Test Procedures for Benchmarking BatMax Technology

A battery test procedure is described here to benchmark how the BatMax foil affects the battery performance. The approach to establish this benchmark protocol is the following:

(A) Use a used Li-Ion or Ni-MH cellular phone battery as a benchmarking tool.

(B) Characterize the battery to establish the baseline performance, primarily its voltage profile (so-called charge and discharge curves) and capacity under a constant-power (CP, or constant power consumption rate) discharge test This CP discharge protocol will be used for all the discharge tests described herein to determine the battery capacity.

(C) Verify an accompanied cellular phone handset can reliably charge the battery, so the battery's charge and discharge curves and capacity can be obtained repeatedly by using this handset.

(D) Follow the installation instruction of BatMax manufacturer to apply a BatMax foil to activate the battery.

(E) After an activation period, conduct battery tests with the same test protocol used in (B) to find out if the BatMax foil has actually activated the battery and result in different performance characteristics.

(F) Conduct three (3) different subsets of test: (a) use a BatMax foil during both charging and discharging regime to benchmark the battery performance, (b) use the BatMax foil only when charging, and (c) use the BatMax foil only when discharging. The results of the three subset tests will reveal if the BatMax effect only happen in either charging or discharging regime, or both.

The test procedure is designed to verify the BatMax effect using a quantitative benchmarking approach. It is not designed to investigate the origin, mechanism, or induction of the effect, or to explain how it works, although some data collected from the tests might provide useful clues to understand the process. The benchmarking is intended to quantify the effect, through the tests.

More detailed procedures are described as follows:

1. Characterize the baseline performance of a test battery. In this step we will characterize charging and discharge behavior of a battery using a battery test station.

Currently, we intend to use a used Nokia Ni-MH cellular phone battery, which has been used for more than two years and showed some degradation in its performance. This battery has three cells in series with a nominal voltage of 4,2 V and is rated for 900 mAh in capacity; however, its current capacity is about 800 mAh. We need to benchmark its performance, primarily based on its charging and discharging curves (which is the voltage versus time curve under charging and discharging) and rate capacity (which is the amount of charge delivered under a constant power discharge or power consumption rate) to define its existing property.

To determine such performance characteristics, we will first charge die battery with a commonly used charging algorithm, which is comprised of (i) a constant current (CO charging regime, in which the battery is charged at a constant rate, say (73, or three-hour rate, to a pre-defined potential (say 1.45 V per cell), (ii) a constant voltage (CV) charge regime, in which we will hold the potential of the battery at the pre-defined potential as specified in (i) over a certain period of time. until the current drops to a pre-defined trickle charging current (say C/18 or 50 mA), (iii) a trickle charging regime, in which die battery is charged at the trickle charge rate until the capacity readies a pre-defined value, or the time of this regime reaches a limit, or the voltage of the battery reaches a maximum value, or the overall charge reaches an amount predetermined by the manufacturer. Once one of these conditions is met, the battery will be considered fully charged. We will then conduct a 10-hour CP discharge experiment to determine the resulting capacity of the battery. This 10-hour CP rate is calculated for the rate of dissipating the rated energy of the battery (which is the product of the rate capacity and nominal voltage) in 10 hours. The capacity so determined will be measured three times to affirm that the battery can deliver such a capacity reproducibly.

2 Determine the normal capacity delivered by the battery using a handset charger. After we determine the existing capacity of the battery, with the test station, we will then use the Nokia handset to charge the battery. The voltage profile of the battery will be recorded during the charging period. The capacity of the battery will be determined by the battery test station, so me power of discharge will be regulated to the same 10 hours constant power rate and the capacity can be determined and compared with the one previously determined in step 1. To facilitate the measurements, we will device a special contact for the battery (basically it is a metal contact on an insulating plastic sheet that can be applied to the battery but block the contact with the handset conductors). This device and contact arrangement will allow me capacity of the battery be measured by the test station, while the battery still sits in the handset. We will repeat this test three times.
This step will verify if the charger can repeatedly charge the battery with a reliable capacity delivered.
Once the first two steps are completed, we will be able to conclude if we have a battery and a handset dial can be used to benchmark the battery performance with confidence.

3. Apply a BatMax foil to activate the battery. Apply a BatMax foil to the handset and battery according to the BatMax's instruction (i.e., apply the BatMax foil onto the handset, which will cover at least 60% of the battery footprint, so the BatMax film can correctly perform its function to the handset and battery – the white active side of BatMax must face towards the battery – the BatMax foil must be installed inside the battery compartment on the handset side not on the cover side if possible – Do not peel off the protective adhesive paper (leave the paper, this is a protection to avoid short-circuit or contact with the SIM card between the aluminum of the BatMax foil and the handset) - Note than if the BatMax foil is reversed there is no effect).
The handset and the battery will be used as in a regular cellular phone operation, although the phone is not subscribed to any service plan. This activation period will last for seven (7) days. The phone will be turned on all the time during this activation period. Every time when the battery is drained, the AC adaptor will be plugged into a wall outlet to recharge the battery. The voltage of the battery will be recorded regularly.
Important note: To obtain an accurate test result, the battery and the foil must be installed inside the handset.. If the test is conducted on the battery itself (uninstalled inside the handset) the test will reflect lower performance.

4. Benchmark the battery performance in the presence of the BatMax foil. At the conclusion of the activation period, we will begin to determine the capacity of the battery according to the procedure described in step 2. In this case, Ac battery will be charged by the handset with the BatMax foil. The discharge capacity will be determined by the test station using the same 10-hours constant power rate, while the battery remains in the handset (in the presence of the BatMax foil), but without any electrical connection to the handset contacts. This step will confirm if the battery perform differently due to the presence of the BatMax foil. We can repeat this step as many times as necessary to find out if the effect can continue being activated or sustained over certain duration.

5 Verity if the battery performance influenced by the BatMax foil was in the charging or discharging stage or even both. After completing the tests in Step 4, and the results are positive, we will remove the battery after charging in the handset with the BatMax foil in place and test it with the test station without the presence of the BatMax foil. This step will separate the influence of the BatMax foil between the charging and discharging stages Vise versa, we will charge the battery in the handset without the presence of the BatMax foil and discharge the battery while it sits in the handset with the foil present. Repeating the experiments and comparing the results obtained from these two different scenarios will enable us to distinguish the influence of the BatMax foil at different stage of charging and discharging.

By completing these five steps of tests, we will have a complete record of the effect of BatMax, the battery life extension and the acceleration of the charging speed.

You can find the installation manuals on our web site at: http://www.batmax.com.
We greatly appreciate your feedback and comments and we are waiting for your test report that you can return using the email address:: info@batmax.com.
Thank you