

Low-Cost, Selectable-Voltage, Digital I/O Devices up to 50 MHz

NI PCIe-6535/36/37, NI PXIe-6535/36/37 **NEW!**

- 10/25/50 MHz maximum clock rate
- Data streaming up to 40 MB/s (NI 6535) 100 MB/s (NI 6536) or 200 MB/s (NI 6537)¹
- Selectable voltage levels of 2.5 and 3.3 V (5.0 V compatible)
- 32 channels with per-channel directional control
- x1 PCI Express/PXI Express interface
- Synchronous and asynchronous (handshaking) timing modes
- Software-compatible with NI 6533 and NI 6534 NI-DAQmx applications

¹Data rates vary depending on device PC chipset, RAM or hard disk data streaming, and data direction.

Operating Systems

- Windows Vista/XP/2000
- LabVIEW Real-Time

Recommended Software

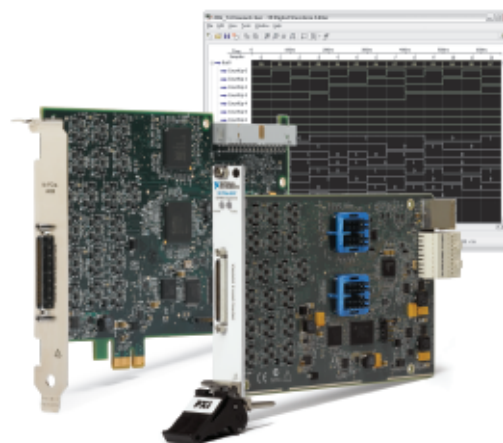
- LabVIEW
- LabWindows™/CVI
- LabVIEW SignalExpress
- Digital Waveform Editor

Other Compatible Software

- Visual Basic
- C/C#
- .NET

Driver Software (included)

- NI-DAQmx
- LabVIEW Express VIs



Product	Platform	Channels	Maximum Clock Rate (MHz)	Compatible Voltage Levels (V)	Maximum Throughput (MB/s)
NI 6535	PCI Express/PXI Express	32	10	2.5, 3.3, and 5.0 TTL	40
NI 6536	PCI Express/PXI Express	32	25	2.5, 3.3, and 5.0 TTL	100
NI 6537	PCI Express/PXI Express	32	50	2.5, 3.3, and 5.0 TTL	200

Table 1. NI 6535, NI 6536, and NI 6537 Specifications Overview

Overview

Applications
Digital Interfacing
Custom Digital Device
Semiconductor
Digital Data Transfers
Consumer Electronics
Digital Display Testing
CCD Imaging Sensors
Communications
Digital I/O Streaming
Wireless Chip Testing

NI 6535, NI 6536, and NI 6537 digital I/O devices are high-speed 32-bit interfaces built on PCI Express bus technology. These cost-effective devices provide an ideal way to interface with a variety of digital applications requiring a high number of channels for digital I/O including high-speed functional digital tests, handshaking, chip testing, pattern generation, memory testing, and logic vector capture. This family features

maximum clock rates of 10, 25, or 50 MHz; selectable voltage levels compatible with 2.5, 3.3, and 5 V TTL logic; and individually configured pins for input or output. With both synchronous and asynchronous timing modes, handshaking, and a software API designed around the NI-DAQmx driver, NI 6535/36/37 devices have the flexibility to meet the requirements of semiconductor, consumer electronics, and communications applications.

Digital Interfacing

- Use NI 6535/36/37 devices to interface digital systems and devices directly with PC-based applications
- Control, communicate with, or send data to a digital device or system
- Analyze and record digital data
- Perform bidirectional communications with handshaking

Timing Modes

- Pattern I/O or sample clock (synchronous) – transfer patterns using an internal or external clock signal
- Burst handshaking (synchronous) – handshake an NI 6535, NI 6536, or NI 6537 device and the peripheral device during synchronous transfer to maximize the transfer rate
- Handshaking I/O (asynchronous) – transfer patterns when both the NI 6535, NI 6536, or NI 6537 device and the peripheral device are ready
- On-demand (unstrobed or static I/O) – acquire or generate data through software-timed commands
- Change detection – acquire data whenever a change occurs on one or more digital lines

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High Signal Quality

NI 6535/36/37 devices feature an improved architecture, offering not only higher clock rates up to 50 MHz at low cost but also superior signal integrity and impedance matching.

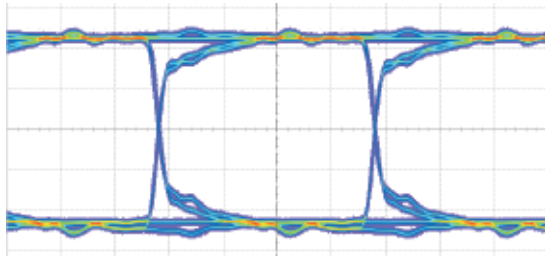


Figure 1. Eye Diagram of NI PXIe-6537 at 50 MHz

Improved Architecture Compatible with NI 6533 and NI 6534 Applications

These devices are ideal replacements for future-proofing applications currently using NI 6533/34 devices.

- NI 6535/36/37 devices are software-compatible with existing NI 6533/34 NI-DAQmx applications
- You can interface to existing NI 6533/34 fixtures and terminal blocks with the NI 653x cable adapter
- NI 6535/36/37 devices are compatible with most NI 6533/34 timing modes – pattern I/O, handshaking, change detection, and burst



Figure 2. You can use NI 6535/36/37 devices with an NI 653x cable adapter to connect to existing NI 6533/34 applications.

- In comparison to legacy digital I/O boards, NI 6535/36/37 devices have improved signal quality. In Figure 3, the top eye diagram is from an NI PXIe-6535 generating at 10 MHz. The bottom diagram shows an NI PXI-6534 generating a 10 MHz signal using signal termination recommended by NI.

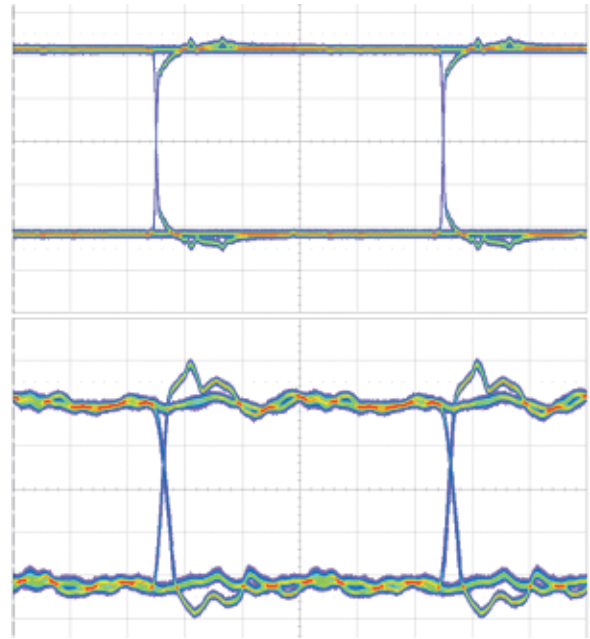


Figure 3. Eye Diagram Comparison of the NI 6535 (top) with the NI 6534 (bottom) Using Recommended Signal Termination

Connectivity Options

To meet connectivity requirements for high-speed digital applications, you can use NI 6535/36/37 devices with a variety of accessories.

- A CB-2162 connector block
- A 50 Ω shielded flying lead cable
- A VHDCI high-density connector

High-Speed Data Streaming

- Generate and acquire larger digital waveforms with PCI Express high-speed devices, using the ideal, low-cost NI 6535/36/37 devices
- Stream continuously at up to 200 MB/s of data
- Stream data from the host computer's memory or high-end storage solution such as NI RAID arrays and controllers
- Use for applications requiring high speeds and fast streaming capabilities such as LCD testing, wireless protocols, ADC/DAC interfacing, or digital pattern capture
- Visit ni.com/streaming for more information

Multidevice Synchronization

These products use the PXI trigger bus or RTSI bus to send and receive clock and trigger signals to and from other NI 6535/36/37 devices in your system. With these capabilities, you can create synchronized systems with large numbers of digital I/O lines.

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Specifications

These specifications are valid for 0 to 55 °C, unless otherwise noted.

Channel Characteristics

Number of channels..... 32 data, 6 PFI
Direction control of channels Per-channel

Generation Signal Characteristics (data, PFI channels)

All voltage ranges specified into 1 M Ω
Generation voltage families (V)..... 2.5, 3.3 logic families
(5.0 V compatible)
Generation signal type..... Single-ended

Generation Voltage Levels

Family Settings (V)	Low Voltage Levels (V)		High Voltage Levels (V)	
	Typical	Max	Min	Typical
2.5	0	0.1	2.4	2.5
3.3	0	0.1	3.2	3.3
5.0	0	0.1	3.2	3.3

Output impedance..... 50 Ω nominal
Maximum DC drive strength..... ± 16 mA at 2.5 V, ± 32 mA at 3.3 V
Channel power-up state Software programmable
(0, 1, or HighZ; 2.5 or 3.3 V)

Acquisition Signal Characteristics (data, PFI channels)

Acquisition voltage families (V)..... 2.5, 3.3 logic families
(5.0 V compatible)

Acquisition Voltage Levels

Family Settings (V)	Low Voltage Thresholds (V)	High Voltage Thresholds (V)
	Max	Min
2.5	0.75	1.75
3.3	1.0	2.3
5.0	1.0	2.3

Input impedance 50 k Ω
Input protection..... -1 to 6 V

Timing Characteristics

Sample Clock

Sources..... Onboard clock
(internal OSC with divider)
PFI<4:5>
RTSI<7> (PCI Express only)
PXI_Trig<7> (PXI Express only)
PXI-Star (PXI Express only)
DSTARA (PXI Express only)
Onboard clock frequency range
NI 6535 48 Hz to 10 MHz,
settable to 200 MHz/N;
20 \leq N \leq 4,194,307
NI 6536 48 Hz to 25 MHz,
settable to 200 MHz/N;
8 \leq N \leq 4,194,307
NI 6537 48 Hz to 50 MHz,
settable to 200 MHz/N;
4 \leq N \leq 4,194,307

Imported sample clock timebase/
frequency range

NI 6535 0 Hz to 10 MHz
NI 6536 0 Hz to 25 MHz
NI 6537 0 Hz to 50 MHz
Exported sample clock destinations..... PFI<4> (generation)
PFI<5> (acquisition)
RTSI<7> (PCI Express only)
PXI_Trig<7> (PXI Express only)
DSTARC (PXI Express only)
Timebase division Imported timebase/N;
NI 6535 20 \leq N \leq 4,194,307
NI 6536 8 \leq N \leq 4,194,307
NI 6537 4 \leq N \leq 4,194,307

Generation Signal Characteristics (data, PFI channels)

Maximum data channel toggle rate
NI 6535 5 MHz
NI 6536 12.5 MHz
NI 6537 25 MHz
Data position modes..... Active edge, inactive edge
(data channels only)

Handshaking

Asynchronous handshaking modes Handshaking sample timing
Synchronous handshaking modes Burst sample timing
Pipelined sample clock timing
Control line polarity Active high
Active low

Change Detection

Change detection resolution..... Sample clock period
Sources for change detection..... Data channels 0 to 31
Valid sample position..... Active edge, inactive edge
Valid changes..... Rising, falling, both

Waveform Characteristics

Transfer types..... DMA
Programmed I/O (static only)

Trigger Inputs

Trigger types..... Start trigger
(pipelined or sample clock timing)
Pause trigger
(pipelined or burst timing)
Reference trigger
(pipelined or sample clock timing)
Handshake trigger
(handshaking timing)
Sources..... PFI <0:5> (DDC connector)
RTSI <0:7> (PCI Express only)
PXI_TRIG<0:6>
(PXI Express only)
DSTARB (PXI Express only)
Pattern match (acquisition only)
Disabled (do not wait for a trigger)

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Trigger detection	Start trigger (edge detection: rising or falling; pattern match: match or don't match) Pause trigger (level detection: high or low; pattern match: match or don't match) Reference trigger (edge detection: rising or falling; pattern match: match or don't match) Handshaking trigger (interlocked: high or low)
Destinations	PFI <0:5> (DDC connector) RTSI <0:7> (PCI Express only) PXI_TRIG<0:7> (PXI Express only) DSTARC (PXI Express only)

Events (outputs from NI 6536/37)

Event types	Data active, ready for start, ready for transfer, handshaking, change detection
Destinations	PFI <0:5> (DDC connector) RTSI <0:7> (PCI Express only) PXI_TRIG<0:7> (PXI Express only) DSTARC (PXI Express only)

Miscellaneous

Physical

Dimensions	
PCI Express	18.1 by 12.6 cm (7.13 by 4.93 in.)
PXI Express	21.4 by 13.1 cm (8.42 by 5.14 in.)

Power Requirements

Typical	5.1 W
Maximum	6.1 W

Software

Driver and application software	NI-DAQmx
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Environment

Operating temperature	
PCI Express	0 to +45 °C
PXI Express	0 to +55 °C
Storage temperature	-20 to +70 °C
Operating relative humidity	10 to 90%, noncondensing (meets IEC-60068-2-56)
Storage relative humidity	5 to 95%, noncondensing (meets IEC-60068-2-56)

Compliance

Safety

The NI 6535/36/37 devices meet the requirements of the following standards for safety and electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 3111-1, UL 61010-1
- CSA 61010-1

Note: For full EMC compliance, you must operate this device with shielded cabling. In addition, all covers and filler panels must be installed. Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information.

For access to certifications, marks, and DoCs, visit ni.com/certification.

Ordering Information

NI PCIe-6535	780694-01
NI PXIe-6535	780695-01
NI PCIe-6536	779672-01
NI PXIe-6536	779988-01
NI PCIe-6537	779673-01
NI PXIe-6537	779989-01

Includes NI-DAQmx software.

Software

NI Digital Waveform Editor	778724-03
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Cables

SHC68-C68-D4 Shielded Single-Ended Cable	196275-01
C68-C68-D4 (unshielded 1 m cable)	195949-01
SHC68-H1X38 (flying lead 1.5 m cable)	192681-1R5

Terminal Blocks

CB-2162 (terminal block with pin headers)	778592-01
SMB-2163 (SMB breakout box)	778747-01
Header Jumper Kit	199101-01

Connectors

Dual Stacked VHDCI Connector, 68-Pin, Right-Angle	780390-01
VHDCI Connector, 68-Pin, Vertical	780389-01
VHDCI Connector, 68-Pin, Right-Angle	778914-01
NI 653x Cable Adapter (68-pin SCSI to 68-pin VHDCI)	195846-01

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S. only) or go to ni.com/hsdio.

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NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with ni.com/pxiadvisor.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit ni.com/calibration.

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