# AP65353SP-EVM

**650kHz, 18V, 3A, COT, DCM/CCM Synchronous DC/DC Buck Converter in SO-8EP**

## Description

The AP65353 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 AP65353 to maintain high efficiency at light load conditions. The AP65353 also features programmable soft-start, UVLO, OTP, OVP 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 AP65353SP-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 |

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## Figure 1. Evaluation Board (Rev1)



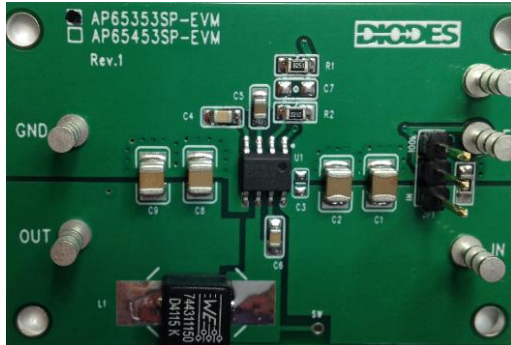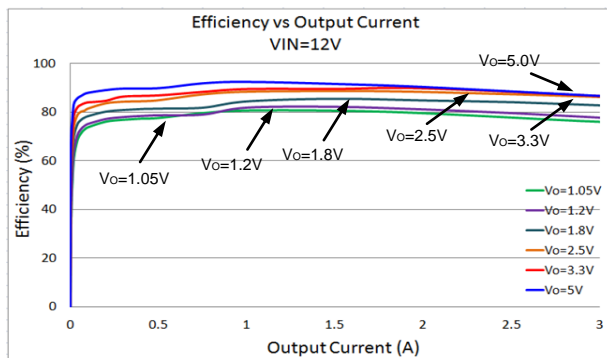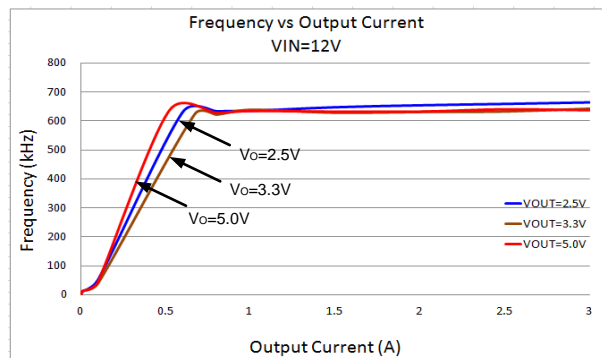## Figure 2. Load Transient 0 to 3A
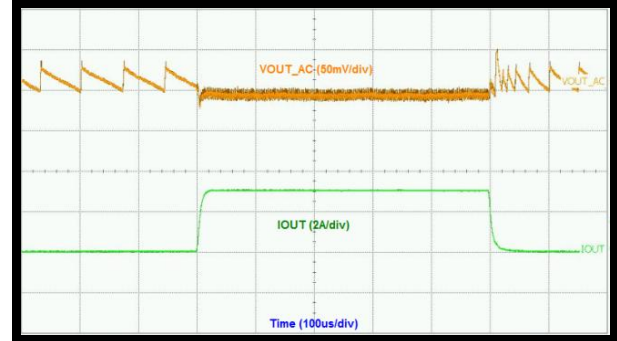


## Figure 3. Efficiency



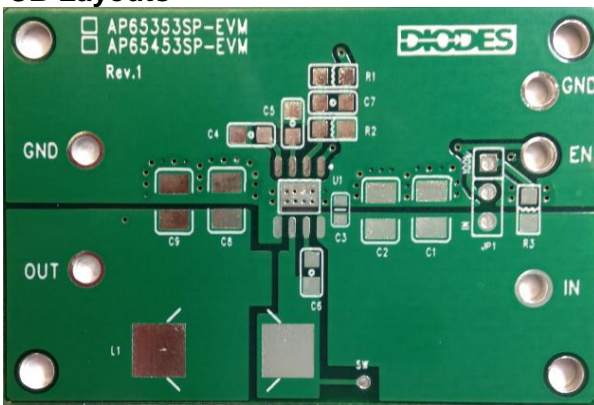## Figure 4. Frequency vs Output Current



## PCB Layouts



**Top Layer**



**Bottom Layer**

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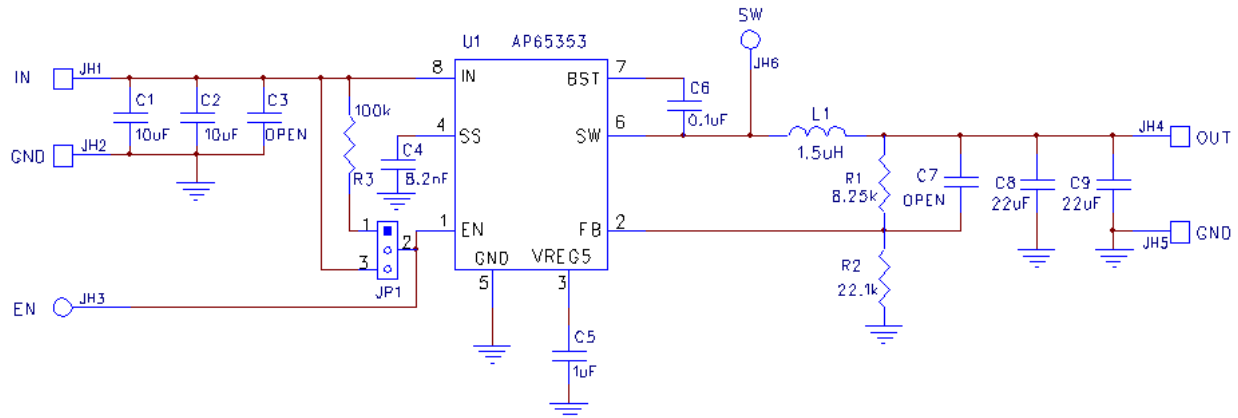**www.diodes.com**

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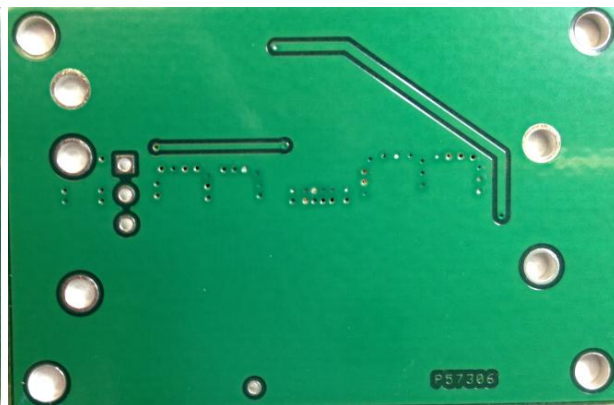
**Quick Start Guide**

The AP65353SP-EVM has a simple layout and allows access to the appropriate signals through test points.  To evaluate the performance of the AP65353, 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 100KΩ 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 (±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.

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## EVALUATION BOARD SCHEMATIC



## BILL OF MATERIALS

| Ref | Value | Description | Qty | Size | Vendor Name | Manufacturer PN |
|-----|-------|-------------|-----|------|-------------|-----------------|
| C6 | 0.1uF | Ceramic Capacitor, 25V, X7R, 10% | 1 | 0805 | AVX | 08055C104KAT2A |
| C1, C2 | 10uF | Ceramic Capacitor, 25V, X5R, 10% | 2 | 1210 | Murata | GRM32DR61E106KA12L |
| C5 | 1uF | Ceramic Capacitor, 16V, X7R, 10% | 1 | 0805 | Kemet | C0805C105K4RACTU |
| C8, C9 | 22uF | Ceramic Capacitor, 25V, X5R, 10% | 2 | 1210 | AVX | 12103D226KAT2A |
| C4 | 8.2nF | Ceramic Capacitor, 16V, X7R, 10% | 1 | 0805 | AVX | 0805YC822KAT2A |
| L1 | 1.5µH | Inductor, SMD, 6.9mmWx6.9mmLx4mmH | 1 | SMD | Wurth | 744311150 |
| R1 | 8.25K | Resistor, 1% | 1 | 0805 | Panasonic | ERJ-6ENF8251V |
| R2 | 22.1K | Resistor, 1% | 1 | 0805 | Panasonic | ERJ-6ENF2212V |
| R3 | 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 | SO-8EP | Diodes Inc | AP65353SP |

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