



# MOTOR CONTROL SOLUTIONS BASED ON S32K3 MCUS

The S32K3 family of 32-bit AEC-Q100 qualified MCUs combines a scalable family of Arm® Cortex-M7-based microcontrollers built on long-lasting features with a comprehensive suite of production-grade tools. S32K3 MCUs are included in NXP's Product Longevity Program, guaranteeing a minimum of 15 years of assured supply.

## S32K3 VALUE PROPOSITION FOR MOTOR CONTROL

### SCALABLE MCU PLATFORM

- Hardware- and Software- compatible MCU family
- 120 – 240 MHz Arm Cortex-M7 core
- Flash memory: from 512 KB up to 8 MB
- MAPBGA, MaxQFP packages, from 48 to 289 pin count
- CAN FD, FlexIO, QSPI, Ethernet and serial audio interfaces
- AEC-Q100 qualified:
  - Grade 1 (-40° C to +125° C)
  - Grade 2 (-40° C to +105° C)
- Functional Safety compliant: ISO 26262 up to ASIL D
- Hardware Security Engine (HSE): AES-128/192/256, RSA and ECC encryption, ISO 21434 intended

### MOTOR CONTROL COVERAGE

- Engineered tools for 3-phase PMSM and 3-phase BLDC motor control targeting body and chassis
- Dedicated peripherals set for rapid motor control loop implementation: enhanced Modular IO Subsystem (eMIOS), Logic Control Unit (LCU), TRGMUX, Body Cross-triggering Unit (BCTU), Analog to Digital Converter (ADC), and Analog Comparator (CMP)

### COMPREHENSIVE MOTOR CONTROL ECOSYSTEM

- Diverse hardware solutions supporting motor control applications
- S32K3 software ecosystem with production-ready algorithm library:
  - Automotive Math and Motor Control Library (AMMCLib) set
  - FreeMASTER and Motor Control Application Tuning (MCAT) tool
  - Model-Based Design Toolbox (MBDT)
- Dedicated technical support and online community







## S32K3 MOTOR CONTROL HARDWARE TOOLS

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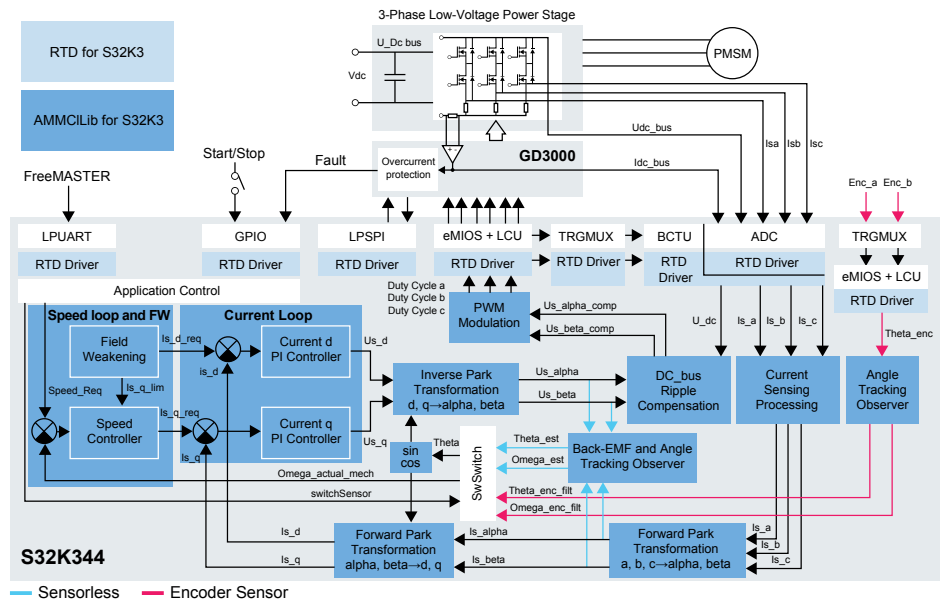
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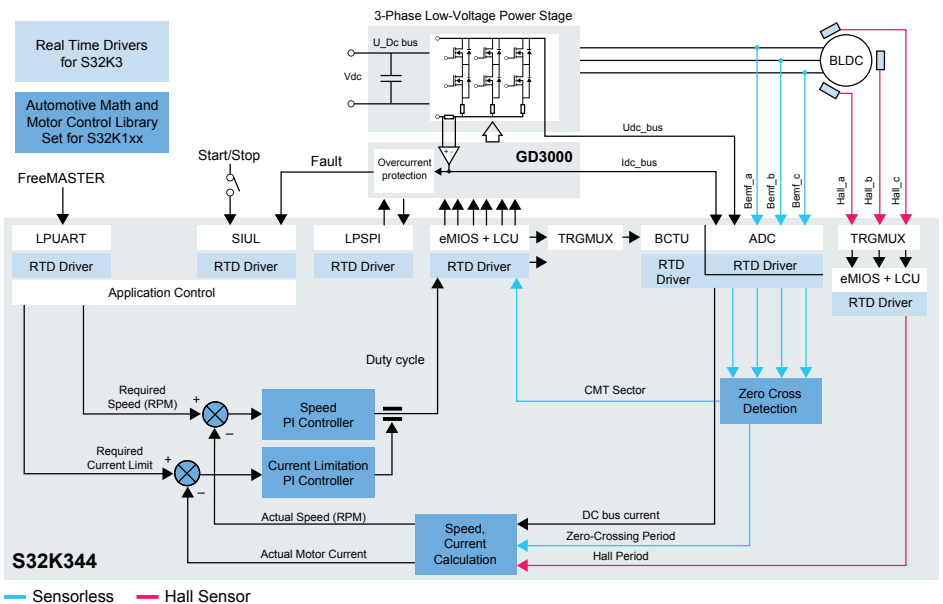
PRODUCTS	
<b>MCU</b>	S32K344
<b>Analog</b>	GD3000: MOSFET gate driver for 3-phase motor FS26: Safety System Basis Chip (SBC) with Low-Power Fit for ASIL D TJA1021: LIN 2.1/SAE J2602 Transceiver TJA1043 HS-CAN Transceiver
HARDWARE	
<b>Motor</b>	3-phase BLDC motor with Hall sensor, 24 VDC, 9000 RPM, 95 W
<b>Power</b>	Up to 100 W
<b>Voltage</b>	12 V (10-18 V)
<b>Current sensing</b>	Single-, dual- and triple-shunt
<b>Position sensing</b>	Hall, encoder
<b>Communication</b>	CAN (FD), LIN, Ethernet, UART, PWM
MOTOR CONTROL SOFTWARE APPLICATION	
<b>PMSM FOC</b>	3-phase field-oriented control (FOC) with field weakening (FW) Sensor (Encoder) or sensorless control (back-EMF observer) Single-shunt and triple-shunt current sensing and 3-phase stator current reconstruction Examples built on either RTD high-level API (Autosar & non-Autosar applications) or low-level API (non-Autosar) applications
<b>BLDC Six-step</b>	3-phase 6-step commutation control Sensor (Hall) or sensorless control based on back-EMF zero-cross detection method
TOOLS	
<b>Integrated development environment</b>	S32 Design Studio IDE for S32 Platform
<b>MCU peripherals settings and control</b>	Real Time Drivers (RTD)
<b>Motor control library</b>	Automotive Math and Motor Control Library (AMMCLib) set
<b>Visualization and motorcontrol tuning</b>	FreeMASTER and Motor Control Application Tuning (MCAT)

# S32K3 MOTOR CONTROL BLOCK DIAGRAMS

## FIELD ORIENTED CONTROL (FOC) FOR PMSM MOTOR



## SIX-STEP COMMUTATION CONTROL FOR BLDC MOTOR



## S32K3 RESOURCES

S32K3 MCUs  
[nxp.com/S32K3](http://nxp.com/S32K3)

MBDT online support  
[nxp.com/MBDTcommunity](http://nxp.com/MBDTcommunity)

FreeMASTER Run-Time Debugging Tool  
[nxp.com/FreeMaster](http://nxp.com/FreeMaster)

S32K Motor Control Development kits  
[nxp.com/S32KMCdevKits](http://nxp.com/S32KMCdevKits)

S32 Design Studio IDE  
[nxp.com/S32DS](http://nxp.com/S32DS)

AMMCLib set  
[nxp.com/AMMCLib](http://nxp.com/AMMCLib)

S32K online support  
[nxp.com/S32Kcommunity](http://nxp.com/S32Kcommunity)

Model-Based Design Toolbox  
[nxp.com/MBDT](http://nxp.com/MBDT)

[nxp.com/S32KMCdevKits](http://nxp.com/S32KMCdevKits)

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Document Number: S32K3MCBROCH REV 2