Application Note

NOVOSENSE

NSM2032/33/20 Programmer User Guide

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NOVOSENSE

ABSTRACT

Core-based Linear hall sensor is that a concentrator core focuses magnetic flux lines, which are generated by electrical current flowing through a conductor, at the center of the air gap, where the Hall magnetic sensor IC is positioned.

The customer can calibrate the sensitivity or offset of the sensor by adjusting the relevant registers in the chip.

NOVOSENSE Microelectronics provides calibration hardware platform and software operation greatly facilitate customer development.

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1.Hardware

1.1Function Overview

The NSM2032/NSM2033/NSM2020 user sensitivity programmable function can be achieved by controlling the NSM2032/NSM2020 configuration calibration related registers through the Aries-1 series controller board and programmer software.

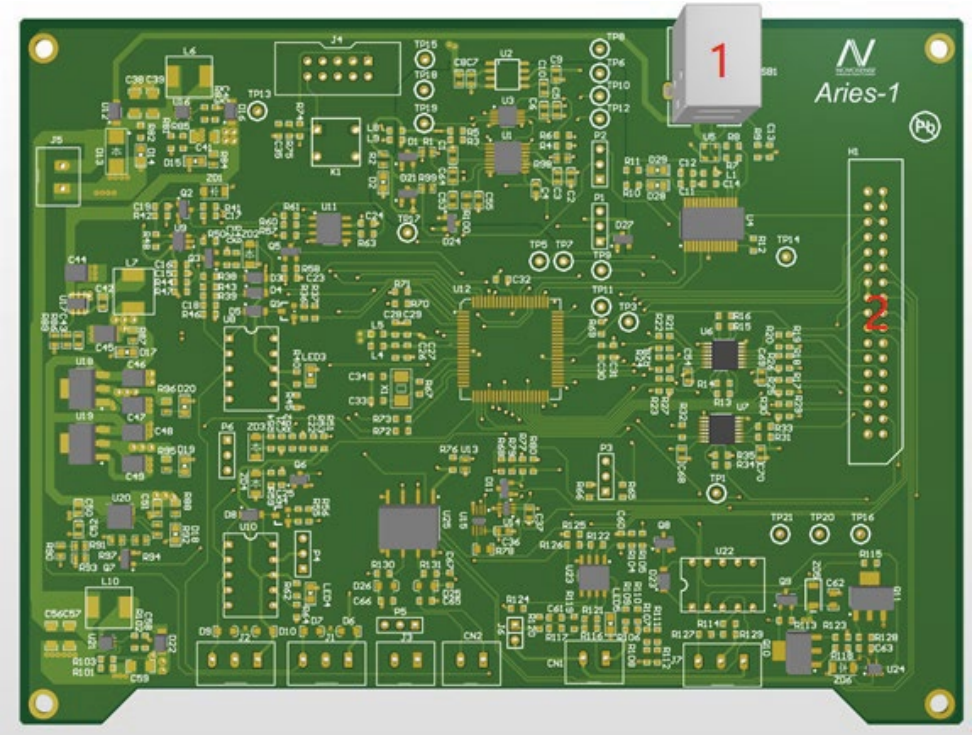

Figure 1. 3D schematic of Controller board

In Figure1 ,

1 : USB Power port , connected with PC.

2 : the function expansion port of the controller board is connected to the device(NSM2032/NSM2033/NSM2020), as shown in Figure2.

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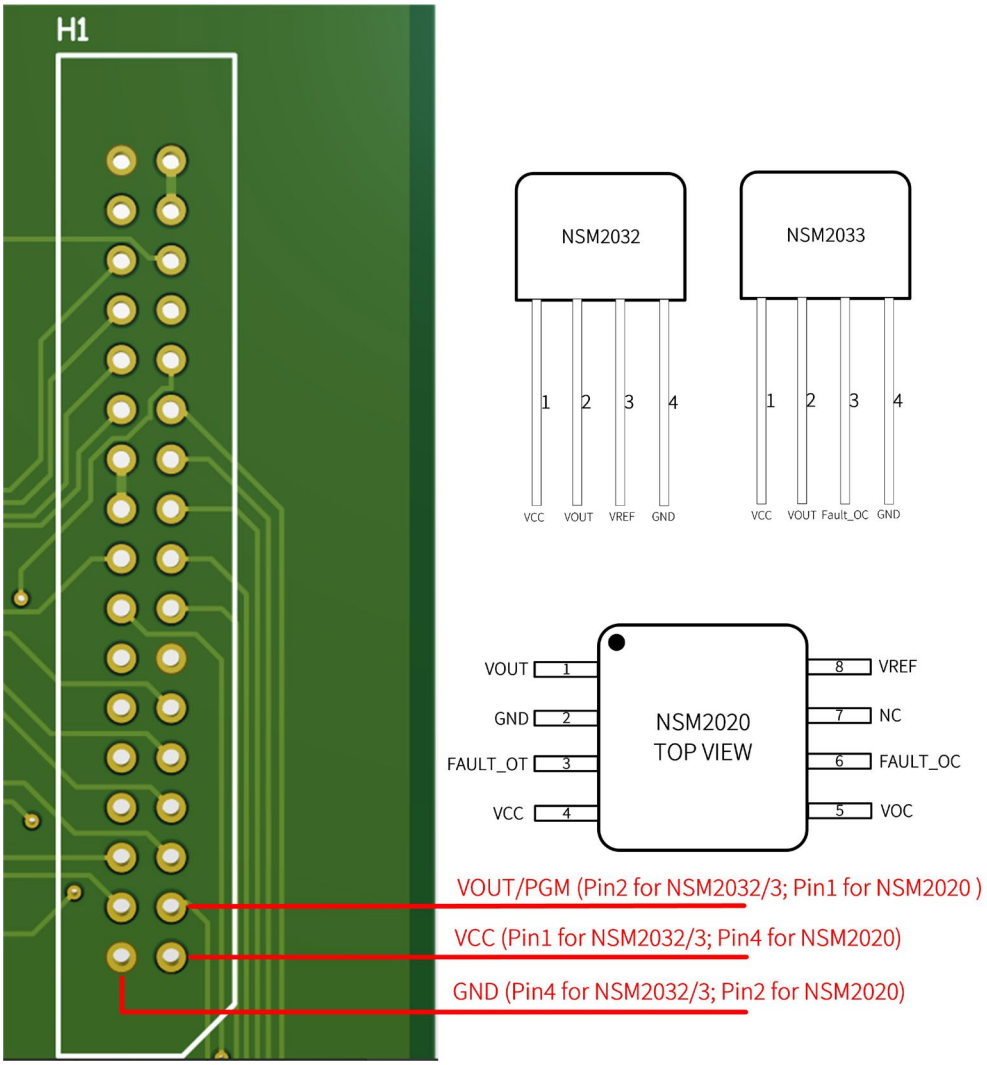

Figure 2. Connection diagram of Controller board with NSM2032/NSM2033/NSM2020 device

2.Software Install

2.1 Software Installation Environment

- NI LabVIEW 2019 and above
- NI VISA 19.0 and above

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2.2 Path of GUI

Figure 3. Example of the Software path

Double-clicking name. Exe in the folder NSM2032 _Programmer to run the program to enter the main interface of the software.

3.Software

3.1 Calibration Procedure [NSM2032]

The figure shows the calibration interface of NSM2032. The operation and calibration steps are as follows:

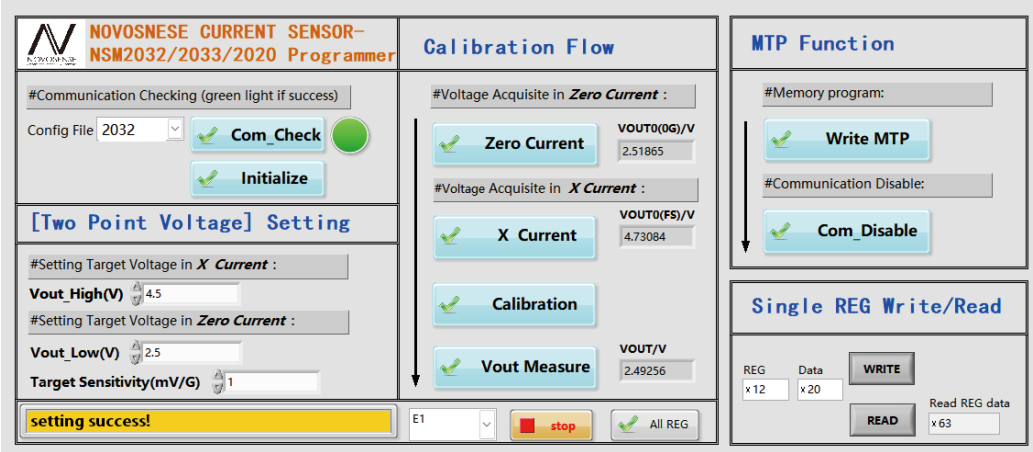

Figure 4. Programmer GUI for NSM2032

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3.1.1 Establish communication and initialize device:

The configuration file name is 2032. Clicking the button Com_Check to establish communication between Controller Board and device(DUT: NSM2032). If communication is successful, the light button is green and then clickinging Initialize button to Initialize the DUT to get a new device.

3.1.2 Two-point programming voltage setting:

Two-point programming voltage setting: NSM2032 chip programming adopts "two-point calibration". Set the corresponding output voltage Vout_Low(V) at zero current and Vout_High(V) at X current, and set the target sensitivity of the device. For example, if the device needs to output Vout_Low(V) of 2.5V at 0 amps and Vout_High(V) of 3V at 100 amps, and the coupling factors(CF) of the ferromagnetic core used is 1G/A, the Target Sensitivity value can be:

$$\text{Target Sensitivity} = \frac{(\text{Vout\_High} - \text{Vout\_Low}) / (x - 0)}{\text{CF}} = \frac{(3 - 2.5)\text{V} / (100 - 0)\text{A}}{1\text{G} / \text{A}} = 5\text{mV} / \text{G}$$

After the above two steps are completed, enter the calibration process.

3.1.3 Voltage acquisiting at zero current:

Zero current in the system, clicking the button Zero Current to acquisiting the zero voltage, and the voltage value is showed as VOUT0(0G).

3.1.4 Voltage acquisiting at zero current: :

X current in the system, clicking the button X Current to acquisiting the voltage @ X current, and the voltage value is showed as VOUT0(FS).

3.1.5 Calibration:

clicking the button Calibration to calibrate the sensitivity of device.

The output voltage of the calibrated device at zero current and X current should be closed to Vout_Low and Vout_High voltages set in Step 2. The output voltage of different magnetic fields or currents can be measured by clicking the button Vout Measure.

3.1.6 MTP program:

Clicking the button Write MTP write memory of device . MTP can be programmed multiple times.

3.1.7 Communication disable:

Click the button COM_Disable to permanently disconnect digital communication with device.

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3.2 Calibration Procedure [NSM2033/NSM2020]

The figure shows the calibration interface of NSM2033/NSM2020. The operation and calibration steps are as follows:

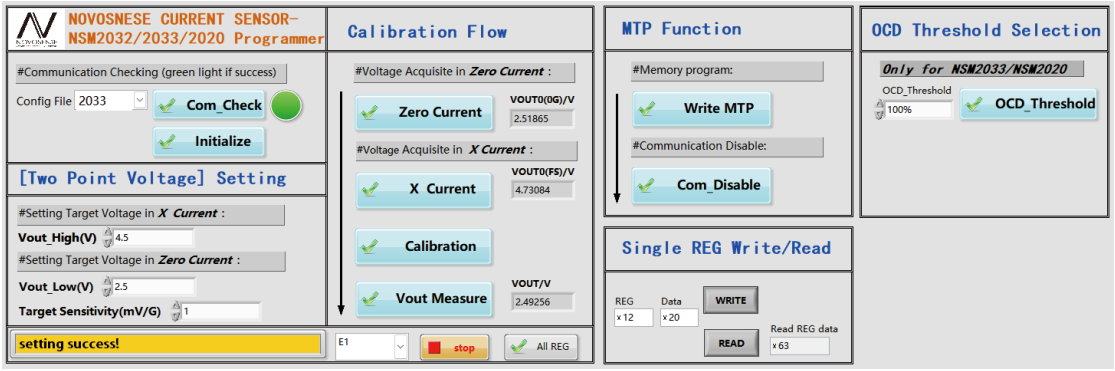

Figure 5. Programmer GUI for NSM2033/NSM2020

3.2.1 Establish communication:

The configuration file name is 2033 or 2020. Clicking the button Com_Check to establish communication between Controller Board and device(DUT: NSM2033 or NSM2020). If communication is successful, the light button is green.

3.2.2 OCD threshold selection:

NSM2033 and NSM2020 has overcurrent protection function. The range of threshold is 50%~200%FullScale and step is 25%. Clicking the button OCD_Threshold to set the overcurrent protection threshold, the factory default is 100% FullScale.

3.2.3 Initialize device:

clickinging Initialize button to Initialize the DUT to get a new device.

3.2.4 Two-point programming voltage setting:

Two-point programming voltage setting: NSM2033 and NSM2020 chip programming adopts "two-point calibration". Set the corresponding output voltage Vout_Low(V) at zero current and Vout_High(V) at X current, and set the target sensitivity of the device. For example, if the device needs to output Vout_Low(V) of 2.5V at 0 amps and Vout_High(V) of 3V at 100 amps, and the coupling factors(CF) of the ferromagnetic core used is 1G/A, the Target Sensitivity value can be:

$$\text{Target Sensitivity} = \frac{(\text{Vout\_High} - \text{Vout\_Low}) / (x - 0)}{\text{CF}} = \frac{(3 - 2.5)\text{V} / (100 - 0)\text{A}}{1\text{G} / \text{A}} = 5\text{mV} / \text{G}$$

After the above two steps are completed, enter the calibration process.

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3.2.5 Voltage acquisiting at zero current:

Zero current in the system, clicking the button Zero Current to acquisiting the zero voltage, and the voltage value is showed as VOUT0(0G).

3.2.6 Voltage acquisiting at zero current:

X current in the system, clicking the button X Current to acquisiting the voltage @ X current, and the voltage value is showed as VOUT0(FS).

3.2.7 Calibration:

clicking the button Calibration to calibrate the sensitivity of device.
The output voltage of the calibrated device at zero current and X current should be closed to Vout_Low and Vout_High voltages set in Step 2. The output voltage of different magnetic fields or currents can be measured by clicking the button Vout Measure .

3.2.8 MTP program:

Clicking the button Write MTP to write memory of device . MTP can be programmed multiple times.

3.2.9 Communication disable:

Click the button COM_Disable to permanently disconnect digital communication with device.

Note the yellow progress bar on the lower left of the main interface for all the above process.

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4.Revision History

Revision	Description	Author	Date
1.0	Initial version	Haijun Cao	15/10/2023

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