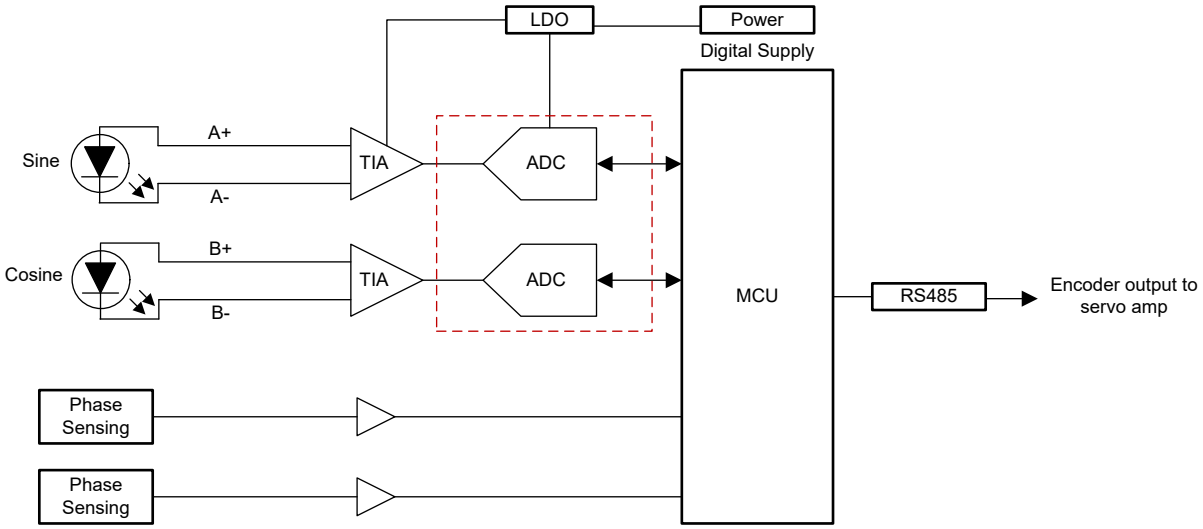
*Product Overview*

# *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 ≥ 500kHz, 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 |
|---|---|---|---|---|---|---|---|
| **Group 1** (1) | | | | | | | |
| ADS7042 | 12 | 1 | 1 | Single-ended | External | 3.3V | 1.5mm × 1.5mm 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 | | | |
| **Group 2** (1) | | | | | | | |
| ADS7253 | 12 | 1 | 2 | Single-ended | Internal and External | 5V | 3mm × 3mm WQFN |
| ADS7254 | | | | Differential | | | |
| ADS7853 | 14 | 1 | | Single-ended | | | |
| ADS7854 | | | | Differential | | | |
| ADS8353 | 16 | 0.6 | | Single-ended | | | |
| ADS8354 | | | | Differential | | | |
| **Group 3** (1) | | | | | | | |
| ADS7223 | 12 | 1 | 8 SE 4 DIFF | Single-ended, Differential | Internal and External | 5V | 5mm × 5mm VQFN |
| ADS7263 | 14 | 1 | | | | | |
| ADS8363 | 16 | 1 | | | | | |
| **Group 4** (1) | | | | | | | |
| ADS9234R | 14 | 3.5 | 2 | Differential | Internal and External | 5V | 5mm × 5mm VQFN |
| ADS9224R | 16 | 3 | | | | | |
| **Group 5**(1) | | | | | | | |
| ADS9229 | 16 | 20 | 2 | Differential | Internal and External | 5V | 6mm × 6mm VQFN |
| ADS9228 | | 10 | | | | | |
| ADS9227 | | 5 | | | | | |
| ADS9219 | 18 | 20 | | | | | |
| ADS9218 | | 10 | | | | | |
| ADS9217 | | 5 | | | | | |
| **Group 6**(1) | | | | | | | |
| ADS9327 | 16 | 5 | 2 | Differential | Internal and External | 5V and 3.3V | 3.5mm × 3.5mm VQFN |
| ADS9326 | | 3 | | | | | |

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

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