

Programmable Switch-mode, Li+ Battery Charger with TurboCharge™ Mode, USB “On-the-Go” Power and Automatic Input Current Limiting

FEATURES & APPLICATIONS

- Automatic input current limit *
- 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 voltage range (+18V tolerant)
- USB “On-the-Go” Power support for USB OTG enabled devices (+5V reverse output @ 500mA)
- Reverse current blocking
- High-efficiency 2.2MHz current-mode step-down regulator
- Integrated frequency compensation
- Internal power MOSFETs
- High-accuracy float voltage regulation: 1%
- Pre-charge and complete-charge safety timers
- 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
- uCSP-20 RoHS/lead-free package with 0.4mm ball pitch

Applications

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

* Patents pending

INTRODUCTION

The SMB338P 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 SMB338P is able to automatically adjust input current level by monitoring the status of the adapter voltage.

Unlike conventional devices, the SMB338P'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. The SMB338P also supports USB On-the-Go devices by providing the required USB-OTG +5V power supply using the Li-Ion battery as a source.

The SMB338P can switch between USB mode and AC Adapter mode and works seamlessly in conjunction with a USB controller. 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. 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 SMB338P 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 SMB338P 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. 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 SMB338P is available in an ultra-compact lead-free uCSP-20 package and is rated over the -30C to +85C temperature range.

SYSTEM APPLICATION

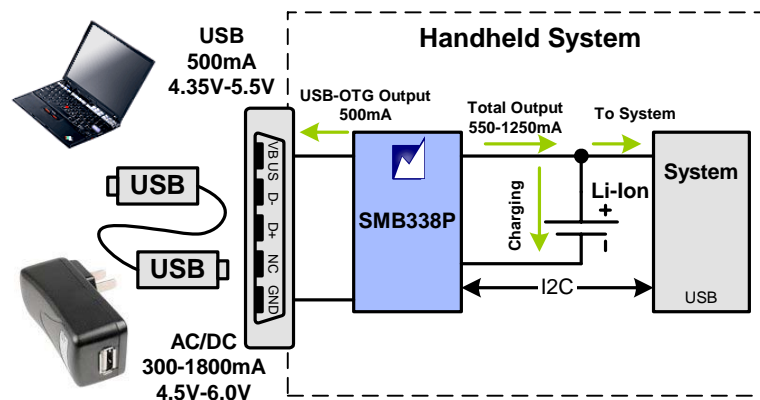


Figure 1 – Using the SMB338P to charge a single cell Li+ battery from USB or AC Adapter power sources