



US-BOARDS	SS4-48V-PD
<p><b>Description</b></p> <p>Specifically designed for 12 Volt to 48 volt DC operation, the RB-SS4-48V-PD is a solid state relay board equipped with four outputs each one capable of switching up to 10 Amp current. Inputs are optically isolated therefore there is complete separation between inputs, outputs and the circuitry driving the solid state relays.</p> <p><u>All outputs are Pull Down to Ground and the ground of all outputs is in common and common to the logic ground.</u></p>	<p><b>Main parameters</b></p> <p>Vcc = +12 Volt to +48 Volt</p> <p>Input Voltage = - 48 to + 48 Volt</p> <p>Load Output Current = 10 Amp/each</p>
<p><b>Benefits</b></p> <p>Wide input voltage range</p> <p>Separate input circuits</p> <p>Switching of up to 40 Amp current all outputs combined</p> <p>Mix and match of floating and common reference inputs</p> <p>Compact size</p> <p>Battery inversion protected</p> <p><b>Typical applications</b></p> <p>Automotive</p> <p>Lamp, alarm, sound drive</p> <p>Emergency switch</p> <p>Battery power main switch</p> <p>Motor direction control</p> <p>Electric brake</p>	<p style="text-align: center;"><b>Schematic One channel shown</b></p> <p style="text-align: center;"><b>Fig -1 Components shown outside of the dotted block are external to the board.</b></p>

**Absolute Maximum Ratings**

Parameter	Min Limit	Max Limit	Units
Supply Voltage Vbb and Vcc	+ 9	+ 48	Volt
Input Voltage	- 48	+ 48	Volt
Current each output		10	Amp
Output DC Voltage to ground		48	Volt



## Operating Parameters

	<b>Parameter</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>
V <sub>bb</sub>	Power Supply Voltage	9	-	48	Volt
V <sub>cc</sub>	Logic Supply voltage	9	-	48	Volt
I <sub>cc</sub>	Supply Current		10		milliAmp
V <sub>in-high</sub>	Input Voltage High Level	3.5	-	48	Volt
V <sub>in-low</sub>	Input Voltage Low Level	-48	-	1	Volt
I <sub>in-high</sub>	Input High Current (NOTE1)	0.1	-	2.5	mAmp
I <sub>output</sub>	Load Current			-10	Amp
Enable	Inactive (Disable) if grounded. Active if left floating		0		Volt

*NOTE 1 : Input high current increases with the high input voltage applied.*

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## Application Information

### Inputs

The SS4-48V-PD board has opto-insulated inputs so it can be used:

- With all inputs loops separate and independent from each other.
- With all input loops sharing connection - 1 as an independent common reference.
- With all input loops sharing a common ground reference.
- With any mix of separate loops and common loops.

The input voltage is considered logic High if higher than 3.5 Volt and logic Low if lower than 1.0 Volt.

Negative input voltages are acceptable up to -48 Volt and considered logic Low.

Positive input voltages between 1.0 and 3.5 Volt must to be avoided, since they cannot be interpreted neither High nor Low.

In order to enhance noise immunity, each input loop has a resistance of 20 k Ohm, so the input drive needs to be able to supply the relevant input current (0.1 to 2 milliAmp according to the value of the input voltage).

A High input will turn on the relevant output; a LED will visually indicate it by lighting if the output is OFF and darkening if the output is ON.

### Outputs

The SS40-48V-PD has four output LED's; the LED's light when the load is turned ON and become dark when the load is switched OFF.

The SS4-48V-PD has two protections:



- A diode in parallel to the load to prevent over-voltage in case of inductive load.
- A short circuit protection that floats the output should a short across the load be detected. A separate LED will light indicating that the short circuit protection has been triggered on a specific output.  
Once the short circuit protection has triggered, the output stays OFF until the short has been removed and the board has been reset.  
The board can be reset by:
  - grounding the enable terminal, in which case all outputs are switched OFF until the Enable terminal has been left open again or
  - switching Low the corresponding input, in which case only the corresponding output is switched OFF (the corresponding LED turns ON)..

### Vcc connection

The Vcc input is protected by a diode against wrong battery connection (inverted battery connection); it provides power to the logic section. Do not use this connection to power the loads; the 33 Ohm series resistor will prevent the load current from flowing. See figure 3 to see how to feed the loads.

Outputs - Short Circuit LED's	Load LED's	ON/OFF LED	Inputs
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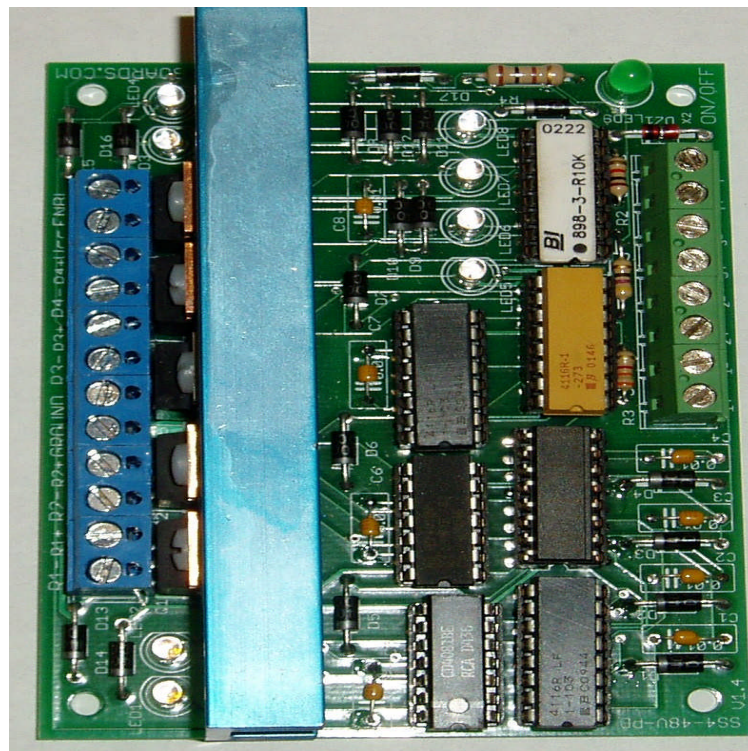


Fig – 2 Board top view



## External connections

The schematic below shows the connection to the external world. Please note:

- Only one Vbb is shown but it is possible to connected each load to its own power supply of different voltage as long as they all share the common ground.
- The Vcc is shown separate but it can be replaced by anyone of the Vbb's. Use the lowest voltage one. If using Vbb to power the terminal Vcc, connect the negative pole of Vbb to both GROUND terminals, since ground current is the highest being the sum of all load currents.
- As a safety precaution, all loads are OFF when the board is initially powered (all short circuit LED's are ON and all the Load LED's are ON) . Cycle the Enable switch to deactivate the short circuit protection.
- In normal operation the Enable switch is open and the enable terminal is left floating. The enable switch can be used to set all outputs OFF or to reset after a short has been detected.

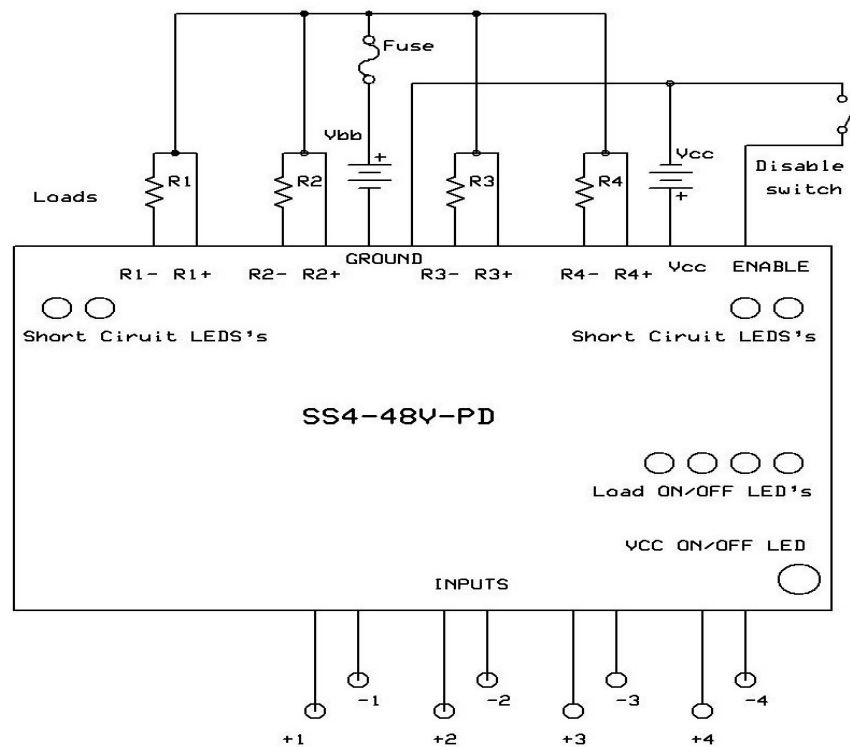


Fig-3 External connections

## Mechanical

Dimensions: 4 x 3 inches /10 x 7.5 millimeters Weight: 0.5 lbs / 220 grams

## Ordering instructions

Part number: SS4-48V-PD