Automotive motor control development solutions

MTRDEVKSPNK144

The MTRDEVKSPNK144 development kit demonstrates the advantages of the NXP S32K144 MCU for motor control applications with a three-phase permanent magnet synchronous motor (PMSM).

OVERVIEW

The MTRDEVKSPNK144 development kit serves as an example of a motor control design using the NXP family of automotive motor control MCUs based on a 32-bit ARM Cortex-M4F optimized for a full range of automotive applications.

KEY FEATURES

▸ **S32K144 MCU –** 32-bit ARM Cortex-M4F based MCUs targeted for general purpose automotive and high reliability industrial applications

▸ **Low Voltage Power Stage –** 3-phase power stage DEVKIT-MOTORGD based on SMARTMOS GD3000 pre-driver with condition monitoring and fault detection

▸ **Automotive Motor Control Algorithm –** sensorless control of the PMSM motor based on Field Oriented Control (FOC) allowing independent control of the magnetic field and torque/speed

▸ **Automotive Math and Motor Control Library Set –** control algorithm built on blocks of precompiled SW library

▸ **FreeMASTER and MCAT support –** application tuning and variables tracking at different levels of the FOC cascade structure

S32K144 AND KIT SPECIFICATIONS

Flash	512 KB	PWM & Timers	4 x FlexTimer (8-ch.)
RAM	64 KB		1 x LPIT 1 x LPTMR
Core	ARM Cortex – M4F, 32-bit CPU	ADC	2 modules, 12-bit
Speed	80 MHz	Trigger Unit	2 x PDB + TRGMUX
Package	LQFP-100	Comms	3xLPUART, 3xLPSPI
Temp	+125°C Tj	BEMF Fbc	YES
Clock	8 MHz – ext.		

TARGET AUTOMOTIVE APPLICATIONS

▸ Actuators and valve controls

▸ Electric fuel, water and oil pumps

▸ Engine cooling fans

▸ Windshield wipers

▸ Heating, ventilation and air conditioning (HVAC)

▸ Transmission and gearbox

▸ Doors, window lift and seat control

ENABLEMENT TOOLS

Development Hardware:

▸ 3-phase low-voltage power stage DEVKIT-MOTORGD based on SMARTMOS GD3000 pre-driver up to 18 Volts

▸ S32K144EVB: S32K144 Evaluation Board

▸ 3-phase PMSM low-voltage motor

Runtime Software:

▸ Sensorless control of the PMSM motor based on FOC

▸ Example software created in the S32 Design Studio for ARM built on S32 SDK software

▸ MCU peripherals initialization generated by Processor Expert

▸ FreeMASTER project part of software package

▸ MCAT tool 1.1 available

3-PHASE PMSM DEVELOPMENT KIT WITH S32K144
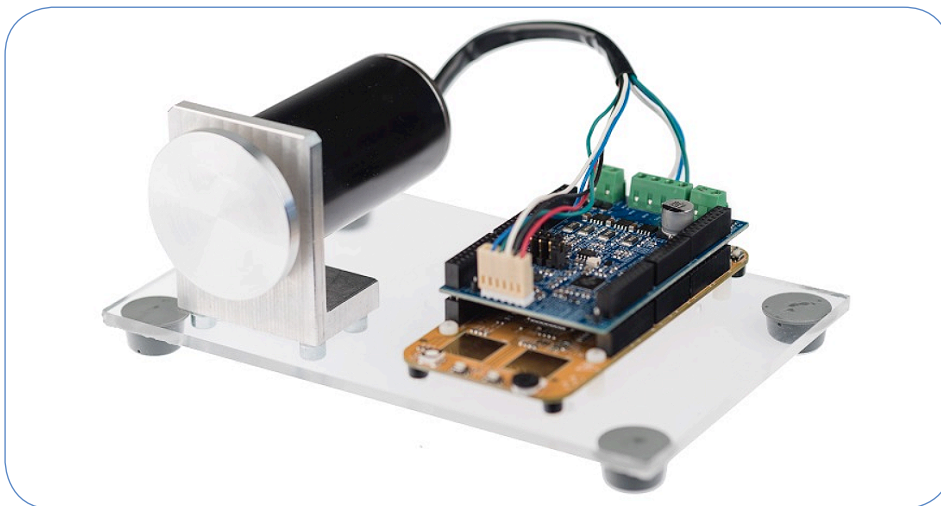
MOTOR CONTROL ALGORITHM CONCEPT