

R Series Intelligent DAQ – Data Acquisition and Control with Onboard Processing

Specifications

Analog Input (NI 783xR/784xR/785xR Only)

Input Characteristics

Number of channels	4
NI 7830R	8
NI 7831R/7833R/784xR/785xR	DIFF, RSE, NRSE (software-selectable; selection applies to all channels)
Input modes	Successive approximation
Type of ADC	16 bits, 1 in 65,536
Resolution	
Conversion time	
NI 783xR/NI 784xR	4 μ s
NI 785xR	1 μ s
Maximum sampling rate	
NI 783xR/NI 784xR	200 kS/s (per channel)
NI 785xR	750 kS/s (per channel)
Input impedance	
Powered on	10 G Ω in parallel with 100 pF
Powered off/overload	4.0 k Ω min
Input signal range	± 10 V
Input bias current	
NI 783xR	± 2 nA
NI 784xR/785xR	± 5 nA
Input offset current	
NI 783xR	± 1 nA
NI 784xR/785xR	± 5 nA
Input coupling	DC
Maximum working voltage (signal + common mode)	Inputs should remain within ± 12 V of ground
Overvoltage protection	
Powered on	± 42 V
Powered off	± 35 V
Data transfers	DMA, interrupts, programmed I/O

Accuracy Information – NI 783xR

Nominal Range (V)	Absolute Accuracy					Relative Accuracy	
	% of Reading	Noise + Quantization	Absolute Accuracy	Temp Drift	Scale	Resolution (μ V)	
Positive Full Scale	Negative Full Scale	24 Hours	1 Year	Offset Point	Single Point	Single Point	Averaged
10.0	-10.0	0.0496	0.0507	2.542	1.779	165	0.0005 7.78 2.170 217

Note: 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.

Accuracy Information – NI 784xR/785xR

Nominal Range (V)	Absolute Accuracy					Relative Accuracy	
	% of Reading	Noise + Quantization	Absolute Accuracy	Temp Drift	Scale	Resolution (μ V)	
Positive Full Scale	Negative Full Scale	24 Hours	1 Year	Offset Point	Single Point	Single Point	Averaged
10.0	-10.0	0.0186	0.0228	1.591	1.029	91.6	0.0005 3.97 1.205 121

Note: 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.

DC Transfer Characteristics

INL	
NI 783xR	± 3 LSB typ, ± 6 LSB max
NI 784xR/785xR	± 1 LSB typ, ± 3 LSB max
DNL	
NI 783xR	-1.0 to +2.0 LSB max
NI 784xR/785xR	± 0.4 LSB typ, ± 0.9 LSB max
No missing codes	
NI 783xR	16 bits typ, 15 bits min
NI 784xR/785xR	16 bits guaranteed
CMRR, DC to 60 Hz	-86 dB

Settling Time

Device	Step Size	Accuracy		
		16 LSB	4 LSB	2 LSB
NI 783xR	± 20.0 V	7.5 μ s	10.3 μ s	40 μ s
	± 2.0 V	2.7 μ s	4.1 μ s	5.1 μ s
	± 0.2 V	1.7 μ s	2.9 μ s	3.6 μ s
NI 784xR/ 785xR	± 20.0 V	2.1 μ s	4.2 μ s	8 μ s
	± 2.0 V	1.3 μ s	1.6 μ s	1.8 μ s
	± 0.2 V	0.8 μ s	1.1 μ s	1.2 μ s

Crosstalk..... -80 dB, DC to 100 kHz

Dynamic Characteristics

Bandwidth	
NI 783xR	
Small signal (-3 dB)	650 kHz
Large signal (1% THD)	55 kHz
NI 784xR/785xR	
Small signal (-3 dB)	1 MHz
Large signal (1% THD)	500 kHz

Analog Output (NI 783xR/784xR/785xR Only)

Output Characteristics

Number of channels	4
NI 7830R	8
NI 7831R/7833R/784xR/785xR	Single-ended, voltage output
Output type	16 bits, 1 in 65,536
Resolution	1.0 μ s
Update time	1 MS/s
Maximum update rate	Enhanced R-2R
Type of DAC	DMA, interrupts, programmed I/O
Data transfers	

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