iC-MA provides the absolute angular position of a magnet placed above or below the chip’s package, whereas a set of four distributed Hall sensors grants a reasonable system assembly tolerance. Controlled signal amplitudes are ensured by the embedded signal conditioning circuit also monitoring a “loss of magnet” condition for Z-axis detection.

The encoding stage operates on 6, 7 or 8 bit resolution and can resolve a 360 degree magnet turn into 256 angular steps, i.e. into increments of 1.4 °. Different operating modes are available by pin selection offering analog output signals (sawtooth, triangle, sine/cosine) as well as digital output signals (encoder quadrature, counter control). A sequencer logic eases daisy chaining of multiple sensors on a 4-wire bus and can be selected optionally.

**Features**
- Resolution of 64, 128 and 256 positions within 360°
- Rotation speed up to 60,000 rpm
- Outputs configurable to provide analog and digital signals
- Fail signal for low magnetic strength
- Cascading multiple iC-MA allows use of single bus
- Enable input for low power standby
- Small DFN10 Package (4 x 4 x 1 mm)
- Wide operating temperature range of -40 to +125°C

**Applications**
- Contactless rotary switch
- Digital potentiometer
- Angular encoding
- Motion control and robotics
- Positioning and servo systems
- Commutation of brushless DC motors
- Vehicle control
- Office equipment
- Flow meter
- Household appliances
- Joystick and front panel controls

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**Diagram**

![Diagram of iC-MA](image-url)

Package DFN10

4 x 4 x 1 mm

Scale 5 : 1 (top view)

actual package size
### Pin Functions

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NEN</td>
<td>Not Enable / Standby</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>CFG2</td>
<td>Configuration Input 2</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>I/O</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>I/O</td>
</tr>
<tr>
<td>6</td>
<td>D</td>
<td>I/O</td>
</tr>
<tr>
<td>7</td>
<td>C</td>
<td>I/O</td>
</tr>
<tr>
<td>8</td>
<td>CFG3</td>
<td>Configuration Input 3</td>
</tr>
<tr>
<td>9</td>
<td>VDD</td>
<td>+5 V Supply</td>
</tr>
<tr>
<td>10</td>
<td>CFG1</td>
<td>Configuration Input 1</td>
</tr>
</tbody>
</table>

### Definition Of Angular Position

![Diagram of angular position]

### Key Specifications

**General**

- Supply Voltage: 5 V ±10%
- Supply Current: 20 mA max.
- Standby Current: 200 μA max.
- Analog Output (sine/cosine): controlled to 2 Vpp
- Max. Rotation Speed: 60,000 rpm
- Magnetic Field Strength: 20 ... 100 kA/m
- Digital Resolution: 6, 7, 8 bit
- Angular Resolution: 5.6, 2.8, 1.4 degree
- Operational Temperature Range: -40 to +125 °C
- ESD Susceptibility: 2 kV (HBM 100 pF, 1.5 kΩ)

**Operational Modes**

<table>
<thead>
<tr>
<th>Name</th>
<th>Output Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-Sensor</td>
<td>analog triangle or ramp, output magnitude, error (NERR)</td>
</tr>
<tr>
<td>D-Sensor*</td>
<td>analog sine and cosine, mean value, gain signal</td>
</tr>
<tr>
<td>S-Sensor*</td>
<td>analog sine and cosine, noninverted and inverted</td>
</tr>
<tr>
<td>ABZ-INC*</td>
<td>quadrature signals (A, B), index (Z) and error (NERR)</td>
</tr>
<tr>
<td>CLK-INC</td>
<td>counter signals: count up / down, clock, clear, error (NERR)</td>
</tr>
</tbody>
</table>

* Daisy chain operation is configurable.

This preliminary information is not a guarantee of device characteristics or performance. All rights to technical changes reserved.