

News Release

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Digitally Programmable 1A Switch-Mode USB/AC Li-Ion Charger IC Sets Records for Charge Time, Power Dissipation and Size

World's smallest charger IC provides 750mA from a 500mA USB port slashing charge time by 66% and cutting power dissipation by 90%, versus linear chargers.

San Jose, Calif. – February 21, 2006 - Summit Microelectronics has announced the first product in a family of Programmable Li-Ion Charger IC's aimed at the latest portable consumer applications. Specially designed to operate with the popular Universal Serial Bus (USB™) and other current-limited power sources, the SMB135 revolutionizes single cell Li-Ion and Li-Polymer battery charging.

Combining switch-mode operation with Summit's proprietary *TurboCharge*™ mode the SMB135 dramatically cuts charge time, shrinking or eliminating costly and bulky AC/DC "wallwart" power supplies. Additionally the SMB135 eliminates power cables and connectors by allowing standardization to a single mechanical connector (USB) for power and data, thereby reducing system cost and complexity.

By addressing the major drawbacks of conventional solutions, namely charge time, power dissipation and solution size, the SMB135 enables new standards for performance, mobility and convenience in portable consumer electronics.

Features

The SMB135 comprises a 1A current-mode step-down (buck) switching battery charger including a fully programmable algorithm for single-cell Li-Ion and Li-Polymer cells. All charging parameters - pre-charge/fast-charge/charge termination current, cell float/pre-charge voltage, battery temperature/timer safety limits - are configurable via the I²C/SMBus interface enabling a wide variety of algorithms without hardware changes.

The programmable algorithm combined with the inherent current multiplication effect of the

switching regulator enables Summit's *TurboCharge*™ mode that delivers up to 750mA charging current from a standard 500mA USB port (up to 1A from an AC/DC adapter). This represents more than double the charge current typically available from competing solutions, cutting the battery charge time by as much as 66%.

The SMB135 can be programmed either dynamically (real-time using volatile registers), by a microcontroller and software via the I²C/SMBus port, or statically (pre-programmed using non-volatile registers). If the static programming mode is used there is no need for software to access the I²C/SMBus interface and the SMB135 functions independently as a customized but parametrically fixed solution.

Additionally the SMB135's switch-mode operation provides another major advantage, reducing power dissipation by as much as 90% compared to competing linear-mode solutions. This characteristic has a dual benefit - dramatically reduced power dissipation eliminates the need for "thermal current foldback" circuitry of competing linear solutions, which unnecessarily extends charge time.

Also reduced power dissipation allows the SMB135 to be packaged in a tiny 1.3mm x 2.1mm chip-scale package (CSP) – the world's smallest for a battery charger IC. Linear charger solutions are typically offered in large packages that have high power dissipation capacity and require extra PCB copper "flood" areas for heatsinking.

"Leveraging Summit's field-proven programmable power management technology the SMB135 sets new standards for Li-Ion battery charging in portable systems. Switch-mode operation and a programmable algorithm enable huge gains in charge time, power dissipation, solution size and safety", stated Abid Hussain, Summit's Director of Marketing. "The SMB135 is a truly ground-breaking product that will enable a new generation of 'ultra-mobile' devices by simplifying the critical battery charging function."

The SMB135 operates from a +4.35V to +6.0V input making it ideally suited for either USB or AC adapter power sources. However for applications where the AC adapter may be poorly regulated and/or an aftermarket product the SMB135 will tolerate +10V inputs without damage. Switching frequency is programmable between 750kHz and 1.25MHz providing for small external passive component size and cost.

Ensuring long battery life when not connected to a DC power source, the reverse leakage current is less than 2uA. Also when not using the I²C/SMBus port for charge control/monitoring the SMB135 provides a 500mA/100mA control pin for USB compliance and

a STATUS output to drive an LED.

Enhancing reliability the SMB135 integrates over-voltage, short-circuit and thermal protection circuits. Also the SMB135 protects the battery pack with a programmable battery temperature monitor and charge timers to prevent dangerous charging conditions. Furthermore, to protect deeply discharged cells, the SMB135 has a 3mA “trickle charge” mode below 2.0V. This mode allows safe, controlled recovery of the deeply discharged cell until it can accept normal charging currents.

Finally the SMB135’s programmability enables future battery upgrades while preserving safety. For example as newer battery packs employ cell float voltages other than 4.1V or 4.2V a conventional, non-programmable charger IC’s, at best, can disable charging - the worst case could be a battery pack fire or explosion. However with the SMB135, as long the new battery pack can be properly identified, the charging algorithm is dynamically adapted (up to 4.62V) and it continues to safely charge the battery.

Applications

The SMB135 is well suited to handheld consumer electronics devices such as 2.5G/3G phones, PDAs/smartphones, Bluetooth headsets, portable media players (PMP), portable game consoles, digital still cameras (DSC)/camcorders (DCC) and GPS terminals. In particular it is the ideal battery charging solution for applications that use a single USB connector to provide both data and power.

Pricing and Availability

The SMB135 has an operating temperature range of 0°C to +70°C and is available in the 1.3mm x 2.1mm 15-ball chip scale (uCSP™) package that is lead-free and RoHS-standards compliant. Available now in production quantities, the device is priced at \$0.98 each in quantities of 10,000 units.

Design Software and Programmer for Prototype Development

To speed user product development, Summit offers customers the SMB135EV companion evaluation board and a graphical user interface (GUI) software so designers can quickly see the features and benefits and design a prototype power supply with the SMB135. This is a complete development tool that lets designers easily manipulate the characteristics of their systems. The SMB135EV design kit includes menu-driven Microsoft Windows® graphic user interface (GUI) software to automate programming tasks and also includes all necessary hardware to interface to the parallel or USB port of a laptop or PC.

Once a user completes design and prototyping, the SMB135EV automatically generates a HEX data file that can be transmitted to Summit for review and approval. Summit then assigns a unique customer identification code to the HEX file and programs the customer's production devices prior to final electrical test operations. This ensures that the device will operate properly in the end application. The design kit software can be downloaded today from Summit's website (www.summitmicro.com).

About Summit Microelectronics: "Programmable Power for a Digital World"

Summit Microelectronics is the leader in flexible, multiple-output power management solutions, for the consumer, communications and computing markets, integrating precision power regulation with sophisticated digital control in a single chip.

Summit's unique programmable, non-volatile mixed-signal IC technology combined with a convenient graphical (GUI) development environment allows for unparalleled functional and parametric flexibility in power supply design. This flexibility applied to common problems such as dynamic voltage/current control and intelligent battery charging, allows for significant system performance improvement while realizing drastic reductions in design effort.

Digital programmability enables high integration and system flexibility in a single chip - impossible with conventional "hard-wired" analog power IC's. Additionally, this integration reduces the bill-of-materials (BOM) yielding the lowest total system cost and size. Summit solutions address the biggest challenges facing OEM developers today; Increasing system functionality, performance and complexity accompanied by shrinking development time cycles.

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