



# DC Programmable Power Supply

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## Overview

A DC power supply provides direct current (DC) voltage to power a device under tests such as a circuit board or electronic product. A DC power supply typically sits on an engineer's work area or bench and is often referred to as a bench power supply.

DC-regulated power supply with an adjustable output.

This output can be used for constant voltage (C.V.) and constant current (C.C.). The output voltage can be adjusted between 0V and 30V when the device is in constant voltage mode. The current-limiting point can be set arbitrarily in this mode. The output current can be adjusted continuously between 0A and 10A in the constant current mode. The output current and voltage are indicated on the LCD displays.

## Project Background

My motivation behind it. a DC power supply is used by engineers to test a component, circuit, or electronic devices, such as IoT devices, medical products, mobile phones, and remote industrial sensors. The DC power supply allows engineers to set and supply specific voltages to power the device to confirm it's working as intended.

- Number of output channels (single or multi-output)
- Output voltage, current, and power
- Setting resolution and accuracy
- Ripple and noise
- Features and programmability
- Advanced features like current measurement with nanoamp resolution, sequencing, analog inputs, digital I/O, and programming features

## Proposed Solution

1. Programmable Remote-controlled over USB and WiFi.
2. Over Voltage, Over Current, Over Power, Over Temperature, Reverse polarity, and short circuit protection.
3. Includes free software for Windows and Linux.
4. Stabilized voltage and current for repair processes.
5. Manual control mode. Including storing preset voltage and current.
6. Galvanic isolation between the power supply and the computer.
7. Set voltage and current Control function on Display.
8. Battery life tester and battery charger.
9. Custom Modular PCB boards.
10. Rotary encoder and switches are used to Interface.
11. Monitor temp, test result Parameters, and power failure.
12. Multi-range Voltage & Current Combinations in One Power Supply.
13. CV/CC Priority; Particularly Suitable for the Battery and LED Industry.
14. LCD display and menu-typed functionality selection.
15. Support front panel output terminals (Max.10A) and rear panel output terminals (Rating current output).
16. Output on/off control.
17. Fan speed control.

## Specifications

Voltage Rating:	30V
Current Rating:	10A
Output Power Rating:	300W
Display:	LCD Color 128 x 160
Microcontroller:	ESP32/STM32

## Requirements

### Budget

Item	Price(Rs)
Display	729
ESP32 module STM32F103C6T6	328 594 +659
WCM1700-50C (50A) / SparkFun Current Sensor Breakout – ACS723 (5A)	997
INA219 26v/3.2A	290
IRL520 N-channel 100V 10A Mosfet	72
Mosfet Driver IRS2104	100
Switch	50
ISO3082DW – 5V 20Mbps Half-Duplex RS-485 Transceiver 2.5kVrms Isolated IC	400
ISO7721FBDWR	230
ADUM121N0BRZ-RL7	230
Rotary Encoder	50
Temperature Sensor	100
Fan 12v	100
LTC2453CTS8 (ADC)	350
ADS1115 ultra-compact 16-bit(ADC)	466
PCM1753DBQR (DAC)	195
DAC0808LCN (DAC)	237
TOTAL (Estimation)	~3,761 RS

## Tools

- Esp32/Stm32 Microcontroller
- Lcd Module
- Current measurement IC
- Voltage Measurement IC
- Power Mosfet Switch
- Mosfet Driver
- Galvanic Isolator
- Switch and Rotary Encoder
- Fan with Temperature Sensor
- DAC and ADC 16 bit/32-bit

## Skills

- Programming in ESP IDF / STM32CubeIDE
- Python For App
- Graphics for Interface
- PCB in KiCad

## Expected impact and Success metric

Complete the Project on time without being lazy.

## Timeline

Task	Number of days	Notes
ESP IDF compatibility with Lcd Driver		code
Selection of Hardware Parts Mosfet, Mosfet Driver ADC, DAC, Temperature, Fan, rotary encoder, voltage, and current.		physical
Buy the stock		
Current Sensor		code
Voltage Sensor		code
DAC / ADC Module		code
Temperature sensor		code
Fan, Rotary Encoder and Switch		code
Mosfet driver and Mosfet		Hardware with code compatibility
Multi Core function implementation		code
Add Algorithm		Measure current, voltage, power, temp, switch, DAC, ADC, and rotary encoder.
Print every data on serial		code
Display Data on Lcd		Raw real-time
Graphics-box, color, animation, and images		code
Design MotherBoard PCB		Combine every module ic and connector,
OTA		Update the firmware over air
Webpage Integration		Monitor remotely -JSON
Linux and windows based app		Interface for the user to set and monitor data for analysis -JSON
Testing and calibration		DSO and Multimeter