AP65550FN-EVM

650kHz 18V 5A Synchronous DC/DC Buck Converter

Description

The AP65550 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 AP65550 maintain high efficiency at light load conditions. The AP65550 also features programmable soft-start, UVLO, OTP and OCP to protect the circuit.

This IC is available in DFN3030-10 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 AP65550FN-EVM

Parameter	Conditions	Performance Value
Input voltage	Range 4.5V to 18V	12V
Output Current		5A
Output Voltage		1.05V
Output Voltage Ripple		20mV$_{P-P}$
Transient Response	Peak-to-peak Deviation Load step from 0A to 5A	30mV$_{P-P}$
Switching Frequency		650kHz
Efficiency		90% @VOUT=5V

Figure 1. Evaluation Board

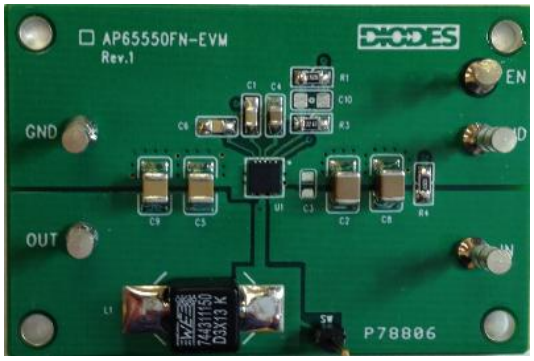


Figure 2. Load Transient 0 to 5A

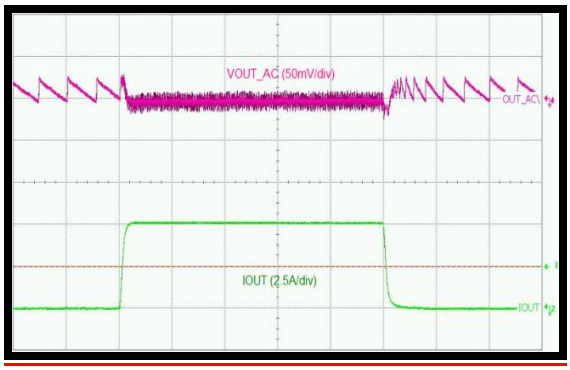


Figure 3. Efficiency

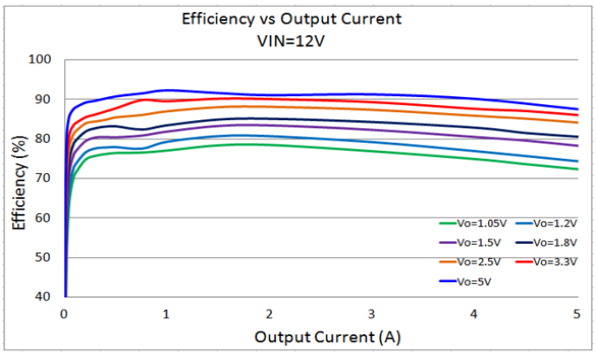
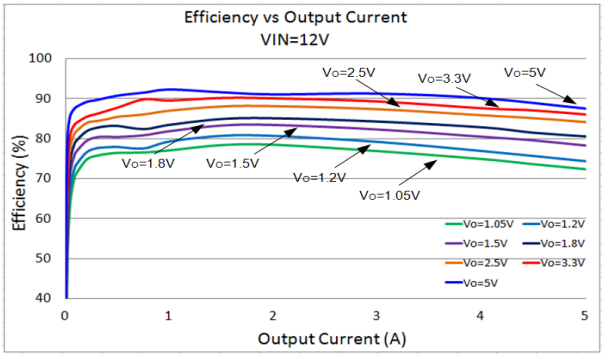
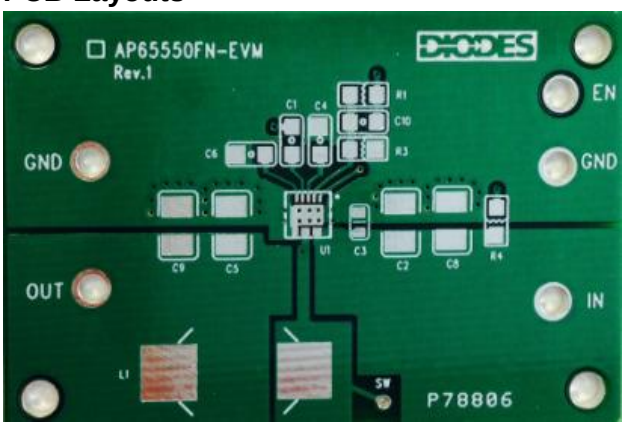


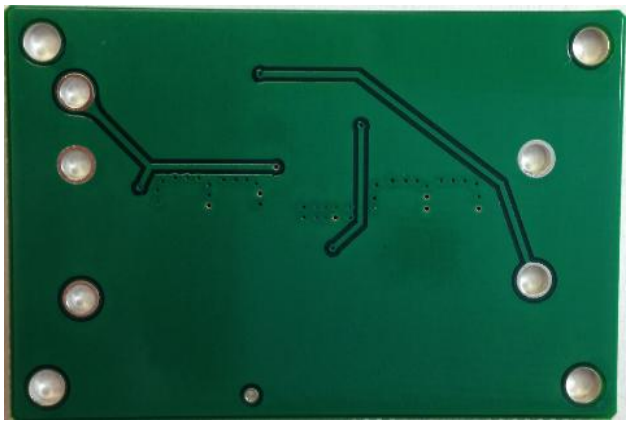
Figure 4. Light Load Efficiency



PCB Layouts



Top Layer



Bottom Layer

Quick Start Guide

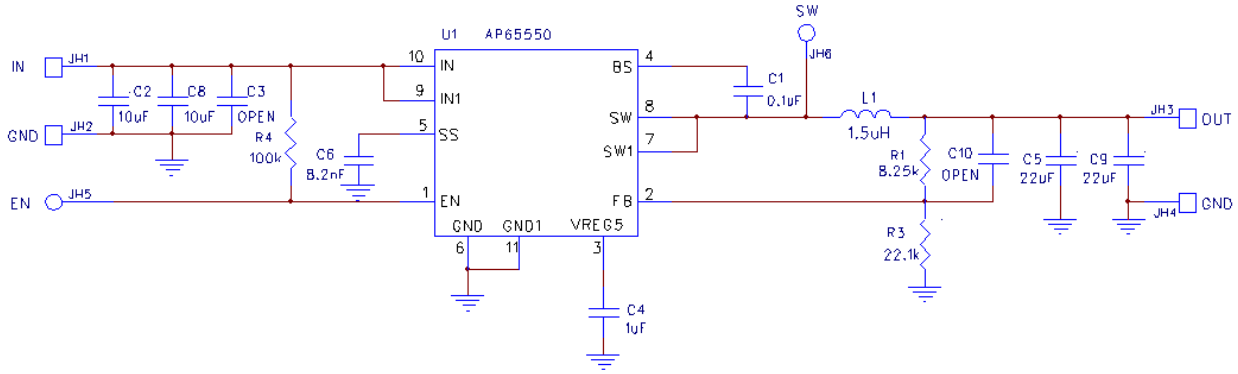
The AP65550FN-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP65550, follow the procedure below:

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 (±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 5A 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	0.1µF	Ceramic Capacitor, 25V, X7R	0805	Samsung	CL21B104KACNNNC
C2, C8	10µF	Ceramic Cap, 25V, X5R	1210	Murata	GRM32DR61E106KA12L
C4	1µF	Ceramic Cap, 16V, X7R	0805	Kemet	C0805C105K4RACTU
C5, C9	22µF	Ceramic Cap, 25V, X5R	1210	AVX	12103D226KAT2A
C6	8.2nF	Ceramic Capacitor, 16V, X7R	0805	AVX	0805YC822KAT2A
L1	1.5µH	Inductor, 10A, 12mmWx12mmLx6mmH	SMD	Wurth	744311150
R1	8.25kΩ	Resistor, 1%	0805	Panasonic	ERJ-6ENF8251V
R3	22.1kΩ	Resistor, 1%	0805	Panasonic	ERJ-6ENF2212V
R4	100kΩ	Resistor, 1%	0805	Panasonic	ERJ-6ENF1003V
U1		DC/DC Converter	DFN3030-10	Diodes Inc	AP65550FN

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