

Brushless DC (BLDC) Motor Control Board with Ethernet and CAN

Ordering Information

Order No.	Description
MDL-BLDC	Brushless DC Motor Control Board Only
RDK-BLDC	Stellaris® Brushless DC (BLDC) Motor Control Reference Design Kit (includes MDL-BLDC board)



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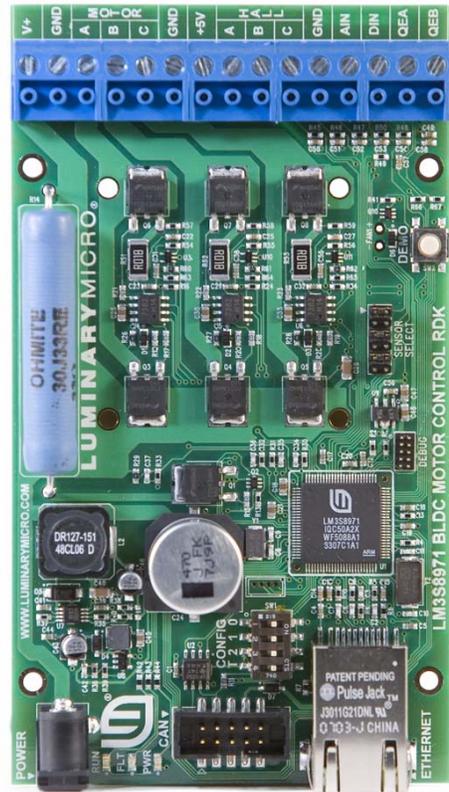


Figure 1. BLDC Motor Control Board

General Description

The brushless DC (BLDC) motor control board is a four-quadrant motor control board for three-phase BLDC motors rated at up to 36 V (see Figure 1). Key features include complete CAN and Ethernet communications interfaces, the powerful, 32-bit Stellaris® LM3S8971 microcontroller, and sophisticated software to optimally control a range of motors in diverse applications.

10/100 Ethernet connects the BLDC module to an array of networks—from dedicated industrial networks to the internet. The standard BLDC module includes the Stellaris motor control and configuration (MCC) protocol. This protocol can be replaced with any industry-standard protocol.

First-time users should purchase a complete BLDC reference design kit (RDK) which includes the control board, cables, configuration software (GUI), a documentation CD, and a sample motor. After evaluating the BLDC module, users may choose to either customize the design or use the BLDC board without modification. Refer to the *RDK-BLDC User's*

BOARD DATA SHEET

Guide (available for download from www.luminarymicro.com) for complete technical details on using and customizing the motor control board.

Overview

The MDL-BLDC control board provides the following features:

- Controls three-phase BLDC motors up to 36 V 500 W
- 10/100 Ethernet and CAN interfaces
- Four-quadrant operation
- Hall Effect, Quadrature, and Sensorless operation modes
- Extensive configuration options using Windows graphical user interface (GUI)
- Easy to customize—full source code and design files available

General Features

- On-board braking circuit
- Incremental quadrature encoder input
- Analog and digital control inputs
- Test mode push-button
- Status LEDs indicate Power, Run, and Fault conditions
- Optional power-managed fan for forced-air cooling
- Screw terminals for all power and signal wiring

Communications Features

- 10/100 Ethernet
 - Auto MDI/MDIX
 - Traffic and link indicator LEDs
 - MCC protocol supports multiple boards on the same network
- CAN bus
 - Support up to 1 Mbps
 - On-board selectable CAN terminator
- Serial port
 - Header provides TXD and RXD signals
 - CMOS signal levels
 - MCC communication protocol
 - 115.2 kbaud, 8 bit, no parity, 1 stop bit

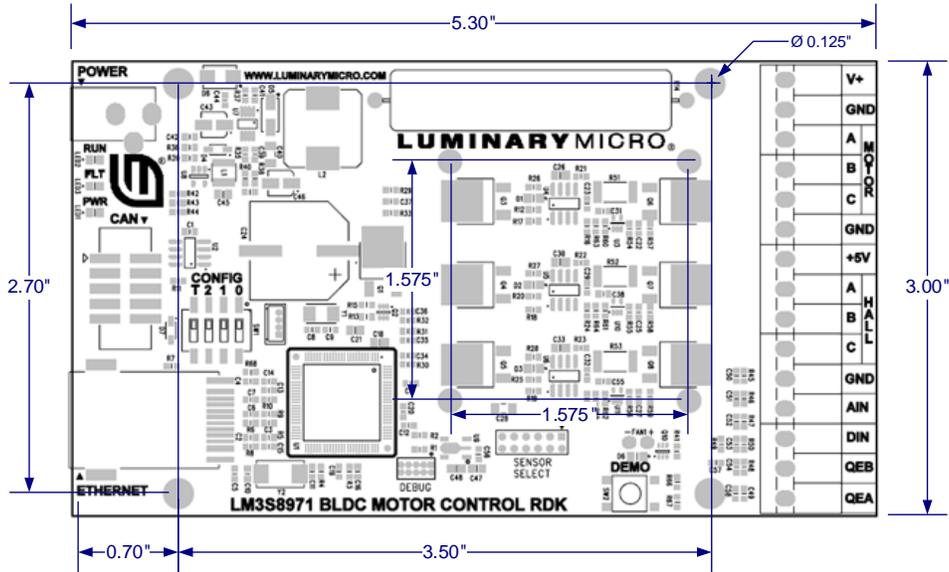
Board Dimensions

Figure 2 on page 3 shows the board dimensions for the MDL-BLDC motor control board.



BOARD DATA SHEET

Figure 2. MDL-BLDC Board Dimensions



Operational Specifications

Table 1 shows the operating parameters for the MDL-BLDC motor control board.

Table 1. MDL-BLDC Operating Specifications

Parameter Name	Min	Nom	Max	Unit
Power Supply	12	–	36	V
Switching Frequency	8	16	20	kHz
Speed Range ^a	1	–	60,000	RPM
Continuous Output Current ^b	–	–	14	A
Continuous Output Current ^c	–	–	10	A
Operating Temperature Range	0	–	70	°C
Storage Temperature Range	-25	–	85	°C
Supply Current – Motor Stopped ^d	–	13	–	mA
Analog Input Range	0	–	5	V
Digital Input Low-Level Input Voltage	-0.3	–	1.3	V
Digital Input High-Level Input Voltage	2.0	–	5.0	V
Digital Input Pull-Up Resistor	–	6.8	–	kΩ
Hall Sensor Supply (at 5.0 V)	–	–	30	mA
Brake Resistor Continuous Power	–	–	10	W
Brake Resistor Peak Power (5 s)	–	–	50	W

a. Actual range depends on motor type

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- b. At 25° C ambient
- c. At 40° C ambient
- d. With 24 V supply

Maximum Ratings

The maximum ratings are the limits to which the device can be subjected without causing permanent damage (see Table 2).

Table 2. MDL-BLDC Maximum Ratings

Parameter Name	Min	Nom	Max	Unit
DC Bus Voltage Range	10	–	60	V
Peak Output Current for 2 seconds	–	–	30	A
Continuous Output Power	–	–	500	W
Control Signal Input Range ^a	-0.3	–	5.5	V

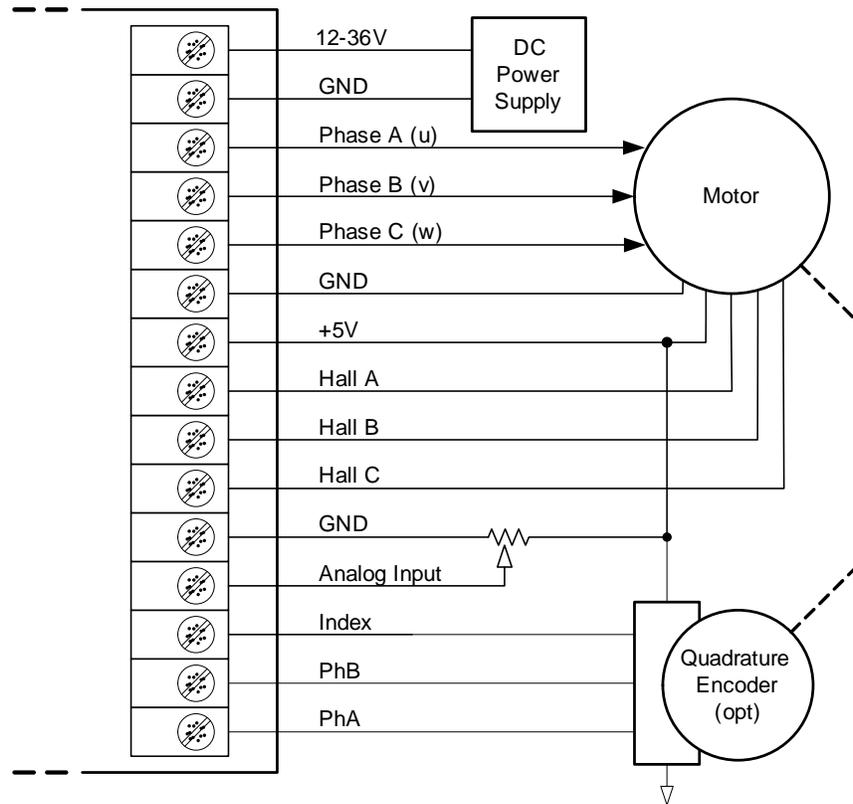
- a. Applies to Hall Effect sensor, analog, and digital inputs

Wiring

The MDL-BLDC motor control board is controlled by one of the three communication interfaces, or by a simple analog control voltage. Figure 3 shows power, motor, and peripheral connections to the main terminal block. Connections to the Hall sensors, analog speed control potentiometer, and quadrature/incremental encoder are all optional.



Figure 3. Terminal Wiring Diagram



Configurable Parameters

The follow list shows just a few of the parameters that can be configured by the GUI or directly using the MCC protocol:

- Motor poles
- Speed range
- Motor current and voltage
- Acceleration and deceleration rate
- Control method: Hall effect sensors or back-EMF
- Trapezoidal (BLDC) or sinusoidal (PMAC, BLDC) control
- Control-loop coefficients

Additional Information

The following documents are available for download at www.luminarymicro.com:

- *RDK-BLDC User's Manual*, Publication Number RDK-BLDC-UM
- *RDK-BLDC Quickstart*

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