

Stellaris® DK-LM4F-DRV8312

ARM® Cortex™-M4F Motor controlCARD Kit for 3-Phase Brushless DC (BLDC) Motors

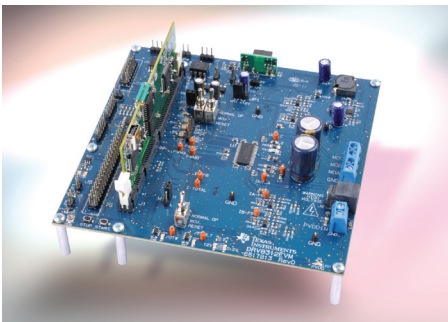


Texas Instruments introduces the first floating-point ARM Cortex-M4F sensorless field-oriented control (FOC) motor-control kit that also lets developers instantly spin their BLDC and PMSM motors.

The Texas Instruments Medium Voltage Digital Motor Control Kit for Stellaris® Microcontrollers (DK-LM4F-DRV8312) is a development platform for spinning three-phase brushless DC (BLDC) and permanent magnet synchronous motors (PMSMs).

The low-cost Stellaris LM4F211 microcontroller on the **MDL-LM4F211CNCD** controlCARD module comes pre-programmed with the necessary firmware in Flash memory to run TI's InstaSPIN™-BLDC motor control solution out-of-the-box. The system automatically spins a user's three-phase brushless DC motor (assuming operation with the included 24-V, 2.5-A supply). The kit also includes a project to spin the included PMSM using a sensorless sliding mode observer FOC technique.

The operation of both solutions can be controlled and viewed across a USB interface using an included GUI. Follow the steps in the DK-LM4F-DRV8312 kit's README First document to quickly get up and running.



▲ *Medium Voltage Digital Motor Control Kit for Stellaris LM4F MCUs (DK-LM4F-DRV8312)*

Features

The DK-LM4F-DRV8312 motor control kit contains a high-performance Stellaris LM4F microcontroller-based controlCARD module compatible with other TI motor-control platforms.

TI's Stellaris Motor controlCARD kit provides an easy-to-use, low-cost, all-inclusive solution for three-phase motor-control application developers.

In addition to instantly spinning your motor, the kit also demonstrates the InstaSPIN-BLDC motor control solution's operational advantages with simplified tuning, immediate acceleration adaptation, reliable low-speed operation, and more.

The DK-LM4F-DRV8312 kit is hardware-compatible with the following TI DRV baseboards:

- DRV8312 EVM RevD+
- DRV8301 or 8302-HC EVM RevC+

Target applications

Target motor control applications for the DK-LM4F-DRV8312 kit include:

- Pumps
- Blowers
- Fans
- Compressors
- Vacuums

- Traction and transport
- Tools
- Robotics

Kit contents

The DK-LM4F-DRV8312 kit is a bundle of the following components:

- Texas Instruments' DRV312 Three-Phase Brushless DC Motor Driver
 - InstaSPIN-BLDC and Sensorless (Sliding Mode Observer, or SMO) FOC
 - 50-V, 3.5-A inverter drive board
 - Supports sub-50-V and 6.5-A peak brushless motors
- Stellaris LM4F211 controlCARD module (MDL-LM4F211CNCD)
 - Stellaris LM4F211 32-bit ARM Cortex-M4F microcontroller
 - 80-MHz floating-point processor core
 - 256 KBytes Flash
 - 32 KBytes SRAM
- 24-V NEMA17 BLDC/PMSM motor
 - Spins 24-V BLDC motors up to 3.5-A (continuous)
- 24-V, 2.5-A power supply with worldwide cables
- USB Micro-B to USB-A plug cable
- DVD with tools and documentation
 - Code Composer Studio™ Integrated Development Environment V5
 - InstaSPIN-BLDC and sensorless (SMO) FOC software projects

Why Field-Oriented Control (FOC)?

- Ideal torque control
- Sinewave PWM for quieter operation
- Reduced torque ripple
- Faster dynamic response
- Better speed compensation

SMO FOC benefits

The sensorless sliding mode observer FOC technique allows for full torque control, quieter operation, and better dynamic performance. Using the Stellaris Motor controlCARD kit lets developers spin their motor in seconds, instead of days. By using the controlCARD concept, you can choose the right drive platform for your voltage and current, and then choose the right microcontroller for your control. Additional benefits include:

Software

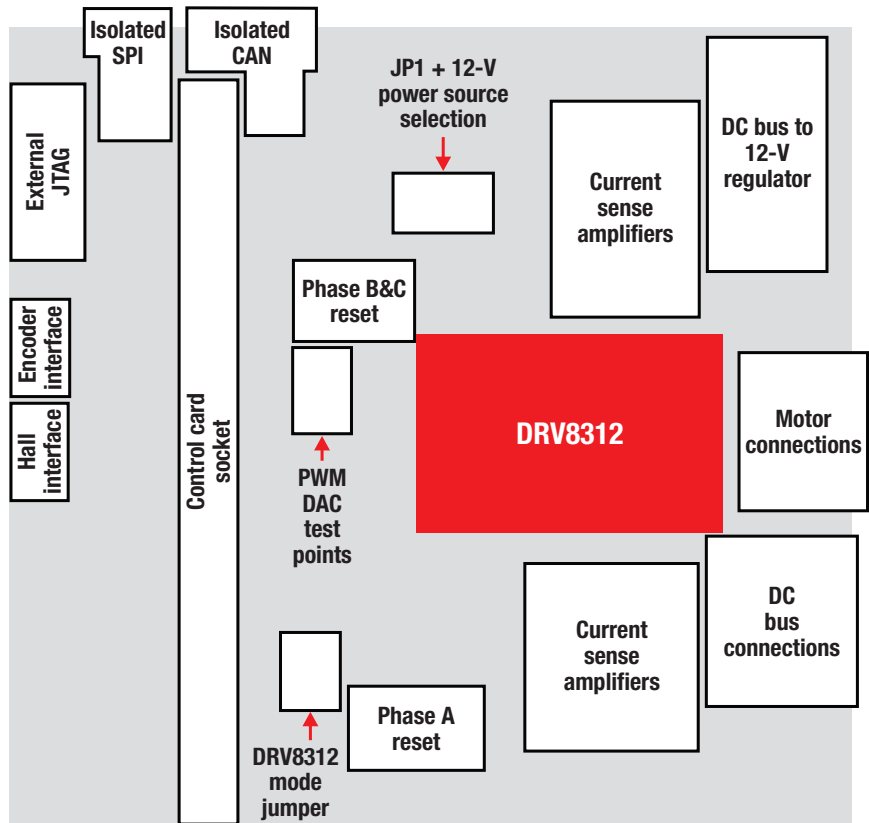
- Object-oriented software APIs are intuitive, re-usable, and portable across solutions.
- All software is written using the latest object-oriented C programming techniques for intuitive use and efficient, robust performance.
- Includes object-oriented functions and drivers that make coding extremely easy and enables easy portability among TI's microcontroller families and motor driver electronics.
- All motor-control software and documentation is free.

Sensorless (sliding mode observer) FOC

- The sensorless sliding mode observer FOC technique allows for full torque control, quieter operation, and better dynamic performance than BLDC trapezoidal control techniques.

InstaSPIN™-BLDC

- The Stellaris® LM4F211 microcontroller on the Stellaris MDL-LM4F211CNCD module



▲ Medium Voltage Digital Motor Control Kit for Stellaris LM4F MCUs block diagram

has the required firmware pre-programmed in Flash to run the InstaSPIN-BLDC software out-of-the-box.

- Developers can dramatically reduce time-to-market when using InstaSPIN-BLDC because it spins your motor instantly and gives you an easy, graphical way to tune the commutation, current, and speed loops. Get started in seconds/minutes instead of hours/days.
- ARM® Cortex™-M4F-based LM4F211 microcontroller provides all the necessary

computational requirements to run TI's InstaSPIN-BLDC or FOC solution with plenty of headroom to add a variety of application and communication functions.

Additional information

The controlCARD motor control kit includes TI's motor software and sensorless InstaSPIN-BLDC and SMO FOC solutions that allow designers to spin motors instantly. Get started in seconds/minutes instead of hours/days.

For more information, see the following TI web sites:

- www.ti.com/stellaris
- www.ti.com/tool/dk-lm4f-drv3812
- www.ti.com/tool/mdl-lm4f211cncd
- www.ti.com/motor

Ordering information

Product number	Description
DK-LM4F-DRV8312	Stellaris Medium Voltage Digital Motor Control Kit for Stellaris LM4F Microcontrollers
MDL-LM4F211CNCD	Stellaris LM4F211 controlCARD Module in single-unit packaging



Important Notice: The products and services of Texas Instruments Incorporated and its subsidiaries described herein are sold subject to TI's standard terms and conditions of sale. Customers are advised to obtain the most current and complete information about TI products and services before placing orders. TI assumes no liability for applications assistance, customer's applications or product designs, software performance, or infringement of patents. The publication of information regarding any other company's products or services does not constitute TI's approval, warranty or endorsement thereof.

The platform bar, Code Composer Studio and InstaSPIN are trademarks and Stellaris is a registered trademark of Texas Instruments. All other trademarks are the property of their respective owners.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46C and to discontinue any product or service per JESD48B. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

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

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license 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 significant portions 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. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

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

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Mobile Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community e2e.ti.com