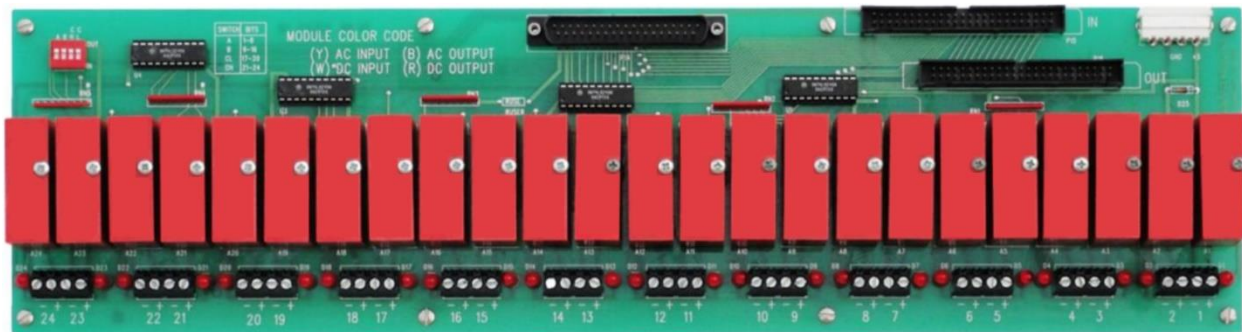


SSR-RACK24 Datasheet

24-Channel Solid-State Relay (OPTO22, Gordos) Mounting & Interface Rack Accessory for MCC Digital I/O Boards



Overview

The SSR-RACK24 is a mounting and interface rack for use with industry-standard size solid state I/O modules. These modules provide functional isolation¹ for both digital inputs and outputs. Onboard TTL-level drivers provide the necessary drive current to control any compatible 5 V solid-state relay. This board allows interfacing 24-channel relay accessories to any Measurement Computing Corporation (MCC) digital I/O board with 50-pin or 100-pin connectors.

Interface to DIO Boards

The SSR-RACK24 is compatible with MCC digital I/O boards such as the PCI-DIO24, PCI-DIO24H, PCI-DIO48H, PCI-DIO96, PCI-DIO96H, USB-DIO24/37, and USB-DIO96H/50.

Powered from the PC

The SSR-RACK24 board is powered from a +5 V computer power supply line or an external +5 V supply. Power is connected through a four-pin MOLEX connector, just like that found on all PC power supplies with expansion plugs.

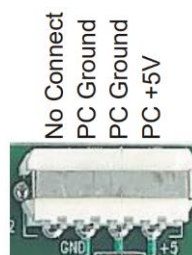


Figure 1. Molex connector pin assignments

¹ Functional isolation up to 30 VAC, 42.2 Vpk, 60 VDC maximum. Do not connect to voltages above these levels; product is not certified for use with hazardous voltages.

Screw Terminal Wiring

Each SSR-RACK24 screw terminal supports two relay modules. Use 12-22 AWG wire to connect signals to the screw terminals.¹ The screw terminals are high-quality jaw types that do not bind when removing wires. The status LED is ON when a module is active.

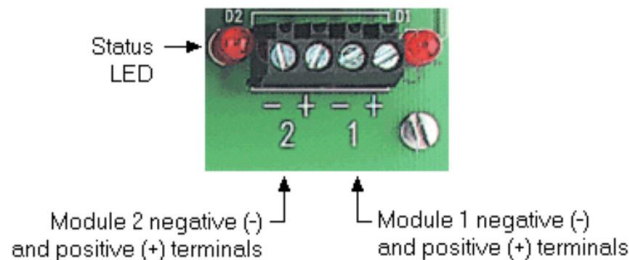


Figure 2. Typical relay channel screw terminal

The screw terminal/module numbers correspond to 8255 ports:

- 1 to 8 correspond to FIRSTPORTA Bit 0 to Bit 7
- 9 to 16 correspond to FIRSTPORTB Bit 0 to Bit 7
- 17 to 20 correspond to FIRSTPORTC Low Bit 0 to 3
- 21 to 24 correspond to FIRSTPORTC High bits 4 to 7

Solid-state I/O modules

The SSR-RACK24 has 24 mounting positions for solid state I/O modules manufactured by Gordos, OPTO22, Grayhill, Western Digital, and others. These modules provide functional isolation for both digital inputs and outputs. Mounting screw threads are provided for you to easily install the SSR modules. An example of an SSR module and mounting screw is shown below.

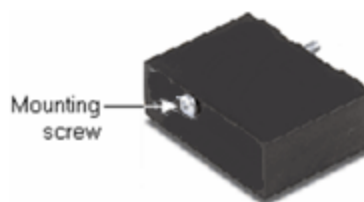


Figure 3. Typical SSR module with mounting screw

Compatible SSR modules:

- 1781-IB5S (DC input, 3.3 to 32VDC, 5V logic, slim module²)
- 1781-OB5S (DC output, 3 to 60VDC, 5V logic, slim module²)

¹ This product is not certified for use with hazardous voltages. Do not connect to voltages above 30 VAC, 42.2 Vpk, 60 VDC levels.

² Do not connect to voltages above these levels.

Module input/output control

Set the module type for input or output using the DIP switch for each port.

- **A** – FIRSTPORTA control
- **B** – FIRSTPORTB control
- **CH** – FIRSTPORTC High (controls four bits)
- **CL** – FIRSTPORTC Low (controls four bits)

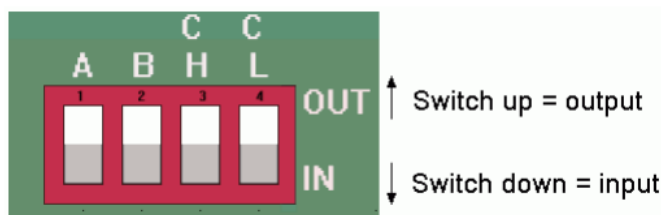


Figure 3. DIP switch to control port direction

37-pin I/O Connector

The SSR-RACK24 has one 37-pin D type connector (P14). Use a 37-pin cable to connect with 24-bit DIO boards, such as the USB-DIO24/37.

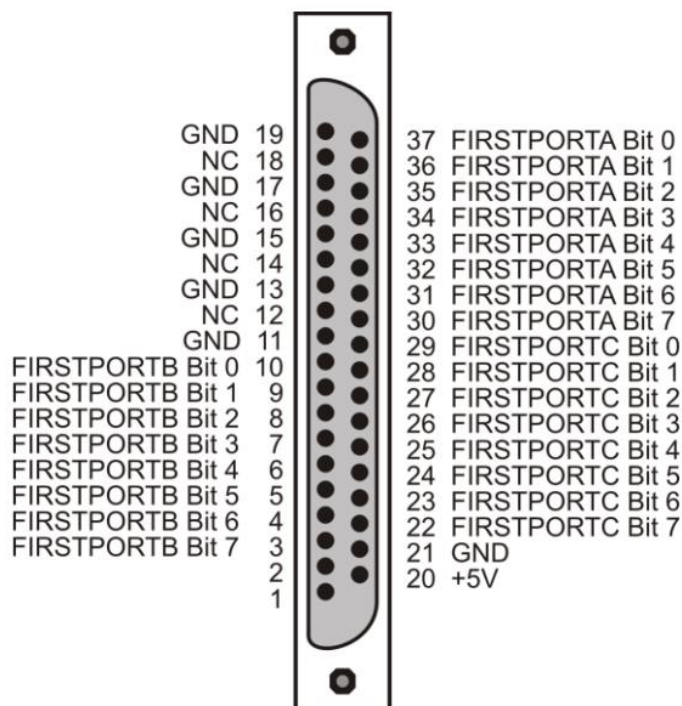


Figure 4. 37-pin connector pinout

Do not make connections to pins marked "NC".

50-pin I/O Connectors

The SSR-RACK24 has two 50-pin connectors labeled IN (**P15**) and OUT (**P16**). Use a 50-pin cable to connect with compatible MCC digital I/O boards.

- Connect a cable from a DIO device to the **IN** connector.
- Connect a cable from another SSR-RACK24 to the **OUT** connector.

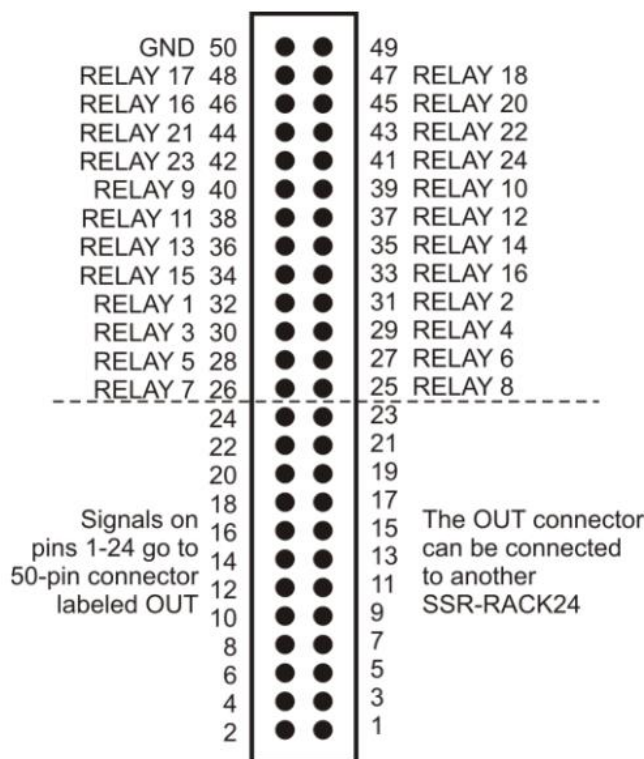


Figure 5. 50-pin connector pinout

Onboard buffers

Because most manufacturers of SSR racks do not supply output buffers on the SSR rack, simple digital I/O boards such as the PCI-DIO24, PCI-DIO96, and other manufacturer's 82C55-based digital I/O boards do not have the power to switch the SSRs. For example, to use an OPTO22 PB16 rack, you need to use a high-drive DIO board such as the PCI-DIO24H or PCI-DIO96H. To be usable with all common TTL output boards, the SSR-RACK24 is designed with onboard buffers. With these buffers, you can plug directly into the SSR-RACK24 from your PCI-DIO24, PCI-DIO96, or any other manufacturer's 82C55-based digital I/O board.

SSR-RACK Inverting Logic

On an input SSR, the presence of a voltage raises the TTL output of the SSR from TTL low to TTL high. Because the SSR-RACK uses conventional inverting logic, the completed circuit of SSR and SSR-RACK lowers the signal to the DIO board from TTL high (+5) to TTL low (GND). An output SSR completes a circuit when the DIO board TTL signal to the SSR is low. The circuit through the SSR is open when the signal from the DIO board is high.

Converting the SSR-RACK from Inverting Logic

The SSR-RACK follows the convention set by OPTO22 and followed by virtually all SSR rack manufacturers — the sense and control logic for the relays is inverted. This means that a 0 output from the digital I/O board causes an output relay to activate (complete the circuit), while a 1 (TTL high) causes the relay to deactivate. The chips which invert the logic are socketed and can be easily replaced with chips that do not invert the logic. Please consult with a professional if you need non-inverting logic, so not to void the device's warranty. This service is not available from Diligent.

Specifications

All specifications are subject to change without notice.

Typical for 25 °C unless otherwise specified.

Specifications in italic text are guaranteed by design.

Relay Input Specifications

Number of Channels	24
Isolation	<i>Functional isolation</i>

Power Supply Specification

Power Supply	+5 V from a computer power supply or an external +5 V supply connected to the four-pin MOLEX connector
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Screw Terminal Connectors

Wire Sizes	12 – 22 AWG
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Environmental Specifications

Operating Temperature Range	0 °C to 70 °C
Storage temperature range	–40 °C to 100 °C
Humidity	0% to 90% non-condensing
Hazardous locations	Not certified for use in hazardous locations.

Certifications

<https://ni.com/certification>

Software Options

The SSR-RACK24 is an accessory board compatible with MCC digital I/O boards, such as the PCI-DIO24, PCI-DIO24H, PCI-DIO48H, PCI-DIO96, PCI-DIO96H, USB-DIO24/37, and USB-DIO96H/50, which use the following MCC software:

- **InstaCal**
- **Universal Library for Windows**
- **Universal Library for Linux** (PCI-DIOxxx boards are not supported)
- **ULx for NI LabVIEW**
- **DAQami** (PCI-DIOxxx boards are not supported)

Ordering Information and Purchasing Options

Digilent Part Numbers:

- 6069-410-069 – SSR-RACK24 (Solid state relay backplane (Gordos/OPTO-22 type relays), 24-channel)
 - Molex 4-pin Male-to-Female Power Cable, 10 ft, 18 AWG (included)

Additional Resources

Reference materials are available on Digilent's Reference site (<https://digilent.com/reference>).

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