The iC-MHL200 is an integrated Hall encoder for sensing linear and rotary magnetic targets with a 2 mm pole pitch. A smallest linear position increment of 1 µm can be achieved when the device is operated at 12 bit resolution. The interpolator resolution can be programmed up to a maximum of 4096 increments per magnetic signal period (equivalent to a 4 mm position shift).

Incremental ABZ quadrature position signals up to a rate of 2 MHz are available on single-ended or differential outputs, permitting at least a linear speed of 8 m/s at 12 bit resolution, and even higher velocities at a reduced resolution. The position of the index pulse Z is adjustable within the magnetic signal period. For linear motor applications, one and twofold UVW commutation signal over a signal period are available. Both incremental and commutation outputs are RS422 compatible and can be configured regarding output drive current and slew rate. Using the serial BiSS interface position data can be transmitted and iC-MHL200 can be accessed for setup. The power-on configuration and internal parameters can then be stored permanently in an on-chip zapping ROM. For position readout only, the SSI protocol is also available.

**Features**

- Automatic signal conditioning with configurable control
- 12-bit real-time interpolation at 8 m/s velocity
- Interpolation factors ×1 to ×128, ×256, ×512, ×1024
- Quadrature AB and index Z signal outputs
- Z output can be enabled via strobe input ENZ
- One and twofold UVW commutation signals
- Independent zero position for ABZ or UVW
- Incremental AB frequency of up to 2 MHz
- RS422 output driving stages for ABZ and UVW
- BiSS C interface for position readout and programming
- Device setup and OEM data stored into OTP ZAPROM
- Open-drain NERR signal (loss of magnet, frequency error)
- Error codes accessible via BiSS C interface
- Operating temperature range of -40 °C to +125 °C

**Applications**

- Incremental linear and rotary encoders
- Electronic commutation of linear motors
**Key Specifications**

### General
- **Supply Voltage**: 5 V +/-10%
- **Linear Speed (@12 bit)**: 8 m/s
- **Magnetic Field Strength**: 20 ... 100 kA/m
- **Resolution (digital/linear)**: 12 bit / 1 µm
- **ESD Susceptibility**: 2 kV (HBM 100 pF, 1.5 kΩ)

### Operating Modes
- **Output Modes**: ABZ and UVW
  - ABZ and inverted ABZ
  - UVW and inverted UVW
  - ABZ and AB period signals

### Interpolation Factors
- ×1 ... ×128, ×256, ×512, ×1024 @ A, B

### Commutation Signals
- UVW one and two periods every 360°

### Output Driver Settings
- **Drive Modes**: push-pull (RS422), high-side, low-side, tristate
- **Driving Capability**: +/- 4 mA, 12 ns, 10 MHz
  - +/- 60 mA, 200 ns, 300 kHz
  - +/- 20 mA, 20 ns, 3 MHz

### Signal Conditioning
- **Internal Hall Signal Level**: controlled to 2 Vpp
- **Coarse Gain Selection**: ×5, ×10, ×15, ×20
- **Fine Gain (AGC range)**: ×1 ... ×19 (64 steps)
- **Sin/Cos Amplitude Ratio**: 0.91 ... 1.097 (128 steps)
- **Offset Correction Range**: +/- 60 mV in steps of 1 mV
- **Hysteresis ABZ**: 0.17°, 0.35°, 0.7° and 1.4°
- **Zero Position UVW**: adjustable in increments of 1.875°
- **Zero Position ABZ**: adjustable in increments of 1.4°

### Serial Interface Output
- SSI Mode: data output to 2 MHz, 13 bit format
- BiSS Mode: 10 MHz, register access, CRC

**Pin Functions**

### No. Name Function
1. **SLI**: Serial Interface, Data Input
2. **MA**: Serial Interface, Clock Input
3. **VPA**: +5 V Supply Voltage (analog)
4. **VNA**: Ground (analog)
5. 6. **nc**: not connected
7. **VZAP**: Zener Zapping Programming Voltage
8. **A**: Incremental Output A (+NU)
9. **B**: Incremental Output B (+NV)
10. **Z**: Index Output Z (+NW)
11. **VND**: Ground (digital)
12. **VPD**: +5 V Supply Voltage (digital)
13. **U**: Commutation Output U (+NA)
14. **V**: Commutation Output V (+NB)
15. **W**: Commutation Output W (+NZ)
16. **PTE**: Test Enable Input
17. **NERR**: Error output (active low)
18. **GAIN**: Gain Signal
19. **ENZ**: Index Z Enable Input
20. **SLO**: Serial Interface, Data Output

**Application Example**

- **Index Track**
- **Incremental Track**
- **Index Sensor**
- **Enable**

**Pin Configuration TSSOP20**

*MHL200*

- **Code**: ...yyww
- **Absolute Position**: 0

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