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# PXIe-6548

# Specifications

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**dataTec AG**  
E-Mail: [info@datatec.eu](mailto:info@datatec.eu)  
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# PXIe-6548 Specifications

## PXIe-6548 Specifications

This document provides the specifications for the PXIe-6548.



**Note** All values were obtained using a 1 m cable (SHC68-C68-D4 recommended). Performance specifications are not guaranteed when using longer cables.

## Definitions and Conditions

Specifications are valid for the range 0 °C to 55 °C unless otherwise noted.

*Maximum* and *minimum* specifications are warranted not to exceed these values within certain operating conditions and include the effects of temperature and uncertainty unless otherwise noted.

*Typical* specifications are unwarranted values that are representative of a majority ( $3\sigma$ ) of units within certain operating conditions and include the effects of temperature and uncertainty unless otherwise noted.

*Characteristic* specifications are unwarranted values that are representative of an average unit operating at room temperature.

*Nominal* specifications are unwarranted values that are relevant to the use of the product and convey the expected performance of the product.

All specifications are Typical unless otherwise noted.

## PXIe-6548 Pinout

The PXIe-6548 front panel exposes the following connections:

- Three SMA connectors named CLK IN, PFI 0, and CLK OUT

- One 68-pin VHDCI connector named DIGITAL DATA & CONTROL, or DDC

Figure 1. PXIe-6548 Front Panel with VHDCI Connector Pinout

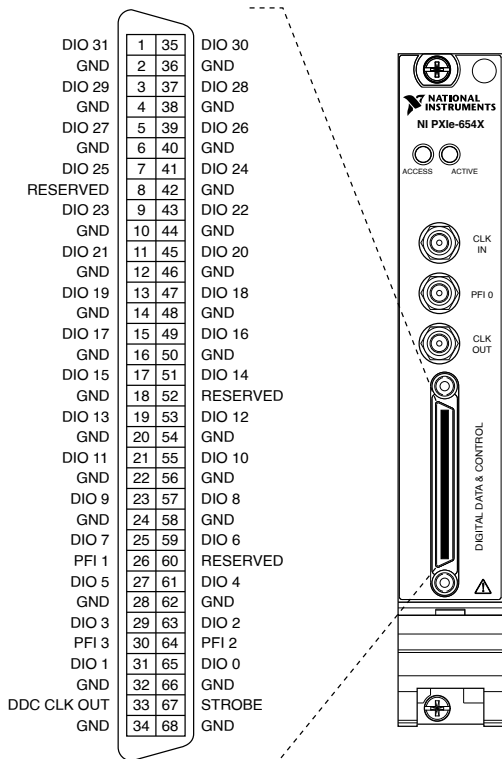


Table 2. PXIe-6548 DDC Connector Pins

Pins	Signal Name	Signal Type	Signal Description
33	DDC_CLK OUT	Control	Output terminal for the exported Sample Clock.
67	Strobe	Control	Terminal for the external Sample clock source, which can be used for dynamic acquisition.
1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65	DIO <0..31>	Data	Bidirectional digital I/O data channels 0 through 31.
26, 30, 64	Programmable Function Interface (PFI) <1..3>	Control	Input terminals to the device for external triggers, or output terminals from the device for events.
2, 4, 6, 10, 12, 14, 16, 18, 20,	GND	Ground	Ground reference for signals.

Pins	Signal Name	Signal Type	Signal Description
22, 24, 28, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 54, 56, 58, 62, 66			
8, 52, 60	RESERVED	N/A	Terminals reserved for future use. Do not connect to these pins.

Table 3. PXIe-6548 SMA Connectors

Connector	Signal Name	Signal Type	Description
CLK IN	Reference Clock Input	Control	Terminal for the external Reference clock used for the PLL or for the external Sample clock used for dynamic generation and/or acquisition.
PFI 0	PFI 0	Control	Single-ended input terminals to the device for static I/O, for external triggers, or for output terminals from the device for events. Refer to the device specifications for signal voltage levels.

Connector	Signal Name	Signal Type	Description
CLK OUT	Reference Clock Output	Control	Terminal for the exported PLL Reference clock or the exported Sample clock.

## Channels

Data	
<b>Number of channels</b>	
SDR selected (data clocked using Sample clock rising or falling edge)	32
DDR selected (data clock using both Sample clock edges) <sup>1</sup>	16 per direction
Extended data mode selected <sup>2</sup>	24
Direction control	Per channel Per cycle
Time to tristate ( $t_{PZ}$ ), 2 k $\Omega$ and 15 pF load	6.2 ns, nominal
<b>Programmable Function Interface (PFI)</b>	
Number of channels	4

1. Generation and acquisition sessions may be independently configured for DDR operation on either the lower data channels (<0..15>) or the upper data channels (<16..31>).
2. Used for hardware comparison and cycle-to-cycle tristate operations.

Direction control	Per channel
<b>Clock terminals</b>	
Input	2
Output	2

**Related reference:**

- [Triggers](#)
- [Events](#)
- [CLK IN](#)
- [CLK OUT](#)

**Generation Channels**

Channels	Data DDC CLK OUT PFI <0..3>
Generation signal type	Single-ended
<b>Generation voltage features, all Data, PFI, and clock channels</b>	
Number of programmable generation voltage levels <sup>3</sup>	1 voltage high level ( $V_{OH}$ ) Generation voltage low level ( $V_{OL}$ ) is always set to 0 V

3.  $V_{OH}$  is functionally related to  $V_{IH}$  and  $V_{IL}$  and must be set to twice the Acquisition Threshold

Range	1.2 V to 3.3 V	
Resolution	100 mV	
DC generation voltage accuracy <sup>4</sup>	±35 mV, typical ±200 mV, maximum	

Table 4. Generation Voltage Levels

Logic Family <sup>5</sup>	Voltage Low Level ( $V_{OL}$ )		Voltage High Level ( $V_{OH}$ )		Accuracy for Nominal Values into 1 M $\Omega$ Load
	Nominal	Max	Min	Nominal	
1.2 V ( $V_{OH} = 1.2$ V)	0.0 V	0.2 V	1 V	1.2 V	±35 mV, typical
1.5 V ( $V_{OH} = 1.5$ V)			1.3 V	1.5 V	
1.8 V ( $V_{OH} = 1.8$ V)			1.6 V	1.8 V	
2.5 V ( $V_{OH} = 2.5$ V)			2.3 V	2.5 V	
3.3 V ( $V_{OH} = 3.3$ V)			3.1 V	3.3 V	



**Note** Generation and acquisition sessions share a common voltage resource. Simultaneous operations must be set to the same logic family.

Output impedance	50 $\Omega$ , nominal
<b>Maximum allowed DC drive strength per channel, by logic family</b>	

4. Into 1 M $\Omega$ ; does not include system crosstalk.

5. For all data, PFI, and clock channels. Does not include system crosstalk.

1.2 V	±12 mA, nominal	
1.5 V	±15 mA, nominal	
1.8 V	±18 mA, nominal	
2.5 V	±25 mA, nominal	
3.3 V	±33 mA, nominal	
Data channel driver enable/disable control		Software-selectable: per channel
Channel power-on state		Drivers disabled, 50 kΩ nominal input impedance
<b>Output protection</b>		
Range		0 V to 5 V
Duration		Indefinite

**Related reference:**

- [CLK OUT](#)
- [DDC CLK OUT](#)

**Acquisition Channels**

Channels	Data
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	STROBE PFI <0..3>
Acquisition signal type	Single-ended
<b>Acquisition threshold features, all Data, PFI, and clock channels</b>	
Number of programmable acquisition thresholds <sup>6</sup>	1 ( $V_{IH} = V_{IL}$ )
Range	0.6 V to 1.65 V
Resolution	50 mV
Accuracy <sup>7</sup>	±150 mV, typical ±30%, maximum

Logic Family <sup>8</sup>	Voltage Thresholds Low ( $V_{IL}$ )		Voltage Thresholds High ( $V_{IH}$ )	
	Minimum	Typical	Typical	Maximum
1.2 V ( $V_{IH}, V_{IL} = 0.60$ V)	420 mV	450 mV	750 mV	780 mV
1.5 V ( $V_{IH}, V_{IL} = 0.75$ V)	525 mV	600 mV	900 mV	975 mV
1.8 V ( $V_{IH}, V_{IL} = 0.90$ V)	630 mV	750 mV	1.05 V	1.17 V
2.5 V ( $V_{IH}, V_{IL} = 1.25$ V)	875 mV	1.10 V	1.40 V	1.625 V

6. The PXIe-6548 requires that  $V_{IH}$  and  $V_{IL}$  be half the value of  $V_{OH}$ .

7. Does not include system crosstalk.

8. For all data, PFI, and clock channels. Does not include system crosstalk.

Logic Family	Voltage Thresholds Low ( $V_{IL}$ )		Voltage Thresholds High ( $V_{IH}$ )	
	Minimum	Typical	Typical	Maximum
3.3 V ( $V_{IH}, V_{IL} = 1.65$ V)	1.155 V	1.50 V	1.80 V	2.145 V



**Note** Generation and acquisition sessions share a common voltage resource. Simultaneous operations must be set to the same logic family.

Input impedance	High-impedance (50 k $\Omega$ ), nominal
Input protection <sup>9</sup>	-1 V to 5 V

## Timing

### Sample Clock

Sources	<ol style="list-style-type: none"> <li>1. On Board clock (internal 800 MHz VCO with 32-bit DDS)</li> <li>2. CLK IN (SMA jack connector)</li> <li>3. STROBE (Digital Data &amp; Control [DDC] connector; acquisition only)</li> </ol>
<b>Frequency range</b>	
On Board clock	100 Hz to 200 MHz
CLK IN	20 kHz to 200 MHz

9. Internal diode clamps may begin conduction outside the -0.5 V to 3.5 V range.

STROBE	100 Hz to 200 MHz
<b>On Board clock characteristics</b>	
Resolution <sup>10</sup>	0.2 Hz, maximum
Accuracy <sup>11</sup>	±150 ppm + 5 ppm per year
<b>On Board clock characteristics valid only when PLL reference source is set to None</b>	
Frequency accuracy	±150 ppm (including temperature effects), typical
Aging	±5 ppm first year, nominal
<b>Sample clock relative delay adjustment<sup>12</sup></b>	
<b>Range</b>	
Acquisition sessions	0.0 to 1.0 Sample clock periods
Generation sessions	0.0 ns to 5.0 ns
Resolution	0.5 ps
Exported Sample clock destinations	DDC CLK OUT (DDC connector) CLK OUT (SMA jack connector)
<b>Exported Sample clock delay</b>	

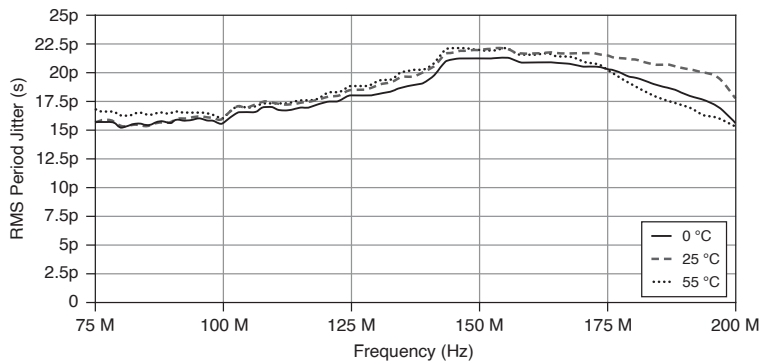
10. Varies with Sample clock frequency. You can query NI-HSDIO for the programmed frequency value.

11. Accuracy may be increased by using a higher-performance external Reference clock.

12. You can apply a delay or phase adjustment to the On Board clock to align multiple devices.

Range	0.0 to 1.0 Sample clock periods
Resolution ( $\delta_C$ ) <sup>13</sup>	117 ps to 143 ps, nominal
<b>Frequency</b>	
On Board clock	All supported frequencies
External clock	Frequencies $\geq 20$ MHz
<b>Exported Sample clock jitter, using On Board clock</b>	
Period	24 ps <sub>rms</sub> , characteristic
Cycle-to-cycle	43 ps <sub>rms</sub> , characteristic

Figure 2. Characteristic Period Jitter (RMS) vs. Frequency

**Related reference:**

- [CLK IN](#)
- [STROBE](#)

13. Resolution is nonlinearly dependent on clock frequency. You can query clock frequency using NI-HSDIO.

## Generation Timing

Channels	Data DDC CLK OUT PFI <0..3>
Data channel-to-channel skew <sup>14</sup>	±300 ps, maximum

Table 5. Maximum Data Rate by Logic Family<sup>15[15]</sup>

Logic Family	SDR	DDR <sup>16</sup>
3.3 V	200 Mbps	400 Mbps
2.5 V		400 Mbps
1.8 V		375 Mbps
1.5 V		350 Mbps
1.2 V		300 Mbps

Table 6. Maximum Data Rate by Voltage Level<sup>[15]</sup>

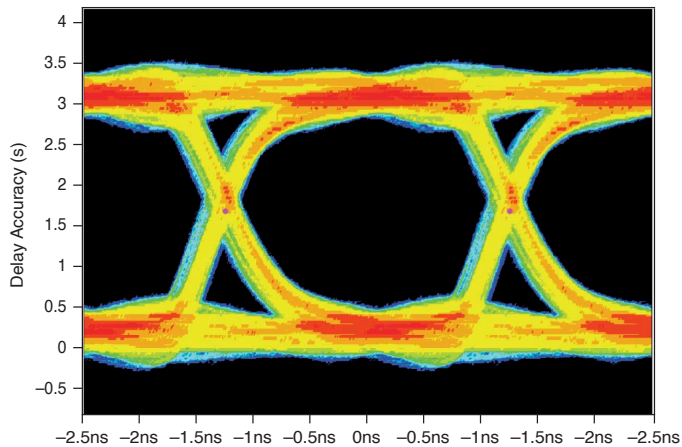
Voltage Levels	SDR	DDR <sup>17</sup>
2.5 V to 3.3 V	200 Mbps	400 Mbps
1.8 V to 2.4 V		375 Mbps
1.5 V to 1.7 V		350 Mbps
1.2 V to 1.4 V		300 Mbps

The following figure shows an eye diagram of a 400 Mbps pseudorandom bit sequence (PRBS) waveform in DDR mode at 3.3 V. This waveform was captured on DIO 0 at room

14. Maximum skew across all data channels, PFI channels, and voltage levels when using the same data position or data delay bank.
15. Includes maximum data channel-to-channel skew and typical crosstalk.
16. Generates two samples per clock cycle in DDR mode.
17. Generates two samples per clock cycle in DDR mode.

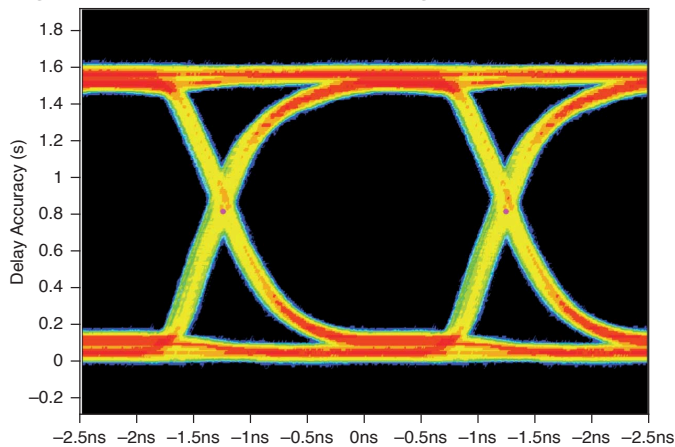
temperature into high impedance.

Figure 3. Characteristic Eye Diagram (High Impedance)



The following figure shows an eye diagram of a 400 Mbps PRBS waveform in DDR mode at 3.3 V. This waveform was captured on DIO 0 at room temperature into 50  $\Omega$  termination.

Figure 4. Characteristic Eye Diagram (50  $\Omega$  Termination, Characteristic)



Data position modes	<ul style="list-style-type: none"> <li>Sample clock rising edge</li> <li>Sample clock falling edge</li> <li>Delay from Sample clock rising edge</li> </ul>
<b>Data delay banks</b>	

Bank 0	DIO <0..3> DIO <16..19> DIO <28..31> PFI <0..3>
Bank 1	DIO <4..7> DIO <20..23>
Bank 2	DIO <8..15> DIO <24..27>

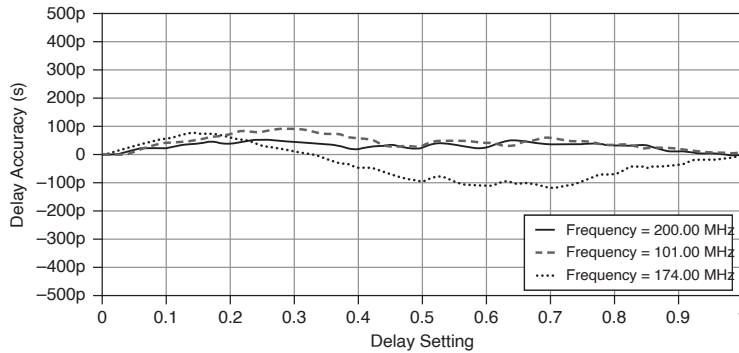


**Note** Multibank data delay was first available in NI-HSDIO 1.7.

<b>Generation data delay</b>	
Range ( $\delta_G$ )	0.0 to 1.0 Sample clock periods
Resolution ( $\delta_G$ ) <sup>18</sup>	117 ps to 143 ps, nominal
<b>Generation data delay frequency</b>	
On Board clock	All supported frequencies
External clock	Frequencies $\geq 20$ MHz

18. Resolution is nonlinearly dependent on clock frequency. You can query resolution using NI-HSDIO.

Figure 5. Characteristic Data Delay Accuracy



Exported Sample clock offset ( $t_{CO}$ ) <sup>19</sup>	0.0 ns or 1.65 ns (default), nominal
Time delay from On Board Sample clock to DDC connector ( $t_{SCDDC}$ )	8.1 ns, characteristic; exported Sample clock offset = 0 ns

## Generation Provided Setup and Hold Times

Compare the setup and hold times from the datasheet of your device under test (DUT) to the values in the table. The provided setup and hold times must be greater than the setup and hold times required for the DUT. If you require more setup time, configure your exported Sample clock mode to Inverted and/or delay your clock or data relative to the Sample clock. This table includes worst-case effects of channel-to-channel skew and intersymbol interference.

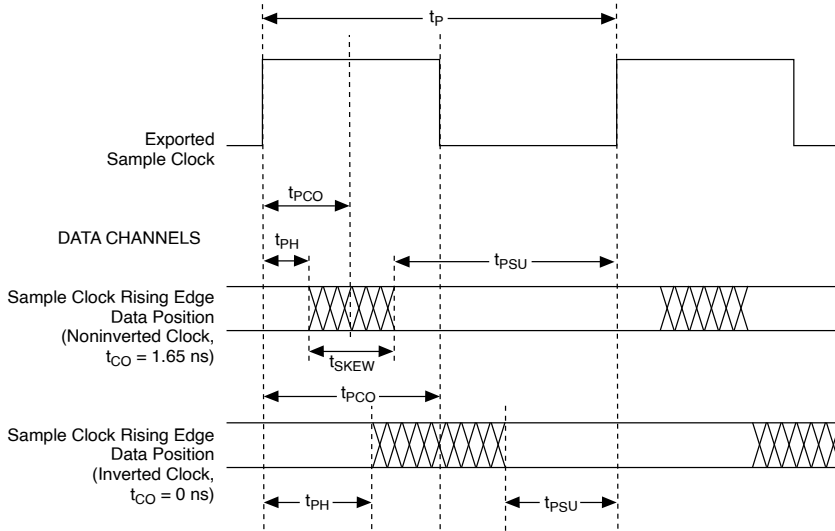
Exported Sample Clock Offset ( $t_{PCO}$ )	Minimum Provided Setup Time ( $t_{PSU}$ )	Minimum Provided Hold Time ( $t_{PH}$ )
1.65 ns	$t_p - 2.15$ ns	1.15 ns
0.0 ns	$t_p - 500$ ps	-500 ps



**Note** This table assumes the data position is set to Sample clock rising edge and the noninverted Sample Clock is exported to the DDC connector.

19. Software-selectable for DDC\_CLK\_OUT.

Figure 6. Generation Provided Setup and Hold Times Timing Diagram



$t_p = \frac{1}{f}$  = Sample Clock Period

$t_{PH}$  = Minimum Provided Hold Time

$t_{PSU}$  = Minimum Provided Set-Up Time

$t_{PCO}$  = Time from Rising Clock Edge to Data Transition (Provided Clock to Out Time)

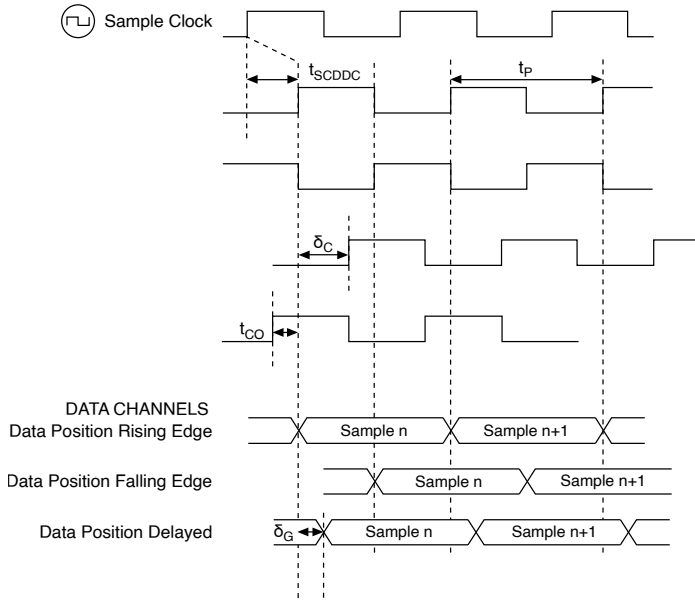
$t_{CO}$  = Exported Sample Clock Offset

$t_{SKEW}$  = Maximum Channel-to-Channel Skew and Clock Uncertainty



**Note** Provided setup and hold times account for maximum channel-to-channel skew and jitter.

Figure 7. Generation Timing Diagram



$t_{SCDDC}$  : Time Delay from Sample Clock (Internal) to DDC Connector  
 $0 \leq \delta_C \leq 1$  : Exported Sample Clock Delay (Fraction of  $t_p$ )  
 $0 \leq \delta_G \leq 1$  : Pattern Generation Data Delay (Fraction of  $t_p$ )  
 $t_p = \frac{1}{f}$  = Period of Sample Clock  
 $t_{CO}$  = Exported Sample Clock Offset; 1.65 ns, Software-Selectable

## Acquisition Timing

Channels	Data STROBE PFI <0..3>
Channel-to-channel skew <sup>20</sup>	±350 ps

20. Maximum skew across all data channels, PFI channels, and voltage levels when using the same data position or data delay bank.

Table 7. Maximum Data Rate Per Channel by Logic Family<sup>21[21]</sup>

Logic Family	SDR	DDR <sup>22[22]</sup>
3.3 V	200 Mbps	300 Mbps
2.5 V		300 Mbps
1.8 V		250 Mbps
1.5 V		225 Mbps
1.2 V		200 Mbps

Table 8. Maximum Data Rate Per Channel by Voltage Threshold<sup>[21]</sup>

Voltage Threshold	SDR	DDR <sup>[22]</sup>
1.25 V to 1.65 V	200 Mbps	300 Mbps
0.90 V to 1.20 V		250 Mbps
0.75 V to 0.85 V		225 Mbps
0.60 V to 0.70 V		200 Mbps

Data position modes	Sample clock rising edge Sample clock falling edge Delay from Sample clock rising edge
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Table 9. Setup and Hold Times to STROBE, Characteristic<sup>23</sup>

Voltage Threshold	Setup Times ( $t_{sus}$ )		Hold Time ( $t_{hs}$ )	
	$f < 20$ MHz	$f \geq 20$ MHz	$f < 20$ MHz	$f \geq 20$ MHz
1.25 V to 1.65 V	2.8 ns	1.15 ns	2.4 ns	900 ps

21. Includes maximum data channel-to-channel skew and typical crosstalk.

22. Acquires two samples per clock cycle in DDR mode.

23. Includes maximum data channel-to-channel skew and uncertainty, but does not include system crosstalk. Performance may vary with system crosstalk performance.

Voltage Threshold	Setup Times ( $t_{sus}$ )		Hold Time ( $t_{hs}$ )	
	$f < 20$ MHz	$f \geq 20$ MHz	$f < 20$ MHz	$f \geq 20$ MHz
0.90 V to 1.20 V		1.20 ns		1.00 ns
0.75 V to 0.85 V		1.40 ns		1.10 ns
0.60 V to 0.70 V		1.75 ns		1.25 ns

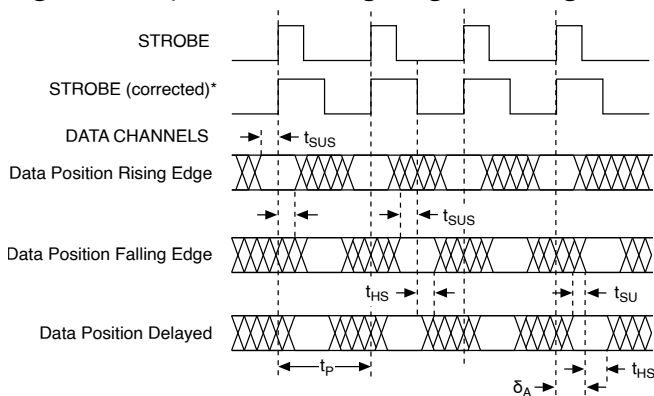
Setup and hold times to Sample clock <sup>24</sup>	
Setup time ( $t_{susc}$ )	900 ps, nominal
Hold time ( $t_{HSC}$ )	425 ps, nominal
Data delay banks <sup>25</sup>	
Bank 0	DIO <0..3> DIO <16..19> DIO <28..31> PFI <0..3>
Bank 1	DIO <4..7> DIO <20..23>
Bank 2	DIO <8..15> DIO <24..27>

24. Does not include channel-to-channel skew,  $t_{DDCSC}$ , or  $t_{SCDDC}$

25. Multibank data delay was first made available NI-HSDIO 1.7.

Time delay from DDC connector to internal Sample clock	6.8 ns, nominal
<b>Acquisition data delay</b>	
<b>Frequency</b>	
On Board clock	All supported frequencies
External clock and STROBE	Frequencies $\geq 20$ MHz
Range	0.0 to 1.0 Sample clock periods
Resolution <sup>26</sup>	117 ps to 143 ps, nominal

Figure 8. Acquisition Timing Diagram Using STROBE as the Sample Clock



$t_{SUS}$  = Set-Up Time to STROBE

$t_{HS}$  = Hold Time from STROBE

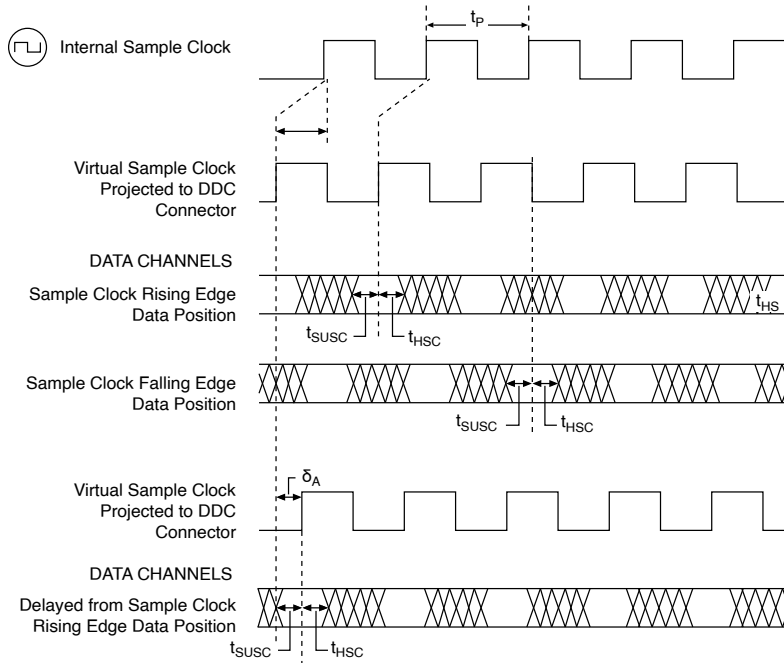
$0 \leq \delta_A \leq 1$  : Acquisition Data Delay (fraction of  $t_p$ )

$t_p = \frac{1}{f}$  = Sample Clock Period

\*Note: When using an external Sample clock greater than 20 MHz, the duty cycle is corrected to 50%.

26. Resolution is nonlinearly dependent on clock frequency. You can query resolution using NI-HSDIO.

Figure 9. Acquisition Timing Diagram with Sample Clock Sources Other than STROBE



$t_{DCSC}$  : Time Delay from DDC Connector to Internal Sample Clock

$0 \leq \delta_A \leq 1$  : Acquisition Data Delay (fraction of  $t_p$ )

$t_p = \frac{1}{f}$  = Period of Sample Clock

$t_{susc}$  = Set-Up Time to Sample Clock

$t_{hsc}$  = Hold Time to Sample Clock

**Related reference:**

- [STROBE](#)

**CLK IN**

Connector	SMA jack
Direction	Input
Destinations	<ol style="list-style-type: none"> <li>1. Reference clock (PLL)</li> <li>2. Sample clock</li> </ol>

Input coupling	AC
Input protection	$\pm 10$ VDC, nominal
Input impedance	Software-selectable: 50 $\Omega$ (default) or 1 k $\Omega$ , nominal
Minimum detectable pulse width	2 ns, nominal
Clock requirements	Free-running (continuous) clock

## Waveform Voltage Ranges

Square wave voltage range	0.65 $V_{pk-pk}$ to 5.0 $V_{pk-pk}$
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Table 10. Sine Wave Voltage Ranges

Voltage Range ( $V_{pk-pk}$ )	Frequency Range
0.65 to 5.0	20 MHz to 200 MHz
1.0 to 5.0	13 MHz to 200 MHz
1.3 to 5.0	10 MHz to 200 MHz
2.6 to 5.0	5 MHz to 200 MHz

## CLK IN Implementations

As Sample clock <sup>27</sup>	
Frequency range	20 kHz to 200 MHz
Duty cycle range	

$f < 20$ MHz	25% to 75%
$f \geq 20$ MHz	40% to 60%
<b>As Reference clock</b>	
Frequency range	5 MHz to 100 MHz (integer multiples of 1 MHz)
Frequency accuracy <sup>28</sup>	$\pm 0.1\%$
Duty cycle range	25% to 75%

**Related reference:**

- [Channels](#)
- [Sample Clock](#)

**STROBE**

Connector	DDC
Direction	Input
Destination	Sample clock (acquisition only)
Frequency range	100 Hz to 200 MHz

27. Nominal 3 dB cutoff point at 100 MHz when using 1 k $\Omega$  input impedance.

28. Required accuracy of the external Reference clock source.

Duty cycle range (at the programmed threshold)	
$f < 20$ MHz	25% to 75%
$f \geq 20$ MHz	40% to 60% (corrected to 50%)
Minimum detectable pulse width <sup>29</sup>	2 ns, nominal
Clock requirements	Free-running (continuous) clock
Input impedance	50 k $\Omega$ , nominal

### Related reference:

- [Acquisition Timing](#)
- [Sample Clock](#)

## CLK OUT

Connector	SMA jack
Direction	Output
Sources	<ol style="list-style-type: none"> <li>1. Sample clock (excluding STROBE)</li> <li>2. Reference clock (PLL)</li> </ol>
Output impedance	50 $\Omega$ , nominal

29. Required at acquisition voltage thresholds.

Logic type	Matched with generation and acquisition sessions
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**Related reference:**

- [Channels](#)
- [Generation Channels](#)

**DDC CLK OUT**

Connector	DDC
Direction	Output
Source	Sample clock (generation only)



**Note** STROBE and acquisition Sample clock cannot be routed to DDC CLK OUT.

**Related reference:**

- [Generation Channels](#)

**Reference Clock (PLL)**

Sources <sup>30</sup>	<ol style="list-style-type: none"> <li>1. PXI_CLK100 (PXI Express backplane)</li> <li>2. CLK IN (SMA jack connector)</li> <li>3. None (internal oscillator locked to an internal reference)</li> </ol>
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30. Provides the frequency for the PLL.

Destination	CLK OUT (SMA jack connector)
Lock time	150 ms, maximum (not including software latency)
Frequency range	5 MHz to 100 MHz (integer multiples of 1 MHz), 0.1% required accuracy
Duty cycle range	25% to 75%

## Waveform

### Memory and Scripting

Memory architecture	This device uses the Synchronization and Memory Core (SMC) technology in which waveforms and instructions share onboard memory. Parameters such as number of script instructions, maximum number of waveforms in memory, and number of samples (S) available for waveform storage are flexible and user defined.	
<b>Onboard memory size<sup>31</sup></b>		
<b>1 Mbit per channel</b>		
Acquisition	1 Mbit per channel (4 MBytes total)	
Generation	1 Mbit per channel (4 MBytes total)	
<b>8 Mbit per channel</b>		
Acquisition	8 Mbit per channel (32 MBytes total)	
Generation	8 Mbit per channel (32 MBytes total)	

<b>64 Mbit per channel</b>	
Acquisition	64 Mbit per channel (256 MBytes total)
Generation	64 Mbit per channel (256 MBytes total)
<b>Generation</b>	
Single-waveform mode	Generates a single waveform once, n times, or continuously
Scripted mode <sup>32</sup>	Generates a simple or complex sequence of waveforms.
Finite repeat count	1 to 16,777,216
<b>Waveform quantum<sup>33</sup></b>	
Data width = 4	1 sample
Data width = 2	2 samples
<b>Waveform block size (in physical memory)</b>	
Data width = 4	32 samples
Data width = 2	64 samples

31. Maximum limit for generation sessions assumes no scripting instructions.
32. Use scripts to describe the waveforms to be generated, the order in which the waveforms are generated, how many times the waveforms are generated, and how the device responds to Script Triggers.
33. DDR mode sets data width to 2.

Table 11. Generation Minimum Waveform Size<sup>34</sup>

Configuration	Sample Rate	
	200 MHz	100 MHz
Single waveform	1 S	1 S
Continuous waveform	128 S	64 S
Stepped sequence	128 S	64 S
Burst sequence	1056 S	512 S

Acquisition	
Minimum waveform size <sup>35</sup>	1 S
Record quantum	1 S
Total number of records <sup>36</sup>	2,147,483,647
Total pre-Reference trigger samples	0 up to full record
Total post-Reference trigger samples	0 up to full record

## Triggers

Types	Sessions	Edge Detection	Level Detection
1. Start	Acquisition and generation	Rising or falling	—
2. Pause	Acquisition and generation	—	High or low

34. Sample rate dependent. Increasing sample rate increases minimum waveform size requirement.

35. Regardless of waveform size, NI-HSDIO allocates at least 640 bytes for a record.

36. The session should fetch quickly enough that unfetched data is not overwritten.

Types	Sessions	Edge Detection	Level Detection
3. Script <0..3>	Acquisition	Rising or falling	High or low
4. Reference	Acquisition	Rising or falling	—
5. Advance	Acquisition	Rising or falling	—
6. Stop	Generation	Rising or falling	—

Sources	<ul style="list-style-type: none"> <li>1. PFI 0 (SMA jack connector)</li> <li>2. PFI &lt;1..3&gt; (DDC connector)</li> <li>3. PXI_TRIG &lt;0..7&gt; (PXI Express backplane)</li> <li>4. Pattern match (acquisition sessions only)</li> <li>5. Software (user function call)</li> <li>6. Disabled (do not wait for a trigger)</li> </ul>
Destinations, excluding Pause trigger <sup>37</sup>	<ul style="list-style-type: none"> <li>1. PFI 0 (SMA jack connector)</li> <li>2. PFI &lt;1..3&gt; (DDC connector)</li> <li>3. PXI_TRIG &lt;0..6&gt; (PXI Express backplane)</li> </ul>
Minimum required trigger pulse width	15 ns
<b>Trigger rearm time</b>	
Start to Reference trigger	150 S, maximum

37. Each trigger can be routed to any destination except the Pause trigger. The Pause trigger cannot be exported.

Start to Advance trigger	220 S, maximum
Advance to Advance trigger	220 S, maximum
Reference to Reference trigger	220 S, maximum
<b>Delay from Pause trigger to Pause state and Stop trigger to Done state<sup>38</sup></b>	
Generation sessions	50 Sample clock periods + 300 ns, maximum
Acquisition sessions	Synchronous with the data
Delay from Start trigger and Script trigger to digital data output	3 Sample clock periods + 600 ns, maximum

### Related reference:

- [Channels](#)

## Events

Types	Sessions
1. Marker <0..2>	Generation
2. Data Active	Generation
3. Ready for Start	Acquisition and generation
4. Ready for Advance	Acquisition
5. End of Record	Acquisition

38. Use the Data Active event during generation to determine on a sample-by-sample basis when the device enters the Pause or Done states.

Destinations (excluding Data Active event) <sup>39</sup>		<ol style="list-style-type: none"> <li>1. PFI 0 (SMA jack connectors)</li> <li>2. PFI &lt;1..3&gt; (DDC connector)</li> <li>3. PXI_TRIG &lt;0..6&gt; (PXI Express backplane)</li> </ol>
<b>Marker time resolution (placement)</b>		
SDR	Can be placed at any sample	
DDR	Must be placed at an integer multiple of two samples	

**Related reference:**

- [Channels](#)

## Software

### Driver Software

Driver support for this device was first available in NI-HSDIO 1.6.

NI-HSDIO is an IVI-compliant driver that allows you to configure, control, and calibrate the PXIe-6548. NI-HSDIO provides application programming interfaces for many development environments.

### Application Software

NI-HSDIO provides programming interfaces, documentation, and examples for the following application development environments:

- LabVIEW
- LabWindows™/CVI™
- Measurement Studio

39. The Data Active event can only be routed to the PFI channels.

- Microsoft Visual C/C++
- .NET (C# and VB.NET)

## NI Measurement Automation Explorer

NI Measurement Automation Explorer (MAX) provides interactive configuration and test tools for the PXIe-6548. MAX is included on the NI-HSDIO media.

## Power



**Note** Characteristic results are commensurate with an average user application using all data channels into high impedance load. Maximum results include worst-case data pattern.

VDC	Current, Characteristic	Current, Maximum
+3.3 V	1.75 A	1.77 A
+12 V	2.2 A	2.3 A

Total power	32.2 W, characteristic 33.5 W, maximum
Warm-up time	15 minutes

## Physical

Dimensions	Single 3U, CompactPCI Express slot, PXI Express compatible 21.6 cm × 2.0 cm × 13.0 cm
Weight	519 g (18.3 oz)

## I/O Panel Connectors

Label	Connector Type	Description
CLK IN	SMA jack	External Sample clock, external Reference clock
PFI 0		Events, triggers
CLK OUT		External Sample clock, exported Reference clock
DIGITAL DATA & CONTROL	68-pin VHDCI	Digital data channels, exported Sample clock, STROBE, events, triggers

## Environment



**Note** To ensure that the PXIe-6548 cools effectively, follow the guidelines in the *Maintain Forced Air Cooling Note to Users* included with the PXIe-6548 or available at [ni.com/manuals](http://ni.com/manuals). The PXIe-6548 is intended for indoor use only.

Operating temperature	0 °C to 55 °C in all NI PXI Express chassis and hybrid NI PXI Express chassis
Operating relative humidity	10 to 90% relative humidity, noncondensing (meets IEC 60068-2-56)
Storage temperature	-20 °C to 70 °C
Storage relative humidity	5 to 95% relative humidity, noncondensing (meets IEC 60068-2-56)
Operating shock	30 g, half-sine, 11 ms pulse (meets IEC 60068-2-27; test profile developed in

	accordance with MIL-PRF-28800F)
Operating vibration	5 Hz to 500 Hz, 0.31 g <sub>rms</sub> (meets IEC 60068-2-64)
Storage shock	50 g, half-sine, 11 ms pulse (meets IEC 60068-2-27; test profile developed in accordance with MIL-PRF-28800F)
Storage vibration	5 Hz to 500 Hz, 2.46 g <sub>rms</sub> (meets IEC 60068-2-64; test profile exceeds requirements of MIL-PRF-28800F, Class B)
Altitude	0 to 2,000 m above sea level (at 25 °C ambient temperature)
Pollution degree	2

## Compliance and Certifications

### Safety Compliance Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1



**Note** For safety certifications, refer to the product label or the [Product Certifications and Declarations](#) section.

### Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical

equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



**Note** In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11), Class A equipment is intended for use only in heavy-industrial locations.



**Note** Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.



**Note** For EMC declarations, certifications, and additional information, refer to the [Product Certifications and Declarations](#) section.



**Notice** Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for important safety and electromagnetic compatibility information. To obtain a copy of this document online, visit [ni.com/manuals](http://ni.com/manuals) and search for the document title.



**Notice** To ensure the specified EMC performance, operate this product only with shielded cables and accessories. Do not use unshielded cables or accessories unless they are installed in a shielded enclosure with properly designed and shielded input/output ports and connected to the product using a shielded cable. If unshielded cables or accessories are not properly installed and shielded, the EMC specifications for the product are no longer guaranteed.



**Note** SHC68-C68-D4 shielded cable and the provided snap-on ferrite beads, National Instruments part number 711627-01, must be used when operating the PXIe-6548.



**Notice** To ensure the specified EMC performance, the length of all I/O cables must be no longer than 3 m (10 ft).



**Notice** To ensure the specified EMC performance, you must install PXI EMC Filler Panels, National Instruments part number 778700-01, in all open chassis slots.

## CE Compliance

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2011/65/EU; Restriction of Hazardous Substances (RoHS)
- 2014/53/EU; Radio Equipment Directive (RED)
- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

## Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit [ni.com/product-certifications](http://ni.com/product-certifications), search by model number, and click the appropriate link.


## Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.


For additional environmental information, refer to the *Engineering a Healthy Planet*

web page at [ni.com/environment](https://ni.com/environment). This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

#### EU and UK Customers

-  **Waste Electrical and Electronic Equipment (WEEE)**—At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit [ni.com/environment/weee](https://ni.com/environment/weee).

#### 电子信息产品污染控制管理办法（中国RoHS）

-  **中国RoHS**—NI符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于NI中国RoHS合规性信息，请登录 [ni.com/environment/rohs\\_china](https://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](https://ni.com/environment/rohs_china).)