

### Description

The AP65450 is an adaptive on-time mode synchronous buck converter providing high efficiency, excellent transient response and high DC output accuracy for low-voltage regulation in digital TV and monitor.

The constant-on-time control scheme handles wide input/output voltage ratios and provides low external component count. The internal proprietary circuit enables the device to adopt both low equivalent series resistance (ESR) output capacitors, such as SP-CAP or POSCAP and ultra-low ESR ceramic capacitors.

The adaptive on-time control supports seamless transition between continuous conduction mode (CCM) at higher load conditions and discontinuous conduction mode (DCM) at lighter load conditions.

DCM allows AP65450 maintain high efficiency at light load conditions. The AP65450 also features programmable soft-start, UVLO, OTP and OCP to protect the circuit.

This IC is available in SO-8EP package.

- Gaming Consoles
- Flat Screen TV Sets and Monitors
- Set Top Boxes
- Distributed Power Systems
- Green Electronics
- Home Audio
- Consumer Electronics
- Network Systems
- FPGA, DSP and ASIC Supplies

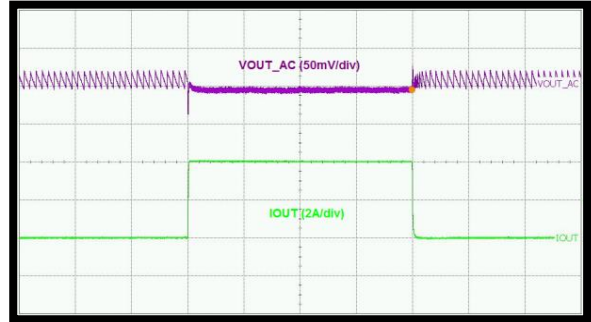
### Performance Spec of AP65450SP-EVM (Rev2)

Parameter	Conditions	Performance Value
Input voltage	Range 4.5V to 18V	12V
Output Current		4A
Output Voltage		1.05V
Output Voltage Ripple		20mV <sub>P-P</sub>
Transient Response	Peak-to-peak Deviation Load step from 0A to 4A	30mV <sub>P-P</sub>
Switching Frequency		650kHz
Efficiency		90% @V <sub>OUT</sub> =5V

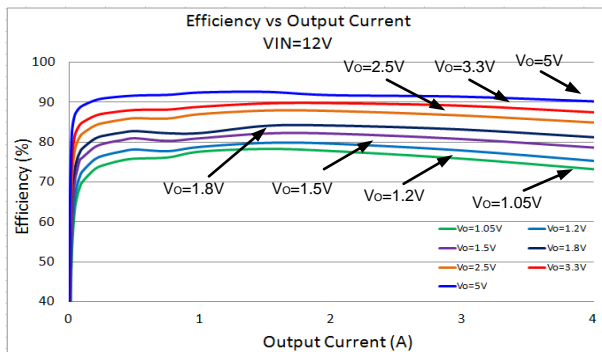
**Figure 1. Evaluation Board (Rev2)**



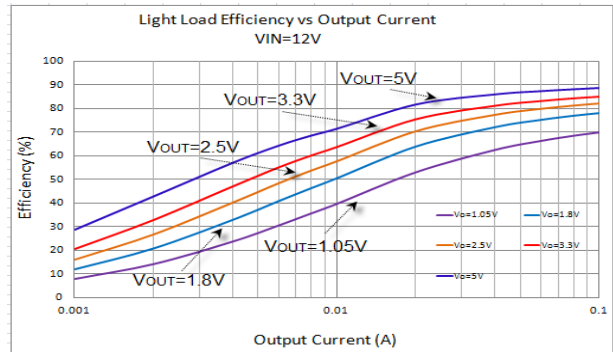
**Figure 2. Load Transient 0 to 4A**



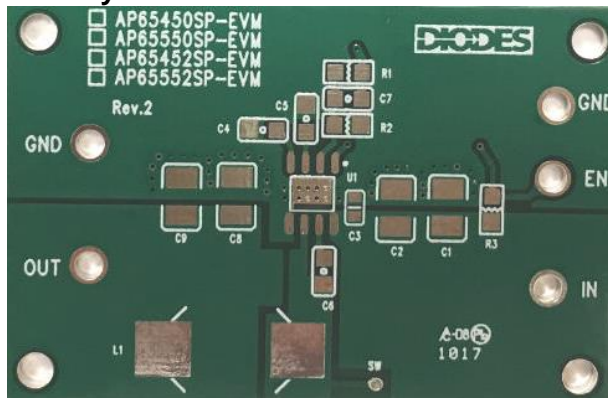
**Figure 3. Efficiency**



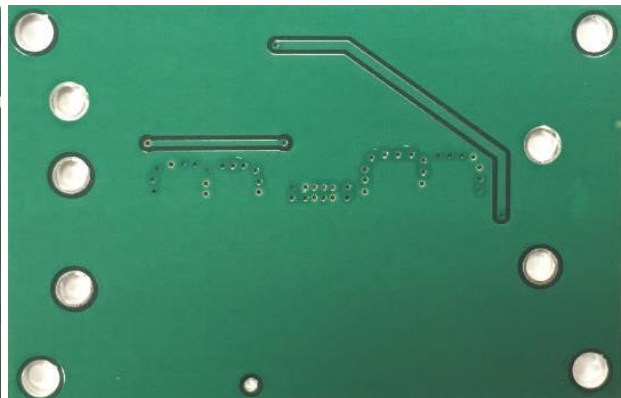
**Figure 4. Light Load Efficiency**



**PCB Layouts**



**Top Layer**



**Bottom Layer**

## Quick Start Guide

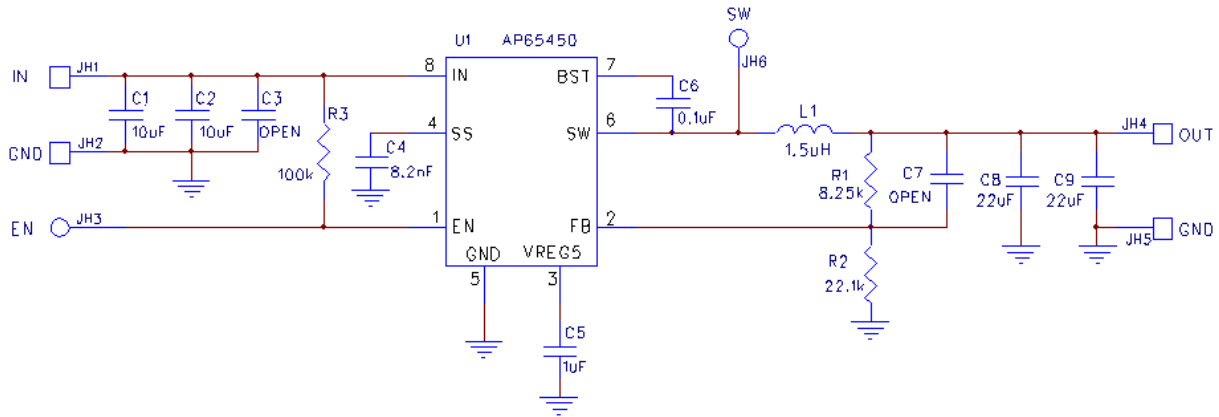
The AP65450SP-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP65450, follow the procedure below:

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. Note: To use the EN function drive EN above 1.9V to start the converter and below 0.6V to stop the converter.
4. The evaluation board should now power up with a 1.05V output voltage.
5. Check for the proper output voltage of 1.05V ( $\pm 1\%$ ) 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 4A through the electronic load. Check for the stable operation of the SW signal on the oscilloscope. Measure the switching frequency. A test point is conveniently located at the head of the inductor.

## 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



### BILL OF MATERIALS

REF	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
C1, C2	10µF	Ceramic Cap, 25V, X7R	1210	Würth Electronics	885012209028
C4	8.2nF	Ceramic Capacitor, 16V, X7R	0805	AVX	0805YC822KAT2A
C5	1µF	Ceramic Cap, 16V, X7R	0805	Würth Electronics	885012207051
C6	0.1µF	Ceramic Capacitor, 50V, X7R	0805	Würth Electronics	885012207098
C8, C9	22µF	Ceramic Cap, 25V, X5R	1210	AVX	12103D226KAT2A
L1	1.5µH	Inductor, SMD 6.9mmWx6.9mmLx4mmH	SMD	Würth Electronics	744311150
R1	8.25kΩ	Resistor, 1%	0805	Panasonic	ERJ-6ENF8251V
R2	22.1kΩ	Resistor, 1%	0805	Panasonic	ERJ-6ENF2212V
R3	100kΩ	Resistor, 1%	0805	Panasonic	ERJ-6ENF1003V
T1	1598	Terminal Turret Triple 0.094" L (Test Points)	Through-Hole	Keystone Circuit	1598-2
U1		DC/DC Converter	SO-8EP	Diodes Inc	AP65450SP

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