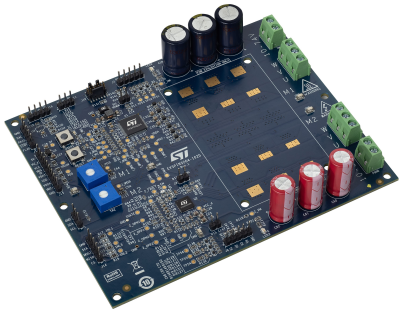
EVSPIN32G4-102D

Data brief

STSPIN32G4 and STDRIVE102BH reference design for driving two BLDC motors



Product status link
EVSPIN32G4-102D
STSPIN32G4
STDRIVE102BH

Product label
SUSTAINABLE TECHNOLOGY

Features

- Two power stages based on STL120N10F8 and STL220N6F7 power MOSFETs with output current up to 10 A_{rms} and 13 A_{rms}, respectively, protected against overcurrent conditions
- Independent bus voltage from 6 V to 75 V and 6 V to 36 V respectively with dedicated monitoring
- Possibility to mount a heat sink for both motors
- STSPIN32G4, high-performance three-phase motor controller with embedded STSPIN32G431 MCU:
  - 32-bit ARM Cortex®-M4 MCU with FPU
  - Up to 170 MHz clock frequency
  - CORDIC mathematical hardware accelerator for trigonometric functions
  - 128 KB flash memory with proprietary code readout protection (PCROP), securable memory area, 1 KB OTP
  - 32 KB SRAM memory with hardware parity check
  - 2 x advanced timers for motor control, 16-bit with up to 6 x PWM channels each
  - 2 x ADCs with 12-bit resolution (up to 19 channels) with 4 Msps conversion rate
  - 4 x ultrafast rail-to-rail comparators
  - 3 x rail-to-rail operational amplifiers also usable in PGA mode
  - Internal high-precision voltage reference
  - VCC step-down converter up to 200 mA, with programmable output and embedded MOSFET
  - 3.3 V LDO linear regulator up to 150 mA
  - Low quiescent linear regulator for MCU supply in standby mode
  - Regulators with a full set of protection features; thermal shutdown, short-circuit, and overload protections
  - 75 V rated gate drivers with 1 A sink and source current and embedded bootstrap diodes
  - Drain-source voltage sensing of each power MOSFET
- STDRIVE102BH, triple half-bridge gate driver with programmable currents:
  - 50 V rated gate drivers with programmable current capability with 1 A sink and 2 A source current and embedded charge pump for 100% duty cycle operation
  - Dual control modes: ENx/INx with programmable dead time or INHx/INLx with interlocking
  - Very short propagation delay of 50 ns, matched among channels
  - Flexible power management: 3.3 V and 12 V LDO linear regulators with dedicated undervoltage lockout protection
  - V_{DS} monitoring for safe driving operation of the power MOSFETs
  - Flexible analog front-end: three wide-bandwidth operational amplifiers and three high-speed comparators
  - UVLO and thermal shutdown protections
  - Standby mode for low current consumption operations
- Triple-shunt differential current sensing using embedded operational amplifiers

- Inputs for speed/position feedback available for both motors:
  - Digital Hall-effect sensors
  - Incremental quadrature encoders
  - Absolute encoders
- Full set of communication interfaces: I^2C, SPI, UART
- Predisposition for CAN bus
- NTC sensors for power-stages temperature monitoring

Applications

- Industrial and home automation
- Home appliances such as vacuum cleaners, dryers, and cleaning robots
- Servo drives and e-bikes
- Service and automation robots
- Power and garden tools
- Pumps and fans
- Drones and aeromodelling

Description

The EVSPIN32G4-102D is a demonstration board based on STSPIN32G4 and STDRIVE102BH for applications using two three-phase brushless motors.

The STSPIN32G4 is a system-in-package housed in a 9x9 mm VFQFPN package. It integrates a triple high-performance half-bridge gate driver with a rich set of programmable features and one mixed-signal STM32G431 microcontroller. The STDRIVE102BH is a triple half-bridge gate driver in a compact 6x6 VFQFPN package featuring programmable current capability and embedded protections.

The two power stages based on STL120N10F8 and STL220N6F7 power MOSFETs can simultaneously operate up to 10 A_{rms} at 75 V and 13 A_{rms} at 36 V respectively, providing dedicated temperature and bus-voltage monitoring, drain-source voltage sensing of power MOSFETs and overcurrent protection.

The board supports sensorless operation using three-shunt current sensing. It uses the PGAs inside the STSPIN32G4 and the operational amplifiers inside the STDRIVE102BH. The board also supports sensor-based control algorithms. Dedicated inputs for each motor connect Hall sensors, quadrature encoders, or absolute encoders with an SSI communication interface.

Thanks to the integrated voltage regulators both the gate driver and control logic supplies can be generated starting from the motors' supplies without dedicated circuitry.

The CAN bus interface provision enables the EVSPIN32G4-102D to easily connect with controller or target modules and build complex motion control systems.

1 Specification

Ratings of the board can be found in Table 1.

Table 1. EVSPIN32G4-102D specifications

Parameter		Value
Supply voltage	Motor1, nominal	From 6 V to 75 V
	Motor2, nominal	From 6 V to 36 V
Maximum current for each power stage	Motor1, peak	20 A
	Motor2, peak	25 A
	Motor1, continuous (1)	10 A_{rms}
	Motor2, continuous(1)	13 A_{rms}

1. *Maximum current at ambient temperature of 25°C with both power stages active. Power dissipation could limit the maximum current.*

Revision history

Table 2. **Document revision history**

Date	Version	Changes
23-Nov-2026	1	Initial release.

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