AC Induction Motor (ACIM) Control Board

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Ordering Information

Order No.	Description
MDL-ACIM	Stellaris® ACIM Control Board Only
RDK-ACIM	Stellaris® ACIM Control Board Reference Design Kit (includes MDL-ACIM board)
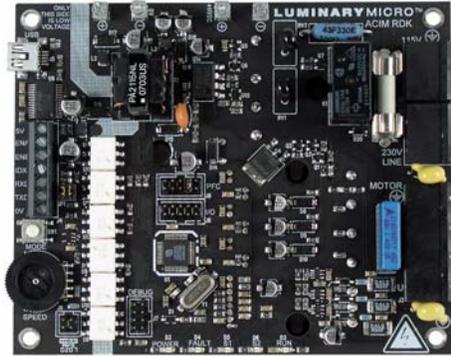
Contents

Figure 1. ACIM Control Board Only

Figure 2. ACIM RDK Control Board

General Description

The AC induction motor control board is a sophisticated motor control for single- and three-phase AC induction motors rated at up to 230 V. Key features include the feature-rich Stellaris LM3S818 microcontroller designed for motion control applications, Fairchild Semiconductor's FSBS10CH60 power module, and sophisticated software to optimally control a wide range of motors in diverse applications.

First-time users should purchase the RDK-ACIM Reference Design Kit (RDK) which includes the control board, cables, a documentation CD, and a sample motor. Refer to the *RDK User's Guide* (available for download from www.luminarymicro.com) for complete technical details on using and customizing the motor control board. Figure 1 shows the ACIM control board only (MDL-ACIM) and Figure 2 shows the ACIM RDK control board (RDK-ACIM).

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Overview

The MDL-ACIM motor control board controls three-phase and single-phase AC induction motors. The board has an integrated USB port (Virtual COM port) and logic-level serial port connections along with a quadrature encoder/tachometer input for speed and position monitoring. Extensive configuration options using Windows Graphical User Interface (GUI) are available and the board is easy to customize—full source code and design files are available.

Features

The MDL-ACIM motor control board provides the following features:

- End-user customizable line filter, bus capacitors, and JTAG interface

- Split low-side current sensing for accurate current sensing

- Dynamic braking circuit

- Active in-rush control circuit

- Electrically isolated JTAG port for software debugging or production programming (RDK only)

- Integrated AC line filter (RDK only)

- USB/Serial UART

  – FTDI FT232R USB to serial UART

  – Virtual COM port, 115.2k,8,n,1 operation

  – Stellaris MCC protocol

Operational Specifications

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

Table 1.   MDL-ACIM Operating Specifications

Parameter Name		Min	Nom	Max	Unit
AC Input Voltage (50/60Hz)	230V operation	195	230	265	V_{AC}
	115V w/ voltage doubler	95	115	135	V_{AC}
DC Bus Voltage		270	320	370	V_{DC}
Frequency Range		0		400	Hz
Continuous Output Current				3.2	A_{RMS}
Electrical Isolation			2500		V_{RMS}
Supply Current				10	A_{RMS}
Operating Temperature Range		0	–	70	°C
Storage Temperature Range		-25	–	85	°C
Digital Input Low Level Input Voltage		-0.3		1.3	V_{DC}

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Table 1.   MDL-ACIM Operating Specifications (Continued)

Parameter Name	Min	Nom	Max	Unit
Digital Input High Level Input Voltage	2.0		5.0	V_{DC}

Mechanical

Figure 3 shows the mechanical drawing for the MDL-ACIM.

- PCB size: 3.65" x 4.55" (93 mm x 115 mm)
- Heatsink is required (MDL-ACIM only)
- Bus capacitors are required (MDL-ACIM only)
- Motor connector on PCB
  - RIA Connect part #31262104

- Power connector on PCB
  - RIA Connect part #31262102

Figure 3. MDL-ACIM Mechanical Diagram
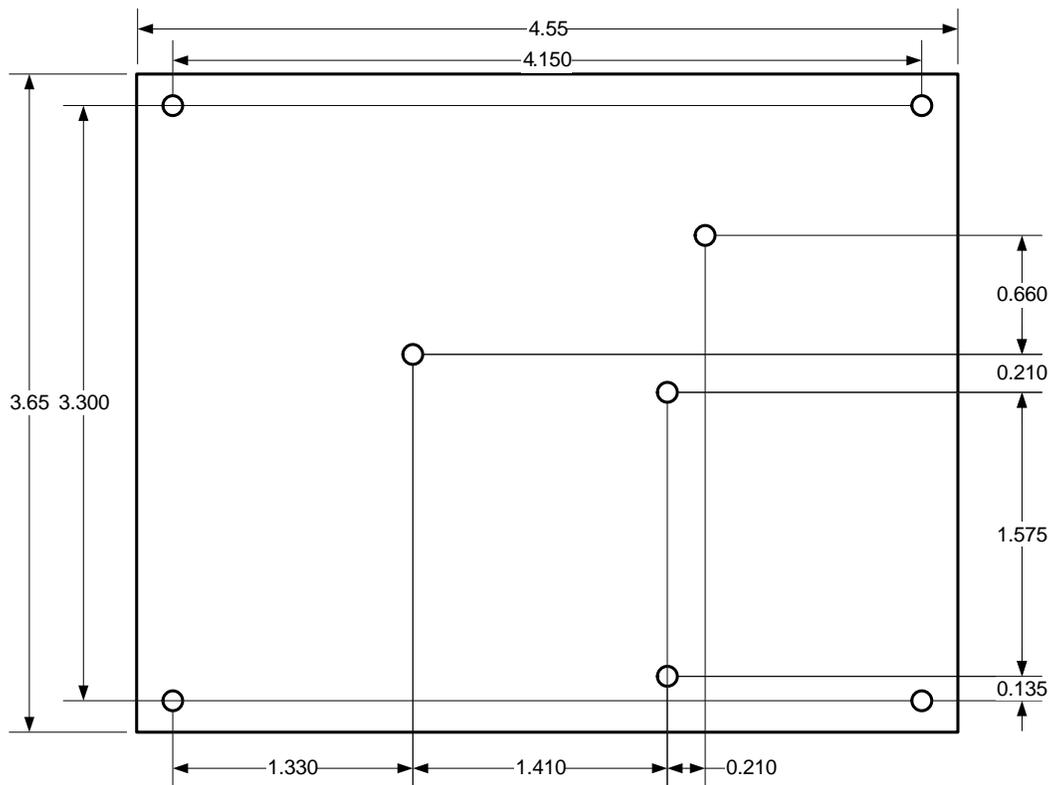
Mounting diagram for MDL-ACIM
All holes 4-40 or M3 tapped
Dimensions in inches +/- 0.010"

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Heat Sink

The ACIM motor module does not come with a heatsink like the RDK-ACIM, but does require a heatsink for operation. Underwriters Laboratories (UL) standards generally require that surfaces that could be touched by a user or service person must not exceed 70°C, so this must be considered when choosing the size material of the heatsink.

Bus Capacitors

The ACIM motor module requires that the customer supply bus capacitors for the board. The recommended capacitors to use are 1500 uF, 200 V electrolytic capacitors.

Safety Information

WARNING – Risk of Electric Shock
The microcontroller in the RDK is not referenced to ground; it is at AC line potential. Do not make direct connection to the JTAG header or any other microcontroller-related circuit. Read the Quickstart Guide first for additional warnings.

This RDK operates from AC line voltage. Improper use or application carries electric shock, fire, and other risks that may result in serious injury or death. Please read and follow these safety notices:

- This documentation and kit must only be used by people with training and experience in working with voltage potentials up to 230 V.

- The control board has both high-voltage potential and safety low-voltage sections.

- Do not connect high-voltage potential circuits to safety low-voltage circuits or to ground-referenced equipment such as computers or test equipment.

- After power is removed, high voltages remain until the bus capacitors discharge. Wait at least one minute after removing power before working with high-voltage circuitry.

- Use caution when using the on-board controls to adjust motor speed etc. High-voltage circuits are in close proximity.

- Never perform work on the control board, motor or, wiring while power is applied. Always wear eye protection and use care when operating the motor.

In addition to safety risks, other factors that may damage the control hardware, the motor, and its load include improper configuration, wiring, or software. Minimize the risk of damage by following these guidelines.

Additional Information

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

- *RDK-ACIM User's Manual*, Publication Number RDK-ACIM-UM

- *RDK-ACIM Quickstart*

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