LITHIUM-ION BATTERY

HOW IT WORKS AND HOW TO USE IT WITH SAMSUNG TABLETS.

INTRODUCTION: KEY CHARACTERISTICS OF A LITHIUM-ION BATTERY

Most mobile devices (including tablets) currently use built in Lithium-ion rechargeable batteries. These batteries have a high energy density, minimal memory effect, and low self-discharge.

When using replaceable Lithium-ion batteries, only use a battery charger designed for this type of battery. Charging a Lithium-ion battery with the wrong charger can damage the battery, result in a fire, or cause the battery to explode.

DESING: PRINCIPAL CHARGING RULES

The special charging hardware and rules are built into a Samsung Tablet, rather than the external USB power supply. This built in charging hardware and battery pack design ensures the batteries are safe to use.

Many of the special rules managed by a Lithium-ion battery charger include:

- The battery voltage must never be too high or too low
- The battery must not be charged if temperature is too high or too low
- The recharging voltages and currents must follow rules specific to the battery chemistry
- Charging characteristics may need to be adjusted based on temperature
- Once the battery is fully charged, the voltage applied turned off or dropped to a safe level

If a Lithium-ion battery voltage drops too low, the battery is permanently damaged. Tablets will turn off before the battery level drops to a critical level.

The battery in a tablet that is turned off will slowly lose some charge each day, even if not being used. If the tablet was shut down due to a low battery, you still have many days before there is any real problem. Samsung tablets are generally shipped from the manufacturer with the battery charged to the 50% to 60% level. These tablets may sit on the shelf for months, before they arrive in a store.

Always keep the battery charged up, even if the device is not to be used for a period of time.

It is preferred to turn off a tablet while it is being recharged, and then unplug the charger once the battery is full. Many people will use a tablet while it is charging; however this will reduce the battery life.

A Lithium-ion battery loses capacity as it ages, which to true for any rechargeable battery. The chemistry permits a limited number of full recharge cycles. It is better to keep the battery "topped" up, rather than always letting it discharge to a low level before recharging.

Older battery technologies suffer from what is called "memory effect". These batteries lose capacity if repeatedly recharged after being only partially discharged. There are numerous battery issues that are treated as "memory effect", which are not correct. The common myth that resulted was that all rechargeable batteries should be routinely discharged to a low level and then fully recharged. This isactually a good way shorten the life of your batteries. If your lithium-ion battery can be topped up, do so as it is actually better for the battery.

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Tablets are design for operation at room temperature. The expected value is around 25 degrees Celsius. Operation of a tablet at elevated temperatures will shorten the battery life.

As the battery ages it may not just lose capacity, but can also start to expand. A battery may expand (aka bloat) enough to bulge the tablet screen and eventually damage the tablet screen. Once a battery starts to expand it should be replaced. This is a common problem with mobile (aka cell) phones. A common test is to place the device on a flat surface and try to spin it. If the spins, the battery is starting to expand.

The temperature sensors present in tablet battery packs are not located within the battery itself, but in close proximity. The sensors used to not have a high degree of precision, but are adequate for the purpose of managing the battery. If the battery changes between charging and discharging, the reported temperature may jump. The initial jump is due to the changes in voltage levels in the related electronics. Changes due to battery temperature occur at a slower rate.

Heat is not good for battery life or the tablet electronics. The tablet generates heat when being charged or discharged. The tablet electronics and screen generate heat. The tablet screen is a major source of heat, and is of course right on top of the battery. If you application do not require full brightness, lower it to improve battery life. Reduced heat helps prolong the electronics of the tablet as well.