

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

- SMB328A with I2C and SMB328B with pin control
- Automatic input current limit *
- USB or AC input with programmable input current limiting
- Up to 1.2A continuous charging current from AC adapter
- Up to 750mA charging current from 500mA USB port using automatic TurboCharge™ mode *
- +4.00 to +6.3V input range (+20V input protected)
- USB “On-the-Go” Power support for USB OTG enabled devices (+5V reverse output @ 500mA)
- 50mA LDO output for “dead battery” boot-up
- 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%
- Supports JISC8714 and JEITA standards
- 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
- CSP-20 package (0.4mm pitch lead-free)

Applications

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

* Patents pending

INTRODUCTION

The SMB328 is a programmable single-cell lithium-ion/lithium-polymer battery charger designed for a variety of portable applications. The device provides a simple and efficient way to charge high-capacity Li-Ion batteries via a USB or AC adapter input. Furthermore, the SMB328 is 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 SMB328’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 LDO output provides a bypass power supply to boot the system for “instant on” without waiting for charging in case of a dead battery. The SMB328 also supports USB On-the-Go devices by providing the required USB-OTG +5V power supply using the Li-Ion battery as a source.

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 device truly a flexible solution. Input current level can be set via I2C (limited in USB mode to ensure 100mA or 500mA input) or via a dual-state input pin. Built-in is reverse-current blocking to prevent inadvertent cell discharge. The SMB328 offers 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 SMB328 also offers several features that protect the battery pack as well as the charger and input circuitry: over-current, under/over-voltage and thermal protection. A missing battery detection I/O is also provided to detect missing battery conditions. The STAT output can be used to provide charging status information to the system. A second logic output is also available to indicate valid input power presence. Furthermore, the SMB328 incorporates various status/fault registers that can be read via the serial port. The SMB328 is available in an ultra-compact lead-free uCSP-20 package and is rated over the -30C to +85C temperature range.

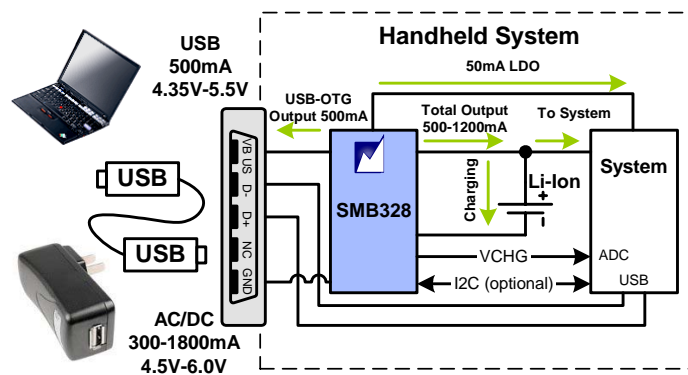
SYSTEM APPLICATION


Figure 1 – Using the SMB328 to charge a single cell Li+ battery from USB or AC Adapter power sources.