

# iC-PNH3348 PHASED ARRAY NONIUS ENCODER



The iC-PNH3348 EncoderBlue represents an advanced optical encoder IC featuring monolithically integrated photosensors arranged as an HD Phased Array, providing excellent signal fidelity at relaxed alignment tolerances. Its precision sine/cosine output signals allow a high-resolution interpolation by subsequent devices: a singleturn position can be resolved with up to 24 bit utilizing the 3-channel nonius interpolation of iC-MN.

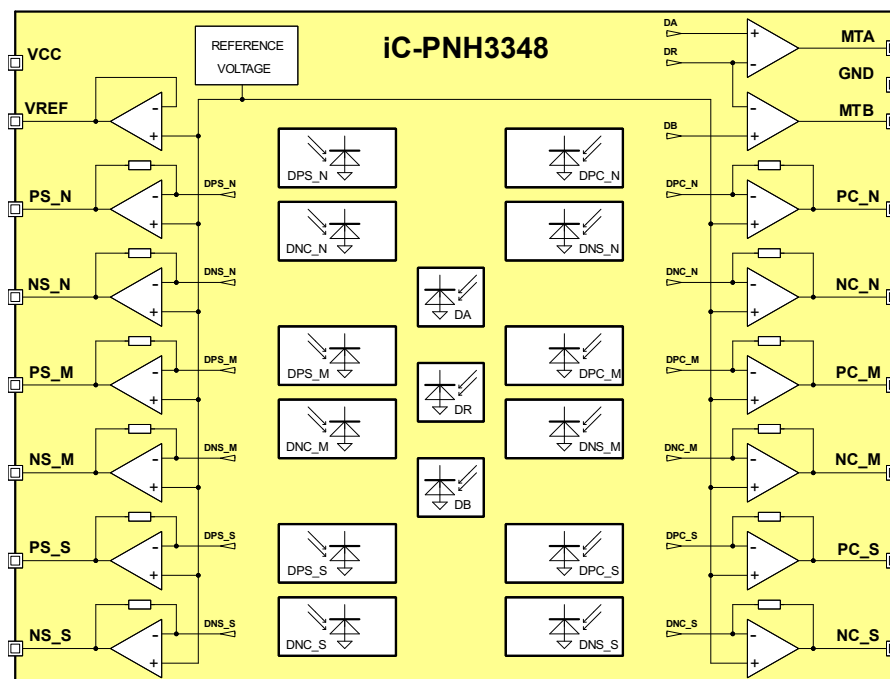
iC-PNH3348 scans 5 tracks in total, whereof 3 analog tracks feature phased-arrays of multiple photosensors, each per track, generating positive and negative going sine signals and cosine signals. Due to a typical transimpedance gain of 1 MΩ, the output signal level reaches a few hundred millivolts already at low light conditions.

## Applications

- Absolute position encoders
- AC servo feedback

## Features

- Compact, high resolution absolute encoder IC for up to 24 bit singleturn resolution (after interpolation)
- For code discs of Ø 33 mm
- Monolithic 3-channel HD Phased Array with excellent signal matching
- Moderate track pitch for reduced cross talk
- Ultra low dark currents for operation up to high temperature
- Low noise amplifiers with high transimpedance gain
- Enhanced EMI tolerance by low impedance differential, short-circuit-proof, analog sine/cosine outputs
- Embedded sector detection by 2 digital tracks (2-bit Gray code)
- Low power consumption from single 4.1 to 5.5 V supply
- Operational temperature range of -40 °C to +110 °C
- Space saving optoQFN package (RoHS compliant)
- Evaluation kit with LED and code disc available

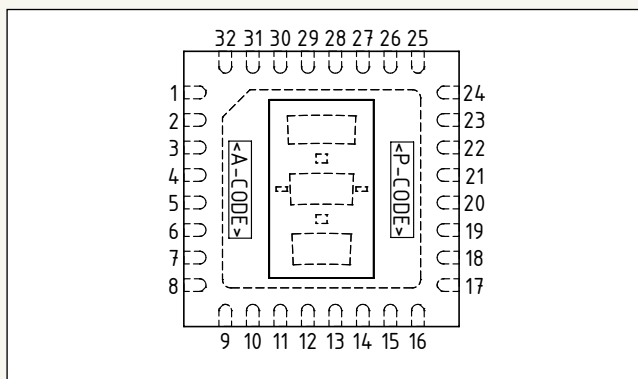


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Additionally two digital tracks are implemented for sector detection to separate a repeated nonius scale. Sector detection can be used already at low supply voltages from 1.6 V up; the power consumption is low unless other sections are biased.

EncoderBlue devices feature blue-enhanced photosensors requiring the application of a LED with short wavelength, preferably iC-TL46. An outstanding signal performance is the key benefit due to the improvements of optical contrast.

## Pin Configuration oQFN32 5 mm x 5 mm



## Pin Functions

No.	Name	Function
1	VCC	+4.1...5.5 V Supply Voltage
2	VREF	Reference Voltage Output
3, 4	PS_N, NS_N	N-Track Sine +, Sine -
5, 6	PS_M, NS_M	M-Track Sine +, Sine -
7, 8	PS_S, NS_S	S-Track Sine +, Sine -
9...16	n.c.	
17, 18	NC_S, PC_S	S-Track Cosine -, Cosine +
19, 20	NC_M, PC_M	M-Track Cosine -, Cosine +
21, 22	NC_N, PC_N	N-Track Cosine -, Cosine +
23	MTB	Digital Output B
24	GND	Ground
25	MTA	Digital Output A
26...31	n.c.	
32	VB	Supply Voltage Input (optional)

## Key Specifications

General	
Supply Voltage	+4.1 V to +5.5 V
Supply Current	typ. 9.5 mA, 15 mA max.
ESD Susceptibility	2 kV (HBM 100 pF, 1.5 kΩ)
Operational Temperature	-40 °C to +110 °C
Package (RoHS compliant)	32-pin optoQFN (5.0 mm x 5.0 mm, thickness 0.9 mm)

Photosensors	
Spectral Application Range	400 to 780 nm (sensitivity to 25 %)
Spectral Sensitivity	typ. 0.3 A/W at $\lambda = 460$ nm
Effective Area N/M/S-tracks	0.074 mm <sup>2</sup>
MTA/MTB-tracks	0.031 mm <sup>2</sup>
Required Irradiance	typ. 3.0 mW/cm <sup>2</sup> at $\lambda = 460$ nm

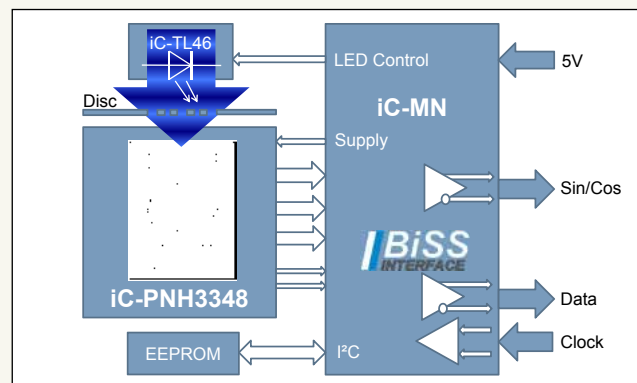
Photocurrent Amplifiers	
Operating Range	up to 1120 nA photocurrent
Photo Sensitivity	typ. 0.23 V/ $\mu$ W at $\lambda = 460$ nm
Transimpedance Gain	typ. 1 MΩ
Gain Matching	+/- 0.2 %
Cut-off Frequency (-3 dB)	typ. 400 kHz
Reference Voltage Output	typ. 770 mV

Signal Outputs	
Recommended Signal Level	1 Vpkpk differential
Maximum Signal Level	2.0 V min. above dark voltage
Dark Voltage	typ. 770 mV
Output Impedance	typ. 110 Ω
Short-Circuit Current	typ. 480 $\mu$ A sink, typ. 420 $\mu$ A source

## System Components

Components	
Signal-Conditioning Interpolator	iC-MN for up to 24 bit ST resolution
Collimated blue LED	iC-TL46

Code Disc	
Model Name	PNH1S 33-2048 (glass 1 mm)
Cycles Per Revolution	2x 1023/1024/992 CPR
Diameter	Ø 33.2 mm
Optical Center Radius (code begin/end)	14.5 mm / 13.0/16.0 mm
Bore hole	Ø 18.0 mm



EncoderBlue is a trademark of iC-Haus GmbH.

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