

October 16, 2017 (v11)

LAVA PhoneFuse Description (a reference for internal use)

The LAVA PhoneFuse improves the battery longevity of any device requiring a 5V USB Charger and a standard Micro-USB connector. Although the PhoneFuse was originally intended for mobile devices such as telephones and tablets, any device which uses a USB Wall Charger (e.g., a Blue-Tooth Wireless speakers) may also benefit from PhoneFuse.

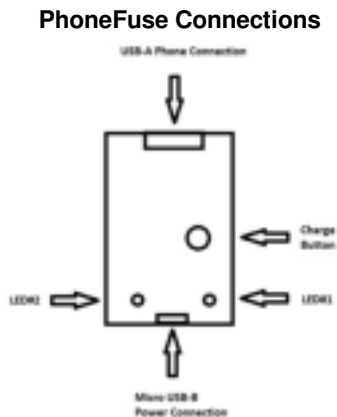
The PhoneFuse connects between a Mobile device and the USB Charger it was supplied with. The primary feature of the PhoneFuse is to allow the device battery to charge for up to 4 hours and then disconnect the charger from the device. The PhoneFuse allows charging to continue long enough for most devices to fully charge and prevent overcharging.

The PhoneFuse also monitors the power being drawn by the device and may preemptively disconnect the charger if the battery appears to be full, or nearly full. The PhoneFuse does not know the exact level of the battery charge and therefore has to make an estimate based on how lithium-ion batteries behave.

The PhoneFuse saves the user from having to monitor the charge cycle and disconnect the device at an appropriate time. Some mobile devices even display a message when the charge is completed, requesting the charger be removed.

After attaching your mobile device to the PhoneFuse, press the Charge Button to start charging. This assumes the PhoneFuse is already attached you your USB Power Supply, and the Power Supply is plugged into a wall outlet. Briefly pressing the Charge Button during a charge cycle, restarts the charge cycle. The button must be pressed and released within a ¼ second to 2-second window.

If you attach your mobile device to the PhoneFuse and then connect the PhoneFuse to power, the device charging will start the same as if the Charge Button was pressed.



The PhoneFuse case has the following:

- Micro-USB receptacle for input power
- USB-A receptacle for connection to your mobile device
- a short cable to connect the Phone Fuse to your device
- a charge button
- two status LEDs
- molded casing with a flat bottom for a label

A short USB-A to Micro USB-B cable is provided to connect the PhoneFuse to the phone.

Once the PhoneFuse has turned off power to your device, if the battery is not full, briefly pressing the Charge Button starts the charging cycle again for a minimum of 10 minutes and a maximum of 4 hours. The PhoneFuse will always disconnect the charger after a while, saving you the trouble of having to disconnect the charger.

Each time the charging has ended, the PhoneFuse waits 3 hours to automatically start a “top up” the charge. If the device was being used or simply has a weak battery, the “top up” helps keep the device

ready for mobile use. The “top up” timeout has 6 settings. Setting 1 to 5 selects a timeout of 1 hour to 5 hours. The default is setting 3, which yields 3 hours. A “top up” setting of 6 disables the “top up” feature.

Intended target devices all use lithium-ion batteries, as this type of battery does not suffer from the memory effects associated with older types of rechargeable batteries. This means that a device can be recharged any time it is convenient, rather than waiting for the battery charge to drop to a minimum percentage. In this situation, a battery does not need to be fully charged during each charge operation.

Ideally, a device using a Lithium-Ion battery should be turned off while charging, although most people do not bother. Using the device while charging makes it difficult for the internal charge controller to operate properly. Once the battery is fully charged, the device should ideally be removed from the USB Charger which is handled automatically by PhoneFuse.

As with all batteries, lithium-ion batteries have a minimum and maximum temperature at which they can be charged, and the battery charging must adhere to these limits. These batteries have very specific rules on how they are to be charged, which are handled by the charge controller built into each device. The built in charge controller allows a simple USB Power supply to be attached for recharging.

While many of the LAVA tablet oriented products are designs specifically for Samsung devices, the PhoneFuse works with any device containing a lithium-ion battery and a 5-volt USB Charger which is attached through a Micro USB connection.

Warning: *Many phones now support the Quick-Charge feature. Provided a 5-volt USB Power supply is used, the PhoneFuse is compatible. The PhoneFuse **must not** be used with a Quick Charge v2.0 (or higher) charger as these units provide more than 5-volts, which will damage the PhoneFuse.*

Setting and Viewing the “Top Up Settings”

The PhoneFuse has six “Top Up Settings” used to optimize the device for a given phone. The settings are referred to as level 1 to 6. The default is level 3.

Clicking the button 1 to 6 times, followed by holding the button for at least 10 seconds allows the Charge Setting to be configured and verified. After 5 seconds, the two LEDs flash back and forth for a moment, and then the Charge Setting is reported by flashing both LEDs a number of times equal to the Charge Setting followed by a 2-second pause. So long as the button is pressed, the Charge Setting is reported.

The “click” duration is a button press of ¼ second to 2 seconds. The pause between “clicks” must be no more than 1.2 seconds, else the previous “clicks” are ignored. Each of the 1 to 6 clicks starts a new charge cycle; hence the 4-hour timer is restarted.

Just pressing the button for at least 10 seconds, allows the current configuration to be viewed.

If the button is pressed 7 or more times, see the “Day and Night Mode” section.

When the button is released, the normal LED display rules are restored.

While reporting the Charge Setting, the normal charging operation continues.

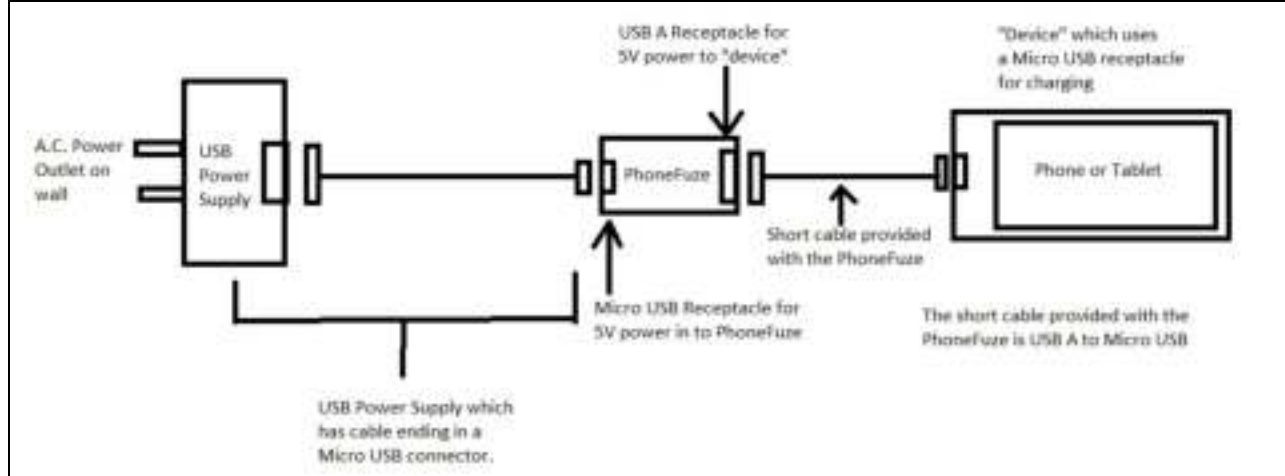
Night and Day Mode

The Night Mode results in the LEDs being turned off after 10 to 12 seconds. Clicking the button wakes up the LEDs to permit a status report. If neither LED comes on, the button was not released within 2 seconds of it being pressed, or the USB Charger has been unplugged.

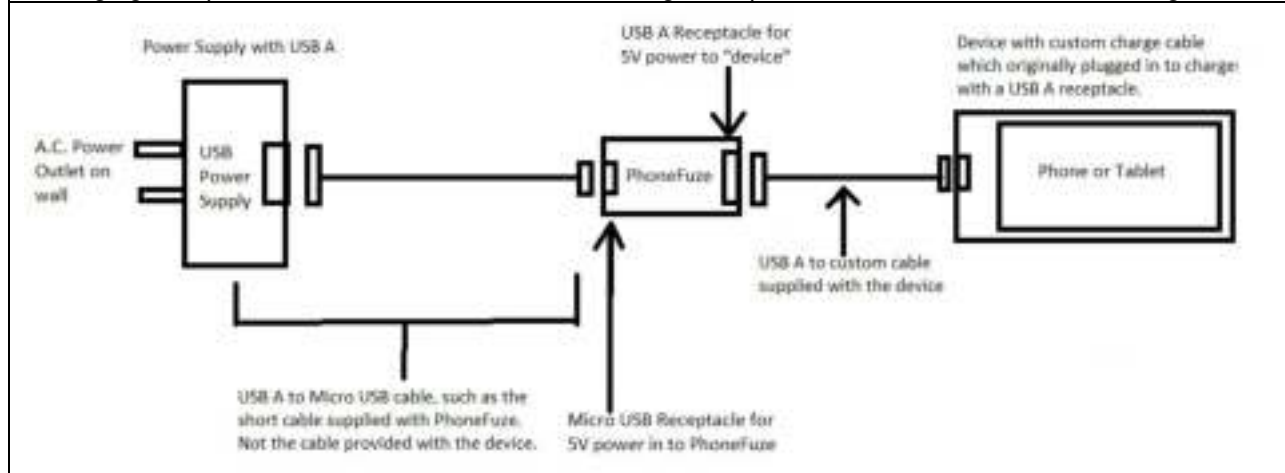
In Day Mode the LED status is always reported.

Day Mode is the manufacturing default.

Charging Setup #1: Device which uses a Micro-USB receptacle



Charging Setup #2 – Device which uses custom charge receptacle that has a USB A at the charger end.



This configuration allows the PhoneFuse to be used with any device that used a USB Charger with a USB A receptacle. Devices such as iPhone, iPad, USB-C based devices, become a possible target for the PhoneFuse. A simple method of explaining these options is required.