

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	± 2.5 V into $50 \Omega^1$
Accuracy	± 5 mV
Output coupling	DC
Output impedance	50Ω or 75Ω , software selectable
Load impedance	50Ω or greater
Output enable	Software switchable
Protection	Short-circuit protected
Typical rise/fall time	8 ns (10–90% 0–5 V square wave into 50Ω 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	± 2 dB

¹ With less than 10 dB of attenuation, signal maximum plus offset (before attenuation) must not exceed ± 5 V (into 50Ω).

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.....	± 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

TypeSlave

Operational Modes

TypeSingle, continuous, stepped

SYNC Out

LevelTTL

Duty cycle20–80%, software controllable

External Clock Reference Input

Frequency1 MHz or 5–20 MHz in
1 MHz steps

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

Internal Clock

Frequency40 MHz

Initial accuracy ± 5 ppm

Temperature stability (0 to 50 °C) ± 25 ppm

Aging (1 year) ± 5 ppm

Mechanical

Connectors

ARB (output)

PCISMB

PXIBNC

SYNC (output)

PCISMB

PXIBNC

PLL reference (input)SMB

External trigger in

PCI50-pin digital

PXISMB

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, 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, search by model number or product line, and click the appropriate link in the Certification column.

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