



The smart battery monitor for safety lamp based on impedance track gas gauge

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Abstract

To improve the efficiency of safety lamp, this design introduce Impedance Track Gas technology. The Impedance Track technology continuously analyzes the battery impedance, resulting in superior gas-gauging accuracy. This enables remaining capacity to be calculated with discharge rate, temperature, and cell aging all accounted for during each stage of every cycle.

Key words: *Impedance track, Smart Battery, Safety lamp*

1. Introduction

At present in the coal mines most of miner lamps are made from lead acid cell. Storage batteries which are large easily crash with the miner's lamps. So it can make the skin of cable broken and pulled-apart. Under given conditions the above phenomenons induce to bomb and cause security accidents. For improving the safety of miner lamp this paper proposes a new kind of lamp that uses lithium battery and LED to be the main light sources. The lamp is more safety and Usability. There are the following questions to be solved for the safety of miner lamps. Firstly in case of a short circuit the current will be so great that it can make the battery broken in a short time and the sparkle can cause the explosion because lithium battery has small internal resistance. The second when it discharges lithium battery has a large scale between the beginning and the end, so it difficult to supply power for the LED. LED is current-driven element. The work current, voltage and

luminous efficiency show linear relationship. If the current exceed rated operational current the life of LED will be reduced. To be better and more stability illumination the LED should make a constant current driver circuit. The third over charge and discharge can reduce the lithium battery's life. To solve the problems the battery's quantity of electricity should be detected and controlled.

This design use bq20z80 as control IC, The bq20z80 family are advanced, SBS v1.1 compliant, feature-rich battery gas gauge ICs, designed for accurate reporting of available charge of Li-ion or Li-polymer batteries. The bq20z80 incorporates the patented Impedance Track technology, whose unique algorithm allows for real-time tracking of battery capacity change, battery impedance, voltage, current, temperature, and other critical information of the battery pack. Unlike the current integration- or voltage-correlation-based gas gauge algorithms, the Impedance Track algorithm takes full advantage of battery response to electronic and thermal stimuli and therefore maintains the best capacity estimate accuracy