



48V/12V Automotive Bidirectional Synchronous Buck or Boost DC/DC Controller Increases Available Power

MILPITAS, CA – September 20, 2016 – Linear Technology Corporation announces the [LTC3871](#), a 100V/30V bidirectional two phase synchronous buck or boost controller, ideal for 48V/12V automotive dual battery systems. Current 12V automotive systems are reaching their 3kW power limit due to the ever-increasing demand for more electrical devices. A newly proposed standard, LV148, combines a secondary 48V bus with the existing 12V system. The 48V rail includes a belt starter generator (BSG) or an integrated starter generator (ISG), a 48V lithium-ion battery and a bidirectional DC/DC converter for delivery of up to 10kW of available energy from the 48V and 12V batteries combined. This technology is targeted for conventional internal combustion automobiles, as well as hybrid electric and mild hybrid vehicles, as auto manufacturers strive to meet increasingly stringent CO₂ emissions targets.

According to Don Paulus, Vice President, Power Management Products for Linear Technology, “Running a portion of a vehicle’s electrical system at 48V will play a central role in increasing available energy, while reducing wiring harness weight and losses. This additional energy capacity paves the way for new technologies, enabling cars to be safer and more efficient, without compromising performance.”

The LTC3871 provides bidirectional DC/DC control and battery charging between the 12V and 48V boardnets. It operates in buck mode from the 48V bus to the 12V bus or in boost mode from 12V to 48V. Either mode is configured on demand with an applied control signal. Up to 12 phases can be paralleled and clocked out-of-phase to minimize input and output filtering requirements for high current applications (up to 250A). Its advanced current mode architecture provides excellent current matching between phases when paralleled. Up to 3kW can be supplied in buck mode or in boost mode with a 12-phase design.

When starting the car or when additional power is required, the LTC3871 allows both batteries to supply energy simultaneously by converting energy from one boardnet to the other. Typically, the 12V bus will continue to power the ignition, lighting, infotainment and audio

systems. The 48V bus will supply active chassis systems, power steering, air conditioning compressors, electric superchargers/turbos and support regenerative braking. Up to 97% efficiency can be achieved and the on-chip current programming loop regulates the maximum current that can be delivered to the load in either direction. Four control loops, two for current and two for voltage, enable control of voltage and current on either the 48V or 12V boardnets.

The LTC3871 operates at a selectable fixed frequency between 60kHz and 460kHz, and can be synchronized to an external clock over the same range. The user can select from continuous operation or pulse-skipping during light loads. Additional features include overload and short-circuit protection, independent loop compensation for buck and boost, EXTV_{CC} for increased efficiency, ±1% voltage regulation accuracy over temp, along with undervoltage and overvoltage lockout. The LTC3871 has been qualified to meet AEC-Q100 specifications and was designed with intrinsic safety being fully considered in line with the ISO 26262 standard.

The LTC3871 is available in a thermally enhanced 48-lead LQFP package. Three temperature grades are available, with operation from -40°C to 125°C for the extended and industrial grades and a high temp automotive range of -40°C to 150°C. The 1,000-piece price starts at \$5.40 each. For more information, visit www.linear.com/product/LTC3871.

Photo Caption: Bidirectional Buck or Boost DC/DC Controller

Summary of Features: LTC3871

- Buck or Boost on Demand
- Unique Architecture Allows Regulation of the Input Voltage, Output Voltage or Current
- 48V Nominal Bus, Up to 100V
- 12V Nominal Bus, Up to 30V
- AEC-Q100 Compliant
- Engineered for Diagnostic Coverage in ISO 26262 Systems
- Up to 12-Phase Operation
- Synchronous Rectification: Up to 97% Efficiency
- Advanced Current Mode Control
- ±1% Reference Voltage Accuracy over Temperature
- Programmable Output Current Monitoring & Regulation for Both Buck & Boost Operation
- Selectable Buck and Boost Current Sense Limit
- Programmable DRV_{CC}/EXTV_{CC} Optimizes Efficiency
- Phase-Lockable Frequency: 60kHz to 460kHz
- Overload/Short-Circuit Protection
- Thermally Enhanced 48-Lead LQFP Package

Pricing shown is for budgetary use only and may differ due to local duties, taxes, fees and exchange rates.

About Linear Technology

Linear Technology Corporation, a member of the S&P 500, has been designing, manufacturing and marketing a broad line of high performance analog integrated circuits for major companies worldwide for over three decades. The Company's products provide an essential bridge between our analog world and the digital electronics in communications, networking, industrial, automotive, computer, medical, instrumentation, consumer, and military and aerospace systems. Linear Technology produces power management, data conversion, signal conditioning, RF and interface ICs, μ Module[®] subsystems, and wireless sensor network products. For more information, visit www.linear.com

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