Features

- Drives two N-channel MOSFETs
- Operates from +5V and +12V input
- Simple single-loop control
  -Voltage-mode PWM control
- Fast transient response
  - High-bandwidth error amplifier
  - Full 0% to 100% duty ratio
- Excellent output voltage regulation
  - ± 1% over line voltage and temperature
- TTL-compatible 5 bit digital-to-analog output voltage selection
  - Wide range 1.3V_{Dc} to 3.5V_{DC}
  - 0.1V binary steps from 2.1V_{DC} to 3.5V_{DC}
  - 0.05V binary steps from 1.3V_{DC} to 2.05V_{DC}
- Power-good output voltage monitor
- Over-voltage and over-current fault monitors
  -Does not require extra current sensing element
- Small converter size
  -Constant frequency operation
  -200 kHz free-running oscillator programmable from 50 kHz to over 1 MHz

Applications

- Power supply for Pentium™, Pentium™ Pro, PowerPC™ and Alpha™ Microprocessors
- High-power 5V to 3.xV DC-DC regulators
- Low-voltage distributed power supplies

General Description

The AT1604 provides complete control and protection for a DC-DC converter optimized for high-performance microprocessor applications. It is designed to drive two N-channel MOSFETs in a synchronous-rectified buck topology. The AT1604 integrates all of the control, output adjustment, monitoring and protection functions into a single package.

The AT1604 includes a fully-TTL compatible 5-bit digital-to-analog converter (DAC) that adjusts the output voltage from 2.1V_{DC} to 3.5V_{DC} in 0.1V increments and from 1.3V_{DC} to 2.1V_{DC} in 0.05V steps. The precision reference and voltage–mode regulator hold the selected output voltage to within ± 1% over temperature and line voltage variations.

The AT1604 provides simple, single feedback loop, voltage-mode control with fast transient response. It includes a 200kHz free-running triangle-wave oscillator that is adjustable from below 50kHz to over 1MHz. The error amplifier features a 12MHz gain-bandwidth product and 6V/μs slew rate which enable high converter bandwidth for fast transient performance. The resulting PWM duty ratio ranges from 0% to 100%.

The AT1604 monitors the output voltage with a window comparator that tracks the DAC output and issues a Power Good signal when the output is within ± 10% of the targeted value. The AT1604 protects against over-current conditions by inhibiting PWM operation. Built-in over-voltage protection triggers an external SCR to crowbar the input supply. The AT1604 monitors the current by using the $r_{DS(on)}$ of the upper MOSFET, which eliminates the need for a current sensing resistor.

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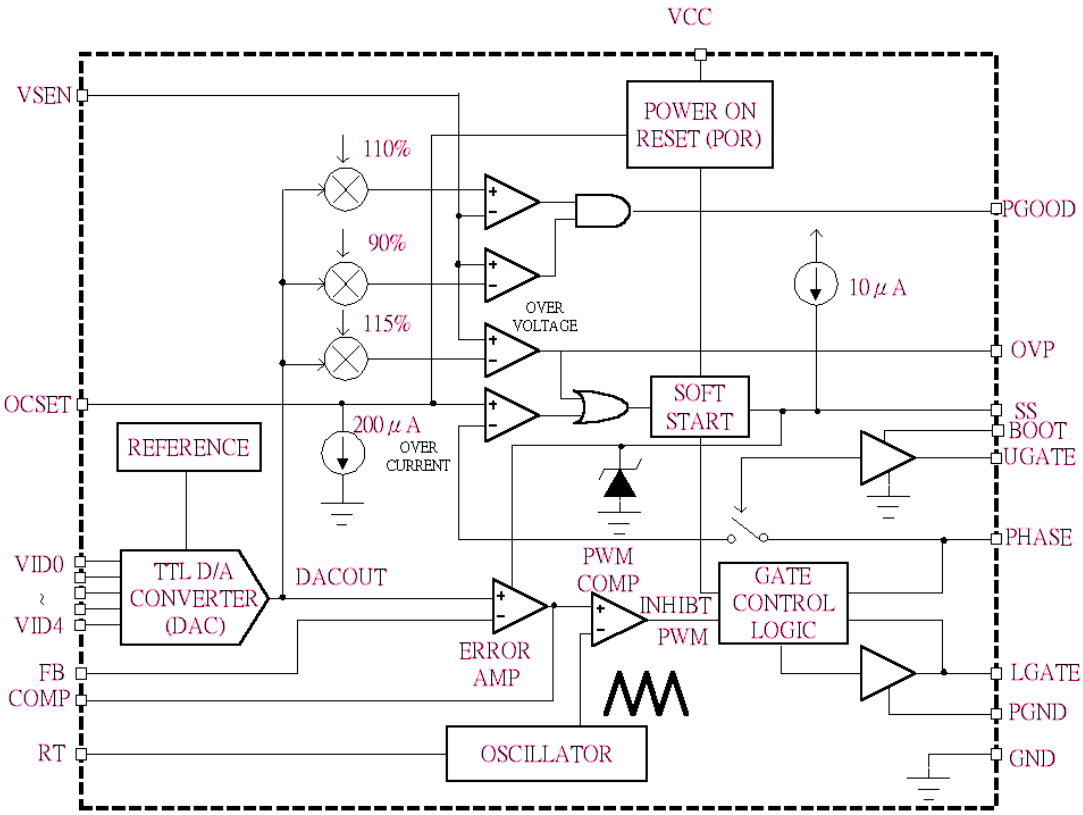
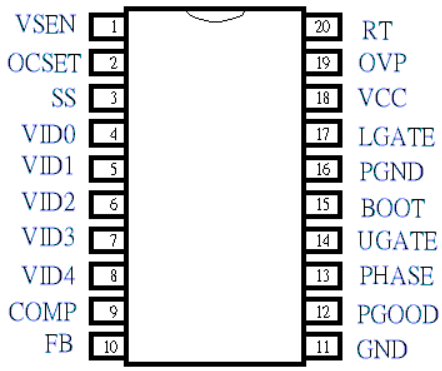
Block Diagram



Pin Configuration

AT1604 (20-Pin SOIC)



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