

# Universal USB Power Supply with Intelligent Supply Voltage Regulation for Charging of Smart Phones, Tablets and Laptop Computers

## Energy & Environment

Electricity and Power Electronics

Energy Conservation/Generation/Management/Storage (Battery)

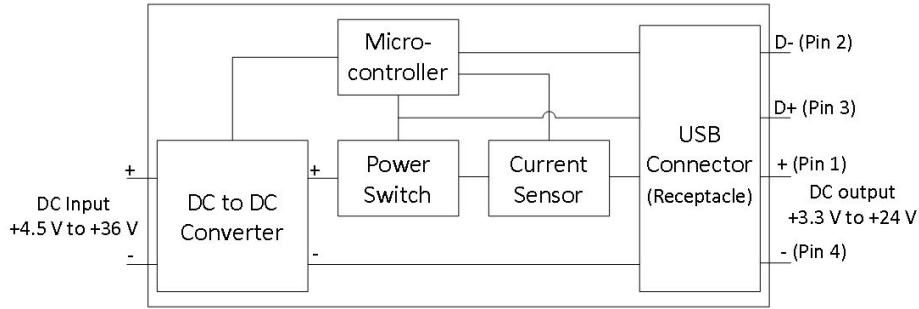


Figure 1. Schematic block diagram of a universal power supply

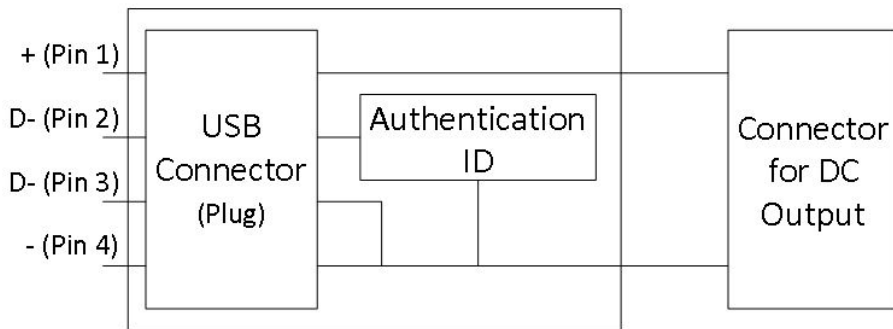


Figure 2. Schematic block diagram of a custom-made cable



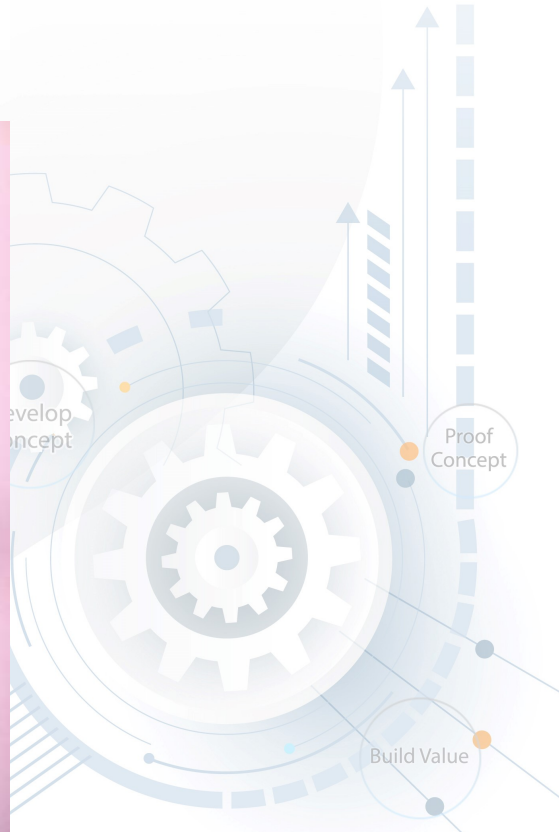
Figure 3. Custom made cable

**IP Status**  
Patent granted

Technology Readiness Level (TRL) ?

4

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## Opportunity

It is habitual nowadays to carry multiple portable personal devices, e.g. smartphones, tablets and laptop computers, for travelling or for business purpose, because of the necessity to communicate with others and access online information. However, the batteries for power storage in these devices get drained in a few hours, and it is inconvenience that dedicated power supply for the personal devices shall be carried depending on different brands, models and power output. Particularly, there is no harmonized standard for the laptop power supply voltage, therefore, laptop computers always come with a specific power supply for battery charging. Indeed, the specific power supply becomes an unnecessary electronic wastage once the laptop computer is abandoned. Accordingly, there is vested interest regarding universal power supply for the sake of a convenient and reliable way of charging and environmental sustainability to reduce electronic wastage.

## Technology

This invention conveys an intelligent universal USB power supply and a custom-made cable for portable personal devices requiring a direct current (DC) supply of different voltages. When the custom-made cable is not connected, the intelligent universal USB power supply has typical output voltage (e.g. around 5 V DC) for charging smartphones and tablets. While the custom-made cable is employed and identified, a current sensor and a microcontroller embedded in the intelligent USB power supply can detect and analyze the current patterns of a connected device, and then an intelligent algorithm is capable of identifying input current patterns of the connected device for recognition of desired operational voltage, in order to automatically adapting to charge the connected device, including laptop computers of different models and manufacturers having DC operating voltages ranging from 9 V DC to 20 V DC. The intelligent universal USB power supply can also be configured to operate under buck mode for a stabilized lower output voltage and boost mode for fast charging.

## Advantages

- Universal power supply to charge smartphones, tablets, and laptop computer
- Manual selection of the desired voltage is not required for the connected device of smartphones, tablets, or laptop computer

## Applications

- Charging portable personal devices at Home, in Automobile and Public Area

