ANALOG DEVICES

AN-607
APPLICATION NOTE

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Selecting a Low Bandwidth (<15 kSPS) Σ-Δ ADC

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INTRODUCTION

Analog Devices has a wide range of low bandwidth, high resolution Σ-Δ ADCs. Along with the ADC, these devices contain current sources, a multiplexer, a PGA, and analog input buffers on-board. This application note identifies some of the applications in which the ADCs are used as well as identifies the most suitable ADCs for each application.

Number of Bits

16-Bit: AD7705, AD7706, AD7707, AD7708, AD7709, AD7715, AD7788, AD7790, AD7792, AD7798

24-Bit: AD7710, AD7711, AD7711A, AD7712, AD7713, AD7714, AD7718, AD7719, AD7730, AD7730L, AD7731, AD7732, AD7734, AD7738, AD7739, AD7782, AD7783, AD7787, AD7789, AD7791, AD7793, AD7794, AD7799

Multichannel Applications

High Throughput: AD7731, AD7734, AD7738, AD7739

Low Throughput: AD7708, AD7714, AD7718, AD7794

Temperature Measurements

For thermal diode and RTD applications, current sources are required.

Thermocouple: AD7714, AD7719, AD7792/AD7793, AD7794

Thermal Diode: AD7709

RTD: AD7711, AD7719, AD7783, AD7792/AD7793, AD7794

Pressure

Requirements: Low level differential analog inputs with a high level differential reference input for ratiometric operation. Optional features include an auxiliary ADC that can be used for temperature compensation.

AD7710, AD7714, AD7719, AD7730, AD7798/AD7799

Weighscale

Requirements: Low level differential analog inputs with a high level differential reference input for ratiometric operation. Optional features include an auxiliary ADC that can be used for temperature compensation, fast-step, ac excitation, a reference detect circuit, and increased filter rejection in the out-of-band region.

AD7714, AD7719, AD7730, AD7730L, AD7798/AD7799

Low Power

AD7705/AD7706, AD7714, AD7715, AD7719, AD7787, AD7788/AD7789, AD7790/AD7791, AD7792/AD7793, AD7794, AD7798/AD7799

High Analog Input Voltages (±10 V)

AD7707, AD7712, AD7732, AD7734

Rail-to-Rail On-Chip Buffers

AD7708/AD7718, AD7709, AD7719, AD7782, AD7783, AD7787, AD7790/AD7791

Bipolar Inputs (±2.5 V)

AD7710, AD7711, AD7712

Pin Configurable

AD7782, AD7783

Sumary of Low Bandwidth Σ-Δ ADCs

Model	No. of Bits	Min Input Range (V)	Max Input Range (V)	P-P Res. @ Max Range (Bits)	P-P Res. @ Data Rate (Hz)	AIN Chan.	On-Chip AIN Buffer	On-Chip Current Source	Power Supply Current (mA)	Price $/1k	Coments
AD7701	16	2.5	2.5	16	4000	1			5	15.70	10 Hz Bandwidth
AD7703	20	2.5	2.5	17	4000	1			5	13.26	10 Hz Bandwidth
AD7705	16	0.02	2.5	16	60	2	Y		0.3	4.12	
AD7706	16	0.02	2.5	16	60	3	Y		0.3	4.12	
AD7707	16	0.02	10	16	60	3	Y		0.28	4.46	
AD7708	16	0.02	2.56	16	20	10	Y		1.28	3.98	
AD7709	16	0.02	2.56	16	20	4	Y	Y	1.25	3.89	
AD7710	24	0.02	2.5	17.5	60	2			5	14.45	
AD7711	24	0.02	2.5	17.5	60	2		Y	5	15.30	2 Current Sources
AD7711A	24	0.02	2.5	17.5	60	2		Y	5	15.30	1 Current Source
AD7712	24	0.02	2.5	17.5	60	2			5	13.20	
AD7713	24	0.02	2.5	16	20	3		Y	0.7	16.15	
AD7714	24	0.02	2.5	17.5	60	5	Y		0.35	8.28	
AD7715	16	0.02	2.5	16	60	1	Y		0.35	5.65	
AD7718	24	0.02	2.56	18.5	20	10	Y		1.28	5.24	
AD7719	24	0.02	2.56	18.5	20	5	Y	Y	1.5	8.76	Dual ADC
AD7730	24	0.01	0.08	17	200	2	Y		13	11.60	Weighscale
AD7730L	24	0.01	0.08	17	200	2	Y		13	9.55	Weighscale
AD7731	24	0.02	1.28	17	800	5	Y		13.5	9.86	
AD7732	24	5	10	16	2000	2	Y		18	8.50	Fast Ch. Switching
AD7734	24	5	10	16	2000	4	Y		18	8.50	Fast Ch. Switching
AD7738	24	0.625	2.5	16	8500	8	Y		18	7.77	Fast Ch. Switching
AD7739	24	0.625	2.5	16	4000	8	Y		14	7.65	Fast Ch. Switching
AD7782	24	0.16	2.56	18.5	20	2	Y		1.3	4.25	Read-only
AD7783	24	0.16	2.56	18.5	20	1	Y		1.3	4.25	Read-only
AD7787	24	2.5	2.5	19	16.6	2	Y		0.13	3.80	Low Power
AD7788	16	2.5	2.5	16	16.6	1			0.065	1.99	Low Power
AD7789	24	2.5	2.5	19	16.6	1			0.065	2.95	Low Power
AD7790	16	0.3125	2.5	16	16.6	1	Y		0.13	2.96	Low Power
AD7791	24	2.5	2.5	19	16.6	1	Y		0.13	3.83	Low Power
AD7792	16	0.01	2.5	16	16.6	3	Y	Y	0.40	3.99	On-Chip Reference
AD7793	24	0.01	2.5	19	16.6	3	Y	Y	0.40	5.10	On-Chip Reference
AD7794	24	0.01	2.5	19	16.6	6	Y	Y	0.40	4.80	High Channel Count
AD7798	16	0.01	2.5	16	16.6	3	Y		0.30	3.80	Weight/Pressure
AD7799	24	0.01	2.5	19	16.6	3	Y		0.38	4.35	Weight/Pressure

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