iC-MH16
12-BIT ANGULAR HALL ENCODER

200 000 rpm

FlexCount® 1...1024 cpr

Zero Latency 1...16 cpr

BiSS INTERFACE

200 000 rpm

BiSS INTERFACE

Zero Latency 1...
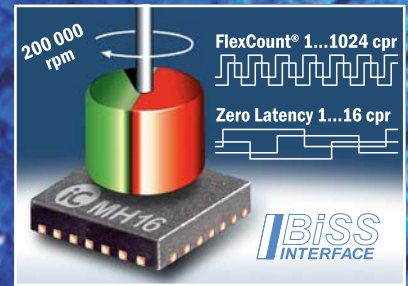
Integrated

The iC-MH16 is an integrated Hall encoder for sensing the angular position of a diametral magnet. The FlexCount® interpolator can be set to any factor from 1 to 1024 to and achieve up to 4096 angle steps per revolution.

ABZ quadrature signals up to an edge rate of 16 MHz are available at the incremental outputs, permitting 200 000 rpm at the highest resolution. The outputs are RS422 compatible with adjustable output current and slew rate. The position of the index pulse is adjustable.
At pins U, V and W three electrically 120° phase shifted signals are available for the commutation of brushless DC motors with 1 to 16 pole pairs.
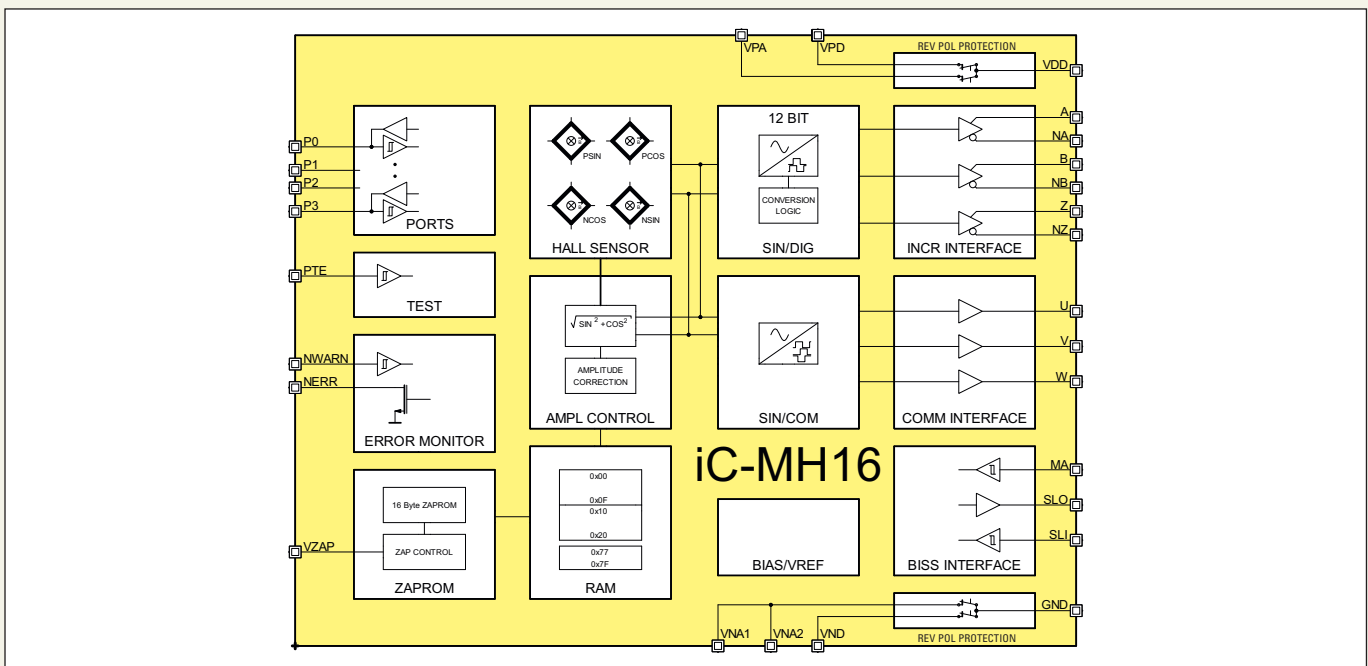
iC-MH16 features the BiSS Interface for a fast serial, CRC secures data output and bidirectional register access. The programmed setup can be stored to a non-volatile ROM, based on zapping diodes.

Features

- Real-time system for full resolution at up to 200 000 rpm
- 4x Hall sensor arrangement for fault-tolerant adjustment
- FlexCount® interpolator with 1 to 1024 CPR, resolution 4096 / 0.08°
- UVW commutation signals with 1 to 16 CPR, for motors of up to 16 pole pairs
- Programmable resolution, hysteresis, edge spacing, zero position and direction
- Up to 16 MHz incremental edge rate
- RS422-compatible ABZ incremental signals
- BiSS/SSI interface for data and programming
- Integrated Zapping ROM for default setup and OEM data
- Errors output by pin and serial interface
- Reverse-polarity-proof 5 V supply
- Extended temperature range of -40 °C to +125 °C

Applications

- Brushless DC motor commutation / feedback
- Incremental and absolute angular encoder
- Digital angular sensor technology, 0° to 360°
- Rotational speed control

iC-MH16
12-BIT ANGULAR HALL ENCODER

Key Specifications

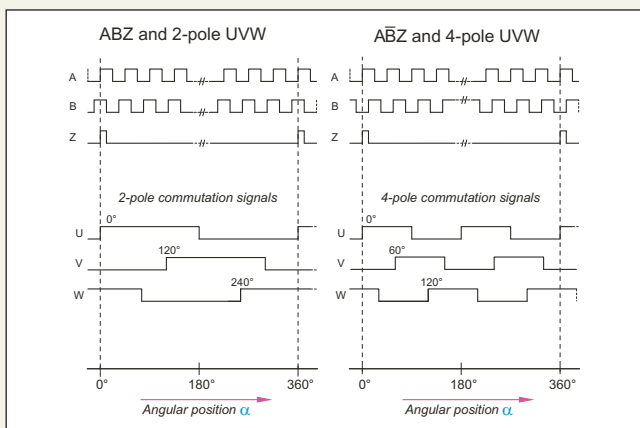| General	
Supply Voltage VDD	5 V +/- 10 %
Supply Current in VDD	30 mA max.
Max. Rotation Speed	200,000 rpm
Magnetic Field Strength	20 ... 100 kA/m
Resolution (digital / angular)	12 bit / 0.088°
Operational Temperature Range	-40 to +125 °C
ESD Susceptibility	2 kV (HBM 100 pF, 1.5 kΩ)

Operational Modes	
Incremental Output Modes	A and B normal A normal, B inverted A inverted, B normal A and B inverted
FlexCount® Interpolation	1 to 1024 CPR at AB
Commutation Signals	1 to 16 CPR at UVW

Incremental Output Settings	
Driver Capability	10 MHz, 4 mA (default) 10 MHz, 60 mA 300 kHz, 60 mA 3 MHz, 20 mA
Configurations	push-pull, high-side, low-side, tristate

Signal Settings	
Internal Hall signals	2 Vpp (with active gain control)
Coarse Gain	×5, ×10, ×20
Fine Gain (automatic gain off)	1.1 ... 18.2 (64 steps)
Internal Signal Bandwidth	16 kHz / 3 kHz selectable
Sin/Cos Amplitude Ratio	0.91 ...1.097 (128 steps)
Sin/Cos Offset Range	+/- 63 mV in 1 mV steps
Hysteresis ABZ	0°, 0.17°, 0.35°, 0.7°
Zero Position ABZ	adjustable in 0.088° increments
Zero Position UVW	aligned to incremental zero

Serial Interface	
BiSS C	10 MHz bidirectional, data read out and programming
SSI	4 MHz data read out (SSI 13 bit standard)

Output Signal Examples

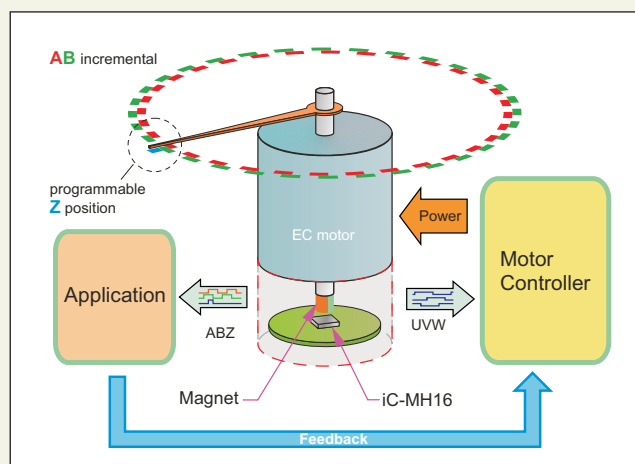ABZ and 2-pole UVW

A͞BZ and 4-pole UVW

Pin Functions

No.	Name	Function
1	PTE	Test Enable Input
2	NERR	Error Output (active low)
3	VPA	Protected Supply (analog)
4, 13	VNA1, VNA2	Protected Ground (analog)
5	SLI	Serial Interface, Data Input
6	MA	Serial Interface, Clock Input
7	SLO	Serial Interface, Data Output
8	VND	Protected Ground (digital)
9, 10, 11	U, V, W	Commutation Outputs: U, V, W
12	VZAP	Zener Zapping Programming Voltage
14	n.c.	not connected
15, 16, 17	A, B, Z	Incremental Outputs: A, B, Index Z
18	GND	Ground
19	VDD	+5 V Supply Voltage Input
20, 21, 22	NA, NB, NZ	Inverted Incremental Outputs: NA, NB, Index NZ
23	NWARN	Warning Input (active low)
24...27	P0, P1, P2, P3	Bidirectional GPIO Ports
28	VPD	Protected Supply (digital)

Pin Configuration QFN28 5 mm x 5 mm

Application Example

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