iC-RT2624

26-Bit Optical Absolute Encoder



Description

The iC-RT2624 is an optical transmissive absolute encoder System-on-Chip for high-resolution motor feedback and angle measurement systems. Combining a precision sensor front-end with contamination-tolerant and robust scanning technology, the iC-RT2624 is perfectly suited for housed as well as kit-style encoders.

The iC-RT2624 provides outstanding accuracy with high alignment tolerances and a wide sensor-to-disc gap range. The on-chip interpolator resolves 26 bits angle information from the standard Ø 26 mm code disc. FlexCode® allows the use of arbitrary code disc sizes ≥ Ø 20 mm. Auto-calibration and eccentricity compensation ensure best possible measurement results after end-of-line assembly as well as in-field installation of the encoder system.

The BiSS, SSI and SPI interfaces allow seamless integration. Programmable FlexCount® ABZ output resolution and UVW signals for motors of 1 to 32 pole pairs easily adapt the encoder to any motor feedback application. A programmable Sin/Cos generator providing 2^n CPR (n = 0..15) complements the native CPR differential Sin/Cos outputs. The integrated Absolute Data Interface (ADI) is compatible with established iC-Haus multiturn sensor solutions.

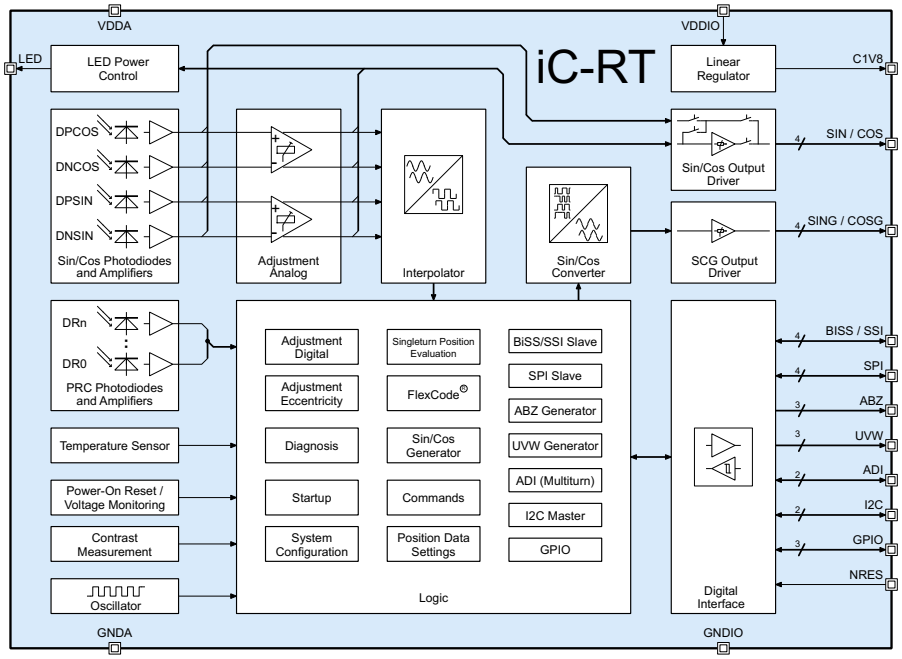
Features

- 26 bits angle resolution with standard code disc (Ø 26 mm)
- Eccentricity compensation for increased accuracy
- Contamination-tolerant and robust scanning technology
- FlexCode® for arbitrary code disc sizes (≥Ø 20 mm)
- High alignment tolerances (±0.5 mm in X and Y directions)
- Wide sensor-to-disc gap range (up to 0.8 mm in Z direction)
- BiSS/SSI and SPI serial interfaces for simultaneous use
- FlexCount® for programmable ABZ output resolution
- UVW commutation signals for motors of 1 to 32 pole pairs
- Safety-ready differential Sin/Cos outputs with native 1024 CPR
- Additional programmable Sin/Cos generator (2^n CPR, n = 0..15)
- Absolute data interface for multiturn sensors
- Auto-calibration triggered by pin or command
- 3.0 V to 5.5 V operation within –40°C to 125°C

Applications

- High-resolution rotary encoders
- Modular kit encoders
- Motor feedback systems
- Angle measuring systems

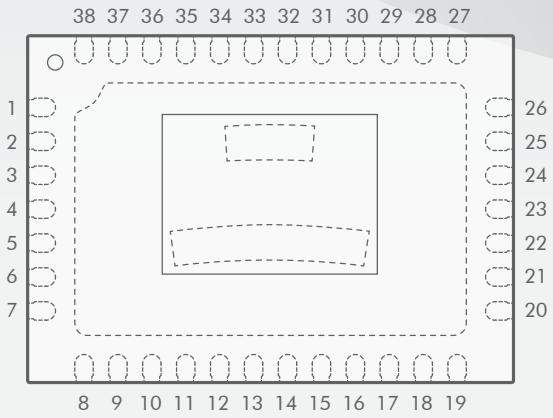
Block Diagram



Key Specifications

General	
Main Supply Voltage	3.0 V to 5.5 V, typ. 16 mA
I/O Supply Voltage	2.25 V to 5.5 V, typ. 17 mA
Code Disc	Standard = Ø 26 mm, FlexCode® ≥ Ø 20 mm
Operating Speed	Up to ~30,000 RPM (Ø 26 mm code disc)
Operating Temperature	–40 to +125°C (ambient)
Package (RoHS compliant)	38-pin optoQFN 7.0 mm × 5.0 mm, thickness 0.9 mm
Position Acquisition	
Singleturn Resolution	Up to 26 bits
Multiturn Resolution	Up to 32 bits (internal revolution counter or external MT sensor)
Position Update Rate	Typ. 80 MHz
Sensor Latency	Max. 1 µs (from optical input to data output)
Absolute Accuracy	Typ. < 0.01° (calibrated)
Outputs and Interfaces	
Position Data Interfaces	BiSS (up to 10 MHz) or SSI (up to 4 MHz) SPI (up to 12 MHz) data protected by CRC (6 bits or 16 bits), optional sign-of-life counter, programmable error and warning bits
Quadrature Outputs	ABZ Generator (up to 18 MHz AB frequency) FlexCount® 1 to 2^{22} AB cycles (programmable)
Commutation Outputs	UVW Generator for 1 to 32 pole pairs
Sin/Cos Outputs	Native 1024 CPR (Ø 26 mm code disc), safety-ready Sin/Cos Generator 2^n CPR (n = 0..15, programmable Analog output driver (amplitude 250 mV/6 mA or 1000 mV/1 mA)
Multiturn Interface	ADI master (SSI protocol) compatible with e.g.: iC-PVL battery-buffered counters, iC-MV gear scanners, iC-Haus solutions for energy harvesting by Wiegand wire
I²C Interface	I²C master (Fast Mode), interface to external EEPROM

Pin Configuration oQFN38-7×5

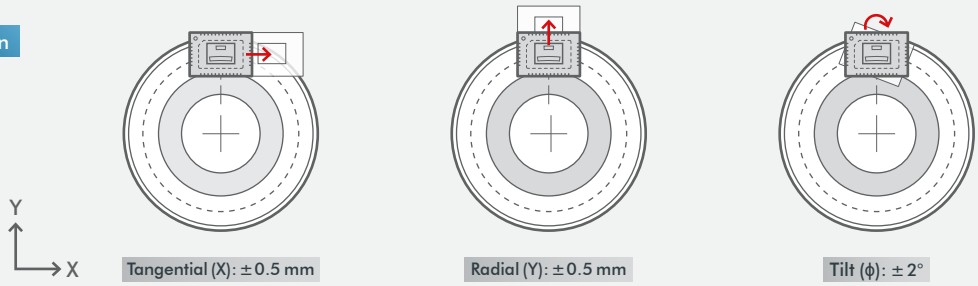


Pin Functions

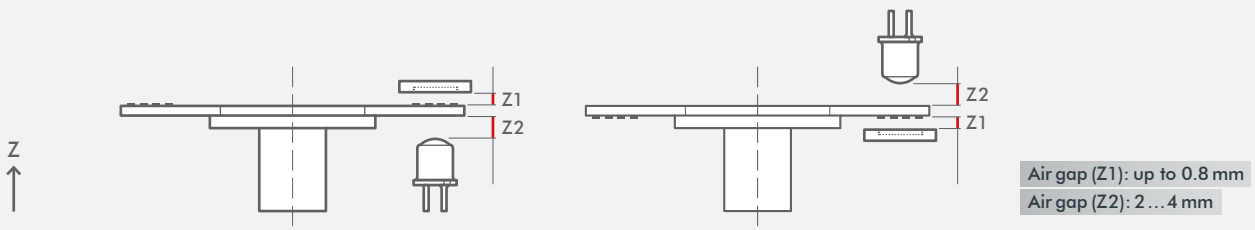
Name	Function
MA, SLI, SLO, MAO	BiSS/SSI (bus-compatible), slave
SCLK, MOSI, MISO, NCS	SPI (4-wire), slave
A, B, Z	ABZ Generator, outputs
U, V, W	UVW Generator, outputs
PSIN, NSIN, PCOS, NCOS	Sin/Cos Output Driver, differential outputs
PSING, NSING, PCOSG, NCOSG	Sin/Cos Generator Output Driver, differential outputs
ACL, ADA	Absolute Data Interface, master
SCL, SDA	I²C Interface, master
GPIO0, GPIO1, GPIO2	General Purpose Input/Output
LED	LED Power Control, output
NRES	Reset, low active input
C1V8	Linear Regulator, external capacitor
VDDA, GNDA	+3.0 to 5.5 V Supply Voltage/Ground (analog)
VDDIO, GNDIO	+2.25 to 5.5 V Supply Voltage/Ground (I/O)

Alignment Tolerances (Ø 26 mm code disc, blue LED)

X/Y direction



Z direction



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