

A design blueprint for low-cost motor control on 8-bit MCU platform

The SPINnaker board is a motor control daughter board which is hardware- and software-compatible with the **STMicroelectronics STM8S-DISCOVERY kit**, a development board for the **STM8S** series of low-cost 8-bit microcontrollers.

The SPINnaker daughterboard is the ideal rapid prototyping platform for any cost-constrained motor control application based on the use of an **8-bit MCU**. Applications in the **automotive, industrial, consumer** and **home automation** sectors can all take advantage of the ready-made capabilities of the SPINnaker board.

Space vector modulation: high-performance motor control on 8-bit MCU

The SPINnaker board implements the space vector modulation method of motor control, a technique which is normally performed by 32-bit MCUs. Now the Future Electronics Centre of Excellence has created an 8-bit MCU implementation to reduce overall costs.

Compared to block commutation, space vector modulation offers these advantages:

- Simpler control algorithm
- Smaller code footprint
- Less acoustic noise
- Lower cost

Space vector modulation also produces no torque ripple.



ON Semiconductor



Panasonic



APPLY FOR A FREE SPINNAKER DAUGHTER BOARD

SPINnaker daughter boards are supplied free-of-charge to pre-qualified customers of Future Electronics. To apply for your board, contact your local branch or visit: www.my-boardclub.com.

Complete hardware and software platform for low-cost motor control on an 8-bit MCU

Innovative hardware configuration

The Future Electronics SPINnaker board takes advantage of some of the latest developments in semiconductor and passive component and connector technology, including:

STL20N6F7 MOSFETs in the three-phase power stage, paired with L6398 MOSFET drivers, all from STMicroelectronics

A USB power supply using the USB Power Delivery protocol. Power is transferred via a GCT USB4085 USB Type-C™ connector and fully managed by STMicroelectronics' STUSB4500

POSCAP conductive polymer tantalum solid capacitors from Panasonic, notable for their small size, low ESR and high reliability.

Panasonic supercapacitors, providing a back-up energy source to power a safe system shut-down if the main power supply fails

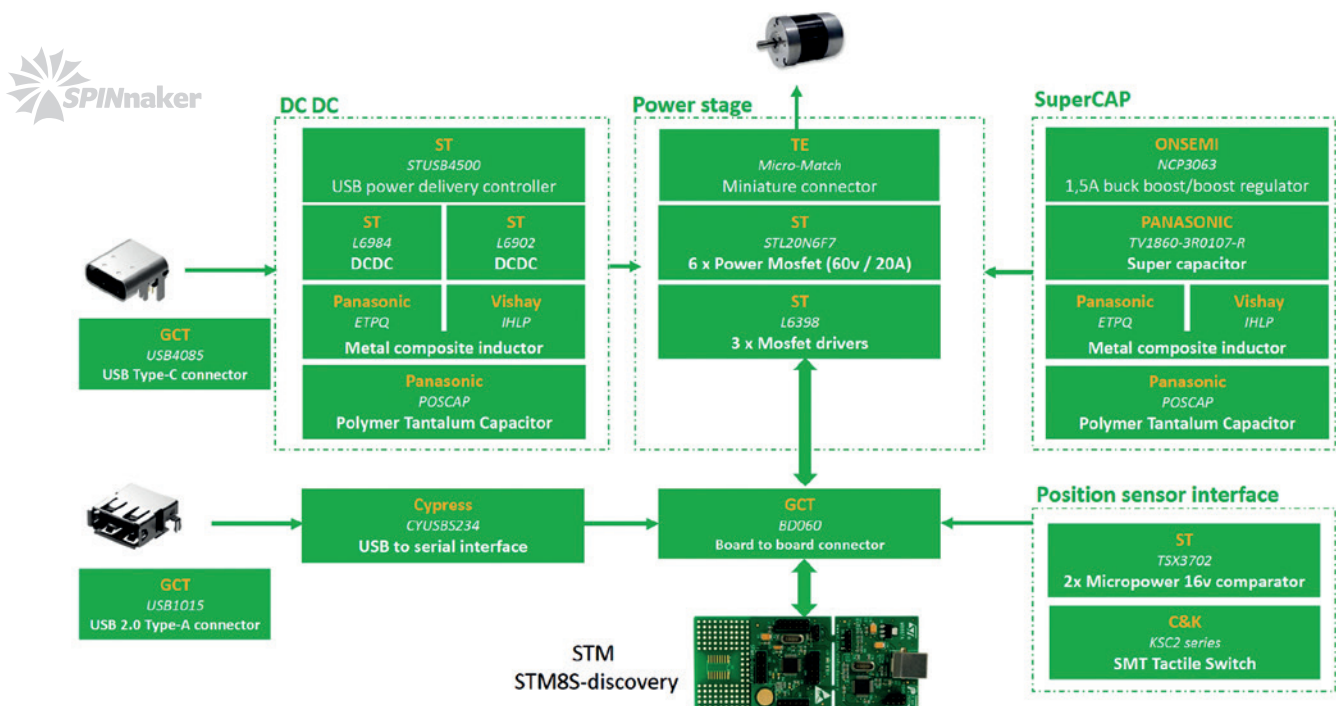
Panasonic ETPQ and Vishay IHLP metal composite inductors, which offer excellent DC saturation and temperature stability characteristics in a small footprint

Corrosion-resistant motor connector from TE Connectivity

SPINnaker software: ideal fit for low-cost hardware

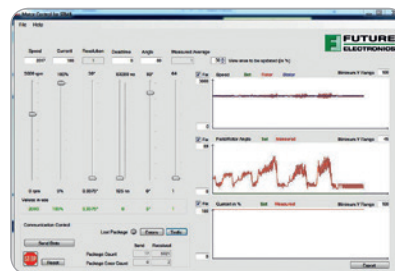
The software supplied free with the SPINnaker board provides a complete implementation of a motor control system using space vector modulation. Key features of the SPINnaker software include:

- Small footprint - <8kbytes of Flash and <1.5kbytes of RAM
- Fine resolution - 384 steps/revolution
- Proportional-integral control emulation
- Algorithm to optimize speed, torque and efficiency
- Supports classic high-/low-side driver or totem pole topologies
- Stall detection
- Outputs speed, rotor/stator angle and current via serial interface
- UART, I²C, SPI or LIN interfaces to host controller



The SPINnaker GUI design tool enables the user to configure operational parameters such as:

- Speed, flux and resolution
- Stator-field position
- Communications with the host
- Multi-pole-pair support
- Dead-time insertion in high-/low-side driver
- Pulse-width correction of totem-pole driver stage



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