

# iC-PVS

## Linear/Off-Axis Battery-Buffered Absolute Position Hall Sensor

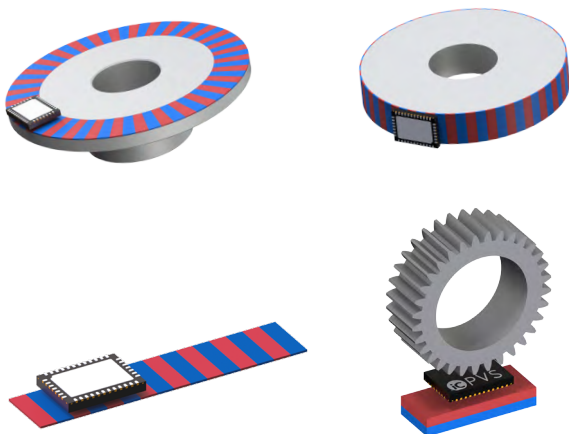
### Description

iC-PVS is a high-performance hall sensor suitable for incremental or absolute position sensing. It generates analog sine/cosine signals which can be used as inputs for downstream high-resolution A/D conversion. For absolute position sensing, an ultra-low power battery-backed magnetic period counter is integrated. On main power shutdown, iC-PVS automatically switches to battery supply and keeps track of the absolute position. The battery current is typically in the range of 2 to 30  $\mu\text{A}$  and can be adapted to the respective application. iC-PVS operates with pole wheels or linear scales with a pole width of 1.0 mm up to 2.5 mm. Ferrous gear wheels with a gear tooth module of 0.3 up to 1.5 can be scanned by using a back-bias magnet. With the internal interpolation stage, iC-PVS can also be used as a stand-alone absolute or incremental encoder with up to 6-bit resolution per magnetic period. The serial I/O interface supports the BiSS-C, SSI or SPI protocol. Additionally, incremental (ABZ) and parallel output modes are available.

### Applications

- Freely scalable hollow-shaft absolute multturn position sensors
- Freely scalable linear absolute position sensors
- Ferrous gear wheel or magnetic scale scanning
- Configurable magnetic sensing heads
- Incremental scanning

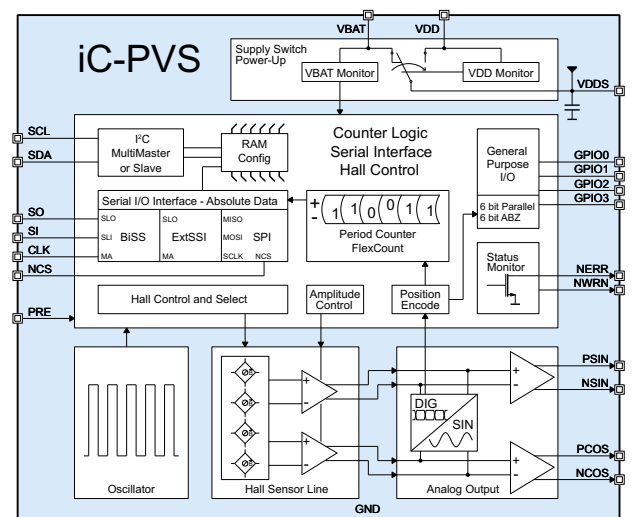
### Application Examples



### Features

- High-performance Hall sensors with analog output for downstream high-resolution A/D conversion
- Fits magnetic scales of 1.0 mm up to 2.5 mm pole width or gear tooth modules of 0.3 up to 1.5
- Absolute position data with battery-buffered period counting up to 56 bits
- Adjustable period count per mechanical revolution: FlexCount logic for 1 to 65,536 magnetic periods
- Backup battery current consumption of only 2  $\mu\text{A}$  to 30  $\mu\text{A}$  in typical applications
- Internal 6-bit flash interpolation
- Incremental output (ABZ) with up to 64 increments per magnetic period
- Serial I/O interfaces (BiSS, SSI, SPI, and I<sup>2</sup>C)
- Tracking speed of up to 75 m/s (1.5 mm poles) or 46,000 rpm (32 pole pairs)
- Differential scanning for high immunity to external magnetic stray fields
- I<sup>2</sup>C master function for initial boot-up from EEPROM
- Overspeed, battery, loss-of-magnet and RAM (CRC) monitoring
- Main supply voltage of 3.15 V to 5.5 V.

### Block Diagram



# iC-PVS

## Linear/Off-Axis Battery-Buffered Absolute Position Hall Sensor

### Key Specifications

#### General

Main Supply Voltage	3.15V to 5.5V
Main Supply Current	typ. 40 mA at 3.3V
Battery Supply Voltage	3.0V to 5.0V
Battery Supply Current	typ. 2 $\mu$ A to 30 $\mu$ A at 3.6V in battery backup mode
Operating Temperature Range	-40°C to 125°C
Magnetic Field Operating Amplitude	10 kA/m to 100 kA/m
Magnetic Input Frequency	25 kHz max.
Package	38-pin QFN 5 mm x 7 mm

#### Magnetic Pole Wheel/Linear Scale Requirements

Pole Size	1.0 mm up to 2.5 mm
Scanning	differential

#### Gear Wheel Requirements

Gear Tooth Module	0.3 up to 1.5
Scanning	differential with back-bias magnet

#### Counter Logic

Battery-buffered period counting up to 56 bits
Internal 6-bit flash interpolation
FlexCount© logic to interpret 1 to 65536 magnetic periods as one mechanical revolution

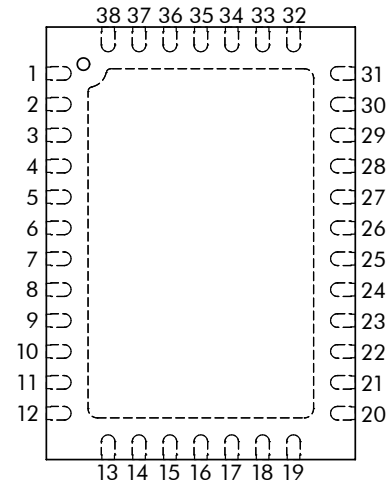
#### Outputs and Interfaces

Sin/Cos Analog	typ. 1 V <sub>pp</sub> differential, $\pm$ 0.5 mA max. VCM 1.25V, 2.5V or VDD/2 configurable
Serial I/O	BiSS, SSI, SPI, I <sup>2</sup> C
Incremental	A/B with Z Index (adjustable gating), up to 64 increments per magnetic period

#### Signal Conditioning

Automatic Amplitude Control
Sin/Cos offset and amplitude correction

### Pin Configuration QFN38-5x7



### Pin Functions

No.	Name	Function
1	GPIO3	General Purpose I/O 3
2	GPIO2	General Purpose I/O 2
3	GPIO1	General Purpose I/O 1
4	GPIO0	General Purpose I/O 0
10	NWRN	Battery Early Warning (active low)
11	NCS	SPI Not Chip Select
12	SI	Serial Interface, Slave In
13	CLK	Serial Interface, Clock Line
14	SO	Serial Interface, Slave Out
15	PRE	Preset Trigger Input
16	GND	Ground
17	SCL	I <sup>2</sup> C Interface, Clock Line
18	SDA	I <sup>2</sup> C Interface, Data Line
19	NERR	Error Output (active low)
32	NCOS	Analog Output Negative Cosine
33	PCOS	Analog Output Positive Cosine
34	NSIN	Analog Output Negative Sine
35	PSIN	Analog Output Positive Sine
36	VDD	+3.15V to 5.5V Main Supply Voltage
37	VDDS	Switched Supply Voltage Output
38	VBAT	Battery Supply Voltage Input (typ. 3.6V)
	BP	Backside Paddle
all others	n.c.	not connected

