inventlab®

iub - inventlab ultracapacitor buffer

Datasheet

Observe safety instructions on page 2

V1.0

Features of iub

- ► **High current buffer and UPS solutins**
- ► **Integrated charger and power path controller**
- ► **Up to 40A output current**
- ► **3.6 to 36 VDC input/output**
- ► 12.5 V buffer voltage
- ► Capacity increasable by using more than one iub
- ► Capacity increasable by third party Ultracaps
- ► -40°C to 65°C operating temperature
- ► Small form factor: 120 mm x 50 mm x 55 mm
- ► Protection for short transients
- ► Automatic charger thermal shutdown / charge current limitation

Safety instructions

The manufacturer declines any liability for damage to humans and machines. In particular, damage arising from the non-observance of the following safety regulations!
All work on the device must be carried out only by qualified and trained personnel!
Keep conductive parts away from the connectors and PCB pads, risk of short circuit!
If the device has visible defects or it indicates defects, disconnect it and return it to manufacturer for repair.

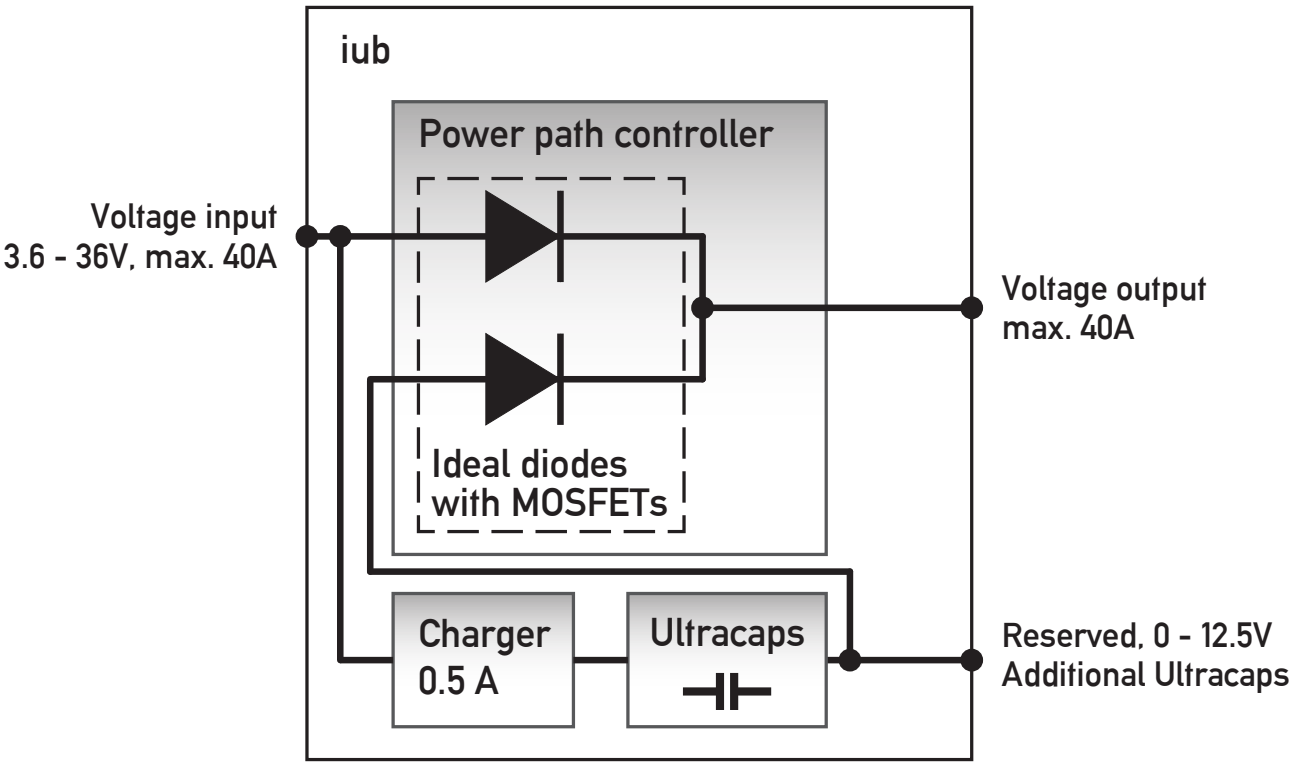
Applications

- ► Industrial
- ► Security
- ► Vehicle
- ► ...

Description

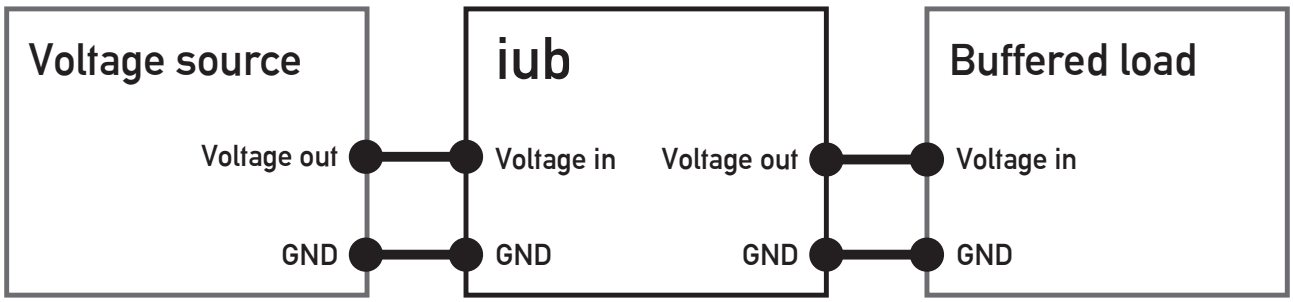
iub - inventlab ultracapacitor buffer module - is an integration module to build ups solutions or buffer solutions for sporadic high-current peaks. The input voltage can be in the range of 3.6 to 36 VDC. The iub has an integrated power path controller and ultracapacitor charger. When the input voltage is higher than the ultracapacitor voltage, the output current is drawn from the input voltage. When the input voltage falls below the ultracapacitor voltage - which is max. 12.5 V - the current will be drawn from the ultracapacitors. The capacity of iub is extendable.

Block diagram

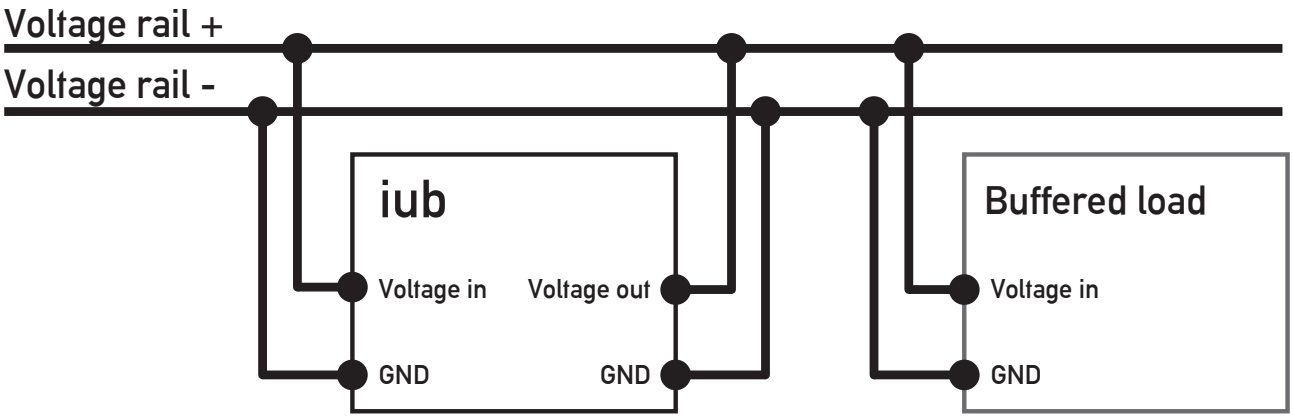


Application examples

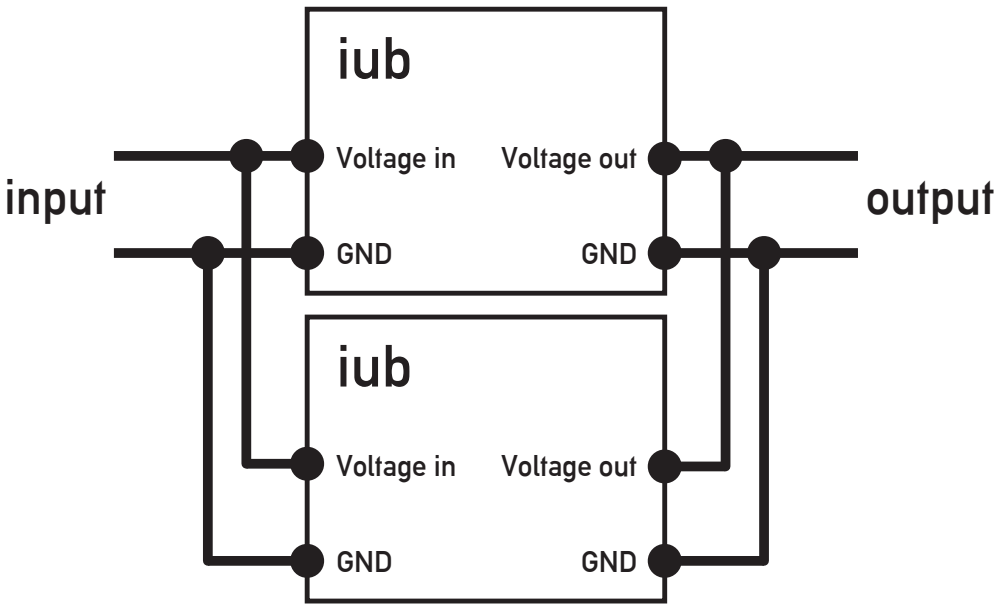
High-current buffering a voltage source:



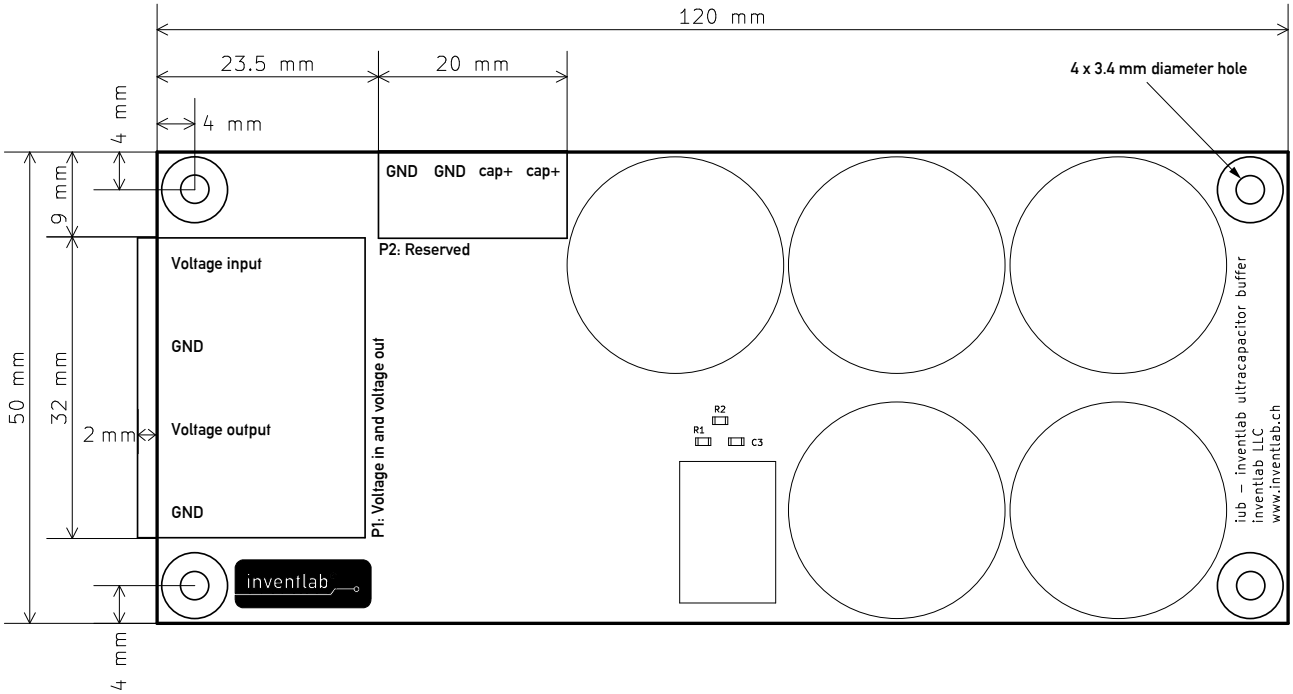
High-current buffering a voltage rail:



iub parallelization to increase the capacity:



Connectors, pinout and dimensions (top view)



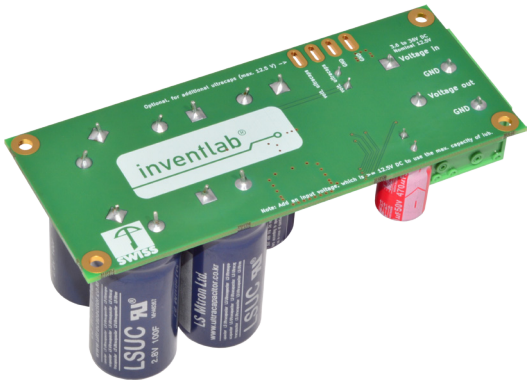
P1 connector: Voltage input and voltage output, cable cross sections

Conductor cross section solid min. 0.2 mm²
Conductor cross section solid max. 10 mm²
Conductor cross section flexible min. 0.2 mm²
Conductor cross section flexible max. 6 mm²
Conductor cross section flexible, with ferrule without plastic sleeve min. 0.25 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max. 6 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min. 0.25 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max. 4 mm²
Conductor cross section AWG min. 24
Conductor cross section AWG max. 8
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min. 0.25 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max. 1.5 mm²
Wire Stripe length: 15mm

P2 connector: Reserved

P2 is not assembled. Additional Ultracapacitors can be connected here.
Contact inventlab LLC to get design support for using the connector P2.

Bottom view image of iub



Electrical Specifications / Absolute Maximum Ratings

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{IN}	Input voltage		0[1]	3.6 - 36	40	V
V_{OUT}	Output voltage	When input voltage is available and higher than Ultracapacitor voltage		V_{IN}		V
$V_{OUTBUFF}$	Output buffer voltage	Output buffer voltage, when input voltage is belofw Ultracapacitor voltage	0	12.5 - 0	13	V
$I_{INCHARGE}$	Input charge current	When output current is 0	0	0.5	1	A
I_{IN}	Input current		0		40	A
I_{OUT}	Output current		0		40	A
ϑ_A	Temperature range	Storage	-40	25	65 [2]	°C
ϑ_O	Temperature range	Operating	-40	25	65 [2]	°C
-	Cycle life	Number of charge / discharge cycles			500000	cycles

[1] Input voltages below 3.6V results in higher power dissipation. The load should be switched off/disconnected on an at least 3.6V power path input voltage.
[2] Life 2000 h at maximum operating temperature. Over 10 years at room temperature.

Charge time

The charge time depends on the input voltage, the PCB- and the environment-temperatur.
At a given input voltage of 13 VDC and an environment temperature of 25°C, while no load is connected, the charging time is:
410 Seconds (± 40 %)

Running time, when input voltage is failed / Hold-up time

The voltage falls down while the discharging process. The hold-up time depends on the following aspects:
- ► Discharge current / power
- ► Charged voltage (max. 12.5V, when input voltage to charge was at least 12.5V)
- ► Cut-Off voltage, when the load switches off. This is the minimum voltage the connected load accepts.
- ► Ultracapacitor tolerances

At the given values - discharge from 12.5 V to 10 V - the discharge time is as following for different loads:
- ► 540 s @ 1 W load
- ► 55 s @ 10 W load
- ► 27 s @ 20 W load
- ► 10 s @ 50 W load
- ► 4.5 s @ 100 W load
- ► 2.7 s @ 150 W load
- ► 1.75 s @ 200 W load
- ► 820 ms @ 300 W load
- ► 370 ms @ 400 W load
- ► 110 ms @ 500 W load
- ► 10 ms @ 550 W load

Note: Take care to the max. ultracapacitor tolerance of ± 40 %. For increasing the lifetime; add additional margins.

Manufacturer

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Product website / Where to buy

http://shop.inventlab.ch/en/12-integration-modules

or for German:

http://shop.inventlab.ch/de/12-integration-module

Your specific requirements

Please contact inventlab LLC if your project has special requirements or to get design support. Our engineers look forward to hearing from you.

Disclaimer