Magnetic Sensor
Switching output type
HGDVST022A
Evaluation Kit Manual

Document No: 830N0047-O
Feb.2024

Table of Contents

Switching Output Type Magnetic Sensor for Vehicles HGDVST022A

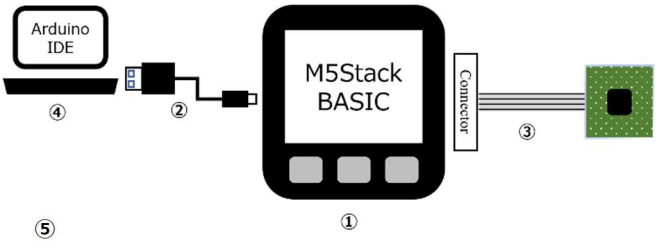
Alps Alpine high-precision magnetic sensors use Giant Magneto Resistive effect (GMR) for horizontal magnetic fields detection. Utilizing the GMR element for its high output and exceptional resistance to high temperatures and magnetic fields, our sensors achieve high output level and sensitivity compared to other GMR sensors; approximately 100 times higher than Hall element and 10 times higher than AMR element based on our research. We offer various magnetic sensors for dedicated usage such as non-contact switch applications, linear position detection and angle detection as well as rotational speed and direction sensing in response to external magnetic fields.

This document provides the information how to evaluate Switching Output Type Magnetic Sensor (HGDVST022A) with M5Stack quickly.

1. Requirements

Please prepare followings for evaluation:

① M5Stack BASIC
② USB cable (come with M5Stack)
③ Evaluation board for HGDVST022A
④ PC w/Arduino IDE & other files (see below)
⑤ Neodymium magnet (see Fig.1)



Note) All the necessary files should be installed into Arduino IDE such as “M5Stack Boards Manager” and “Library Manager”. For setting of M5Stack, please also refer to M5Stack website and other materials.

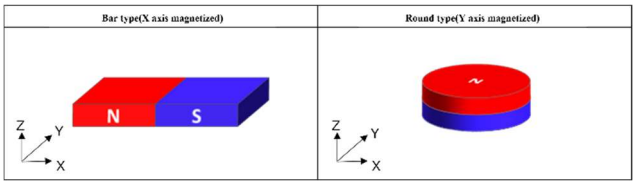


Fig.1 Magnet

2. Connection

Connect PC, M5Stack and the evaluation board by USB cable as shown in Fig.2.

The circuit diagram of the evaluation board is shown in appendix in this document.

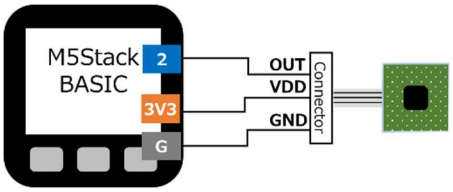


Fig.2

3. Compile a program

Download sample program for the magnetic sensor (HGDVST022A) from Alps Alpine website and extract zip file anywhere on your PC. Then follow the instruction below 1 - 4.

(For download, user registration is required)

Archive file: ALAP_HGDVST022A.zip

After extraction: ..¥(Any)¥ALAP_HGDVST022A¥ALAP_HGDVST022A.ino

Document No: 830N0047-O
Feb.2024

1. Start Arduino IDE.
2. In menu [file]→[Open] and select (ALAP_HGDVST022A.ino) in list (Fig.3).
3. Select “M5Stack-Core-ESP32” or "M5Core"in [Select Board] and select COMxx which is connected with M5Stack (Fig.4).

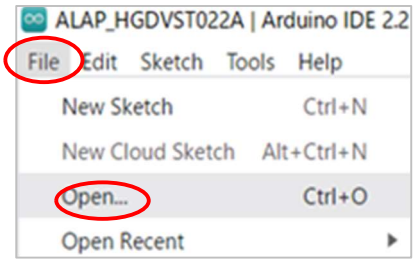


Fig.3

Note) Number of COM port (xx) is different depend on user condition.

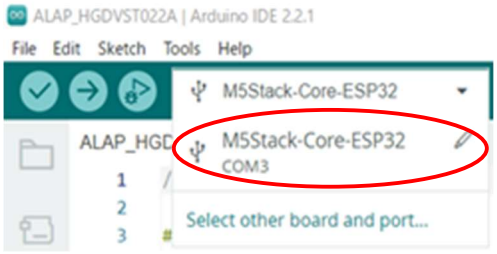


Fig.4

4. Click “√” for compile and wait

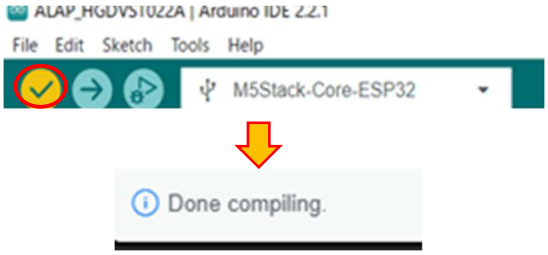


Fig.5

4. Upload compiled program to M5Stack

Upload (write) the compiled sample code to M5Stack.

1. Click “→” for upload and wait for message “Done uploading” (Fig.6).
2. After uploading, M5Stack restart automatically.
3. Status of magnetic sensor can be monitored on M5stack LCD.

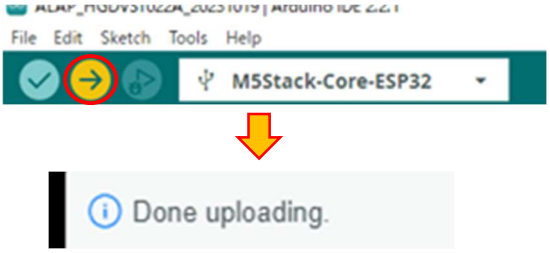
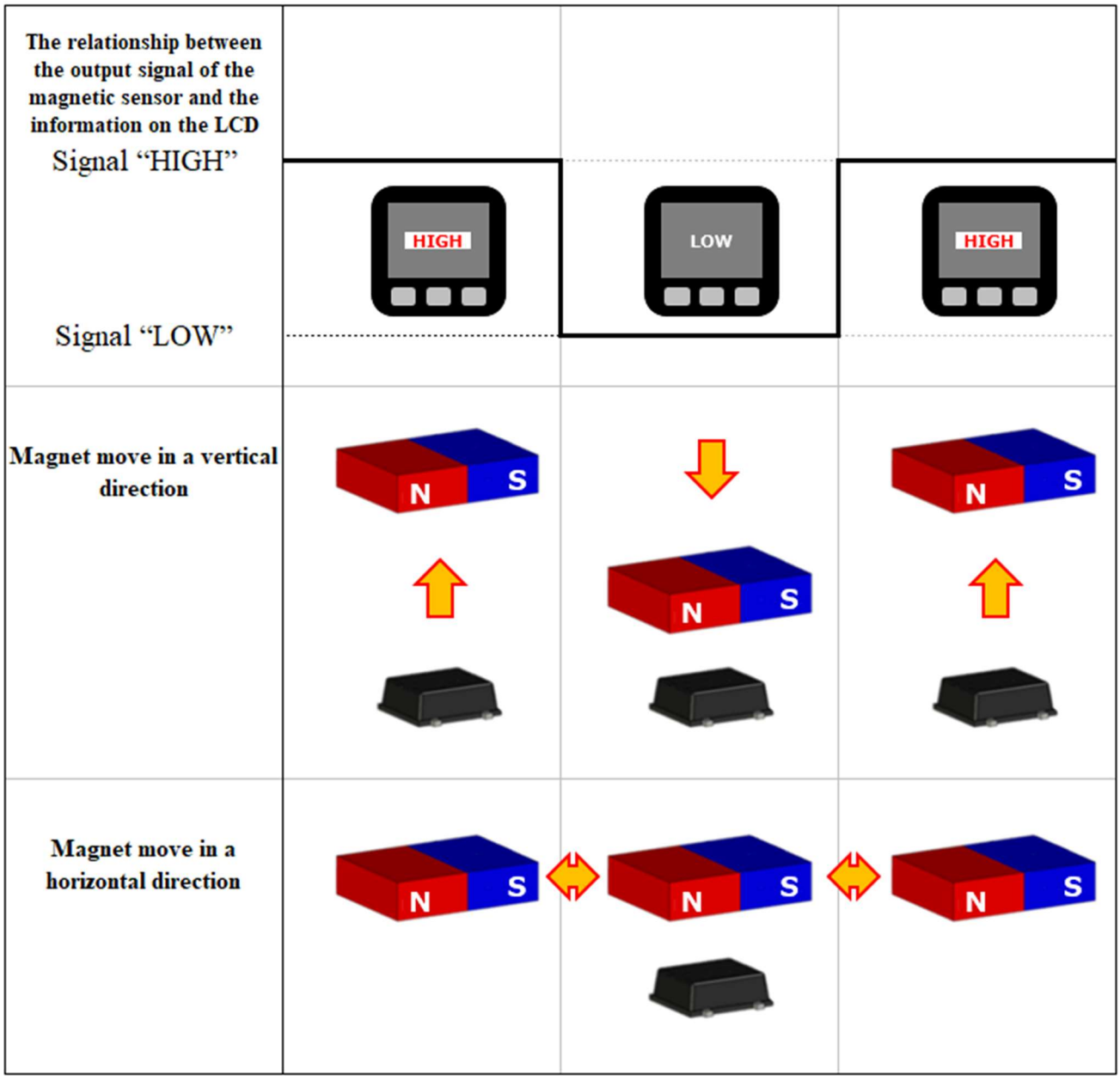


Fig.6

5. About sample program

This sample program demonstrates simple example of magnetic switch usage. When magnet has moved around the sensor, message will appear on M5Stack LCD accordingly.

1. After turning on M5Stack, M5Stack shows initial status of magnetic sensor.
2. When magnet has moved apart from the sensor, the sensor output the signal “HIGH”. Accordingly, M5Stack LCD displays “HIGH”.
3. When magnet has brought close to the sensor, the sensor output the signal “LOW”. Accordingly, M5Stack LCD displays “LOW”.



About magnetic switch

The magnetic switch (HGDVST022A) is an open-collector output as shown in Fig.7, which detects the magnetic flux in the direction of the length of the device package (pin3 to pin1); ON (output Low) at 2 mT (typ.) and OFF (output High) at 1.4 mT (typ.).

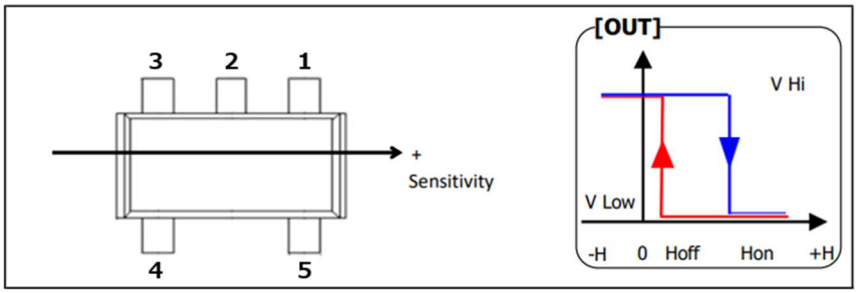


Fig.7 Sensing direction for magnetic switch

Fig.8 and Fig.9 show an example of magnetic flux density (MFD) when the magnet is brought close to the magnetic sensor. Fig.8 shows the variation of the MFD with respect to the movement of the magnet in the vertical direction of the magnetic sensor. Fig.9 shows the variation of the MFD with respect to the movement of the magnet in the horizontal direction of the magnetic sensor. Please refer to "Design guide", "Data sheet" and "Application note" for detail.

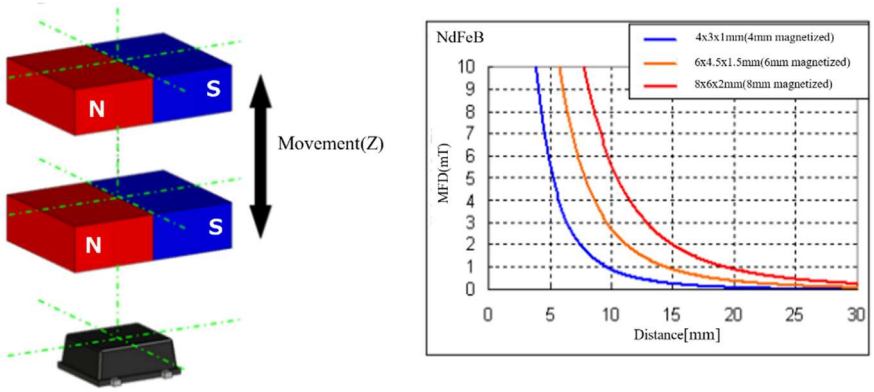


Fig.8 MFD vs vertical magnet movement

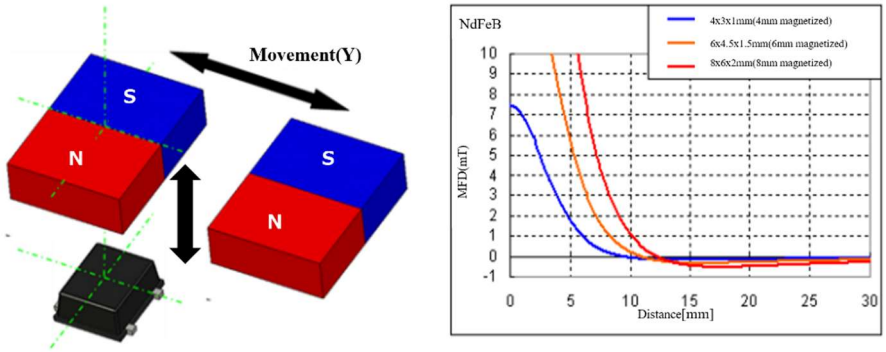


Fig.9 MFD vs horizontal magnet movement

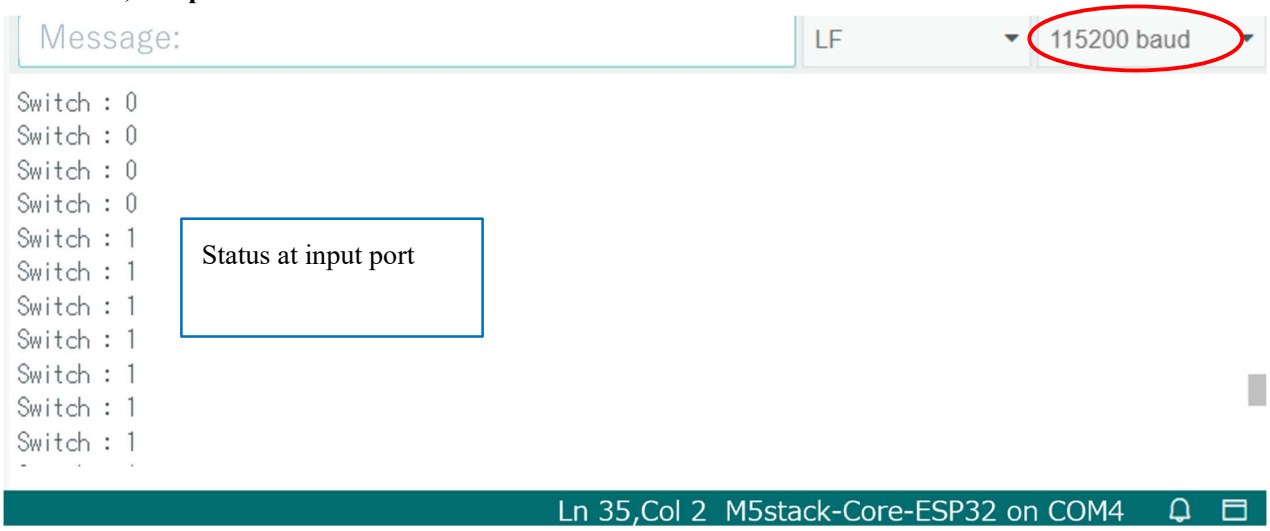
About serial monitor

The status of sensor input port can be monitored at Arduino IDE “serial monitor” when M5stack is connected.

“Switch: 0” means “LOW” and “Switch: 1” means “HIGH”.

To use this function, please set baud rate as below:

Baud rate: 115,200bps



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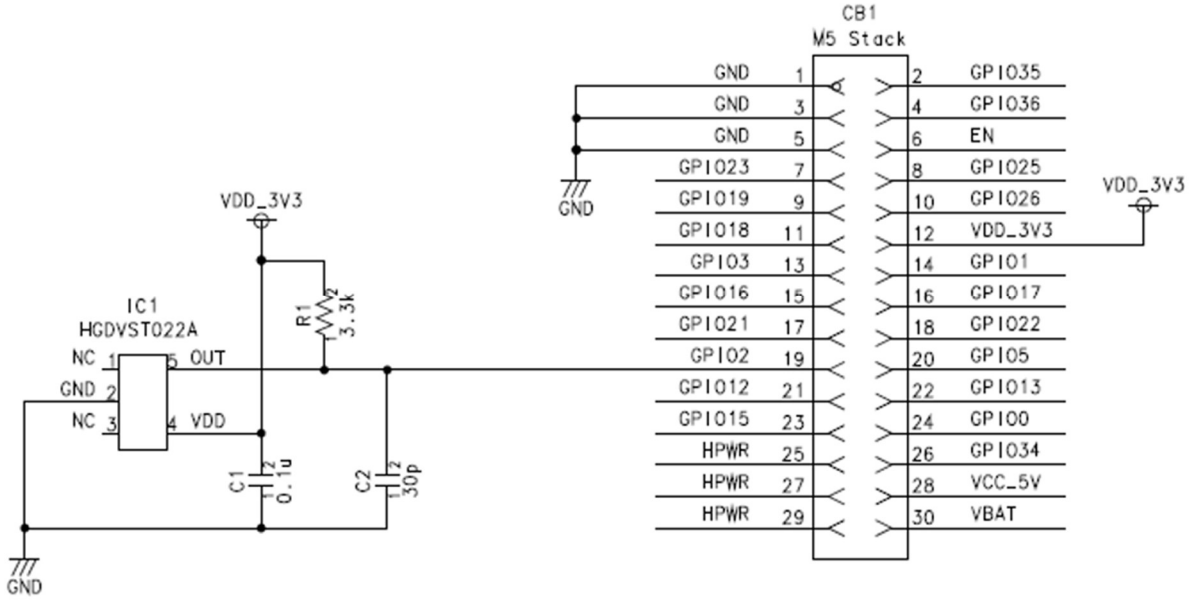
Appendix

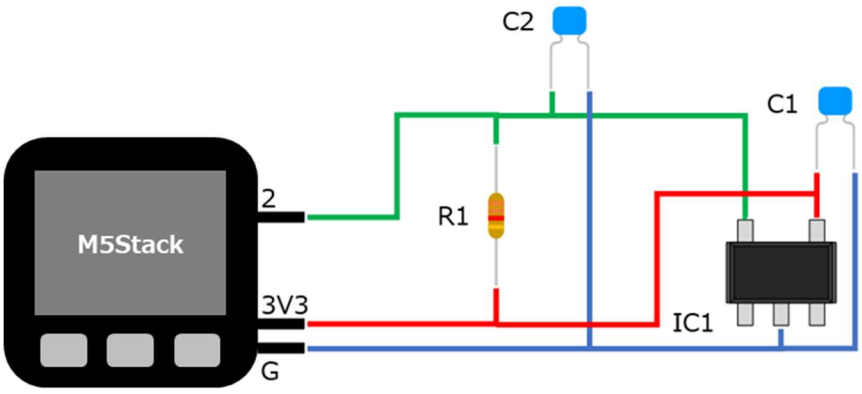
1. Circuit Diagram



2. Components

Part No.	Description	Parts / Value
IC1	Magnetic Sensor	HGDVST022A
C1	Bypass Capacitor	0.1uF
C2	Load capacitor	30pF
R1	Pull-up resistor	3.3kΩ

3. Wiring diagram



Note) Follow the pin description back on M5Stack for wiring

Revision history

Date	Version	Change
Feb. 14 2024	1.0	Initial Release (English version)