

Selecting a Low Bandwidth (<15 kSPS) Sigma-Delta ADC

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INTRODUCTION

Analog Devices, Inc., 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 and also identifies the most suitable ADCs for each application.

NUMBER OF BITS

16-Bit: AD7705, AD7706, AD7707, AD7708, AD7709, AD7715, AD7788, AD7790, AD7792, AD7795, AD7796, 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, AD7797, AD7799

MULTICHANNEL APPLICATIONS

High Throughput: AD7731, AD7734, AD7738, AD7739

Low Throughput: AD7708/AD7718, AD7714, AD7794/AD7795

TEMPERATURE MEASUREMENT

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

Thermocouple: AD7714, AD7719, AD7792/AD7793, AD7794/AD7795

Thermal Diode: AD7709

RTD: AD7711, AD7719, AD7783, AD7792/AD7793, AD7794/AD7795

PRESSURE MEASUREMENT

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

WEIGH SCALE MEASUREMENT

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, AD7796/AD7797, AD7798/AD7799

LOW POWER

AD7705/AD7706, AD7714, AD7715, AD7719, AD7787, AD7788/AD7789, AD7790, AD7791, AD7792/AD7793, AD7794/AD7795, AD7796/AD7797, 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

Table 1. Summary of Low Bandwidth Σ - Δ ADCs

Part No.	Bits	P-P Resolution @ Max Range (Bits)	P-P Resolution @ Data Rate (Hz)	AIN Channels	On-Chip PGA	On-Chip AIN Buffer	On-Chip Current Source	AVDD/ DVDD (V)	Power Supply Current (mA)	Price (\$/1k)	Comments
AD7701	16	16	4000	1				5	5	15.70	10 Hz bandwidth
AD7703	20	17	4000	1				5	5	13.26	10 Hz bandwidth
AD7705	16	16	60	2	Y	Y		3/5	0.3	4.12	
AD7706	16	16	60	3	Y	Y		3/5	0.3	4.12	
AD7707	16	16	60	3	Y	Y		3/5	0.28	4.46	
AD7708	16	16	20	10	Y	Y		3/5	1.28	3.98	
AD7709	16	16	20	4	Y	Y	Y	3/5	1.25	3.89	
AD7710	24	17.5	60	2	Y			5	5	14.45	
AD7711	24	17.5	60	2	Y		Y	5	5	15.30	Two current sources
AD7711A	24	17.5	60	2	Y		Y	5	5	15.30	One current source
AD7712	24	17.5	60	2	Y			5	5	13.20	
AD7713	24	16	20	3	Y		Y	5	0.7	16.15	
AD7714	24	17.5	60	5	Y	Y		3/5	0.35	8.28	
AD7715	16	16	60	1	Y	Y		3/5	0.35	5.65	
AD7718	24	18.5	20	10	Y	Y		3/5	1.28	5.24	
AD7719	24	18.5	20	5	Y	Y	Y	3/5	1.5	8.76	Dual ADC
AD7730	24	17	200	2	Y	Y		AVDD: 5 DVDD: 3/5	13	11.60	Weigh scale
AD7730L	24	17	200	2	Y	Y		AVDD: 5 DVDD: 3/5	13	9.55	Weigh scale
AD7731	24	17	800	5	Y	Y		AVDD: 5 DVDD: 3/5	13.5	9.86	
AD7732	24	16	2000	2	Y	Y		AVDD: 5 DVDD: 3/5	18	8.50	Fast channel switching
AD7734	24	16	2000	4	Y	Y		AVDD: 5 DVDD: 3/5	18	8.50	Fast channel switching
AD7738	24	16	8500	8	Y	Y		AVDD: 5 DVDD: 3/5	18	7.77	Fast channel switching
AD7739	24	16	4000	8	Y	Y		AVDD: 5 DVDD: 3/5	14	7.65	Fast channel switching
AD7782	24	18.5	20	2	Y	Y		3/5	1.3	4.25	Read-only
AD7783	24	18.5	20	1		Y		3/5	1.3	4.25	Read-only
AD7787	24	19	16.6	2		Y		3/5	0.13	3.80	Low power
AD7788	16	16	16.6	1				3/5	0.065	1.99	Low power
AD7789	24	19	16.6	1				3/5	0.065	2.95	Low power
AD7790	16	16	16.6	1		Y		3/5	0.13	2.96	Low power
AD7791	24	19	16.6	1		Y		3/5	0.13	3.83	Low power
AD7792	16	16	16.6	3	Y	Y	Y	3/5	0.40	3.99	On-chip reference
AD7793	24	19	16.6	3	Y	Y	Y	3/5	0.40	5.10	On-chip reference
AD7794	24	19	16.6	6	Y	Y	Y	3/5	0.40	4.80	High channel count
AD7795	16	16	16.6	6	Y	Y	Y	3/5	0.40	4.40	High channel count
AD7796	16	15.5	16.6	1	Y	Y		3/5	0.25	2.75	Weigh scale
AD7797	24	15.5	16.6	1	Y	Y		3/5	0.25	3.35	Weigh scale
AD7798	16	16	16.6	3	Y	Y		3/5	0.30	3.80	Weigh scale/ pressure
AD7799	24	19	16.6	3	Y	Y		3/5	0.38	4.35	Weigh scale/ pressure