PIC® MCU based USB AAA Battery Charger
PIC® USB AAA Battery Charger

PIC18F14K50 USB AAA Battery Charger – Introduction

This PIC18F14K50 based battery charger brings advanced features and exceptional value to the portable battery charger market. This low cost PIC® Microcontroller features a full speed USB 2.0 compliant interface that can automatically change clock sources and power levels upon connection to a host, making it an exceptional device for battery charging applications.

The battery charger’s small form-factor, optimized, low-cost design and ease of use make it an ideal solution for travel, entertainment. Fits conveniently in horizontal and vertical USB ports found on most of today’s portable computing devices.
PIC® USB AAA Battery Charger

PIC18F14K50 USB AAA Battery Charger – Key features

• Negotiates USB power requirements
  ➢ Built for NiMH AAA rechargeable batteries
  ➢ No separate charge control chip needed; saves on BOM cost
  ➢ Smart switching charger; more efficient than linear equivalent

• Integrated charge control
  ➢ Alkaline detect and fault
  ➢ Independent cell charging control
  ➢ LEDs for charge status

• Unique safety features
  ➢ ΔV and ΔTime charge termination
  ➢ Over current protection
  ➢ Timed safety shutdown for bad cells
  ➢ Min/max temperature safety checks and shutdown
PIC® USB AAA Battery Charger

PIC18F14K50 USB AAA Battery Charger - GUI and Collateral

- GUI available showing charge process and status
  - Icon to represent charge status; GUI not required for operation
  - Icon to indicate charge pass/fail status
  - Windows and Mac versions available now; Linux available FY12’Q2

- Comprehensive collateral set available
  - Reference schematics
  - Application source code; USB libraries
  - Battery charging Application Note: AN1384
  - Energizer AAA Battery Datasheet: NH12-850

- Learn more at:
  - www.microchip.com – search 18F14K50
  - www.energizer.com

Microchip Confidential
**PIC® USB AAA Battery Charger**

**Key Components**

- **Battery Status LEDs (Red)**
  - Slow blinking = Charging
  - Fast blinking = Fault
  - Solid ON = Fully Charged
  - OFF = No Battery

- **Charge Regulator Circuit**
  - Inductor
  - Switching FET

- **Current Sense Amplifier**
  - MCP6V01 – Auto-Zeroed Op Amp

- **Over Current Protection Fuse**

- **USB Status LED (Green)**
  - ON = Connected

- **USB Connector**

- **Battery Select FETs**

- **Temperature Sensor (R17)**

- **PIC18F14K50 USB Flash Microcontroller**
PIC® USB AAA Battery Charger
Block Diagram

Over Current Protection Fuse

+5V

Charge Regulator Circuit

PWM

MCP6V01 Circuit

Battery Select

Current Feedback

Battery Voltage Feedback

Board Temperature

PIC18F14K50

Data (-)

Data (+)

Battery Status LEDs (Red)
Slow blinking = Charging
Fast blinking = Fault
Solid ON = Fully Charged
OFF = No Battery

USB Status LED (Green)
ON = Connected

Battery

Voltage

Feedback

Charge

Regulator

Circuit

Over Current Protection Fuse

+5V

Charge Regulator Circuit

PWM

MCP6V01 Circuit

Battery Select

Current Feedback

Battery Voltage Feedback

Board Temperature

PIC18F14K50

Data (-)

Data (+)

Battery Status LEDs (Red)
Slow blinking = Charging
Fast blinking = Fault
Solid ON = Fully Charged
OFF = No Battery

USB Status LED (Green)
ON = Connected
Thank You!

USB AAA Battery Charger