



2A Buck-Boost Supercapacitor Charger Features Bidirectional Operation for Fast Charging & System Backup

MILPITAS, CA – June 16, 2015 – Linear Technology Corporation introduces the [LTC3110](#), a bidirectional, programmable input current buck-boost supercapacitor charger with active charge balancing for 1- or 2-series supercapacitors. The proprietary low noise buck-boost topology does the work of two separate switching regulators, saving size, cost and complexity. The LTC3110 operates in two modes, backup and charge mode. In backup mode, the device maintains a system voltage, V_{SYS} , of 1.71V to 5.25V, powered from the supercapacitor stored energy. Further, the supercapacitor storage input, V_{CAP} , features a wide practical operating range from 5.5V down to 0.1V. This ensures that all practical stored supercapacitor energy is utilized, thereby extending backup times or shrinking the storage capacitors. Alternatively, in charge mode when the main power system is active, the LTC3110 can autonomously or through user command reverse the direction of power flow using the regulated system voltage to charge and balance the supercapacitors. V_{CAP} is efficiently charged to above or below V_{SYS} by the buck-boost PWM (pulse width modulator). The device also features a charge-mode average input current limit that can be programmed up to 2A with +/-2% accuracy, preventing system power source overload while minimizing capacitor recharge time.

The LTC3110's active charge balancing eliminates the constant drain of dissipative external ballast resistors, ensuring charging even with mismatched capacitors, and less frequent recharge cycles. Programmable maximum capacitor voltage regulation actively balances and limits the voltage across each capacitor in the series stack to one-half of the programmed value, ensuring reliable operation as capacitors age and develop mismatched capacities. The low $R_{DS(ON)}$, low gate charge synchronous switches provide high efficiency conversion to minimize the charging time of storage elements. The LTC3110 is ideal for safely charging and protecting large capacitors in backup power applications such as servers and RAID systems, and RF systems with battery/capacitor backup.

The LTC3110's input current limit and maximum capacitor voltage is resistor programmable. Average input current is accurately controlled over a 0.125A to 2A programming range. Pin-selectable Burst Mode[®] operation improves light-load efficiency and reduces standby current to only 40μA, and shutdown current to less than 1μA. Other features of the LTC3110 include high 1.2MHz switching frequency to minimize external component size, thermal overload protection, two voltage supervisors for direction control and end of charge, and one general purpose comparator with an open-collector output for interfacing with a microcontroller or microprocessor.

The LTC3110 is housed in compact, thermally enhanced 24-lead and TSSOP 4mm x 4mm QFN packages, both featuring E- and I-grade operation from –40°C to 125°C, and up to 150°C for the high reliability H grade. Pricing for the E-grade device starts at \$4.45 each in 1,000-piece quantities. For more information, visit www.linear.com/product/LTC3110

Photo Caption: 2A Bidirectional Buck-Boost Supercap Charger


Summary of Features: LTC3110

- V_{CAP} Operating Range: 0.1V to 5.5V
- V_{SYS} Operating Range: 1.71V to 5.25V
- Automatic Switchover from Charge to Backup Mode
- Programmable $\pm 2\%$ Accurate Charge Input Current Limit from 125mA to 2A
- $\pm 1\%$ Backup Voltage Accuracy
- Automatic Backup Capacitor Balancing
- Fixed 1.2MHz Frequency Switching
- Burst Mode[®] Operation: 40μA I_Q
- Extra Programmable Multipurpose Comparator with Open-Collector Output
- Open-Collector Outputs to Indicate Direction of Operation & End of Charge
- Low Profile TSSOP-24 & 4mm × 4mm QFN-24 Packages

The USA list pricing shown is for budgetary use only. International prices 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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