Quick Start Guide

Bipolar stepper motor driver expansion board based on L6208 for STM32 Nucleo (X-NUCLEO-IHM05A1)
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Hardware overview

X-NUCLEO-IHM05A1 Hardware Description

• The X-NUCLEO-IHM05A1 is a bipolar stepper motor driver expansion board based on the L6208 for STM32 Nucleo.

• It provides an affordable and easy-to-use solution for driving bipolar stepper motors in your STM32 Nucleo project.

• The X-NUCLEO-IHM05A1 is compatible with the Arduino UNO R3 connector, and supports the addition of other shielded boards with a single STM32 Nucleo board.

Key Products on board

L6208
DMOS driver for bipolar stepper motors

Latest info available at www.st.com
X-NUCLEO-IHM05A1

(*) Not mounted
Bipolar stepper motor driver expansion board

Software overview

X-CUBE-SPN5 software description

- This software running on STM32 completely manages the L6208 for micro-stepping control of stepper motors. It is built on top of STM32Cube software technology that eases portability across different STM32 microcontrollers.

Key features

- Driver layer for a complete management of the L6208 (driver for bipolar stepper motor) which is integrated on the X-NUCLEO-IHM05A1 expansion board
- Example to control one bipolar stepper motor.
- Easy portability across different MCU families thanks to STM32Cube.
- Free, user-friendly license terms.

Latest info available at www.st.com

X-CUBE-SPN5
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Hardware prerequisites

- 1x STM32 Nucleo development board
  (NUCLEO-F401RE or NUCLEO-F334R8 or NUCLEO-F030R8 or NUCLEO-L053R8)

- 1x Bipolar stepper motor driver expansion board
  (X-NUCLEO-IHM05A1)

- 1x Bipolar stepper motor

- 1x Laptop/PC with MS Windows 7 or 8

- 1x External DC power supply with two electric cables (*)

- 1x USB type A to mini-B USB cable

(*) Power stage supply voltage from 8 V to 50 V
Setup & demo examples
Software prerequisites

• **STSW-LINK008**: ST-LINK/V2-1 USB driver

• **STSW-LINK007**: ST-LINK/V2-1 firmware upgrade

• A Windows PC with one of the supported development toolchains:
  • KEIL: MDK-ARM
  • IAR: EWARM
  • GCC-based IDE: System Workbench for STM32

• **X-CUBE-SPN5**: firmware
Bipolar stepper motor driver expansion board
Start coding in just a few minutes with X-CUBE-SPN5

Driving one stepper motor with X-NUCLEO-IHM05A1 and X-CUBE-SPN5

1. When using a NUCLEO-F030R8, pin 4 of CN5 connector must be shorted to pin 4 of CN9 connector through the R15 resistor. Otherwise R15 resistor can be removed to free pin4 of CN5 connector.

2. Stack the X-NUCLEO-IHM05A1 on the STM32 Nucleo board through the Arduino UNO R3 connector and connect the stepper motor to the power outputs (A+/− and B+/−) and the power supply (Vin\Gnd) to the CN1 connector.

3. Connect the STM32 Nucleo board to the PC through the USB cable.
Bipolar stepper motor driver expansion board
Start coding in just a few minutes with X-CUBE-SPN5

4. Depending on your STM32 Nucleo board, from the examples folder
   \(\texttt{stm32 Cube}\textbackslash Projects\Multi\Examples\MotionControl\IHM05A1}_ExampleFor1Motor\)
   open the software project from:
   - \(\texttt{Your Tool Chain Name}\textbackslash STM32F401RE-Nucleo\) for Nucleo based on STM32F401
   - \(\texttt{Your Tool Chain Name}\textbackslash STM32F334R8-Nucleo\) for Nucleo based on STM32F334
   - \(\texttt{Your Tool Chain Name}\textbackslash STM32F030R8-Nucleo\) for Nucleo based on STM32F030
   - \(\texttt{Your Tool Chain Name}\textbackslash STM32L053R8-Nucleo\) for Nucleo based on STM32L053

5. Open the file: \(\texttt{stm32 Cube}\textbackslash Drivers\BSP\Components\l6208\l6208_target_config.h.\)
   and modify the parameters according to your target configuration,
   Or open the file
   \(\texttt{stm32 Cube}\textbackslash Projects\Multi\Examples\MotionControl\IHM05A1}_ExampleFor1Motor\textbackslash Src\main.c\) and modify the initDeviceParameters as well as the call to
   BSP_MotorControl_Init with the address of this variable.

6. Build the project and download it into the STM32 memory.

7. Run the example. The motor automatically starts (see main.c for a detailed demo sequence).
Documents & related resources

All documents are available in the DESIGN tab of the related products webpage

X-NUCLEO-IHM05A1:
- Gerber files, BOM, and schematics
- **DB2639**: Bipolar stepper motor driver expansion board based on L6208 for STM32 Nucleo – Data brief
- **UM1926**: Getting started with bipolar stepper motor driver expansion board based on L6208 for STM32 Nucleo – User manual

X-CUBE-SPN5:
- **DB2640**: Bipolar stepper motor driver software expansion for STM32Cube – Data brief
- **UM1927**: Getting started with the X-CUBE-SPN5 bipolar stepper motor driver software expansion for STM32Cube – User manual
- Software setup file

Consult www.st.com for the complete list
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- STM32 Open Development Environment: Overview
The STM32 Open Development Environment (ODE) consists of a set of stackable boards and a modular open SW environment designed around the STM32 microcontroller family.
STM32 Nucleo Development Boards (NUCLEO)

- A comprehensive range of affordable development boards for all the STM32 microcontroller series, with unlimited unified expansion capabilities and integrated debugger/programmer functionality.

Power supply through USB or external source

Integrated debugging and programming ST-LINK probe

STM32 microcontroller

Complete product range from ultra-low power to high-performance

ST morpho extension header

Arduino™ UNO R3 extension headers

www.st.com/stm32nucleo
STM32 Nucleo Expansion Boards (X-NUCLEO)

- Boards with additional functionality that can be plugged directly on top of the STM32 Nucleo development board directly or stacked on another expansion board.

![Example of STM32 expansion board (X-NUCLEO-IKS01A1)](www.st.com/x-nucleo)
STM32 Open Development Environment
Software components

- **STM32Cube software (CUBE)** - A set of free tools and embedded software bricks to enable fast and easy development on the STM32, including a Hardware Abstraction Layer and middleware bricks.

- **STM32Cube expansion software (X-CUBE)** - Expansion software provided free for use with the STM32 Nucleo expansion board and fully compatible with the STM32Cube software framework. It provides abstracted access to expansion board functionality through high-level APIs and sample applications.

- **Compatibility with multiple Development Environments** - The STM32 Open Development Environment is compatible with a number of IDEs including IAR EWARM, Keil MDK, and GCC-based environments. Users can choose from three IDEs from leading vendors, which are free of charge and deployed in close cooperation with ST. These include Eclipse-based IDEs such as Ac6 System Workbench for STM32 and the MDK-ARM environment.

**OPEN LICENSE MODELS:** STM32Cube software and sample applications are covered by a mix of fully open source BSD license and ST licenses with very permissive terms.

www.st.com/stm32cube
www.st.com/x-cube
STM32 Open Development Environment
Building block approach

The building blocks

- Sense
  - Accelerometer, gyroscope
  - Inertial modules, magnetometer
  - Pressure, temperature, humidity
  - Proximity, microphone

- Connect
  - Bluetooth LE, Sub-GHz radio
  - NFC, Wi-Fi, GNSS

- Translate
  - Audio amplifier
  - Touch controller
  - Operation Amplifier

- Move / Actuate
  - Stepper motor driver
  - DC & BLDC motor driver
  - Industrial input / output

- Power
  - Energy management & battery

- Process
  - General-purpose microcontrollers
  - Secure microcontrollers

- Software

Your need

Our answer

- COLLECT
- TRANSMIT
- ACCESS
- CREATE
- POWER
- PROCESS

www.st.com/stm32ode