Application Note

NOVOSENSE

Programming Tools User Guide Based on NSM1030

AN-12-0015

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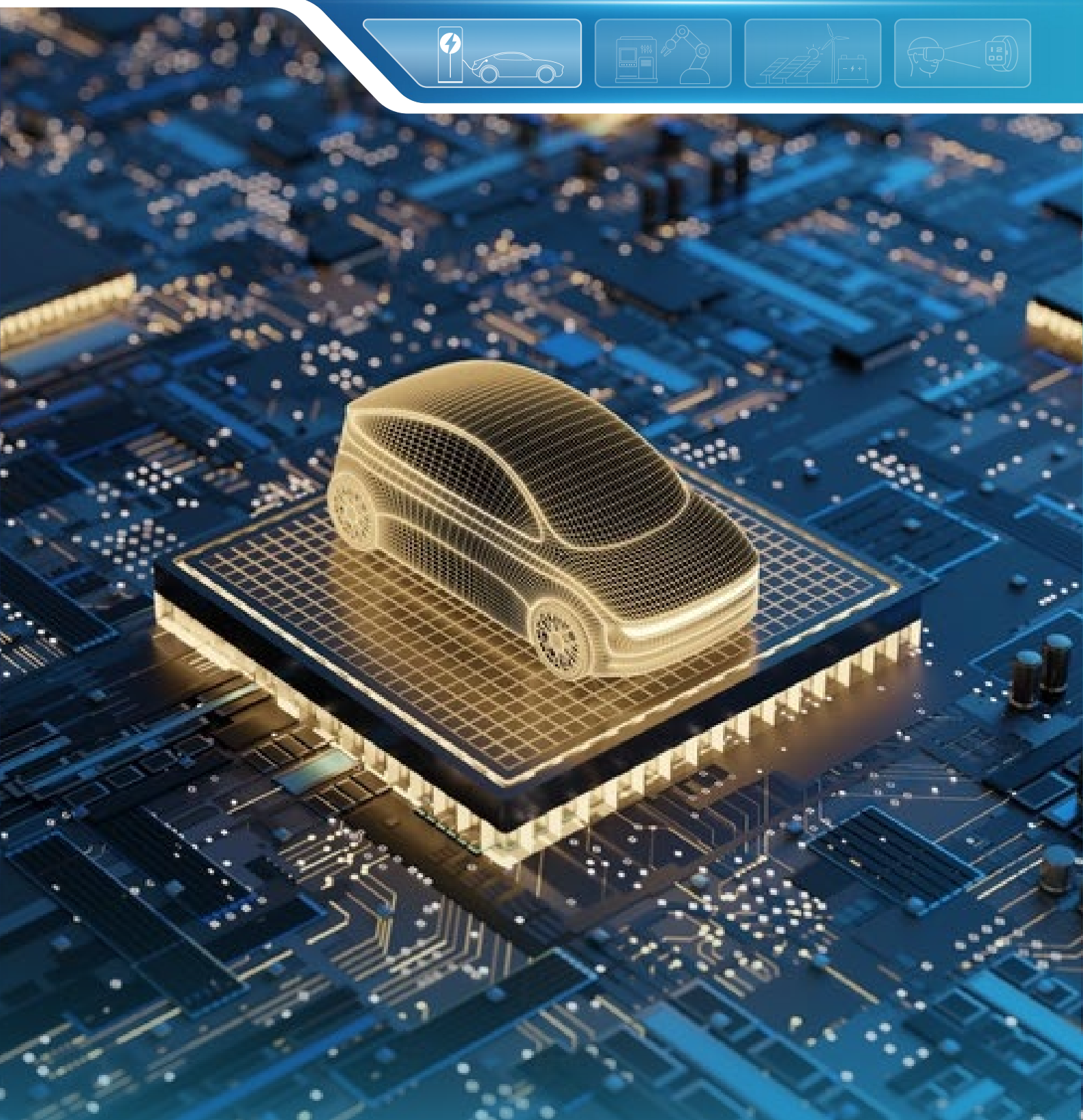

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ABSTRACT

The NSM1030 programming kit and the corresponding application interface are suitable for programmable Hall switch IC NSM1030 product. Customers can use the OWI communication for EOL programming. Programmable parameters include working magnetic range, auto trim BOP/BRP, output polarity, magnetic polarity, TC coefficient, power consumption, etc. These parameters can easily be modified or adapted to the individual requirements of the customer's application. This application note introduces how to use the programming kit.

INDEX

1.Programming Kit Setting

Figure 1.1 shows the NSM1030 programming KIT, please follow the steps to set up:

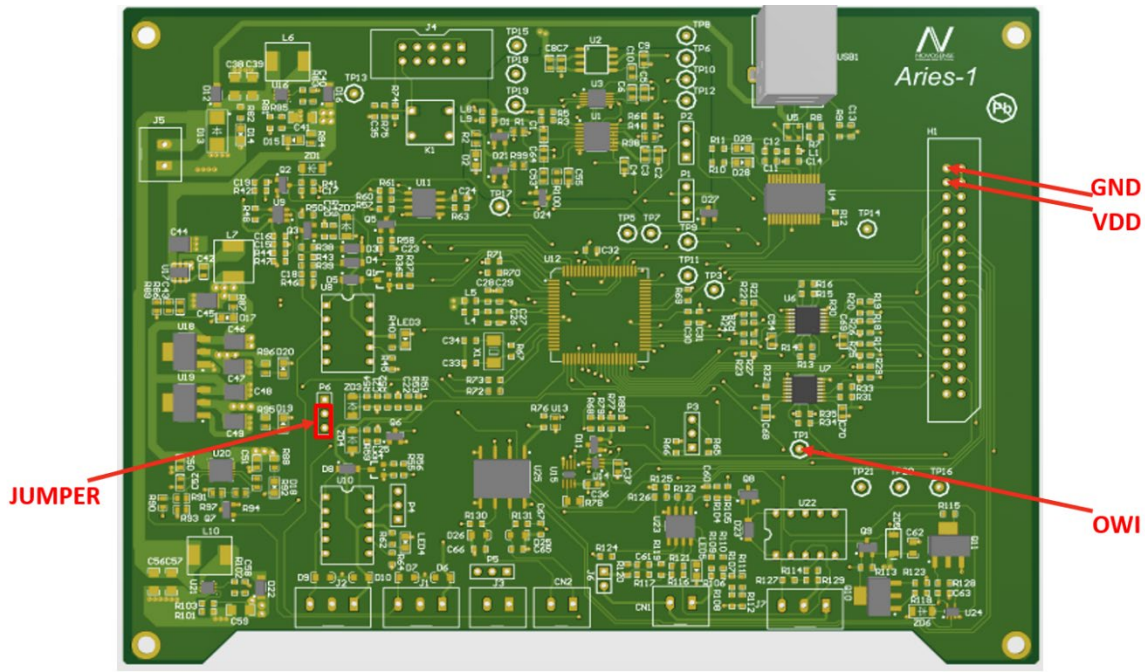


Figure 1.1 Programming KIT

1)Using Jumper to connect Sensor Voltage with VCC_Sensor. Please refer to the location Jumper in Figure 1.1.

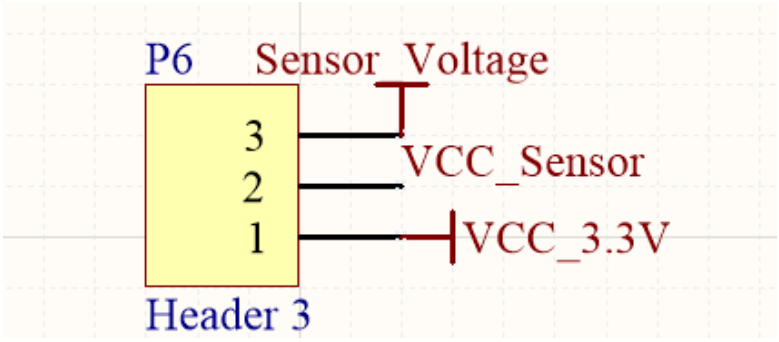


Figure 1.2 P6 Schematic

2)Connecting Out pin of NSM1030 with the test point TP1 of programming kit for OWI communication. Please refer to the location of TP1 in Figure 1.1.
3)Connecting VDD pin of NSM1030 with Header1 pin 32 of programming kit. Connecting GND pin of NSM1030 with Header1 pin 34 of programming kit. Please refer to the location of Header1 in Figure 1.3. The Power supply voltage is 10V.

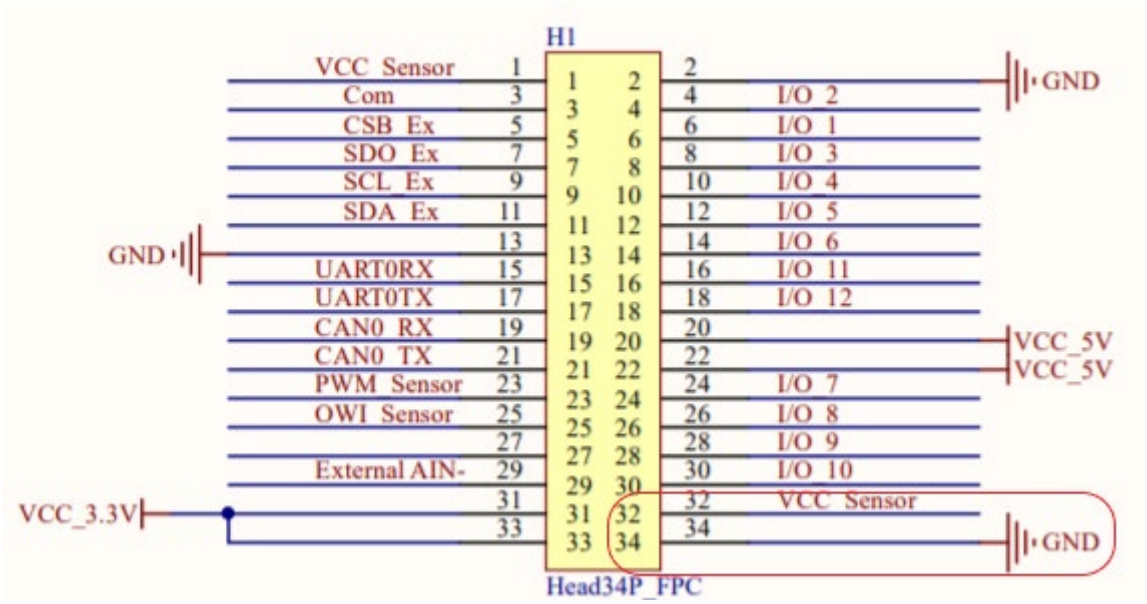


Figure 1.3 Header 1

2.Software Application

2.1.Driver Installation

The programming board use serial port as the interface with PC by FT232 Standard. Users need to install a FT232 serial port driver. After installing complete, the users can see the serial port in the device manager window shown in figure below.

Figure 2.1 USB Serial Port

2.2.Application

NOVOSNS provides a Zip file include an application (NSM1030.exe) and a NSM1030.dll file. Users can open the application software by double clicking the NSM1030.exe.

Figure 2.1 USB Serial Port

3.Software Guide

3.1.Software introduction

The following figure is GUI for NSM1030 programming tool.

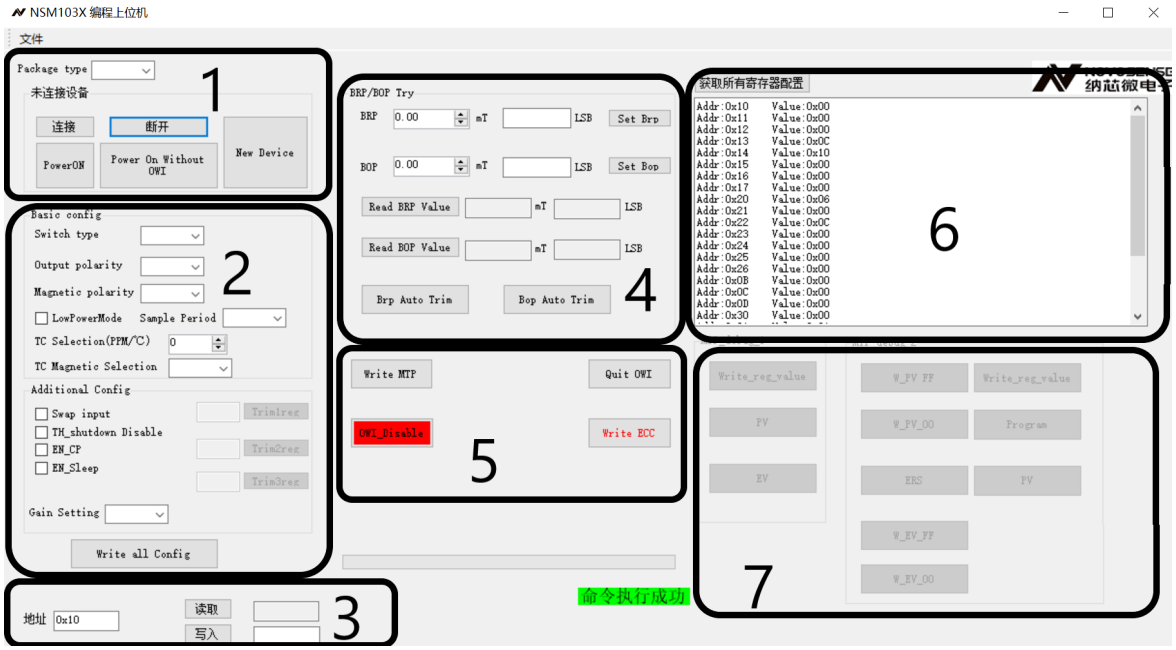
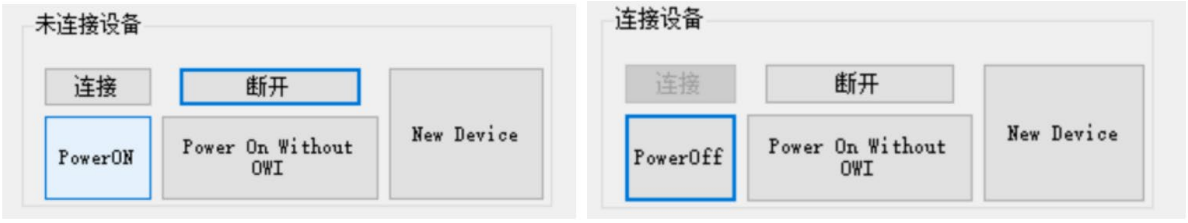


Figure 3.1 Software GUI

Each time uses take an action, the command execution status can be confirmed by the status bar. If the command is successfully executed, the status bar will turn green, and the text will turn into “命令执行成功”. If the command fails ,the status bar will turn red, and the text will turn into “命令执行失败”.

1.Device connection

After programmer hardware has been connected to the PC by USB cable. Users can click “连接” button. After the connection is successful, the status will change from “未连接设备” to “连接设备”. After connecting to the device, the user can power on or off by clicking Power on/off button. All other operations need to be performed after the device is connected and the chip is powered on, otherwise the operation will be invalid. The “New Device” button is used to initialize the default setting of the chip. Users can click the button to change the chip status to the factory setting. Before configuration, users need to choose the package type they use (SOT-23/TO-92S).



Unconnected Device **Connected Device**

Figure 3.2 Device connection

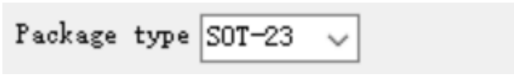


Figure 3.3 Package Type Selection

2.Parameters configuration

In this block, customers can configure the working mode according to individual requirements.

1)Basic config:

- Switch type: Unipolar / Omnipolar / Latch
- Output polarity: Low (When B>Bop, the output will be low level), High (When B>Bop, the output will be high level)
- Magnetic polarity: South/North (Only available in Unipolar mode. Please set to South in other mode)
- Low Power Mode: Enable or disable lower power mode (CHECK √ means enable)
- Sample Period: Sample period selection. Power consumption depends on the sample period selection. (Common power mode corresponding to 2ms/common power mode. If no special requirement, the low power mode corresponding to 256ms for lowest power consumption).
- TC Selection: Magnetic temperate compensation (If no T coefficient information or magnetic drift can be ignored, please select flat).

2)Applications:

Application1: Unipolar North Inverted Polarity:

- Switch type: Unipolar
- Output polarity: High
- Magnetic polarity: North

Application2: Unipolar North Standard Polarity:

- Switch type: Unipolar
- Output polarity: Low
- Magnetic polarity: North

Application3: Unipolar South Standard Polarity:

- Switch type: Unipolar
- Output polarity: Low
- Magnetic polarity: South

Application4: Unipolar South Inverted Polarity:

- Switch type: Unipolar
- Output polarity: High
- Magnetic polarity: South

Application5: Latch Standard Polarity:

- Switch type: Latch
- Output polarity: Low
- Magnetic polarity: South

Application6: Latch Inverted Polarity:

- Switch type: Latch
- Output polarity: High
- Magnetic polarity: South

Application7: Omnipolar Standard Polarity:

- Switch type: Omnipolar
- Output polarity: Low
- Magnetic polarity: South

Application8: Omnipolar Inverted Polarity:

- Switch type: Omnipolar
- Output polarity: High
- Magnetic polarity: South

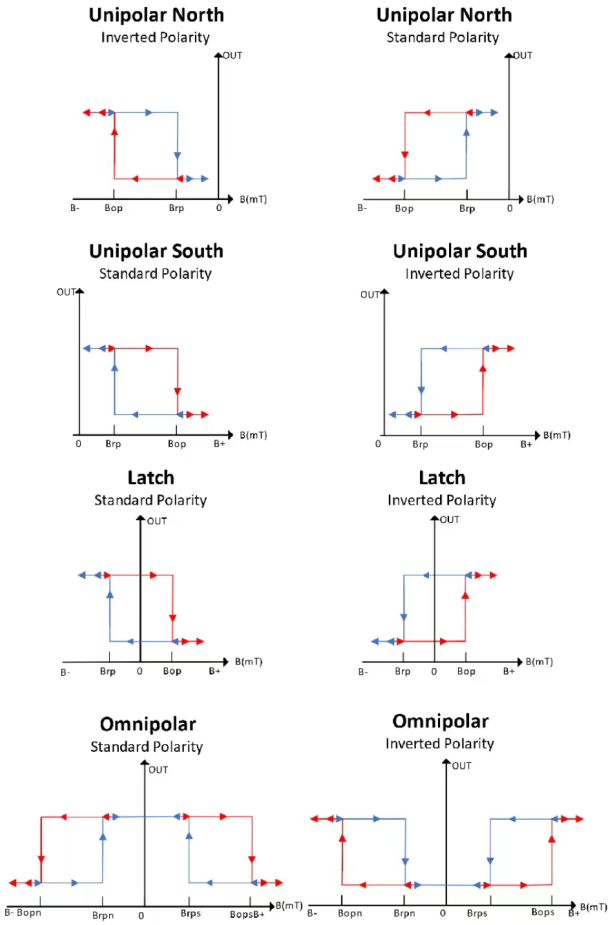


Figure 3.4 NSM1030 Work Mode

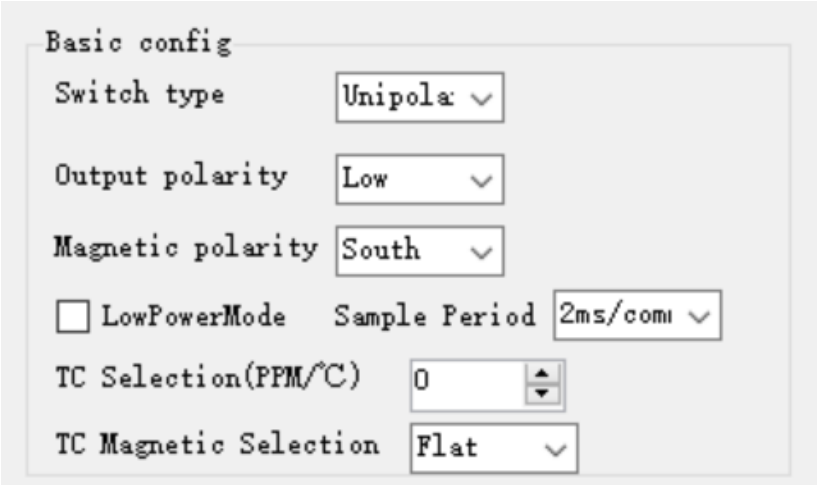


Figure 3.5 Example of Unipolar South Standard Polarity

3)Additional Config:

- Swap input: For TO-92S unipolar application, enable swap input (CHECK √ means enable)
- TH_shutdown_Disable: If no requirement for THD, disable TH_shutdown_Disable (CHECK √ means disable)
- EN_CP: For all application, EN_CP must be enabled (CHECK √ means enable)
- EN_Sleep: For low power mode, EN_Sleep must be enabled (CHECK √ means enable)
- Gain setting: Change the full-scale range for different magnetic strength application. For Bop<15mT, select Gain=1; For 15mT<Bop<30mT, select Gain=2; For 30mT<Bop<45mT, select Gain=3; For 45mT<Bop<60mT, select Gain=4.

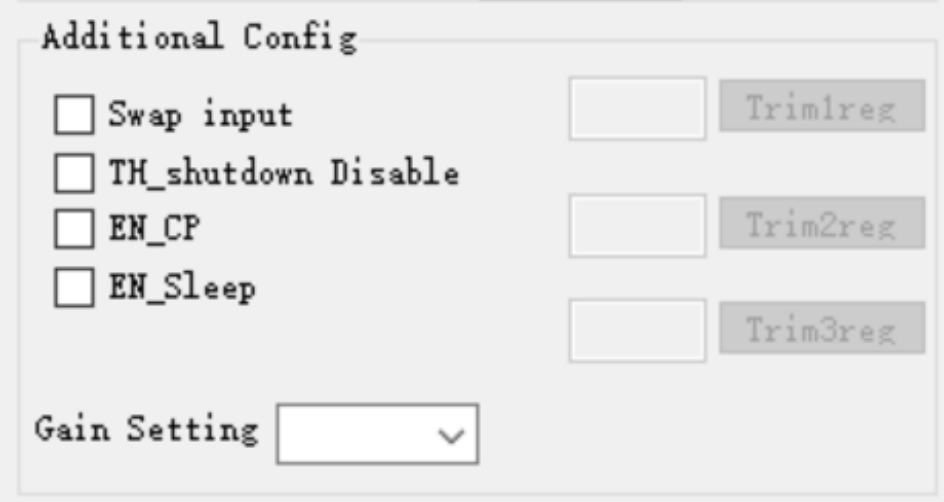


Figure 3.6 Additional Config

3.Read or write single byte register (Debug used)

Figure 3.7 Read or Write Register

4.BOP/BRP Try:

- NOVOSNS innovative auto trim technology can provide high precision BOP/BRP calibration.
- Figure3.8 shows a unipolar standard polarity application case. X-axis represents the mechanical position and Y-axis represents the chip output.

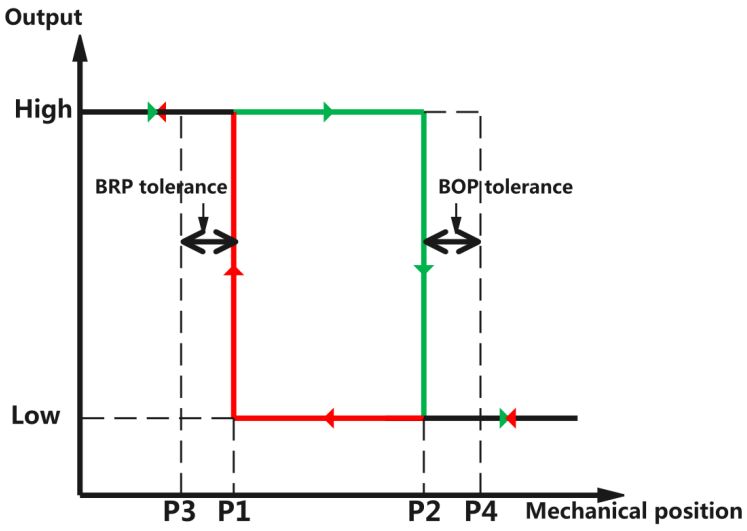


Figure 3.8 Relationship between Mechanical Position and Output

- Position 1 is the BRP position which is defined by users. Users should calibrate BRP by click Brp Auto Trim button at this position. After auto trim, users can click BRP value to get the magnetic strength at position 1.
- Position 2 is the BOP position which is defined by users. Users should calibrate BOP by click Bop Auto Trim button at this position. After auto trim, users can click BOP value to get the magnetic strength at this position 2.

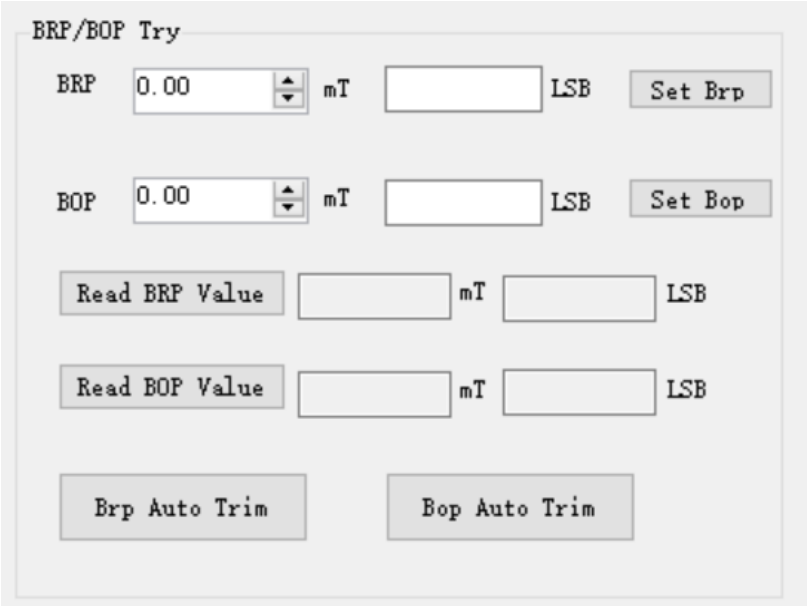


Figure 3.9 Relationship between Mechanical Position and Output

- Position 3 is the latest low-to-high change position defined by the user's specification. The BRP position must lag from the position 3 to give a buffer for BRP tolerance.
- Position 4 is the latest high-to-low change position defined by the user's specification. The BOP position must lead from the position 4 to give a buffer for BOP tolerance.
- The flow chart for BOP/BRP calibration

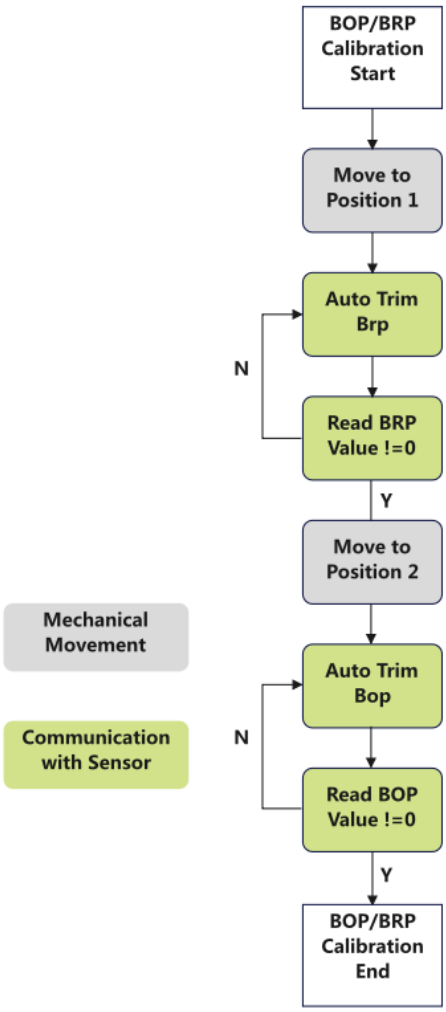


Figure 3.9 Relationship between Mechanical Position and Output

5.Final Config

- OWI_Disable: After parameters config and BOP/BRP calibration done, the communication should be disabled. Click this button will disable OWI communication function. MTP setting will be locked, and the POR time will be less than 1ms.

- Write ECC: After all config done, users must click write ECC button to write ECC value into MTP.
- Quit OWI: Debug use. Users can quit communication mode and debug their config by clicking Quit OWI button.
- Write MTP: After all config done, click this button to write all config into MTP. Attention: NSM1030 only supports 20 times MTP programming!

6.Read all register value: Debug use. User can get all register value for NSM1030.

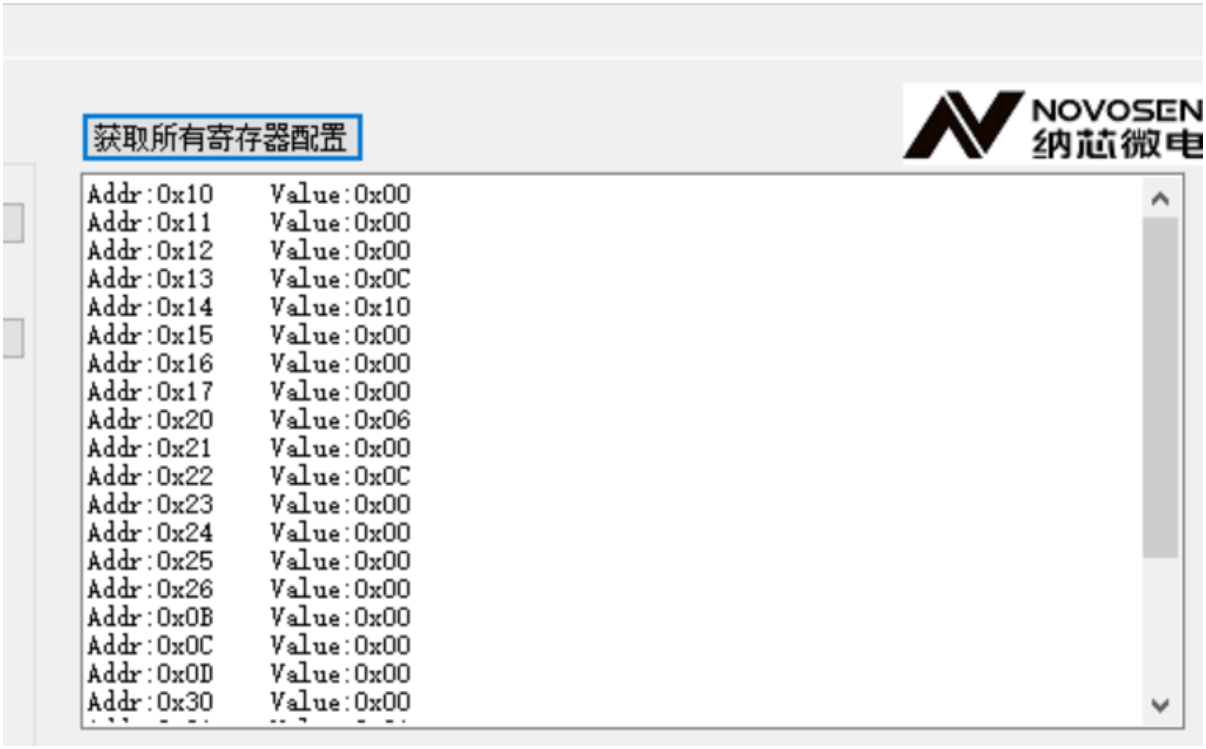


Figure 3.11Read All Register Value

7.Reserved for NOVOSNS debug use.

3.2.Full configuration flow

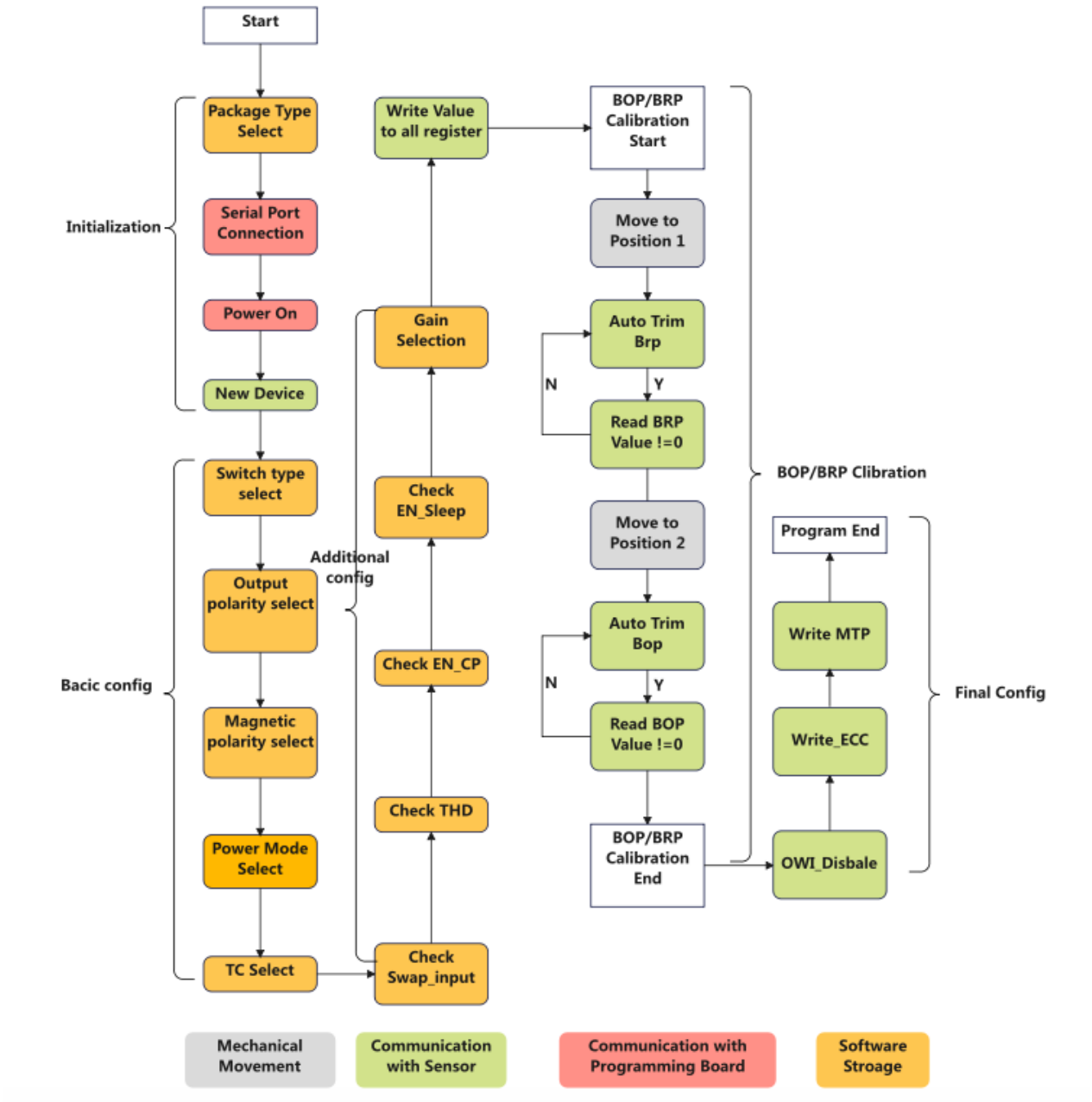


Figure 3.12 Full Configuration Flow

4.Revision History

Revision	Description	Author	Date
1.0	Initial version	Zhiyu Yao Xuanzhong Jiang	04/12/2023

Sales Contact: sales@novosns.com;Further Information: www.novosns.com