General Description

The AAT4250 SmartSwitch is a member of AnalogicTech's Application Specific Power MOSFET™ (ASPM™) product family. It is a slew rate controlled P-channel MOSFET power switch designed for high-side load switching applications. This switch operates with an input voltage range from 1.8V to 5.5V, making it ideal for 2.5V, 3.3V, or 5V systems. The part features 1.5ms turn-on and 10µs turn-off time. The AAT4250 has an under-voltage lockout which turns off the switch when an under-voltage condition exists. Input logic levels are TTL compatible. The quiescent supply current is very low, typically 2µA. In shutdown mode, the supply current is typically reduced to 0.1µA or less.

The AAT4250 is available in a Pb-free, 5-pin SOT23 (SOT25) package or a Pb-free, 8-pin SC70JW package and is specified over the -40°C to +85°C temperature range.

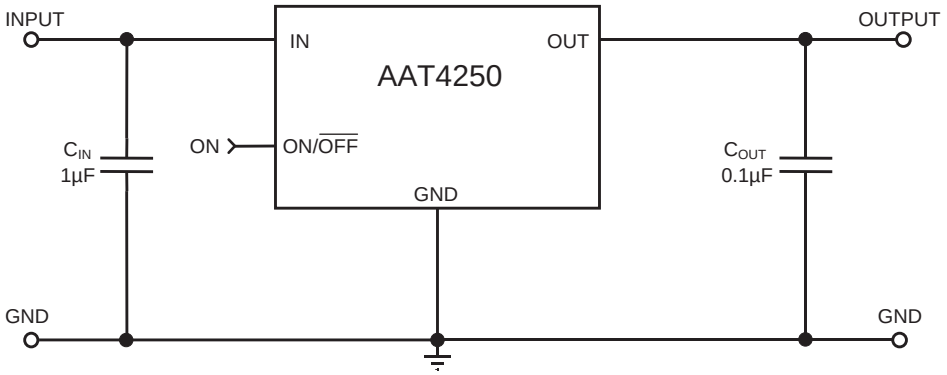
Features

- 1.8V to 5.5V Input Voltage Range
- 120mΩ (5V) Typical $R_{DS(ON)}$
- Low Quiescent Current:
  - Typical 2µA
  - Typical 0.1µA with Enable Off
- Only 2.0V Needed for ON/$\overline{OFF}$ Control
- Temperature Range: -40°C to +85°C
- 5kV ESD Rating
- SOT23-5 or SC70JW-8 Package

Applications

- Hot Swap Supplies
- Notebook Computers
- Personal Communication Devices

Typical Application

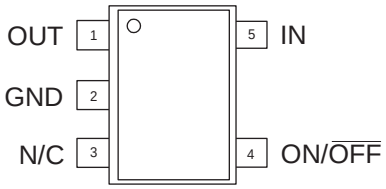


Pin Descriptions

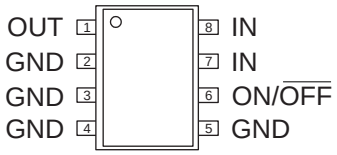
Pin #		Symbol	Function
SOT23-5	SC70JW-8		
1	1	OUT	P-channel MOSFET drain.
2	2, 3, 4, 5	GND	Ground connection.
3	N/A	N/C	Not internally connected.
4	6	ON/$\overline{\text{OFF}}$	Active-high enable input. Logic high turns the switch on.
5	7, 8	IN	P-channel MOSFET source.

Pin Configuration

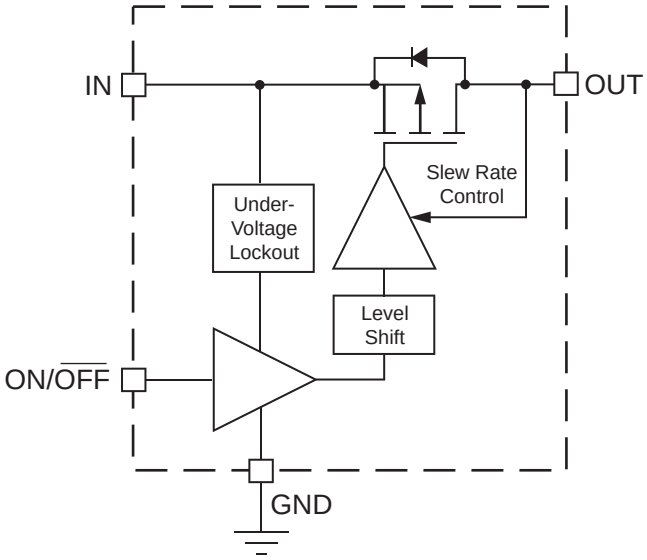
SOT23-5 (SOT25)
(Top View)



SC70JW-8
(Top View)



Functional Block Diagram



Functional Description

The AAT4250 is a slew rate controlled P-channel MOSFET power switch designed for high-side load switching applications. It operates with input voltages ranging from 1.8V to 5.5V which, along with its extremely low operating current, makes it ideal for battery-powered applications. In cases where the input voltage drops below 1.8V, the AAT4250 MOSFET is protected from entering the saturated region of operation by automatically shutting down. In addition, the TTL compatible ON/$\overline{\text{OFF}}$ pin makes the AAT4250 an ideal level-shifted load switch. The slew rate controlling feature eliminates inrush current when the MOSFET is turned on, allowing the AAT4250 to be used with a small input capacitor, or no input capacitor at all. During slewing, the current ramps linearly until it reaches the level required for the output load condition. The proprietary control method works by careful control and monitoring of the MOSFET gate voltage. When the device is switched ON, the gate voltage is quickly increased to the threshold level of the MOSFET. Once at this level, the current begins to slew as the gate voltage is slowly increased until the MOSFET becomes fully enhanced. Once it has reached this point, the gate is quickly increased to the full input voltage and $R_{DS(ON)}$ is minimized.

Applications Information

Input Capacitor

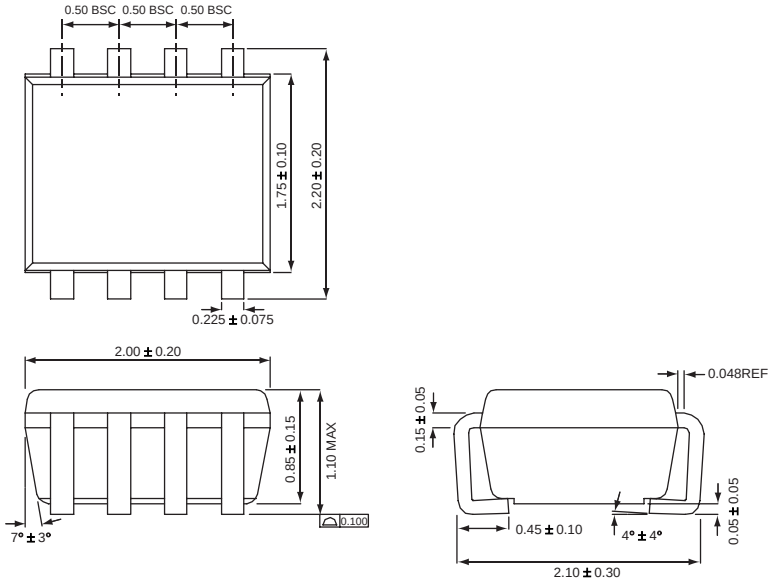
A 1µF or larger capacitor is typically recommended for C_{IN} in most applications. A C_{IN} capacitor is not required for basic operation; however, it is useful in preventing load transients from affecting upstream circuits. C_{IN} should be located as close to the device V_{IN} pin as practically possible. Ceramic, tantalum, or aluminum electrolytic capacitors may be selected for C_{IN}. There is no specific capacitor equivalent series resistance (ESR) requirement for C_{IN}. However, for higher current operation, ceramic capacitors are recommended for C_{IN} due to their inherent capability over tantalum capacitors to withstand input current surges from low-impedance sources, such as batteries in portable devices.

Output Capacitor

For proper slew operation, a 0.1µF capacitor or greater is required between V_{OUT} and GND.

Likewise, with the output capacitor, there is no specific capacitor ESR requirement. If desired, C_{OUT} may be increased without limit to accommodate any load transient condition without adversely affecting the slew rate.

SC70JW-8



All dimensions in millimeters.

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Advanced Analogic Technologies, Inc.
830 E. Arques Avenue, Sunnyvale, CA 94085
Phone (408) 737-4600
Fax (408) 737-4611