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**PCI-5401**

# NI PXI/PCI-5401 Specifications

## PXI/PCI Arbitrary Function Generator

This document lists the specifications for the NI PXI/PCI-5401. These specifications are typical at 25 °C unless otherwise stated. The operating temperature range is 0–50 °C.

### Analog Output

Number of channels .....	1
Resolution .....	12 bits
Maximum update rate .....	40 MHz
DDS accumulator .....	32 bits
Frequency range	
Sine .....	16 MHz, max
SYNC (TTL).....	16 MHz, max
Square .....	1 MHz, max
Ramp .....	1 MHz, max
Triangle .....	1 MHz, max
Frequency resolution.....	9.31 mHz

### Voltage Output

Ranges .....	±5 V into a 50 Ω load; ±10 V into a high-impedance load
Accuracy .....	±0.1 dB
Output attenuation.....	0–73 dB
Resolution .....	0.001 dB steps

Pre-attenuation offset	
Range.....	$\pm 2.5$ V into $50\ \Omega^1$
Accuracy.....	$\pm 5$ mV
Output coupling.....	DC
Output impedance.....	$50\ \Omega$ or $75\ \Omega$ , software selectable
Load impedance.....	$50\ \Omega$ or greater
Output enable.....	Software switchable
Protection.....	Short-circuit protected
Typical rise/fall time.....	8 ns (10–90% 0–5 V square wave into $50\ \Omega$ load, filters off)

## Sine Spectral Purity

Harmonic products and spurs	
Up to 1 MHz.....	–60 dBc
Up to 16 MHz.....	–35 dBc
Phase noise.....	–105 dBc/Hz at 10 kHz from carrier

## Filter Characteristics

### Digital

Type.....	Half-band interpolating
Selection.....	Software switchable (enable or disable)
Taps.....	67
Filter coefficients.....	Fixed 20-bit
Data interpolating frequency.....	80 MS/s
Pipeline signal delay.....	26 sampling periods

### Analog

Type.....	7th-order L-C lowpass filter
Passband ripple.....	$\pm 2$ dB

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<sup>1</sup> With less than 10 dB of attenuation, signal maximum plus offset (before attenuation) must not exceed  $\pm 5$  V (into  $50\ \Omega$ ).

## Waveform Specifications

Memory .....	16,384 16-bit samples
Segment length.....	16,384 samples, exact
Segment linking (instruction FIFO).....	512 links

## Timing I/O

Update clock .....	Internal, 40 MHz only
Frequency locking	
External reference sources	
NI PCI-5401 .....	Front panel PLL IN SMB connector, internal, or RTSI clock line
NI PXI-5401 .....	Front panel PLL Ref SMB connector, internal, or PXI_CLK10
Reference clock frequencies .....	1 MHz, 5–20 MHz in 1 MHz steps
Frequency locking range.....	$\pm 100$ ppm

## Triggers

### Digital Trigger

Compatibility .....	TTL
Response .....	Rising edge
Pulse width ( $T_{d1}$ ).....	20 ns, minimum
Trigger to waveform output delay ( $T_{d2}$ ).....	28 sample clocks plus 150 ns, max

### RTSI

Trigger lines	
NI PCI-5401 .....	7
NI PXI-5401 .....	7
Clock lines	
NI PCI-5401 .....	1
NI PXI-5401 .....	Not applicable

## Bus Interface

Type .....Slave

## Operational Modes

Type .....Single, continuous, stepped

## SYNC Out

Level .....TTL

Duty cycle .....20–80%, software controllable

## External Clock Reference Input

Frequency .....1 MHz or 5–20 MHz in  
1 MHz steps

Amplitude ..... $1 V_{pk-pk} \leq \text{level} \leq 5 V_{pk-pk}$

## Internal Clock

Frequency .....40 MHz

Initial accuracy ..... $\pm 5$  ppm

Temperature stability (0 to 50 °C) ..... $\pm 25$  ppm

Aging (1 year) ..... $\pm 5$  ppm

## Mechanical

### Connectors

#### ARB (output)

PCI .....SMB

PXI .....BNC

#### SYNC (output)

PCI .....SMB

PXI .....BNC

PLL reference (input) .....SMB

#### External trigger in

PCI .....50-pin digital

PXI .....SMB

Size.....	1 slot
Power requirements.....	5 V, 3.5 A, max; 12 V, 125 mA

## Safety

This product meets the requirements of the following standards for safety for electrical equipment for measurement, control, and laboratory use:

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



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

## Electromagnetic Compatibility

Emissions .....	EN 55011 Class A at 10 m FCC Part 15A above 1 GHz
Immunity .....	EN 61326:1997 + A2:2001, Table 1
EMC/EMI.....	CE, C-Tick, and FCC Part 15 (Class A) Compliant



**Note** For EMC compliance, you *must* operate this device with shielded cabling.

## CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety) .....	73/23/EEC
Electromagnetic Compatibility Directive (EMC) .....	89/336/EEC



**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](http://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

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