NI 6731/6733 Specifications

このドキュメントの日本語版については、ni.com/manuals を参照してください。
(For a Japanese language version, go to ni.com/manuals.)

This document lists the specifications for the NI 6731/6733 analog output devices. The following specifications are typical at 25 °C unless otherwise noted.

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* section of Chapter 2, *I/O Connector*, of the *Analog Output Series User Manual*.

Analog Output

Output Characteristics

Number of channels

NI 6731 ..... 4 voltage outputs

NI 6733 ..... 8 voltage outputs

Resolution ..... 16 bits, 1 in 65,536

Max update rate

Number of Channels	Max Update Rate	
	Using Local FIFO (kS/s)*	Using Host PC Memory (kS/s)†
1	1,000	1,000
2	1,000	1,000
3	1,000	1,000
4	1,000	1,000
5	1,000	1,000
6	952	1,000
7	833	869
8	740	769

* These numbers apply to continuous waveform generation, which allows for the time it takes to reset the FIFO to the beginning when cycling through it. This additional time, about 200 ns, is not incurred when using host PC memory for waveform generation. Max update rate in FIFO mode does not change regardless of the number of devices in the system.

† These results were measured using a PCI-6711/6713 device with a 90 MHz Pentium machine. These numbers may change when using more devices or when other CPU or bus activity occurs.

Type of DAC ..... Double-buffered, multiplying

FIFO buffer size

NI 6731 ..... 8,192 samples

NI 6733 ..... 16,384 samples

DMA channels 3

Data transfers ..... DMA, interrupts, programmed I/O

DMA modes ..... Scatter-gather

Accuracy Information

Nominal Range at Full Scale (V)	Absolute Accuracy				
	% of Reading			Offset (mV)	Temp Drift (%/°C)
	24 Hours	90 Days	1 Year		
±10	0.0044%	0.0052%	0.0061%	±1.027	0.0006%

Absolute accuracy = (% of Reading × Voltage) + Offset + (Temp Drift × Voltage)
Note: Temp drift applies only if ambient is greater than ±10 °C of previous external calibration.

Transfer Characteristics

Relative accuracy (INL)
- After calibration.....±2.2 LSB max
- Before calibration .....±2.2 LSB max

DNL
- After calibration.....±1.0 LSB max
- Before calibration .....±1.0 LSB max

Monotonicity .....16 bits guaranteed after calibration

Offset error
- After calibration.....±168 µV max
- Before calibration .....±40 mV max

Gain error (relative to internal reference)
- After calibration.....±30 ppm of output max
- Before calibration .....±9,000 ppm of output max

Gain error (relative to external reference).....+0.1% of output max, not adjustable

Voltage Output

Ranges .....±10 V, ±EXT REF

Output coupling.....DC

Output impedance.....0.1 Ω max

Current drive.....±5 mA max

Output stability .....Any passive load, up to 1,500 pF

Protection.....Short-circuit to ground

Power-on state .....0 V (±200 mV)

External Reference Input

Range.....±11 V

Overvoltage protection .....±25 V powered on, ±15 V powered off

Input impedance..... 1 MΩ

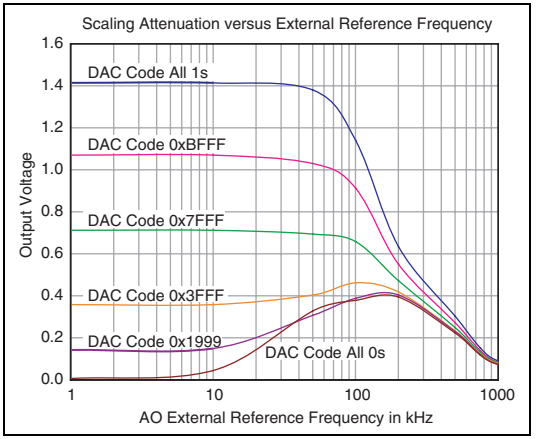

Figure 1. Scaling Attenuation versus External Reference Frequency

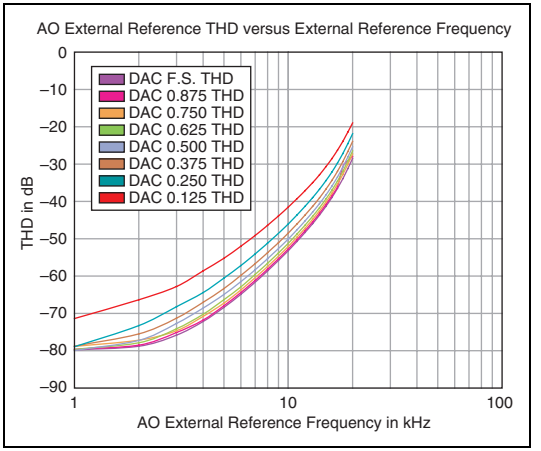

Figure 2. AO External Reference THD versus External Reference Frequency

Dynamic Characteristics

Slew rate ..... 15 V/µs

Noise ..... 80 μV_{rms}, DC to 1 MHz

Channel crosstalk ..... –95 dB with SH68-68-EP cable (generating a 10 V, 10 point sinusoidal at 100 kHz on the reference channel)

Settling time ..... 2.8 µs to ±1.0 LSB accuracy

Total harmonic distortion ..... –90 dB typ (generating a 10 V, 1,000 point, 750 Hz sine wave, summing 9 harmonics)

Stability

Offset temperature coefficient ..... ±35 µV/°C

Gain temperature coefficient

- Internal reference ..... ±6.5 ppm/°C
- External reference ..... ±5.0 ppm/°C

Onboard calibration reference

- Level ..... 5.000 V (1.0 mV) (actual value stored in EEPROM)
- Temperature coefficient ..... ±0.6 ppm/°C max
- Long-term stability ..... ±15 ppm/$\sqrt{1{,}000\ h}$

Digital I/O

Number of channels ..... 8 input/output

Compatibility ..... TTL/CMOS

Digital logic levels

Level	Min	Max
Input low voltage	0 V	0.8 V
Input high voltage	2.0 V	5.0 V
Input low current (V_{in} = 0 V)	—	–320 µA
Input high current (V_{in} = 5 V)	—	10 µA
Output low voltage (I_{OL} = 24 mA)	—	0.4 V
Output high voltage (I_{OH} = –13 mA)	4.35 V	—

Power-on state ..... Input (high-impedance)

Data transfers ..... DMA, interrupts, programmed I/O

Input buffer ..... 2,000 bytes

Output buffer ..... 2,000 bytes

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 ..... ±0.01% over operating temperature

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

Digital Trigger

Purpose

- Analog output ..... Start trigger, gate, clock
- Counter/timers ..... Source, gate

Source ..... PFI <0..9>

Compatibility ..... TTL

Response ..... Rising or falling edge

Pulse width ..... 10 ns min

RTSI Bus (PCI Only)

Trigger lines <0..6> 7

RTSI clock 1

PXI Trigger Bus (PXI Only)

Trigger lines <0..5> 6

Star trigger 1

Clock 1

Bus Interface

NI PCI-6731/6733 .....5 V PCI master, slave

NI PXI-6733 .....PXI/CompactPCI master, slave

Power Requirement

NI 6731

+5 VDC (±5%).....0.80 A typ, 1.25 A max

+3.3 VDC (±5%).....125 mA typ, 250 mA max

Power available at I/O connector .....+4.65 to +5.25 VDC at 1 A

NI 6733

+5 VDC (±5%).....1.25 A typ, 1.8 A max

+3.3 VDC (±5%).....125 mA typ, 250 mA max

Power available at I/O connector .....+4.65 to +5.25 VDC at 1 A

Physical

Dimensions (not including connectors)

NI PCI-6731/6733.....17.5 × 10.7 cm (6.87 × 4.2 in.)

NI PXI-6733 .....16 × 10 cm (6.3 × 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.....±11 V, Installation Category I

Channel-to-channel .....±22 V, Installation Category I

Environmental

The NI 6731/6733 is intended for indoor use only.

Operating temperature.....0 to 50 °C

Storage temperature.....–20 to 70 °C

Humidity.....5 to 90% RH, noncondensing

Maximum altitude .....2,000 meters

Pollution Degree.....2

Note Clean the device with a soft, non-metallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

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 with shielded cabling.

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.

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`.

Device Pinouts

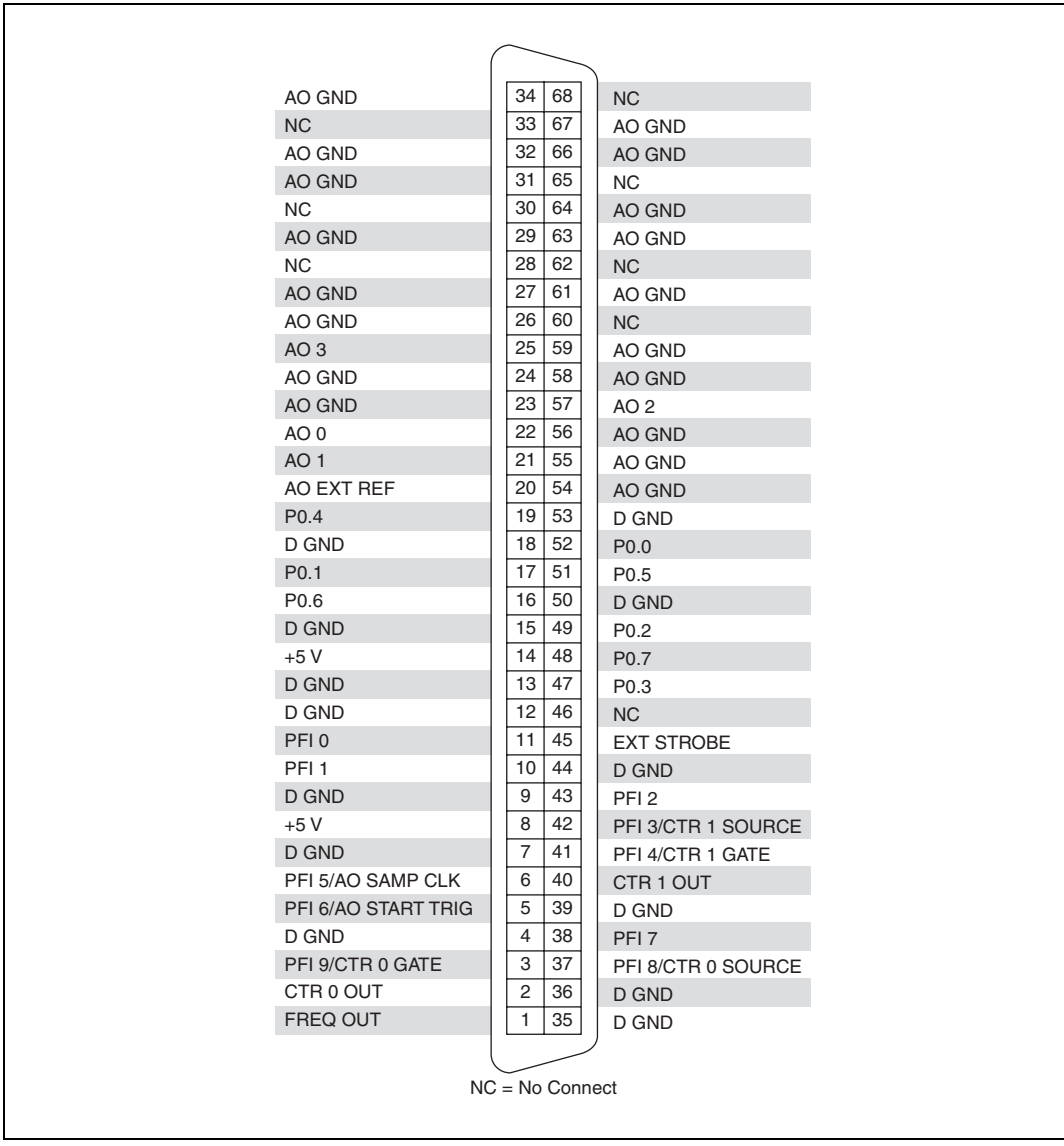

Figure 3. NI 6731 68-Pin AO I/O Connector Pin Assignments

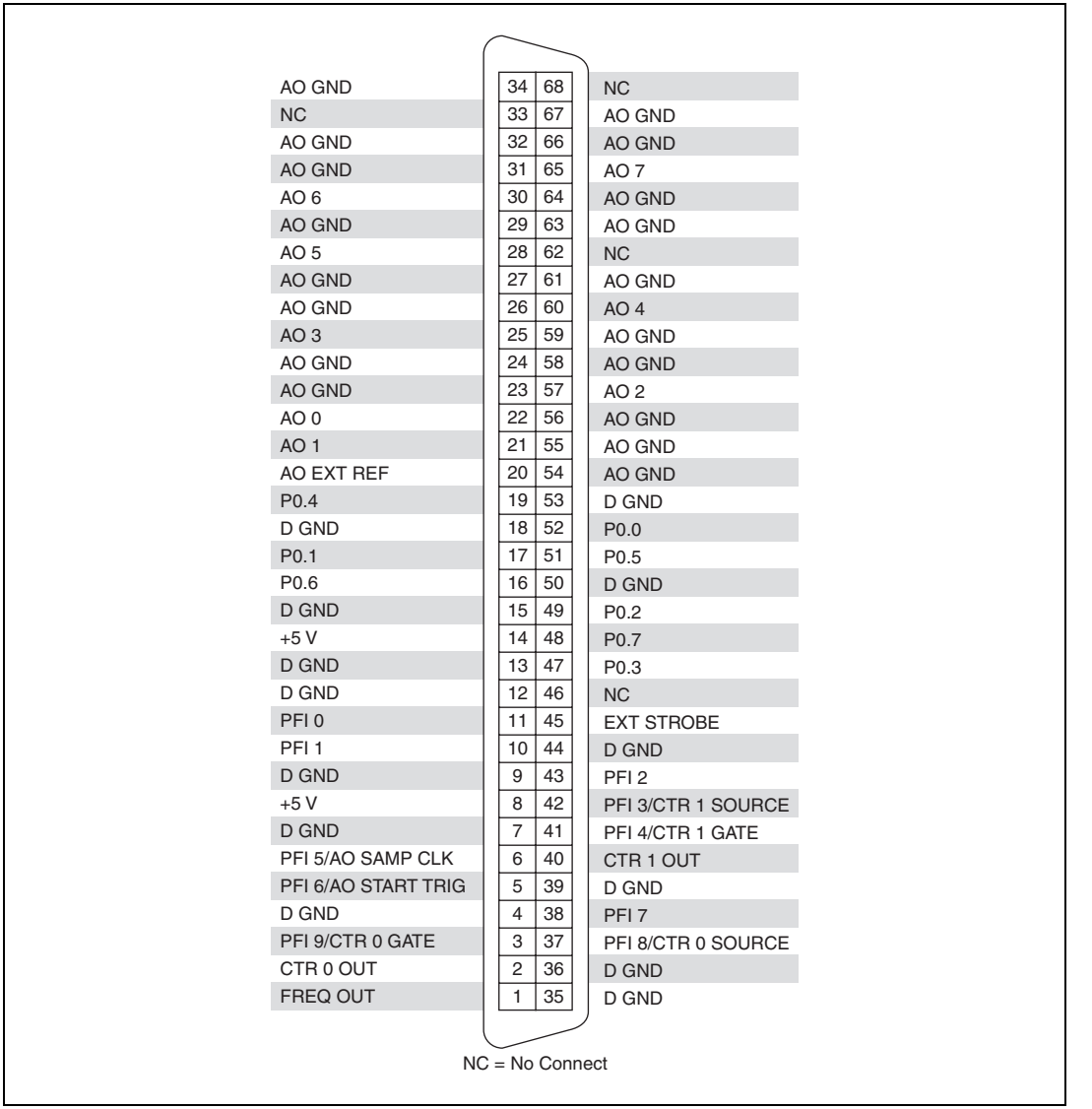

Figure 4. NI 6733 68-Pin AO I/O Connector Pin Assignments