InterActive™ Battery Management System

Preliminary

GENERAL DESCRIPTION

The EXAR InterActive Battery Management System monitors critical battery parameters to produce a highly accurate state-of-charge indication and to control slave charging systems. It is compatible with Ni-Cd, Ni-MH, & Li-Ion technologies.

By providing charger control, fuel gauge display drivers, and both a digital and analog interface, the XR-8100 allows both the OEM and user maximum flexibility and performance. The combination of these features makes it the most comprehensive and flexible system in the market today.

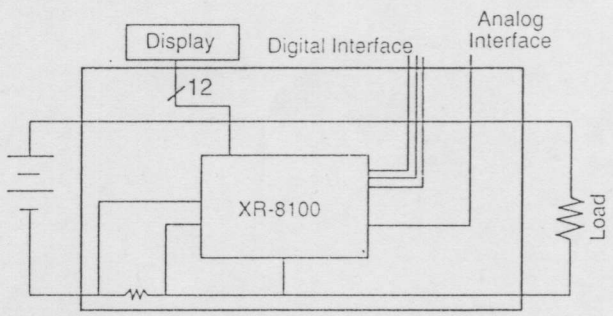
Combined with the battery and applications experience of our partner Anton/Bauer, Inc., a direct solution to the most demanding portable power applications can be achieved in the shortest time possible.

PRODUCT PACKAGING

The XR-8100 is a two chip set which allows for a high performance, high integration solution. Married with few peripheral components, it occupies minimal board space.

BENEFITS

With the incorporation of the EXAR XR-8100 InterActive Battery Management System, manufacturers can provide their end users the most reliable, highest quality, portable power system available today. The advanced logic in the XR-8100 monitors critical parameters and actually "learns" cell capacity changes over time. The XR-8100 can interface with intelligent charging systems, or it can take control of a DC power source to provide the optimum charging profile for Ni-Cd, Ni-MHi, and Li-Ion cells. The multiple interfaces provide for maximum system flexibility, while the on board display drivers allow for local display of capacity when a battery pack is removed from the host system.



XR-B1100P System Block Diagram

FEATURES	FUNCTION
•Changes in battery capacity are "learned"	•System monitors shift in capacity as cells age
•Analog capacity indication	•Provides an analog signal proportional to capacity.
•Digital interface includes async RS-232 or 1, 2 or 3 line sync communication, SBD, or custom	•Three modes of communication for maximum flexibility
•Algorithm allows for multiple system coefficients for charge, discharge, and self discharge calculations	•Compensates for temperature, capacity, and flow rates in all calculations
•On board 12 segment LED/LCD drivers	•Allows for on-board indication of capacity and status
•Calibration and service flags	•Notifies user or host of a calibration or service condition
•Compatible with Ni-Cd, Ni-MH, and Li-Ion	•Minimizes system redesign efforts
•Coulomb counter for current measurement	•Monitors system current flow
•Cycle counter and history data retention	•User and OEM can track age and usage of battery •Lower warranty costs
•Three types of charger control	•Analog, digital, and communications channels
•Six types of end of charge detection	•dT/dt, -DV, TCO, VCO, Min. I, and backup timer

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Communication

As the market has developed, many communication protocols have been established. No one communications protocol covers all the needs of a system. The robust protocols provide much information, but at a higher system cost. The simple protocols don't communicate enough information for some applications.

The EXAR XR-8100 Battery Management System supports a variety of standard protocols. A command-response protocol is transmitted over RS-232 or a synchronous 2 or 3 wire interface, the new SBD standard, or a fully custom proprietary interface. Since the EXAR XR-8100 Battery management system employs separate digital and analog ASICs, changing protocols is simply a matter of changing one small IC, with all other components (and the PC board layout) remaining the same. In addition, custom protocols can be easily developed, giving the design engineer additional flexibility and the protection enjoyed by having a proprietary interface.

Li-Ion

Li-Ion cells require a protection system to monitor for overcharge or overdischarge conditions on each cell in the stack. The XR-8100 system monitors the voltage on each cell without affecting the cell pack balance. If any cell voltage rises above a preset voltage or drops below a preset voltage, the battery pack is automatically disconnected from the terminals, thus protecting the cells from damage and the user from any harm.

Charge Cutoff Methods

The XR-8100 supports all standard cutoff methods. The system will terminate charge on maximum voltage, maximum change in temperature, maximum temperature, a minus change in voltage, a minimum current, or a maximum time. The proper cutoff method is chosen based upon cell type.

In addition, the XR-8100 supports a pack balancing algorithm, and a self discharge compensation "maintenance" algorithms, where appropriate. This ensures maximum battery capacity after removal from the charger.

Fuel Gauge

The XR-8100 employs a sophisticated analog front end and a proprietary algorithm to produce the most accurate fuel gauge indication available in the marketplace today. With multiple self discharge parameters selected by battery environment and condition, and a learning system with non volatile data storage, the XR-8100 fuel gauge accurately indicates state of charge.

Battery Life and Maintenance

As the battery ages, the fuel gauge will track the available capacity of the cells. In addition, the XR-8100 maintains a count of cycles and time since last calibration. The XR-8100 maintains "service required" and "calibration required" flags, which can be displayed to alert users of problems before they find themselves without battery power.

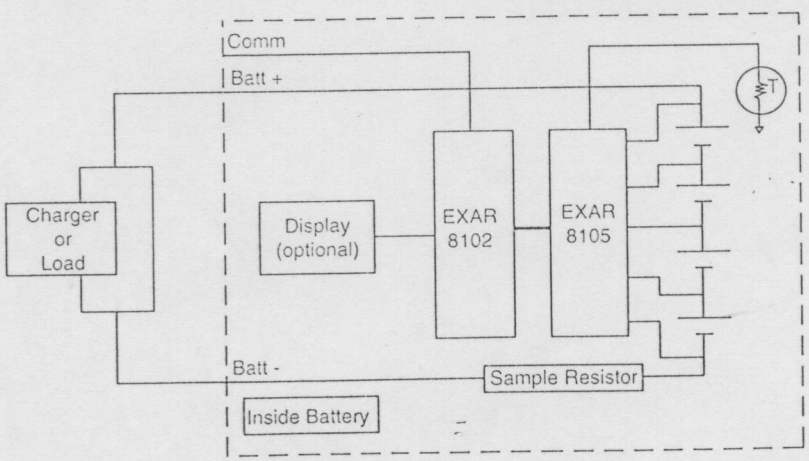

Figure 1