



High Efficiency Bidirectional Multicell Active Balancer Maximizes Capacity Recovery in Series-Connected Battery Stacks

MILPITAS, CA – March 5, 2013 – Linear Technology Corporation announces the [LTC3300-1](#), a high efficiency bidirectional multicell battery balancer for equalizing cell state of charge (SoC) in a series-connected battery stack. With the LTC3300-1, applications such as electric vehicles (EVs), plug-in hybrid EVs and large energy storage systems using cells with mismatched capacities are no longer limited by the lowest capacity cell in the stack. The LTC3300-1 goes beyond purely dissipative passive balancing solutions, enhancing battery performance by efficiently transferring charge to or from adjacent cells in order to bring mismatched cells into SoC balance within the stack. By redistributing charge throughout the stack, the LTC3300-1 compensates for lost capacity due to the weakest cells, enabling faster charging and extending the run time and usable lifetime of the battery stack.

The LTC3300-1 is a key component in a high performance battery management system (BMS) for series-connected Li-Ion or LiFePO₄ batteries. The device operates as a fault-protected controller IC for transformer-based bidirectional active balancing. The part utilizes a nonisolated bidirectional synchronous flyback topology to balance up to 6 series-connected cells. Charge can be transferred between a selected cell and 12 or more adjacent cells. All balancers can operate independently and simultaneously with charge/discharge currents up to 10A. Bidirectional operation and simultaneous balancing minimizes the time required to equalize stack SoC, and the parts' high transfer efficiency (up to 92%) enables high current balancing with minimal power dissipation.

Control of each balancer is provided via a unique level-shifting SPI-compatible serial interface which enables multiple LTC3300-1 devices to be connected in series, without optocouplers or isolators. The part's stackable architecture together with interleaved transformer connections enable efficient balancing of every cell in an arbitrarily tall string (>1000V) of series-connected batteries. All associated gate drive circuitry, precision current sensing, fault protection circuitry and a robust serial data interface with built-in watchdog timer and cyclic redundancy check (CRC) data error checking are integrated.

The LTC3300-1 is offered in thermally enhanced surface-mount compatible packages: a low profile (0.75mm) 48-lead 7mm x 7mm QFN and a 48-pin 7mm x 7mm LQFP package. The I grade is specified for both packages, with operating junction temperature range of -40°C to +125°C. Devices are available from stock and 1,000-piece pricing starts at \$5.95. For more information, visit www.linear.com/product/LTC3300-1.


Photo Caption: High Efficiency Bidirectional Multicell Balancer

Summary of Features: LTC3300-1

- Bidirectional Synchronous Flyback Balancing of up to 6 Li-Ion or LiFePO₄ Cells in Series
- Up to 10A Balancing Current (Set by External Components)
- Bidirectional Architecture Minimizes Balancing Time & Power Dissipation
- Up to 92% Charge Transfer Efficiency
- Stackable Architecture Enables >1000V Systems
- Uses Simple 2-Winding Transformers
- 1MHz Daisy-Chainable Serial Interface with 4-Bit CRC Packet Error Checking
- High Noise Margin Serial Communication
- Numerous Fault Protection Features
- 48-Lead 7mm x 7mm Exposed Pad QFN & LQFP Packages

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 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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Press Contacts:

North America / Worldwide

John Hamburger, Director Marketing
Communications
jhamburger@linear.com
Tel: 408-432-1900 ext 2419

Doug Dickinson, Media Relations Manager
ddickinson@linear.com
Tel: 408-432-1900 ext 2233

UK & Nordic

Alan Timmins
alan@ezwire.com
Tel: +44-1-252-629937