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PCI-6713

NI 6711/6713/DAQCard-6715 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 6711/6713 and NI DAQCard-6715 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 (Legacy) 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 6711 4 voltage outputs

NI 6713/DAQCard-6715 8 voltage outputs

Resolution 12 bits, 1 in 4,096

Max update rate

Number of Channels	Max Update Rate (NI 6711/6713)		Max Update Rate (NI DAQCard-6715)	
	Using Local FIFO (kS/s)*	Using Host PC Memory (kS/s)†	Using Local FIFO (kS/s)	Using Host PC Memory (kS/s)‡
1	1,000	1,000	1,000	833
2	1,000	1,000	850	417
3	1,000	1,000	750	282
4	1,000	1,000	650	211
5	1,000	1,000	600	169
6	952	1,000	550	141

Number of Channels	Max Update Rate (NI 6711/6713)		Max Update Rate (NI DAQCard-6715)	
	Using Local FIFO (kS/s)*	Using Host PC Memory (kS/s)†	Using Local FIFO (kS/s)	Using Host PC Memory (kS/s)‡
7	833	869	510	121
8	740	769	480	105

* 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.

‡ These results were measured using a DAQCard-6715 with a 266 MHz Pentium II machine. These numbers may change when using more devices or when other CPU or bus activity occurs.

Type of DAC

NI 6711/6713Double-buffered, multiplying
NI DAQCard-6715Serial, multiplying

Data transfers

NI 6711/6713..... DMA, interrupts, programmed I/O
NI DAQCard-6715 Interrupts, programmed I/O

FIFO buffer size

NI 6711/DAQCard-67158,192 samples
NI 671316,384 samples

DMA modes

(NI 6711/6713 only) Scatter-gather

DMA channels

(NI 6711/6713 only).....3

Accuracy Information

Nominal Range at Full Scale (V)	Absolute Accuracy				
	% of Reading			Offset (mV)	Temp Drift (%/°C)
	24 Hours	90 Days	1 Year		
±10	0.0177%	0.0197%	0.0219%	±5.933	0.0005%

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±0.3 LSB typ,
±0.5 LSB max
Before calibration±4.0 LSB max

Offset error

After calibration ±1.0 mV typ,
±5.9 mV max
Before calibration ±200 mV max

DNL

After calibration±0.3 LSB typ,
±1.0 LSB max
Before calibration±3.0 LSB max

Gain error (relative to internal reference)

After calibration ±0.01% of output max
Before calibration ±0.5% of output max

Monotonicity12 bits guaranteed after calibration

Gain error (relative to external reference)

..... +0.0 to +0.67% of output max, not adjustable at >4 V

Voltage Output

Ranges	± 10 V, \pm 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	10 k Ω

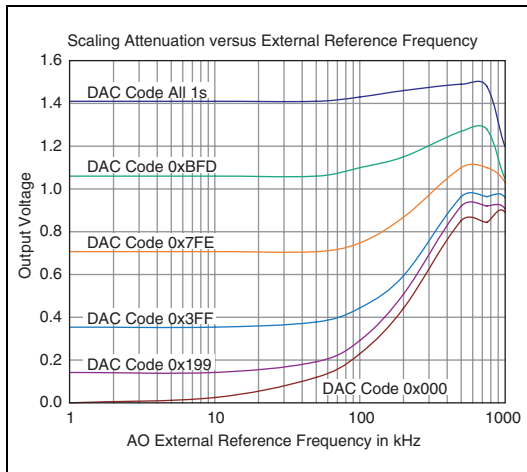


Figure 1. NI 6711/6713 Scaling Attenuation versus External Reference Frequency



Note (NI 6711/6713 Only) External reference input is always a 1.414 V peak-to-peak sine wave.

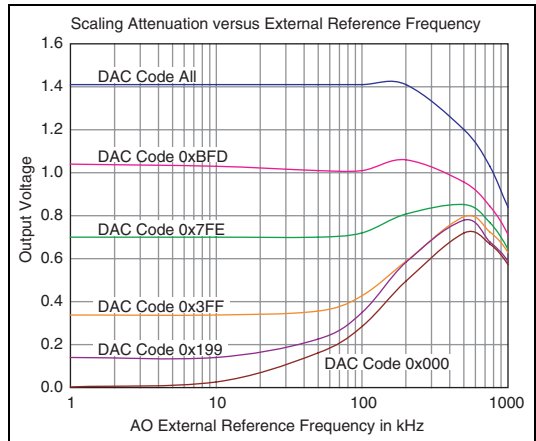


Figure 2. NI DAQCard-6715 Scaling Attenuation versus External Reference Frequency

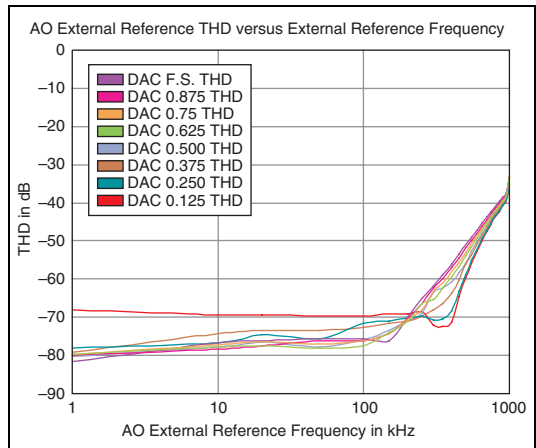


Figure 3. NI 6711/6713 AO External Reference THD versus External Reference Frequency

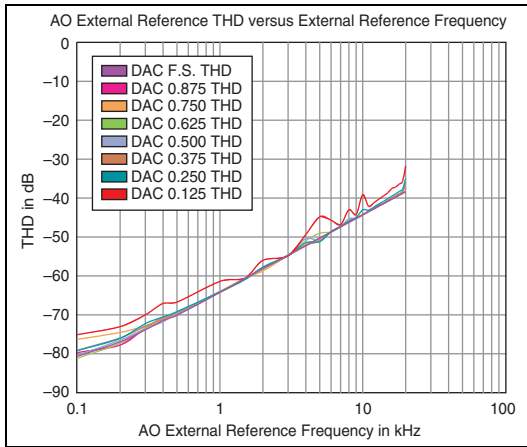


Figure 4. NI DAQCard-6715 AO External Reference THD versus External Reference Frequency

Dynamic Characteristics

Slew rate20 V/ μ s

Noise

NI 6711/6713200 V_{rms}, DC to 1 MHz

NI DAQCard-6715400 μ V_{rms}, DC to 1 MHz

Glitch energy (at mid-scale transition,
NI DAQCard-6715 only)

Magnitude

Reglitching disabled \pm 20 mV

Reglitching enabled \pm 4 mV

Duration1.5 μ s

Channel crosstalk

NI 6711/6713-70 dB with SH68-68-EP
cable (generating a 10 V,
10 point sinusoidal at
100 kHz on the reference
channel)

NI DAQCard-6715-60 dB (generating a
10 V, 10 point sinusoidal
at 100 kHz on the
reference channel)

Settling time3.0 μ s to \pm 0.5 LSB
accuracy

Total harmonic distortion-80 dB typ (generating a
10 V, 1,000 point, 750 Hz
sine wave, summing
9 harmonics)

Stability

Offset temperature coefficient \pm 50 μ V/ $^{\circ}$ C

Gain temperature coefficient

Internal reference \pm 25 ppm/ $^{\circ}$ C

External reference \pm 25 ppm/ $^{\circ}$ C

Onboard calibration reference

Level 5.000 V (\pm 2.5 mV)
(actual value stored in
EEPROM)

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

Long-term stability \pm 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 μ A
Input high current ($V_{in} = 5$ V)	—	10 μ A
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 Programmed I/O

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% over operating
temperature

Max source frequency.....	20 MHz
External source selections (NI DAQCard-6715 only).....	PFI <0..9>, software-selectable
External gate selections (NI DAQCard-6715 only).....	PFI <0..9>, software-selectable
Min source pulse duration.....	10 ns, edge-detect mode
Min gate pulse duration	10 ns, edge-detect mode
Data transfers	
NI 6711/6713.....	DMA, interrupts, programmed I/O
NI DAQCard-6715.....	Interrupts, programmed I/O
DMA modes (NI 6711/6713 only)	Scatter-gather

Triggers

Digital Trigger

Purpose	
Analog output	Start trigger, gate, clock
Counter/timers	Source, gate
Source	PFI <0..9>
Slope (NI DAQCard-6715 only).....	Positive or negative; software-selectable
Compatibility	TTL
Response	Rising or falling edge
Pulse width.....	10 ns min

RTSI Bus (PCI-6711/6713 Only)

Trigger lines <0..6>	7
RTSI clock	1

PXI Trigger Bus (PXI-6711/6713 Only)

Trigger lines <0..5>	6
Star trigger	1
Clock	1

Bus Interface

NI PCI-6711/6713.....	5 V PCI master, slave
NI PXI-6711/6713	PXI/CompactPCI master, slave

NI DAQCard-6715	16-bit PC Card (PCMCIA)
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Power Requirement

NI 6711	
+5 VDC ($\pm 5\%$)	0.80 A typ, 1.0 A max
Power available at I/O connector	+4.65 to +5.25 VDC at 1 A
NI 6713	
+5 VDC ($\pm 5\%$)	1.25 A typ, 1.5 A max
Power available at I/O connector	+4.65 to +5.25 VDC at 1 A
NI DAQCard-6715	
+5 VDC ($\pm 5\%$)	160 mA typ, 250 mA max plus any current used from the I/O connector

Physical

Dimensions (not including connectors)

NI PCI-6711/6713.....	17.5 × 10.7 cm (6.87 × 4.2 in.)
NI PXI-6711/6713	16 × 10 cm (6.3 × 3.9 in.)
NI DAQCard-6715	Type II PC Card

I/O connector

NI 6711/6713	68-pin male SCSI-II type
NI DAQCard-6715	68-pin female Honda connector

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 6711/6713/DAQCard-6715 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 altitude2,000 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:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; 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.

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Device Pinouts

AO GND	34	68	NC
NC	33	67	AO GND
AO GND	32	66	AO GND
AO GND	31	65	NC
NC	30	64	AO GND
AO GND	29	63	AO GND
NC	28	62	NC
AO GND	27	61	AO GND
AO GND	26	60	NC
AO 3	25	59	AO GND
AO GND	24	58	AO GND
AO GND	23	57	AO 2
AO 0	22	56	AO GND
AO 1	21	55	AO GND
AO EXT REF	20	54	AO GND
P0.4	19	53	D GND
D GND	18	52	P0.0
P0.1	17	51	P0.5
P0.6	16	50	D GND
D GND	15	49	P0.2
+5 V	14	48	P0.7
D GND	13	47	P0.3
D GND	12	46	NC
PFI 0	11	45	EXT STROBE
PFI 1	10	44	D GND
D GND	9	43	PFI 2
+5 V	8	42	PFI 3/CTR 1 SOURCE
D GND	7	41	PFI 4/CTR 1 GATE
PFI 5/AO SAMP CLK	6	40	CTR 1 OUT
PFI 6/AO START TRIG	5	39	D GND
D GND	4	38	PFI 7
PFI 9/CTR 0 GATE	3	37	PFI 8/CTR 0 SOURCE
CTR 0 OUT	2	36	D GND
FREQ OUT	1	35	D GND

NC = No Connect

Figure 5. NI 6711 68-Pin AO I/O Connector Pin Assignments

AO GND	34	68	NC
NC	33	67	AO GND
AO GND	32	66	AO GND
AO GND	31	65	AO 7
AO 6	30	64	AO GND
AO GND	29	63	AO GND
AO 5	28	62	NC
AO GND	27	61	AO GND
AO GND	26	60	AO 4
AO 3	25	59	AO GND
AO GND	24	58	AO GND
AO GND	23	57	AO 2
AO 0	22	56	AO GND
AO 1	21	55	AO GND
AO EXT REF	20	54	AO GND
P0.4	19	53	D GND
D GND	18	52	P0.0
P0.1	17	51	P0.5
P0.6	16	50	D GND
D GND	15	49	P0.2
+5 V	14	48	P0.7
D GND	13	47	P0.3
D GND	12	46	NC
PFI 0	11	45	EXT STROBE
PFI 1	10	44	D GND
D GND	9	43	PFI 2
+5 V	8	42	PFI 3/CTR 1 SOURCE
D GND	7	41	PFI 4/CTR 1 GATE
PFI 5/AO SAMP CLK	6	40	CTR 1 OUT
PFI 6/AO START TRIG	5	39	D GND
D GND	4	38	PFI 7
PFI 9/CTR 0 GATE	3	37	PFI 8/CTR 0 SOURCE
CTR 0 OUT	2	36	D GND
FREQ OUT	1	35	D GND

NC = No Connect

Figure 6. NI 6713/DAQCard-6715 68-Pin AO I/O Connector Pin Assignments

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