iC-MV

8-BIT HALL ENCODER WITH SERIAL INTERFACE

Magnetic encoder iC-MV has been optimized for multiturn measuring systems with up to four dependent axes and gear reduction ratios of between 1:2 and 1:32.

The sensor generates one sine and one cosine cycle per revolution of the magnet, enabling the angle to be clearly determined by the integrated 8-bit sine-to-digital converter. The internal signal conditioning unit provides a constant signal level that is independent of the magnetic field strength, supply voltage, and temperature. A loss-of-magnet condition can be indicated at alarm output NERR and via the serial interface (SSI protocol with an optional error bit).

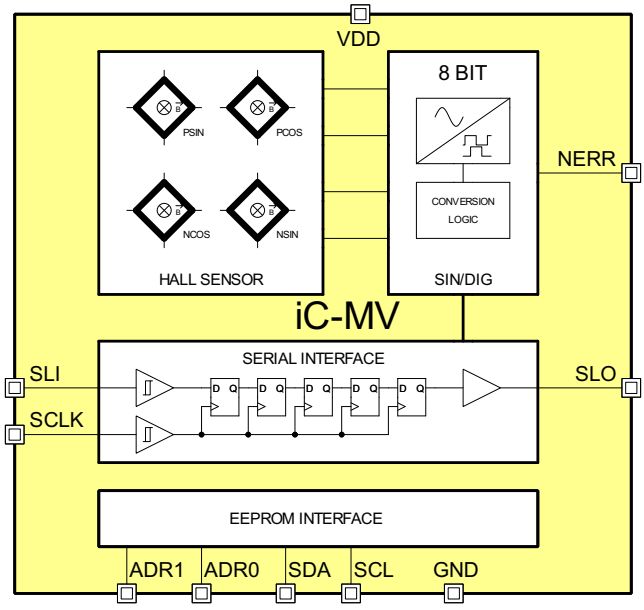
Two to four iC-MVs can be connected in series using their SLI and SLO pins. During data transmission, the position data of the fastest turning iC-MV is sent to the next slowest device. This then corrects its position data to match that of the previous IC and sends this in protocol to the next slowest chip. This procedure provides the SSI master with a multiturn data word that is synchronized with itself. Furthermore, in place of mechanical phase alignment between the gear stages, iC-MV features an offset register to compensate for the phase angle electronically.

Features

- Integrated Hall sensors with signal conditioning
- Automatic gain control with error detection (loss of magnet)
- 8-bit real-time interpolation for up to 24,000 rpm
- Binary interpolation factors from 2 to 8 bit
- Programmable zero position
- Cascadable serial shift register with SSI compatibility
- Bus-compatible EEPROM I²C interface
- Space saving features:
  small QFN16 3 mm x 3 mm package and recommended magnets of Ø 3 mm

Applications

- Contactless rotary switches
- Absolute rotary encoders
- Multiturn encoders



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iC-MV 8-BIT HALL ENCODER WITH SERIAL INTERFACE

The sensor permits reasonable alignment tolerances for the magnet and thus reduces assembly time and cost. If the radial alignment needs to be monitored, the automatic gain signal can be output to error pin NERR. During inspection, other iC-MVs connected up to the error line can be set to standby mode.

Up to four iC-MVs share one serial EEPROM sourcing their 4 bytes of CRC-protected setup data automatically on power up. No further active components are required to create a multiturn encoder system.

Key Specifications

General	
Supply Voltage	+4.5 V to +5.5 V
Supply Current	6 mA max.
Max. Rotation Speed	24,000 rpm
Magnetic Field Strength	20 to 100 kA/m
Hall Sensor Circle	Ø 1.5 mm
ESD Susceptibility	2 kV (HBM 100 pF, 1.5 kΩ)
Operational Temperature	-40 °C to +125 °C
Package (RoHS compliant)	QFN16 (3 mm x 3 mm)

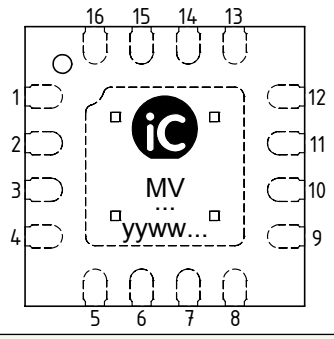
Sine-to-Digital	
Resolution	8 bit / 1.4°
Absolute Accuracy	2 LSB @ 8 bit

Serial Interface	
Clock Frequency	2 MHz max.
Timeout	typ. 20 µs
Synchronisation	1 bit (chip to chip)
Data Format	binary
Error Bits	configurable

Pin Functions

No.	Name	Function
1	n.c.	-
2	VDD	+4.5 V to +5.5 V Supply Voltage
3	NERR	Error Output (open drain)
4	n.c.	-
5	ADR1	EEPROM I²C Interface, address configuration
6	ADR0	EEPROM I²C Interface, address configuration
7	n.c.	-
8	GND	Ground
9	n.c.	-
10	SDA	EEPROM I²C Interface, data
11	SCL	EEPROM I²C Interface, clock
12	n.c.	-
13	SLO	Serial Interface, data output
14	n.c.	-
15	SLI	Serial Interface, data input
16	SCLK	Serial Interface, clock

Pin Configuration QFN16 3x3 mm²



12 bit Multiturn Application Example