ANALOG DEVICES

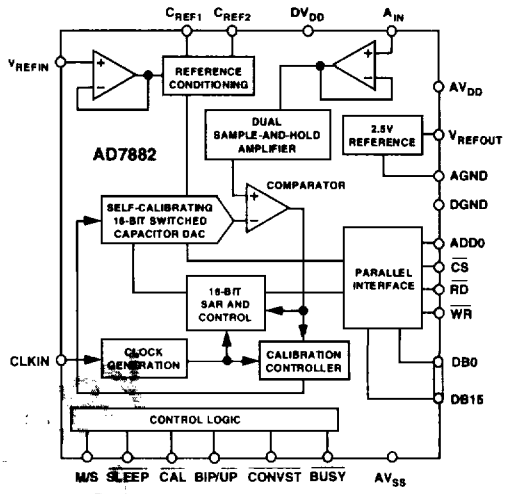
LC²MOS 16-Bit, 2.5 µs, Sampling ADC

AD7882

FEATURES
2.5 µs Throughput Time
16-Bit Sampling ADC
Self-Calibration
High Speed Parallel Interface
92 dB Signal-to-Noise Ratio
Low Power: 200 mW typ
1 mW in Power-Down Mode
Unipolar and Bipolar Input Signal Ranges
On-Chip 2.5 V Reference
Operates from ±5 V Supplies

APPLICATIONS
Data Acquisition Systems
Digital Signal Processing
Spectrum Analysis
DSP Servo Control

FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The AD7882 is a fast, 16-bit self-calibrating A/D converter. It consists of a sample-and-hold amplifier, a self-calibrating 16-bit ADC, a 2.5 V reference and versatile interface logic. An on-chip controller manages the self-calibrating algorithm that reduces linearity, offset and gain errors to ±0.0015%. System offset and gain errors, caused by external conditioning circuitry, can also be included in the calibration procedure. Throughput time is minimized at 2.5 µs by the use of a dual sample-and-hold amplifier. The ADC also has a self-contained internal clock which is laser trimmed to guarantee accurate control of conversion time; alternatively, an external clock may be used.

Another feature of the AD7882 is a power-down mode that reduces power dissipation from its normal operating value of 200 mW to 1 mW.

The AD7882 operates from ±5 V supplies. Analog input ranges can be unipolar, 0 V to 2.5 V, or bipolar, ±2.5 V. The analog input bandwidth is 200 kHz.

In addition to traditional dc accuracy specifications such as linearity, the AD7882 is also fully specified for dynamic performance parameters including harmonic distortion and signal-to-noise ratio (SNR).

The AD7882 is fabricated in Analog Devices' Linear Compatible CMOS (LC²MOS), an advanced, mixed technology process that combines precision bipolar circuits with low power, high speed CMOS logic. The part is available in a 44-pin plastic quad flatpack (PQFP) and 40-pin cerdip.

PRODUCT HIGHLIGHTS

1. Fast 2.5 µs Throughput Time
   A fast 2.5 µs throughput time makes the AD7882 suitable for a wide range of data acquisition applications.
2. Self-Calibration Achieves High Accuracy
   A self-calibrating algorithm minimizes linearity, offset and gain errors. The calibration procedure can also include external offset and gain errors.

ORDERING GUIDE

Model	Temperature Range	Integral Nonlinearity (LSB)	Package Option*
AD7882SQ	–55°C to +125°C	±0.5 typ	Q-40
AD7882TQ	–55°C to +125°C	±1 max	Q-40
AD7882AS	–40°C to +85°C	±0.5 typ	S-44
AD7882BS	–40°C to +85°C	±1 max	S-44
AD7882SX	–55°C to +125°C	±0.5 typ	X-44
AD7882TX	–55°C to +125°C	±1 max	X-44

*Q = Cerdip; S = PQFP; X = Cerquad. For outline information see Package Information section.

AD7882—SPECIFICATIONS (AV_{DD} = 5 V ± 5%, DV_{DD} = 5 V ± 5%, AV_{SS} = −5 V ± 5%, V_{REFIN} = 2.5 V, AGND = DGND = 0 V, f_{CLKIN} = 10 MHz, f_{SAMPLE} = 400 kHz. All specifications T_{MIN} to T_{MAX} unless otherwise noted.)

Parameter	A, S Versions[1]	B, T Versions[1]	Units	Test Conditions/Comments
DYNAMIC PERFORMANCE[2]				
Signal to (Noise + Distortion Ratio)	90	90	dB min	A_{IN} = 10 kHz, Typical SNR = 92 dB
	85	85	dB min	A_{IN} = 100 kHz, Typical SNR = 87 dB
THD	−95	−95	dB max	A_{IN} = 10 kHz, Typical THD = −100 dB
	−88	−88	dB max	A_{IN} = 100 kHz, Typical THD = −90 dB
Peak Harmonic or Spurious Noise	−98	−98	dB max	A_{IN} = 10 kHz, Typical Peak Harmonic = −100 dB
	−90	−90	dB max	A_{IN} = 100 kHz, Typical Peak Harmonic = −92 dB
Intermodulation Distortion (IMD)				
2nd Order Terms	−88	−88	dB max	f_A = 98 kHz, f_B = 100 kHz
3rd Order Terms	−88	−88	dB max	
Throughput Time	2.5	2.5	µs max	
Aperture Delay	10	10	ns typ	
Aperture Jitter	20	20	ps typ	
Noise	70	70	µV rms typ	
DC ACCURACY[2]				
Resolution	16	16	Bits	
Minimum Resolution for Which No Missing Codes are Guaranteed	16	16	Bits	
Integral Nonlinearity	±1/2	±1/2	LSB typ	
Integral Nonlinearity		±1.0	LSB max	
Differential Nonlinearity	±0.9	±0.5	LSB max	
Unipolar Offset Error	±2	±2	LSB max	
Unipolar Gain Error	±2	±2	LSB max	
Bipolar Zero Error	±2	±2	LSB max	
Bipolar Positive Gain Error	±2	±2	LSB max	
Bipolar Negative Gain Error	±2	±2	LSB max	
POWER SUPPLY REJECTION				
AV_{DD} Only	84	84	dB typ	
AV_{SS} Only	84	84	dB typ	
ANALOG I/P				
Input Current	±1	±1	µA max	Input Range = 0 V to +2.5 V or ±2.5 V
Input Capacitance[3]	20	20	pF max	
REFERENCE OUTPUT				
V_{REFOUT} @ +25°C	2.5	2.5	Volts Nominal	±1%
V_{REFOUT} Tempco	20	20	ppm/°C typ	
REFERENCE INPUT				
V_{REFIN} Range	2.5	2.5	Volts	±2%
V_{REFIN} Current	±1	±1	µA max	
LOGIC INPUTS				
Input High Voltage, V_{INH}	2.4	2.4	Volts min	
Input Low Voltage, V_{INL}	0.8	0.8	Volts max	
Input Current	±10	±10	µA max	
Input Capacitance[3]	10	10	pF max	
$\overline{SLEEP}$ INPUT				
Input High Voltage, V_{INH}	V_{DD} − 0.2	V_{DD} − 0.2	Volts min	
Input Low Voltage, V_{INL}	0.2	0.2	Volts max	
CLKIN INPUT				
Negative Trigger Level	−2	−2	Volts min	This is the Trigger Level for Choosing Internal Clock Operation of the Device

NOTES

[1]Temperature ranges are as follows: A, B Versions: −40°C to +85°C; S, T Versions: −55°C to +125°C.

[2]Specifications apply after calibration.

[3]Sample tested at +25°C to ensure compliance.

Specifications subject to change without notice.

This information applies to a product under development. Its characteristics and specifications are subject to change without notice. Analog Devices assumes no obligation regarding future manufacture unless otherwise agreed to in writing.