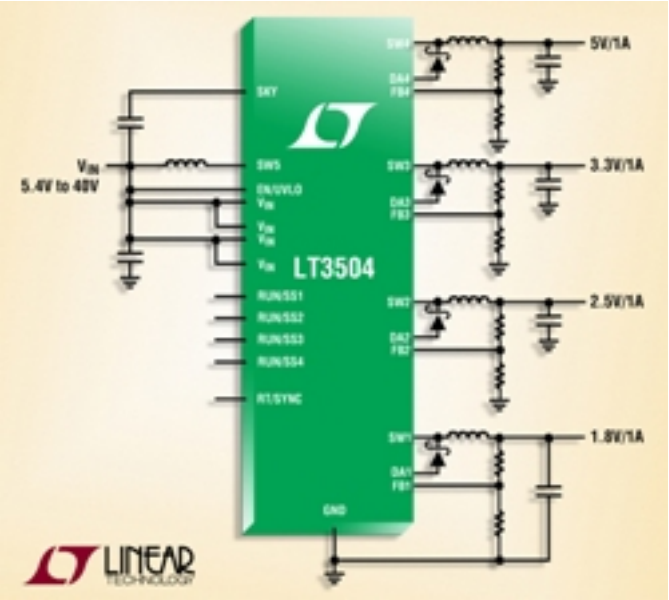
Step-Down Switching Regulator with 100% Duty Cycle Operation

Linear Technology Corporation announces the LT3504 [1], a quad 1A output, 40V step-down switching regulator with 100% duty cycle operation. The LT3504's 3.2V to 40V input voltage range makes it ideal for automotive and industrial applications that require multiple outputs. Its internal 1.5A switches can deliver up to 1A of continuous output current per channel to voltages as low as 0.8V. The LT3504's unique design includes an onboard boost regulator, enabling each channel to operate at 100% duty cycle, even with input voltage as low as 3.2V. This architecture makes the LT3504 well suited for applications requiring continuous output regulation, such as automotive cold-crank and stop-start scenarios. Switching frequency is user-programmable from 250kHz to 2.2MHz and synchronizable throughout the range, enabling the designer to optimize efficiency while avoiding critical noise-sensitive frequency bands. The combination of its 28-lead 4mm x 5mm QFN and high switching frequency keeps external inductors and capacitors small, providing a compact, thermally efficient footprint for multiple output applications.

The LT3504 utilizes four internal 1.5A switches for the step-down conversion and a 220mA switch for the internal boost circuit, with the necessary oscillator, control and logic circuitry integrated into a single die. Special design techniques and a new high voltage process deliver efficiencies up to 88% over a wide input voltage range, while the LT3504's current mode topology enables fast transient response and excellent loop stability. Anti-phase switching reduces input ripple and robust short-circuit protection enhances system reliability. Other features include output voltage tracking, programmable undervoltage lockout and a power good pin to indicate when all outputs are in regulation.

Summary of Features: LT3504

- Wide Input Range: 3.2V to 40V
- Four 1A Outputs
- 100% Duty Cycle Operation



- Resistor-Programmed Constant Frequency
- Short-Circuit Robust
- Wide SYNC Range: 250kHz to 2.2MHz
- Anti-Phase Switching Reduces Ripple
- 800mV FB Voltage
- Independent Run/Soft-Start Pins
- Shutdown with UVLO
- Internal Compensation
- Thermal Shutdown
- Tiny 28-Lead (4mm × 5mm) Thermally Enhanced QFN Package

www.linear.com [2]

Posted by Sara Cohen, Editorial Intern

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