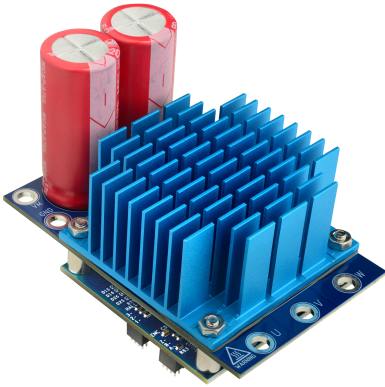# STSPIN32G4 reference design for servo driving applications

Features

- 3-phase power stage based on paralleled STL160N10F8 power MOSFETs and protected from overcurrent condition
- Motors up to 3 kW with active cooling or 2 kW with passive cooling
- Optimized for 24 V and 48 V applications
- STSPIN32G4, high performance 3-phase motor controller with embedded STSPIN32G431 MCU
- Triple-shunt differential current sensing
- External resistor management for regenerative braking
- Inputs for speed/position feedback by digital Hall sensors and incremental/absolute encoder in differential or single-ended mode
- CAN bus
- NTC sensor for power stage temperature monitoring

Applications

- Servo drives
- Industrial and home automation
- e-bikes
- Service and automation robots

Product status link
EVLSERVO1

Description

The EVLSERVO1 is a reference design for driving low-voltage and high-current servo motors.

This design is centered on the STSPIN32G4 which is a system-in-package integrating a triple high-performance half-bridge gate driver with a rich set of programmable features, a mixed signal STM32G431 microcontroller, and state-of-the-art power management generating internally the required supply for them, all in a compact 9x9 mm VFQFPN package.

The EVLSERVO1 has a very compact form factor of 50 mm x 80 mm x 60 mm thanks to the fact that a power board and a control board are stacked up together.

The system is designed to drive 3-phase brushless motors delivering up to 2 kW power out of the box with provided heatsink or 3 kW if adding an external fan for cooling. The system is intended for applications with nominal bus voltage up to 48 V but is designed to manage overvoltage conditions up to 75 V.

To achieve such outstanding performance, the power stage is composed by six couples of paralleled STL160N10F8 MOSFETs having extremely low $R_{DS(ON)}$: 3.2 mΩ max.

The power stage is fully protected thanks to the monitoring of possible overheating, overvoltage, and overcurrent. Triple-shunt topology is used for sensing of motor winding currents in differential mode.

Additional details make this reference design ready for advanced features. A dedicated circuitry is available to control bus voltage in case of regenerative motor braking. Power from the motor can be dissipated in one external resistor clamping the bus voltage at the required safe level.

DB5364 - Rev 1 - November 2024
For further information contact your local STMicroelectronics sales office.

www.st.com

Full flexibility from a firmware point of view is ensured, as the board is ready for FOC and 6-step control algorithms and can run in sensor-less mode or use up to two position feedback simultaneously. Hall sensors, incremental encoder, and absolute encoder with UART or SPI communication are supported with differential or single-ended wiring.

A CAN transceiver is also provided to ensure robust communication in an industrial environment when needed.

1 Specifications

Table 1. EVLSERVO1 specifications

Parameter		Value
Input voltage	Nominal	From 10 V to 48 V
	Peak	75 V
Output current	Passive cooling [1] [2]	42 A$_{rms}$
	Active cooling [1] [2] [3]	63 A$_{rms}$
Output power	Passive cooling [1] [2]	2 kW
	Active cooling [1] [2] [3]	3 kW
External resistor current	Peak	90 A
	Passive cooling [1]	31 A$_{rms}$
	Active cooling [1] [3]	47 A$_{rms}$

1. *With an ambient temperature of 25 °C.*

2. *With a switching frequency of 10 kHz.*

3. *Ducted airflow greater than 12 m^3/h.*

Revision history

Table 2. Document revision history

Date	Version	Changes
14-Nov-2024	1	Initial release.

Contents

IMPORTANT NOTICE – READ CAREFULLY