

NCS32100 Evaluation Kit

User Manual (Quick Start)

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Owner:	N-and Embedded / Avnet Silica
Author:	Piergiorgio Ratti

Notice. This document describes an evaluation kit designed by **N-and**. The kit uses the **onsemi NCS32100** rotary inductive position sensor. Product names and trademarks are the property of their respective owners. This is an evaluation platform (not a finished end product). Handle using standard ESD precautions.

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1 Overview

1.1 What this kit is

The **NCS32100 Evaluation Kit** is a USB-powered evaluation platform intended to demonstrate and validate rotary position sensing using the **NCS32100** inductive sensor and a PCB rotor/stator pair.

The system is composed of **three PCBs**:

- **Rotor PCB** (mechanically coupled to the shaft under test)
- **Stator PCB (NCS)** hosting the slave NCS32100 and sensing coils
- **Stator PCB (STM)** hosting the master controller and the USB interface to the PC

Power is provided by the USB cable or by 24 VDC



Figure 1: Overall kit

1.2 What you can do

Connect the kit to a PC via USB, open the **ncs32100 evaluation application** and you could:

- Stream live measurement data (e.g., position/angle, velocity) and visualize them;
- Perform basic register access for configuration (write-register supported by the PC app protocol).

2 Kit Contents

- 1x Rotor PCB
- 1x Stator PCB (NCS32100 + coils)
- 1x Stator PCB (STM32 master + USB interface)
- Mechanical fixture/spacers/screws

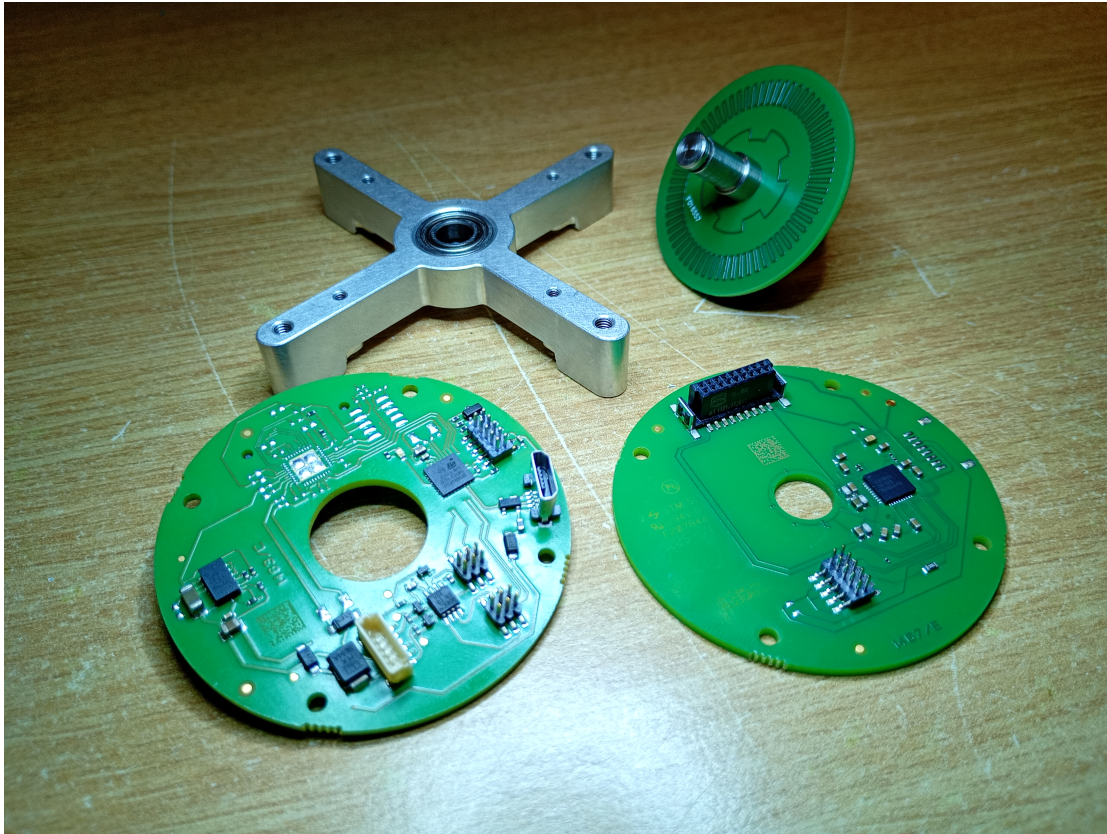


Figure 2: Box contents

3 System Architecture

3.1 Block diagram

The PC communicates with the STM controller board over USB. The STM board communicates with the NCS32100 with a 2.5MHz UART located on the NCS stator board and then streams computed values back to the PC.

3.2 Signal flow

1. The rotor turns above the stator coil structure.
2. The NCS32100 measures the rotor position using inductive sensing.
3. The STM controller acquires/decodes sensor data and exposes it to the PC application.
4. The PC application displays time plots and numeric values and can perform configuration actions (e.g., register write).

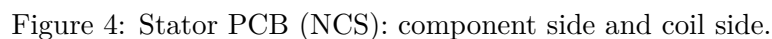
4 Hardware Description

4.1 Rotor PCB

- Function: moving target for inductive sensing.
- Notes: measurement quality depends on rotor/stator alignment and the rotor-stator gap.



- Function: hosts the NCS32100 and the sensing coil geometry.
- Interfaces: board-to-board connector to the STM controller board.
- Notes: avoid metallic parts too close to the sensing area unless part of the mechanical design.



Ref (slave)	Name	Description
J2	Programmer	Programming interface for NCS32100

4.4 Stator PCB (STM32 master + USB interface + 24V PS)

- Function: master controller + USB interface to PC (Virtual COM).
- Power: USB / 24 VDC.
- Provides: streaming data to the PC application; configuration channel to the sensor module.

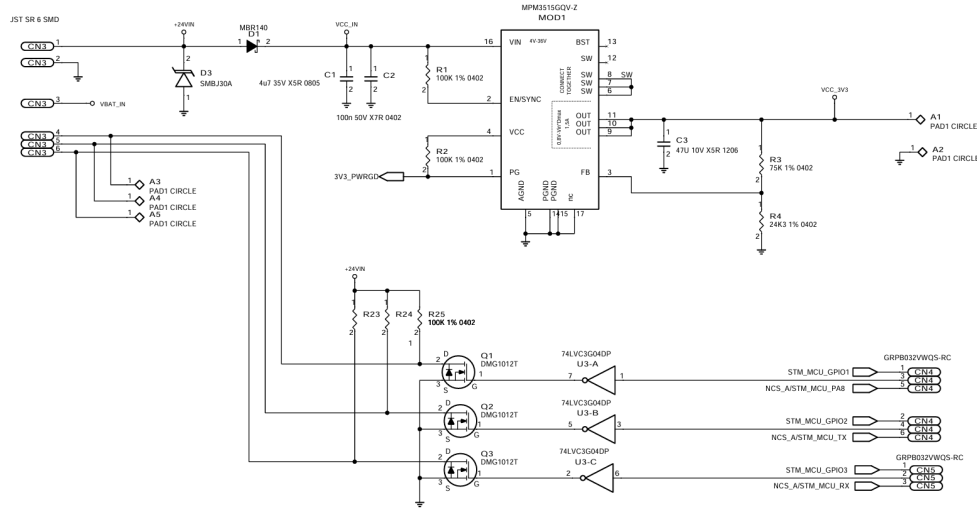


Figure 5: Stator PCB (STM): 24VDC power supply / data out.

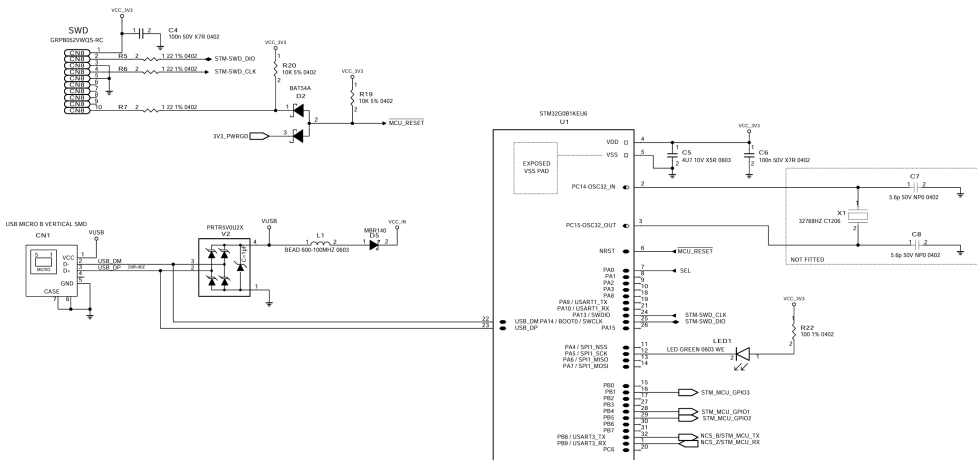


Figure 6: Stator PCB (STM): USB connector and main components.

4.5 Connectors

Ref (master)	Name	Description
CN1	USB to PC	USB power + Virtual COM port
CN2	Board-to-board	Interconnect: STM board and NCS board
CN3	24 VDC-in	24 VDC power supply + data out
CN8	Programmer	Programming interface for STM32

5 PC Software: Evaluation Application

5.1 Supported OS

Windows 10, Windows 11

5.2 First connection (Quick Start)

1. Connect the kit to the PC using a USB cable.
When power is on the green LED on master board lights up.
2. Launch the application `ncs32100_evkapp_version.exe`
3. Select the correct COM port.
4. Connect.
5. Start acquisition/streaming in the UI.
The green LED on master board start toggling.

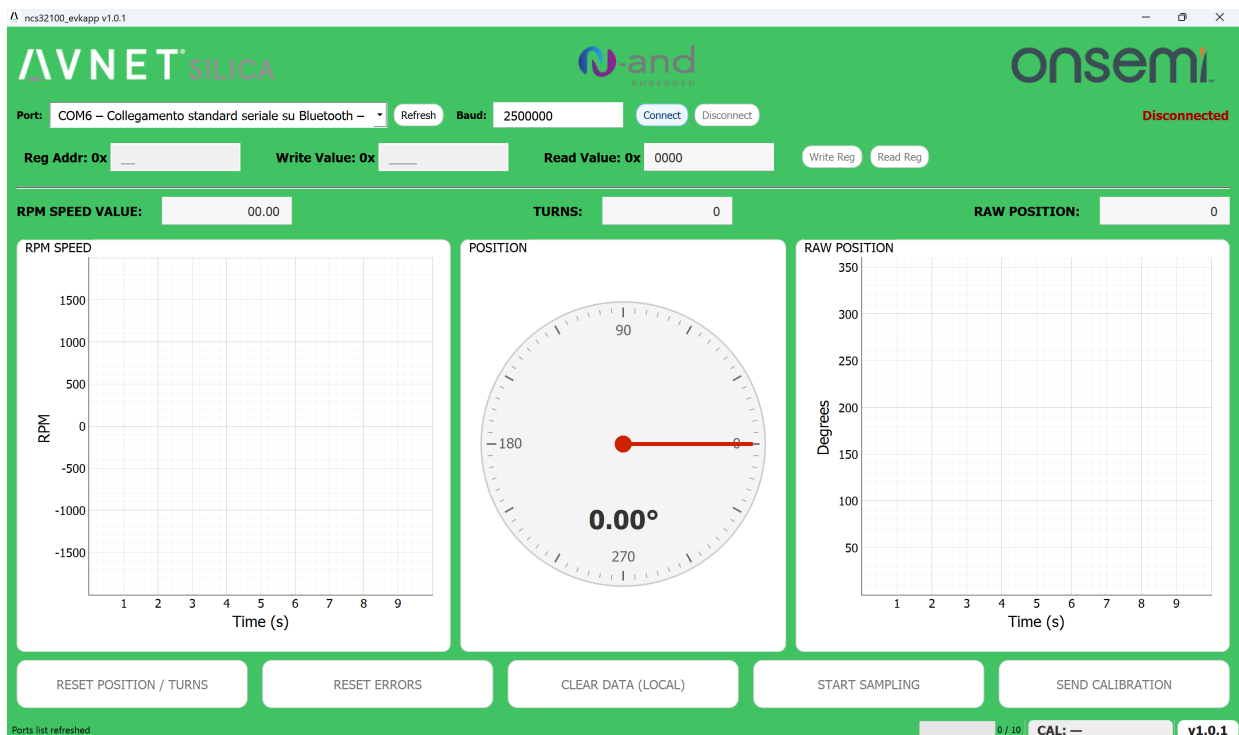


Figure 7: Application main window.

5.3 Live plots and numeric readouts

Typical UI elements:

- Position/angle plot vs time
- Velocity plot vs time
- Numeric readouts (current position, velocity, status)

6 USB / Serial Communication

6.1 Physical link

- PC to kit: USB Virtual COM port
- Power: USB bus-powered

6.2 Application command examples

The PC application implements a simple ASCII command protocol over the Virtual COM port.

- **Start streaming:** send `S\r\n`
- **Write register:** `W,XX,XXXX\r\n`

Where:

- **XX** is the register address in hex (2 digits).
- **XXXX** is the register payload in hex (4 digits).

Note: In the application source, `W` is reserved for Write Register, and `S` is used for Start to avoid parser/protocol conflicts.

7 Mechanical Integration Guidelines

Measurement quality depends strongly on mechanical alignment and stability. At minimum:

- Maintain a stable rotor-stator gap: 0.2-0.5mm
- Eccentricity Tolerance: $\pm 0.25\text{mm}$
- Use rigid mounting to avoid tilt between the rotor and stator planes.

8 Troubleshooting

Symptom	Possible cause	Suggested actions
No COM port appears	Driver / USB cable issue	Try another cable / port; verify Device Manager; reinstall driver.
Connect fails	Wrong COM selected / port busy	Close other serial tools; select correct COM; power-cycle kit.
No data / flatline plots	Streaming not started	Press Start in UI; verify <code>S\r\n</code> is sent.
Noisy / unstable angle	Mechanical misalignment	Check gap, tilt, rotor centering, fasteners.
Intermittent resets	USB power drop	Try powered hub; check cable length; inspect shorts.

9 Specifications

- Power: USB bus-powered, 5 V nominal / external ps, 24 VDC nominal
- PC interface: USB Virtual COM
- Signal update rate: 20Hz
- Output units:
RPM SPEED VALUE = rpm / TURNS = counts
RAW POSITION = 20bit / RAW POSITION = degree
- Operating temperature: -40°C - 85°C
- NEMA23 compatible mechanical fixture

10 Revision History

Rev	Date	Notes
1.0.0	February 11, 2026	Initial template draft.
1.0.1	February 16, 2026	Add 24 VDC + review connectors