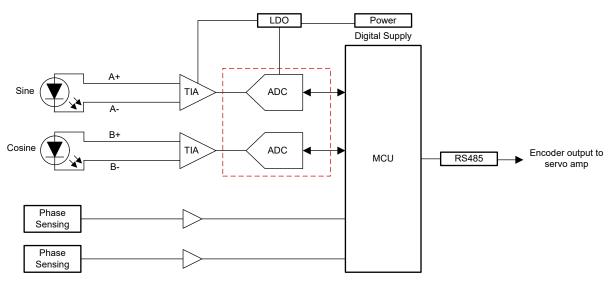
Precision ADCs for Motor Encoders and Position Sensing





Example: Optical Motor Encoder Block Diagram

Design Considerations

- Improving Response Time and Accuracy in Autonomous Robots With Wideband SAR-ADCs
- · Adjusting the Input Common-Mode Voltage for SAR ADCs to Avoid Amplifier Output Swing Limitations
- Optimizing Sensor Measurement: Driving a SAR ADC Input Without a Driver Amplifier

What are the Key Specifications for Analog-to-Digital Converters (ADCs) in Motor Encoders?

- Resolution: Higher resolution ADCs improve the position sensing accuracy in absolute and incremental encoders.
- Sampling rate: The signal-chain bandwidth required by the encoder is determined by the resolution (periods per revolution) and speed (revolutions per minute) of the motor. In typical applications, the signal-chain bandwidth needed is ≥ 500 kHz, so the precision ADC must have a sampling rate ≥ 1 MSPS.
- Size: Encoders are typically located on a PCB mounted on the motor; therefore, a small form factor ADC is required.

Need additional assistance? Ask our engineers a question on the TI E2E™ Data Converters Support Forum.

Recommended Parts

Part Number	Resolution	Sampling Rate (MSPS)	Channel Count	Input Type	Reference	Analog Supply	Package
			Gr	oup 1 ⁽¹⁾			
ADS7042	12	1	1	Single-ended	External	3.3 V	1.5 mm × 1.5 mm X2QFN
ADS7044				Differential			
ADS7046	12	3		Single-ended			
ADS7047				Differential			
ADS7052	14	1		Single-ended			
ADS7054				Differential			
ADS7056	14	2.5		Single-ended			
ADS7057				Differential			
			Gr	oup 2 ⁽¹⁾	1		
ADS7253	12	1	2	Single-ended	Internal and External	5 V	3 mm × 3 mm WQFN
ADS7254				Differential			
ADS7853	14	1		Single-ended			
ADS7854				Differential			
ADS8353	16	0.6		Single-ended			
ADS8354				Differential			
			Gr	oup 3 ⁽¹⁾		'	
ADS7223	12	1			Internal and External	5 V	5 mm × 5 mm VQFN
ADS7263	14	1	8 SE 4 DIFF	Single-ended, Differential			
ADS8363	16	1	7 011 1	Dilicicitia			
			Gr	oup 4 ⁽¹⁾	1		
ADS9234R	14	3.5	2	Differential	Internal and External	5 V	5 mm × 5 mm VQFN
ADS9224R	16	3					
			C	Froup 5	'		1
ADS9218	18	10	2	Differential	External	5 V	6 mm × 6 mm VQFN

⁽¹⁾ The devices that are grouped together are pin-to-pin compatible.

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