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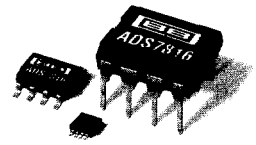


ADS7816

www.burr-brown.com/databook/ADS7816.html

12-Bit High Speed Micro Power Sampling ANALOG-TO-DIGITAL CONVERTER

FEATURES

- 200kHz SAMPLING RATE
- MICRO POWER:
  1.9mW at 200kHz
  150µW at 12.5kHz
- POWER DOWN: 3µA Max
- 8-PIN MINI-DIP, SOIC, AND MSOP
- DIFFERENTIAL INPUT
- SERIAL INTERFACE

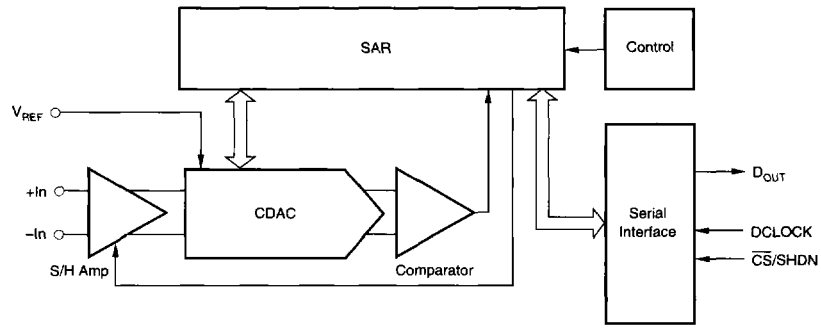
APPLICATIONS

- BATTERY OPERATED SYSTEMS
- REMOTE DATA ACQUISITION
- ISOLATED DATA ACQUISITION

DESCRIPTION

The ADS7816 is a 12-bit, 200kHz sampling analog-to-digital converter. It features low power operation with automatic power down, a synchronous serial interface, and a differential input. The reference voltage can be varied from 100mV to 5V, with a corresponding resolution from 24µV to 1.22mV.

Low power, automatic power down, and small size make the ADS7816 ideal for battery operated systems or for systems where a large number of signals must be acquired simultaneously. It is also ideal for remote and/or isolated data acquisition. The ADS7816 is available in an 8-pin plastic mini-DIP, an 8-lead SOIC, or an 8-lead MSOP package.



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SPECIFICATIONS

At –40°C to +85°C, $+V_{CC}$ = +5V, V_{REF} = +5V, f_{SAMPLE} = 200kHz, f_{CLK} = 16 • f_{SAMPLE}, unless otherwise specified.

PARAMETER	CONDITIONS	ADS7816 MIN	ADS7816 TYP	ADS7816 MAX	ADS7816B MIN	ADS7816B TYP	ADS7816B MAX	ADS7816C MIN	ADS7816C TYP	ADS7816C MAX	UNITS
ANALOG INPUT											
Full-Scale Input Span	+In – (–In)	0		V_{REF}	*		*	*		*	V
Absolute Input Voltage	+In	–0.2		V_{CC} +0.2	*		*	*		*	V
	–In	–0.2		+0.2	*		*	*		*	V
Capacitance			25			*			*		pF
Leakage Current			±1			*			*		µA
SYSTEM PERFORMANCE											
Resolution			12			*			*		Bits
No Missing Codes		11			12			*			Bits
Integral Linearity Error			±0.5	±2		±0.5	±2		±0.5	±1	LSB[1]
Differential Linearity Error			±0.5	±2		±0.5	±1		±0.25	±0.75	LSB
Offset Error				±4			*			*	LSB
Gain Error				±4			*			*	LSB
Noise			33			*			*		µVrms
Power Supply Rejection			82			*			*		dB
SAMPLING DYNAMICS											
Conversion Time				12			*			*	Clk Cycles
Acquisition Time		1.5			*			*			Clk Cycles
Throughput Rate				200			*			*	kHz
DYNAMIC CHARACTERISTICS											
Total Harmonic Distortion	V_{IN} = 5.0Vp-p at 1kHz		–84			*			*		dB
	V_{IN} = 5.0Vp-p at 5kHz		–82			*			*		dB
SINAD	V_{IN} = 5.0Vp-p at 1kHz		72			*			*		dB
Spurious Free Dynamic Range	V_{IN} = 5.0Vp-p at 1kHz		86			*			*		dB
REFERENCE INPUT											
Voltage Range		0.1		5	*		*	*		*	V
Resistance	$\overline{CS}$ = GND, f_{SAMPLE} = 0Hz		5			*			*		GΩ
	$\overline{CS}$ = V_{CC}		5			*			*		GΩ
Current Drain	At Code 710h		38	100		*	*		*	*	µA
	f_{SAMPLE} = 12.5kHz		2.4	20		*	*		*	*	µA
	$\overline{CS}$ = V_{CC}		0.001	3		*	*		*	*	µA
DIGITAL INPUT/OUTPUT											
Logic Family			CMOS			*			*		
Logic Levels:											
V_{IH}	I_{IH} = +5µA	3		$+V_{CC}$ +0.3	*		*	*		*	V
V_{IL}	I_{IL} = +5µA	–0.3		0.8	*		*	*		*	V
V_{OH}	I_{OH} = –250µA	3.5			*			*			V
V_{OL}	I_{OL} = 250µA			0.4			*			*	V
Data Format			Straight Binary			*			*		
POWER SUPPLY REQUIREMENTS											
V_{CC}	Specified Performance	4.50		5.25	*		*	*		*	V
Quiescent Current			380	700		*	*		*	*	µA
	f_{SAMPLE} = 12.5kHz[2, 3]		30			*			*		µA
	f_{SAMPLE} = 12.5kHz[3]		280	400		*			*		µA
Power Down	$\overline{CS}$ = V_{CC}, f_{SAMPLE} = 0Hz			3			*			*	µA
TEMPERATURE RANGE											
Specified Performance		–40		+85	*		*	*		*	°C

* Specifications same as ADS7816.

NOTE: (1) LSB means Least Significant Bit, with V_{REF} equal to +5V, one LSB is 1.22mV. (2) f_{CLK} = 3.2MHz, $\overline{CS}$ = V_{CC} for 241 clock cycles out of every 256. (3) See the Power Dissipation section for more information regarding lower sample rates.

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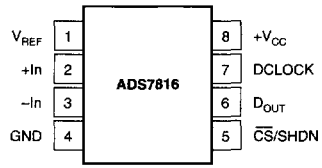
ABSOLUTE MAXIMUM RATINGS[1]

$+V_{CC}$	+6V
Analog Input	−0.3V to ($+V_{CC}$ + 0.3V)
Logic Input	−0.3V to ($+V_{CC}$ + 0.3V)
Case Temperature	+100°C
Junction Temperature	+150°C
Storage Temperature	+125°C
External Reference Voltage	+5.5V

NOTE: (1) Stresses above these ratings may permanently damage the device.

PIN CONFIGURATION



8-Pin PDIP,
8-Lead SOIC,
8-Lead MSOP

ELECTROSTATIC DISCHARGE SENSITIVITY

Electrostatic discharge can cause damage ranging from performance degradation to complete device failure. Burr-Brown Corporation recommends that all integrated circuits be handled and stored using appropriate ESD protection methods.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet published specifications.

PIN ASSIGNMENTS

PIN	NAME	DESCRIPTION
1	V_{REF}	Reference Input.
2	+In	Non Inverting Input.
3	−In	Inverting Input. Connect to ground or to remote ground sense point.
4	GND	Ground.
5	$\overline{CS}$/SHDN	Chip Select when LOW, Shutdown Mode when HIGH.
6	D_{OUT}	The serial output data word is comprised of 12 bits of data. In operation the data is valid on the falling edge of DCLOCK. The second clock pulse after the falling edge of $\overline{CS}$ enables the serial output. After one null bit the data is valid for the next 12 edges.
7	DCLOCK	Data Clock synchronizes the serial data transfer and determines conversion speed.
8	$+V_{CC}$	Power Supply.

PACKAGE/ORDERING INFORMATION

PRODUCT	MAXIMUM INTEGRAL LINEARITY ERROR (LSB)	MAXIMUM DIFFERENTIAL LINEARITY ERROR (LSB)	TEMPERATURE RANGE	PACKAGE	PACKAGE DRAWING NUMBER[1]
ADS7816P	±2	±2	−40°C to +85°C	Plastic DIP	006
ADS7816U	±2	±2	−40°C to +85°C	SOIC	182
ADS7816E	±2	±2	−40°C to +85°C	MSOP	337
ADS7816PB	±2	±1	−40°C to +85°C	Plastic DIP	006
ADS7816UB	±2	±1	−40°C to +85°C	SOIC	182
ADS7816EB	±2	±1	−40°C to +85°C	MSOP	337
ADS7816PC	±1	±0.75	−40°C to +85°C	Plastic DIP	006
ADS7816UC	±1	±0.75	−40°C to +85°C	SOIC	182
ADS7816EC	±1	±0.75	−40°C to +85°C	MSOP	337

NOTE: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book.