

Description

The AP65251 is an adaptive constant on-time mode synchronous buck converter providing high efficiency, excellent transient response and high DC output accuracy for low-voltage regulation in digital TVs, set-top-boxes, and network systems.

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 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 AP65251 to maintain high efficiency at light load conditions. The AP65251 also features UVLO, OTP, and OCP to protect the circuit.

This IC is available in TSOT23-6 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 AP65251WU-EVM

Parameter	Conditions	Performance Value
Input voltage	Range 4.5V to 16V	12V
Output Current		2A
Output Voltage		1.2V
Output Voltage Ripple		15mV _{P-P}
Transient Response	Peak-to-peak Deviation Load step from 0A to 2A	30mV _{P-P}
Switching Frequency		500kHz
Efficiency		91% @V _{OUT} =5V; I _{OUT} =2A

Figure 1. Evaluation Board

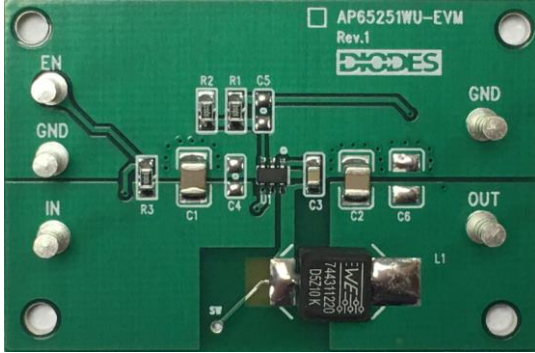


Figure 2. Load Transient 0 to 2A

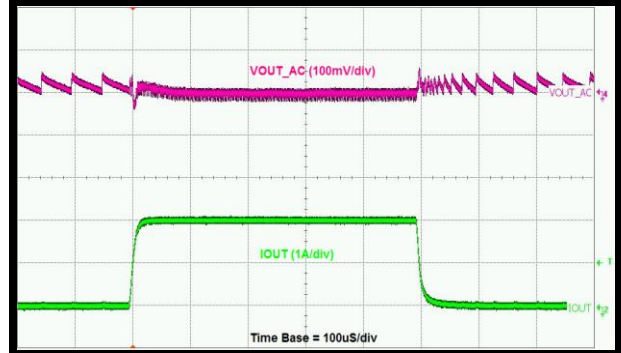


Figure 3. Efficiency

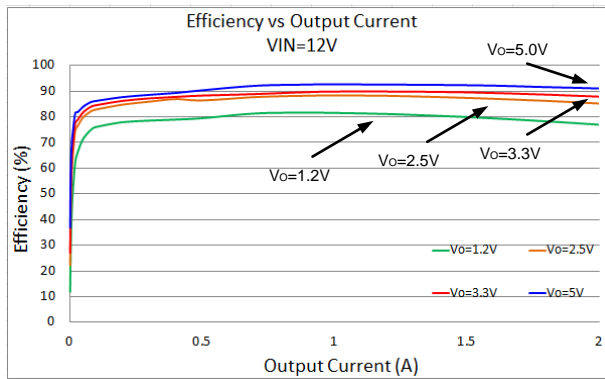
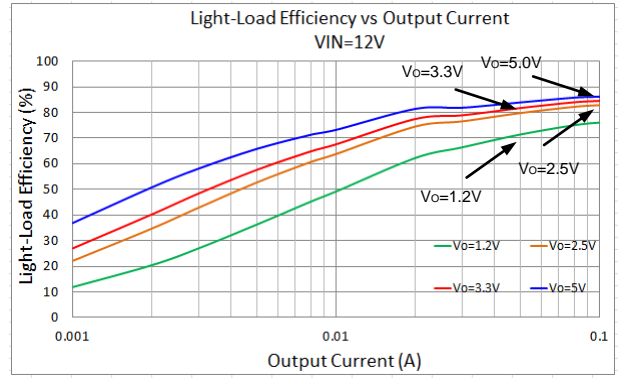
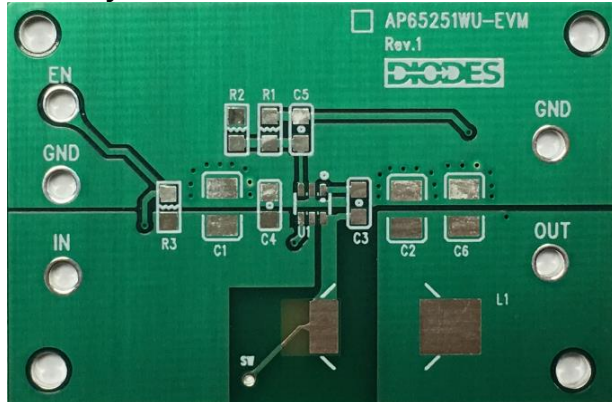


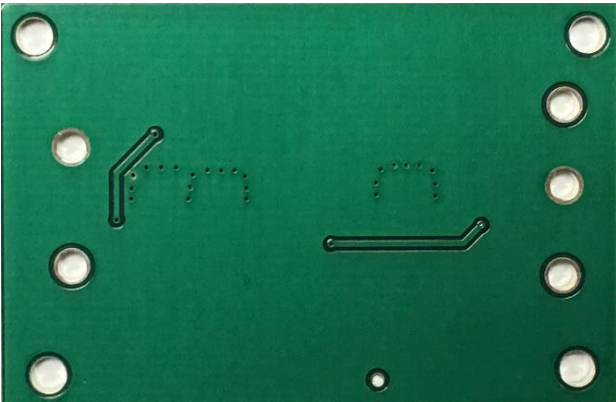
Figure 4. Light Load Efficiency



PCB Layouts



Top Layer



Bottom Layer

Quick Start Guide

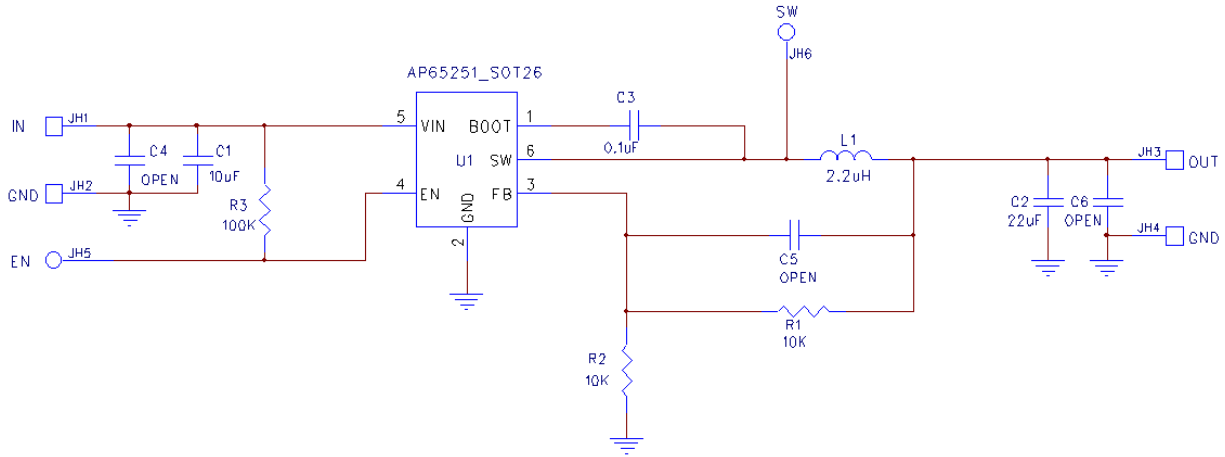
The AP65251WU-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP65251, follow the procedure below:

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 is a positive voltage that can be safely connected either through a 100K Ω pull-up to V_{IN} or directly to maximum V_{IN} for automatic start-up. No supply input is required for EN.
Note: To use the EN function drive EN above 1.5V to start the converter and below 0.4V to stop the converter.
4. The evaluation board should now power up with a 1.2V output voltage.
5. Check for the proper output voltage of 1.2V ($\pm 1\%$) 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 2A 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	Qty	Size	Manufacturer P/N
C1	10µF	Ceramic Capacitor, 25V, X5R	1210	Murata	GRM32DR61E106KA12L
C2	22µF	Ceramic Capacitor, 25V, X5R	1210	AVX	12103D226KAT2A
C3	0.1µF	Ceramic Capacitor, 50V, X7R	0805	AVX	08055C104KAT2A
L1	2.2µH	Inductor, 9A, 6.9mmWx6.9mmLx4mmH	SMD	Würth	744311220
R1, R2	10K	Resistor, 1%	0805	Panasonic	ERJ-6ENF1002V
R3	100K	Resistor, 1%	0805	Panasonic	ERJ-6ENF1003V
T1	1598	Terminal Turret Triple 0.094" L (Test Points)		Keystone circuit	1598-2
U1	AP65251	DC/DC converter	SOT23-6	Diodes, Inc	AP65251WU

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