WINFORD ENGINEERING, LLC
4569 Garfield Road • Auburn, MI 48611
Phone: 1-877-634-2673
FAX: 1-989-671-2941
www.winford.com

RLYSS102 Datasheet

Overview

The RLYSS102 provides two solid-state SPST relays with convenient screw terminal connections and a 2x5 header for the inputs, and screw terminal connections for the contacts. LED indicators allow the state of each channel to be visually observed. The contacts are easily configured so that each relay may either be used as a traditional relay for AC or DC signals, or maybe configured in DC-only mode for higher current-carrying capability.

Each channel can be activated with a control signal that is anywhere from 3.3V to 24V, making this device suitable for use with 3.3V micros (e.g., Raspberry Pi, Arduino Due), 5V micros (e.g., Arduino Uno, Arduino Mega), 12V PLCs (sourcing outputs), or 24V PLCs (sourcing outputs).

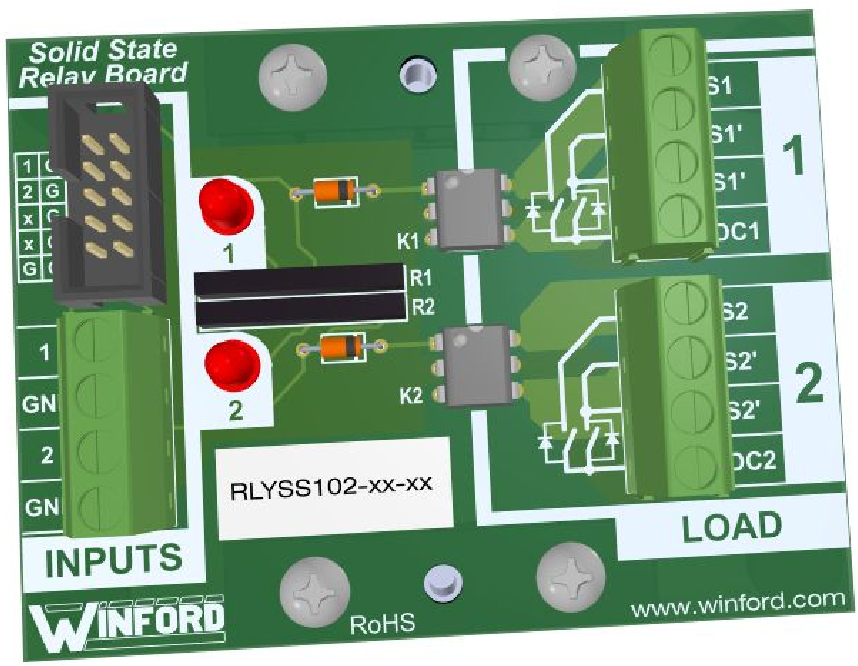
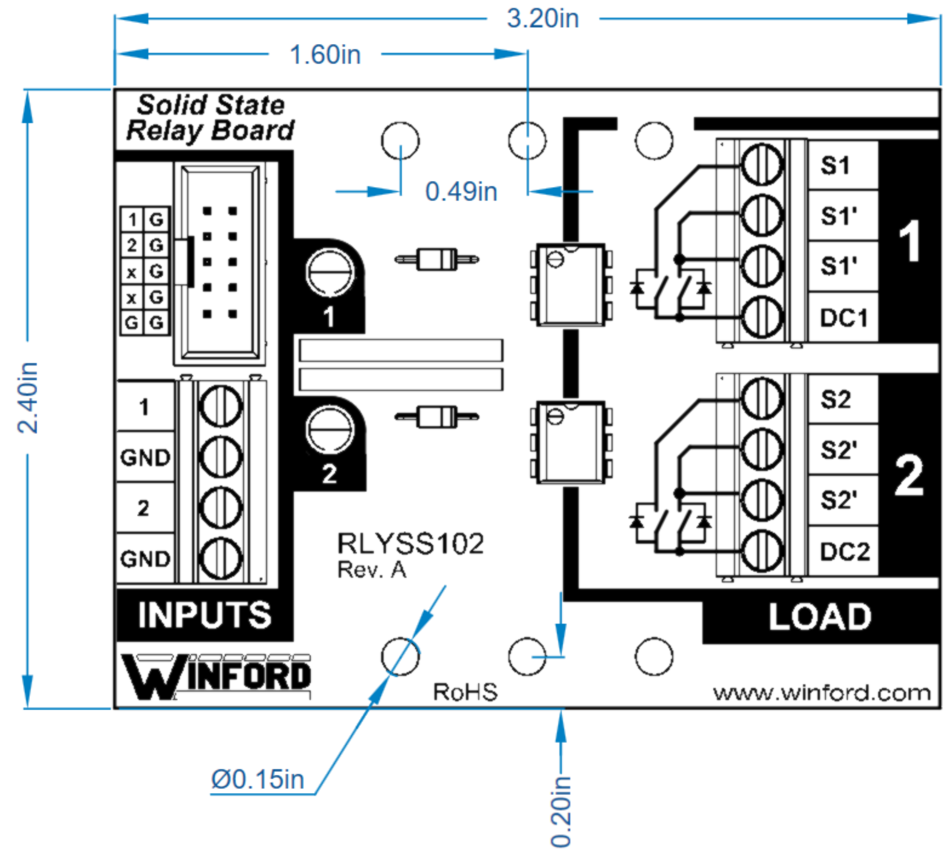
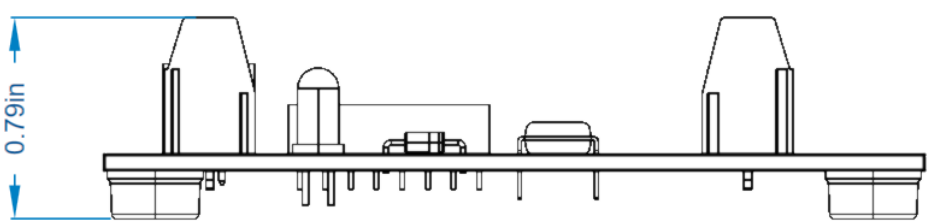


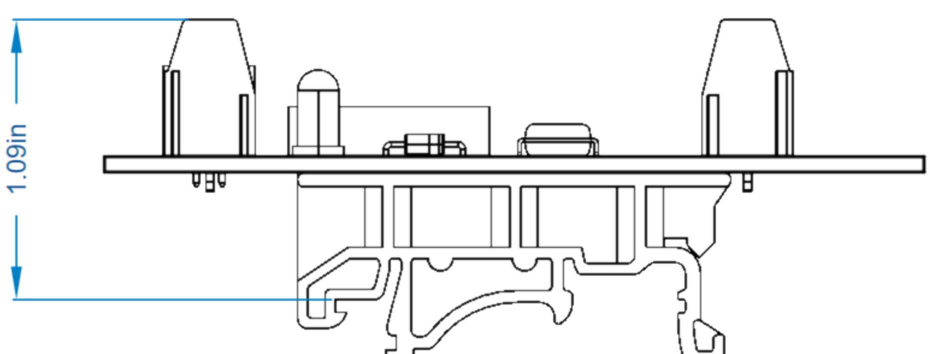
Figure 1

Dimensions (typical shown)





Rubber Feet



DIN Mount

Part Number Ordering Information

RLYSS102	-	060	-	35	-	
		1		2		3

1. Solid State Relay Voltage Rating

- **060 = 60V**

2. Solid State Relay Current Rating

- **35 = 3.5A @ room temp (AC wiring)**

3. Mounting Option

- **FT** Rubber Feet on bottom side of PCB
- **DIN** DIN Rail Mounting Clips

Simplified Schematic Drawing (one channel)

Implementation is the same for both channels.

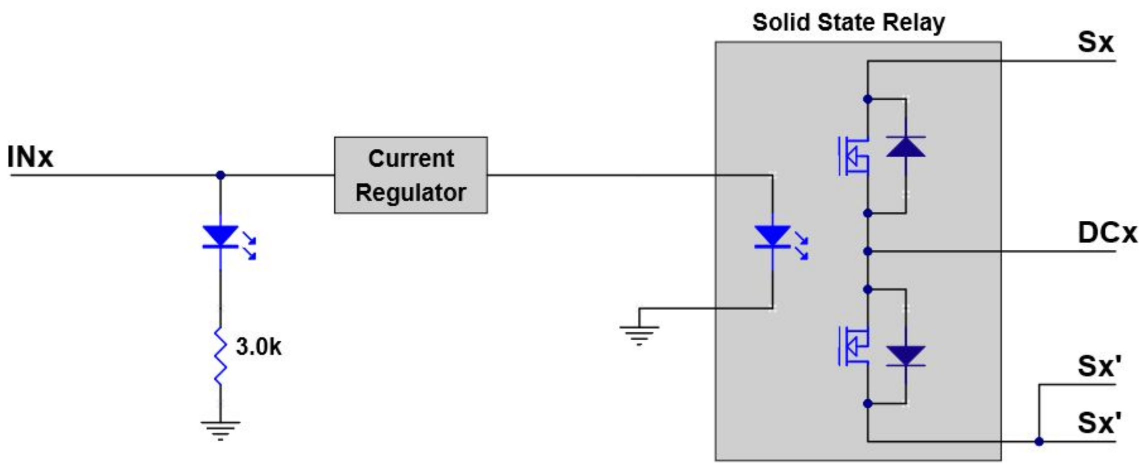


Figure 3

When there is sufficient current thru the LED in the solid-state relay, the opto-MOSFETs in the solid-state relay turn on, connecting Sx, DCx, and Sx'. See later sections in this document for configuration recommendations based on the type of load being controlled.

Detailed Description

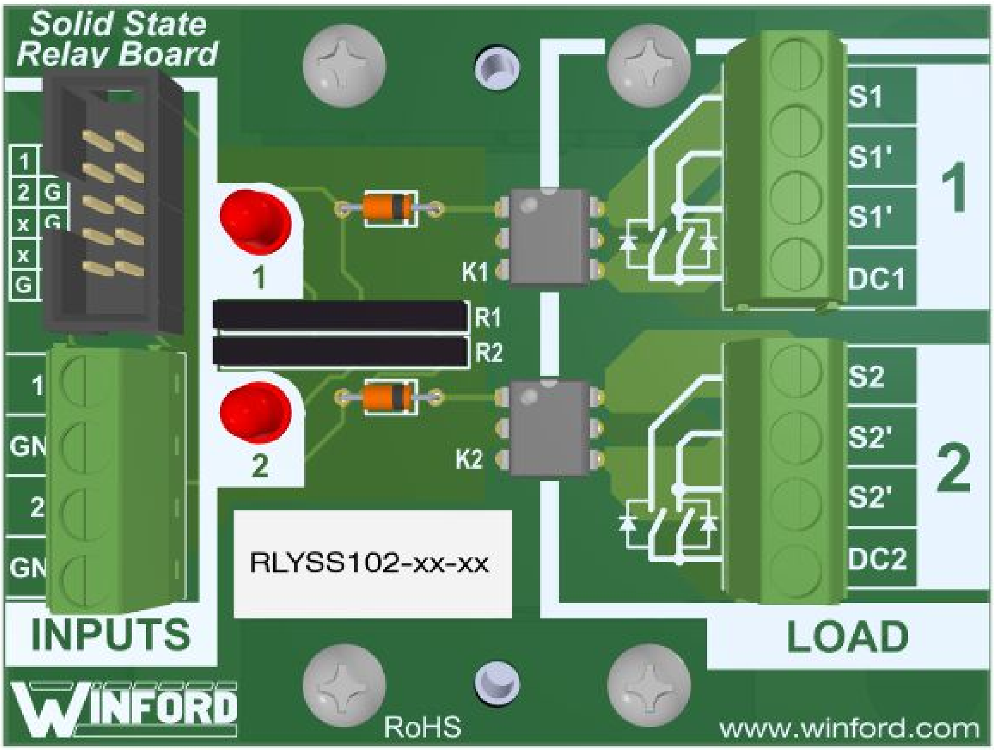


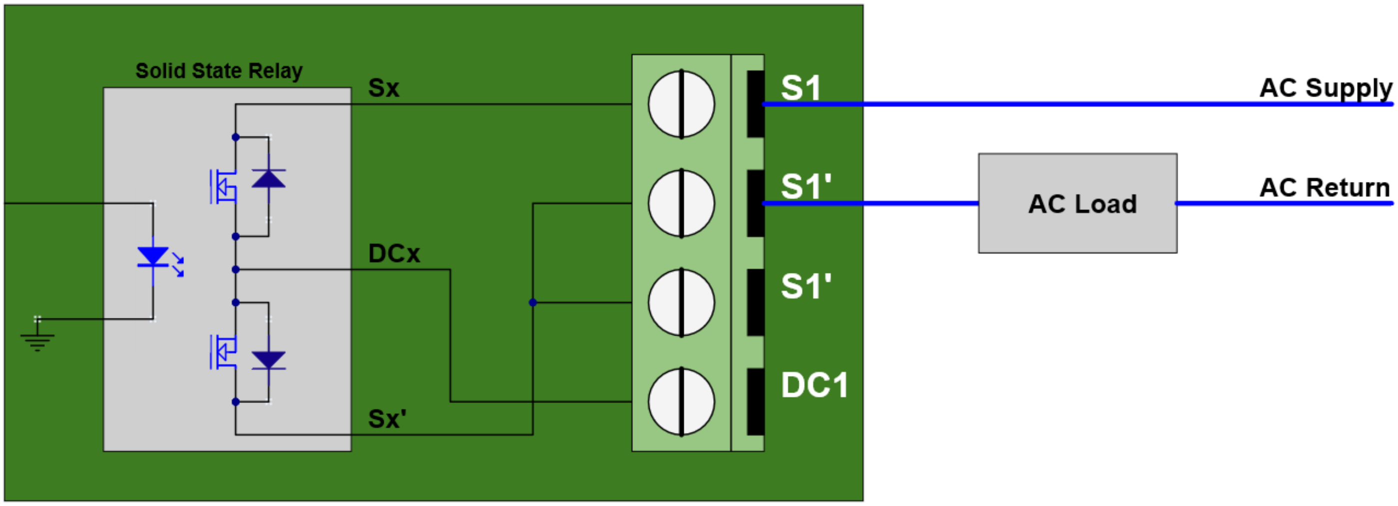
Figure 4

SIGNAL	DESCRIPTION
1	Input control signal for Channel 1
2	Input control signal for Channel 2
GND (or G)	Ground reference

SIGNAL	DESCRIPTION
Sx	Relay contact A for Channel x (drain pin, opto-MOSFET A)
Sx’	Relay contact B for Channel x (drain pin, opto-MOSFET B)
DCx	Junction point for the two opto-MOSFETs for Channel x

Standard Relay Configuration (AC wiring)

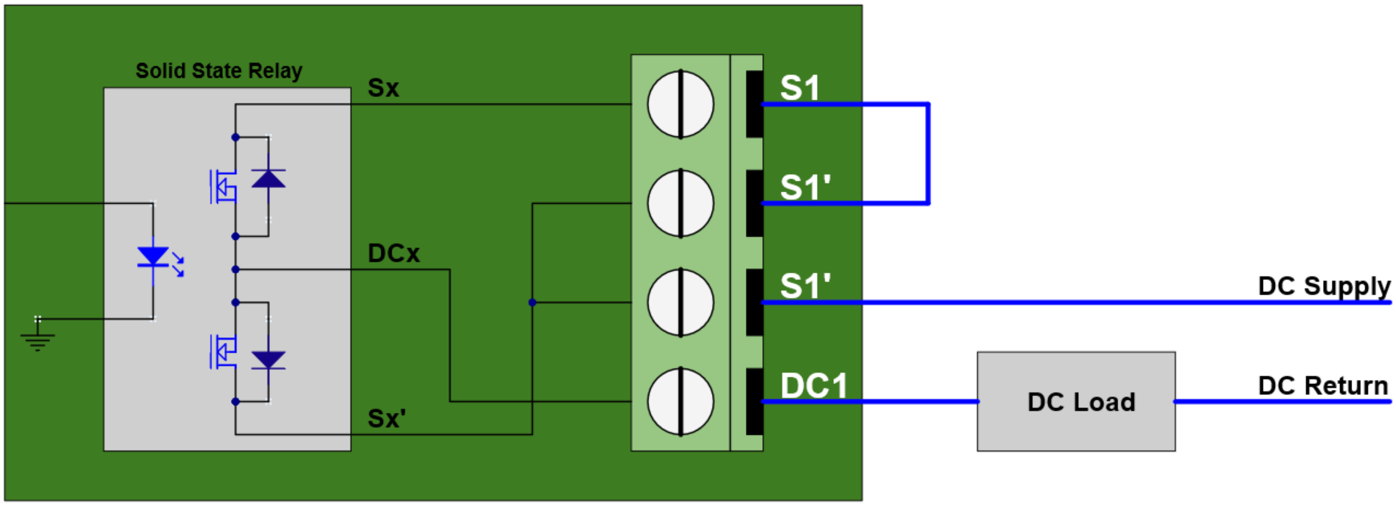
In the standard configuration (AC wiring), the opto-MOSFETs are in series, with their body diodes in opposite directions. Thus, when the opto-MOSFETs are off, no current can flow in either direction. The figure below illustrates the wiring for this configuration.



DC Switch Configuration (DC wiring)

In the DC switch configuration (DC wiring), the opto-MOSFETs are in parallel due to placing a wire that connects Sx and Sx', so their body diodes are also in parallel. Since the body diodes allow current to flow in one direction even when the opto-MOSFETs are off, this configuration is only appropriate in a DC application (not an AC application). However, since the MOSFETs are in parallel, the current-carrying capability is increased.

Due to the extra Sx' terminal block position, it is easy to implement this configuration, as illustrated below.



Caution: Note that if DC Supply and DC Return are swapped in the DC configuration, the load will always be powered since current will flow thru the opto-MOSFET body diodes even if the opto-MOSFETs are off.

Operating Conditions

Ambient Temperature Range	–30°C to 70°C
Relative Humidity Range - not icing or condensing	5% to 85% RH

Absolute Maximum Ratings (25 degC, all voltages relative to GND unless indicated otherwise)

Common Ratings for all RLYSS102 Part Numbers

Specification	*Symbol*	*Min*	*Typ*	*Max*	*Unit*
Input Control Signal Voltages, for all RLYSS102 products	V_INx	-5V		25	V

Ratings for Specific RLYSS102 Part Numbers

Part Number	*Relay Contact Voltage Absolute Max Rating (Sx relative to Sx')*	*Relay On-State Resistance (typical)*	*Relay Contact Absolute Max Current Rating at 25 degC*	*Relay Contact Absolute Max Current Rating at 70 degC*
RLYSS102-060-35	60V	AC Wiring: 40 mOhms DC wiring: 15 mOhms	AC Wiring: 3.5A DC wiring: 7.0A	AC Wiring: 2.5A DC wiring: 5.0A

Exceeding the absolute maximum ratings may result in damage to the product.

Electrical Performance and Recommended Operating Conditions (at 25 degC, all voltages relative to GND)

Specification	*Symbol*	*Min*	*Typ*	*Max*	*Unit*
Input Signal Voltage Range for logic HIGH	V_IH	3.2		24	V
Input Signal Voltage Range for logic LOW	V_IL	0		0.8	V
Input Signal Current V_INx = 3.3V V_INx = 5.0V V_INx = 12V V_INx = 24V	I_INx		8 12 15 18		mA
Output Leakage (INx = 0.0V, Sx voltage relative to Sx' voltage is 60V)	I_R			2	uA

Screw Terminal Blocks

- Wire sizes (all positions): 12-30 AWG
- Terminal block pitch: 5.00mm

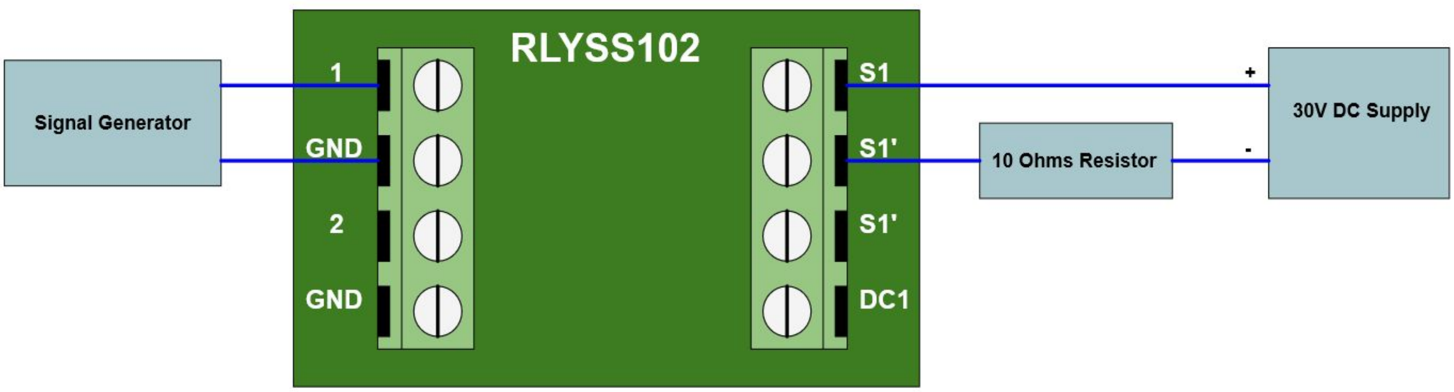
Component Details

Component	*Manufacturer*	*Manuf. Part Number*
Solid State Relay, RLYSS102-060-35	Toshiba	TLP3545A(F

Typical Timing Performance

For reference, some typical output transition timing plots are provided on the following pages (for a single channel). In all plots, the horizontal time scale is 1ms/division.

The following test setup was used for capturing the typical timing performance:

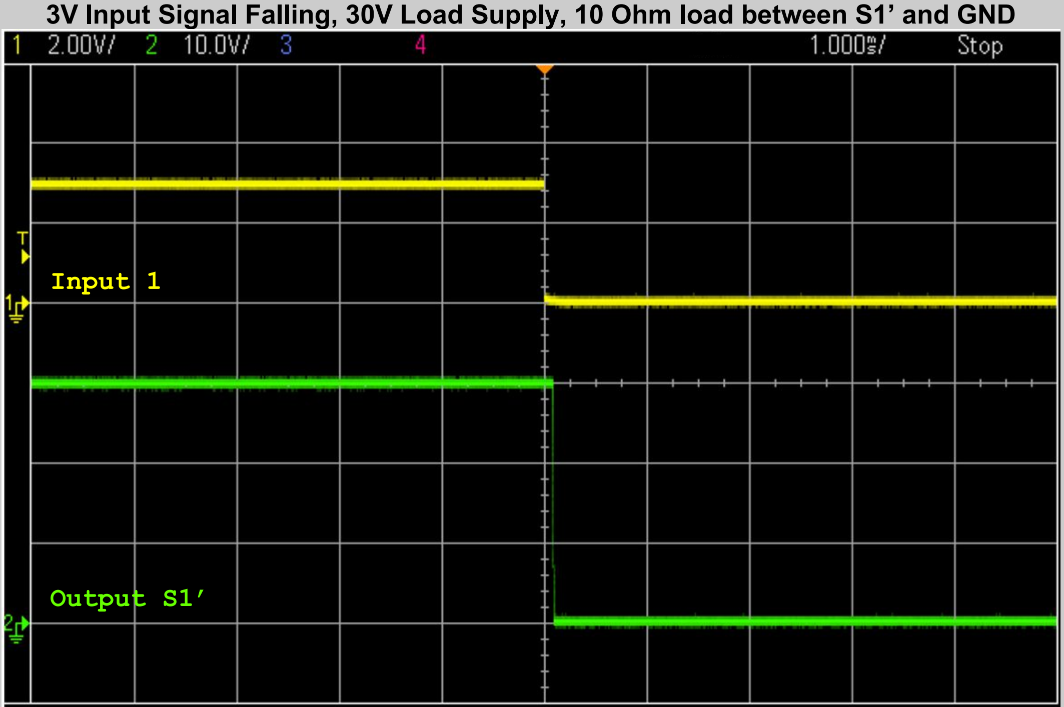


3V Input Signal, Rising Edge, RLYSS102-060-35

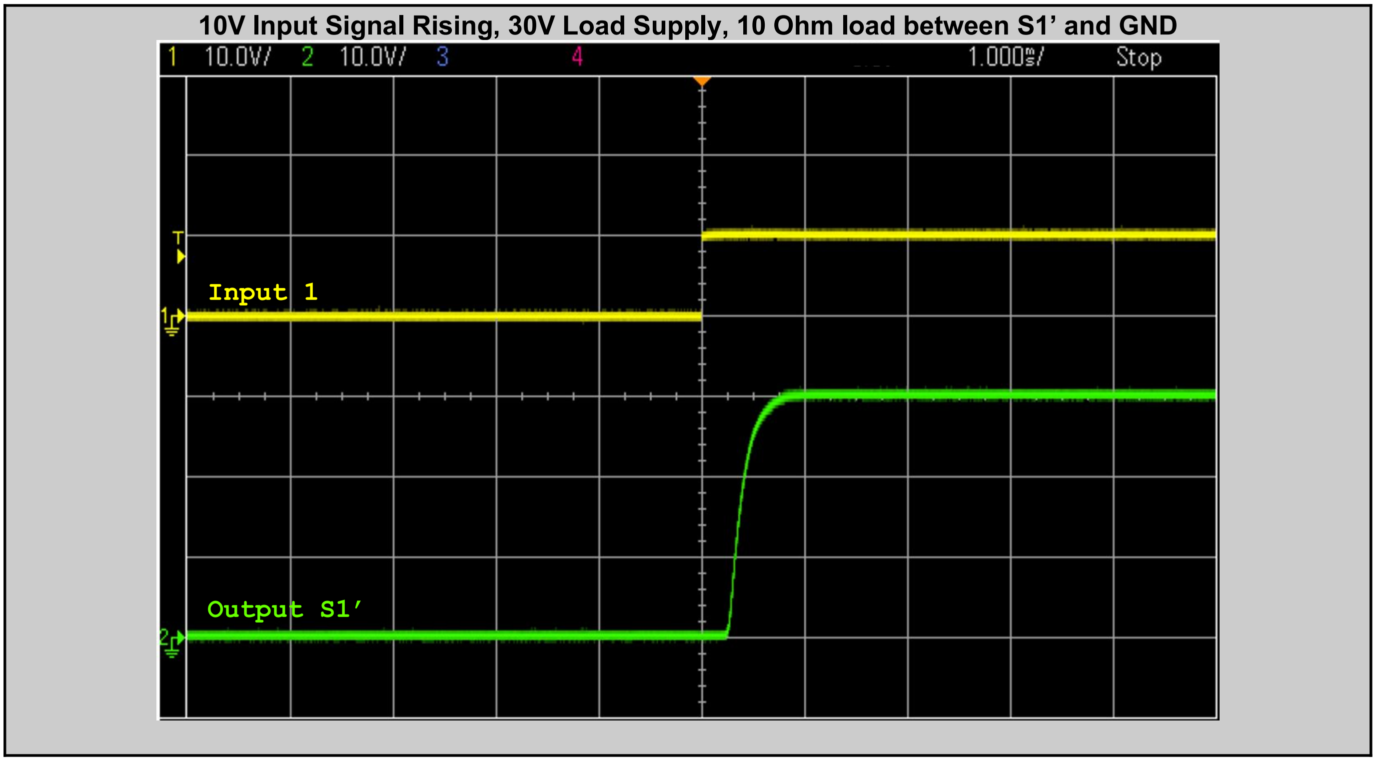
3V Input Signal Rising, 30V Load Supply, 10 Ohm load between S1' and GND

3V Input Signal, Falling Edge, RLYSS102-060-35

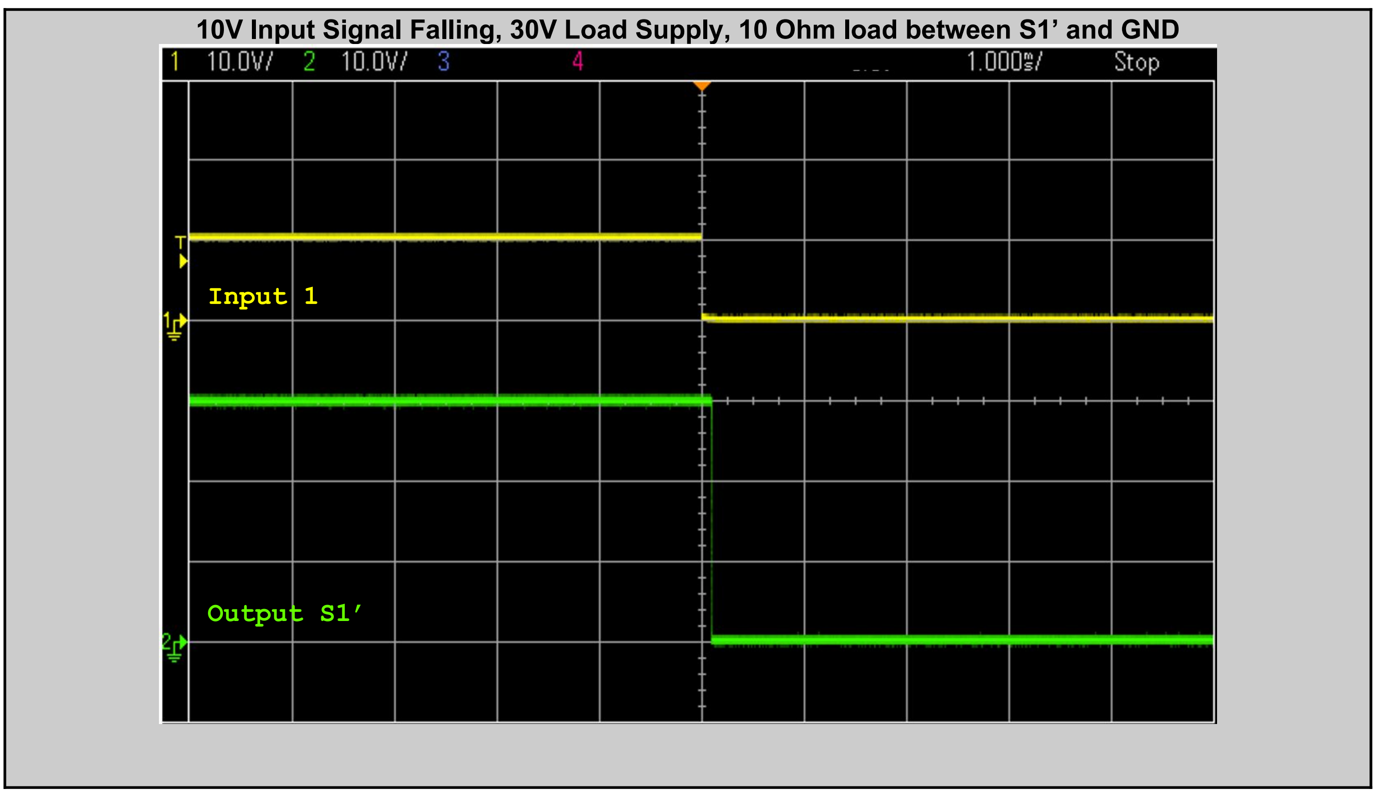
3V Input Signal Falling, 30V Load Supply, 10 Ohm load between S1' and GND



__10V Input Signal, Rising Edge, RLYSS102-060-35__



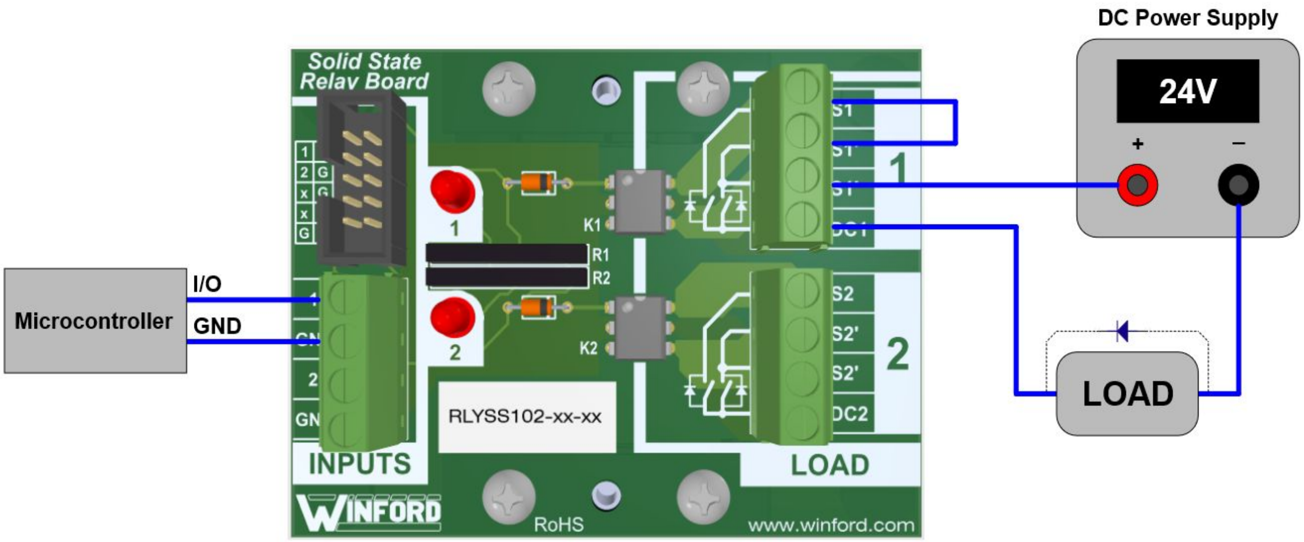
__10V Input Signal, Falling Edge, RLYSS102-060-35__



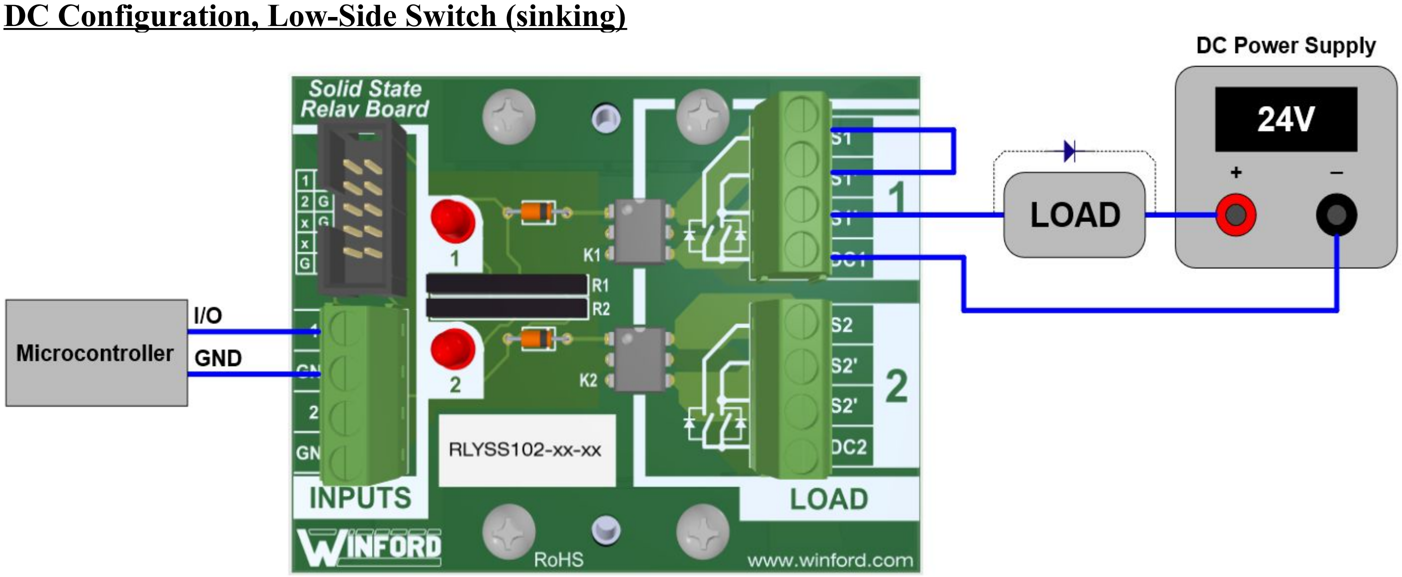
Applications

Wiring diagrams for some typical applications are shown below.

DC Configuration, High-Side Switch (sourcing)



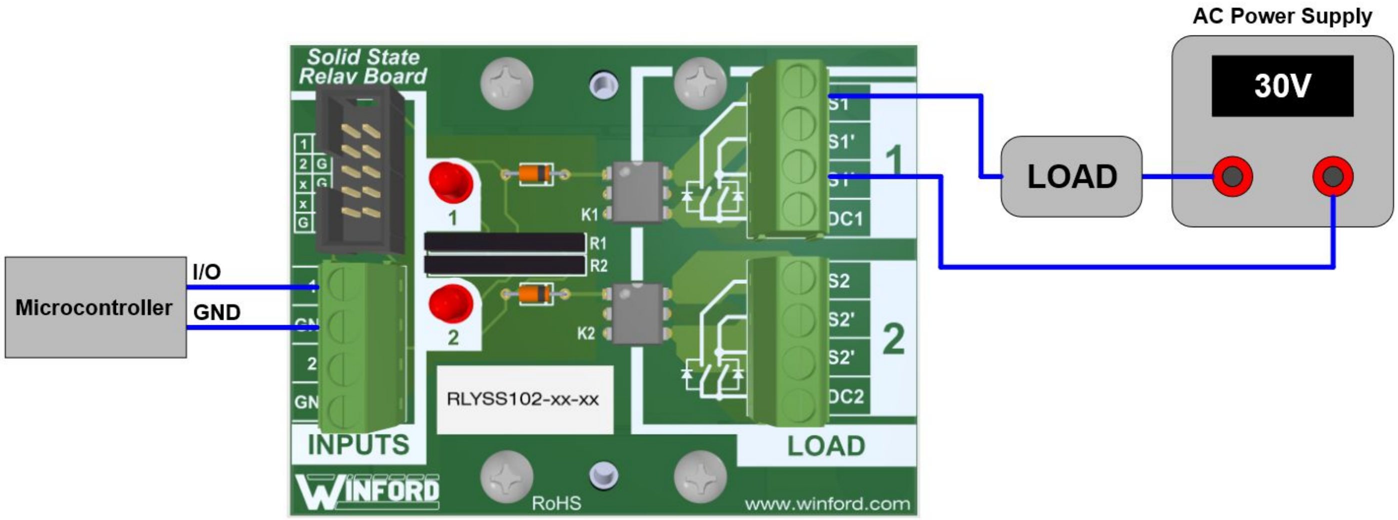
DC Configuration, Low-Side Switch (sinking)



Note that in either of the above cases, the wire connecting S1 and S1' is not needed for low-current loads. It is only needed if warranted by the load current.

If driving an inductive load, be sure to include a clamping device. Clamping is often accomplished by wiring a diode in parallel with the load, as shown in the figures above.

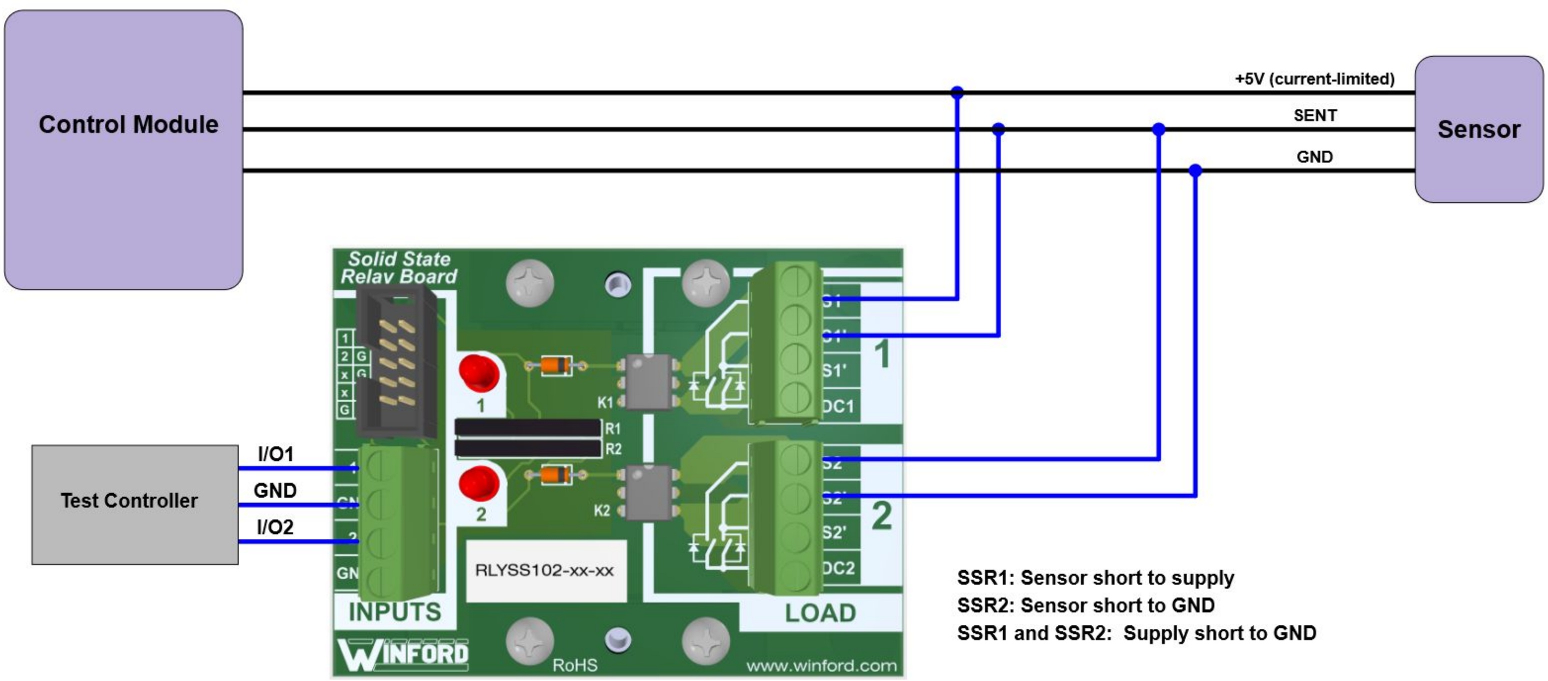
AC Configuration



In general, the RLYSS102 is not recommended for inductive AC loads, but there are some exceptions (particularly for low AC voltages, or if there is robust inductive spike clamping in place to ensure absolute max ratings for this product are not exceeded). If there is application in which an AC inductive load needs to be controlled, please see Winford's electromechanical relay products, or contact us to discuss further.

Sensor Short-Circuit Testing

During automotive sensor development (e.g. torque sensor, position sensor, speed sensor), it is commonplace to perform short-circuit testing to confirm that the system responds appropriately. The diagram below shows the RLYSS102 being used for short-circuit testing on a sensor having +5V, SENT, and GND connections.



System Analysis: Failure Modes & Effects

When designing any system, it is advisable to ensure that there is a thorough understanding of what will happen when each piece of the system fails. It is the responsibility of the system designer to ensure that the failure effects are understood, and that appropriate countermeasures or redundancies are implemented if warranted.

If there are additional questions about using this product in a particular application, please contact Winford Engineering for more information.

Notice

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