NI 625x Specifications

Specifications listed below are typical at 25 °C unless otherwise noted. Refer to the M Series User Manual for more information about NI 625x devices.

Analog Input
Number of channels
- NI 6250/6251 ......................... 8 differential or 16 single ended
- NI 6254/6259 ......................... 16 differential or 32 single ended
- NI 6255 ................................. 40 differential or 80 single ended

ADC resolution ............................... 16 bits
DNL ................................................ No missing codes guaranteed
INL.................................................. Refer to the AI Absolute Accuracy Table

Sampling rate
- Maximum
  - NI 6250/6251/6254/6259............. 1.25 MS/s single channel, 1.00 MS/s multi-channel (aggregate)
  - NI 6255 ................................. 1.25 MS/s single channel 750 kS/s multi-channel (aggregate)
- Minimum ................................. No minimum
Timing accuracy ........................... 50 ppm of sample rate
Timing resolution .......................... 50 ns
Input coupling ............................... DC
Input range ................................. ±10 V, ±5 V, ±2 V, ±1 V, ±0.5 V, ±0.2 V, ±0.1 V

Maximum working voltage for analog inputs (signal + common mode) .......... ±11 V of AI GND
CMRR (DC to 60 Hz) ......................... 100 dB

Input impedance
- Device on
  - AI+ to AI GND ..........................<10 GΩ in parallel
  - AI– to AI GND ..........................<10 GΩ in parallel
- Device off
  - AI+ to AI GND ..........................820 Ω
  - AI– to AI GND ..........................820 Ω

Input bias current ............................±100 pA
Crosstalk (at 100 kHz)
- Adjacent channels ......................−75 dB
- Non-adjacent channels...............−95 dB

Small signal bandwidth (−3 dB) .........1.7 MHz
Input FIFO size ......................... 4,095 samples
Scan list memory ....................... 4,095 entries

Data transfers
- PCI/PCIe/PXI/PXIe devices .........DMA (scatter-gather), interrupts, programmed I/O
- USB devices ............................ USB Signal Stream, programmed I/O

Overvoltage protection (AI <0..79>, AI SENSE, AI SENSE 2)
- Device on ................................ ±25 V for up to four AI pins
- Device off ................................ ±15 V for up to four AI pins

Input current during overvoltage condition ................................±20 mA max/AI pin
### Settling Time for Multichannel Measurements

**NI 6250/6251/6254/6259**

<table>
<thead>
<tr>
<th>Range</th>
<th>±60 ppm of Step (±4 LSB for Full Scale Step)</th>
<th>±15 ppm of Step (±1 LSB for Full Scale Step)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±10 V, ±5 V, ±2 V, ±1 V</td>
<td>1 µs</td>
<td>1.5 µs</td>
</tr>
<tr>
<td>±0.5 V</td>
<td>1.5 µs</td>
<td>2 µs</td>
</tr>
<tr>
<td>±0.2 V, ±0.1 V</td>
<td>2 µs</td>
<td>8 µs</td>
</tr>
</tbody>
</table>

**NI 6255**

<table>
<thead>
<tr>
<th>Range</th>
<th>±60 ppm of Step (±4 LSB for Full Scale Step)</th>
<th>±15 ppm of Step (±1 LSB for Full Scale Step)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±10 V, ±5 V, ±2 V, ±1 V</td>
<td>1.3 µs</td>
<td>1.6 µs</td>
</tr>
<tr>
<td>±0.5 V</td>
<td>1.8 µs</td>
<td>2.5 µs</td>
</tr>
<tr>
<td>±0.2 V, ±0.1 V</td>
<td>3 µs</td>
<td>8 µs</td>
</tr>
</tbody>
</table>

### Typical Performance Graphs

- **NI 6250/6251/6254/6259**
- **NI 6255**
- **AI <0..79> Small Signal Bandwidth**
- **AI <0..79> CMRR**
### Analog Triggers

Number of triggers: 1

**Source**

- NI 6250/6251: AI <0..15>, APFI 0
- NI 6254/6259: AI <0..31>, APFI <0..1>
- NI 6255: AI <0..79>, APFI 0

**Functions**

- Start Trigger, Reference Trigger, Pause Trigger, Sample Clock, Convert Clock, Sample Clock Timebase

**Source level**

- AI <0..79>: ±full scale
- APFI <0..1>: ±10 V

**Resolution**

10 bits, 1 in 1,024

**Modes**

- Analog edge triggering, analog edge triggering with hysteresis, analog window triggering

**Bandwidth (–3 dB)**

- AI <0..79>: 3.4 MHz
- APFI <0..1>: 3.9 MHz

**Accuracy**

±1%

**APFI <0..1> characteristics**

- Input impedance: 10 kΩ
- Coupling: DC
- Protection
  - Power on: ±30 V
  - Power off: ±15 V

---

### Analog Output

Number of channels

- NI 6250/6254: 0
- NI 6251/6255: 2
- NI 6259: 4

**DAC resolution**

16 bits

**DNL**

±1 LSB

**Monotonicity**

16 bit guaranteed

**Accuracy**

Refer to the AO Absolute Accuracy Table

**Maximum update rate**

- 1 channel: 2.86 MS/s
- 2 channels: 2.00 MS/s
- 3 channels: 1.54 MS/s
- 4 channels: 1.25 MS/s

**Timing accuracy**

50 ppm of sample rate

**Timing resolution**

50 ns

**Output range**

±10 V, ±5 V, ±external reference on APFI <0..1>

- Output coupling: DC
- Output impedance: 0.2 Ω
- Output current drive: ±5 mA
- Overdrive protection: ±25 V
- Overdrive current: 20 mA
- Power-on state: ±5 mV
- Power-on glitch: 1.5 V peak for 1.5 s

**Output FIFO size**

8,191 samples shared among channels used

**Data transfers**

- PCI/PCIE/PXI/PXIe devices: DMA (scatter-gather), interrupts, programmed I/O
- USB devices: USB Signal Stream, programmed I/O

---

1 For all USB-6251/6259 devices, when powered on, the analog output signal is not defined until after USB configuration is complete.
AO waveform modes:
- Non-periodic waveform
- Periodic waveform regeneration mode from onboard FIFO
- Periodic waveform regeneration from host buffer including dynamic update

Settling time, full scale step
15 ppm (1 LSB) .................................. 2 μs

Slew rate .................................. 20 V/μs

Glitch energy at midscale transition, ±10 V range
- Magnitude .................................. 10 mV
- Duration .................................. 1 μs

External Reference
APFI <0...1> characteristics
- Input impedance .................. 10 kΩ
- Coupling .......................... DC
- Protection
  - Power on .................. ±30 V
  - Power off .................. ±15 V

Range .................................. ±11 V

Slew rate .................................. 20 V/μs

Calibration (AI and AO)
Recommended warm-up time .......... 15 minutes
Calibration interval .................. 2 years
### AI Absolute Accuracy Table

<table>
<thead>
<tr>
<th>Nominal Range</th>
<th>Residual Gain Error (ppm of Reading)</th>
<th>Gain Tempco (ppm/°C)</th>
<th>Reference Tempco</th>
<th>Residual Offset Error (ppm of Range)</th>
<th>Offset Tempco (ppm of Range/°C)</th>
<th>INL Error</th>
<th>Random Noise, σ (μVrms)</th>
<th>Absolute Accuracy at Full Scale1 (μV)</th>
<th>Sensitivity2 (μV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Full Scale</td>
<td>Negative Full Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>-10</td>
<td>60</td>
<td>13</td>
<td>1</td>
<td>20</td>
<td>21</td>
<td>60</td>
<td>280</td>
<td>1,920</td>
</tr>
<tr>
<td>5</td>
<td>-5</td>
<td>70</td>
<td>13</td>
<td>1</td>
<td>20</td>
<td>21</td>
<td>60</td>
<td>140</td>
<td>1,010</td>
</tr>
<tr>
<td>2</td>
<td>-2</td>
<td>70</td>
<td>13</td>
<td>1</td>
<td>20</td>
<td>24</td>
<td>60</td>
<td>57</td>
<td>410</td>
</tr>
<tr>
<td>1</td>
<td>-1</td>
<td>80</td>
<td>13</td>
<td>1</td>
<td>20</td>
<td>27</td>
<td>60</td>
<td>32</td>
<td>220</td>
</tr>
<tr>
<td>0.5</td>
<td>-0.5</td>
<td>90</td>
<td>13</td>
<td>1</td>
<td>40</td>
<td>34</td>
<td>60</td>
<td>21</td>
<td>130</td>
</tr>
<tr>
<td>0.2</td>
<td>-0.2</td>
<td>130</td>
<td>13</td>
<td>1</td>
<td>80</td>
<td>55</td>
<td>60</td>
<td>16</td>
<td>74</td>
</tr>
<tr>
<td>0.1</td>
<td>-0.1</td>
<td>150</td>
<td>13</td>
<td>1</td>
<td>150</td>
<td>90</td>
<td>60</td>
<td>15</td>
<td>52</td>
</tr>
</tbody>
</table>

Accuracies listed are valid for up to two years from the device external calibration.

Absolute Accuracy = Reading · (Gain Error) + Range · (Offset Error) + Noise Uncertainty

Gain Error = Residual AI Gain Error + Gain Tempco · (Temp Change From Last Internal Cal) + Reference Tempco · (Temp Change From Last External Cal)

Offset Error = Residual AI Offset Error + Offset Tempco · (Temp Change From Last Internal Cal) + INL Error

Noise Uncertainty = \( \frac{\text{Random Noise} \cdot 3}{\sqrt{100}} \) For a coverage factor of 3 \( \sigma \) and averaging 100 points.

1 Absolute accuracy at full scale on the analog input channels is determined using the following assumptions:

- \( \text{Temp Change From Last External Cal} = 10 ^\circ C \)
- \( \text{Temp Change From Last Internal Cal} = 1 ^\circ C \)
- number_of_readings = 100
- Coverage Factor = 3 \( \sigma \)

For example, on the 10 V range, the absolute accuracy at full scale is as follows:

- Gain Error = 60 ppm + 13 ppm · 1 + 1 ppm · 10 = 83 ppm
- Offset Error = 20 ppm + 21 ppm · 1 + 60 ppm = 101 ppm
- Noise Uncertainty = \( \frac{275 \mu V \cdot 3}{\sqrt{100}} \) = 83 \( \mu V \)

Absolute Accuracy = 10 V · (Gain Error) + 10 V · (Offset Error) + Noise Uncertainty = 1920 \( \mu V \)

2 Sensitivity is the smallest voltage change that can be detected. It is a function of noise.
# AO Absolute Accuracy Table

<table>
<thead>
<tr>
<th>Nominal Range</th>
<th>Residual Gain Error (ppm of Reading)</th>
<th>Gain Tempco (ppm/°C)</th>
<th>Reference Tempco</th>
<th>Residual Offset Error (ppm of Range)</th>
<th>Offset Tempco (ppm of Range/°C)</th>
<th>INL Error (ppm of Range)</th>
<th>Absolute Accuracy at Full Scale[^1] (μV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>75</td>
<td>17</td>
<td>1</td>
<td>40</td>
<td>2</td>
<td>64</td>
<td>2,080</td>
</tr>
<tr>
<td>-10</td>
<td>85</td>
<td>8</td>
<td>1</td>
<td>40</td>
<td>2</td>
<td>64</td>
<td>1,045</td>
</tr>
<tr>
<td>5</td>
<td>85</td>
<td>8</td>
<td>1</td>
<td>40</td>
<td>2</td>
<td>64</td>
<td>1,045</td>
</tr>
<tr>
<td>-5</td>
<td>85</td>
<td>8</td>
<td>1</td>
<td>40</td>
<td>2</td>
<td>64</td>
<td>1,045</td>
</tr>
</tbody>
</table>

[^1]: Absolute Accuracy at full scale numbers is valid immediately following internal calibration and assumes the device is operating within 10 °C of the last external calibration. Accuracies listed are valid for up to two years from the device external calibration.

Absolute Accuracy = Output Value · (Gain Error) + Range · (Offset Error)

- Gain Error = Residual Gain Error + Gain Tempco · (Temp Change From Last Internal Cal) + Reference Tempco · (Temp Change From Last External Cal)
- Offset Error = Residual Offset Error + AO Offset Tempco · (Temp Change From Last Internal Cal) + INL Error
Digital I/O/PFI

Static Characteristics

Number of channels
- NI 6250/6251/6255: 24 total, 8 (P0.<0..7>), 16 (PFI <0..7>/P1, PFI <8..15>/P2)
- NI 6254/6259: 48 total, 32 (P0.<0..31>), 16 (PFI <0..7>/P1, PFI <8..15>/P2)

Ground reference: D GND

Direction control: Each terminal individually programmable as input or output

Pull-down resistor: 50 kΩ typ, 20 kΩ min

Input voltage protection: ±20 V on up to two pins

Waveform Characteristics (Port 0 Only)

Terminals used
- NI 6250/6251/6255: Port 0 (P0.<0..7>)
- NI 6254/6259: Port 0 (P0.<0..31>)

Port/sample size
- NI 6250/6251/6255: Up to 8 bits
- NI 6254/6259: Up to 32 bits

Waveform generation (DO) FIFO: 2,047 samples
Waveform acquisition (DI) FIFO: 2,047 samples

DI Sample Clock frequency
- PCI/PCIe/PXI/PXIe devices: 0 to 10 MHz
- USB devices: 0 to 1 MHz

DO Sample Clock frequency
- PCI/PCIe/PXI/PXIe devices:
  - Regenerate from FIFO: 0 to 10 MHz
  - Streaming from memory: 0 to 10 MHz
- USB devices:
  - Regenerate from FIFO: 0 to 10 MHz
  - Streaming from memory: 0 to 1 MHz

PFI/Port 1/Port 2 Functionality

Functionality: Static digital input, static digital output, timing input, timing output

Timing output sources: Many AI, AO, counter, DI, DO timing signals

Debounce filter settings: 125 ns, 6.425 μs, 2.54 ms, disable; high and low transitions; selectable per input

Data transfers
- PCI/PCIe/PXI/PXIe devices: DMA (scatter-gather), interrupts, programmed I/O
- USB devices: USB Signal Stream, programmed I/O
- DO or DI Sample Clock source:
  - Any PFI, RTSI, AI Sample or Convert Clock, AO Sample Clock, Ctr n Internal Output, and many other signals

1 Stresses beyond those listed under Input voltage protection may cause permanent damage to the device.
2 Performance can be dependent on bus latency and volume of bus activity.
3 The digital subsystem does not have its own dedicated internal timing engine. Therefore, a sample clock must be provided from another subsystem on the device or an external source.
### Recommended Operation Conditions

**PCI/PCIe/PXI/PXIe devices**

<table>
<thead>
<tr>
<th>Level</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input high voltage (V_{IH})</td>
<td>2.2 V</td>
<td>5.25 V</td>
</tr>
<tr>
<td>Input low voltage (V_{IL})</td>
<td>0 V</td>
<td>0.8 V</td>
</tr>
<tr>
<td>Output high current (I_{OH})</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>P0.&lt;0..31&gt;</td>
<td>—</td>
<td>−24 mA</td>
</tr>
<tr>
<td>PFI &lt;0..15&gt;/P1/P2</td>
<td>—</td>
<td>−16 mA</td>
</tr>
<tr>
<td>Output low current (I_{OL})</td>
<td>—</td>
<td>24 mA</td>
</tr>
<tr>
<td>P0.&lt;0..31&gt;</td>
<td>—</td>
<td>24 mA</td>
</tr>
<tr>
<td>PFI &lt;0..15&gt;/P1/P2</td>
<td>—</td>
<td>16 mA</td>
</tr>
</tbody>
</table>

**USB devices**

<table>
<thead>
<tr>
<th>Level</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input high voltage (V_{IH})</td>
<td>2.2 V</td>
<td>5.25 V</td>
</tr>
<tr>
<td>Input low voltage (V_{IL})</td>
<td>0 V</td>
<td>0.8 V</td>
</tr>
<tr>
<td>Output high current (I_{OH})</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>P0.&lt;0..15&gt;</td>
<td>—</td>
<td>−24 mA</td>
</tr>
<tr>
<td>P0.&lt;16..31&gt;</td>
<td>—</td>
<td>−16 mA</td>
</tr>
<tr>
<td>PFI &lt;0..15&gt;/P1/P2</td>
<td>—</td>
<td>−16 mA</td>
</tr>
<tr>
<td>Output low current (I_{OL})</td>
<td>—</td>
<td>24 mA</td>
</tr>
<tr>
<td>P0.&lt;0..15&gt;</td>
<td>—</td>
<td>24 mA</td>
</tr>
<tr>
<td>P0.&lt;16..31&gt;</td>
<td>—</td>
<td>16 mA</td>
</tr>
<tr>
<td>PFI &lt;0..15&gt;/P1/P2</td>
<td>—</td>
<td>16 mA</td>
</tr>
</tbody>
</table>

### Electrical Characteristics

<table>
<thead>
<tr>
<th>Level</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive-going threshold (VT+)</td>
<td>—</td>
<td>2.2 V</td>
</tr>
<tr>
<td>Negative-going threshold (VT−)</td>
<td>0.8 V</td>
<td>—</td>
</tr>
<tr>
<td>Delta VT hysteresis (VT+ – VT−)</td>
<td>0.2 V</td>
<td>—</td>
</tr>
<tr>
<td>I_{IN} input low current (V_{IN} = 0 V)</td>
<td>—</td>
<td>−10 µA</td>
</tr>
<tr>
<td>I_{IH} input high current (V_{IN} = 5 V)</td>
<td>—</td>
<td>250 µA</td>
</tr>
</tbody>
</table>
Digital I/O Characteristics

PCI/PCIe/PXIe DIO (P0.<0..31>): $I_{oh}$ versus $V_{oh}$
USB DIO (P0.<0..15>): $I_{oh}$ versus $V_{oh}$

$$V_{oh} \text{ (V)}$$
$$I_{oh} \text{ (mA)}$$

25 °C; Vdd = 5.0 V
55 °C; Vdd = 4.5 V
0 °C; Vdd = 5.5 V

PCI/PCIe/PXIe DIO (P0.<0..15>): $I_{oh}$ versus $V_{oh}$
USB DIO (P0.<0..15>): $I_{oh}$ versus $V_{oh}$

$$V_{oh} \text{ (V)}$$
$$I_{oh} \text{ (mA)}$$

0 °C; Vdd = 5.5 V
55 °C; Vdd = 5.0 V

PCI/PCIe/PXIe DIO (PFI <0..15>/P1/P2): $I_{ol}$ versus $V_{ol}$
USB DIO (PFI <0...15>/P0.<16..31>/P1/P2): $I_{ol}$ versus $V_{ol}$

$$V_{ol} \text{ (V)}$$
$$I_{ol} \text{ (mA)}$$

25 °C; Vdd = 5.0 V
55 °C; Vdd = 4.5 V
0 °C; Vdd = 5.5 V
**General-Purpose Counter/Timers**

- Number of counter/timers: 2
- Resolution: 32 bits
- Counter measurements: Edge counting, pulse, semi-period, period, two-edge separation
- Position measurements: X1, X2, X4 quadrature encoding with Channel Z reloading; two-pulse encoding
- Output applications: Pulse, pulse train with dynamic updates, frequency division, equivalent time sampling
- Internal base clocks: 80 MHz, 20 MHz, 0.1 MHz
- External base clock frequency: 0 MHz to 20 MHz
- Base clock accuracy: 50 ppm
- Inputs: Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down
- Routing options for inputs: Any PFI, RTSI, PXI_TRIG, PXI_STAR, analog trigger, many internal signals
- FIFO: 2 samples
- Data transfers:
  - PCI/PCIe/PXI/PXIe devices: Dedicated scatter-gather DMA controller for each counter/timer; interrupts, programmed I/O
  - USB devices: USB Signal Stream, programmed I/O

**Phase-Locked Loop (PLL)**

- Number of PLLs: 1
- Reference signal: PXI_STAR, PXI_CLK10, RTSI <0..7>
- Output of PLL: 80 MHz Timebase; other signals derived from 80 MHz Timebase including 20 MHz and 100 kHz Timebases

**External Digital Triggers**

- Source: Any PFI, RTSI, PXI_TRIG, PXI_STAR
- Polarity: Software-selectable for most signals
- Analog input function: Start Trigger, Reference Trigger, Pause Trigger, Sample Clock, Convert Clock, Sample Clock Timebase
- Analog output function: Start Trigger, Pause Trigger, Sample Clock, Sample Clock Timebase
- Counter/timer functions: Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down
- Digital waveform generation:
  - (DO) function: Sample Clock
- Digital waveform acquisition:
  - (DI) function: Sample Clock

**Frequency Generator**

- Number of channels: 1
- Base clocks: 10 MHz, 100 kHz
- Divisors: 1 to 16
- Base clock accuracy: 50 ppm
- Output can be available on any PFI or RTSI terminal.
**Device-To-Device Trigger Bus**

PCI/PCIe devices .................................. RTSI <0..7>1
PXI/PXIe devices .................................. PXI_TRIG <0..7>, PXI_STAR
USB devices ........................................ None

Output selections ............................... 10 MHz Clock; frequency generator output; many internal signals

Debounce filter settings ....................... 125 ns, 6.425 μs, 2.54 ms, disable; high and low transitions; selectable per input

**Bus Interface**

PCI/PXI/PXIe devices ............................ 3.3 V or 5 V signal environment

PCIe devices
- Form factor ................................. x1 PCI Express, specification v1.0a compliant
- Slot compatibility ............................ x1, x4, x8, and x16 PCI Express slots2

USB devices ....................................... USB 2.0 Hi-Speed or full-speed3,4

DMA channels
(PCI/PCIe/PXI/PXIe devices) ........... 6, analog input, analog output, digital input, digital output, counter/timer 0, counter/timer 1

USB Signal Stream
(USB devices) ................................... 4, can be used for analog input, analog output, digital input, digital output, counter/timer 0, counter/timer 1

---

**Power Requirements**

Current draw from bus during no-load condition5

PCI/PXI devices
- +5 V ........................................... 0.03 A
- +3.3 V ........................................ 0.725 A
- +12 V ......................................... 0.35 A

PCIe devices
- +3.3 V ........................................ 0.925 A
- +12 V ......................................... 0.35 A

---

All PXI-625x devices support one of the following features:
- May be installed in PXI Express hybrid slots
- Or, may be used to control SCXI in PXI/SCXI combo chassis

---

Table 1. PXI and PXI Express Chassis

<table>
<thead>
<tr>
<th>Device</th>
<th>Part Number</th>
<th>SCXI Control in PXI/SCXI Combo Chassis</th>
<th>PXI Express Hybrid Slot Compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td>PXI-6250</td>
<td>191325D-04</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>PXI-6251</td>
<td>191325D-03</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>191325D-13</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>PXI-6254</td>
<td>191325D-02</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>PXI-6255</td>
<td>193618A-01</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>PXI-6259</td>
<td>191325D-01</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>191325D-11</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Earlier</td>
<td>191325C-0x</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>versions</td>
<td>191325B-0x</td>
<td></td>
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<td>PXI-625x</td>
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All NI PXIe-625x devices may be installed in PXI Express slots or PXI Express hybrid slots.

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1 In other sections of this document, RTSI refers to RTSI <0..7> for PCI/PCIe devices or PXI_TRIG <0..7> for PXI/PXIe devices.
2 Some motherboards reserve the x16 slot for graphics use. For PCI Express guidelines, refer to ni.com/pciexpress.
3 If you are using a USB M Series device in full-speed mode, device performance will be lower and you will not be able to achieve maximum sampling/update rates.
4 Operating on a full-speed bus may result in lower high-speed full-speed performance.
5 Does not include P0/PFI/P1/P2 and +5 V terminals.
PXIe devices
+3.3 V .................................. 0.45 A
+12 V .................................. 0.5 A

Current draw from bus during AI and AO overvoltage condition

PCI/PXI devices
+5 V .................................. 0.03 A
+3.3 V .................................. 1.2 A
+12 V .................................. 0.38 A

PCle devices
+3.3 V .................................. 1.4 A
+12 V .................................. 0.38 A

PXIe devices
+3.3 V .................................. 0.48 A
+12 V .................................. 0.71 A

Caution USB-625x devices must be powered with NI offered AC adapter or a National Electric Code (NEC) Class 2 DC source that meets the power requirements for the device and has appropriate safety certification marks for country of use.

USB power supply requirements.....11 to 30 VDC, 20 W

Power Limits

Caution Exceeding the power limits may cause unpredictable behavior by the device and/or PC/chassis.

PCI devices
+5 V terminal (connector 0)........... 1 A max
+5 V terminal (connector 1)........... 1 A max

PCle devices
Without disk drive power connector installed
+5 V terminals combined ................. 0.35 A max
P0/PFI/P1/P2 and +5 V terminals combined ................. 0.39 A max

With disk drive power connector installed
+5 V terminal (connector 0)......... 1 A max
+5 V terminal (connector 1)......... 1 A max
P0/PFI/P1/P2 combined ................. 0.39 A max

PXI/PXIe devices
+5 V terminal (connector 0)......... 1 A max
+5 V terminal (connector 1)......... 1 A max

P0/PFI/P1/P2 and +5 V terminals combined ................. 2 A max

USB devices
+5 V terminal .......................... 1 A max
P0/PFI/P1/P2 and +5 V terminals combined ................. 2 A max
Power supply fuse ........................ 2 A, 250 V

Physical Requirements

Printed circuit board dimensions
NI PCI-6250/6251/6254/6255/6259........................................ 9.7 × 15.5 cm (3.8 × 6.1 in.)
NI PCle-6251/6259 ........................................ 9.9 × 16.8 cm (3.9 × 6.6 in.) (half-length)
NI PXI/PXIe-625x........................................ Standard 3U PXI

Enclosure dimensions (includes connectors)
NI USB-6251/6259 ........................................ 26.67 × 17.09 × 4.45 cm (10.5 × 6.73 × 1.75 in.)
NI USB-6251/6259 Mass Termination ................. 18.8 × 17.09 × 4.45 cm (7.4 × 6.73 × 1.75 in.)

Weight
NI PCI-6250 ........................................ 142 g (5 oz)
NI PCI-6251 ........................................ 149 g (5.2 oz)
NI PCI-6254 ........................................ 152 g (5.3 oz)
NI PCI-6255 ........................................ 164 g (5.8 oz)
NI PCI-6259 ........................................ 162 g (5.6 oz)
NI PCle-6251 ........................................ 161 g (5.7 oz)
NI PCle-6259 ........................................ 175 g (6.1 oz)
NI PXI-6250 ........................................ 212 g (7.5 oz)
NI PXI-6251/6254 ........................................ 222 g (7.8 oz)
NI PXI-6255 ........................................ 236 g (8.3 oz)
NI PXI-6259 ........................................ 233 g (8.2 oz)
NI PXIe-6251 ........................................ 215 g (7.5 oz)
NI PXIe-6259 ........................................ 226 g (7.9 oz)
NI USB-6251 ........................................ 1.2 kg (2 lb 10 oz)
NI USB-6259 ........................................ 1.24 kg (2 lb 11 oz)
NI USB-6251/6259 Mass Termination ................. 907 g (2 lb)
NI USB-6251 OEM ................................. 140 g (4.9 oz)
NI USB-6259 OEM ................................. 172 g (6.1 oz)

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1 Does not include P0/PFI/P1/P2 and +5 V terminals.
2 Has a self-resetting fuse that opens when current exceeds this specification.
I/O connector
NI PCI/PCIe/PXIe-6250/6251 ............................................ 1 68-pin VHDCI
NI PCI/PCIe/PXIe-6254/6255/6259 ................................... 2 68-pin VHDCI
NI USB-6251 ........................................ 64 screw terminals
NI USB-6259 ........................................ 128 screw terminals
NI USB-6251 Mass Termination ............................. 1 68-pin SCSI
NI USB-6259 Mass Termination ............................. 2 68-pin SCSI
Disk drive power connector
(PCIe devices) ........................................ Standard ATX peripheral connector
(not serial ATA)

Maximum Working Voltage
NI 6250/6251/6254/6255/6259 Channel-to-earth ............... 11 V,
Measurement Category I

Caution Do not use for measurements within Categories II, III, or IV.

Environmental
Operating temperature
PCI/PXI/PXIe devices ............... 0 to 55 °C
PCIe devices ............... 0 to 50 °C
USB devices ............... 0 to 45 °C
Storage temperature ............... –20 to 70 °C
Humidity ............... 10 to 90% RH, noncondensing

Maximum altitude ............... 2,000 m
Pollution Degree
(indoor use only) ............... 2

Shock and Vibration (PXI/PXIe Devices Only)
Operational shock ........... 30 g peak, half-sine, 11 ms pulse
( Tested in accordance with IEC-60068-2-27.
Test profile developed in accordance with MIL-PRF-28800F.)
Random vibration
Operating .................. 5 to 500 Hz, 0.3 gmax
Nonoperating .................. 5 to 500 Hz, 2.4 gmax
( Tested in accordance with IEC-60068-2-64.
Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Safety
This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:
• IEC 61010-1, EN 61010-1
• UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility
This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:
• EN 61326 EMC requirements; Minimum Immunity
• EN 55011 Emissions; Group 1, Class A
• CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

Note For EMC compliance, operate this device according to product documentation.

CE Compliance
This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:
• 73/23/EEC; Low-Voltage Directive (safety)
• 89/336/EEC; Electromagnetic Compatibility Directive (EMC)

Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

1 Maximum working voltage refers to the signal voltage plus the common-mode voltage.
Waste Electrical and Electronic Equipment (WEEE)

**EU Customers**  At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit [ni.com/environment/weee.htm](http://ni.com/environment/weee.htm).
Figure 1. NI PCI/PXI-6250 Pinout
Figure 2. NI PCI/PCIE/PCIe/PXIE-6251 Pinout
Figure 3. NI USB-6251 Pinout
Figure 4. NI USB-6251 Mass Termination Pinout
Figure 5. NI PCI/PXI-6254 Pinout
Figure 6. NI PCI/PXI-6255 Pinout

NC = No Connect
Figure 7. NI PCIe/PCIe/PXIe-6259 Pinout
Figure 8. NI USB-6259 Pinout
Figure 9. NI USB-6259 Mass Termination Pinout