48-Bit Isolated Digital I/O

NI 6527
- 24 optically isolated inputs (0-28 VDC)
- 24 isolated, solid-state relay outputs (0-60 VDC, 0-30 Vrms)
- Switch up to 120 mA
- Digital filtering on inputs
- Messaging (change notification)
- NI-DAQ driver simplifies configuration and measurements

Models
- NI 6527
  - PCI-6527
  - PXI-6527

Real-Time
See page 142

NI Application Software
- LabVIEW
- Measurement Studio

Operating Systems
- Windows 2000/NT/Me/9x*

Applications
- Isolation of computer from field devices
- Breaking ground loops
- High current digital outputs
- Sensing non-TTL DC signals
- Switching non-TTL AC or DC signals
- Detecting changes on digital lines
- Driving current-sensitive devices
- Driving mechanical relays

Accessories
See page 338

*Visit ni.com/info and enter winxp for the latest operating system information.

Table 1. NI 6527 Specifications Overview (see page 344 for detailed specifications)

<table>
<thead>
<tr>
<th>Family</th>
<th>Bus</th>
<th>Digital I/O Lines</th>
<th>Maximum Rate</th>
<th>Onboard Memory</th>
<th>Logic Level</th>
<th>Isolation</th>
<th>Handshaking</th>
<th>Pattern</th>
<th>Messaging</th>
<th>Triggering</th>
</tr>
</thead>
<tbody>
<tr>
<td>NI 6527</td>
<td>PCI, PXI/CompactPCI</td>
<td>24 inputs and 24 outputs</td>
<td>Unstrobed I/O</td>
<td>-</td>
<td>0 to 28 VDC input and 0 to 60 VDC (30 Vrms) output</td>
<td>60 VDC</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

Overview
The NI 6527 devices are 48-bit, parallel, isolated digital I/O interfaces for PCI and PXI/CompactPCI. They have 24 optically isolated digital inputs and 24 solid-state relay outputs. The NI 6527 can sense digital levels up to 28 VDC and switch currents up to 120 mA. The isolated inputs and outputs protect your system from noise and spikes on I/O signals and break ground loops.

Hardware
Digital Inputs
You can use the 24 optically isolated inputs of the NI 6527 devices to read the status of external logic at TTL and non-TTL levels. Each input channel has two isolated terminals—one for the signal and one for its reference. A potential difference of 2 to 28 VDC between the two terminals registers as a logic high. Logic low is between 0 and 1 V. The inputs feature 60 VDC isolation from the computer and between channels.

Messaging - Change Notification
NI 6527 devices can generate a message when one or more user-selected input lines changes, either from low to high, high to low, or both. Once notified of a change, NI-DAQ can read the status of other input lines, set outputs, or perform some other programmed operation. Using this feature, you can monitor lines without polling, thus using your CPU more efficiently.

Debouncing and Glitch Removal
Each input line can be digitally filtered to prevent a momentary glitch or spike from affecting the line state. When you use messaging, filtering blocks spurious change events caused by noise on the input line.

Digital Switch Outputs
The 24 solid-state relay outputs on the NI 6527 devices can switch external devices, including those requiring high input currents, and control digital logic levels at both TTL and non-TTL levels. Each relay output has two terminals. Writing a logic low to an output opens the connection between the terminals; writing a logic high opens the connection. Depending on how your load connects to the terminals, an output can either source or sink currents. By adding pull-up resistors externally and, if needed, an isolated power supply, you can output digital signals that drive source or sink currents. The solid-state relay outputs have a maximum switching capacity of 60 VDC, 30 Vrms, or 120 mA, and are isolated up to 60 VDC or 30 Vrms from the computer and between channels.
48-Bit Isolated Digital I/O

The NI 6527 device outputs include circuitry to protect against transient currents above their rated values. When excessive current flows through the relay, the relay limits the current to approximately 260 mA (typical).

By default, the solid-state relays power up open (digital lines high). You can configure the power-up state of each output line independently with a software utility located in the Developer Zone. For more information, go to ni.com/info and enter ex95u3

I/O Connector

The I/O connector for the NI 6527 is a 100-pin female connector, the pinout of which is shown in Figure 1. For a shielded cable/accessory combination, use the SH100-100-F cable with the SCB-100 accessory. The NI 6527 devices are also compatible with the CB-100 kit, which includes two 50-pin connector blocks and ribbon cable.

For 5 V, non-isolated applications, +5 V and GND lines from the computer, available on the I/O connector, eliminate the need for an external power supply.

Ordering Information

NI 6527

PCI-6527…………………….. ............................777810-01

PXI-6527…………………….. ............................777802-01

Includes NI-DAQ driver software.

For information on extended warranty and value added services, see page 22.

Recommended Configurations

See page 338 for accessory and cable information.
Digital I/O Specifications

Specifications

NI 653x (Continued)

Environment
Operating temperature ........................................ 0 to 55 °C, DAQCard should not exceed 55 °C while in PCMCIA slot
Storage temperature ........................................... -20 to 70 °C
Relative humidity ............................................. 10% to 90% noncondensing

Certifications and Compliances
CE Mark Compliance

NI 6527
These specifications are typical for 25 °C unless otherwise noted.

Digital Input
Optically isolated input channels ......................... 24, each with its own isolated ground reference
Maximum input voltage .................................. 28 VDC

Digital Logic Levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input low voltage</td>
<td>0 VDC</td>
<td>1 VDC</td>
</tr>
<tr>
<td>Input high voltage</td>
<td>2 VDC</td>
<td>28 VDC</td>
</tr>
</tbody>
</table>

Input current
5 V input .................................................. 1.5 mA/channel max
24 V input ............................................... 8 mA/channel max
Isolation .................................................. 60 VDC, channel-to-channel, and from computer

Digital Switch Output
Solid-state relay output channels .................... 24, each with two terminals isolated from other channels
Relay type .................................................. Normally open form A solid-state relays
Maximum switching voltage
AC ......................................................... 30 Vpeak (42 V peak)
DC ......................................................... 60 VDC
Common-mode isolation, 25 °C ....................... 120 mA
On resistance ............................................. 35 Ω maximum
Off leakage current (maximum) ....................... 200 mA
Relay set time (maximum) .......................... 3.0 ms
Relay reset time (maximum) ......................... 3.0 ms
Power-on state ........................................... Relays open by default, can be user-defined through software utility
Overcurrent protection on outputs ............ 250 mA, typical

Power Requirement
+5 VDC (±5%) ............................................. 500 mA, maximum
Power available at I/O connector .............. +4.5 to +5.25 VDC, fused at 1 A

Physical
Dimensions (not including connectors)
PCI-6527 .................................................. 17.5 by 10.7 cm (6.9 by 4.2 in.)
PXI-6527 ............................................... 16 by 10 cm (6.3 by 3.9 in.)
I/O connector .............................................. 100-pin keyed female

Environment
Operating temperature .................................. 0 to 50 °C
Storage temperature .................................. -20 to 70 °C
Relative humidity .......................................... 10% to 90% noncondensing

Certifications and Compliances
CE Mark Compliance

NI 650x
These specifications are typical for 25 °C unless otherwise noted.

Digital I/O
Number of channels
NI 6503 .................................................. 24
NI 6507, NI 6508 ................................. 96
Compatibility ........................................... 5 V TTL/CMOS
Power-on state .......................................... Input
Digital logic levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input low voltage</td>
<td>-0.3 V</td>
<td>0.8 V</td>
</tr>
<tr>
<td>Input high voltage</td>
<td>2.2 V</td>
<td>3.3 V</td>
</tr>
<tr>
<td>Output low voltage (out = 2.5 mA)</td>
<td>-</td>
<td>0.4 V</td>
</tr>
<tr>
<td>Output high voltage (out = 2.5 mA)</td>
<td>1.0 V</td>
<td>1.7 V</td>
</tr>
</tbody>
</table>

Transfer rate

<table>
<thead>
<tr>
<th>Bus</th>
<th>Maximum with NI-DAQ Software</th>
<th>Typical Sustainable Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI, PXI, DAQCard, ISA</td>
<td>50 kbytes/s</td>
<td>1-10 kbytes/s</td>
</tr>
</tbody>
</table>

Note: Transfer rate depends on the computer and software. The rates may vary due to programming language and code efficiency, CPU utilization, transfer methods, and so on. Please consult the user manual for specifics.

DAQPad-6507/8 typical; 1 A max +4.65 to +5.25 VDC, 1 A fused
DAQCard-DIO-24 160 mA +4.65 to +5.25 VDC, 1 A fused
DAQPad 250 bytes/s 175 bytes/s

Data transfers ........................................... Interrupts, programmed I/O

Bus interface
PCI, PXI, DAQCard, DAQPad, AT .............. Slave

Power Requirements

Device +5 VDC (5%) Power Available at I/O Connector
DAQCard-DIO-24 15 mA +4.65 to +5.25 VDC, 1 A fused
DAQPad-650x 150 mA at 12 VDC typical; 1 A max +4.65 to +5.25 VDC, 1 A fused

Physical
Dimensions
PCI-6503 .................................................. 12.2 by 9.5 cm (4.8 by 3.7 in.)
DAQCard-DIO-24 ...................................... Type II PC Card
PCI-DIO-24 ........................................... 11.7 by 10.6 cm (4.6 by 4.2 in.)
DAQCard-DIO-96 ....................................... 13.7 by 10.7 cm (5.4 by 4.2 in.)
PXI-6508 ............................................. 10 by 16 cm (3.9 by 6.3 in.)
DAQCard-DIO-96 ....................................... 16.5 by 9.9 cm (6.3 by 3.9 in.)
DAQPad-6507/8 ....................................... 14.6 by 21.3 cm (5.8 by 8.4 by 1.5 in.)

I/O Connector
NI 6503, except DAQCard .................... 50-pin male
DAQCard-DIO-24 ...................................... 25-pin female PCMCIA
NI 6508, except PC-DIO-96 ............... 100-pin female 0.050 series D-type
PC-DIO-96 ........................................... 100-pin male ribbon cable

Environment
Operating temperature .......................... 0 to 55 °C, DAQCard should not exceed 55 °C while in PCMCIA slot
Storage temperature .............................. -20 to 70 °C
Relative humidity ...................................... 10% to 90% noncondensing

For information on static digital I/O in the VXI form factor, refer to the VXI Solutions Product Guide.

Certifications and Compliances
CE Mark Compliance

European Union CE Mark Compliance
For additional European Union CE Mark Compliance information, contact National Instruments or visit the following website:
http://www.ni.com/compliance

For information on static digital I/O in the VXI form factor, refer to the VXI Solutions Product Guide.

Certificates and Compliances
CE Mark Compliance

Western Europe Conformité Européenne (CE) Marking

Japan VCCI Class B

Australiaźni

For additional information, contact National Instruments or visit the following website:
http://www.ni.com/compliance

For information on static digital I/O in the VXI form factor, refer to the VXI Solutions Product Guide.