

NI 6132/6133 Specifications

This document lists the I/O terminal summary and specifications for the NI PXI-6132/6133.

For the most current edition of this document, refer to ni.com/manuals. Refer to the *DAQ Quick Start Guide* for more information about accessing documents on the NI-DAQ CD.



Note With NI-DAQmx, National Instruments has revised its terminal names so they are easier to understand and more consistent among NI hardware and software products. The revised terminal names used in this document are usually similar to the names they replace. For a complete list of Traditional NI-DAQ terminal names and their NI-DAQmx equivalents, refer to the *Terminal Name Equivalents* table in the *S Series Help*.

Table 1. I/O Terminal Summary

Terminal Name	Terminal Type and Direction	Impedance Input/ Output	Protection (Volts) On/Off	Source (mA at V)	Sink (mA at V)	Rise Time (ns)	Bias
AI <0..7>	AI	100 M Ω in parallel with 10 pF	35/25	—	—	—	± 16 nA ± 35 nA
AI GND	—	—	—	—	—	—	—
D GND	—	—	—	—	—	—	—
+5 V	—	0.1 Ω 0.45 Ω	Short-circuit to ground	1 A	—	—	—
P0.<0..7>	DIO	—	$V_{CC} + 0.5$	13 at ($V_{CC} - 0.4$)	24 at 0.4	1.1	50 k Ω pu
EXTSTROBE*	DO	—	—	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 0/ AI START TRIG	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 1/ AI REF TRIG	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 2	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu

Table 1. I/O Terminal Summary (Continued)

Terminal Name	Terminal Type and Direction	Impedance Input/Output	Protection (Volts) On/Off	Source (mA at V)	Sink (mA at V)	Rise Time (ns)	Bias
PFI 3/ CTR 1 SOURCE	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 4/ CTR 1 GATE	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
CTR 1 OUT	DO	—	—	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 5	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 6	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 7/ AI SAMP CLK	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 8/ CTR 0 SOURCE	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
PFI 9/ CTR 0 GATE	DIO	—	$V_{CC} + 0.5$	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
CTR 0 OUT	DO	—	—	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
FREQ OUT	DO	—	—	3.5 at ($V_{CC} - 0.4$)	5 at 0.4	1.5	50 k Ω pu
AI = Analog Input DIO = Digital Input/Output DO = Digital Output pu = pull-up Note: The tolerance on the 50 k Ω pull-up resistors is large. Actual value might range between 17 k Ω and 100 k Ω .							

Specifications

The following specifications are typical at 25 °C unless otherwise noted.

Analog Input

Input Characteristics

Number of channels

NI 6132.....4

NI 6133.....8

Type of ADC

Resolution.....14 bits, 1 in 16,384

Pipeline.....0

Sampling rate	
Maximum	2.5 MS/s per channel
Minimum	No minimum
Input impedance	
AI – to AI GND	100 M Ω in parallel with 10 pF
AI + to AI GND	100 M Ω in parallel with 10 pF
Input bias current	± 2 pA typ, ± 25 pA max
Input offset current.....	± 1 pA typ, ± 10 pA max
Input coupling	DC
Max working voltage for all analog input channels	
Positive input (AI +)	± 13 V for all ranges
Negative input (AI –).....	± 13 V for all ranges
Overvoltage protection	
(AI +, AI –)	± 36 V
Input current during overvoltage conditions	
	± 20 mA max
Input FIFO size	
NI 6132	16 MS
NI 6133	16 or 32 MS
Data transfers	DMA, interrupts, programmed I/O
DMA mode	Scatter-gather

DC Transfer Characteristics

INL	± 0.6 LSB typ, ± 1 LSB max
DNL	± 0.25 typ, ± 0.75 max, no missing codes

Offset, gain error.....Refer to Table 2¹

Table 2. NI 6132/6133 Analog Input DC Accuracy Information

Nominal Range at Full Scale (V)	Absolute Accuracy						Relative Accuracy		
	% of Reading		Offset (μV)	Noise + Quantization (μV)		Temp Drift (%/°C)	Absolute Accuracy at Full Scale (±mV)	Resolution (μV)	
	24 Hours	1 Year		Single Pt.	Averaged			Single Pt.	Averaged
±10	0.0098	0.0140	1,254.4	3,117.5	272.1	0.0005	2.5069	3,582.6	358.3
±5	0.0099	0.0141	633.7	1,568.7	137.0	0.0005	1.2671	1,803.3	180.3
±2.5	0.0101	0.0143	323.4	791.3	69.1	0.0005	0.6439	910.1	91.0
±1.25	0.0111	0.0153	168.2	417.8	36.6	0.0005	0.3430	482.2	48.2

Dynamic Characteristics

Interchannel skew 1 ns typ

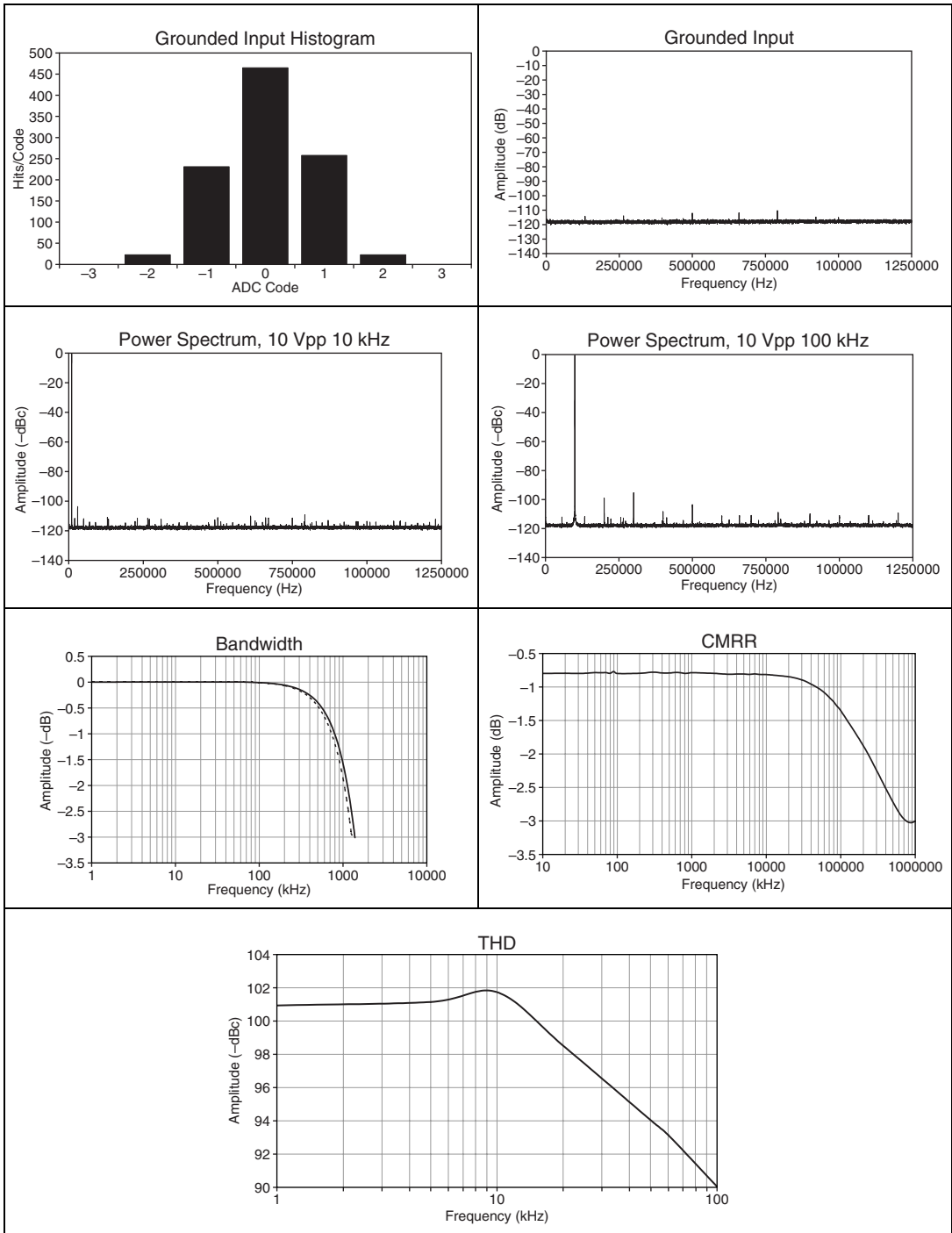
Table 3. NI 6133 Analog Input Dynamic Characteristics

Input Range	Bandwidth ¹ (MHz)	SFDR Typ ² (dB)	CMRR ³ (dB)	System Noise ⁴ (LSB _{rms})	Crosstalk ⁵ (dB)	THD (dB at 10 kHz)
±10 V	1.3	95	70	0.78	-74	-101.1
±5 V	1.3	95	70	0.79	-74	-102.5
±2.5 V	1.25	96	70	0.86	-74	-102.2
±1.25 V	1.25	94	70	0.95	-74	-102.1

¹ -3 dB frequency for input amplitude at 10% of the input range (-20 dB)
² Measured at 100 kHz with twelfth-order bandpass filter after signal source
³ DC to 60 Hz
⁴ LSB_{rms}, including quantization
⁵ DC to 100 kHz

¹ Accuracies are valid for measurements following an internal calibration. Averaged numbers assume dithering and averaging of 100 single-channel readings. Measurement accuracies are listed for operational temperatures within ±1 °C of internal calibration temperature and ±10 °C of external or factory-calibration temperature.

Typical Performance Graphs



Stability

Recommended warm-up time.....15 min

Calibration

Level5.000 V (± 2.5 mV)
(actual value stored in EEPROM)

Temperature coefficient..... ± 5.0 ppm/ $^{\circ}$ C max

Long-term stability ± 15 ppm/ $\sqrt{1,000}$ h

Digital I/O

Number of channels8 input/output

CompatibilityTTL/CMOS

Table 4. Digital Logic Levels

Level	Min	Max
Input low voltage	0.0 V	0.8 V
Input high voltage	2.0 V	5.0 V
Input low current ($V_{in} = 0$ V)	—	$-320 \mu\text{A}$
Input high current ($V_{in} = 5$ V)	—	$10 \mu\text{A}$
Output low voltage ($I_{OL} = 24$ mA)	—	0.4 V
Output high voltage ($I_{OH} = 13$ mA)	4.35 V	—

Power-on stateInput (high-impedance)

Data transfersDMA, interrupts,
programmed I/O

Input buffer2,044 bytes

Output buffer2,044 bytes

Transfer rate (1 word = 8 bits).....10 Mwords/s

Timing I/O

Number of channels	2 up/down counter/timers, 1 frequency scaler
Resolution	
Counter/timers	24 bits
Frequency scaler	4 bits
Compatibility	TTL/CMOS
Base clocks available	
Counter/timers	20 MHz, 100 kHz
Frequency scaler	10 MHz, 100 kHz
Base clock accuracy	$\pm 0.01\%$
Max source frequency	20 MHz
Min source pulse duration.....	10 ns, edge-detect mode
Min gate pulse duration.....	10 ns, edge-detect mode
Data transfers	DMA, interrupts, programmed I/O
DMA modes	Scatter-gather

Triggers

Analog Trigger

Source.....	All analog input channels
Level.....	\pm full-scale
Slope.....	Positive or negative (software selectable)
Resolution	8 bits, 1 in 256
Hysteresis	Programmable
Bandwidth	(-3 dB) 5 MHz internal/external

Digital Trigger

Compatibility	TTL
Response	Rising or falling edge
Pulse width	10 ns min

RTSI

Trigger lines.....	7 ¹
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Bus Interface

Type	Master, slave
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Power Requirement

+5 VDC ($\pm 5\%$)	
NI 6132	2.2 A
NI 6133	3.0 A
+3.3 V	0.8 A
Power available at I/O connector.....	+4.65 to +5.25 VDC at 1 A

Physical

Dimensions (not including connectors)	16.0 cm by 10.0 cm (6.3 in. by 3.9 in.)
I/O connector	68-pin male SCSI-II type

Maximum Working Voltage

Maximum working voltage refers to the signal voltage plus the common-mode voltage.

Channel-to-earth	36 V, Installation Category I
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¹ RTSI Trigger 6 is configured as the PXI Star Trigger for the NI PXI-6132/6133. Refer to *RTSI Triggers* in the *S Series Help* for more information.

Environmental

Operating temperature.....	0 to 50 °C
Storage temperature	-20 to 70 °C
Humidity	10 to 90% RH, noncondensing
Maximum altitude	2,000 m
Pollution Degree (indoor use only)	2

Safety

The NI 6132/6133 devices are 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
- 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, 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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