

Automotive motor control development solutions

# MTRDEVKSPNK144 3-phase PMSM Development Kit with S32K144 MCU

The MTRDEVKSPNK144 motor control development kit is designed to enable rapid prototyping and evaluation of PMSM motor control applications.

# **OVERVIEW**

The MTRDEVKSPNK144 development kit serves as an example of a motor control design using the S32K144 family of automotive microcontrollers based on a 32-bit Arm<sup>®</sup> Cortex<sup>®</sup>-M4F core 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 ultra-reliable 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 and sensor control of the PMSM motor based on Field Oriented Control (FOC) extended by Field Weakening (FW).
- Automotive Math and Motor Control Library Set control algorithm built on blocks of precompiled software library
- FreeMASTER and MCAT support application tuning and variables tracking at different levels of the FOC cascade structure

#### S32K144 MCU SPECIFICATIONS

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

#### 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**

#### 3-PHASE PMSM DEVELOPMENT KIT WITH THE \$32K144 MCU

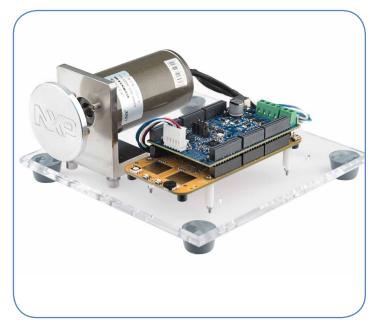
## **Development Hardware:**

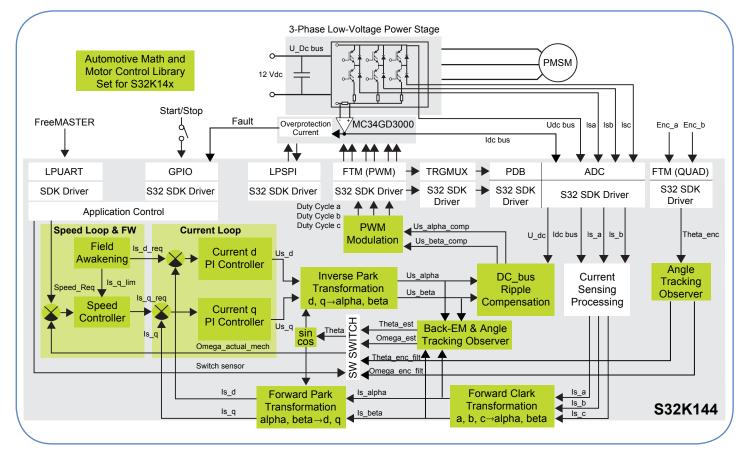
- 3-phase low-voltage power stage DEVKIT-MOTORGD based on SMARTMOS GD3000 pre-driver up to 18 Volts
- S32K144EVB: S32K144 Evaluation Board
- ▶ 3-phase permanent magnet low-voltage motor
- ▶ 12 V / 5 A power supply

#### **Runtime Software:**

- Sensorless control of the PMSM motor with Field Weakening
- Software example contains routine for encoder signal processing
- Single-shunt and dual-shunt current sensing
- Software example created in the S32 Design Studio for Arm built on S32 Software Development Kit (SDK)
- MCU peripherals initialization generated by Processor Expert
- FreeMASTER project part of software package
- Motor Control Application Tuning (MCAT) tool 1.1 available

# MOTOR CONTROL ALGORITHM CONCEPT





#### www.nxp.com/AutoMCDevKits, www.nxp.com/DEVKIT-MOTORGD and www.nxp.com/S32K144EVB

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