



Designed & Manufactured in Spain (EU)

ebikemotion®

SMART CONTROL

Smart Motor Controller for MID and HUB

The Motor Controller is the most important element in the e-bike and is full responsible of the system performance. It processes sensors information and drive the power supplied to the motor. We have developed the "SMART MOTOR CONTROL" using the experience and know-how of Nagares in harsh environment power electronics, to give market response to the demand of High Level solutions, fully customizable and with open architecture to be integrated in quality e-bike systems. Based in CAN BUS, our Smart Controller processes rapidly the inputs and supply fast response adopting different customizable motor maps for each power level. Full designed and produced in Europe to give the best quality at the best price.

Target Applications:

- BLDC Motors in electric bicycles
- HUB Motors with External Controllers
- MID DRIVE or HUB Motors with build in Controller

The Ebikemotion® Technologies Brushless controller is suitable for 48 volts and 36 volts brushless sensed motors that are used in electric bikes. The system works with brushless motors that include Hall sensors. The Design is based on a Dspic33EP 16 Bit Microcontroller that implements a 3 phase sensed control solution using a six-step commutation process, that includes a closed-loop speed control and a current limitation. The circuit also includes a E523.50 3x Half bridge driver that is suitable within a supply voltage range from 12 V to 72 volts. The controller integrates a high speed CAN bus, that could be used to communicate with external LCD Displays, Smart BMS Or other devices and two serial interfaces that could communicate with devices that worksw ith other protocol. An USB host interface is also implemented.

The power level (MOSFET) is full separated of the control board. That leaves us to create different configurations for different markets and power requirements. (It is possible to upgrade the power, size and shape).

HEADQUARTERS 🏠

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RESEARCH CENTERS 🏠

BISITE R+D Group
(University of Salamanca)

GND (NAGARES)
(Valencia - Spain)

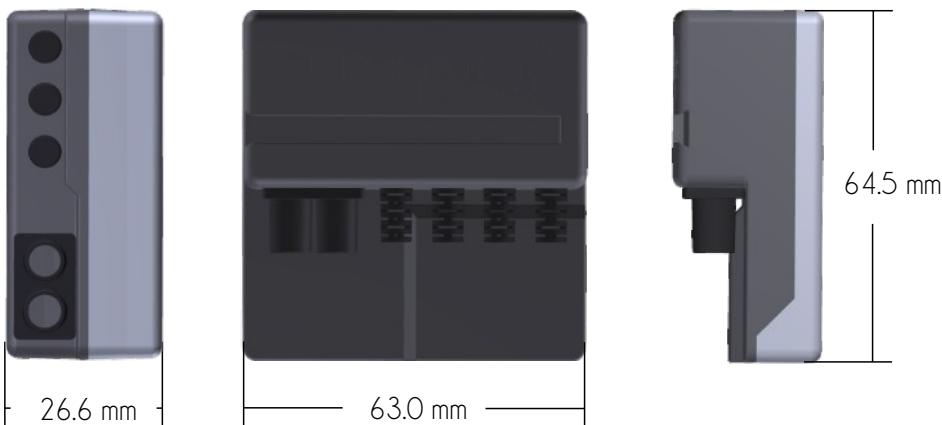
STAGEMOTION SL
(Palencia - Spain)

PRODUCTION CENTER 🏠

NAGARES S.A.
(Motilla del Palancar - Spain)

GRUPELEC (NAGARES)
(Valladolid - Spain)

Technical view



Dimensions Box:

Length: 64.5 mm
Height: 26.6 mm
Width: 63.0 mm
Weight:

Dimensions PCB:

Length: 59 mm
Height:
Width: 59 mm
Weight:

Dspic33EP Features

- 3.0 V to 3.6 V, -40°C to +85°C DC to 70 MIPS
- 16-bit Microcontroller
- 64 pins Device
- Programmable PLLS and Oscillator Clock sources
- 280 kB of flash
- Two independent ADC modules
- Internal comparators
- USB 2.0 OTG Compliant Full-Speed Interface
- Four UART Modules
- Two ECAN modules (1Mbaud) CAN 2.0 B Support
- Internal emulated EEPROM

E523.50 Features

- 200mA gate drivers including protection features
- Configurable for 6 individual PWM inputs or drive 3 mode
- Programmable dead time.
- High-voltage enable input.
- Fast 500 ns current sense amplifier.
- Under voltage, over current and over temperature protection.
- Automotive qualification according to AEC-Q100

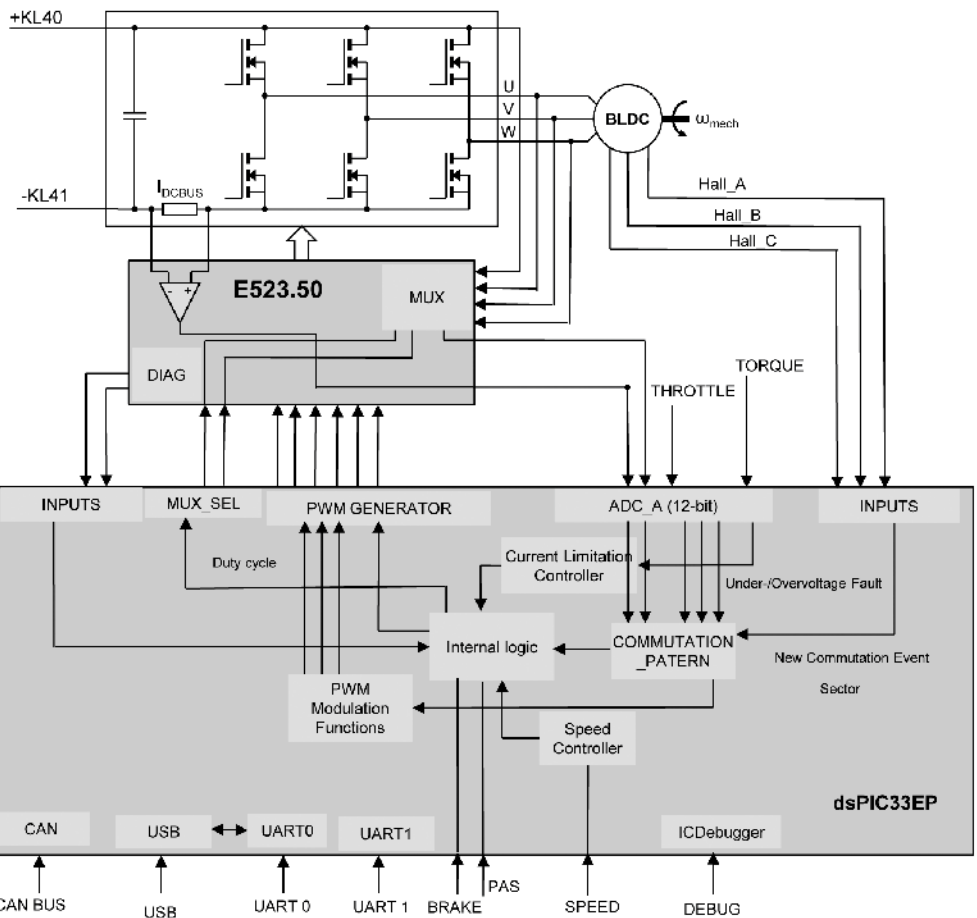
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Product Features and Specifications

- 3-ph 48 volts or 36 volts brushless motors
- Up to 250/350 Watt Motors
- DSPic33EP 16 bit microcontroller
- Elmos E523.50 Driver
- Motor current measurement
- Sensored control using hall sensors
- DC bus overvoltage, undervoltage and overcurrent fault detection
- 5 Volts 500 kbauds High speed CAN
- 2 Serial to TTL Interfaces
- USB host Interface
- In-Circuit and In-Application Programming CAN/USB
- External EEPROM (Store customization data)
- 6 volts (0.4 Amperes) Accessories switchable output
- 6 volts (0.8 Amperes) external Lights switchable output
- 12 volts (2.0 Amperes) Accessories switchable output

- 4.3 Volts Supply for the external sensors be means of a voltage tracker.
- 2 active sensors (torque and throttle) input with open load detection
- 3 digital sensors (speed,PAS and Brake) input with open load detection
- Activation switch be means of a pull up configuration. It has to be switched by pulling the line to ground
- Board temperature measurement close to the 3 half bridges MOSFETs
- Up to 205/350 Watt Motors (more power check)
- EN 15194 - DIN EN ISO 13849 - According to Directive 2006/42/EG
- In-APP full customization of Maps, Limits, Response, Power Supply and user feeling.
- IP67 Waterproof

BLDC Motor Control Algorithm Concept



All the wiring in the PCB Board are based in Plug and Play Connections.