

Description

The AP65355 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 AP65355 to maintain high efficiency at light load conditions. The AP65355 also features power good, programmable soft-start, UVLO, OTP, OVP and OCP to protect the circuit.

This IC is available in U-DFN3x3-10 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 AP65355FN-EVM (Rev1)

| Parameter | Conditions | Performance Value |
|---------------------|---|--------------------------------|
| Input Voltage | Range 4.5V to 18V | 12V |
| Output Current | | 3A |
| Output Voltage | | 1.05V |
| Transient Response | Peak-to-peak Deviation Load step from 0A to 3A | 40mV _{P-P} |
| Switching Frequency | | 650kHz |
| Efficiency | | 87% @V _{OUT} =3.3V |

Figure 1. Evaluation Board (Rev1)



Figure 2. Load Transient 0 to 3A

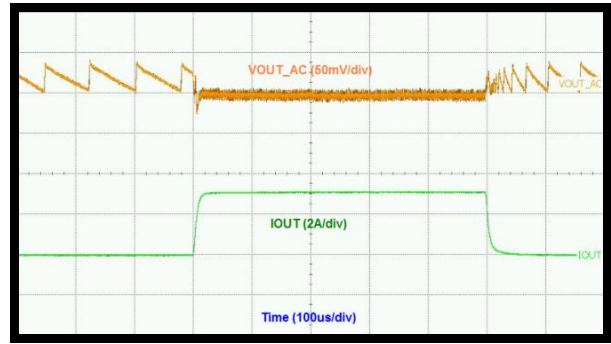


Figure 3. Efficiency

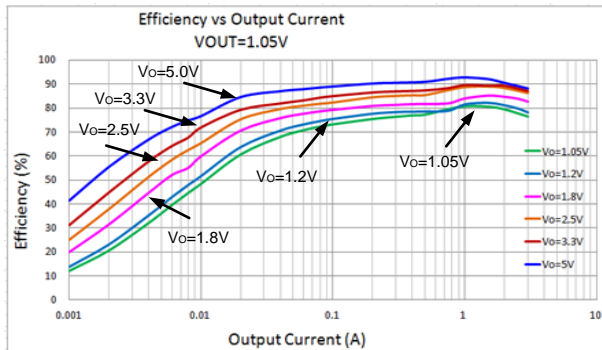
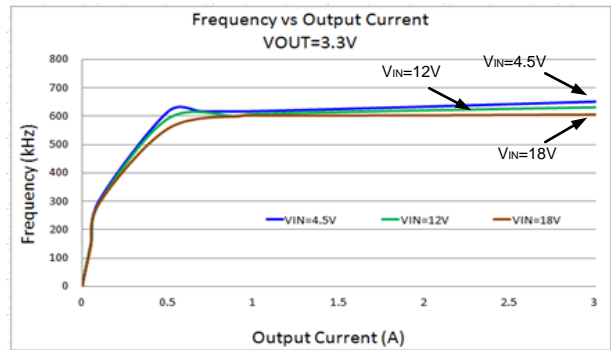
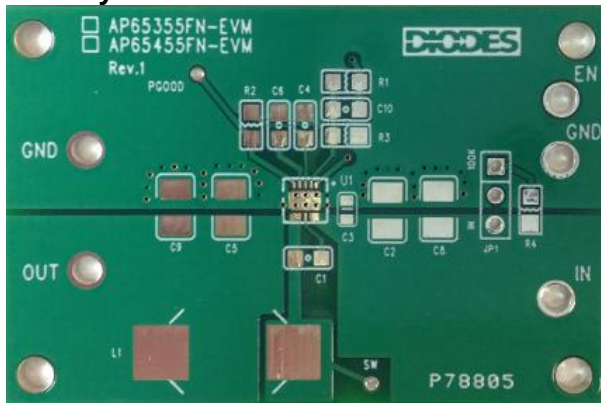


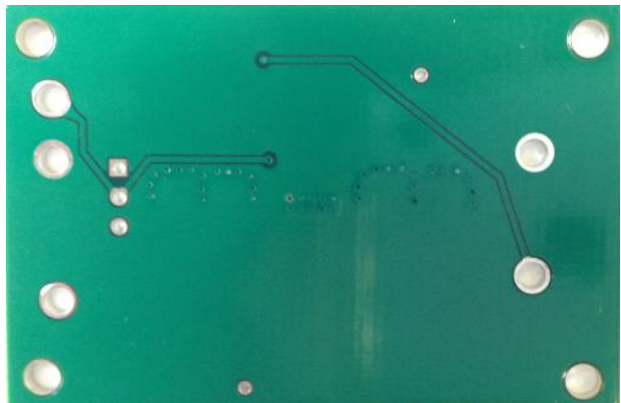
Figure 4. Frequency vs Output Current



PCB Layouts



Top Layer



Bottom Layer

Quick Start Guide

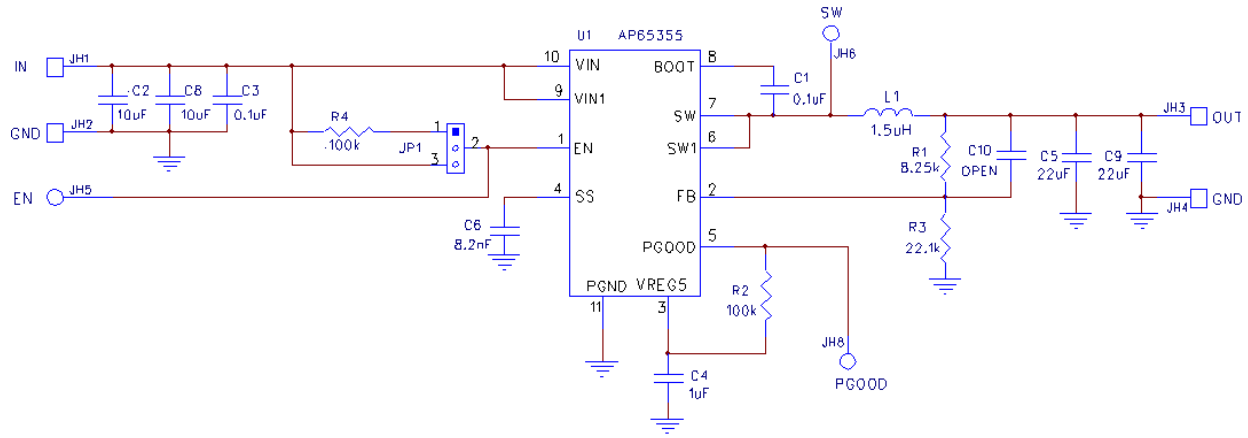
The AP65355FN-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP65355, follow the procedure below:

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. For JP1 header option, 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} (up to 18V) for automatic start-up. No supply input is required for EN.
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 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



BILL OF MATERIALS

| Ref | Value | Description | Qty | Size | Vendor Name | Manufacturer PN |
|--------|-------|---|-----|--------------|------------------|--------------------|
| C1 | 0.1uF | Ceramic Capacitor, 25V, X7R, 10% | 1 | SM0805 | AVX | 08055C104KAT2A |
| C2, C8 | 10uF | Ceramic Capacitor, 25V, X5R, 10% | 2 | 1210 | Murata | GRM32DR61E106KA12L |
| C4 | 1uF | Ceramic Capacitor, 16V, X7R, 10% | 1 | 0805 | Kemet | C0805C105K4RACTU |
| C5, C9 | 22uF | Ceramic Capacitor, 25V, X5R, 10% | 2 | 1210 | AVX | 12103D226KAT2A |
| C6 | 8.2nF | Ceramic Capacitor, 16V, X7R, 10% | 1 | 0805 | AVX | 0805YC822KAT2A |
| L1 | 1.5uH | Inductor, 10A, 12mmWx12mmLx6mmH | 1 | SMD | Würth | 744311150 |
| R1 | 8.25K | Resistor, 1% | 1 | 0805 | Panasonic | ERJ-6ENF8251V |
| R3 | 22.1K | Resistor, 1% | 1 | 0805 | Panasonic | ERJ-6ENF2212V |
| R4 | 100K | Resistor, 1% | 1 | 0805 | Panasonic | ERJ-6ENF1003V |
| T1 | 1598 | Terminal Turret Triple 0.094" L (Test Points) | 5 | | Keystone circuit | 1598-2 |
| JP1 | 1x3 | PCB Header, Straight 40 POS, 1x3 | 1 | Through-Hole | EM | 2340-6111TG |
| U1 | | DC/DC converter | 1 | DFN3030-10 | Diodes Inc | AP65355FN |

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