

Low-Cost Digital I/O 24 or 96 Lines, 5 V TTL/CMOS

NI 650x

- 24 or 96 digital input/output lines
- 5 V TTL/CMOS
- 2-wire handshake capability
- Known power-up states
- Available for PCI, PXI/CompactPCI, ISA, USB, and PCMCIA
- NI-DAQ driver simplifies configuration and measurements

Models

- NI 6503
 - PCI-6503
 - DAQCard-DIO-24
 - PC-DIO-24
- NI 6507/NI 6508
 - PCI-DIO-96
 - PXI-6508
 - DAQPad-6507 for USB¹
 - DAQPad-6508 for USB¹
 - PC-DIO-96

¹USB devices for Windows 2000/Me/98 only

Real-Time

See page 142

NI Application Software

- LabVIEW
- Measurement Studio

Operating Systems

- Windows 2000/NT/Me/9x*
- Mac OS**

Applications

- Interface to parallel digital I/O peripherals
- Monitoring and control of switches, relays, actuators, lights, and motors
- BCD-compatible panel meters and test equipment

Accessories

See page 338

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

**Not for all hardware



Family	Bus	Digital I/O Lines	Maximum Rate	Onboard Memory	Logic Level	Isolation	Handshaking I/O	Pattern I/O	Messaging	Triggering
NI 6503	PCI, PCMCIA, ISA	24	Unstrobed I/O	–	5 V TTL/CMOS	–	✓	–	✓	–
NI 6507 NI 6508	PCI, PXI/CPCI, USB, ISA	96	Unstrobed I/O	–	5 V TTL/CMOS	–	✓	–	✓	–

¹Rates may depend on application, computer, software. See page 344 for more information.

Table 1. NI 650x Specifications Overview (see page 344 for detailed specifications)

Overview

The NI 6503 devices are 24-bit parallel digital I/O interfaces for computers with PCI, USB, PCMCIA, or ISA buses. The NI 6507/NI 6508 families are 96-bit parallel digital I/O devices for computers with PCI, PXI/CompactPCI, USB, or ISA buses. All NI 650x devices are for 5 V TTL/CMOS I/O signals. For higher-voltage signals, see page 486 for digital signal conditioning solutions or consider the NI 6527 devices on page 334.

Hardware

82C55 Parallel Port Interfaces

The NI 650x digital I/O devices use the 82C55 Parallel Port Interfaces (PPIs). The NI 6503 devices contain one PPI, and the NI 6507/NI 6508 devices contain four PPIs. Each PPI controls 24 bits of digital I/O and has three 8-bit ports (A, B, and C), which you can program as either inputs or outputs. Ports A and B are always used for digital I/O, while port C can be configured for digital data I/O, control, status, or handshake signals.

Digital I/O Power-Up State Selection

You can power up the PCI-6503, PC-DIO-24, PC-DIO-96, PXI-6508, and DAQPad-650x digital I/O lines in a user-defined state – either high or low. On these devices, each line is connected to a 100 kΩ resistor and you can use a jumper to select whether the lines of the device power up in the high or low state. The DAQCard-DIO-24 and PCI-DIO-96 have 100 kΩ resistors that always pull high.

Device	Connector
PCI-6503	50-pin, see Figure 3
PC-DIO-24	50-pin, see Figure 3
DAQCard-DIO-24	27-pin; cable adapts it to the 50-pin connector shown in Figure 3
NI 6508 devices	100 pin; see Figure 2
DAQPad-6507	Onboard screw terminals for all I/O signals and strain relief for ruggedized wiring. The DAQPad-6507 does not need additional cables or external termination accessories.

Table 2. Digital Connectors

INFO CODES

For more information or to order products online, visit ni.com/info and enter:

- pci6503
- daqcarddio24
- pcdio24
- pcdio96
- pxi6508
- daqpad6507
- daqpad6508
- pcdio96

BUY ONLINE!

Low-Cost Digital I/O 24 or 96 Lines, 5 V TTL/CMOS

Digital I/O Connector

Digital connectors for the NI 650x devices are described in Table 2. The eight bits in Port A of each PPI are at xPA7 through xPA0 on the digital I/O connector where x represents which PPI is being used. Ports B and C are at xPB7 through xPB0 and xPC7 through xPC0, respectively. Each port is programmed to be input or output. Power from the computer I/O channel or the DAQPad power supply is also available on the digital I/O connector. See page 338 to learn more about connectivity solutions, including direct connectors, electromechanical relay devices, and other signal conditioning solutions.

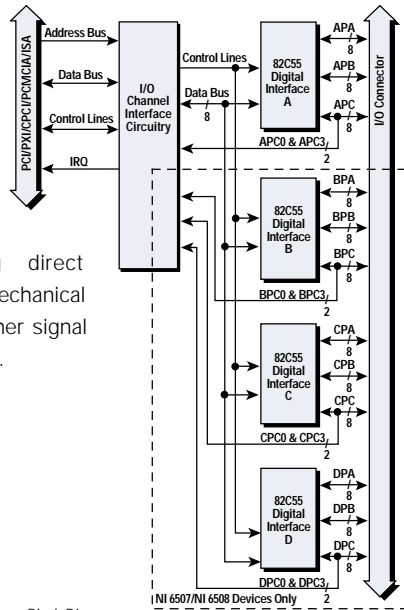


Figure 1. NI 650x Families Hardware Block Diagram

USB Devices Power

You can power the DAQPad-6507 and DAQPad-6508 from the USB bus, the optional BP-1 battery pack, or any 9 to 30 VDC supply. With the AC-to-DC adapter unit included, you can power the device from any standard AC source. If you are using several USB devices or drawing more than 50 mA from the onboard 5 V supply, we recommend that you use the AC-to-DC adapter or BP-1 battery pack. A charger unit is included with the BP-1.

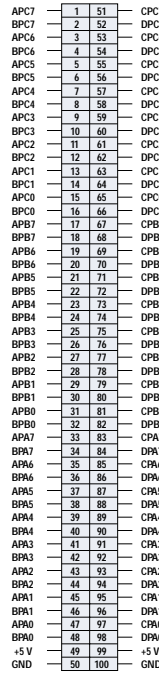


Figure 2. NI 6508 I/O Connector

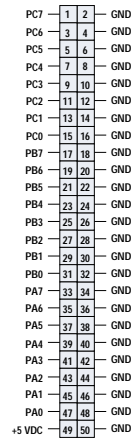


Figure 3. NI 6503 I/O Connector

Ordering Information

NI 6503	
PCI-6503	777690-01
DAQCard-DIO-24	776912-01
PC-DIO-24*	777368-01
NI 6507	
DAQPad-6507 (USB) with built-in screw terminals ¹	
U.S. 120 VAC	777405-01
Universal Euro 240 VAC	777405-04
United Kingdom 240 VAC	777405-06
Japanese 120 VAC	777405-07
NI 6508	
PCI-DIO-96	777387-01
PXI-6508	777598-01
PC-DIO-96*	777271-01
DAQPad-6508 (USB) with 100-pin I/O connector ¹	
U.S. 120 VAC	777661-01
Universal Euro 240 VAC	777661-04
United Kingdom 240 VAC	777661-06
Japanese 120 VAC	777661-07

Includes NI-DAQ driver software.

*Windows only

¹Windows 2000/Me/98 only; 1 m USB cable included

BP-1 Rechargeable battery pack

120 VAC charger	776896-01
230 VAC charger	776896-31

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

Recommended Configurations

Family	Device	Accessory	Cable
NI 6503	PCI-6503	CB-50LP (777101-01)	NB1 (180524-10)
	DAQCard-DIO-24	CB-50LP (777101-01)	PSH27-50F-D1 (776989-01)
	PC-DIO-24	CB-50LP (777101-01)	NB1 (180524-10)
NI 6507	DAQPad-6507	Built-in screw terminals	N/A
NI 6508	PCI-DIO-96	SCB-100 (776990-01)	SH100-100-F (185095-02)
	PXI-6508	SCB-100 (776990-01)	SH100-100-F (185095-02)
	PC-DIO-96	CB-100 Kit (776455-02)	Included in kit
	DAQPad-6508	CB-100 Kit (777812-01)	Included in kit

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

Level	Minimum	Maximum
Input low voltage	0 VDC	1 V
Input high voltage	2 VDC	28 VDC

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 V _{rms} (42 V peak)
DC	60 VDC
Maximum switching capacity, 25 °C	120 mA
Common-mode isolation.....	60 VDC or 30 V _{rms} (42 V peak) channel-to-channel and channel-to-computer
On resistance.....	35 Ω maximum
Off leakage current (maximum).....	200 nA
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	260 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	

Level	Minimum	Maximum
Input low voltage	-0.3 V	0.8 V
Input high voltage	2.2 V	5.3 V
Output low voltage (I _{out} = 2.5 mA)	-	0.4 V
Output high voltage (I _{out} = 2.5 mA)	3.7 V	-

Transfer rate

Bus	Maximum with NI-DAQ Software	Typical Sustainable Rate
PCI, PXI, DAQCard, ISA	50 bytes/s	1-10 bytes/s
DAQPad	250 bytes/s	175 bytes/s

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. The DAQPad-650x transfer rate is dependent upon available USB bandwidth.

Handshaking	2-wire
Data transfers	Interrupts, programmed I/O

Bus interface

PCI, PXI, DAQCard, DAQPad, AT

Power Requirements

Device	+5 VDC (±5%)	Power Available at I/O Connector
6507/8 and PCI-6503	400 mA	+4.65 to +5.25 VDC, 1 A fused
DAQCard-DIO-24	15 mA	+4.65 to +5.25 VDC, 500 mA
PC-DIO-24	160 mA	+4.65 to +5.25 VDC, 1 A fused

Device	+9 to +30 VDC	Power Available at I/O Connector
DAQPad-6507/8	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
PC-DIO-24	11.7 by 10.6 cm (4.6 by 4.2 in.)
PCI-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.)
PC-DIO-96	16.5 by 9.9 cm (6.3 by 3.9 in.)
DAQPad-6507/8	14.6 by 21.3 by 3.8 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 