

Programmable Switch-mode, Li+ Battery Chargers with TurboCharge™ Mode, USB “On-the-Go” Power, USB Power Source Detection and Automatic Input Current Limiting
FEATURES & APPLICATIONS

- Automatic input current limit *
- Optional automatic power source detection per latest USB charging specification 1.0
- USB or AC input with programmable input current limiting
- Up to 1.25A continuous charging current from AC adapter
- Up to 750mA charging current from 500mA USB port using automatic TurboCharge™ mode *
- +4.35 to +6.2V input range (+18V input protected)
- USB “On-the-Go” Power support for USB OTG enabled devices (+5V reverse output @ 500mA)
- 50mA SYSON output for “dead battery” boot-up (SMB329)
- Analog output voltage for direct charge current measurement
- Reverse current blocking
- High-efficiency 3MHz current-mode step-down regulator
- Integrated frequency compensation and power MOSFETs
- High-accuracy float voltage regulation: 1%
- Pre-charge and complete-charge safety timers
- Battery pack thermal monitor
- Digital programming of all major parameters via I²C interface (One-time programmable for default, non-volatile settings)
 - Fast charge voltage threshold, float voltage
 - Pre-charge, fast charge, termination current
- Status register monitors and flags charger operation
 - Charge in-progress/termination
 - Charge timer fault
 - Over-current limiting
 - UV/OV detection/shutdown
- 1.95mm x 2.22mm CSP-20 package (0.4mm pitch lead-free)

Applications

- 2.5G/3G/GSM/CDMA Phones
- Smartphones/PDAs
- Portable Media Players
- Portable GPS Terminals
- Handheld Game Consoles

* Patents pending

INTRODUCTION

The SMB329 and SMB339 are programmable single-cell lithium-ion/lithium-polymer battery chargers designed for a variety of portable applications. The devices provide a simple and efficient way to charge high-capacity Li-Ion batteries via a USB or AC adapter input. Furthermore, the SMB329 and SMB339 are able to automatically adjust input current level by detecting the AC/DC adapter's maximum stable output current, thereby automatically matching wall adapter to electronic device.

Unlike conventional devices, the SMB329's and SMB339's high-efficiency, switch-mode operation eliminates the thermal problems of conventional linear solutions. Also the buck converter architecture effectively multiplies the input current to increase charge rate for the Li+ cell and uses current limited supplies like USB more efficiently. A 50mA SYSON switch output provides a bypass power supply to boot the system for “instant on” without waiting for charging in case of a dead battery (SMB329 only). Both products also support USB On-the-Go devices by providing the required USB-OTG +5V power supply using the Li-Ion battery as a source.

The SMB329 and SMB339 can switch between USB mode and AC Adapter mode and work seamlessly in conjunction with a USB controller. Furthermore, they offer the option to automatically differentiate an AC/DC wall adapter from a USB2.0 hub via the D+/D- USB lines, making them compatible with USB battery charging specification 1.0.

Charge control includes qualification, trickle-charge, pre-charge, constant current/constant voltage, float voltage and termination/safety settings that are fully programmable via a serial I²C/SMBus, making the devices truly a flexible solution. Fast charge current level can be set via I²C (limited in USB mode to ensure 100mA or 500mA input). Built-in is reverse-current blocking to prevent inadvertent cell discharge. The SMB329 and SMB339 offer the option to automatically charge the battery only when the battery voltage is below a selectable “dead-battery” threshold. High-frequency operation and integrated power FETs contribute to a reduced external component count and size.

The SMB329 and SMB339 also offer several features that protect the battery pack as well as the charger and input circuitry: over-current, under/over-voltage and thermal protection. Ultra-accurate, 1% battery float voltage control improves battery capacity utilization. The STAT output is an interrupt to flag various status/flag events (programmable selection) and the status register can be read via the serial port. The SMB329 and SMB339 are available in an ultra-compact lead-free uCSP-20 package and are rated over the -30C to +85C temperature range. The SMB329 is also offered in a 4x4 QFN-24 package.

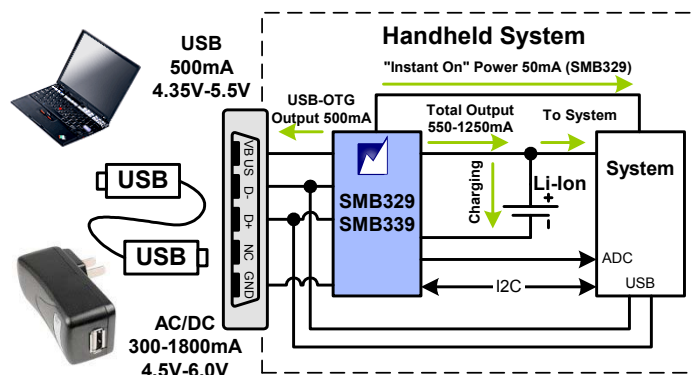
SYSTEM APPLICATION


Figure 1 – Using the SMB329/339 to charge a single cell Li+ battery from USB or AC Adapter power sources.