

## UsbSafe<sup>2</sup>

An open, programmable dongle for protecting USB devices from USB hosts and chargers.

Always be safe and protect your private data and gadgets while connecting by USB.

### Introduction & Overview

USB connections can transfer both information and power. UsbSafe<sup>2</sup> is a device for protecting USB-connected hardware from both excessive voltage, current and unauthorized data access. Unfortunately, the practice of "juice jacking" (accessing data from a device connected to a public charging station), has become all too common. UsbSafe<sup>2</sup> provides a unique combination of an anti-juice jacking mode with protection from faulty power sources. With UsbSafe<sup>2</sup> you'll feel safer knowing that your valuable gadgets are protected and secured, wherever you go and whatever you plug into!



# What Does It Do?

USBSafe<sup>2</sup> provides two kinds of protection: data security and protection from excessive power.

You have complete control over the power going into your device. Over-voltage protection (OVP) ensures your hardware is never exposed to voltage higher than 6.5 V. Current protection is provided at five selectable levels, which you set with a simple button press. If a high voltage or high current condition is detected, UsbSafe<sup>2</sup> disables the power output to your device.

By enabling data integrity mode Juice Jacking will be impossible and your private data is protected.

# Who Needs It and Why?

Frequent travelers, students, or other folk always on the move will appreciate USBSafe<sup>2</sup> for the piece of mind it provides; they'll know their device can be charged safely *and* securely at the airport, train station, or café.

UsbSafe<sup>2</sup> is also a great tool for USB developers. Using it in the lab for power regulation and protection saves developers time and money during measurement and verification. For example, if you are using an Arduino, Raspberry PI, or other expensive development board, you can protect their USB ports with UsbSafe<sup>2</sup>. Similarly, if you want to test a small circuit you've just designed, connect UsbSafe<sup>2</sup>, set the appropriate current threshold level, and run your test without fear of releasing the magic smoke!

# Using UsbSafe<sup>2</sup>

All settings are done with one single button.



1) D2/Data LED 2) Set/Reset buttons 3) D1/Power LED

## Data integrity mode

When the green data LED is lit, USB data traffic is enabled. Press and hold the set/reset button while simultaneously inserting the unit into a USB jack to disable data traffic. You *must* hold the button for longer than two seconds during and after insertion until the green LED goes off. UsbSafe<sup>2</sup> is now in anti-juice jacking mode. By default, data traffic will be enabled each time the UsbSafe<sup>2</sup> is connected. You must manually disable data traffic every time you connect it.



## Power monitoring

The threshold at which UsbSafe<sup>2</sup> will disable power can be set by the user. Five settings are available: setting (1): 0.5 A, (2): 0.9 A, (3): 1.5 A, (4): 2.1 A, and (5): 2.4 A. The red power LED indicates the current power threshold setting. The threshold is set by pressing the set/reset button for more than three seconds, until the red LED lights solid. Release the button and the new threshold will be set. For example, to step from level one to five you will need to press the button four times, remembering to hold the button for three seconds each time to light up the red LED

A short push of the button will display the current power setting. The red LED will flash the number of times corresponding to the number of the current setting. For example, the LED will flash three times to indicate Setting (3) (1.5 A).

During normal operation, the red LED will flash every seven seconds. If the set current threshold is exceeded, power output is disabled and the red LED light solid. Reset UsbSafe<sup>2</sup> by either pressing the button or by disconnecting it from the USB power supply. The set current limit is stored in memory and is not lost when UsbSafe<sup>2</sup> is disconnected from power.

Over voltage protection is managed solely by hardware and is fixed at 6.5 V.



## Open Source

The full documentation, specifications, and source code for the project are [available on Github](#). This means you can customize both the hardware and the software to meet your exact needs. All the components in the BOM are standard and can be easily found and replaced to alter the hardware specifications if needed.

Code is written in C and compiled with MikroC from Mikroelektronika. Schematics and PCB layout are created with Diptrace.





# Manufacturing Plan

UsbSafe<sup>2</sup> will be assembled by Itead Pcb, a reputable external electronics manufacturing service. To ensure high quality, all units will be tested in-house before shipment. Test and manufacturing equipment is still under development.



## Risks & Challenges

UsbSafe<sup>2</sup> prototypes work correctly and have been real-world tested and used by several users without issue. No issues are expected, though of course it's impossible to anticipate everything. The software and hardware layout are still being refined, so always check to see if the design files have been updated.

Production and logistics delays can occur, but we will communicate these and any other issues fully and transparently to the project's backers.



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