

iC-LTA

6-CH. INCREMENTAL OPTO ENCODER ARRAY



The iC-LTA is an advanced optical encoder IC featuring an array of integrated photosensors, which are evaluated by a fast on-chip interpolation circuit to higher resolution.

The device provides differential A/B tracks, a differential index track and three more tracks to generate block commutation signals. The optical radius and the native cycles per revolution (CPR) can be freely determined by the applied code design, i.e. the code disc and reticle (applied externally, or molded into customized packages optionally).

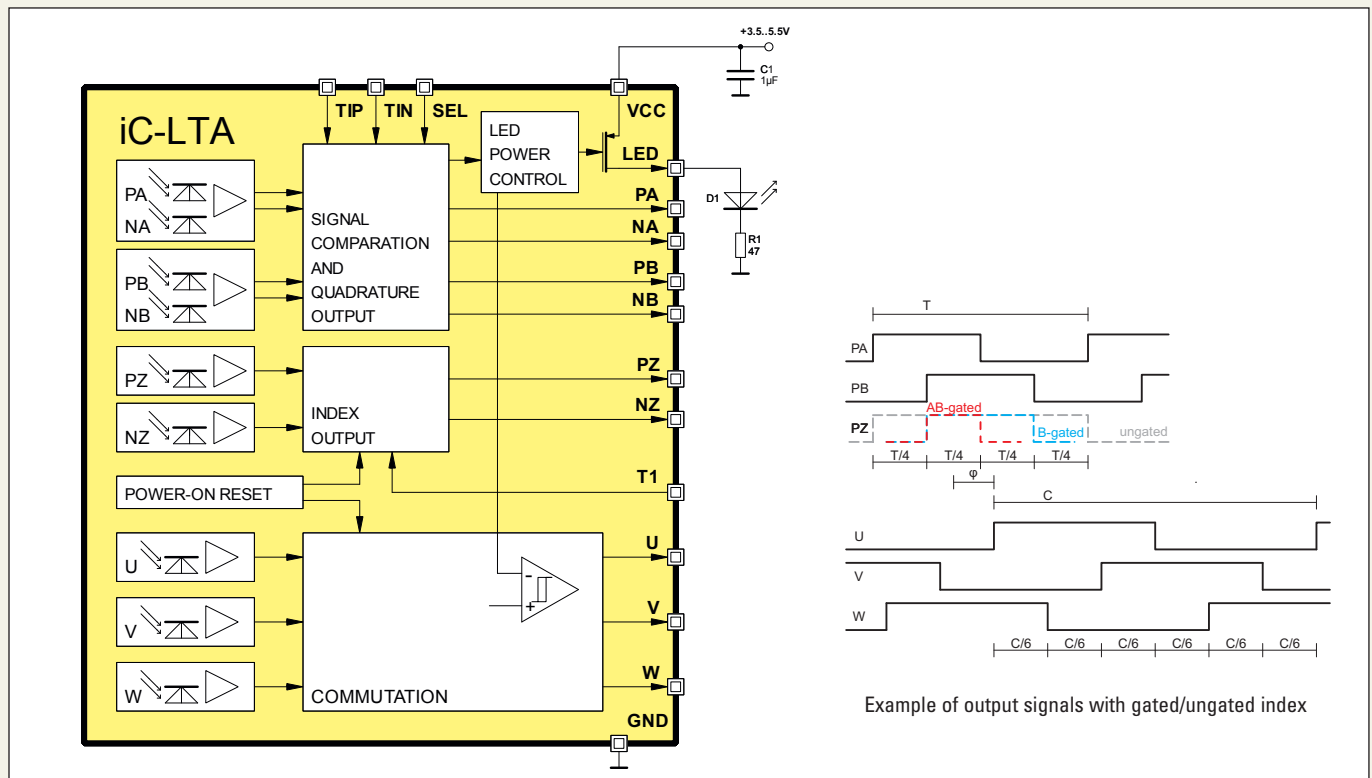
Low-noise trans-impedance amplifiers ensure an excellent channel matching and convert the scanner's signals into voltages of several hundred millivolts.

Applications

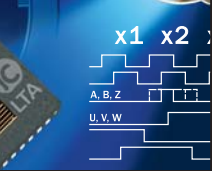
- Incremental encoders
- BLDC motor commutation

Features

- Excellent signal matching due to monolithic integration
- Very compact size for small encoders
- Moderate track pitch for relaxed assembly tolerances
- Pin-selectable operating modes: analog, compared (x1), interpolated (x2, x4)
- Pin-selectable index gating: ungated (1 T), B-gated (0.5 T), AB-gated (0.25 T)
- Complementary quadrature outputs: A, B, Z and NA, NB, NZ
- Commutation signal outputs: U, V, W
- Short-circuit-proof, current-limited, +/- 4mA push-pull
- Analog signal output for ease of alignment and resolution enhancement by external interpolation
- LED power control with 40 mA high-side driver
- Low power consumption from single 3.5 V to 5.5 V supply
- Operating temperature range of -40 °C to +120 °C
- Custom made code disc and reticle design on request



Example of output signals with gated/ungated index



iC-LTA 6-CH. INCREMENTAL OPTO ENCODER ARRAY

The built-in averaging LED power control with its 40 mA driver permits a direct connection of the illumination LED, and stabilizes the receiver's signals regardless of aging effects or changes in temperature.

Various operating modes are selectable at multi-level input SEL: digital output with native (x1) or interpolated resolution (x2 or x4), analog output or mixed analog/digital output (for inspection and monitoring of encoder assembly, or to feed subsequent interpolation circuits).

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) 15-pin optoBGA (6.2 mm x 5.2 mm, thickness 1.7 mm)
LED Recommendation	IR (850 nm): iC-TL85, iC-SD85, blue (460 nm): iC-TL46, iC-SD46

Photosensors and Amplifiers	
Spectral Application Range	400 to 950 nm (sensitivity at 25 %)
Peak Sensitivity Wavelength	λ_{pk} 680 nm
Spectral Sensitivity	typ. 0.5 A/W at λ_{pk} typ. 0.3 A/W at 850 nm and 460 nm
Effective Area per Photodiode	A/B, Z: 0.26 mm ² , C: 0.1 mm ²
Required Irradiance	typ. 0.5 mW/cm ² ($\lambda_{LED} = \lambda_{pk}$, no reticle)
Photocurrent Operating Range	A/B, C: 1200 nA max. Z: 480 nA max.
Photo Sensitivity	A/B, C: typ. 0.25 V/ μ W Z: typ. 0.65 V/ μ W
Transimpedance Gain	A/B, C: 0.5 MΩ, Z: 1.25 MΩ
Gain Matching	+/- 0.2 %
Cut-off Frequency (-3 dB)	typ. 500 kHz
Dark Level	typ. 770 mV
Note: A/B for PA, NA, PB, NB sensors; Z for PZ, NZ sensors; C for U, V, W sensors	

Comparators	
Equivalent Hysteresis	typ. 10 % @ 250 mVpk-pk

LED Control	
Operating Range	0 to 40 mA
Saturation Voltage	typ. 0.4 V @ 40 mA

Outputs	
Max. Output Frequency	400 kHz min. (x1), 800 kHz min. (x2), 1.6 MHz min. (x4)
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 mVpk-pk to 500 mVpk-pk (source impedance typ. 750 Ω)

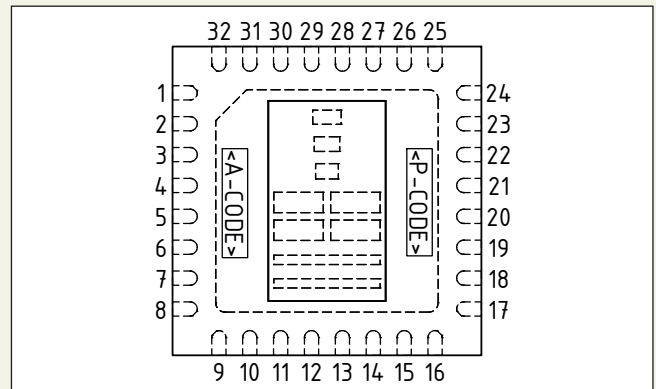
Pin Functions

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	Operation Mode: x1 (lo), x2 (hi), all analog (open or 50% VCC), x4 (25% VCC), analog ABZ / dig. UVW (75% VCC)
18	W	Push-Pull Output W
19, 21	TIN, TIP	Test Current Inputs
20	V	Push-Pull Output V
22	U	Push-Pull Output U
23	T1	Index Gating: ungated / T-gated (hi), B-gated (lo), AB-gated (open)
24	GND	Ground

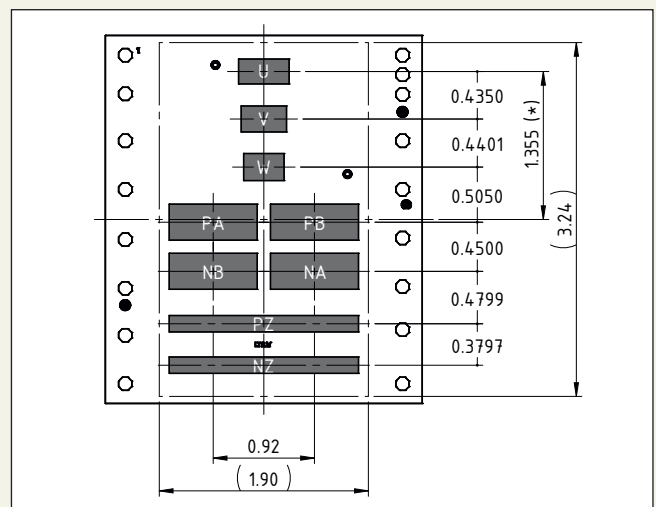
Pins 9...16 and 25...32 are not connected.

iC-LTA pinout and functions are fully compatible to iC-PT H-Series ICs.

Pin Configuration oQFN32 5x5 mm²



Sensor Layout



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