

# tracker™

POSITION SENSORS

## TRACKER NSE-5310 position sensor and evaluation pack

world's smallest, miniature magnetic encoder  
smallest size and highest resolution...

The TRACKER™ NSE-5310 position sensor is a magnetic sensor array with integrated on-chip digital encoding. With smallest size, 0.5  $\mu\text{m}$  resolution and low sensitivity to external magnetic fields, this miniature position sensor is a robust and cost-effective solution for precision positioning.

On-chip encoding provides direct digital output using standard I<sup>2</sup>C protocol, eliminating the need for external pulse counters. Efficient control system communications allows up to two TRACKER position sensors for a single I<sup>2</sup>C bus.

The highest-resolution magnetic encoder available, the TRACKER position sensor is insensitive to light, shock, vibration, and high-particulate environments.

### Ideal for miniature optical, medical systems

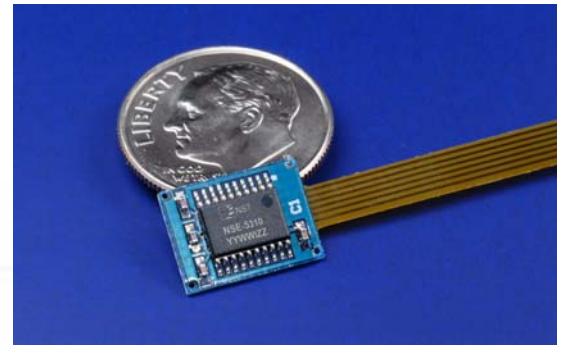
The TRACKER NSE-5310 position sensor is ideal for optical and imaging applications such as focus and optical image stabilization as well as applications in consumer electronics, precision biomedical devices, industrial instrumentation and defense/security. Its small size makes it perfect for creating tiny, integrated closed-loop motion systems using micro motors such as New Scale's SQUIGGLE® motor.

### System overview

The TRACKER NSE-5310 magnetic encoder achieves its precision through a linear array of eight Hall-effect sensors on the chip that measure the spatially varying magnetic field produced by moving a multi-pole magnetic strip above the sensor.

The TRK-1T02-E evaluation pack includes a TRACKER NSE-5310 mounted in a TSSOP 20 package with flex cable and a suitable linear magnetic strip, a MC-31MB interface card and New Scale Pathway™ software to facilitate evaluation. The system can be connected to your computer using a USB interface providing direct position information to your application.

TRACKER NSE-5310 in TSSOP or dice-on-foil packaging is available. Custom TRACKER packaging such as wafer-level chip scale packaging and chip-on-board packaging can also be provided for qualified OEMs. Minimum order quantities may apply.



### TRACKER NSE-5310 BENEFITS

#### Smallest Size

Chip-scale packaging as small as 3.9 x 2.5 mm.

#### Accurate, non-contact sensing

0.5  $\mu\text{m}$  resolution, < 2  $\mu\text{m}$  repeatability

#### Complete system on a chip

sensing and encoding integrated in one ingeniously small package

#### Direct digital output (I<sup>2</sup>C)

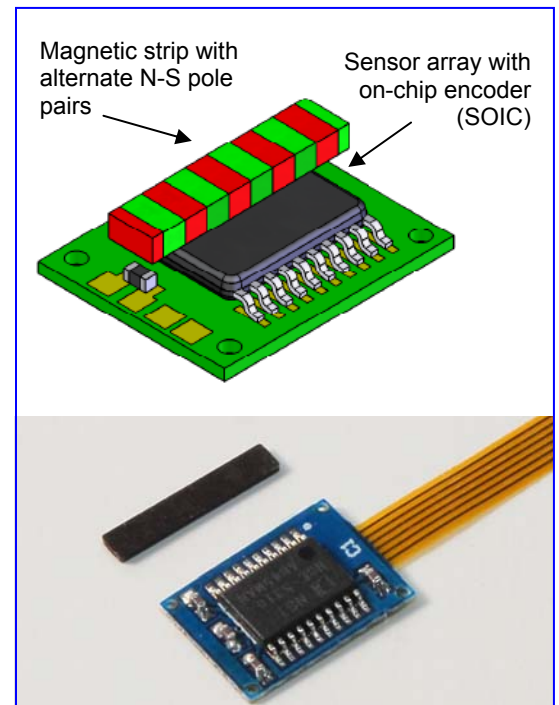
eliminates need for external pulse counters

#### Robust

insensitive to light, shock, vibration and particulates; less stringent mounting alignment

#### Absolute performance

zero reference, automatic gain & offset



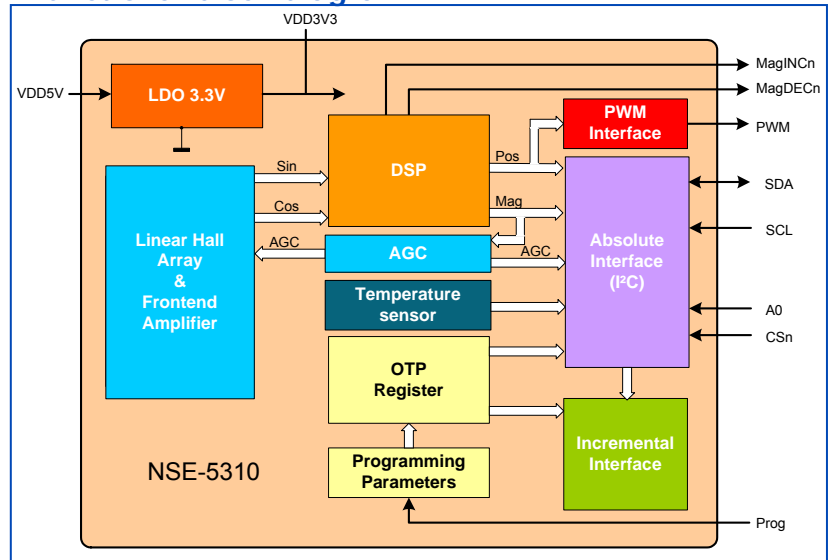
**TRK-1T02-E evaluation pack** includes a TRACKER NSE-5310 in a TSSOP 20 package on a board for ease of handling, along with a matching linear magnetic strip. See page 2 for details.

## Functional description

Moving a multi-pole magnetic strip over the Hall array on the encoder chip generates internal sinusoidal (SIN) and phase-shifted sinusoidal (COS) signals. These signals are filtered and transformed into angle (ANG) and magnitude (MAG), representing the absolute linear position of a 2 mm long pole pair on the magnetic strip. Position info is read via I<sup>2</sup>C interface (SDA, SCL).

Automatic gain control (AGC) adjusts for DC bias in the magnetic field and provides a large magnetic field dynamic range, for high immunity to external magnetic fields. It also provides an absolute magnitude of the magnetic field intensity, which is used to detect the end of the magnetic strip and thereby serves as a built-in zero reference.

## Functional block diagram



## TRK-1T02 Specifications and operating conditions

Parameter	Value
Supply voltage VDD3V3	3 - 3.6 V
Neg. supply voltage VSS	0 V
Supply current	21 mA max
Resolution	0.5 $\mu\text{m}$ @ 12 bits per 2 mm pole pair
Integral Error*	$\pm 20 \mu\text{m}$ < 2mm 1% for >2mm
Differential Error*	$\pm 0.97 \mu\text{m}$ 10bit, no missing codes
Hysteresis	2-8 LSB with incremental output, 12 bit resolution, 0 for absolute serial output
I <sup>2</sup> C read-out frequency	400kHz (typ) to 800kHz (max)
Operating temperature	-40 to +125°C
Storage temperature	-55 to +125°C
Humidity non-condensing	5 to 85%
Dimensions	8.5 x 11.5 x 1.61 mm (Height ~3 mm with magnet and air gap)
TRK-1T02, board-mounted, as shown	
Thermal package resistance	114.5°C/W (still air) absolute max

\* Error includes cumulative magnet error from magnets supplied with developer kit.

## Ordering Information

TRACKER Model	Description
TRK-1T02 (shown)	NSE-5310 SOIC TSSOP version on 8.5 x 11.6 mm printed circuit board with flex cable. (Magnet sold separately)
TRK-1T02-E Evaluation Pack (shown)	TRK-1T02 position sensor, MC-31MB interface card, power supply, cables, USB cable, New Scale Pathway Software Options: 11mm magnet (for 8 mm travel) 53 mm magnet (for 50 mm travel) > 11mm and < than 53mm, request quote.
NSE-5310 (Standard)	TSSOP 20 Packaging Standard.
NSE-5310 (Custom)	Die-on-foil or custom chip-on-board; WLCSP or QFN available in quantity orders. Contact us for information.

## TRK-1T02-E EVALUATION PACK



The TRK-1T02-E Evaluation Pack is a full-featured development platform for the TRACKER NSE-5310 Position Sensor. The MC-33MB interface card accepts the I<sup>2</sup>C input from one or two TRACKER sensors, and connects via USB to your PC. Use the New Scale Pathway™ Software to view and collect position information. This development kit provides for easy sensor evaluation and system development.

NSE-5310 TRK-1T02-E Eval Pack Datasheet 10-18-10