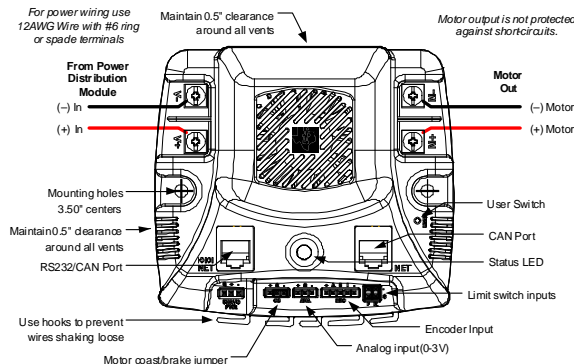


# Stellaris® Brushed DC Motor Control Module with CAN (MDL-BDC24)

The Stellaris® Brushed DC Motor Control Module with CAN (MDL-BDC24) improves on the highly successful MDL-BDC design by providing variable speed control for both 12 V and 24 V brushed DC motors at up to 40 A continuous current, while adding a new RS232-based serial control input that also functions as a serial-to-CAN bridge. The MDL-BDC24 includes a rich set of sensor interfaces, connectivity, and control options, including analog and quadrature encoder interfaces, high performance Controller Area Network (CAN) interfaces, and an RS232 port. The module uses highly optimized software and a powerful 32-bit Stellaris® microcontroller to implement open-loop voltage control as well as closed-loop control of speed, position, or motor current. The H-bridge on the MDL-BDC24 is run at high-frequency through the MCU's integrated PWM interface and enables DC motors to run smoothly and quietly over a wide speed range.

The MDL-BDC24 is powered by the ARM® Cortex™-M3-based LM3S2616 microcontroller that provides efficient and deterministic performance while integrating CAN, UART, and advanced motion control capabilities. The MDL-BDC24 design also incorporates several high-quality analog components from Texas Instruments, including the SN65HVD1050 CAN Transceiver, MAX3221 RS232 Line Driver/Receiver, TPS54040 Swift DC/DC Converter, TPS73633 Voltage Regulator, and INA193 Current Shunt Monitor. The MDL-BDC24 is positioned into a wide variety of consumer and industrial applications, including factory automation devices and systems, mobile robots, household appliances, pumping and ventilation systems, and electric wheelchairs and mobility devices.

## Features



The MDL-BDC24 ships as a ready-to-run, yet customizable, module with the following features:

- Quiet control of brushed DC motors
  - 15 kHz Hbridge frequency
- Three options for open-loop voltage control
  - Industry-standard R-C servo type (PWM) interface
  - Controller Area Network (CAN) interface
  - RS232 serial interface
- Two options for closed-loop, speed, position, or current control
  - Controller Area Network (CAN) interface
  - RS232 serial interface
- CAN communication
  - Full configurability of module options
  - Real-time monitoring of current, voltage, speed, and other parameters
  - Load firmware over RS232/CAN
- RS232 serial communication
  - Bridges an RS232-enabled device to the CAN
  - Directly interfaces to a PC serial port or National Instruments cRIO
- Limit switch inputs for forward and reverse directions
- Firmware features
  - Full configurability of closed-loop module parameters
  - Real-time monitoring of sensor data including motor current, encoder position or speed, and limit switch state
- Status LED indicates run, direction, and fault conditions
- Motor brake/coast selector
- Quadrature encoder input (QE1) and analog input
- Color-coded screw terminals for all power wiring
- Easy to customize using tools supporting the MDL-BDC24 from Keil, IAR, Code Sourcery, or Code Red (using a Stellaris evaluation kit or preferred ARM® Cortex™-M3 debugger)



## Ordering Information

Product Number	Description
MDL-BDC24	Stellaris® Brushed DC Motor Control Module with CAN (MDL-BDC24) for Single-Unit Packaging
MDL-BDC24-B	Stellaris® Brushed DC Motor Control Module with CAN (MDL-BDC24) for Volume Packaging

Texas Instruments • 108 Wild Basin, Suite 350 • Austin, TX 78746  
Main: +1-512-279-8800 • Fax: +1-512-279-8879 • <http://www.ti.com>

Copyright © 2009–2011 Texas Instruments, Inc. All rights reserved. Stellaris and StellarisWare are registered trademarks of Texas Instruments. ARM and Thumb are registered trademarks, and Cortex is a trademark of ARM Limited. Other names and brands may be claimed as the property of others.



## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

### Products

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>

### Applications

Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
Transportation and Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
Wireless	<a href="http://www.ti.com/wireless-apps">www.ti.com/wireless-apps</a>

TI E2E Community Home Page

[e2e.ti.com](http://e2e.ti.com)

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2011, Texas Instruments Incorporated