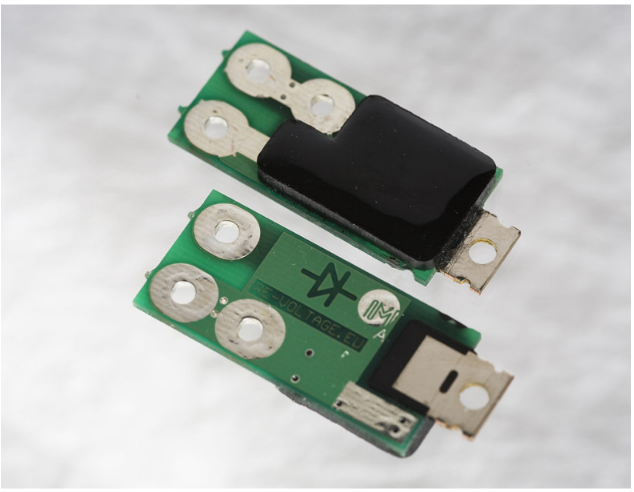
# Ideal Diode  ID80V2

Datasheet – January 2010



**9 - 90 V working**

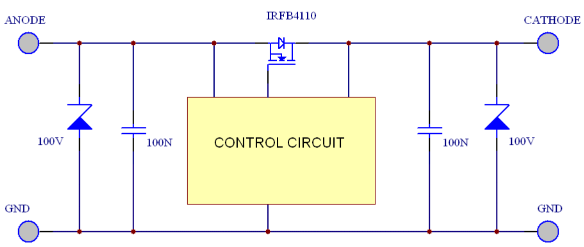
**30 A Forward Current**

The ID80V2 is a diode module that eliminates the forward voltage drop seen with a conventional diode. Thus it can carry high forward currents without significant heat dissipation.

Applications

- Battery combining systems
- Back up power supplies
- Battery charging systems
- Solar PV cell arrays
- Battery/PSU isolators
- Electric vehicles
- RV and Boat electric systems

Block Diagram




Principle of operation. The control circuit detects whether the diode is forward or reverse biassed and controls the FET gate voltage accordingly.  In reverse mode the inverse voltage handling is set by the FET rating. In forward mode the FET is turned on and the voltage drop from a conventional PN junction is eliminated.

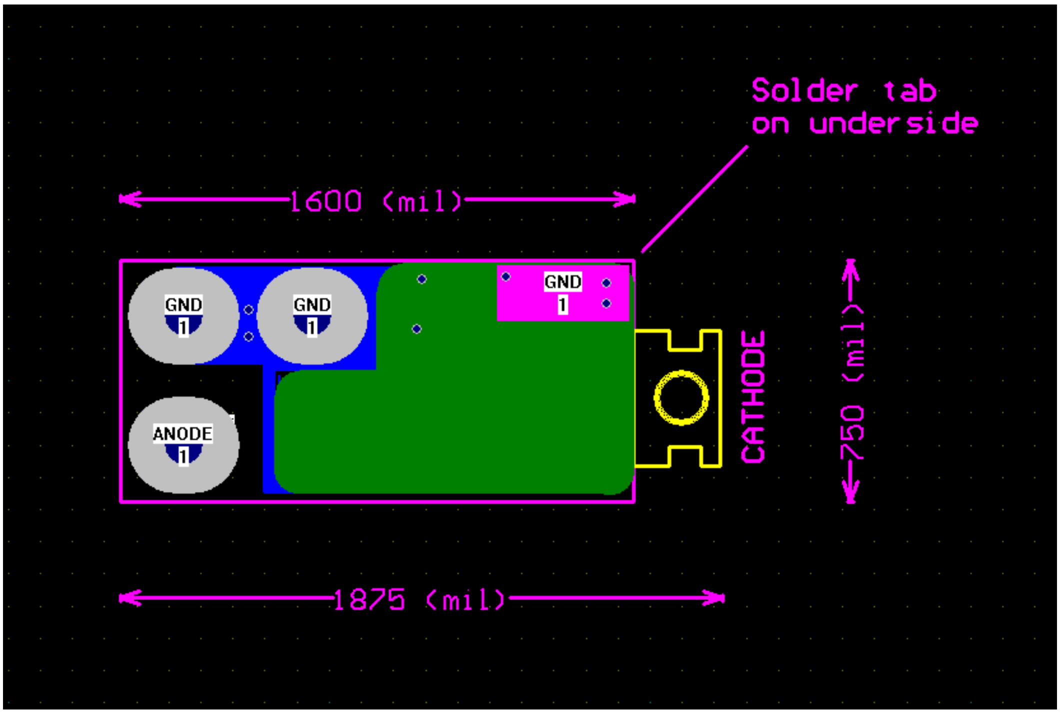
Performance Data

| | | |
|---|---|---|
| Peak Inverse Voltage | 90 | V |
| Peak Forward Current | 75 | A |
| Continuous Forward Current (no heatsinking) | 15 | A |
| Continuous Forward Current (with heatsinking) | 30 | A |
| Supply current (reverse biassed mode) | 1 | mA |
| Supply current (forward biassed mode) | 1.5 | mA |
| Minimum operating voltage | 9 | V |
| Maximum operating voltage | 90 | V |

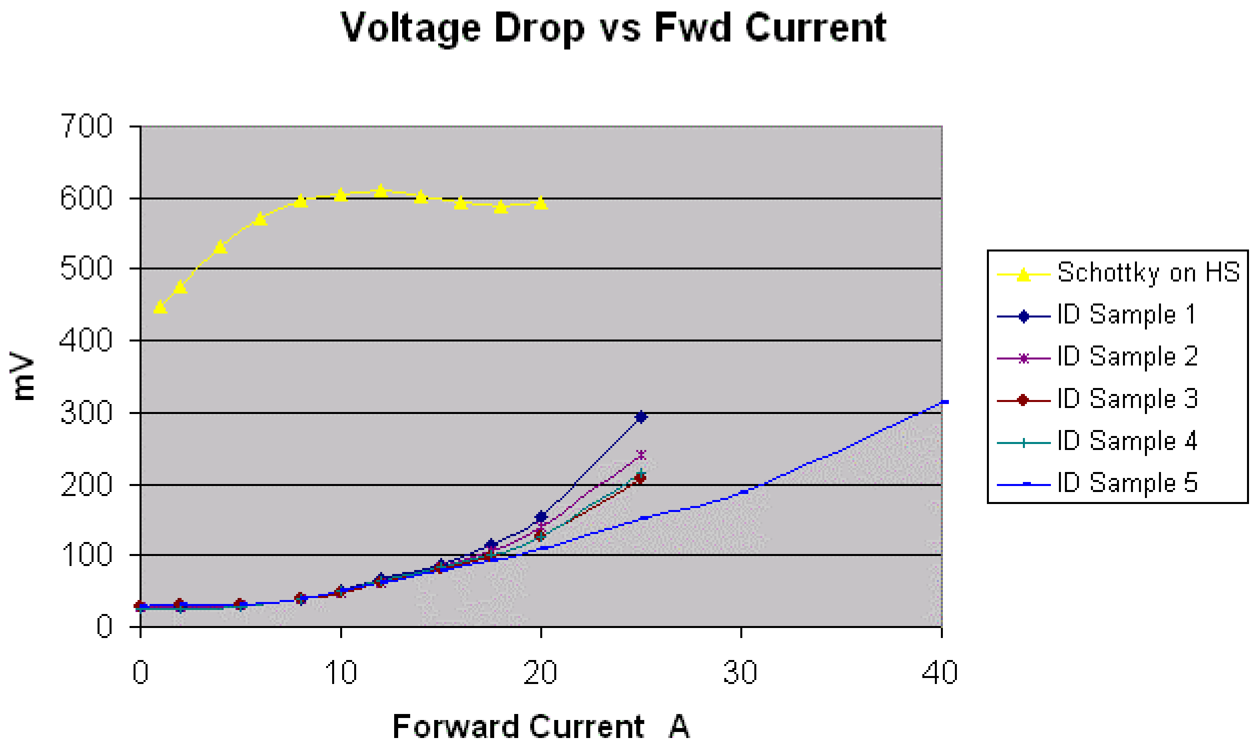
Notes:

The continuous forward current rating is set by thermal considerations. Up to 15 A no heatsinking is required. The tab of the FET is used as the cathode connection; this should be bolted to some form of heatsink if higher continuous currents are expected.
The module is protected by 100 V threshold transient protection diodes. A minimum of 9 V difference between cathode and ground is needed for the control circuit to turn on the FET. The operating range is therefore 9 to 90 V, making the module suitable for 12 to 72 V battery systems. A nominal 72 V battery pack can be up to 90 V fresh off the charger.

Terminal Diagram – Top View



The plot below shows the forward voltage drop versus current for different levels of heatsinking.



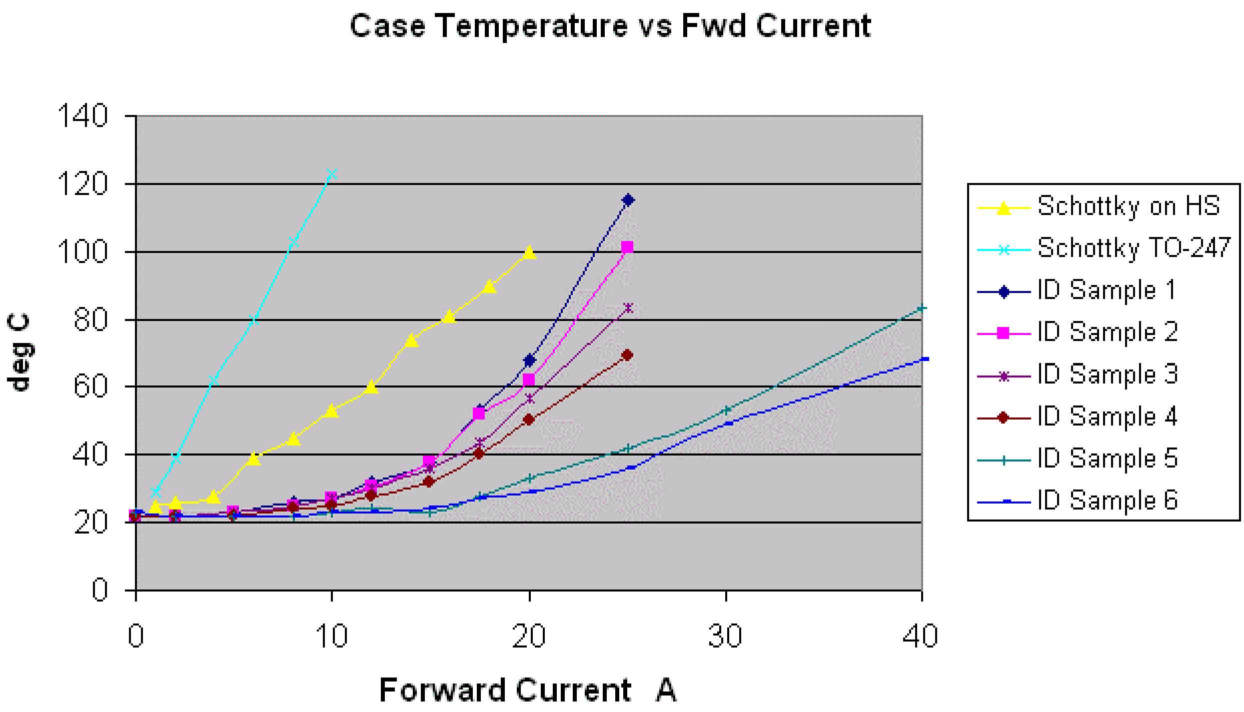

ID Sample 1 is with no heatsink, with Anderson Powerpole PCB connectors soldered to the module.
ID Sample 2 is with no heatsink, with ring shape insulated crimp terminals bolted to the module (Yellow size terminals with 12 AWG cable).
ID Sample 3 is one half of a pair of IDs stacked in parallel with 6 mm spacers. Same connections as Sample 2.
ID Sample 4 is with a small heatsink, 25 x 45 x 3 mm aluminium plate. Same connections as Sample 2.
ID sample 5 is with a large heatsink, 180 x 30 x 6 mm aluminium plate. Same connections as Sample 2.
ID Sample 6 is one half of a pair with a small heatsink encapsulated with epoxy in a potting box 50 x 70 x 15 mm.

The voltage drop is measured from terminal to terminal of the module. Sample 6 is not shown because this measurement cannot be taken on a potted unit.

A TO-247 package Schottky diode is shown for comparison.

The difference in forward voltage drop between the samples is because they each settle at different temperatures. The on resistance of the internal FET is a function of temperature.

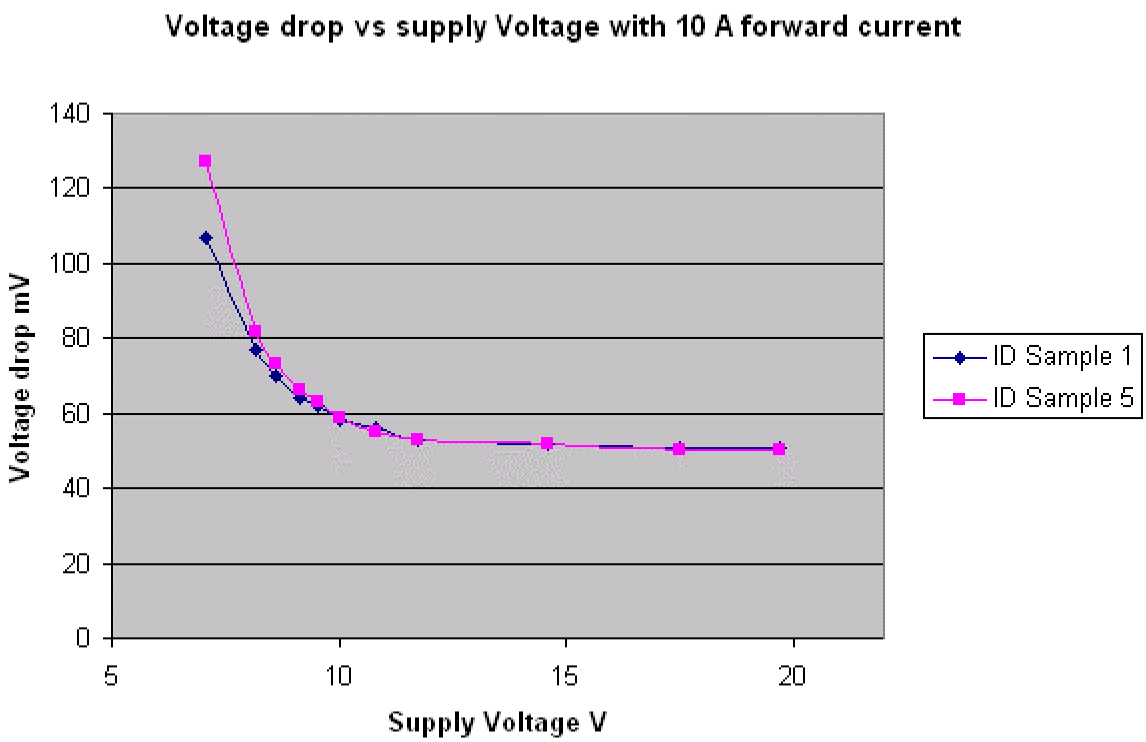
The effect is clear in the plot below. This shows the temperature that the ID setttles at with various currents and levels of heatsinking. The temperatures plotted are approximate values in still air taken with a IR thermometer.




Again, a Schottky diode with and without heatsinking is included for comparison.

The maximum continuous current depends on the permissible temperature rise, the level of heatsinking and the air circulation around the module.

Up to 15 A, no heatsink or special precautions are necessary.
Up to 20 A, some moderate means of carrying heat away is recommended, eg., a small heatsink, airflow, connection to a busbar or stacked with another ID not carrying the same current.
At 25 A a heatsink is needed.
30 A and over is possible with careful heatsinking. Above 25 A, however, it is worth considering paralleling modules. For instance, 2 modules in parallel will carry 30 A with no heatsink, whereas a single module will require bolting to a substantial heatsink.




The minimum recommended supply voltage is 9 V. The maximum is 90 V. The module is suitable for battery systems with nominal system voltages from 12 to 72 V.

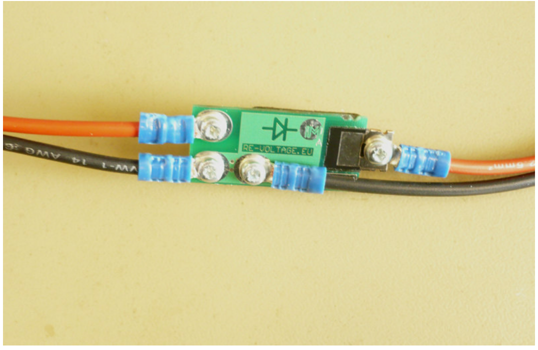
## Connections

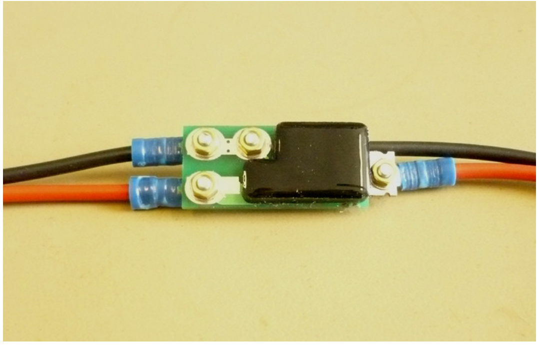
Cable connections may be made to the module by soldering, or by ring terminals as shown in the pictures below.

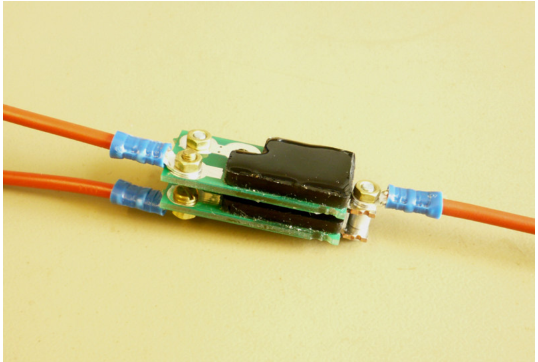
The modules can also be stacked in parallel layers, so that common connections may be made with M3 bolts and spacers.

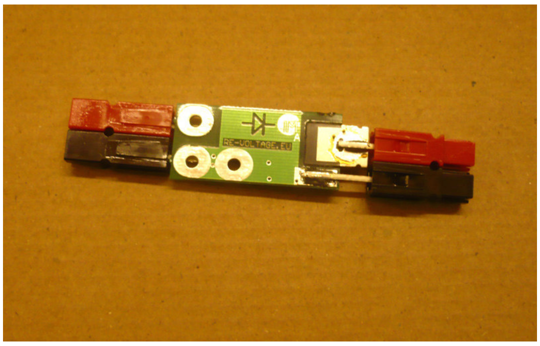
Anderson Powerpole PCB connectors can also be directly soldered to the modules.

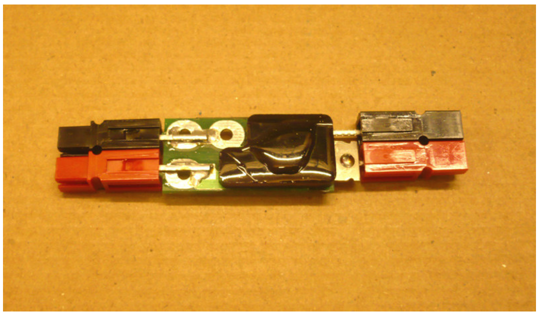
Another method (not shown) is to screw the modules down onto busbars. They are designed so that they can be stacked side by side with common busbars for ground and cathode terminals.





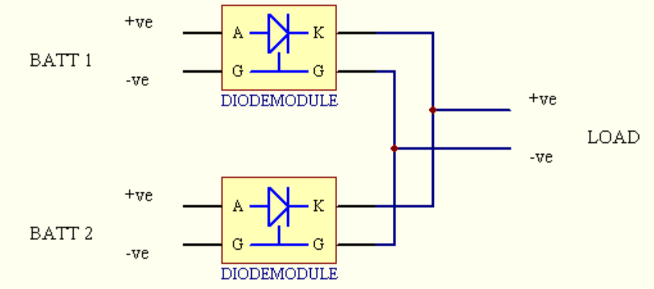




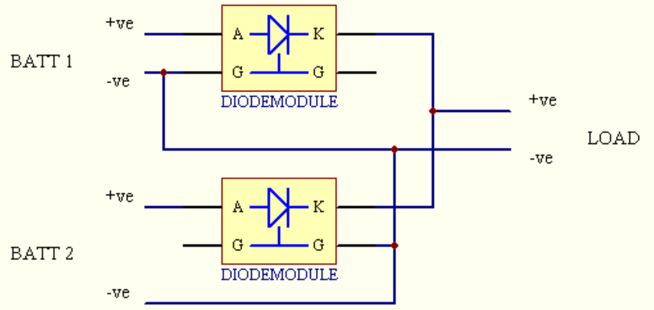


## Application wiring diagrams

On small electric vehicles, such as e-bikes, it is common to use an additional battery pack to increase range. If the packs are at different states of charge then large damaging cross currents can flow when they are connected. The use of diodes eliminates this problem, and even allows packs of different sizes and/or chemistry to be combined. Normal diodes create a voltage drop which wastes power and requires heat removal. The Ideal Diode modules can be used to protect the battery packs without causing these problems.



COMBINING 2 BATTERIES WITH DIODE MODULES



NEGATIVE RAIL IS COMMON SO ALTERNATIVE CONFIGS ARE POSSIBLE

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