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1. Welcome to the G4 Digital I/O Family Data Book

INTRODUCTION

Generation 4 digital I/O, introduced by Opto 22 in 1989, provides increased density over older modules, while maintaining single-channel flexibility. LEDs and fuses are generally on the modules rather than the rack to make them visible and easy to service. The G4 digital I/O family includes a wide variety of modules, mounting racks, and accessories to meet the needs of your system.

WHAT’S IN THIS BOOK

The G4 Digital I/O Family Data Book pulls together information on all Generation 4 digital I/O family products. This same information can also be found in individual product data sheets; it is brought together here for your convenience.

This book covers the following:

Chapter 2. Generation 4 Digital I/O Mounting Racks—Choose your mounting rack from the table on page 4, then see detailed drawings and specifications on the following pages.


Chapter 4. Generation 4 Digital I/O Modules—See the table on page 35 for an overview of all G4 modules. Detailed drawings and specifications follow.

Chapter 5. Generation 4 Digital I/O Accessories—Details on G4 accessories, including cables and connectors, fuses, and a jumper strap.

Appendix A. Designing Custom I/O Mounting Racks—Includes helpful information for customers who are designing their own mounting systems for Generation 4 digital I/O modules.

Appendix B. Wiring Diagrams—Examples for mapping field wiring to mounting racks for each type of module that can be plugged into the rack.

FOR HELP

See Guide to Troubleshooting Legacy Opto 22 Products (form 1104) for help in solving problems you may encounter.

If you have additional questions about using your Generation 4 Digital I/O products, please contact Opto 22 Product Support.
Phone: 800-TEK-OPTO (800-835-6786 toll-free in the U.S. and Canada)
951-695-3080
Monday through Friday,
7 a.m. to 5 p.m. Pacific Time

Email: support@opto22.com

Opto 22 website: www.opto22.com

When calling for technical support, be prepared to provide a complete description of your hardware and operating system to the Product Support engineer. This information should include:

• accessories installed
• type of power supply
• types of I/O modules and racks used
• third-party devices installed
• how the system is wired

NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.
2. Generation 4 Digital I/O Mounting Racks

OVERVIEW OF MOUNTING RACKS

This chapter includes information on mounting racks used with G4 digital I/O modules. For integral racks, which have permanent I/O circuitry built into the rack, see page 29.

Features

The following features apply to all mounting racks in this chapter:

- Minimum mounting space required
- Spare module fuse included
- UL recognized, CSA certified, and CE compliant
- Uses a single 5, 15, or 24 VDC power supply for control power
- You can insert and remove modules easily and quickly without disturbing field wiring.
- Modules are securely attached with a threaded captive hold-down screw.
- Operating temperature: 0° to 70° C
- Humidity: 95% relative humidity, non-condensing

Notes on I/O Module Use

G4 I/O modules are available with logic voltages of 5 VDC, 15 VDC, or 24 VDC. Your choice of modules, however, usually depends on the equipment you use to control the rack. For example:

- Racks with an Opto 22 brain board or a Raspberry Pi can use only 5 VDC logic I/O modules.
- Racks with an Opto 22 PC adapter card (PCI-ACS, PCIe-ACS, or G4ACS) can use only 5 VDC logic I/O modules.

All modules on a rack must use the same logic voltage, except:

- On a G4PB4R rack, you can mix modules with different logic voltages.
- On a G4PB16I rack, dry contact outputs and all input modules must have the same logic voltage, but output modules other than dry contact outputs can have mixed logic voltages.
Choose Your Rack

Choose a rack from the following table, and then see the referenced page in this chapter for detailed drawings and specifications, plus links to the product on our website.

<table>
<thead>
<tr>
<th>Model</th>
<th>Channels</th>
<th>Input Modules</th>
<th>Output Modules</th>
<th>A</th>
<th>C</th>
<th>D</th>
<th>C</th>
<th>Built-in Fuse Test</th>
<th>Field Connector</th>
<th>Control Connector</th>
<th>Special Features</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4PB4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>screw-type barrier strip</td>
<td>Good for compact locations where only a few I/O points are needed.</td>
<td>page 5</td>
</tr>
<tr>
<td>G4PB4R</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>screw-type barrier strip</td>
<td>Channel-to-channel isolation between all field and control circuits. Outputs can be wired for either positive-true logic or standard negative-true logic. Cannot use dry contact output modules.</td>
<td>page 6</td>
</tr>
<tr>
<td>G4PB8</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>50-pin header connector</td>
<td>Compatible with a PC adapter card (PCI-AC5, PCIe-AC5, or G4AC5)</td>
<td>page 8</td>
</tr>
<tr>
<td>G4PB8H</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>50-pin header connector</td>
<td>For use with Optomux B1 or E1, Pamux B5, and mistic B100 brain boards. Also compatible with Raspberry Pi®. Works with Opto 22 PBSA/B/C power supply. Power indicator light.</td>
<td>page 9</td>
</tr>
<tr>
<td>G4PB16</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>50-pin header connector</td>
<td>Compatible with a PC adapter card (PCI-AC5, PCIe-AC5, or G4AC5)</td>
<td>page 11</td>
</tr>
<tr>
<td>G4PB16H</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>50-pin header connector</td>
<td>For use with Optomux B1, E1, Pamux B5, and mistic B100 brain boards. Also compatible with Raspberry Pi®. Works with Opto 22 PBSA/B/C power supply. Power indicator light.</td>
<td>page 13</td>
</tr>
<tr>
<td>G4PB16HC</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>50-pin header connector</td>
<td>Extra row of terminals for field power connections. For use with Optomux B1 or E1, Pamux B5, and Mistic B100 brain boards. Works with Opto 22 PBSA/B/C power supply. Power indicator light.</td>
<td>page 15</td>
</tr>
<tr>
<td>G4PB16I</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>screw-type barrier strip</td>
<td>Channel-to-channel isolation between all field and control circuits. Outputs (except dry contact output modules) can be wired for either positive-true logic or standard negative-true logic. Inputs and dry contact output modules can only be wired for negative-true logic.</td>
<td>page 17</td>
</tr>
<tr>
<td>G4PB16T</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>screw-type barrier strip</td>
<td>--</td>
<td>page 20</td>
</tr>
<tr>
<td>G4PB24</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>50-pin header connector</td>
<td>Compatible with a PC adapter card (PCI-AC5, PCIe-AC5, or G4AC5)</td>
<td>page 21</td>
</tr>
<tr>
<td>G4PB32DEC</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>50-pin header connector</td>
<td>Interfaces to a DEC computer DRV-11J parallel card.</td>
<td>page 24</td>
</tr>
<tr>
<td>G4PB32H</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>screw-type barrier strip</td>
<td>Boxed header connector</td>
<td>For use with Pamux B4 brain board or OptoMMP G4EB2 brain.</td>
<td>page 26</td>
</tr>
</tbody>
</table>
G4PB4 MOUNTING RACK

Description

The G4PB4 I/O mounting rack compactly accommodates up to four G4 digital I/O modules in applications where only a few I/O points are needed. Barrier strips with screw terminals provide the field, control, and mounting rack power connections. This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>0 °C to 70 °C</td>
</tr>
<tr>
<td>Interface connector</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
</tbody>
</table>

Dimensions

![Dimensions Diagram]
G4PB4R MOUNTING RACK

Description

The G4PB4R output mounting rack compactly accommodates up to four G4 output modules and features channel-to-channel isolation between all field and control circuits.

This rack supports negative-true or positive-true logic on a point-by-point basis. Each point can handle control signals differently.

I/O modules on this rack can have varied logic voltage. You can mix 5 VDC, 15 VDC, and 24 VDC logic modules on the rack.

This rack cannot use dry contact output modules.

Barrier strips with screw terminals provide the field, control, and mounting rack power connections.

Notes:
1. Even pins on control side are connected by etch to common.
2. +VCC and return are connected to control terminals 1 and 2.
CHAPTER 2. GENERATION 4 DIGITAL I/O MOUNTING RACKS

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>0 °C to 70 °C</td>
</tr>
<tr>
<td>Interface connector (field and control)</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td>I/O module limitations</td>
<td>Cannot use dry contact output modules</td>
</tr>
</tbody>
</table>

Dimensions

Connections

![Diagram of G4 Digital I/O Mounting Rack](image-url)
Description

The G4PB8 I/O mounting rack accommodates up to eight G4 I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field and mounting rack power connections. A header connector accepts a standard 50-pin cable for the logic connections (typically from a PC adapter card like the PCI-AC5).

Specifications

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0 ° to 70 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface connectors</td>
<td></td>
</tr>
<tr>
<td>Field:</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td>Control:</td>
<td>50-pin header connector</td>
</tr>
</tbody>
</table>

Dimensions
Connections—G4PB8

The G4PB8H I/O mounting rack accommodates up to eight G4 I/O modules. A header connector accepts a standard 50-pin connector, suited for an Optomux® B1 or E1, Pamux® B5, or B100 brain board. This rack is also compatible with the Digital I/O Carrier Board for Raspberry Pi (part number OPTO-P1-40P).

This rack requires 5 VDC logic I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field connections. A two-position screw terminal for 5 VDC connects to a power supply. The logic supply is fused with a 1A fuse.

### Notes:

1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked LOGIC + and -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Control (Header Connector)</th>
<th>Field (Terminal Strip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>47</td>
<td>1 and 2</td>
</tr>
<tr>
<td>1</td>
<td>45</td>
<td>3 and 4</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
<td>5 and 6</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>7 and 8</td>
</tr>
<tr>
<td>4</td>
<td>39</td>
<td>9 and 10</td>
</tr>
<tr>
<td>5</td>
<td>37</td>
<td>11 and 12</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
<td>13 and 14</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
<td>15 and 16</td>
</tr>
</tbody>
</table>
Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>0 °C to 70 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface connectors</td>
<td></td>
</tr>
<tr>
<td>Field:</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td>Control:</td>
<td>50-pin header connector</td>
</tr>
<tr>
<td>Power:</td>
<td>Two-position screw terminal for 5 VDC power supply</td>
</tr>
<tr>
<td>I/O module limitations</td>
<td>Supports 5 VDC I/O modules only</td>
</tr>
</tbody>
</table>

Dimensions—G4PB8H

Connections—G4PB8H

Notes:
1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked +5V and GND.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
4. Use only 5 VDC logic modules when using the mounting rack with a brain board.

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Control (Header Connector)</th>
<th>Field (Terminal Strip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>47</td>
<td>1 and 2</td>
</tr>
<tr>
<td>1</td>
<td>45</td>
<td>3 and 4</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
<td>5 and 6</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>7 and 8</td>
</tr>
<tr>
<td>4</td>
<td>39</td>
<td>9 and 10</td>
</tr>
<tr>
<td>5</td>
<td>37</td>
<td>11 and 12</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
<td>13 and 14</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
<td>15 and 16</td>
</tr>
</tbody>
</table>
G4PB16 MOUNTING RACK

Description

The G4PB16 I/O mounting rack accommodates up to 16 G4 I/O modules. This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF). Barrier strips with screw terminals provide the field and mounting rack power connections. A header connector accepts a standard 50-pin cable for the logic connections (typically from a PC adapter card like the PCI-AC5).

![Image of G4PB16 mounting rack]

Specifications

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0 °C to 70 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface connectors</td>
<td></td>
</tr>
<tr>
<td>Field:</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td>Control:</td>
<td>50-pin header connector</td>
</tr>
</tbody>
</table>

See the following page for dimensions and connection information.
Notes:
1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked LOGIC + and -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
G4PB16H MOUNTING RACK

Description

The G4PB16H I/O mounting rack accommodates up to 16 G4 I/O modules. A header connector accepts a standard 50-pin cable for logic connections, suited for an Optomux® B1 or E1, Pamux® B5, or B100 brain board. This rack is also compatible with the Digital I/O Carrier Board for Raspberry Pi (part number OPTO-P1-40P).

This rack requires 5 VDC logic I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field connections. A two-position screw terminal for 5 VDC connects to a power supply. The logic supply is fused with a 1A fuse.

Specifications

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0 °C to 70 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface connectors</td>
<td></td>
</tr>
<tr>
<td>Field:</td>
<td></td>
</tr>
<tr>
<td>Control:</td>
<td></td>
</tr>
<tr>
<td>Power:</td>
<td></td>
</tr>
<tr>
<td>Screw-type barrier strip</td>
<td>accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td>50-pin header connector</td>
<td></td>
</tr>
<tr>
<td>Two-position screw terminal</td>
<td>for 5 VDC power supply</td>
</tr>
<tr>
<td>I/O module limitations</td>
<td>Supports 5 VDC I/O modules only</td>
</tr>
</tbody>
</table>

See the following page for dimensions and connection information.
**Dimensions—G4PB16H**

![Dimensions Diagram]

**Connections—G4PB16H**

![Connection Diagram]

**Notes:**
1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked +5V and GND.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
4. Use only 5 VDC logic modules when using the mounting rack with a brain board.

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Control (Header Connector)</th>
<th>Field (Terminal Strip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>47</td>
<td>1 and 2</td>
</tr>
<tr>
<td>1</td>
<td>45</td>
<td>3 and 4</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
<td>5 and 6</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>7 and 8</td>
</tr>
<tr>
<td>4</td>
<td>39</td>
<td>9 and 10</td>
</tr>
<tr>
<td>5</td>
<td>37</td>
<td>11 and 12</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
<td>13 and 14</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
<td>15 and 16</td>
</tr>
<tr>
<td>8</td>
<td>31</td>
<td>17 and 18</td>
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<tr>
<td>9</td>
<td>29</td>
<td>19 and 20</td>
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<tr>
<td>10</td>
<td>27</td>
<td>21 and 22</td>
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<tr>
<td>11</td>
<td>25</td>
<td>23 and 24</td>
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<tr>
<td>12</td>
<td>23</td>
<td>25 and 26</td>
</tr>
<tr>
<td>13</td>
<td>21</td>
<td>27 and 28</td>
</tr>
<tr>
<td>14</td>
<td>19</td>
<td>29 and 30</td>
</tr>
<tr>
<td>15</td>
<td>17</td>
<td>31 and 32</td>
</tr>
</tbody>
</table>
G4PB16HC MOUNTING RACK

Description
The G4PB16HC I/O mounting rack accommodates up to 16 G4 I/O modules and features an extra row of terminals for field power connections. A header connector accepts a standard 50-pin cable for logic connections, suited for the Optomux® B1 or E1, Pamux® B5, or B100 brain board.

This rack requires 5 VDC logic I/O modules.
This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).
Barrier strips with screw terminals provide the field connections. A two-position screw terminal for 5 VDC connects to a power supply. The logic supply is fused with a 1A fuse.

Specifications

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0°C to 70°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface connectors</td>
<td></td>
</tr>
<tr>
<td>Field:</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td>Control:</td>
<td>50-pin header connector</td>
</tr>
<tr>
<td>Power:</td>
<td>Two-position screw terminal for 5 VDC power supply</td>
</tr>
<tr>
<td>I/O module limitations</td>
<td>Supports 5 VDC I/O modules only</td>
</tr>
</tbody>
</table>

See the following page for dimensions and connection information.
**Dimensions—G4PB16HC**

![Dimensions Diagram]

**Connections—G4PB16HC**

![Connections Diagram]

**Notes:**
1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked +5V and GND.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
4. Use only 5 VDC logic modules when using the mounting rack with a brain board.
G4PB16I MOUNTING RACK

Description

The G4PB16I I/O mounting rack accommodates up to 16 G4 I/O modules and features channel-to-channel isolation between all field and control circuits. Output modules (except dry contact output modules) may have their control side wired for either positive-true or standard negative-true control signals. Input modules and dry contact output modules operate only with negative true logic.

Barrier strips with screw terminals provide the field, control, and mounting rack power connections.

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>0 °C to 70 °C</td>
</tr>
<tr>
<td>Interface connector (field and control)</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
</tbody>
</table>

See the following page for dimensions and connection information.
### Dimensions—G4PB16I

```
Dimensions—G4PB16I
```

### Connections—G4PB16I

Notes:

1. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the module.
2. Input modules and dry contact output modules (G4ODC5R and G4ODC5R5) require the power supply’s ground to be connected to the control side’s GND terminal. These modules also require that odd-numbered connections on the control side be connected to +VCC.
3. Input modules use even-numbered control terminals and can only be wired for negative-true logic.
4. To wire output modules for standard negative-true logic, connect the odd-numbered control terminals to VCC and use the even-numbered terminals for control.
5. To wire output modules for positive-true logic, connect the even-numbered control terminals to logic ground and use the odd-numbered terminals for control.

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Control Terminals</th>
<th>Field Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 and 2</td>
<td>1 and 2</td>
</tr>
<tr>
<td>1</td>
<td>3 and 4</td>
<td>3 and 4</td>
</tr>
<tr>
<td>2</td>
<td>5 and 6</td>
<td>5 and 6</td>
</tr>
<tr>
<td>3</td>
<td>7 and 8</td>
<td>7 and 8</td>
</tr>
<tr>
<td>4</td>
<td>9 and 10</td>
<td>9 and 10</td>
</tr>
<tr>
<td>5</td>
<td>11 and 12</td>
<td>11 and 12</td>
</tr>
<tr>
<td>6</td>
<td>13 and 14</td>
<td>13 and 14</td>
</tr>
<tr>
<td>7</td>
<td>15 and 16</td>
<td>15 and 16</td>
</tr>
<tr>
<td>8</td>
<td>17 and 18</td>
<td>17 and 18</td>
</tr>
<tr>
<td>9</td>
<td>19 and 20</td>
<td>19 and 20</td>
</tr>
<tr>
<td>10</td>
<td>21 and 22</td>
<td>21 and 22</td>
</tr>
<tr>
<td>11</td>
<td>23 and 24</td>
<td>23 and 24</td>
</tr>
<tr>
<td>12</td>
<td>25 and 26</td>
<td>25 and 26</td>
</tr>
<tr>
<td>13</td>
<td>27 and 28</td>
<td>27 and 28</td>
</tr>
<tr>
<td>14</td>
<td>29 and 30</td>
<td>29 and 30</td>
</tr>
<tr>
<td>15</td>
<td>31 and 32</td>
<td>31 and 32</td>
</tr>
</tbody>
</table>

See application examples on the following page.
Application Examples—G4PB16I

For wiring G4 digital output modules (except dry contact modules):

Positive-True Logic
Connection to PLC

Negative-True Logic
Connection to PLC

* This wiring can be done using a G4STRAP.
G4PB16T MOUNTING RACK

Description
The G4PB16T I/O mounting rack accommodates up to 16 G4 I/O modules. This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF). Barrier strips with screw terminals provide the field, logic, and mounting rack power connections.

Specifications

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0 °C to 70 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface connector (field and control)</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
</tbody>
</table>

Dimensions
Connections—G4PB16T

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Field (Terminal Strip)</th>
<th>Control (Header Connector)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>47</td>
<td>1 and 2</td>
</tr>
<tr>
<td>1</td>
<td>45</td>
<td>3 and 4</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
<td>5 and 6</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>7 and 8</td>
</tr>
<tr>
<td>4</td>
<td>39</td>
<td>9 and 10</td>
</tr>
<tr>
<td>5</td>
<td>37</td>
<td>11 and 12</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
<td>13 and 14</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
<td>15 and 16</td>
</tr>
<tr>
<td>8</td>
<td>31</td>
<td>17 and 18</td>
</tr>
<tr>
<td>9</td>
<td>29</td>
<td>19 and 20</td>
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<tr>
<td>10</td>
<td>27</td>
<td>21 and 22</td>
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<tr>
<td>11</td>
<td>25</td>
<td>23 and 24</td>
</tr>
<tr>
<td>12</td>
<td>23</td>
<td>25 and 26</td>
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<tr>
<td>13</td>
<td>21</td>
<td>27 and 28</td>
</tr>
<tr>
<td>14</td>
<td>19</td>
<td>29 and 30</td>
</tr>
<tr>
<td>15</td>
<td>17</td>
<td>31 and 32</td>
</tr>
</tbody>
</table>

Notes:
1. +VCC and return are connected to control terminals marked + and -.
2. All odd-numbered terminals on the control terminal strip are connected by etch to the VCC return terminal marked -. 
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.

G4PB24 MOUNTING RACK

Description
The G4PB24 I/O mounting rack accommodates up to 24 G4 I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field and mounting rack power connections. A header connector accepts a standard 50-pin cable for the logic connections (typically from a PC adapter card like the PCI-AC5).
Specifications

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0 °C to 70 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface connectors</td>
<td></td>
</tr>
<tr>
<td>Field:</td>
<td>Screw-type barrier strip accepts up to 10 AWG wire</td>
</tr>
<tr>
<td>Control:</td>
<td>50-pin header connector</td>
</tr>
</tbody>
</table>

Dimensions

[Diagram showing dimensions of the G4PB24 Mounting Rack including dimensions like 7.50" (190.5mm), 7.002" (177.8mm), 25" (6.4mm), 6.50" (165.1mm), and 5.750" (146.0mm).]
Connections—G4PB24

Notes:
1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked LOGIC + and -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
G4PB32DEC MOUNTING RACK

Description

The G4PB32DEC I/O mounting rack accommodates up to 32 G4 digital I/O modules and is used to interface to a DEC computer DRV-11J parallel card.

This rack supports negative-true logic only (zero voltage = ON; Vcc = OFF).

A header connector on the rack is used for logic connections with a standard 50-conductor, flat ribbon cable. Barrier strips with screw terminals provide the field and mounting rack power connections.

Specifications

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0 °C to 70 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface connectors</td>
<td></td>
</tr>
<tr>
<td>Field:</td>
<td>Screw-type barrier strip accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td>Control:</td>
<td>50-pin header connector</td>
</tr>
<tr>
<td>Power:</td>
<td>Two-position screw terminal for a VCC power supply</td>
</tr>
</tbody>
</table>

Dimensions

![Dimensions Diagram]
Connections—G4PB32DEC

Notes:
1. Pins 17, 19, 21, 22, 23, 25, 26, 28, 30, 31, 32, and 34 on the control connector are etch-connected to the - terminal.
2. +VCC and the return are connected to terminals marked + and -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
4. The +VCC connection requires +5 VDC.

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Control (Header Connector)</th>
<th>Field (Terminal Strip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>37</td>
<td>1 and 2</td>
</tr>
<tr>
<td>1</td>
<td>39</td>
<td>3 and 4</td>
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<td>2</td>
<td>38</td>
<td>5 and 6</td>
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<td>3</td>
<td>40</td>
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<td>4</td>
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<td>42</td>
<td>11 and 12</td>
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<tr>
<td>6</td>
<td>36</td>
<td>13 and 14</td>
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<tr>
<td>7</td>
<td>41</td>
<td>15 and 16</td>
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<tr>
<td>8</td>
<td>47</td>
<td>17 and 18</td>
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<tr>
<td>9</td>
<td>50</td>
<td>19 and 20</td>
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<tr>
<td>10</td>
<td>44</td>
<td>21 and 22</td>
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<tr>
<td>11</td>
<td>48</td>
<td>23 and 24</td>
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<tr>
<td>12</td>
<td>49</td>
<td>25 and 26</td>
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<tr>
<td>13</td>
<td>43</td>
<td>27 and 28</td>
</tr>
<tr>
<td>14</td>
<td>46</td>
<td>29 and 30</td>
</tr>
<tr>
<td>15</td>
<td>45</td>
<td>31 and 32</td>
</tr>
<tr>
<td>16</td>
<td>14</td>
<td>33 and 34</td>
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<td>17</td>
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<td>35 and 36</td>
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<td>18</td>
<td>13</td>
<td>37 and 38</td>
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<tr>
<td>19</td>
<td>11</td>
<td>39 and 40</td>
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<tr>
<td>20</td>
<td>16</td>
<td>41 and 42</td>
</tr>
<tr>
<td>21</td>
<td>9</td>
<td>43 and 44</td>
</tr>
<tr>
<td>22</td>
<td>15</td>
<td>45 and 46</td>
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<td>23</td>
<td>10</td>
<td>47 and 48</td>
</tr>
<tr>
<td>24</td>
<td>4</td>
<td>49 and 50</td>
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<tr>
<td>25</td>
<td>1</td>
<td>51 and 52</td>
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<tr>
<td>26</td>
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<td>53 and 54</td>
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<td>55 and 56</td>
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<tr>
<td>28</td>
<td>2</td>
<td>57 and 58</td>
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<tr>
<td>29</td>
<td>8</td>
<td>59 and 60</td>
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<tr>
<td>30</td>
<td>5</td>
<td>61 and 62</td>
</tr>
<tr>
<td>31</td>
<td>6</td>
<td>63 and 64</td>
</tr>
</tbody>
</table>
**Description**

The G4PB32H I/O mounting rack accommodates up to 32 G4 I/O modules.

This I/O rack has a header connector and is designed to be used with one of the following brain boards:
- **G4EB2**—Connects to an Ethernet network and uses the OptoMMP protocol.
- **B4**—Connects to a serial network and uses the Pamux protocol.

This rack requires 5 VDC logic I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field connections. A two-position screw terminal for 5 VDC connects to a power supply.

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>0 to 70 °C</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>95% humidity, non-condensing</td>
</tr>
<tr>
<td><strong>Interface Connectors:</strong></td>
<td>Screw-type terminal strip accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td><strong>Field</strong></td>
<td>Boxed header accepts a B4 or G4EB2 brain</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>Two-position screw terminal for 5 VDC accommodates up to 10 AWG wire</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>Supports 5 VDC I/O modules only</td>
</tr>
<tr>
<td><strong>I/O module limitations</strong></td>
<td>Two 50-pin header connectors for a PAMUX bus</td>
</tr>
<tr>
<td><strong>Communications</strong></td>
<td>(Ethernet connections, if used, are made through the G4EB2 brain.)</td>
</tr>
</tbody>
</table>
Dimensions

[Diagram showing dimensions of a G4 Digital I/O mounting rack]

- 10.50" (266.7 mm)
- 8.00" (203.2 mm)
- 3.30" (83.8 mm)
- 7.00" (177.8 mm)
- Plastic Support 2 Places
- Swaged Standoff .150 (3.81) Dia Thru Hole 4 Places
- .25" (6.4 mm)
3. Generation 4 Racks with Integral Digital I/O

OVERVIEW OF RACKS WITH INTEGRAL I/O

This chapter includes information on racks that have permanent I/O circuitry built in. For mounting racks that are used with separate I/O modules, see page 3.

Features

The following features apply to all racks with integral I/O:

- Minimum mounting space required
- UL recognized, CSA certified, and CE compliant
- Uses a single 5 VDC power supply for control power
- Screw-type barrier strip for field connections; 50-pin header connector for control connections
- Operating temperature: -30° to 70° C. Humidity: 95%, non-condensing
- Can be modified for use with PC adapter cards like the PCI-AC5.

Choose Your Rack

Choose a rack from the following table, then see the referenced page for detailed drawings and specifications.

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Channels</th>
<th>Input Modules</th>
<th>Output Modules</th>
<th>AC</th>
<th>DC</th>
<th>Built-in Fuse Tester</th>
<th>Special Features</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4PB16J</td>
<td>16</td>
<td>●</td>
<td>●</td>
<td>n/a</td>
<td></td>
<td></td>
<td>Optically isolated 4–16 VDC input channels built in. Use with Optomux B1 and E1, Pamux B5, and mistic B100 brain boards. LED indicator for each channel. Logic supply is fused.</td>
<td>page 30</td>
</tr>
<tr>
<td>G4PB16K</td>
<td>16</td>
<td>●</td>
<td>●</td>
<td>n/a</td>
<td></td>
<td></td>
<td>Optically isolated 16–28 VDC input channels built in. Use with Optomux B1 and E1, Pamux B5, and mistic B100 brain boards. LED indicator and fuse for each channel. Logic supply is fused.</td>
<td>page 30</td>
</tr>
<tr>
<td>G4PB16L</td>
<td>16</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td>Optically isolated 5–60 VDC output channels built in. Use with Optomux B1 and E1, Pamux B5, and mistic B100 brain boards. LED indicators for each channel. Logic supply is fused.</td>
<td>page 32</td>
</tr>
</tbody>
</table>
G4PB16J AND K RACKS WITH INTEGRAL INPUTS

Description

The G4PB16J and G4PB16K DC input racks provide 16 channels of optically-isolated inputs for sensing on/off DC voltage levels by a B1, E1, B5, or B100 brain board, or a computer with an Opto 22 PCI-AC5, PCIe-AC5, or G4AC5 adapter card.

The compact size and design of these racks yield a substantial space and cost savings over other 16-channel I/O boards.

All input channels are identical on each board and are ideal for applications that need to monitor several 4–16 VDC signals (model G4PB16J) or 16–28 VDC signals (model G4PB16K). On-board LED indicators display each channel’s on/off status.

Typical applications for the integrated DC input racks include sensing the presence or absence of voltage from sources such as BCD devices, TTL level devices, thumbwheel switches, and barcode readers.

Control connections are easily made to a 50-pin header connector. Barrier strips with screw terminals provide the field and rack power connections. The logic supply is fused with a 1A fuse. These racks can be used with Opto 22 PC adapter cards like the PCI-AC5 if jumpers 1 and 2 are removed. (See the Adapter Cards Data Sheet for more information.)

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>G4PB16J</th>
<th>G4PB16K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input line voltage VDC</td>
<td>4–16</td>
<td>16–28</td>
</tr>
<tr>
<td>Input current:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>@ Minimum voltage range mA @ VDC</td>
<td>3.3, 4</td>
<td>3.4, 16</td>
</tr>
<tr>
<td>@ Maximum voltage range mA @ VDC</td>
<td>16, 16</td>
<td>6.3, 28</td>
</tr>
<tr>
<td>Isolation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input-to-output (transient) Channel-to-channel volts</td>
<td>4,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Continuous volts</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Input-to-output capacitance pF/channel</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Turn-on time ms</td>
<td>2.5</td>
<td>3</td>
</tr>
<tr>
<td>Turn-off time ms</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Logic supply voltage VDC</td>
<td>4.5–6</td>
<td>4.5–6</td>
</tr>
<tr>
<td>Logic supply current mA @ VDC</td>
<td>190, 5</td>
<td>190, 5</td>
</tr>
<tr>
<td>Temperature:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating °C</td>
<td>-30 to +70</td>
<td></td>
</tr>
<tr>
<td>Storage °C</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
</tr>
</tbody>
</table>
Dimensions—G4PB16J and K

Connections—G4PB16J and K
G4PB16L RACK WITH INTEGRAL OUTPUTS

Description

The G4PB16L DC output rack provides 16 channels of optically-isolated outputs for controlling or switching small DC loads by a B1, E1, B5, or B100 brain board, or a computer with an Opto 22 PCI-AC5, PCIe-AC5, or G4AC5 adapter card.

This rack’s compact size and design yields a substantial space and cost savings over other 16-channel I/O boards.

All channels are identical on each board and output 5-60 VDC. They are ideal for applications that need to control or switch several similar small DC loads. On-board LED indicators display each channel’s on/off status.

Typical applications for the integrated DC output rack include controlling or switching low-power DC relays, low-power DC solenoids, and DC lamps and indicators.

Control connections are easily made to a 50-pin header connector. Barrier strips with screw terminals provide the field and rack power connections. The logic supply and all output channels are individually fused with a 1A fuse. These racks can be used with Opto 22 PC adapter cards like the PCI-AC5 if jumpers 1 and 2 are removed. (See the Adapter Cards Data Sheet for more information.)
Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage range</td>
<td>5–60 VDC</td>
</tr>
<tr>
<td>Current rating:</td>
<td></td>
</tr>
<tr>
<td>@ 45 °C</td>
<td>0.5 A</td>
</tr>
<tr>
<td>@ 70 °C</td>
<td>0.2 A</td>
</tr>
<tr>
<td>Isolation:</td>
<td></td>
</tr>
<tr>
<td>Input-to-output (transient)</td>
<td>4,000 volts</td>
</tr>
<tr>
<td>Channel-to-channel</td>
<td>300 volts</td>
</tr>
<tr>
<td>Off-state leakage at maximum voltage</td>
<td>1 mA</td>
</tr>
<tr>
<td>One-second surge</td>
<td>1.3 A</td>
</tr>
<tr>
<td>Turn-on time</td>
<td>100 μsec</td>
</tr>
<tr>
<td>Turn-off time</td>
<td>100 μsec</td>
</tr>
<tr>
<td>Output voltage drop maximum peak</td>
<td>1.6 VDC</td>
</tr>
<tr>
<td>Nominal logic voltage</td>
<td>5 VDC</td>
</tr>
<tr>
<td>Logic voltage range</td>
<td>4.5–6 VDC</td>
</tr>
<tr>
<td>Logic input current at nominal logic voltage</td>
<td>190 mA</td>
</tr>
<tr>
<td>Temperature:</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>-30 °C to +70 °C</td>
</tr>
<tr>
<td>Storage</td>
<td>-30 °C to +85 °C</td>
</tr>
</tbody>
</table>

Dimensions

[Diagram of G4 Digital I/O Family Data Book]
Connections – G4PB16L

*Note: Commutation diode must be used on inductive loads. Typically, use diode 1N4004S
4. Generation 4 Digital I/O Modules

OVERVIEW OF ALL MODULES

Features

The following features apply to all modules:

- Small footprint design, reducing mounting space by approximately 50 percent
- UL recognized, CSA certified, and CE compliant
- Passed NEMA Showering Arc Test (ICS 2-230)
- Meet IEEE Surge Withstand Specification (IEEE-472)
- Operating temperature: -30° to 70° C.

Choose Your Module

Choose a module from the following table, then see the referenced page for details.

<table>
<thead>
<tr>
<th>Model</th>
<th>Input AC</th>
<th>Output DC</th>
<th>Logic Voltage</th>
<th>Field Voltage</th>
<th>Use for Testing</th>
<th>Use with Raspberry Pi</th>
<th>Special Features</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4IDC5</td>
<td>5 VDC</td>
<td>10–32 VDC</td>
<td>12–32 VAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 37</td>
</tr>
<tr>
<td>G4IDC5B</td>
<td>5 VDC</td>
<td>4–16 VDC</td>
<td></td>
<td>Higher speed</td>
<td></td>
<td></td>
<td></td>
<td>page 37</td>
</tr>
<tr>
<td>G4IDC5D</td>
<td>5 VDC</td>
<td>2.5–28 VDC</td>
<td></td>
<td>High speed</td>
<td></td>
<td></td>
<td></td>
<td>page 37</td>
</tr>
<tr>
<td>G4IDC5G</td>
<td>5 VDC</td>
<td></td>
<td>35–60 VDC/AC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 37</td>
</tr>
<tr>
<td>G4IDC5K</td>
<td>5 VDC</td>
<td></td>
<td>2.5–16 VDC</td>
<td>Highest speed</td>
<td></td>
<td></td>
<td></td>
<td>page 37</td>
</tr>
<tr>
<td>G4IDC5MA</td>
<td>5 VDC</td>
<td></td>
<td>10–32 VDC</td>
<td>Diagnostic switch</td>
<td></td>
<td></td>
<td></td>
<td>page 37</td>
</tr>
<tr>
<td>G4IDC15</td>
<td>15 VDC</td>
<td>10–32 VDC</td>
<td>12–32 VAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 37</td>
</tr>
<tr>
<td>G4IDC24</td>
<td>24 VDC</td>
<td>10–32 VDC</td>
<td>12–32 VAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 37</td>
</tr>
<tr>
<td>G4IAC5</td>
<td></td>
<td>5 VDC</td>
<td>90–140 VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 40</td>
</tr>
<tr>
<td>G4IAC5A</td>
<td></td>
<td>5 VDC</td>
<td>180–280 VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 40</td>
</tr>
</tbody>
</table>

1 These DC input modules work with either DC or AC voltages.
2 These AC input modules work with either AC or DC voltages.
<table>
<thead>
<tr>
<th>Model</th>
<th>Input</th>
<th>Output</th>
<th>AC</th>
<th>DC</th>
<th>Logic Voltage</th>
<th>Field Voltage</th>
<th>Use for Testing</th>
<th>Use with Raspberry Pi</th>
<th>Special Features</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4IAC5L</td>
<td>●</td>
<td>● ●</td>
<td></td>
<td></td>
<td>5 VDC</td>
<td>90–140 VAC/DC</td>
<td>●</td>
<td></td>
<td>Low input resistance</td>
<td>page 40</td>
</tr>
<tr>
<td>G4IAC5MA</td>
<td>●</td>
<td>● ●</td>
<td></td>
<td></td>
<td>5 VDC</td>
<td>90–140 VAC/DC</td>
<td>●</td>
<td></td>
<td>Diagnostic switch</td>
<td>page 40</td>
</tr>
<tr>
<td>G4IAC15</td>
<td>●</td>
<td>● ●</td>
<td>15 VDC</td>
<td></td>
<td>90–140 VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 40</td>
</tr>
<tr>
<td>G4IAC15A</td>
<td>●</td>
<td>● ●</td>
<td>15 VDC</td>
<td></td>
<td>180–280 VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 40</td>
</tr>
<tr>
<td>G4IAC24</td>
<td>●</td>
<td>● ●</td>
<td>24 VDC</td>
<td></td>
<td>90–140 VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 40</td>
</tr>
<tr>
<td>G4IAC24A</td>
<td>●</td>
<td>● ●</td>
<td>24 VDC</td>
<td></td>
<td>180–280 VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 40</td>
</tr>
<tr>
<td>G4SWIN</td>
<td></td>
<td>● ● ●</td>
<td>NA</td>
<td></td>
<td>NA</td>
<td>NA</td>
<td>●</td>
<td></td>
<td>Simulates input</td>
<td>page 42</td>
</tr>
<tr>
<td>G4ODC5</td>
<td>●</td>
<td>●</td>
<td>5 VDC</td>
<td></td>
<td>5–60 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 43</td>
</tr>
<tr>
<td>G4ODC5A</td>
<td>●</td>
<td>●</td>
<td>5 VDC</td>
<td></td>
<td>5–200 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 43</td>
</tr>
<tr>
<td>G4ODC5MA</td>
<td>●</td>
<td>●</td>
<td>5 VDC</td>
<td></td>
<td>5–60 VDC</td>
<td></td>
<td>●</td>
<td></td>
<td>Diagnostic switch</td>
<td>page 43</td>
</tr>
<tr>
<td>G4ODC15</td>
<td>●</td>
<td>●</td>
<td>15 VDC</td>
<td></td>
<td>5–60 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 43</td>
</tr>
<tr>
<td>G4ODC24</td>
<td>●</td>
<td>●</td>
<td>24 VDC</td>
<td></td>
<td>5–60 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 43</td>
</tr>
<tr>
<td>G4ODC24A</td>
<td>●</td>
<td>●</td>
<td>24 VDC</td>
<td></td>
<td>5–200 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>page 43</td>
</tr>
<tr>
<td>G4OAC5</td>
<td>●</td>
<td>●</td>
<td>5 VDC</td>
<td></td>
<td>120 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td>page 45</td>
</tr>
<tr>
<td>G4OAC5A</td>
<td>●</td>
<td>●</td>
<td>5 VDC</td>
<td></td>
<td>120/240 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td>page 45</td>
</tr>
<tr>
<td>G4OAC5A5</td>
<td>●</td>
<td>●</td>
<td>5 VDC</td>
<td></td>
<td>120/240 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td>Normally closed</td>
<td>page 45</td>
</tr>
<tr>
<td>G4OAC5MA</td>
<td>●</td>
<td>●</td>
<td>5 VDC</td>
<td></td>
<td>120 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td>Diagnostic switch</td>
<td>page 45</td>
</tr>
<tr>
<td>G4OAC5AMA</td>
<td>●</td>
<td>●</td>
<td>5 VDC</td>
<td></td>
<td>120/240 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td>Diagnostic switch</td>
<td>page 45</td>
</tr>
<tr>
<td>G4OAC15</td>
<td>●</td>
<td>●</td>
<td>15 VDC</td>
<td></td>
<td>120 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td>page 45</td>
</tr>
<tr>
<td>G4OAC15A</td>
<td>●</td>
<td>●</td>
<td>15 VDC</td>
<td></td>
<td>120/240 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td>page 45</td>
</tr>
<tr>
<td>G4OAC24</td>
<td>●</td>
<td>●</td>
<td>24 VDC</td>
<td></td>
<td>120 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td>page 45</td>
</tr>
<tr>
<td>G4OAC24A</td>
<td>●</td>
<td>●</td>
<td>24 VDC</td>
<td></td>
<td>120/240 VAC</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td>page 45</td>
</tr>
<tr>
<td>G4ODCSR</td>
<td>●</td>
<td>● ● ●</td>
<td>5 VDC</td>
<td></td>
<td>NA</td>
<td></td>
<td>●</td>
<td></td>
<td>Dry contact module (reed relay)</td>
<td>page 49</td>
</tr>
<tr>
<td>G4ODC5R5</td>
<td>●</td>
<td>● ● ●</td>
<td>5 VDC</td>
<td></td>
<td>NA</td>
<td></td>
<td>●</td>
<td></td>
<td>Dry contact module (reed relay)</td>
<td>page 49</td>
</tr>
<tr>
<td>G4SWOUT</td>
<td>●</td>
<td>● ● ●</td>
<td>NA</td>
<td></td>
<td>NA</td>
<td></td>
<td>●</td>
<td></td>
<td>Simulates output</td>
<td>page 51</td>
</tr>
</tbody>
</table>

1 These DC input modules work with either DC or AC voltages.
2 These AC input modules work with either AC or DC voltages.
DIGITAL DC INPUT MODULES

**Description**

Opto 22’s G4 DC input modules are used to detect on/off DC voltage levels. Each module provides up to 4,000 V of optical isolation between field inputs and the logic output of the circuit.

All DC input modules except the G4IDC5K and the G4IDC5D are designed with filtering on the input and a hysteresis amplifier, providing high noise rejection and transient-free, “clean” switching. The G4IDC5K is a fast-switching module used to detect signals produced by photoelectric switches and TTL devices. The low-cost G4IDC5D is used for data acquisition. The G4IDCSMA is a special module featuring a manual-on/manual-off/automatic switch, ideal for diagnostic testing of control applications.

Typical applications for DC input modules include sensing the presence or absence of voltage with devices such as proximity switches, limit switches, selector switches, push buttons, photoelectric switches, and TTL-compatible devices. All modules include a built-in LED status indicator.

**Specifications—DC Input Modules**

<table>
<thead>
<tr>
<th>Units</th>
<th>G4IDC5*</th>
<th>G4IDC5B</th>
<th>G4IDC5D*</th>
<th>G4IDC5G*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage range</td>
<td>VDC</td>
<td>10–32</td>
<td>4–16</td>
<td>2.5–28</td>
</tr>
<tr>
<td>VAC</td>
<td>12–32</td>
<td>4–16</td>
<td>—</td>
<td>35–60</td>
</tr>
<tr>
<td>Key feature</td>
<td>—</td>
<td>Higher speed</td>
<td>High speed</td>
<td>—</td>
</tr>
<tr>
<td>Input current at maximum line</td>
<td>mA</td>
<td>25</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>Isolation, input-to-output (transient): 1 ms</td>
<td>V</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>1 minute</td>
<td>V</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>Turn-on time</td>
<td>ms</td>
<td>5</td>
<td>0.05</td>
<td>1</td>
</tr>
<tr>
<td>Turn-off time</td>
<td>ms</td>
<td>5</td>
<td>0.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Input allowed for off-state</td>
<td>mA, V</td>
<td>1, 3</td>
<td>0.7, 1</td>
<td>0.2, 1</td>
</tr>
<tr>
<td>Nominal output supply voltage</td>
<td>VDC</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Output supply voltage range</td>
<td>VDC</td>
<td>4.5–6</td>
<td>4.5–6</td>
<td>4.5–6</td>
</tr>
<tr>
<td>Output current supply at nominal logic voltage</td>
<td>mA</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Input resistance (R1 in schematic)</td>
<td>ohms</td>
<td>1.5 K</td>
<td>300</td>
<td>900</td>
</tr>
<tr>
<td>Control resistance (Rc in schematic)</td>
<td>ohms</td>
<td>220</td>
<td>220</td>
<td>470</td>
</tr>
<tr>
<td>Output voltage drop</td>
<td>V @ 50 mA</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Output current (sinking)</td>
<td>mA</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Output leakage with no input</td>
<td>microamps @ 30 VDC</td>
<td>100</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Transistor</td>
<td>V breakdown</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Temperature: Operating</td>
<td>°C</td>
<td>−30 to +70</td>
<td>−30 to +70</td>
<td>−30 to +70</td>
</tr>
<tr>
<td>Storage</td>
<td>°C</td>
<td>−30 to +85</td>
<td>−30 to +85</td>
<td>−30 to +85</td>
</tr>
</tbody>
</table>

* Compatible with Raspberry Pi
## Specifications—DC Input Modules (continued)

<table>
<thead>
<tr>
<th>Units</th>
<th>G4IDC5K</th>
<th>G4IDC5MA*</th>
<th>G4IDC15**</th>
<th>G4IDC24**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage range</td>
<td>VDC</td>
<td>2.5–16</td>
<td>10–32</td>
<td>10–32</td>
</tr>
<tr>
<td></td>
<td>VAC</td>
<td>—</td>
<td>12–32</td>
<td>12–32</td>
</tr>
<tr>
<td>Key feature</td>
<td></td>
<td>Highest speed</td>
<td>Diagnostic switch</td>
<td>—</td>
</tr>
<tr>
<td>Input current at maximum line</td>
<td>mA</td>
<td>30</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Isolation, input-to-output (transient):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 ms V</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>1 minute V</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>Turn-on time ms</td>
<td>0.025***</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Turn-off time ms</td>
<td>0.025***</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Input allowed for off-state mA, V</td>
<td>0.2, 1</td>
<td>1, 3</td>
<td>1, 3</td>
<td>1.3</td>
</tr>
<tr>
<td>Nominal output supply voltage VDC</td>
<td>5</td>
<td>5</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>Output supply voltage range VDC</td>
<td>4.5–6</td>
<td>4.5–6</td>
<td>12–18</td>
<td>20–30</td>
</tr>
<tr>
<td>Output supply current at nominal logic voltage mA</td>
<td>12</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Input resistance (R1 in schematic) ohms</td>
<td>500</td>
<td>1.5 K</td>
<td>1.5 K</td>
<td>1.5 K</td>
</tr>
<tr>
<td>Control resistance (Rc in schematic) ohms</td>
<td>220</td>
<td>220</td>
<td>1 K</td>
<td>2.2 K</td>
</tr>
<tr>
<td>Output voltage drop V @ 50 mA</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Output current (sinking) mA</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Output leakage with no input microamps @ 30 VDC</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Transistor V breakdown</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Temperature:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating °C</td>
<td>–30 to +70</td>
<td>–30 to +70</td>
<td>–30 to +70</td>
<td>–30 to +70</td>
</tr>
<tr>
<td>Storage °C</td>
<td>–30 to +85</td>
<td>–30 to +85</td>
<td>–30 to +85</td>
<td>–30 to +85</td>
</tr>
</tbody>
</table>

* Compatible with Raspberry Pi
** Not for use with Opto 22 brains
*** At 5Vp-p square wave input, 50% duty cycle
CHAPTER 4. GENERATION 4 DIGITAL I/O MODULES

Dimensions—DC Input Modules

Schematics—DC Input Modules
DIGITAL AC INPUT MODULES

Description

Opto 22’s G4 AC input modules are used to detect on/off AC voltage levels. Each module provides up to 4,000 volts of optical isolation between field inputs and the logic output of the circuit.

All AC input modules are designed with filtering on the input and a hysteresis amplifier, providing high noise rejection and transient-free “clean” switching. The G4IAC5MA is a special module featuring a manual-on/manual-off/automatic switch, ideal for diagnostic testing of control applications.

Typical applications for AC input modules include sensing the presence or absence of voltage with devices such as proximity switches, limit switches, float switches, selector switches, push buttons, toggle switches, and thermostats. All modules include a built-in LED status indicator.

Specifications—AC Input Modules

<table>
<thead>
<tr>
<th>Units</th>
<th>G4IAC5*</th>
<th>G4IAC5L*</th>
<th>G4IAC5A*</th>
<th>G4IAC5MA*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage range</td>
<td>VAC or VDC</td>
<td>90–140</td>
<td>90–140</td>
<td>180–280</td>
</tr>
<tr>
<td>Key feature</td>
<td>--</td>
<td>--</td>
<td>Low R in</td>
<td>--</td>
</tr>
<tr>
<td>Input current at maximum line</td>
<td>mA</td>
<td>5</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Isolation, input-to-output (transient):</td>
<td>V</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>1 ms</td>
<td>V</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>Turn-on time</td>
<td>ms</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Turn-off time</td>
<td>ms</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Input allowed for off-state</td>
<td>mA, V</td>
<td>1.4, 40</td>
<td>3, 45</td>
<td>0.7, 45</td>
</tr>
<tr>
<td>Nominal output voltage supply</td>
<td>VDC</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Output supply voltage range</td>
<td>VDC</td>
<td>4.5–6</td>
<td>4.5–6</td>
<td>4.5–6</td>
</tr>
<tr>
<td>Output supply current at nominal logic voltage</td>
<td>mA</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Input resistance (R_1 in schematic)</td>
<td>ohms</td>
<td>28 K</td>
<td>14 K</td>
<td>70K</td>
</tr>
<tr>
<td>Control resistance (R_c in schematic)</td>
<td>ohms</td>
<td>220</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>Output voltage drop</td>
<td>V @ 50 mA</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Output current (sinking)</td>
<td>mA</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Output leakage with no input</td>
<td>microamps @ 30 VDC</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Transistor</td>
<td>V breakdown</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Temperature Operating:</td>
<td>ºC</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
</tr>
<tr>
<td>Storage:</td>
<td>ºC</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
</tr>
</tbody>
</table>

* Compatible with Raspberry Pi
### Specifications—AC Input Modules (continued)

<table>
<thead>
<tr>
<th>Specifications</th>
<th>G4IC15*</th>
<th>G4IC15A*</th>
<th>G4IC24*</th>
<th>G4IC24A*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Units</strong></td>
<td>G4IC15</td>
<td>G4IC15A</td>
<td>G4IC24</td>
<td>G4IC24A</td>
</tr>
<tr>
<td><strong>Input voltage range</strong> VAC or VDC</td>
<td>90–140</td>
<td>180–280</td>
<td>90–140</td>
<td>180–280</td>
</tr>
<tr>
<td><strong>Key feature</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Input current at maximum line</strong> mA</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Isolation, input-to-output</strong> transient:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 ms</td>
<td>V</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>1 minute</td>
<td>V</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td><strong>Turn-on time</strong> ms</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Turn-off time</strong> ms</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Input allowed for off-state</strong> mA, V</td>
<td>1.4, 40</td>
<td>0.7, 45</td>
<td>1.4, 40</td>
<td>0.7, 45</td>
</tr>
<tr>
<td><strong>Nominal output supply voltage</strong> VDC</td>
<td>15</td>
<td>15</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td><strong>Output supply voltage range</strong> VDC</td>
<td>12–18</td>
<td>12–18</td>
<td>20–30</td>
<td>20–30</td>
</tr>
<tr>
<td><strong>Output supply current at nominal logic voltage</strong> mA</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td><strong>Input resistance</strong> (R1 in schematic) ohms</td>
<td>28 K</td>
<td>70 K</td>
<td>28 K</td>
<td>70 K</td>
</tr>
<tr>
<td><strong>Control resistance</strong> (Rc in schematic) ohms</td>
<td>1 K</td>
<td>1 K</td>
<td>2.2 K</td>
<td>2.2 K</td>
</tr>
<tr>
<td><strong>Output voltage drop</strong> V @ 50 mA</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Output current (sinking)</strong> mA</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong>Peak repetitive voltage</strong> VAC</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td><strong>Output leakage with no input</strong> microamps @ 30 VDC</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Transistor</strong> V breakdown</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>°C</td>
<td></td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td><strong>Operating:</strong></td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
</tr>
<tr>
<td><strong>Storage:</strong></td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
</tr>
</tbody>
</table>

* Not for use with Opto 22 brains.

### Dimensions—AC Input Modules

![Dimensions Diagram]
DIGITAL INPUT TEST MODULE

Description

Opto 22’s G4SWIN input test module is used to simulate an input on an I/O mounting rack. Each module contains a toggle switch that closes a contact on the logic side. An internal resistor limits the current through the switch and provides a load similar to that of an actual input module. An internal debounce circuit allows rapid switch closures without false counts.

The G4SWIN module works with logic voltages of 5, 15, and 24 volts. Internally, there is no connection to the field inputs. A built-in LED indicates the simulated on/off status.

This module is ideal for simulating discrete external events when testing application software.

Specifications—Digital Input Test Module

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation, input-to-output (transient):</td>
<td></td>
</tr>
<tr>
<td>1 ms</td>
<td>4000 volts</td>
</tr>
<tr>
<td>1 minute</td>
<td>1500 volts</td>
</tr>
<tr>
<td>Temperature:</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>-30 to +70 °C</td>
</tr>
<tr>
<td>Storage</td>
<td>-30 to +85 °C</td>
</tr>
</tbody>
</table>
DIGITAL DC OUTPUT MODULES

Description

Opto 22’s G4 DC output modules are used to control or switch DC loads. Each module provides up to 4,000 volts of optical isolation between field devices and control logic.

The G4ODC5MA is a special module featuring a manual-on/manual-off/automatic switch, ideal for diagnostic testing of control applications.

Typical applications for DC output modules include switching loads such as DC relays, solenoids, motor starters, lamps, and indicators. All modules include a built-in LED status indicator.
## Specifications—DC Output Modules

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum line voltage</strong></td>
<td>VDC</td>
<td>60</td>
<td>200</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>200</td>
</tr>
<tr>
<td><strong>Output voltage range</strong></td>
<td>VDC</td>
<td>5–60</td>
<td>5–200</td>
<td>5–60</td>
<td>5–60</td>
<td>5–60</td>
<td>5–60</td>
<td>5–200</td>
</tr>
<tr>
<td><strong>Key feature</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Diagnostic</td>
<td>switch</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Current rating:</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>At 45 °C ambient</td>
<td>A</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>At 70 °C ambient</td>
<td>A</td>
<td>2</td>
<td>0.55</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>Isolation input-to-out</strong></td>
<td>volts</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td><strong>put (transient):</strong></td>
<td>—</td>
<td>1 ms</td>
<td>1 minute</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Off-state leakage at</strong></td>
<td>mA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td><strong>maximum voltage</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Control resistance</strong></td>
<td>W</td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>1 K</td>
<td>2.2 K</td>
<td>2.2 K</td>
<td>—</td>
</tr>
<tr>
<td>(Rc in schematic)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>One-second surge</strong></td>
<td>—</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Turn-on time</strong></td>
<td>micro-</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>seconds</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Turn-off time</strong></td>
<td>micro-</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td><strong>seconds</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Output voltage drop</strong></td>
<td>V</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
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<tr>
<td><strong>maximum peak</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Nominal logic voltage</strong></td>
<td>VDC</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>15</td>
<td>24</td>
<td>24</td>
<td>—</td>
</tr>
<tr>
<td><strong>Logic voltage range</strong></td>
<td>VDC</td>
<td>4–8</td>
<td>4–8</td>
<td>4–8</td>
<td>10.5–16</td>
<td>19.5–32</td>
<td>19.5–32</td>
<td>—</td>
</tr>
<tr>
<td><strong>Logic pickup voltage</strong></td>
<td>VDC</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>10.5</td>
<td>19.5</td>
<td>19.5</td>
<td>—</td>
</tr>
<tr>
<td><strong>Logic dropout voltage</strong></td>
<td>VDC</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>—</td>
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<tr>
<td><strong>Logic input current</strong></td>
<td>mA</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>18</td>
<td>—</td>
</tr>
<tr>
<td><strong>at nominal logic voltage</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Temperature:</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Operating</strong></td>
<td>°C</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
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<tr>
<td><strong>Storage</strong></td>
<td>°C</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
</tr>
</tbody>
</table>

* Compatible with Raspberry Pi
** Part numbers ending in FM are Factory Mutual approved
*** Not for use with Opto 22 brains
Opto 22's G4 AC output modules are used to control or switch AC loads. Each module provides up to 4,000 volts of optical isolation between field outputs and the control side of the circuit, and each features zero voltage turn-on and zero current turn-off. All AC output modules are equivalent to single-pole, single-throw, normally open contacts (Form A, SPST-NO) except the G4OAC5A5, which is equivalent to a single-pole, single-throw, normally closed contact (Form B, SPST-NC).

The G4OAC5MA and the G4OAC5AMA are special modules featuring a manual-on/manual-off/automatic switch, ideal for diagnostic testing of control applications.
Typical applications for AC output modules include switching loads such as AC relays, solenoids, motor starters, heaters, lamps, and indicators. All digital AC output modules include a built-in LED status indicator.

### Specifications—AC Output Modules

<table>
<thead>
<tr>
<th>Units</th>
<th>G4OAC5*</th>
<th>G4OAC5A*</th>
<th>G4OAC5AFM**</th>
<th>G4OAC5A5*</th>
<th>G4OAC5A5AFM**</th>
<th>G4OAC5MA*</th>
<th>G4OAC5AMA*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal line voltage</td>
<td>VAC 120</td>
<td>120/240</td>
<td>120/240</td>
<td>120</td>
<td>120</td>
<td>120/240</td>
<td>120</td>
</tr>
<tr>
<td>Output voltage range</td>
<td>VAC 12–140</td>
<td>24–280</td>
<td>24–280</td>
<td>12–140</td>
<td>24–280</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key feature</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Normally closed</td>
<td>Diagnostic switch</td>
<td>Diagnostic switch</td>
<td></td>
</tr>
<tr>
<td>Current rating:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At 45 °C ambient</td>
<td>A 3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At 70 °C ambient</td>
<td>A 2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UL Motor Load Rating</td>
<td>A 1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Isolation input-to-output (transient):</td>
<td>volts</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>1 ms</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 minute</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-state leakage at nominal voltage (60 Hz)</td>
<td>mA RMS</td>
<td>5</td>
<td>1.25/2.5</td>
<td>1.25/2.5</td>
<td>5</td>
<td>1.25/2.5</td>
<td></td>
</tr>
<tr>
<td>Nominal logic voltage</td>
<td>VDC 5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logic voltage range</td>
<td>VDC 4–8</td>
<td>4–8</td>
<td>4–8</td>
<td>4–8</td>
<td>4–8</td>
<td>4–8</td>
<td>4–8</td>
</tr>
<tr>
<td>Logic pickup voltage</td>
<td>VDC 2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logic dropout voltage</td>
<td>VDC 1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Logic input current at nominal logic voltage</td>
<td>mA 12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Control resistance (Rc in schematic)</td>
<td>ohms 220</td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>One-cycle surge</td>
<td>A peak 80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Turn-on time @ 60 Hz</td>
<td>milliseconds ≤8.3***</td>
<td>≤8.3***</td>
<td>≤8.3***</td>
<td>≤8.3***</td>
<td>≤8.3***</td>
<td>≤8.3***</td>
<td>≤8.3***</td>
</tr>
<tr>
<td>Turn-off time @ 60 Hz</td>
<td>milliseconds ≤8.3****</td>
<td>≤8.3****</td>
<td>≤8.3****</td>
<td>≤8.3****</td>
<td>≤8.3****</td>
<td>≤8.3****</td>
<td>≤8.3****</td>
</tr>
<tr>
<td>Peak repetitive voltage</td>
<td>VAC 500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Minimum load current</td>
<td>mA 20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage drop maximum peak</td>
<td>V 1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dV/dT-off-state</td>
<td>V/micro-seconds 200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dV/dT-commutating</td>
<td>-- snubbed for 0.5 power factor load</td>
<td>snubbed for 0.5 power factor load</td>
<td>snubbed for 0.5 power factor load</td>
<td>snubbed for 0.5 power factor load</td>
<td>snubbed for 0.5 power factor load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Operating:</td>
<td>°C</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
</tr>
<tr>
<td>Storage:</td>
<td>°C</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
</tr>
</tbody>
</table>

* Compatible with Raspberry Pi
** Part numbers ending in FM are Factory Mutual approved.
*** One-half cycle maximum. Module turns on at the zero volt crossing of the AC sine wave.
**** One-half cycle maximum. Module turns off at the zero current crossing of the AC sine wave.
## Specifications—AC Output Modules (continued)

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Units</th>
<th>G4OAC15***</th>
<th>G4OAC15A***</th>
<th>G4OAC24***</th>
<th>G4OAC24A***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal line voltage</td>
<td>VAC</td>
<td>120</td>
<td>120/240</td>
<td>120</td>
<td>120/240</td>
</tr>
<tr>
<td>Output voltage range</td>
<td>VAC</td>
<td>12–140</td>
<td>24–280</td>
<td>12–140</td>
<td>24–280</td>
</tr>
<tr>
<td>Key feature</td>
<td></td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Current rating:</td>
<td></td>
<td>A</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>At 45 °C ambient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At 70 °C ambient</td>
<td></td>
<td>A</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>UL Motor Load Rating</td>
<td></td>
<td>A</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Isolation input-to-output (transient):</td>
<td></td>
<td>volts</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>1 ms</td>
<td></td>
<td></td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>1 minute</td>
<td></td>
<td>mA RMS</td>
<td>5</td>
<td>1.25/2.5</td>
<td>5</td>
</tr>
<tr>
<td>Off-state leakage at nominal voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(60 Hz)</td>
<td></td>
<td>volts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logic voltage range</td>
<td>VDC</td>
<td>10.5–16</td>
<td>10.5–16</td>
<td>19.5–32</td>
<td>19.5–32</td>
</tr>
<tr>
<td>Logic pickup voltage</td>
<td>VDC</td>
<td>10.5</td>
<td>10.5</td>
<td>19.5</td>
<td>19.5</td>
</tr>
<tr>
<td>Logic dropout voltage</td>
<td>VDC</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Logic input current at nominal logic</td>
<td>mA</td>
<td>15</td>
<td>15</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control resistance (Rc in schematic)</td>
<td>ohms</td>
<td>1 K</td>
<td>1 K</td>
<td>2.2 K</td>
<td>2.2 K</td>
</tr>
<tr>
<td>One-cycle surge</td>
<td>A peak</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Turn-on time @ 60 Hz</td>
<td>micro-</td>
<td>≤8.3*</td>
<td>≤8.3*</td>
<td>≤8.3*</td>
<td>≤8.3*</td>
</tr>
<tr>
<td>seconds</td>
<td></td>
<td>seconds</td>
<td>seconds</td>
<td>seconds</td>
<td>seconds</td>
</tr>
<tr>
<td>Turn-off time @ 60 Hz</td>
<td>micro-</td>
<td>≤8.3**</td>
<td>≤8.3**</td>
<td>≤8.3**</td>
<td>≤8.3**</td>
</tr>
<tr>
<td>seconds</td>
<td></td>
<td>seconds</td>
<td>seconds</td>
<td>seconds</td>
<td>seconds</td>
</tr>
<tr>
<td>Peak repetitive voltage</td>
<td>VAC</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Minimum load current</td>
<td>mA</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Output voltage drop maximum peak</td>
<td>V</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>dv/dt-off-state</td>
<td>V/micro-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>second</td>
<td></td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>dv/dt-commutating</td>
<td></td>
<td>snubbed for 0.5 power factor load</td>
<td>snubbed for 0.5 power factor load</td>
<td>snubbed for 0.5 power factor load</td>
<td>snubbed for 0.5 power factor load</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
<td>-30 to +70</td>
</tr>
<tr>
<td>Operating:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage:</td>
<td>°C</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
<td>-30 to +85</td>
</tr>
</tbody>
</table>

* One-half cycle maximum. Module turns on at the zero volt crossing of the AC sine wave.
** One-half cycle maximum. Module turns off at the zero current crossing of the AC sine wave.
*** Not for use with Opto 22 brains.
Dimensions—AC Output Modules

Schematics—AC Output Modules

**Control line is compatible with totem pole or tri-state output device.**

**Control line is compatible with totem pole or tri-state output device.**
CHAPTER 4. GENERATION 4 DIGITAL I/O MODULES

DRY CONTACT OUTPUT MODULES

Description

Opto 22’s G4 family of modules includes two dry-contact, low contact-resistance DC output modules: the G4ODC5R and the G4ODC5R5.

The G4ODC5R is a single-pole, single-throw, normally open mechanical relay (Form A, SPST-NO). The G4ODC5R5 is a single-pole, single-throw, normally closed mechanical relay (Form B, SPST-NC).

Typical applications for these dry-contact modules include analog signal and communication line multiplexing.

Specifications—Dry Contact Output Modules

<table>
<thead>
<tr>
<th>Units</th>
<th>G4ODC5R</th>
<th>G4ODC5RFM*</th>
<th>G4ODC5R5</th>
<th>G4ODC5R5FM*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact form</td>
<td>Form A SPST mechanical relay</td>
<td>Form B SPST mechanical relay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal position</td>
<td>Open</td>
<td>Closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact rating</td>
<td>VA</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Maximum switching voltage (see NOTE)</td>
<td>VDC</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VAC</td>
<td>130</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Maximum switching current</td>
<td>A</td>
<td>0.5 (see NOTE)</td>
<td>0.5 (see NOTE)</td>
<td></td>
</tr>
<tr>
<td>Contact resistance</td>
<td>Milliohms</td>
<td>200</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Turn-on time</td>
<td>microseconds</td>
<td>500</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Turn-off time</td>
<td>microseconds</td>
<td>500</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Contact bounce</td>
<td>microseconds</td>
<td>250</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Mechanical life</td>
<td>cycles</td>
<td>5 million</td>
<td>5 million</td>
<td></td>
</tr>
<tr>
<td>Logic voltage range</td>
<td>VDC</td>
<td>4.8–6</td>
<td>4.8–6</td>
<td></td>
</tr>
<tr>
<td>Logic OFF voltage range</td>
<td>VDC</td>
<td>0.0–0.8</td>
<td>0.0–0.8</td>
<td></td>
</tr>
<tr>
<td>Logic ON voltage range</td>
<td>VDC</td>
<td>3.8–6</td>
<td>3.8–6</td>
<td></td>
</tr>
<tr>
<td>Indeterminate range</td>
<td>VA</td>
<td>0.8–3.8</td>
<td>0.8–3.8</td>
<td></td>
</tr>
<tr>
<td>Logic input current at nominal logic voltage</td>
<td>milliamps</td>
<td>14</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Isolation voltage (transient) input-to-output</td>
<td>VDC</td>
<td>1,500</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature: Operating</td>
<td>°C</td>
<td>0 to 70</td>
<td>0 to 70</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>°C</td>
<td>-60 to +105</td>
<td>-60 to +105</td>
<td></td>
</tr>
</tbody>
</table>

*Part numbers ending in FM are Factory Mutual approved.

NOTE: The application of the dry contact module must not exceed 10 VA under steady-state or momentary in-rush conditions. For voltages at or below 20 volts, the current limit is 0.5 amps. For voltages above 20 volts, the maximum allowable current is determined by the following equation: Maximum Current = 10 VA / Voltage

See next page for additional information.
Specifications—Dry Contact Output Modules (continued)

Current Limit at Key Voltages:

<table>
<thead>
<tr>
<th>V</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>500</td>
</tr>
<tr>
<td>12</td>
<td>500</td>
</tr>
<tr>
<td>24</td>
<td>416</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>120</td>
<td>83</td>
</tr>
<tr>
<td>130</td>
<td>76</td>
</tr>
</tbody>
</table>

1 Maximum DC voltage is 100 VDC.
2 Maximum AC voltage is 130 VAC.

Dimensions and Schematics—Dry Contact Output Modules

Note: Also compatible with Totem Pole or Tri-State Output. Will not plug into G4PBAR mounting rack.

* Normally open for G4ODCSR, normally closed for G4ODCSRS.
DIGITAL OUTPUT TEST MODULE

Description

Opto 22’s G4SWOUT output test module is used to simulate a G4 output on an I/O mounting rack. Each module contains a manual toggle switch on the field side. The switch closes a contact that shorts the field terminals to turn on a field output. Internally, there is no connection to the logic side of the module.

The G4SWOUT module is ideal for testing field wiring and devices by simulating an output from the computer. The switch handles 3 amps at 250 VAC/VDC.

Specifications—Output Test Module

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage range</td>
<td>250 VAC/VDC</td>
</tr>
<tr>
<td>Isolation, input-to-output (transient)</td>
<td>4000 volts</td>
</tr>
<tr>
<td>Temperature:</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>-30 to +70 °C</td>
</tr>
<tr>
<td>Storage</td>
<td>-30 to +85 °C</td>
</tr>
</tbody>
</table>

Dimensions and Schematics—Output Test Module
DIGITAL OUTPUT TEST MODULE
5. Generation 4 Digital I/O Accessories

OVERVIEW OF ACCESSORIES

Accessories for Generation 4 I/O include the following:
- Cables and connectors—see below.
- Fuses—see page 54.
- Jumper strap—see page 55.

CABLES AND CONNECTORS

Description

Opto 22 supplies several standard cables to interface with host controllers. There are three series of cables, each available in standard lengths. All three cable types use 50-conductor ribbon cable.

Each series of cables is designated according to the type of connector on each end.
- The HH series has a header connector on both ends.
- The CA series has an edge connector on both ends.
- The OD series has a header connector on one end and a card edge connector on the other.
Specifications

<table>
<thead>
<tr>
<th>Length (feet)</th>
<th>HH (Header to header)</th>
<th>CA (Card edge to card edge)</th>
<th>OD (Header to card edge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>HH1.5</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>--</td>
<td>CA2</td>
<td>OD2</td>
</tr>
<tr>
<td>4</td>
<td>HH4</td>
<td>CA4</td>
<td>OD4</td>
</tr>
<tr>
<td>6</td>
<td>HH6</td>
<td>CA6</td>
<td>OD6</td>
</tr>
<tr>
<td>8</td>
<td>HH8</td>
<td>CA8</td>
<td>OD8</td>
</tr>
<tr>
<td>10</td>
<td>HH10</td>
<td>CA10</td>
<td>OD10</td>
</tr>
</tbody>
</table>

Building Your Own Cables

If the standard cables do not meet your requirements, the following list of manufacturers can help you choose connectors and cable. Contact the manufacturer’s distributor for more information.

**50-Conductor Cables:**
- 3M: P/N 3365/50
- ALPHA: P/N 3580/50 or 3583/50

**Header Connectors:**
- Circuit Assemblies, Inc.: P/N CA50IDS2-C-SPT

**Edge Connectors:**
- 3M: P/N 3415-0001
- Panduit: P/N 055-050-455

**Connectors with Strain Reliefs:**
- Use only Panduit Corporation parts: P/N 050A050-455

FUSES

**G4 output module fuse**—A 4-amp fuse is mounted on the top of most modules. Each mounting rack ships with one spare module fuse. Additional fuses can be ordered from Opto 22 or directly from Wickmann.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 amp fuses for G4 output modules (10 pack)</td>
<td>FUSEG4B</td>
</tr>
<tr>
<td>(Not used for G4SWOUT modules)</td>
<td></td>
</tr>
<tr>
<td>1 amp fuses for G4 reed relay output modules or for G4PB16L output channels (10 pack)</td>
<td>FUSE01G4B</td>
</tr>
</tbody>
</table>

**G4 fuses for racks, brains, and other products**—See the Fuses Data Sheet (form 0489) to determine the fuse needed for your rack, brain, or other part.

**Mounting racks used with Raspberry Pi**—The G4PB8H and G4PB16H mounting racks come equipped with a 1A fuse, which is sufficient for the Raspberry Pi, rack, and I/O modules. However, if you’re using USB-powered peripherals (especially USB-WiFi dongles, displays, and hard drives), the 1 A fuse is not sufficient. If you are using USB peripherals, replace the 1 A fuse in the rack with a 5 A fuse (part number FUSE05B). For your convenience, a compatible 5 A fuse is shipped with the OPTO-P1-40P Carrier Board.
JUMPER STRAP

Description

Jumper straps are used to simplify wiring in applications that require a common connection between each I/O module position. The G4STRAP can be used on all G4 digital I/O mounting racks. (It does not work with the G4PB16J, G4PB16K, or G4PB16L racks with integral I/O, however.) The jumper strap has an insulated coating and can be cut to size.

Dimensions
JUMPER STRAP
A. Designing Custom I/O Mounting Racks

INTRODUCTION

Customers designing their own mounting systems for Generation 4 digital I/O modules may find the following information helpful. Circuit board layout information and a circuit board parts list are provided to help you get started.

Refer to individual module information in Chapter 4, Generation 4 Digital I/O Modules for additional specifications.

DIMENSIONS
## PARTS LIST

<table>
<thead>
<tr>
<th>Item</th>
<th>Notes</th>
<th>Manufacturer’s Part Number</th>
<th>Opto 22 Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4 module sockets</td>
<td>Five required for each module</td>
<td>Elpakco, Inc. P/N 4315-TG</td>
<td>G4-MOD- SOCKETS (Qty. 100)</td>
</tr>
<tr>
<td></td>
<td>position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4 fuse sockets</td>
<td>Two required for each spare</td>
<td>Elpakco, Inc. P/N A2122</td>
<td>G4 FUSE SOCKETS (Qty. 100)</td>
</tr>
<tr>
<td></td>
<td>fuse ¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4 pem nuts</td>
<td>One required for each module</td>
<td>PEM Fastening Systems KF2-440ET</td>
<td>G4-PEM-NUTS (Qty. 100)</td>
</tr>
<tr>
<td></td>
<td>position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4 barrier strip</td>
<td>24-position strip²</td>
<td>Phoenix Contact MKDS5/X³-6.35</td>
<td>(see note 4)</td>
</tr>
</tbody>
</table>

¹ Hole size is 0.052 + 0.003/-0.001 diameter on 0.200 centers.
² Hole size is 0.052 + 0.003/-0.001 diameter on 0.500 centers.
³ X in the part number is the number of positions in the barrier strip.
⁴ See Phoenix Contact (information below)

---

Elpakco, Inc.  
www.elpakco.com  
2 Carl Thompson Rd.  
Westford, MA 01886  
(978) 392-0400  
(978) 392-6814 (fax)

PEM Fastening Systems  
www.pemnet.com  
5190 Old Easton Rd.  
Danboro, PA 18916  
(215) 766-8853  
(215) 766-3633 (fax)

Phoenix Contact  
www.phoenixcontact.com  
P.O. Box 4100  
Harrisburg, PA 17111-0100  
(717) 944-1300  
(717) 944-1625 (fax)
B. Wiring Diagrams

INPUT MODULES USING DC FIELD VOLTAGES

Use the diagrams in this section for the following modules:

- G4IDC5
- G4IDC5G
- G4IDC5MB
- G4IDC5D
- G4IDC5G
- G4IDC5K
- G4IDC5MA
- G4IDC15
- G4IDC24
- G4IAC5
- G4IAC5A
- G4IAC5M

**NOTE:** The AC input modules listed at left will work with either AC or DC field voltages. If you are using them with AC voltages, see the following section. If you are using them with DC field voltages, use these diagrams.

---

**On 4-Position Mounting Racks (G4PB4 and G4PB4R).**

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Field Terminal Strip</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2 3</td>
</tr>
<tr>
<td>3</td>
<td>8 9</td>
</tr>
</tbody>
</table>

**On All Other Mounting Racks.**

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Field Terminal Strip</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 2</td>
</tr>
<tr>
<td>15</td>
<td>31 32</td>
</tr>
</tbody>
</table>
INPUT MODULES USING AC FIELD VOLTAGES

Use the diagrams in this section for the following modules:

- G4IAC5
- G4AC15
- G4IAC5A
- G4AC15A
- G4IAC24
- G4AC24A
- G4IDC5
- G4IDC5A
- G4IDC5MA
- G4IDC5G

**NOTE:** The DC input modules listed at left will work with either DC or AC field voltages. If you are using them with DC voltages, see the previous section. If you are using them with AC field voltages, use these diagrams.

*On 4-Position Mounting Racks (G4PB4 and G4PB4R).*

![Diagram for 4-Position Mounting Racks](image)

*On All Other Mounting Racks.*

![Diagram for All Other Mounting Racks](image)
OUTPUT MODULES USING DC FIELD VOLTAGES

Use the diagrams in this section for the following modules:

- G4ODC5
- G4ODC5A
- G4ODC5MA
- G4ODC15
- G4ODC24
- G4ODC24A

**On 4-Position Mounting Racks (G4PB4 and G4PB4R).**

```
<table>
<thead>
<tr>
<th>Module Position</th>
<th>Field Terminal Strip</th>
<th>DC POWER SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2 3</td>
<td>+ —</td>
</tr>
<tr>
<td>3</td>
<td>8 9</td>
<td>LOAD *</td>
</tr>
</tbody>
</table>
```

*Note: Commutation diode must be used on inductive loads. Typically, use diode 1N4005

**On All Other Mounting Racks.**

```
<table>
<thead>
<tr>
<th>Module Position</th>
<th>Field Terminal Strip</th>
<th>DC POWER SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 2</td>
<td>+ —</td>
</tr>
<tr>
<td>15</td>
<td>31 32</td>
<td>LOAD *</td>
</tr>
</tbody>
</table>
```

*Note: Commutation diode must be used on inductive loads. Typically, use diode 1N4005
OUTPUT MODULES USING AC FIELD VOLTAGES

Use the diagrams in this section for the following modules:

G4OAC5  G4OAC5A  G4OAC5MA  G4OAC15  G4OAC24
G4OAC5A  G4OAC5AMA  G4OAC15A  G4OAC24A

NOTE: The load can go on either terminal because AC modules are non-polar.

On 4-Position Mounting Racks (G4PB4 and G4PB4R).

<table>
<thead>
<tr>
<th>Module Position</th>
<th>Field Terminal Strip</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2 3</td>
</tr>
<tr>
<td>3</td>
<td>8 9</td>
</tr>
</tbody>
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<table>
<thead>
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<tbody>
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<td>0</td>
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</tr>
<tr>
<td>15</td>
<td>31 32</td>
</tr>
</tbody>
</table>

On All Other Mounting Racks.