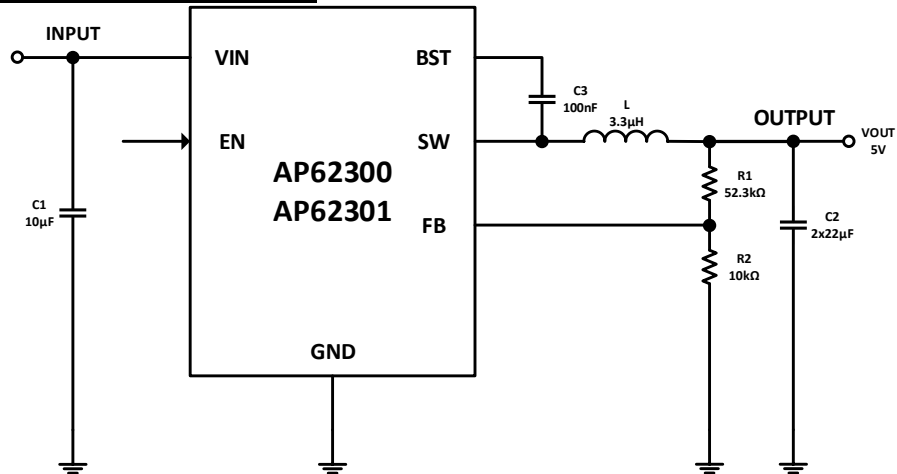


Figure 1. Typical Application Circuit

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
VIN	Supply Pin Voltage	-0.3 to +20.0 (DC)	V
		-0.3 to 22.0 (400ms)	
V <sub>SW</sub>	Switch Pin Voltage	-1.0 to VIN + 0.3 (DC)	V
		-2.5 to VIN + 2.0 (20ns)	
V <sub>BST</sub>	Bootstrap Pin Voltage	V <sub>SW</sub> - 0.3 to V <sub>SW</sub> + 6.0	V
V <sub>EN</sub>	Enable/UVLO Pin Voltage	-0.3 to +6.0	V
V <sub>FB</sub>	Feedback Pin Voltage	-0.3 to +6.0	V
T <sub>ST</sub>	Storage Temperature	-65 to +150	°C
T <sub>J</sub>	Junction Temperature	+150	°C
T <sub>L</sub>	Lead Temperature	+260	°C
<b>ESD Susceptibility</b>			
HBM	Human Body Mode	2000	V
CDM	Charge Device Model	500	V

### RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Rating	Unit
V <sub>IN</sub>	Supply Voltage	4.2 to 18	V
V <sub>OUT</sub>	Output Voltage Range	0.8 to 7	V
T <sub>A</sub>	Operating Ambient Temperature	-40 to +85	°C
T <sub>J</sub>	Operating Junction Temperature	-40 to +125	°C

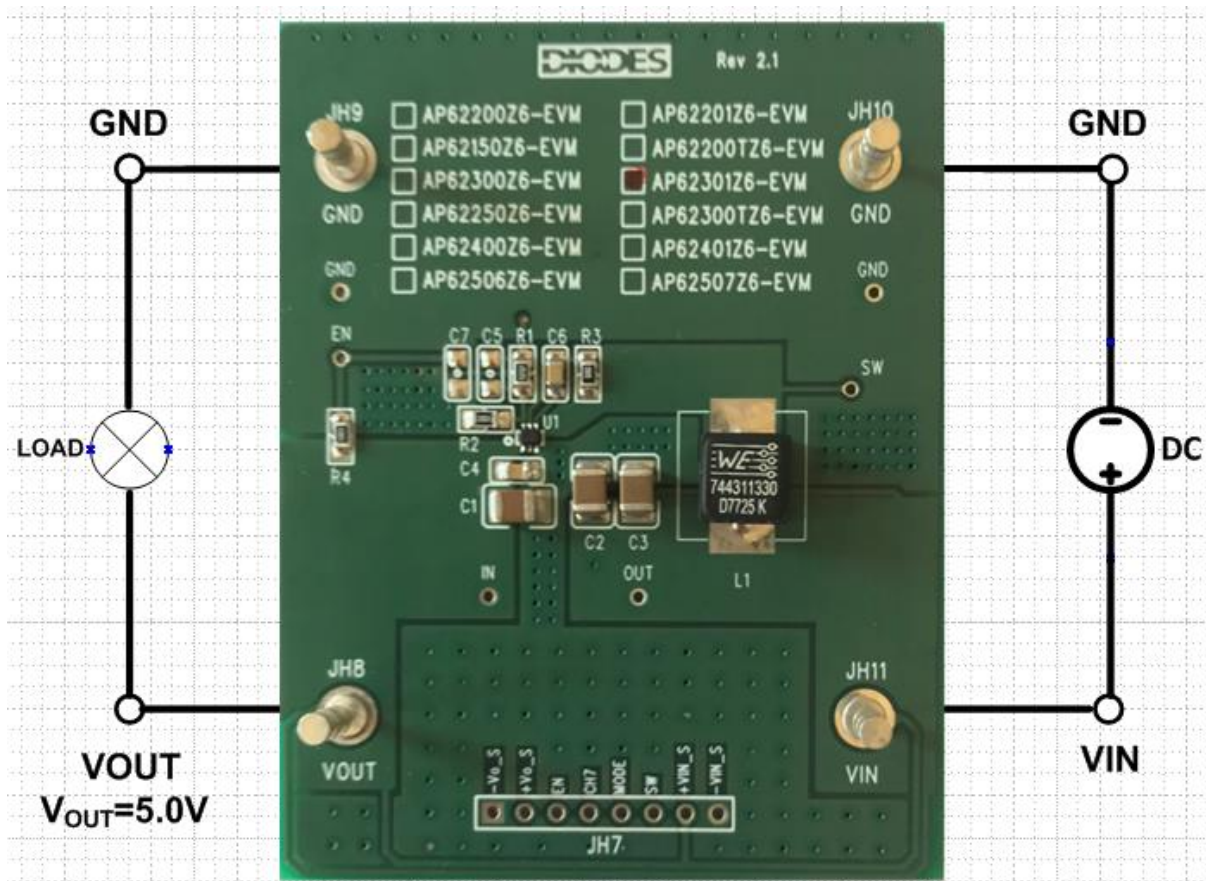
### SETTING OUTPUT VOLTAGE:

Table 1 for AP62300 and AP62301 shows a list of recommended component selections for common output voltages.

V <sub>OUT</sub>	R1	R2	L1
1.2V	4.99KΩ	10KΩ	1.5μH
1.5V	8.66KΩ	10KΩ	1.5μH
1.8V	12.4KΩ	10KΩ	2.2μH
2.5V	21.5KΩ	10KΩ	2.2μH
3.3V	31.6KΩ	10KΩ	3.3μH
5.0V	52.3KΩ	10KΩ	3.3μH

**Table 1. Common Output Voltages (AP62300/301)**

### EVALUATION BOARD



**Figure 2. AP62301Z6-EVM**

**QUICK START GUIDE**

The AP62300/301Z6-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP62300/301, follow the procedure below:

1. Connect a power supply to the input terminals  $V_{IN}$  and GND. Set  $V_{IN}$  to 12V.
2. Connect the positive terminal of the electronic load to  $V_{OUT}$  and negative terminal to GND.
3. EN has a positive voltage through a 100K pull-up to  $V_{IN}$ . No supply input is required for EN.
4. The evaluation board should now power up with a 5.0V output voltage.
5. Check for the proper output voltage of 5.0V ( $\pm 1\%$ ) 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 3A 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**

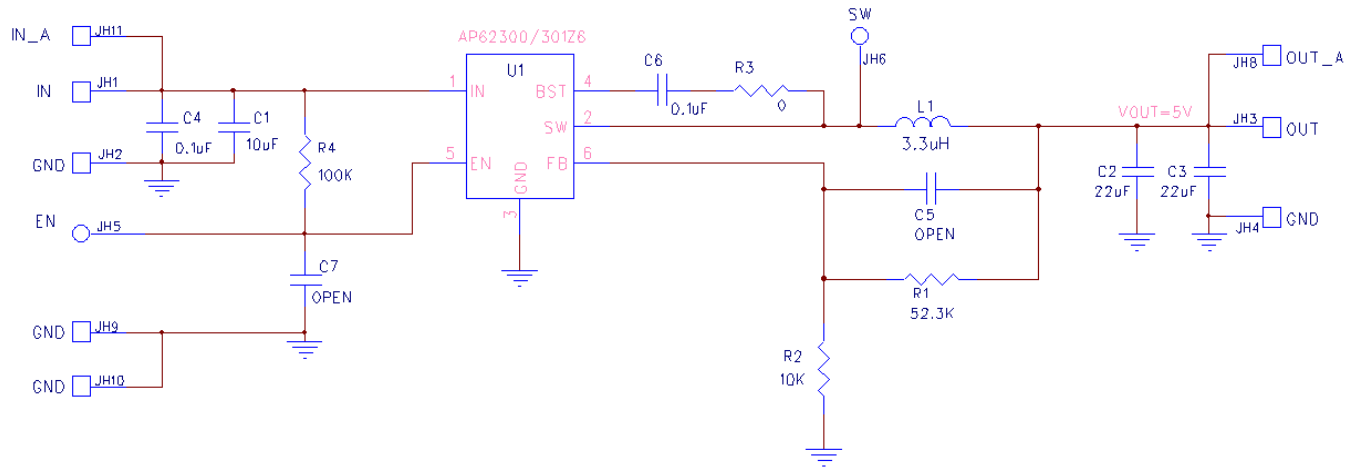


Figure 3. AP62300/301Z6-EVM Schematic

**PCB TOP LAYOUT**

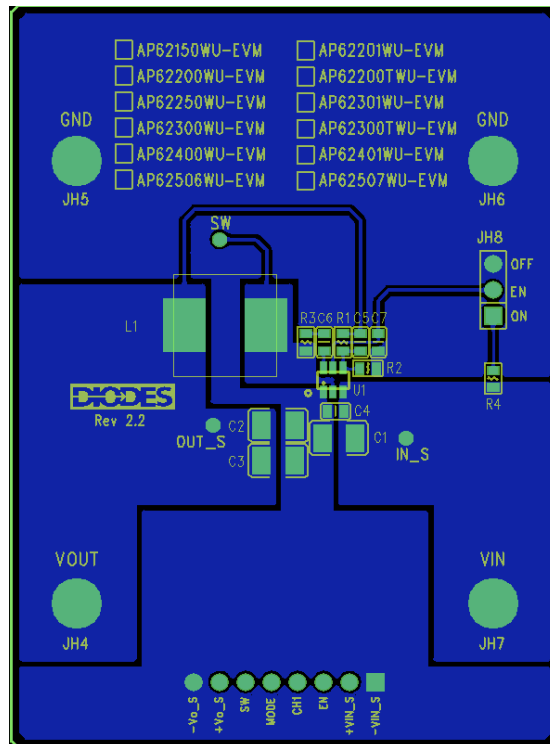


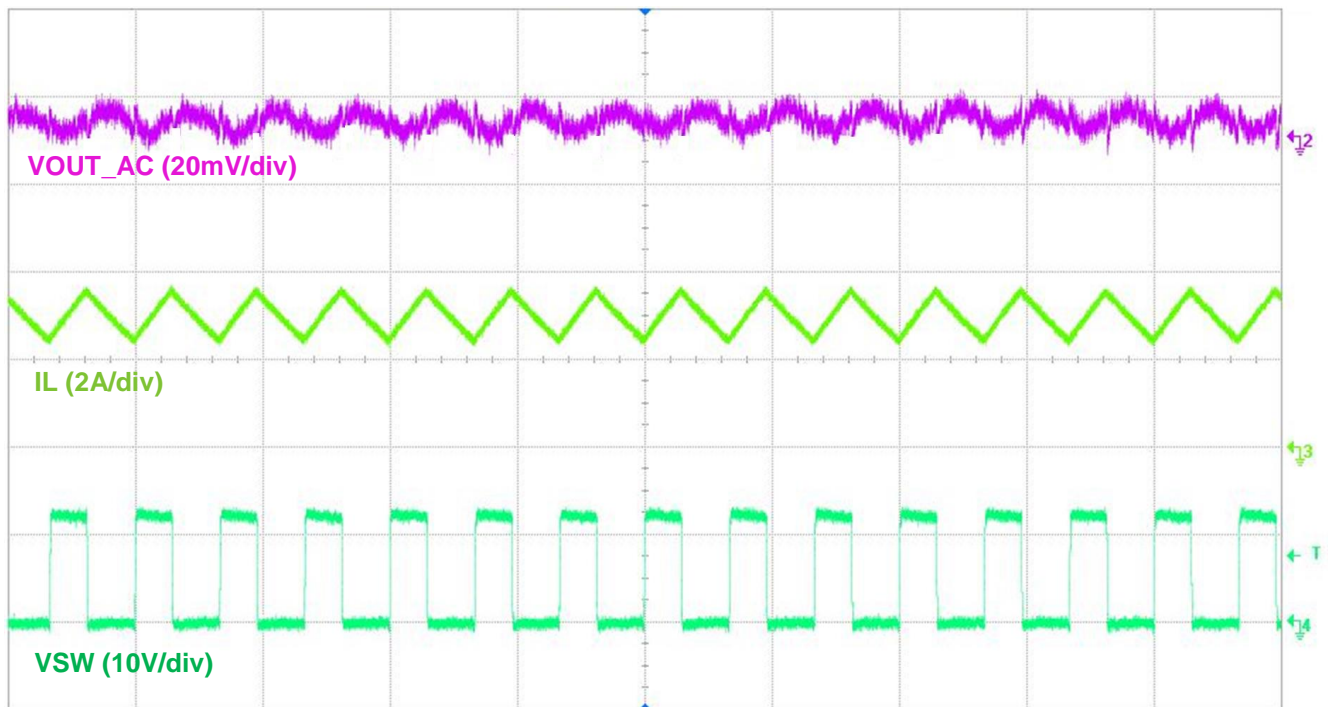
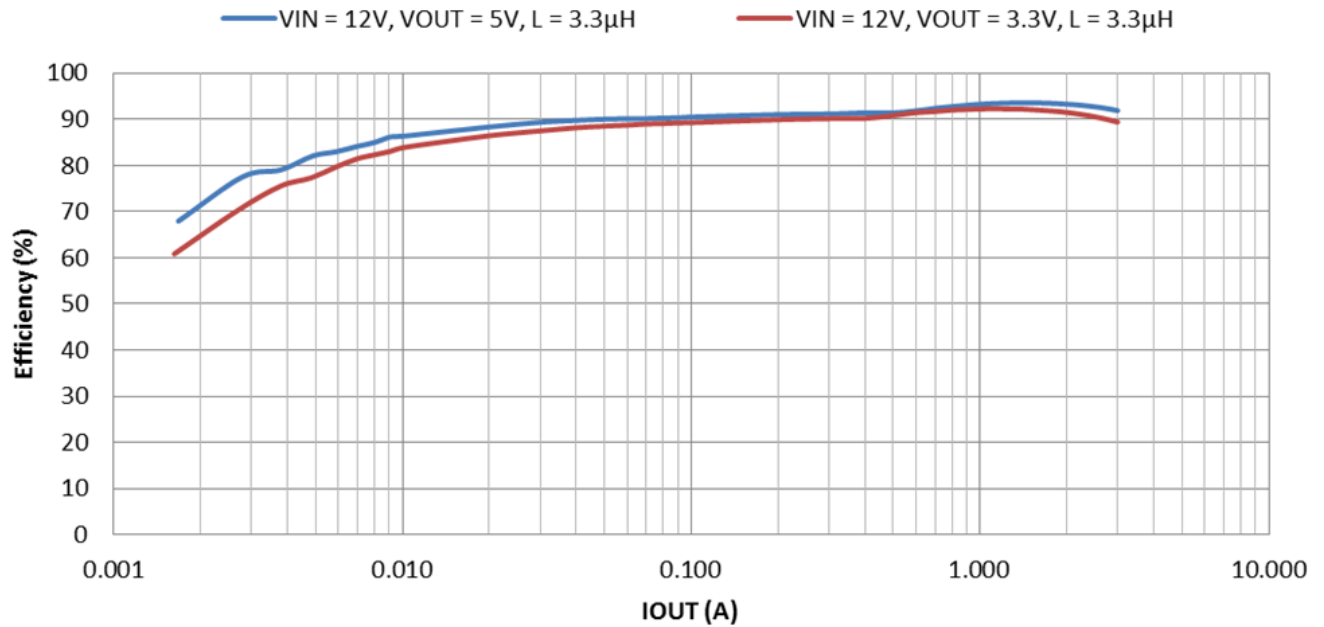
Figure 4. AP62300/301Z6-EVM – Top Layer



### BILL OF MATERIALS for AP62300/301Z6-EVM for V<sub>OUT</sub>=5V

Ref	Value	Description	Qty	Size	Vendor Name	Manufacturer PN
C1	10 $\mu$ F	Ceramic Capacitor, 25V, X7R, 10%	1	1210	KEMET	C1210C106K3RACTU
C2, C3	22 $\mu$ F	Ceramic Capacitor, 25V, X7R, 10%	2	1210	KEMET	C1210C226K3RAC7800
C4, C6	0.1 $\mu$ F	Ceramic Capacitor, 50V, X7R, 10%	2	0603	KEMET	C0603C104K5RACTU
L1	3.3 $\mu$ H	DCR=17.2m $\Omega$ , Ir=6.5A	1	6.9x6.9x4mm	Würth Electronics	744311330
R1	52.3K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF5232V
R2	10K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF1002V
R3	0 $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3GEY0R00V
R4	100K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF1003V
JH4, JH5, JH6, JH7	1598	Terminal Turret Triple 0.094" L (Test Points)	4	Through-Hole	Keystone Circuit	1598-2
JH8		PCB Header, 40 POS	1	1X3	3M	2340-6111TG
U1	AP62301	Sync Buck DC/DC converter	1	TSOT26	Diodes Inc	AP62301Z6-7

**TYPICAL PERFORMANCE CHARACTERISTICS**





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