



LAVA Advanced Battery Info Android Application

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Abstract

The LBI (LAVA Battery Information) application reports battery status for select Samsung Android based tablets. In addition to the standard battery information available through Android, the battery charging current is reported.

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Introduction

The LBI (LAVA Battery Information) application reports battery status for select Samsung Android based tablets. In addition to the standard battery information available through Android, the battery charging current is reported. This application works with Samsung Tablets compatible with the LAVA STS-RBM, STS-E, STS-PE, STS-2UE, STS-P2UE, STS, and TL002 devices.

The program uses a hidden mechanism in a Samsung Tablet that reports the battery charging current. The reported current level changes slowly, which is a tablet specific issue, so you must be patient when checking the charge rate.

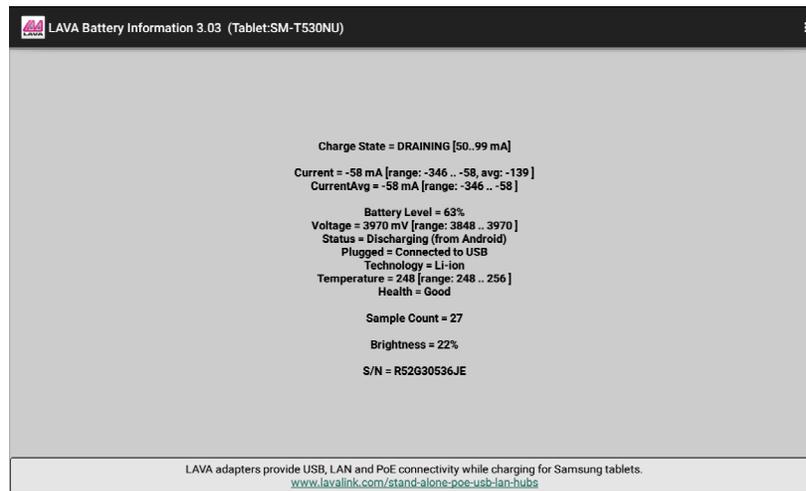
This program is free on Google Play to anyone using a LAVA STS-** products.

The Google Play filters are set to present this application only for select Samsung tablets. If you are using a “new” Samsung tablet, the filters may not have been updated. Please contact LAVA sales or support so we can get the program to you.

“LAVA Advanced Battery Info” on Google Play



“LAVA Advanced Battery Info” running on a tablet



The Battery Charge Icon of a Samsung Tablet does not provide a true indication that the battery is charging. This indicator only reports that a voltage has been applied to the tablet. If the voltage that reaches the tablet is too low, the tablet battery may actually be discharging even though the Battery Charge Icon reports charging.

You cannot rely on the Battery Level due to the update rules used by Android. The Battery Level indicator can get stuck or drop by an unexpected amount when discharging. When a tablet is running a CPU intensive application such as playing a video, some tablets have been seen to go from 20% charge to shut down with no additional warning.

Measuring the current entering a tablet cannot be used to confirm how the battery is being charged. The current entering the tablet must provide for the tablet operation, with excess current being available for the battery charge operation. Many Samsung tablets are designed to limit the current that can enter the tablet in SimulCharge mode that adds another complication for a system developer.

To ensure the battery is actually being charged, the battery charge current must be monitored. The Samsung Tablets used with the LAVA STS-RBM, STS-E, STS-PE, STS-2UE, STS-P2UE, STS, and TL002 have the ability to report the battery charge current.

The LBI Test Application was developed as an in-house test tool at LAVA Computer MFG Inc. This application reports the battery charging current and the standard Android Battery information. The "Charge State" is also evaluated by the application in place of the Android Battery Status.

The LBI specifications are subject to change without notice. The LBI (LAVA Battery Information) application and documentation are owned by LAVA Computer MFG Inc, Copyright 2016. The LBI application can be freely used by customers working with the STS-** family of devices. However, this is not an open source application and has not been put in the public domain.

Application Features

When the LBI application is put into the background; a periodic Android Toast message reports the battery status. This allows a customer application to be run and permit the battery charge status to still be observed. The option menu has a "LBI Shutdown" to optionally terminate the program.

When the LBI application is active, the screen is not allowed to go into a sleep state. In addition to reporting the battery status, the LBI reports the screen brightness and the tablet serial number. The tablet IMEI number is displayed on relevant devices.

The screen brightness report has been useful during tablet testing by LAVA. The screen is a major consumer of power. If the brightness is too high, there is less power (hence current) available for battery charging.

The application allows the background brightness level to also be set.

The application has the option to write the battery information to a log file. The log file is located in the Download folder. The files format is always UTF8 (simple ASCII). The file name is LBI_LOG_*, where * is the tablet serial number. The log file header reports the contents of each field, application version, android version, and tablet build number, and tablet serial number. The file is limited to 25,000,000 characters.

Application Operation

Connect the STS-RBM to the Samsung tablet running LBI. Once the STS-RBM is attached, power is applied to the STS-RBM. The tablet may not recognize the attached USB device(s) if the order is reversed.

The STS-RBM device can change charge modes, be powered off, or removed. The LBI application can be put into the background to permit a user-selected application to run.

The application reports "Charge State" which is an alternate battery status to that reported by Android. It does so by tracking the battery charge current to see if the tendency is to go up or down. Some of the standard Android status is factored in.

The battery charge current measurement update varies between the different tablet models. On some models the reported current may not change for many seconds. You must observe the tablet you are using to determine how fast the update is before accepting a reading.

The program samples the android information once a second. If the program is not in the foreground, then a Android Toast message is displayed every 10 seconds with the following:

- Charge State
- Current
- Current Average (from last 2 minutes)
- Battery Level
- Battery Temperature
- The Charge State is mainly reported as DRAINING or CHARGING along with a current range.
- The following information is direct from Android and the tablet:
 - Battery Level
 - Current
 - CurrentAvg
 - Voltage
 - Status
 - Plugged
 - Technology
 - Temperature
 - Health
 - Online Status
 - Brightness
 - S/N (Serial Number)

The program tracks the min and max values for Current. It also tracks an average for Current for the last two minutes, so is different from CurrentAvg.

The program tracks the min and max values for Voltage. The reported Voltage is the Battery Voltage reported by Android, not the input voltage to the tablet.

The Charge Tendency is a running sum of Current, with a limit of +250 and -250. This is the main parameter watched to determine "charge state".

The Charge Tendency has a second sum reported between '\(' and '\)' characters. This is also a running sum of Current, but with limits of 1000000 and -1000000. In a perfect world the long tendency would report the actual charge in the battery, however the starting point is never known. The values in between the 1 second samples are not known. This long sum has been useful in some tests.

The Charge State Changes is simply a count of the number of jumps in Charge State.

The Sample Count is the number of times the programs timer has run to collect a sample. The Sample Count should advance every second.

The Screen Brightness report is handy to know the actual brightness level. Some tablets only have a slider to set the brightness. This lets you know if you are at 50 percent versus 55 percent (etc).

The brightness level of the application background can be set to a number of levels via a button. This was useful in many of our tests.

The Status field is the Android report of battery status. The Status field replaces the "charging" report with "Voltage present (from Android)". The Android Status of "charging" is misleading. If the input voltage to the tablet is above the reset threshold, then "charging" is reported even though the battery could be draining due to a low input voltage and a bright screen. The screen is the major consumer of power on all these devices.

Additional Notes

The charge current has not been verified against physical battery measurements. Based on close observation of many tablets, it does provide an indication of the charge going up or down. The Samsung Tab 4 10" tablet has been used for the majority of our experiments.

The LBI application does not work with the Samsung Tab Active. This tablet is not included in the LAVA compatibility table for STS-RBM devices. This tablet does not support the battery current report that other Samsung tablets have. The reporting mechanism is present. However a fixed value is always reported.

Measurements reported by LBI should always be confirmed through your own tests before deploying any system. The accuracy of the reported current can vary with each tablet and tablet model.

The LBI Test Application is owned by LAVA Computer MFG, but can be freely used by customers that have purchased and are working with the STS-RBM family of devices.

