Simplify your motor control application with Kinetis Motor Suite and Kinetis MCUs based on ARM® Cortex®-M4 core

Kinetis Motor Suite

Kinetis motor suite is a highly intuitive motor control development solution that enables the design of sensored and sensorless BLDC & PMSM motor control applications quickly and efficiently, allowing those with limited or no motor control experience to develop an application.

TARGET APPLICATIONS

- Sensored and sensorless velocity control for PMSM and BLDC motors
- Sensored position control for PMSM and BLDC motors

The Kinetis motor suite simplifies product development while reducing your product's time-to-market and increasing it's motor efficiency.

SIMPLIFIED DESIGN

Kinetis Motor Suite (KMS) is a software solution that simplifies the design and accelerates the development of motor control applications. KMS consists of 4 main components: motor tuner, motor manager, motor observer, and an open source reference solution that improves overall motor system performance due to its unique SpinTAC™ enabled motion controller. KMS is designed for developers of all experience levels, enabling rapid development via the graphical user interface and close integration with Kinetis Design Studio, or by directly controlling the function blocks via the natural API interface after initial tuning and configuration. KMS enables speed and position control across the complete operating range of any type of 3-ph PMSM or BLDC motor regardless of power level.

INCREASED EFFICIENCY

To increase your motor's efficiency while further reducing time-to-market, Kinetis Motor Suite streamlines your design by implementing the SpinTAC™ control system from LineStream Technologies that includes Active Disturbance Rejection Control (ADRC) Technology.

Kinetis Motor Suite reduces your time-to-market further with:

- **Active disturbance rejection:**
  Any non-ideal behavior in the system such as increased load, mechanical wear or inertia change is observed and automatically compensated for by the controller on-the-fly.
- **Single Parameter tuning:**
  Traditional PID loop control is time-consuming due to trial and error nature of tuning, and requires in-depth knowledge. KMS uses a single, intuitive variable to tune motor response.

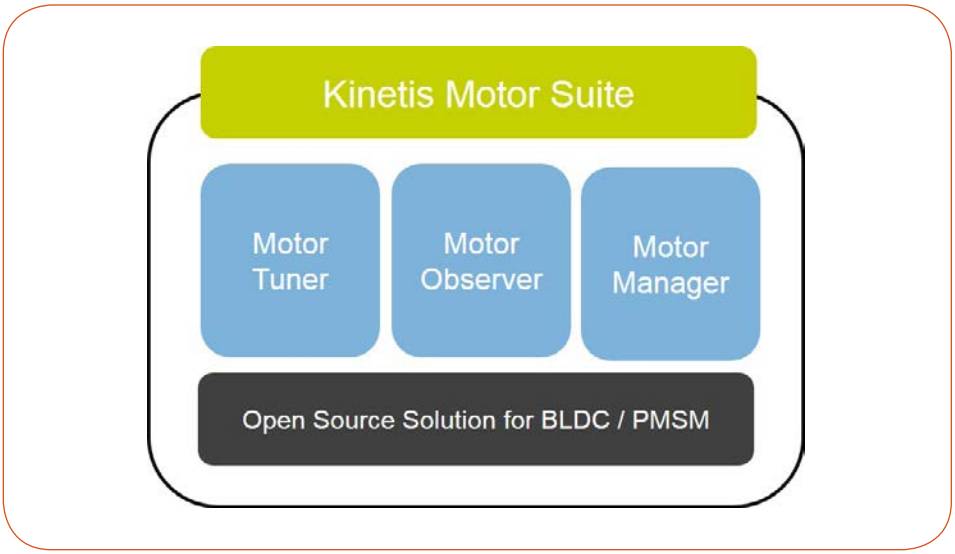
- **Automatic motor parameter identification:**
  Identifies motor characteristics and uses these to automatically tune the control loops.
- **Automatic System Inertia Estimation:**
  By measuring and incorporating greater knowledge of the mechanical system, KMS achieves tight control of the system's motion further improving system performance.

The Kinetis motor suite consists of four software components for tuning, observing and managing motor control system operation:

- **Kinetis motor tuner:**
  A graphical user interface for commissioning that spins the user's motor in minutes. The Kinetis motor tuner automatically identifies electrical and mechanical characteristics, leverages ADRC from LineStream Technologies for easy motion control tuning, then spins the motor across the operating range to give the user confidence in the robustness of the solution.
- **Kinetis motor observer:**
  Control firmware designed to support the Kinetis Motor Suite. The firmware is implemented via two different methods; a small protected block that is pre-programmed into the MCU flash memory in our production line, and an includable library that is a component of the reference project. This firmware enables the MCU to operate the Kinetis Motor Suite tool chain.
- **Kinetis motor manager:**
  A graphical user interface that provides easy access to advanced configuration options and performance information. The Kinetis motor manager includes: software oscilloscope for data visualization, watch window for real-time access to MCU variables, graphical tool for defining complex motion sequences.

  The motor manager also offers software protections, CPU utilization statistics, and the ability to change power hardware settings as the design evolves beyond Kinetis development platforms.

KINETIS MOTOR SUITE BLOCK DIAGRAM



- **Open Source Reference Project:**
  The output of Motor Tuner and Motor Manager is a firmware reference project customized for the user's motor system that is directly compiled by the Kinetis Design Studio IDE. The project combines open source logic with the advanced capabilities in motor observer to realize efficient motor control. It is designed in a modular manner that lets the user replace components of the project for their own version.
- **Low Cost Development:**
  The **FRDM-KV31F** is an ultra-low-cost development platform that features a Kinetis KV3x MCU enabled with Kinetis Motor Suite. Combine this with the **FRDM-MC-LVPMSM** shield and the **FRDM-MC-LVMTR** to create a fully-enabled solution development platform for PMSM and BLDC motor control development.
- **Tower System Development:**
  The **TWR-KV31F120M** Tower System MCU module is a flexible modular development platform that features a KMS enabled KV3x MCU. When used in conjunction with the TWR-MC-LV3PH kit, it provides a very flexible development environment that can be used to simulate many end applications.

  The **TWR-MC-LV3PH** is a low-voltage, three-phase motor control TWR peripheral module that is a fully-fledged motor control reference design kit for developing KMS solutions, and includes a three-phase BLDC motor and motor drive circuitry.
- **High Voltage Development:**
  The **HVP-MC3PH** platform enables development of Kinetis Motor Suite Solutions in a safe high-voltage environment, and is compatible with the Kinetis **HVP-KV31F120M** KMS enabled controller card.

  Input voltage is 85–240 V AC, with output power of the motor stage up to 1 KW, with the ability to drive a 1.2 Hp motor, and 800 watts when utilizing the PFC stage.
- **Integrated Development Environment (IDE):**
  KMS-enabled KV3x MCUs are supported by Kinetis Design Studio and IAR Embedded Workbench® for ARM. All IDEs support the Processor Expert auto code generator, and Kinetis Software Development Kit (SDK).

KINETIS KV3x MCU FAMILY ENABLED WITH KINETIS MOTOR SUITE

PART NUMBER	MAX FREQ. (MHz)	PIN COUNT	PACKAGE	FLASH (KB)	SRAM (KB)	FLEX.BUS	DMA	PLL or FLL	FLEX TIMERS	DAC
MKV31F512VLL12P	120	100	LQFP	512	96	YES	16-ch.	PLL	2 x 8-ch.; 2 x 2-ch.	2
MKV31F256VLH12P	120	64	LQFP	256	48	NO	16-ch.	PLL	1 x 8-ch.; 2 x 2-ch.	1
MKV31F128VLH10P	100	64	LQFP	128	24	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F128VLF10P	100	48	LQFP	128	16	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F64VLH10P*	100	64	LQFP	64	16	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1
MKV30F64VLF10P*	100	48	LQFP	64	1	NO	4-ch.	FLL	1 x 8-ch.; 2 x 2-ch.	1

* package your way

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