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Portable IMVP-IV™ and IMVP-IV+™ Single Phase Power Supply Controller

POWER MANAGEMENT

Description

The SC451 PowerStep IV™ IC is a single chip high-performance Hysteretic PWM controller. With its integrated SmartDriver™, it powers advanced IMVP-IV™ and IMVP4+™ processors. The SC451 features extended Intel Mobile Voltage Positioning (IMVP™) to increase battery life by reducing the voltage at the processor when it is heavily loaded. It directly supports Intel's SpeedStep® processors for even longer battery life. The SC451 fully supports the Intel® Geyserville-III core voltage specification. It provides direct "deeper sleep" mode and boot voltage support. Automatic "power-save" is present to prevent negative current flow in the low-side FET during light loading conditions, saving even more power. The high side driver initially turns on with a weak drive to reduce ringing, EMI, and capacitive turn-on of the low side.

A 6-bit DAC, accurate to 0.85%, sets the output voltage reference, and implements the 0.700V to 1.708V range required by the processor. The hysteretic converter uses a comparator without an error amplifier, and therefore provides the fastest possible transient response, while avoiding the stability issues inherent to classical PWM controllers. The DAC is externally slew rate limited to minimize transient currents and audible noise.

The SC451 operates from 5VDC and also features soft-start, an open-drain PWRGD signal with power-good blanking, and an enable input. Programmable current limiting shuts down the SC451 after 32 current limit pulses. It comes in both a TSSOP-28 and TSSOP-38 package. The TSSOP-38 provides a pin-to-pin upgrade to a dual-phase solution using Semtech's dual-phase controller, SC450.

Features

- ◆ IMVP-IV™ and IMVP-IV+™ compliant single chip solution
- ◆ On-chip CLK_ENABLE# and IMVP4_PWRGD outputs
- ◆ Backward compatible with SC1479
- ◆ High-speed hysteretic controller
- ◆ Single-phase operation
- ◆ Selectable analog or VID controlled DeeperSleep setting
- ◆ 6 bit VID programmable output
- ◆ Integrated drivers with soft high side turn-on
- ◆ Programmable softstart
- ◆ Programmable boot voltage
- ◆ Programmable DeeperSleep voltage
- ◆ Under-voltage lock out on VccA
- ◆ Over-voltage protection on CORE
- ◆ Current limit protection on CORE
- ◆ Thermal protection
- ◆ Powergood flag with blanking during VID or DeeperSleep mode changes
- ◆ Automatic powersave at light load
- ◆ TSSOP-28 and TSSOP-38 package options

Applications

- ◆ Low power Notebook and Laptop computers
- ◆ Embedded Applications

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Conceptual Application Circuit

