

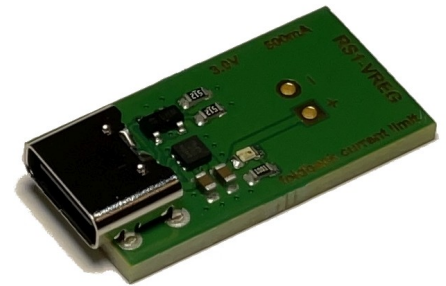
USB-C Voltage Regulator Module for Rosahl PD/RD/RS Electric Dehumidifier Membranes.

Available Options

Module	Input	Output	Peripherals on Module
USB-C-VREG1	USB-C 5V	3.0V / 500mA	<ul style="list-style-type: none"> - 3.0V output voltage for Rosahl PD/RD/RS micro-dehumidifier - 500mA rated current - fold-back current limiting - USB-C connector - solder pads for output voltage

Module Overview

The USB-C-VREG1 power supply module is a suitable and compact power supply solution for the Rosahl PD/RD/RS-series micro-dehumidifiers from USB-C ports. It delivers 3V DC at 500mA rated current with fold-back current limiting.



Rosahl Dehumidifier Membranes

Rosahl dehumidifiers are based on a solid-state polymer membrane. When supplied with a 3V DC voltage, moisture on one side is being decomposed into Hydrogen ions and Oxygen, the Hydrogen ions pass the membrane and recombine with air Oxygen to moisture again on the other side and get discharged.

On the right is a picture of the Rosahl RS1 micro-dehumidifier.



Storage of 3D-Print Filament Spools

Rosahl dehumidifiers are suitable for dry storage of filament spools of various materials for 3D printing. We inspected several storage boxes with regards to their suitability (sealing, capacity, etc.) and selected various Rosahl dehumidifiers for our product range, which turned out well suited. The usually required deccicant (Silica gel), which has to be regenerated periodically, is no longer needed.

With an applicable air volume of 5 liters the Rosahl RS1 membrane is suitable for storage of single filament spools e.g., in 4 litre "cereal boxes". The picture shows such a solution with 3D-printed mounting parts (cover/plug with RS1 mounting hole, cover for USB-C-VREG1 module with sealing, PTFE tube outlet, spool rollers up to 67mm width, cover plug for PTFE tube when not used). The STL files for these are available for download at ... and can be printed on your own.

With pre-dried filament spools (especially spools made of cardboard contain quite high moisture) a continuous storage at approx. 15% rH and less is achievable.



Technical Parameters USB-C-VREG1

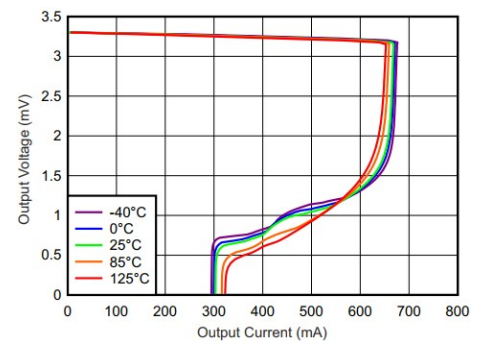
Symbol	Parameter	Condition	Min	Typ	Max	Units
VIN	Input Voltage	USB-C	3.3	5.0	5.5	V
VOUT	Output Voltage			3.0		V
IOUT	Output Current ^[1]	rated		500		mA
	Output Accuracy	85°C			1%	
IQ	Quiscent Current			25		µA
	Current Limiting		fold-back			
T	Operating Temperature		-40		+85	°C
	Dimensions		13 x 25 x 3.9			mm

Notes

[1]: The voltage regulator of the USB-C-VREG1 is specified for a rated output current of 500mA. However, with a 5V USB-C supply voltage this leads to a thermal power dissipation of 1W. Continuous operation at 500mA would hence require cooling. The intended application of the USB-C-VREG1 is with a Rosahl RS1 dehumidifier membrane which draws high inrush current just during startup and a significantly lower current during continuous operation which does not require any cooling.

Fold-Back Current Limiting

Due to the dehumidifier membranes being intrinsically hygroscopic, they absorb humidity if no supply voltage is present. This moisture needs to be discharged on startup and leads to a significantly higher inrush-current than the regular operating current. During startup the supply voltage shall still not drop below 2V, otherwise moisture discharge is not possible or significantly delayed. Suitable current supplies are fold-back current limiting sources, which regulate the output current further down than pure constant current sources and hence maintain the required minimum supply voltage for the dehumidifier membranes.

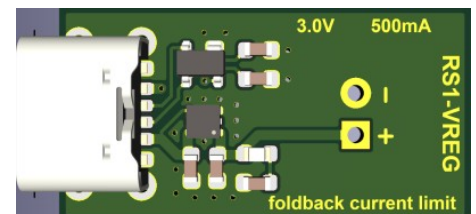


Power Supply

The USB-C-VREG1 is powered over a USB-C port. Even though its rated current is 500mA, the maximum current during fold-back current limiting is around 680mA and hence the recommended power rating of the used USB power supply would be 3.5W.

Connection and Pinout

Right picture shows the USB-C-VREG1 module with USB-C connector to the left and solder pads for the output voltage.



Revision History

- V1.0: First version
- V1.1:
 - changed GND solder pad from direct connect to relief connect for better solderability
 - changed LED color from red to green
 - changed PCB print from „RS1-VREG“ to „VREG-1“

Declaration of Electro Magnetic Conformity of the CHIP45 „USB-C-VREG1“

CHIP45 voltage regulator modules (henceforth products) are designed for installation in electrical appliances or as dedicated evaluation boards (i.e.: for use as a test and prototype platform for hardware/software development) in laboratory environments.



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CHIP45 products lacking protective enclosures are subject to damage by ESD and, hence, may only be unpacked, handled or operated in environments in which sufficient precautionary measures have been taken in respect to ESD-dangers. It is also necessary that only appropriately trained personnel (such as electricians, technicians and engineers) handle and/or operate these products. Moreover, CHIP45 products should not be operated without protection circuitry if connections to the product's pin header rows are longer than 3m.

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The RoHS compliance of any product so designated is based upon evidence from the producers (manufacturers) of the utilized components comply with the RoHS Directive. Chip45 – Dr. Erik Lins has taken all reasonable steps to confirm producers' statements and other evidence regarding the absence of the restricted substances to support claim of compliance. To the best of our knowledge, the USB-C-VREG1 is RoHS Compliant with RoHS Directive 2011/65/EU and as amended by Directive 2015/863, and without material exemptions according to the underlying manufacturer's documentation.

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