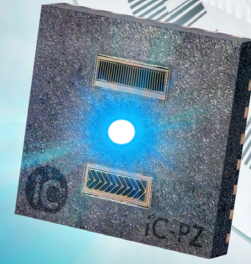


# iC-PZ Series

## High-Resolution Optical Reflective Absolute Encoder



### Description

The iC-PZ is a complete lensless optical reflective absolute encoder IC. With its integrated blue LED and interpolator, the iC-PZ provides a high-resolution single-chip absolute linear or rotary encoder solution. Independently configurable BiSS/SSI, ABZ, UVW, SPI, and analog Sin/Cos outputs may be used singly or in combination to provide a highly flexible system. FlexCount® and FlexCode® allow arbitrary ABZ resolution and arbitrary code disc diameter.

Automatic calibration corrects for sin/cos signal errors (offset, gain, and phase) and code wheel eccentricity without requiring external hardware or software. Calibrated parameter values are stored in an external EEPROM. Wide assembly tolerances ensure that the iC-PZ is easy to install and align, making design-in to any application simple.

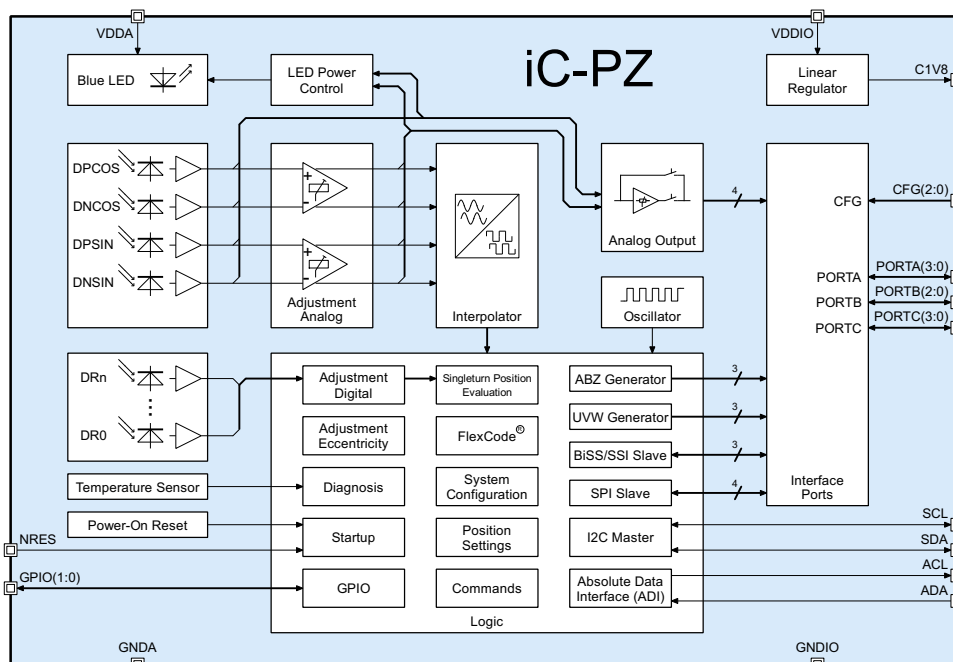
### Applications

- Linear scales and rotary encoders
- High accuracy absolute encoders
- Motion control

### Features

- Reflective, compact, high-resolution, absolute encoder iC
- iC-PZ0974 and iC-PZ2656 for reflective code discs up to  $\varnothing 45$  mm
- iC-PZ205 for reflective code discs  $> \varnothing 45$  mm and linear scales (max. 6.71 m)
- Miniature oQFN32 5x5 package
- Monolithic HD Phased Array with excellent signal matching
- System-on-chip design with embedded blue LED for excellent reliability, EncoderBlue®
- FlexCount® interpolation for arbitrary ABZ resolutions
- FlexCode® circuitry for arbitrary code disc diameters
- UVW commutation signals with 1 to 32 CPR, for motors of up to 32 pole pairs
- LED power control for constant illumination (sine square or sum control)
- Absolute singleturn resolution of 22 bits ( $\varnothing 26$  mm) via built-in interpolation
- On-chip automatic signal adjustment
- Calibration and configuration storage via external I<sup>2</sup>C EEPROM
- Digital BiSS, SSI, and SPI interfaces with CMOS I/O
- Temperature detection and monitoring
- 2.5, 3.3, and 5.0 V compatible I/O ports
- Configurable analog outputs
- Absolute data interface for connection of external multiturn sensors

### Block Diagram



# iC-PZ Series

## High-Resolution Optical Reflective Absolute Encoder

### Key Specifications

#### General

Supply Voltage	VDDA: 4.5 to 5.5 V VDDIO: 2.25 to 5.5 V
Supply Current	typ. 35 mA
Operational Temperature	-40 to +125 °C
Package (RoHS compliant)	32-pin optoQFN (5.0 mm × 5.0 mm, thickness 0.9 mm)

#### Position Acquisition

Singleturn Resolution	up to 22 bits (ø26 mm), iC-PZ2656
Linear Resolution	12.5 nm max., iC-PZ205
Absolute Sensor Accuracy	±1 LSB at 18 bits (ø26 mm)
Position Update Rate	80 MHz

#### FlexCode®

ø9 mm	ø16 – 45 mm	ø45 – linear
iC-PZ0974	iC-PZ2656	iC-PZ205

#### ABZ FlexCount®

Selectable Resolution	1 to 2 <sup>20</sup> AB cycles per revolution
AB Frequency	6.5 MHz max.

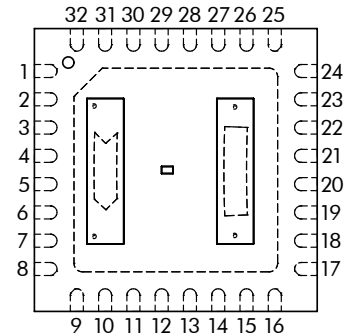
#### Outputs and Interfaces

Sin/Cos Analog	VDDA/2 ± 250 mV VDDA/2 ± 1000 mV
UVW Interpolation	1 to 32 UVW cycles per revolution
I/O	BiSS (20 MHz*), SSI (10 MHz*), SPI (12 MHz*) *max. values I <sup>2</sup> C master to serial EEPROM (400 kHz)
ADI Format	Multiturn SSI master, 1 to 32 bit position data, up to 8 slaves, built-in sync. (1 to 4 bits)

#### Signal Conditioning

Auto Calibration	Sin/Cos offset, gain, phase Eccentricity
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### Pin Configuration oQFN32-5×5



### Pin Functions

No.	Name	Function
1	CFG0	Port Configuration Input
2-7		not connected
8-11	PORTA(3-0)	Interface Port A
12	C1V8	Core Voltage Buffer Capacitance
13	GNDIO	Digital I/O Ground
14	VDDIO	+ 2.25 to + 5.5 V Digital I/O Supply Voltage
15-17	PORTB(2-0)	Interface Port B
18	ACL	Absolute Data Interface, clock line
19	ADA	Absolute Data Interface, data line
20	GPIO1	General Purpose I/O
21	GPIO0	General Purpose I/O
22	NRES	Reset Input
23-26	PORTC(3-0)	Interface Port C
27	SCL	I <sup>2</sup> C Config. Interface, clock line
28	SDA	I <sup>2</sup> C Config. Interface, data line
29	GNDA	Analog Ground
30	VDDA	+ 4.5 to + 5.5 V Analog Supply Voltage
31	CFG2	Port Configuration Input
32	CFG1	Port Configuration Input
	BP	Backside Pad/Exposed Pad

### Assembly Tolerances (ø26 mm)

