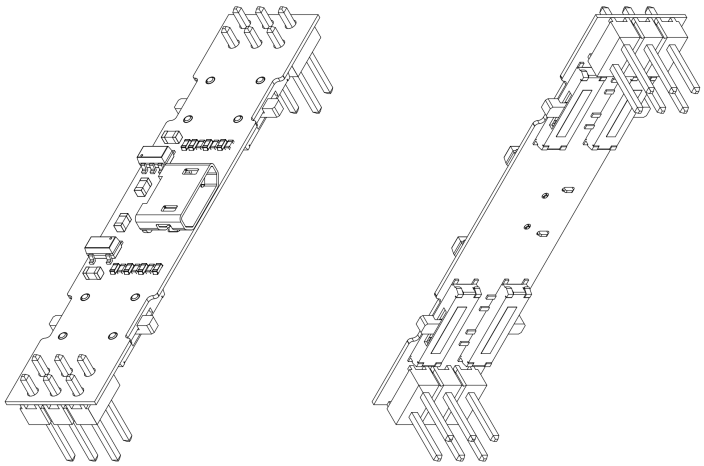
DrAlexander

Datasheet

DAT-PWR-RAIL-MICRO-MULTI

Micro USB Power Supply Rail Kit Multi



Description

This kit supports six different voltages and can output two different voltages at the same time. This makes it very flexible and perfect for all the circuit prototyping where different voltages or uncommon voltages are needed.

The small form factor is designed to fit into most commonly used Breadboard power rails. The output voltage can be selected for each output rail and the outputs can be disabled individually.

The maximum output current is 300mA per voltage regulator. The maximum output power of 2.5W can be reached by choosing 3.3V for one rail and 5V for the other rail.

The design is based on the AP2127[1] from Diodes Incorporated. The adjustable version is used, to be able to adjust the output voltage on the fly. This circuit can very well be used with other adjustable low-dropout regulators or with adjustable LDO's from other manufacturers.

This Kit has been created for engineers, hackers and other technical people to simplify the circuit prototyping process and to always have a fitting USB power supply on hand, even if an uncommon voltage is needed.

[1] Diodes Incorporated AP2127

Features

- Micro USB Connector
- Two Adjustable Voltage Regulators
- Supports different Voltages per Output Rail
- Supports the same output Voltage for both Rails
- Each Rail can be switched off separately
- Maximum Output Power 2.5W
- Short Circuit Protection
- Over Temperature Protection
- High Ripple Rejection:
  68dB @ f = 1kHz, 54dB @ f = 10kHz
- Small size: 50mm x 10mm

Output Options

- 5.0V @300mA
- 3.3V @300mA
- 3.0V @300mA
- 2.5V @300mA
- 1.8V @300mA
- 1.5V @300mA

Application Information

Getting Started

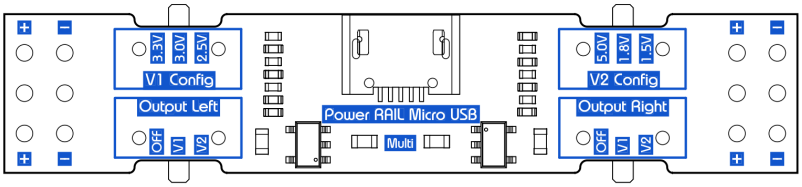
The Contents of the Kit are the following:

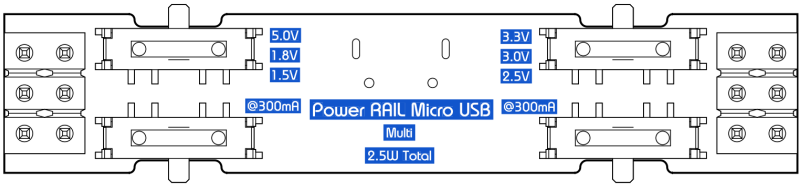
- 1x PCB with SMD components pre-assembled
- 2x Pin Headers 2.54mm 2x3

To get started, you need to assemble the kit by soldering the pin headers to the PCB. The easiest way is to plug the pin headers into the breadboard and then put the PCB on them. By doing this the PCB is held in place while soldering.

Overview

On the top side is the USB Connector and the voltage regulators located. The silkscreen shows what each switch position means and the output rails are marked with '+' or '-'.

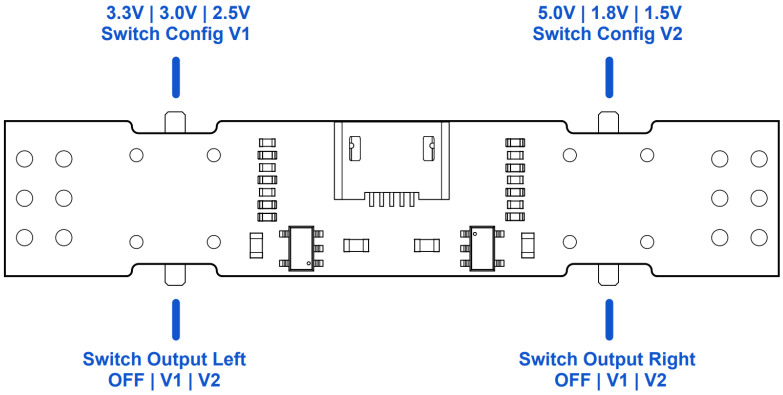




On the bottom side there are the configuration switches and the 2.54mm output connectors. The bottom silk screen has some additional information on the maximal output current and power.

Configuration Switches

There are four configuration switches to select the voltages to output and to disable outputs as needed. It is best to set the wanted configuration before placing the board into the breadboard. It is not advised to change the configuration while the output voltages are being used, all tough it is possible to change them on-the-go. Since the switches are quite small, it can be hard to configure them by hand. In that case it is recommended to use tweezers to configure the switches.



Description	Left	Middle	Right
Config V1 *Top Left*	3.3V	3.0V	2.5V
Config V2 *Top Right*	5.0V	1.8V	1.5V
Output Left *Bottom Left*	OFF[3]	V1[1]	V2[2]
Output Right *Bottom Right*	OFF[3]	V1[1]	V2[2]

Configuration Matrix

Because voltages that are on the same configuration switch can't be selected at the same time, not all voltage combinations are possible. See the configuration matrix below, to check the supported voltage combinations.

Config V1	Config V2	Output Left	Output Right	Left Rail	Right Rail
X	X	OFF	OFF	HIGH-Z	HIGH-Z
A	X	OFF	V1	HIGH-Z	A
B	X	V1	OFF	B	HIGH-Z
X	D	OFF	V2	HIGH-Z	D
X	E	V2	OFF	E	HIGH-Z
C	X	V1	V1	C	C
C	F	V1	V2	C	F
C	F	V2	V1	F	C
X	F	V2	V2	F	F

- **X** doesn't matter in the chosen configuration
- **A, C, & F** reprents the possible options **5.0V, 1.8V or 1.5V**
- **B, D, & E** reprents the possible options **3.3V, 3.0V or 2.5V**

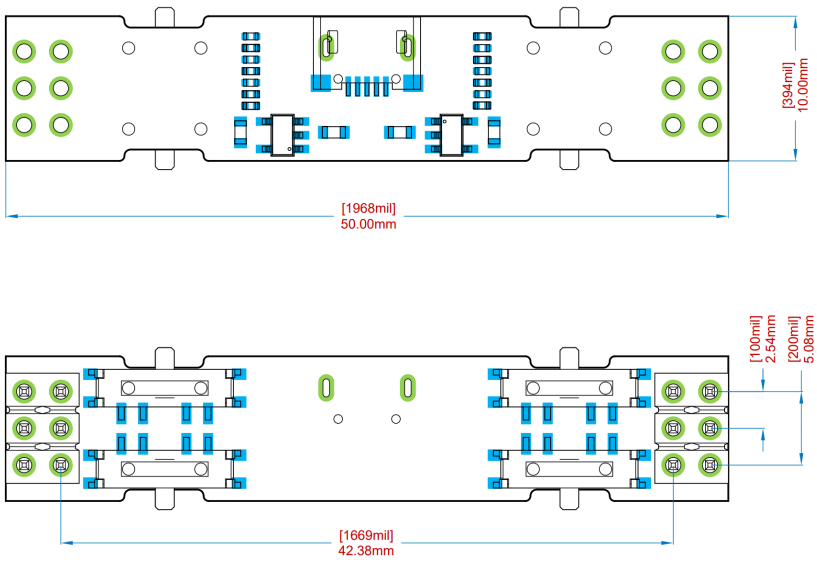
[1]The option **V1** outputs the Voltage on the output that was selected with the switch *Config V1*
[2]The option **V2** outputs the Voltage on the output that was selected with the switch *Config V2*
[3]The option **OFF** disconnects the positive terminal (+) of the output, but the negative terminal (-) **is always connected to Ground**

Possible Voltage Configurations

- 3.3V - 5.0V
- 3.3V - 1.8V
- 3.3V - 1.5V
- 3.0V - 5.0V
- 3.0V - 1.8V
- 3.0V - 1.5V
- 2.5V - 5.0V
- 2.5V - 1.8V
- 2.5V - 1.5V

Mechanical Drawing

The board is sized 50mm x 10mm with THT 2.54mm 2x3 connectors on each side to power two breadboard rails at the same time. The spacing between the inner 2.54mm THT connectors is 42.38mm to fit into the most common breadboards.



Electrical Characteristics

Symbol	Description	Value	Unit
U_{OUT}	Output Voltage Options	1.5, 1.8, 2.5, 3.0, 3.3, 5.0	V
I_{5V0}	Output Current ($U_{OUT} = 5.0V$)	300	mA
I_{3V3}	Output Current ($U_{OUT} = 3.3V$)	300	mA
I_{3V0}	Output Current ($U_{OUT} = 3.0V$)	300	mA
I_{2V5}	Output Current ($U_{OUT} = 2.5V$)	300	mA
I_{1V8}	Output Current ($U_{OUT} = 1.8V$)	300	mA
I_{1V5}	Output Current ($U_{OUT} = 1.5V$)	300	mA
P_{5V0}	Output Power ($U_{OUT} = 5.0V$)	1.5	W
P_{3V3}	Output Power ($U_{OUT} = 3.3V$)	1	W
P_{3V0}	Output Power ($U_{OUT} = 3.0V$)	900	mW
P_{2V5}	Output Power ($U_{OUT} = 2.5V$)	750	mW
P_{1V8}	Output Power ($U_{OUT} = 1.8V$)	540	mW
P_{1V5}	Output Power ($U_{OUT} = 1.5V$)	450	mW
I_Q	Quiescent Current ($I_{OUT} = 0mA$)	180	μA
I_{SHORT}	Short Current Limit ($U_{OUT} = 0V$)	50	mA
$PSRR$	Power Supply Rejection Ratio	45 - 68	dB
U_{NOISE}	RMS Output Noise	60	μV_{RMS}

Absolute Maximum Ratings

Symbol	Description	Value	Unit
I_{OUT}	Current Draw per Output	300	mA
I_{TOT}	Total Current Draw	600 [1]	mA
P_{OUT}	Power per Output	1.5	W
P_{TOT}	Total Power Output	2.5 [2]	W
U_{IN}	Input Voltage	6.5	V
T_J	Junction Temperature	150	°C

Recommended Operation Conditions

Symbol	Description	Min	Max	Unit
U_{IN}	Input Voltage	4.75	6.0	V
T_A	Ambient Temperature	-10	+50	°C

[1] 600 mA if two different Voltages are used, otherwise 300 mA
[2] 2.5 W if one Output is set to 5V and the other Output to 3.3V. Otherwise the maximal total output power is less.

Revisions

Description	Version	Date
Initial Document Release	1.00	July 2023