Quick Start Guide

Three-phase brushless DC motor driver expansion board based on L6230 for STM32 Nucleo (X-NUCLEO-IHM07M1)
Quick Start Guide Contents

X-NUCLEO-IHM07M1: Three-phase brushless DC motor driver expansion board
Hardware and Software overview

Setup & Demo Examples
Documents & Related Resources

STM32 Open Development Environment: Overview
Three-phase brushless DC motor driver expansion board

Hardware Overview

X-NUCLEO-IHM07M1 Hardware Description

- The X-NUCLEO-IHM07M1 is a three-phase brushless DC motor driver expansion board based on L6230 for STM32 Nucleo. It provides an affordable and easy-to-use solution for driving three-phase brushless DC motor in your STM32 Nucleo project. It is compatible with the ST morpho connector and supports the addition of other boards which can be stacked with a single STM32 Nucleo board. The user can also mount the Arduino UNO R3 connector.

- Main features
  - Nominal operating voltage range: 8 V - 48 V DC
  - Maximum output peak current: 2.8 A
  - Thermal measuring and overheating protection
  - 3-Shunt and 1-Shunt configurable jumpers for motor current sensing
  - Hall / Encoder motor sensor connector and circuit

Key Products on board

- L6230
  - DMOS driver for three-phase brushless DC motor
- TSV994
  - Rail to rail input / output high merit factor op-amps
- BAT30
  - Small signal Schotky diodes, 30V, 0.3A

Latest info available at www.st.com X-NUCLEO-IHM07M1
X-CUBE-SPN7 Software Description

- The X-CUBE-SPN7 is an expansion software package for STM32Cube. The software runs on the STM32 and includes drivers that recognize, initialize and send application commands to L6230 device.

- It is compatible with the NUCLEO-F030R8, the NUCLEO-F103RB, the NUCLEO-F302R8 or the NUCLEO-F401RE when connected to one or more X-NUCLEO-IHM07M1 expansion boards.

Key features

- Complete middleware to build Motor Control applications based on three-phase BLDC motor.
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms

Latest info available at www.st.com X-CUBE-SPN7
Setup & Demo Examples

HW prerequisites

- 1x Three-phase Motor driver expansion board based on L6230 (X-NUCLEO-IHM07M1)

- 1x STM32 Nucleo development board (NUCLEO-F030R8, NUCLEO-F103RB, NUCLEO-F302R8 or NUCLEO-F401RE)

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

- 1x low voltage three-phase BLDC motor

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

- 1x mini USB cable

(*) Power stage supply voltage from 8 V to 48 V DC
• **STSW-LINK008**: ST-LINK/V2-1 USB driver

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

• **X-CUBE-SPN7**
  • copy the .zip file content into a folder on your PC. The package will contain source code example (Keil, IAR, System Workbench) based on **NUCLEO-F030R8**, **NUCLEO-F103RB**, **NUCLEO-F302R8** or **NUCLEO-F401RE**.
X-CUBE-SPN7 in 8 steps

Use of X-CUBE-SPN7 with pre-compiled .BIN FW file

1. www.st.com/x-nucleo

2. Select X-NUCLEO-IHM07M1

3. Download & unpack X-CUBE-SPN7

4. Download & install STM32 Nucleo ST-LINK/V2-1 USB driver STSW-LINK008

5. Download / Install / Run ST-Link FW Upgrade Utility STSW-LINK007

X-CUBE-SPN7 package main structure

- Docs
- Motor Control drivers
- Motor Control lib, Serial UI
- F0/F1/F3/F4 src code

- [Documentation]
- [Drivers]
- [Middlewares]
- [Projects]
X-CUBE-SPN7 in 8 steps

Use of X-CUBE-SPN7 with pre-compiled .BIN FW file

X-CUBE-SPN7 for NUCLEO-F030 or NUCLEO-F103, NUCLEO-F302 or NUCLEO-F401

1. Connect the NUCLEO board with the X-NUCLEO board and LV BLDC motor (by default BR2804 motor)
2. Drag and drop
   - X-CUBE-SPN7_F030.bin for F0
   - X-CUBE-SPN7_F103.bin for F1
   - X-CUBE-SPN7_F302.bin for F3
   - X-CUBE-SPN7_F401.bin for F4
   on Nucleo drive
3. Push the blue button and motor RUN
X-CUBE-SPN7 for code developers

Compile the FW using one of supported IDE

X-CUBE-SPN7 for NUCLEO-F030 or NUCLEO-F103, NUCLEO-F302 or NUCLEO-F401

1. www.st.com/x-nucleo

2. Select X-NUCLEO-IHM07M1

3. Download & unpack X-CUBE-SPN7

4. Open the IDE workspace for Nucleo board selected

\STM32CubeExpansion_SPN7_V1.0.0\Projects\Multi\Examples\MotorControl\EWARM\STM32FXXXRX-Nucleo

Flash and Run the project

IAR IDE vers. 7.20
Documents & Related Resources

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

X-NUCLEO-IHM07M1:

- Gerber files, BOM, Schematic
- **DB2665**: Three-phase brushless DC motor driver expansion board based on L6230 for STM32 Nucleo – Data Brief
- **UM1943**: Getting started with the X-NUCLEO-IHM07M1; three-phase brushless DC motor driver expansion board based on L6230 for STM32 Nucleo – User Manual

X-CUBE-SPN7:

- **DB2667**: Three-phase brushless DC motor driver software expansion for STM32Cube – Data Brief
- **UM1946**: Getting started with the X-CUBE-SPN7; three-phase DC 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)

- Sense
- Connect
- Power
- Move/Actuate
- Interact

- Motion MEMS sensors
- Environmental sensors
- DIL24 support for new devices

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

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

Our answer

www.st.com/stm32ode