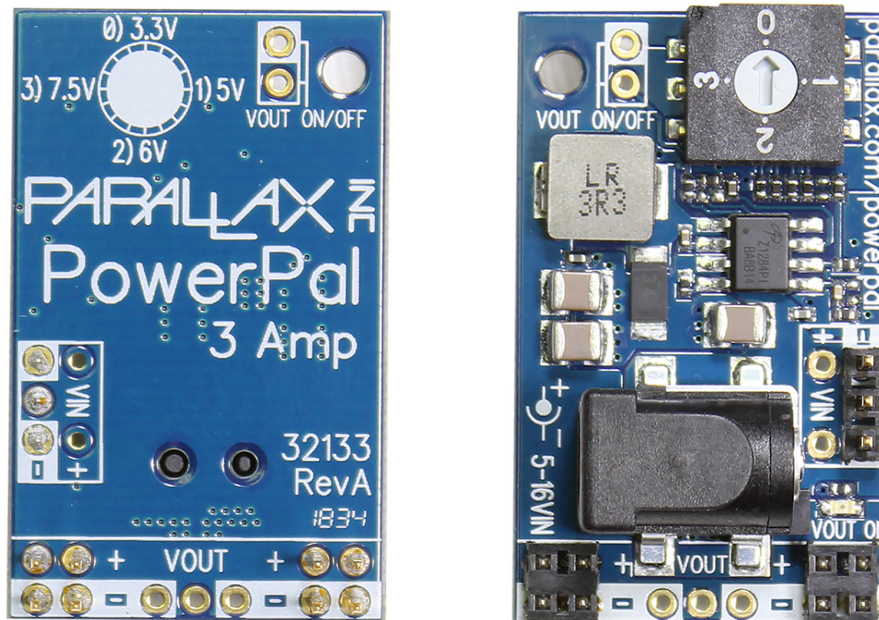


PowerPal Selectable Voltage 3-Amp Breadboard Power Supply (#32133)

The PowerPal is a breadboard-friendly 3A power supply module that allows you to select from four different output voltage levels. It's ideal for regulating power to the Propeller FLiP Try-it Kit or other breadboard based projects along with a battery pack or wall-mount supply. It comes with two sturdy 2x2 headers which plug directly into the breadboard rail. Through-hole pads are provided that allow the user to optionally add an additional VOUT header or on-off switch leads.



Features

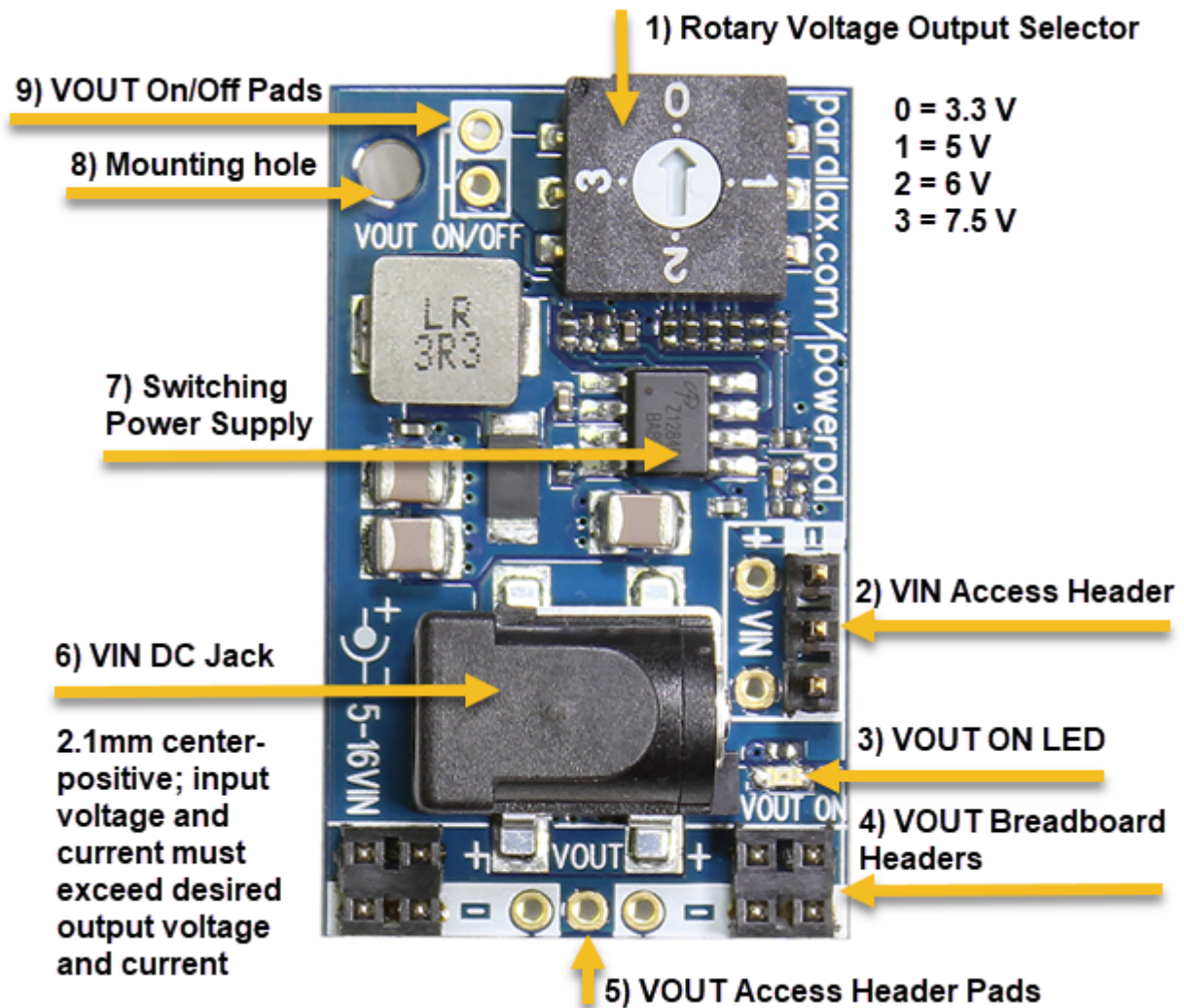
- Rotary switch for user-selectable voltage output choices: 3.3 V, 5 V, 6 V, 7.5 V
- 3 Amp continuous load switching power supply
- 4 Amp peak surge rating is ideal for servo motors
- Barrel Jack or 0.1 inch pitch headers for 5-16 VIN
- Through-hole pads for optional On/Off switch leads
- Green power-status LED
- Over-current and over-voltage protection
- Over-temperature and short-circuit protection
- 0.1 inch (2.6 mm) diameter mounting hole
- All headers on a 0.1 inch (2.54 mm) grid

Key Specifications

- Voltage input requirements: +5 to +16 VDC
- Voltage output selectable by user: 3.3V, 5V, 6V, or 7.5V
- Voltage output tolerance: Typically 2% at a 2A load, 3% at a 4A peak load
- Current rating: constant load 3 A; absolute peak 4 A
- Nominal switching frequency: 770 KHz
- Efficiency: up to 95%
- Operating temperature: -13 to +185 °F (-25 to +85 °C)
- Dimensions: PCB 1.5 x 1 inch (39 x 24 mm); 0.1 inch (2.6 mm) mounting hole

Feature Descriptions

Read the full explanation of each labeled feature on the pages that follow this diagram.



1) Rotary Voltage Output Selector

Select an output voltage (VOUT) using a small screwdriver to rotate the arrow. The markings on the rotary selector and the voltage are shown on the back of the PowerPal:

0 = 3.3V, 1 = 5V, 2 = 6V, 3 = 7.5V

While rotating the voltage selector between options, the output voltage will be limited to about 1.8V and the VOUT LED will switch off to signal that the voltage selection is not valid.



Take care when changing voltages! If your project expects 3.3V, but you select 7.5V even briefly, it may cause significant damage!

Always unplug the external power supply while changing voltage. We strongly suggest unplugging the PowerPal from the breadboard and testing the VOUT setting with a multimeter before connecting the PowerPal to your project, especially if you have any doubts about the module or your power supply.

2) VIN Access Header

The VIN Header is a 0.1" pitch 3-pin header. To provide some polarity protection for the user, the two outer pins are negative, and the center pin is positive.

The 3-pin VIN header is connected directly to the DC Jack, and so care should be taken not to supply power into the PowerPal through both the DC Jack and the 3-pin VIN header at the same time.

Located between the DC Jack and 3-pin VIN header are two additional unpopulated + VIN through-hole pads. These do not have any headers installed, and are intended for advanced users who might want to install alternative connectors here. If you not need these, then please ignore them!

3) VOUT ON LED

The green VOUT ON LED will light up when the rotary voltage output selector is set to one of the four positions, and VOUT is active. The brightness will vary depending on the output voltage selected.

If the PowerPal detects an over-current condition, the VOUT ON LED will start blinking rapidly to indicate a fault. If this occurs, disconnect power immediately and investigate.

If the VOUT ON/OFF pads are shorted together, the VOUT ON LED will go off, as the output is disabled.

4) VOUT Breadboard Headers

The PowerPal has two blocks of 4-pin headers positioned to allow insertion directly into the breadboard power rail. The top pins are all positive voltage, and the bottom row of pins (nearest the board edge) are negative GND. The GND pins are identified by a white square around the pads, both on the top and the bottom of the pcb.



CAUTION! Before connecting power to the PowerPal, ensure that it is oriented in the breadboard, such that the positive and negative outputs match the circuit. Use color-coded wires and, if available, breadboard markings, to differentiate VOUT and GND.

5) VOUT Access Header Pads

Located between the breadboard headers are a set of 3-pin through-hole pads that allow users to fit a custom VOUT connector. The pads are spaced at a 0.1" pitch.

The center pin is positive, and the two outer pins negative/GND. The GND pins are identified on both sides of the PCB by the white silk square around the pad.

6) VIN DC Jack

The DC Jack accepts a 2.1mm center-positive barrel plug. It is compatible with many different power source options, including wall-mount power supplies and battery packs sold by Parallax Inc.

The jack socket is connected directly to the VIN Header pins, located behind the DC Jack. The dual connection option allows you to supply power through one, and source power from the other. This might be useful to power high-voltage servo motors at battery supply voltage, while PowerPal VOUT could be set to provide a lower voltage to your microcontroller and the rest of your project's circuits.

If your project required two PowerPals, you can power them both from one DC-Jack by linking the VIN headers together with a short 3-pin jumper cable (751-00010).



WARNING! DO NOT connect a power input source to both the DC Jack and VIN headers at the same time!

7) Switching Power Supply

The center area of the PowerPal pcb contains the switching power supply IC and supporting components.



CAUTION! Components will become HOT when supplying high current loads!

TIP! The PCB is designed to act as heatsink, and the reverse of the PCB features a continuous 2 oz copper ground plane which will become warm in normal use.

The PowerPal uses a switching buck regulator to efficiently drop VIN to the user selected VOUT voltage.

It is not possible to output voltage larger than the input voltage, and the available output current will depend on the input current. The output voltage will start to drop once you exceed the power (voltage or current) available from your input power supply.

To minimise output voltage drop when powering high current (>2A) loads, ensure that VIN is at least 1.5V more than your required VOUT.

8) Mounting Hole

The mounting hole is 0.1 inch (2.6mm) diameter, with clearance around up to 0.2 inches (5.4mm), suitable for M2.5 or #3 mounting hardware.

The hole has no electrical connection, but care should be taken when using metal fixings, and a Nylon washer is recommended.

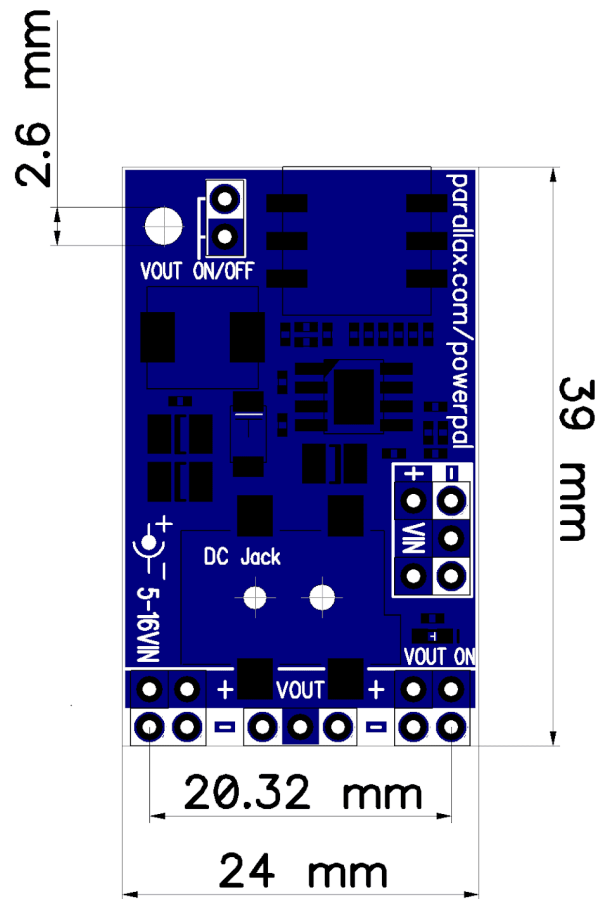
The location of the hole makes it convenient to fix a 12mm (15/32") long nylon spacer, which would act as a leg to support the PowerPal when inserted into a breadboard. Example: Digi-Key part numbers: 1772-2059-ND (12mm Nylon spacer) and 36-29331-ND (6mm Nylon screw)

9) VOUT On/Off Pads

These optional through-hole pads allow remote control of the VOUT state. When the on/off pins are shorted together, VOUT will be switched off. The pads accept a 0.1" pitch 2-pin header.

VOUT ON/OFF could be controlled by a simple switch, or electronically by driving the ON/OFF signal pin low using a microcontroller. The ground pin is surrounded by a white silkscreen marking, and the signal pin is not.

PCB Dimensions



Revision History

Version 1.0: original release.

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