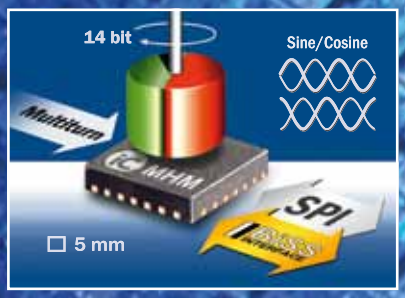
iC-MHM

14-BIT ABSOLUTE ANGLE HALL ENCODER



iC-MHM is a compact, contactless high-resolution magnetic angle sensor for the on-axis scanning of a diametric magnet. Its Hall sensor array provides sine/cosine signals output by differential drivers with 1 Vpp, which are resolved by a fast vector-tracking interpolation circuit. A signal fine-calibration can compensate placement errors and thus higher precision.

The chip features multiturn counting, preset on power up and verified cyclically if an external multiturn sensor is connected. GPIO pins permit system control, can be used for pin-triggered position preset, or output of incremental and test signals.

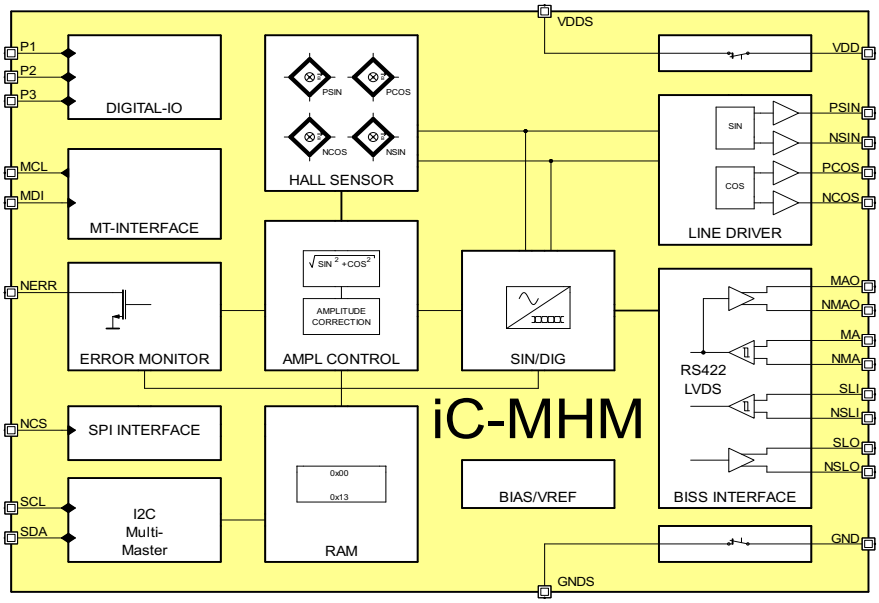
The device's setup with CRC is acquired from an external EEPROM; sharing with other devices is possible due to the I²C multimaster interface. The embedded RS422 transceiver allows direct BiSS/SSI line connections. All interface pins are reverse-polarity and short-circuit-proof.

Applications

- Absolute angle sensors
- Singleturn/multiturn position encoders
- Motor feedback

Features

- Integrated Hall sensor array for fault-tolerant assembly
- Signal stabilization by auto-gain with monitoring
- Compensation of misalignment by optional fine-calibration
- Absolute resolution of 0.02° (14 bit / 360° up to 10,000 rpm)
- Selectable resolution and tracking rate (e.g. 12 bit at up to 80,000 rpm)
- Adjustable zero position and code direction
- Diff. current-limited sin/cos outputs (1 Vpp to 100 Ω)
- BiSS Interface for CRC-secured position and programming
- Compatible to BiSS-C profiles (BP1, BP3) and SSI
- Integrated RS422 transceiver for up to 10 Mbit/s (at 5 V)
- Higher data rates supported by LVDS compatibility
- System monitoring via BiSS error/warning bits
- Multiturn data processing for up to 32 bit (SSI interface)
- Command/pin-triggered position preset for ST/MT data
- 3 GPIO pins for system control, incr. and test signals
- Pin-selectable SPI operation
- Open-drain error message output
- CRC-protected setup from I²C EEPROM
- Extended temperature range from -40 to +125 °C
- Reverse-polarity and short-circuit-proof interfacing pins



iC-Haus

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iC-MHM 14-BIT ABSOLUTE ANGLE HALL ENCODER

Key Specifications

General	
Supply Voltage	5 V +/- 10%
Supply Current	20 mA typ.
Load current at VDDS	max. 25 mA, reverse polarity protected
Operational Temperature Range	-40 °C to +125 °C
ESD Susceptibility	2 kV (HMB 100 pF, 1.5 kΩ)

Hall Sensor Frontend / Analog Outputs	
Magnetic Field Strength	20 ... 100 kA/m
Line Driver, differential outputs PSIN vs. NSIN, PCOS vs. NCOS	controlled to 1 Vpp / max. load +/- 10 mA

Interpolator	
Converter Resolution	binary, 9 to 14 bit
Max. Rotation Speed	10,000 rpm @ 14 bit 80,000 rpm @ 12 bit
Conversion Accuracy	+/- 0.35 deg.
Analog Cutoff Frequency	20 kHz (-3 dB)
Hysteresis	0°, 0.17°, 0.35°, 0.7°

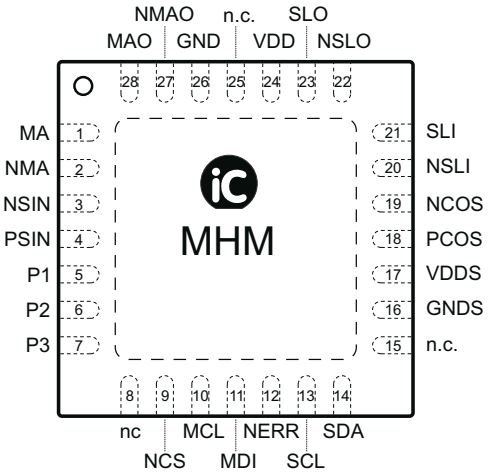
Multiturn Interface	
Multiturn Data Length	4, 8, ... , 20, 24, 32 bit
Synchronization	1 ... 5 bit
Clock Output Frequency	375 kHz or 1.5 MHz selectable

BiSS Interface	
Input / Outp. Operating Modes	Typical Application (clock rate)
TTL / RS422	default, after startup and error
TTL / TTL	embedded environments
LVDS / LVDS	high speed line driving (80 MHz)
RS422 / RS422	BiSS devices (10 MHz)

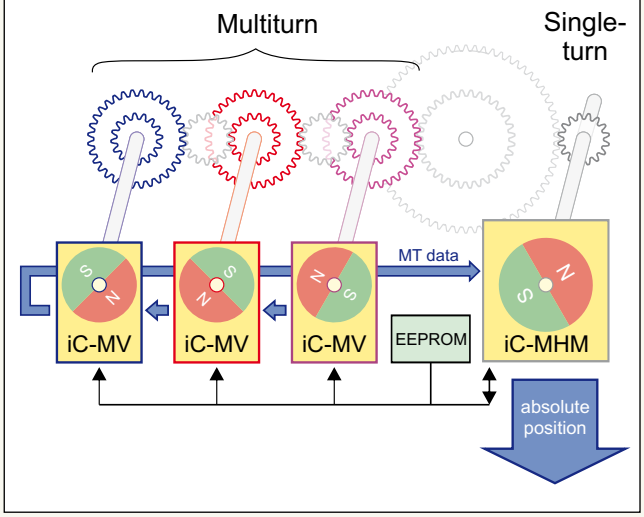
Pin Functions

No.	Name	Function
1	MA	BiSS/SSI Clock Input / SPI Clock Input (SCLK)
2	NMA	BiSS/SSI Clock Input, inverted
3	NSIN	Analog Sine Output, inverted
4	PSIN	Analog Sine Output
5	P1	Digital I/O Port 1
6	P2	Digital I/O Port 2
7	P3	Digital I/O Port 3
8	n.c.	not connected
9	NCS	SPI Enable and Chip Select Input, low active
10	MCL	Multiturn SSI Clock Output
11	MDI	Multiturn SSI Data Input
12	NERR	Error Message Input/Output, low active
13	SCL	I²C Clock Line
14	SDA	I²C Data Line
15	n.c.	not connected
16	GNDS	Switched GND (reverse-polarity protected)
17	VDDS	Switched VDDS (reverse-polarity protected)
18	PCOS	Analog Cosine Output
19	NCOS	Analog Cosine Output, inverted
20	NSLI	BiSS Data Input, inverted
21	SLI	BiSS Data Input / SPI Data Input (MOSI)
22	NSLO	BiSS/SSI Data Output, inverted
23	SLO	BiSS/SSI Data Output / SPI Data Output (MISO)
24	VDD	+5 V Supply Voltage
25	n.c.	not connected
26	GND	Ground
27	NMAO	BiSS Clock Output, inverted (multislave op.)
28	MAO	BiSS Clock Output (multislave operation)

Package QFN28 5 mm x 5 mm



Application Example



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