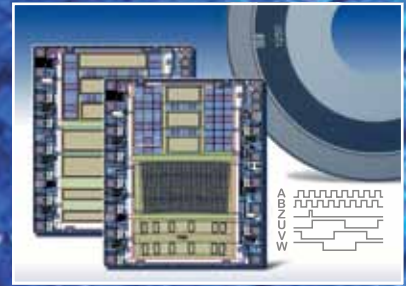


iC-PT26xx Series

6-CH. PHASED ARRAY OPTO ENCODER SERIES



Devices in the iC-PT26xx series are versatile optical encoder ICs with integrated photosensors whose signals are converted into voltages by low-noise transimpedance amplifiers. Precise voltage comparators with hysteresis are used to generate the digital signals, supplied to the output pins via CMOS/TTL-compatible differential push-pull drivers.

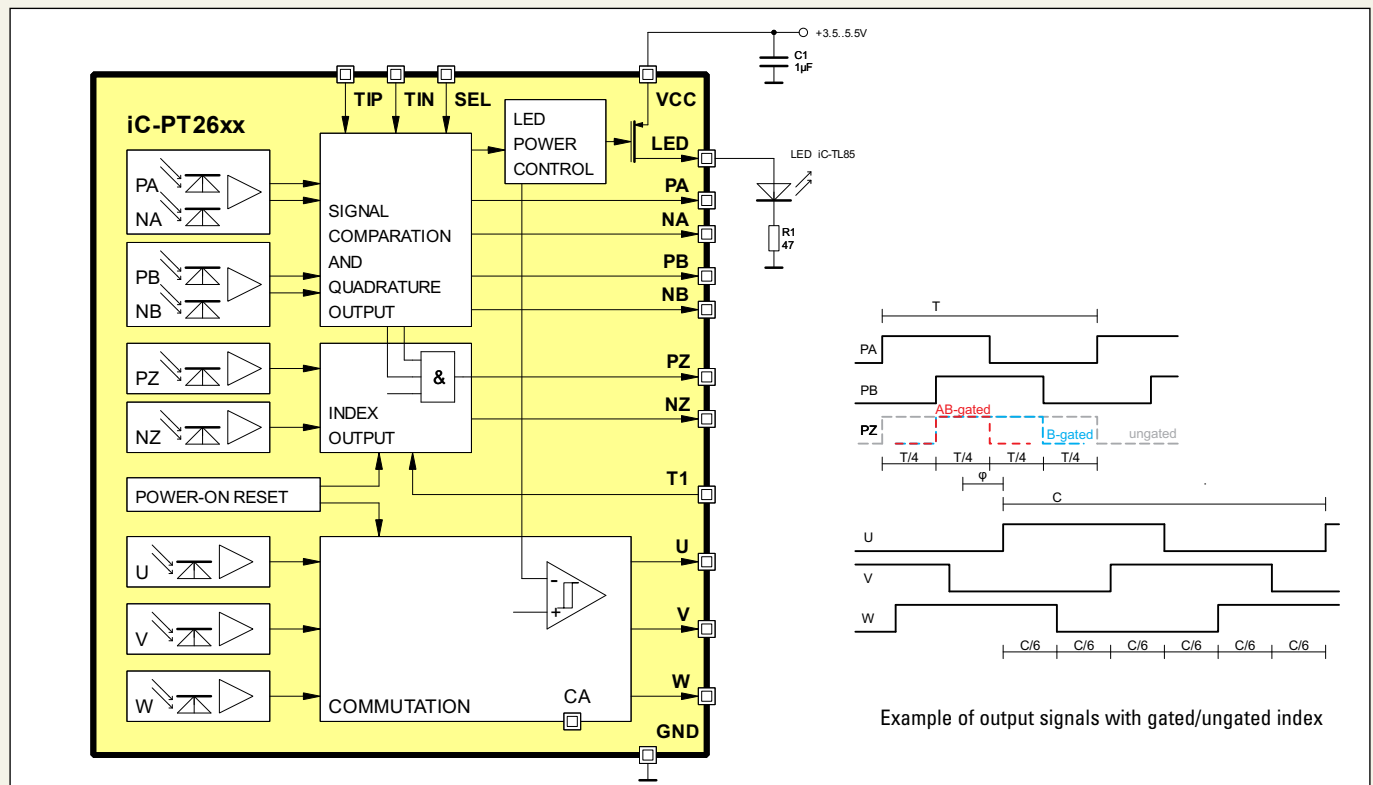
The built-in LED controller with its 40 mA high-side current source directly powers the encoder LED and maintains the operating point regardless of LED aging or changes in temperature. The optical receiver power is kept constant using several A/B track photodiodes for averaging.

Features

- Excellent signal matching due to monolithic integration
- Very compact size for small encoders
- Moderate track pitch for relaxed assembly tolerances
- Low-noise signal amplifiers with high EMI tolerance
- Single-pin programming of 3 operating modes: analog, digital, and x2 interpolation
- Selectable index gating: ungated, B-gated, AB-gated
- Complementary outputs: A, B, Z and NA, NB, NZ
- 3 independent commutation tracks with U, V and W outputs
- All outputs +/- 4 mA push-pull, current-limited and short-circuit-proof
- Illumination control with a 40 mA high-side LED driver
- Single 3.5 V to 5.5 V operation
- Very low power consumption
- Operating temperature range of -40 to +120 °C

Applications

- Incremental encoders
- BLDC motor commutation



Example of output signals with gated/ungated index

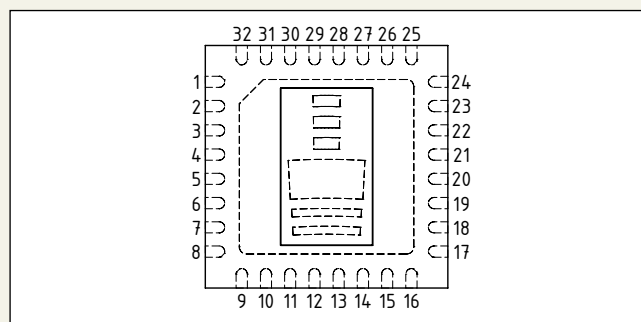
iC-PT26xx OPTO ENCODER SERIES

Typical applications for iC-PT26xx iCs include incremental encoders for motor feedback and commutation. To this end, the iCs provide differential scanning for the A/B tracks and the Z index track and single-ended scanning on three additional tracks, generating commutation signals for multipole BLDC motors depending on the code disc applied.

Pin Functions

No.	Name	Function
1	VCC	+3.5 V to +5.5 V Supply Voltage
2	LED	LED Controller, High-Side Current Source Output
3, 4	PA, NA	Push-Pull Output A+, A- / Analog Sin+, Sin-
5, 6	PB, NB	Push-Pull Output B+, B- / Analog Cos+, Cos-
7, 8	PZ, NZ	Push-Pull Output Z+, Z- / Analog Z+, Z-
17	SEL	Op. Mode Selection: lo = digital, hi = x2 interpolated, open = analog (alignment)
18	W	Push-Pull Output W
19	TIN	Negative Test Current Input
20	V	Push-Pull Output V
21	TIP	Positive Test Current Input
22	U	Push-Pull Output U
23	T1	Index Gating: hi = 1 T (ungated/T-gated), lo = 0.5 T (B-gated), open = 1/4 T (AB-gated)
24	GND	Ground
9...16, 25...32 not connected		

Pin Configuration oQFN32 5x5 mm²



Key Specifications

General	
Supply Voltage	+3.5 V to 5.5 V, single-sided
Supply Current	typ. 3 mA
ESD Susceptibility	2 kV (HBM 100 pF, 1.5 kΩ)
Operational Temperature	-40 °C to +120 °C
Package (RoHS compliant)	32-pin optoQFN (5.0 mm x 5.0 mm, thickness 0.9 mm)

Photosensors	
Spectral Application Range	400 to 950 nm (sensitivity decreased to 25 %)
Peak Sensitivity Wavelength	λ _{pk} 680 nm
Spectral Sensitivity	typ. 0.5 A/W at λ _{pk}
Effective Area per Photodiode	0.03 to 0.14 mm ²
Required Irradiance	ca. 0.9 to 3 mW/cm ² (λ _{LED} = λ _{pk})

Photocurrent Amplifiers	
Operating Range	up to 550 nA photocurrent
Photo Sensitivity A/B, Z/C	typ. 0.3 V/μW, typ. 0.4 V/μW
Transimpedance Gain A/B, Z/C	0.75 MΩ, 1 MΩ
Gain Matching	+/- 0.2 %
Cut-off Frequency (-3 dB)	400 kHz min., typ. 500 kHz
Notes: A/B for PA, NA, PB, NB sensors; Z for PZ, NZ sensors; C for U, V, W sensors	

Comparators	
Equivalent Hysteresis	typ. 5 to 15 % @ 250 mV _{pkpk}

LED Control	
Operating Range	0 to 40 mA
Saturation Voltage	typ. 0.5 V @ 40 mA

Outputs	
Max. Output Frequency	800 kHz min.
Saturation Voltage hi/lo	0.6 V max. at +/- 4 mA
Short-Circuit Current hi/lo	typ. 20 mA source/sink, 70 mA max.
Analog Output Signal	typ. 125 mV _{pkpk} to 500 mV _{pkpk} (source impedance typ. 750 Ω)

Encoder	iC-PT2656		iC-PT2650		iC-PT2610		iC-PT2613		iC-PT2615
Cycles Per Revolution	250	256	500	512	1000	1024	1250	1500	
CPR x2 interpolated	500	512	1000	1024	2000	2048	2500	3000	
Max. Counts (4 edges)	1000	1024	2000	2048	4000	4096	5000	6000	
Codewheel	PT16S 26-250 film (0.18 mm)	PT14S 26-256 film (0.18 mm)	PT13S 26-500 film (0.18 mm)	PT21S 26-512 film (0.18 mm)	PT15S 26-1000 glass (1.0 mm)	PT20S 26-1024 glass (1.0 mm)	PT6S 26-1250 glass (1.0 mm)	PT22S 26-1500 glass (1.0 mm)	
Diameter	Ø 26.0 mm	Ø 26.0 mm	Ø 26.0 mm	Ø 26.5 mm	Ø 26.0 mm	Ø 26.5 mm	Ø 26.0 mm	Ø 26.0 mm	
Optical Center Radius (code begin/end)	10.74 mm 9.2/12.3 mm	11.0 mm 9.5/12.6 mm	11.0 mm 9.5/12.6 mm	11.26 mm 9.8/12.8 mm	11.0 mm 9.5/12.6 mm	11.26 mm 9.8/12.8 mm	11.0 mm 9.5/12.6 mm	11.0 mm 9.5/12.6 mm	
Bore hole	Ø 12.0 mm	Ø 12.0 mm	Ø 12.0 mm	Ø 12.0 mm	Ø 11.6 mm	Ø 11.6 mm	Ø 11.6 mm	Ø 11.6 mm	
Pole Pairs / Cycle C	4 / 90°	4 / 90°	4 / 90°	4 / 90°	4 / 90°	4 / 90°	4 / 90°	4 / 90°	
Phase Shift (Phase φ)	30° (+/- 1°)	30° (+/- 1°)	30° (+/- 1°)	30° (+/- 1°)	30° (+/- 1°)	30° (+/- 1°)	30° (+/- 1°)	30° (+/- 1°)	
Recommended collimated LEDs: iC-SD85 and iC-TL85.									

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