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SSR-150xxx-60VL-12P-xC-xxxCS

The SSR-150xxx-60VL-12P-xC-xxxCS is designed for Low Side, Fast DC load switching (solid state relay) applications with power source voltages up to 36 Vdc max across the terminals when off. It switches the Low side with a 12 to 16 volt power source and ttl compatible control input relative to the power source common. This SSR provides fast switching transitions of less than 2 microseconds and it has the following additional features:

Under voltage shutdown (shuts down if the power source falls below about 10 volts.) Once the power source goes above 11 volts, a reset can be established by cycling the control input.

Overcurrent shutdown (shuts down if current exceeds a set threshold of voltage across the output transistors) Factory set to a value of "xxxCS" amps + 30%. Typically, the "1501K" model is ordered with "NCS" (No Current Sense) because of the high current expected for pulse operation.

Fault\ output terminal (upon an overcurrent shutdown, an open collector output low signal is provided on this output terminal.) Reset is achieved by cycling the control input off then on again. This terminal is not present for units designated as "NCS". **Note:** If pulled up to the SSR power source, then you should use a diode in line with the pull up resistor too.

For switching the high side, an external opto isolated input with floating power module is required. Hellroaring Technologies can provide custom control modules for this if desired.

Should you have a specific application or question not covered here, feel free to send an e-mail technical support request. Include as much detail as practical regarding your application. Send to: support@hellroaring.com.

Depending on your power source capability and wire size utilized, appropriate circuit protection should be installed. The following table includes recommendations for wire protection values. In all cases, we recommend using circuit protection no greater than 150 amps.

Wire Size AWG	Circuit protection
4	150 A
6	100 A
8	60 A
10	40 A
12	25 A

The circuit protection listed is for continuous current.

Hellroaring SSR-150xxx-60VL-12P-xC-xxxCS Instructions

Ordering Information:

SSR-1501K-60VL-12P-<u>L</u>C-xxxCS	(TTL logic Low activates SSR ON)
SSR-1501K-60VL-12P-<u>H</u>C-xxxCS	(TTL logic High activates SSR ON)
SSR-1501K-60VL-12P-xC-xxxCS	(Default = Common Anode configuration L= low side switching only without floating supply or high side converter module)
SSR-150xxx-60VL-12P-xC-<u>xxx</u>CS	(xxx = Approximate Overcurrent shutdown threshold)
SSR-1501K-60VL-12P-xC-<u>N</u>CS	(NCS = No Current Sense, 1K = 1,000 amp peak pulse switching level)
SSR-150<u>xxx</u>-60VL-12P-xC-xxxCS	(xxx is max short term current subject to xxxCS limit)
SSR-<u>150</u>xxx-60VL-12P-xC-xxxCS	(150 = 150 amp max continuous current)

Hellroaring SSR-150xxx-60VL-12P-xC-xxxCS Instructions

Industrial Switching Applications:

Wire per one of the Load Switching Applications diagram illustrated below. **Diode suppression** for inductive loads is recommended for most applications. For highly inductive loads, appropriate transient suppression may be required, including the use of external **transient suppression diodes** rated for 50 to 75% of the SSR rating across the output terminals. This must effectively reduce the max voltage being switched.

For installation, follow these steps:

- 1) For highly inductive loads, Verify the load has diode suppression installed as illustrated.
- 2) Connect the power source Negative (-) to terminal "B".
- 3) Connect the load (-) to either terminal "A" or "C" and jumper "A" and "C" together with the supplied jumper. The positive side of the load should be connected to the power source positive (up to +30 Vdc).
- 4) Connect a nominal +12 to +16 Vdc to the Power terminal (relative to the power source common (negative)). This power source need supply as little as 1 mA.

The unit is now ready for switching. Apply either a ttl signal or a high and low signal with voltage up to the Power terminal voltage less 0.7 volts. Do not disconnect the load while the SSR is switched ON.

Note on Diode Suppression

The Hellroaring SSR-1501K has some built-in suppression for slight inductive loads, but will dissipate up to 1 Joule of transient. For higher inductive energy, or high current switching, or high frequency switching, you will need to use an external transient suppressor (nominal rating of 24 to 36V max) across the terminals to protect the SSR.

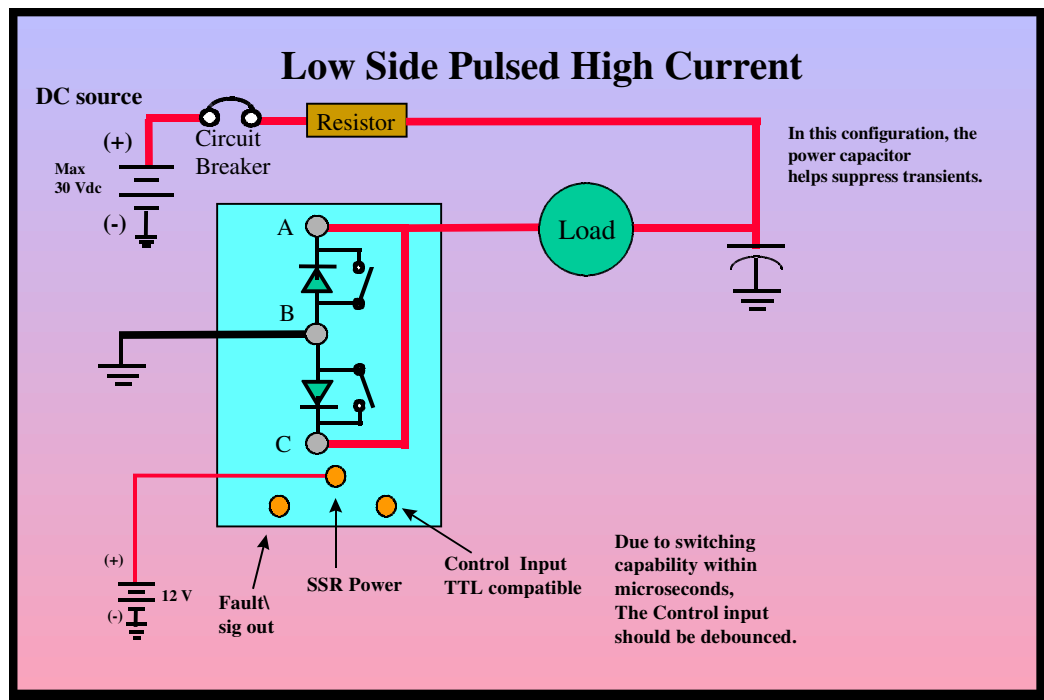


Figure 1

Capacitive Pulsed DC Load Switching applications.

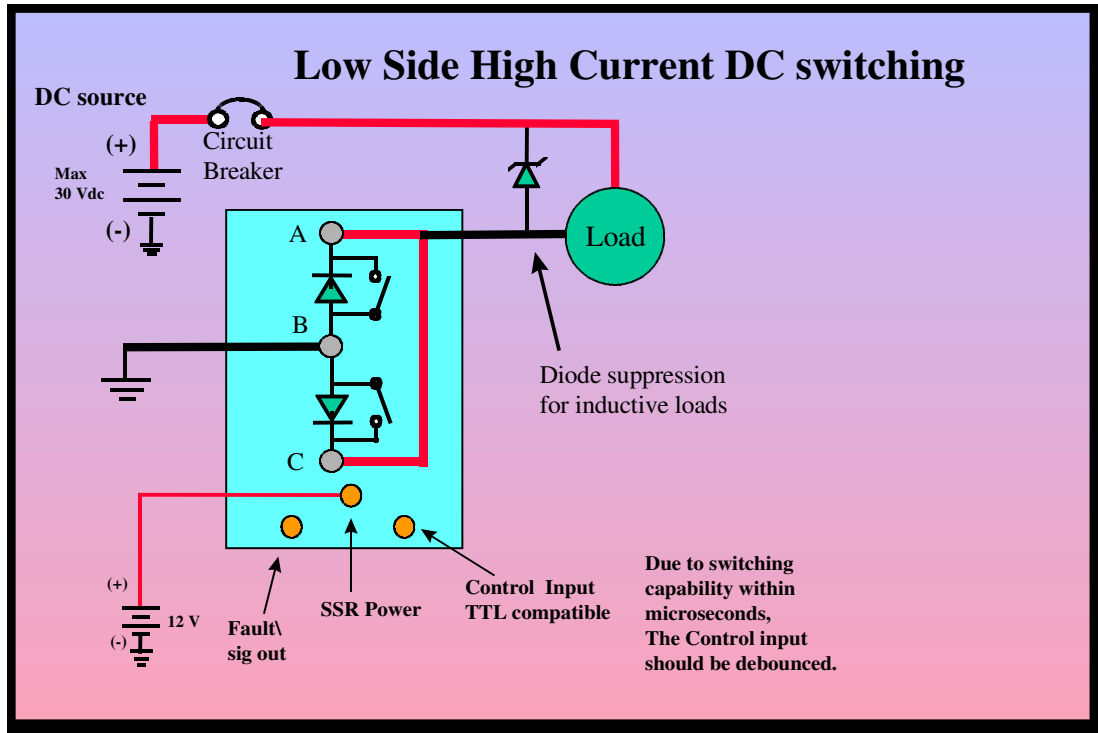


Figure 2

Basic low side, DC Load Switching applications.

A 24V to 36V TVS diode is recommended across the across the output terminals of the SSR and across the load for additional protection. **TVS diodes should be placed from terminal B (Anode) and either A or C or both (Cathode +), i.e. oriented like in the diagram above.** The power rating required will depend upon the load inductance and current level being switched as well as the frequency. Multiple TVS diodes in parallel may be needed for higher switching frequencies.

Some other Possible Applications include:

DC Heater current pulsing.

Fast power pulsing.

Very fast responding circuit breaker (current sensed models).

Low side backup battery charging and isolation.

For applications assistance, you can send e-mail to support@hellroaring.com .

Hellroaring SSR-150xxx-60VL-12P-xC-xxxCS Instructions

Definitions:

Power Terminal: This terminal requires +12 to +16 Vdc relative to terminal "B" (the power source negative). This supply must be floating in order to switch the high side.

Control Input: This terminal, when connected to a TTL signal, the active state will cause the output transistors to switch ON. The opposite logic state, will cause the output transistors to switch OFF. A signal with voltage up to the power terminal voltage (less 0.7V) can be used for the active high logic input. A ground can be used for the active low logic input.

Terminals A, B, & C: Terminals A and C are typically jumpered together to obtain the maximum current capability. When Jumpered, terminals A and C must be more positive than terminal B and are normally connected to the load Negative for Low Side switching. Terminal B would normally be connected to the power source negative for low side switching. A transient suppressor should be externally mounted across either Terminals A or C, and terminal B with A as the cathode and B as the Anode.

Dimensions: 4.8" long, by 3.0" wide, by 2.0" to the top of the terminal studs.

Weight: 12 Oz., typical with 6 AWG jumper.



Non Current Sensed model Shown. CS model has a third small terminal.

Hellroaring SSR-150xxx-60VL-12P-xC-xxxCS Instructions

Specifications:

SSR-1501K-60VL-12P-xC-xxxCS:		Unless specified otherwise, ambient temp=65C ; max current from terminals "B" to parallel "A" & "C".
Max voltage	30 Volts	+A or +C to -B
Absolute Max ON Current	150 Amps	100% duty cycle 65C ambient to 30 Vdc Natural Convection.
	250 Amps	50% duty cycle, to 20 seconds wide, 65C ambient. Natural Convection
	300 Amps	30% duty cycle, to 10 seconds wide, 65C ambient. Natural Convection
	500 Amps	10% duty cycle, to 300mS wide, 65C ambient. Natural Convection
	600 Amps	5% duty cycle, to 200 mS wide, 65C ambient. Natural Convection
	800 Amps	2% duty cycle, to 30 mS wide, 65C ambient to 30 Vdc. Natural Convection
	800 Amps	1% duty cycle, to 100 mS wide, 45C ambient with 100 fpm forced air.
	1000 Amps	0.67% duty cycle, to 30 mS wide, 65C ambient, Natural Convection
	1000 Amps	1% duty cycle, to 20 mS wide, 65C ambient, Natural Convection
Max On resistance (@ 10 amps)	0.0008	Ohms (B to parallel A & C)
Control Input	TTL logic	
SSR Power input	+12 to +16 Vdc	
Undervoltage shutdown (SSR Power input)	+11.5 V	volts max, 10 V typical.
Overcurrent Shut-Down	NCS model	No over current protection.
Switch on transient time Tr	< 2 uS	
Switch off transient time Tf	< 2 uS	

SSR-150200-60VL-12P-xC-xxxCS:		Unless specified otherwise, ambient temp=65C ; max current from terminals "B" to parallel "A" & "C".
Max voltage	60 Volts	+A or +C to -B
Absolute Max ON Current	150 Amps	100% duty cycle 65C ambient to 30 Vdc Natural Convection.
	200 Amps	50% duty cycle, to 30 Sec wide, 65C ambient, to 30 Vdc, Natural Convection
Max On resistance (@ 10 amps)	0.0008	Ohms (B to parallel A & C)
Control Input	TTL logic	HC= Active High, LC= Active Low
SSR Power input	+12 to +16 Vdc	
Undervoltage shutdown (SSR Power input)	+11.5 V	volts max, 10 V typical.
Overcurrent shut-down	200CS	= 200 amp threshold shutdown + 30% +/- 30% over temp.
Switch on transient time Tr	< 2 uS	
Switch off transient time Tf	< 2 uS	

Note: Specifications are subject to change without notice.

Hellroaring SSR-150xxx-60VL-12P-xC-xxxCS Instructions

Standard Terms and Conditions of Sale

The sale of Hellroaring Technologies, inc. products shall be governed by the laws of the state of Montana. All sales shall transfer title within the state of Montana via common carrier. Hellroaring Technologies, inc. will not collect sales taxes for any other state. Should the unlikely event, a cause of action arises, buyer agrees that such action shall be held and governed in the state of Montana. The buyer recognizes that there exists inherent risks associated with batteries and installation & operation of battery devices. It is understood that any technical information published by Hellroaring Technologies, inc. including any installation instructions is of a general nature only and it is the user's responsibility to determine the proper application, installation, and operation of products. The buyer assumes all risk and agrees to indemnify Hellroaring Technologies, inc. against any and all causes for injury or damage to third parties that arises from use of such product.

Return Policy

Should any single unit product sold by Hellroaring Technologies, inc. not meet or exceed your expectations, you may, within 30 days of our shipment to you, return such product for a full refund (credit on credit card orders) less a 15% restock charge, provided that:

- a) You obtain an RMA number and provide your shipping address by calling customer service at 406 883-3801 or send an RMA request via e-mail (include the model #, serial number, and your phone number), and
- b) The product, including all accessories, is returned in original and re-saleable condition, and
- c) Units are Shipped (prepaid and insured for damage in transit) in the original or equivalent packaging, and
- d) (optional) You include a simple note as to the reason for dissatisfaction. (This can help us improve our products)

For quantity orders, sales are final and our standard limited warranty applies.

Limited Warranty

This Limited Warranty is extended to the original purchaser. Hellroaring Technologies, inc. warrants that our SSR products will be free from defects in materials and workmanship upon delivery. All claims for defects must be made within 30 days of delivery. The sole and exclusive remedy for failure of the product shall be for us, at our option, to repair or replace the product, to whatever extent we deem necessary to restore the product to proper operating condition. We may make replacements with new or functionally equivalent products of equal value. Should Hellroaring Technologies, inc. be unable to repair or replace the product within a reasonable time, we reserve the right, at our option, to issue a refund or credit of the purchase price in lieu of repair or replacement. We reserve the right to assess a \$15 fee for units returned and proven not to be defective. To obtain warranty service you must:

- 1) Call Customer Service at 406-883-3801 for a Return Material Authorization (RMA) number and shipping address. Or send an RMA request via e-mail (include the model #, serial number, and your phone number and your return shipping address)
- 2) Return the product in the original or equivalent packaging (Shipping prepaid and insured for damage in transit), together with the RMA number AND a description of the problem. Include your return shipping address and your phone number.

Do not attempt to disassemble, or otherwise tamper with any of the 4 nuts on the bottom of each unit. Doing so will void this limited warranty. For quantity orders, extended warranty for switching applications may be available on an application specific basis at slight extra cost.

Exclusions

This Limited Warranty is made expressly in lieu of and to the exclusion of any and all warranties, express or implied, oral or written, including, without limitation, any and all implied warranties of merchantability or fitness for a particular purpose, and all such other warranties are expressly disclaimed. This Limited Warranty shall not be applicable to failures of the product that result from accident, abuse, misapplication or alteration, improper installation or maintenance, unauthorized repair attempts, operation or attempts to operate it beyond its mechanical, chemical, thermal, or electrical capacity intentionally or otherwise, and we assume no liability as a consequence of such events under the terms of this warranty. Hellroaring Technologies, inc. shall not be liable for any special, indirect, incidental, consequential, exemplary, or punitive damages for claims in any claim, action, suit or proceeding arising out of the purchase, use or performance of the product, and whether or not it has been advised of the possibility of such damages. The foregoing allocation of risk is reflected in the price of the product. Nor shall there be any liability thereunder for claims of labor, loss, profit, goodwill, repairs or other expenses incidental to the repair or replacement of such product.

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Hellroaring SSR-150xxx-60VL-12P-xC-xxxCS Instructions

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