# QuickSort™

QuickSort™ is a rapid test method to classify the State of Health (SoH) of single-cell Li-ion batteries commonly used in portable communication devices such as cell phones, smartphones and PDAs.

In just 30 seconds, QuickSort simulates a digital load on the battery, records the response of several input variables, and then using a patented mathematical model compares the results with the known outcome for similar batteries. The result is an indication of the SoH of the battery that is over 90% accurate (*An independent study conducted in 2009 yielded a 97% accuracy result*).

**Classification vs. Measurement:**

Cadex is often asked why QuickSort does not provide a single percentage readout of capacity:

At one time, it was possible to simply measure the internal resistance of the battery and guess battery health. As Li-ion batteries have improved in quality, their resistance has stabilized and this method is no longer reliable.

On the other hand, QuickSort uses multiple inputs to obtain a more complete picture of the health of the battery instead of relying on one single measurement. As a result, it can accurately classify the health as being **Good**, **Low**, or **Poor**.

*This situation is perhaps analogous to visiting the doctor. It is possible to guess about your state of health based on a measurement of your blood pressure, but you are more likely to understand the complete picture if you also take into account your heart rate, weight, and temperature and compare them to healthy and sick people of your own age. In this case, you are more concerned with whether the doctor says you are healthy or not (Good, Low or Poor) than you are with any one measurement.*

To provide a comparison to capacity measurements, QuickSort has been designed so that within each of SoH classifications, 500-1500 mAh rated batteries will fall within a specific range of capacity measurements:

- Good = >80%
- Low = 70%-80%
- Poor = <70%


Occasionally, when compared to a full cycle discharge test that is a true measurement of capacity, QuickSort will yield a result that appears to be very far from the actual value. Cadex has determined that in a very small percentage of cases, batteries with a different chemical makeup (polymer) can act like “good” batteries when they are in fact in very poor health. Cadex continues to conduct research into issues such as this to improve the already impressive accuracy of its QuickSort technology.