



S32K344 ブラシレスDC および永久磁石同期モータ制御開発キット

MCSPTE1AK344

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MCSPTE1AK344は、冷暖房空調設備 (HVAC) や電動ポンプを対象としたブラシレスDC (BLDC) モータ制御、およびアクティブ・サスペンション、電動パワートレイン、eTurbo、ベルト・スタータ・ジェネレータを対象とした三相永久磁石同期モータ (PMSM) 制御のために設計された開発キットです。

32ビットArm® Cortex®-M7搭載S32K3マイクロコントローラとGD3000プリドライバをベースとしたMCSPTE1AK344は、最終的なハードウェア設計を待つことなく、BLDCおよびPMSM制御アプリケーションのラピッド・プロトタイピングと評価を可能にします。

MCSPTE1AK344のアプリケーション・ソフトウェアは、車載用演算/モータ制御ライブラリ (AMMCLib) セットに加え、リアルタイム・ドライバ (RTD) ソフトウェア・パッケージを活用しており、三相BLDCとPMSMモータ制御の両方の完全なリファレンス実装を実現します。

RTDソフトウェアにより、AUTOSAR®と非AUTOSAR環境の両方に対応するモータ制御アプリケーションのビルドが可能です。

The diagram illustrates the system architecture for the S32K344, showing the integration of various components for motor control:

- Real-Time Drivers for S32K3** and **Automotive Math and Motor Control Library Set for S32K3** provide the core control logic.
- FreeMASTER** is used for development and debugging via **LPUART**.
- Start/Stop** and **Fault** signals are managed through **SIUL** and **LPSPi**.
- The **3-Phase Low-Voltage Power Stage** (GD3000) is connected to a **U_Dc bus** and a **BLDC** motor.
- RTD Drivers** are used for **eMIOS + LCU** and **TRGMUX** signals.
- Application Control** manages the **Required Speed (RPM)** and **Required Current Limit**.
- The **Speed PI Controller** and **Current Limitation PI Controller** process the required signals to generate a **Duty Cycle**.
- Speed, Current Calculation** block receives **Actual Speed (RPM)** and **Actual Motor Current** to calculate the **DC bus current** and **Zero-Crossing Period**.
- Zero Cross Detection** is used for **CMT Sector** and **Hall Period** detection.
- ADC** and **TRGMUX** are used for **Bemf_a**, **Bemf_b**, **Bemf_c**, **Hall_a**, **Hall_b**, and **Hall_c** signals.
- Legend:**
 - Blue line: Sensorless
 - Orange line: Hall sensor

The diagram illustrates the system architecture for the S32K344, divided into several functional blocks:

- Real-Time Drivers for S32K3**: Includes **FreeMASTER** (connected to LPUART) and **Automotive Math and Motor Control Library Set for S32K3** (connected to SIUL).
- 3-Phase Low-Voltage Power Stage**: Features a **GD3000** driver connected to a **PMSM** motor. It includes a **U_Dc bus** and **Vdc** input.
- RTD Drivers**: Multiple **RTD Driver** blocks are connected to the **GD3000** and the **3-Phase Low-Voltage Power Stage**. They interface with **Start/Stop**, **Fault**, and **LPSPi** signals.
- Application Control**: This central block contains:
 - Speed loop & FW**: Includes **Field Weakening** and **Speed Controller** blocks.
 - Current Loop**: Includes **Current PI Controller** blocks.
 - PWM Modulation**: Receives **Duty Cycle** and **Duty C** inputs.
 - Inverse Park's Transformation**: Converts **d, q** to **alpha, beta**.
 - DC_bus Ripple Compensation**: Receives **Udc** and **Is_a, Is_b, Is_c** inputs.
 - Current Sensing Processing**: Receives **Is_a, Is_b, Is_c** inputs.
 - Angle Tracking Observer**: Receives **Theta_enc** and **Theta** inputs.
 - Back-EMF & Angle Tracking Observer**: Receives **Theta** and **Omega** inputs.
 - Forward Park Transformation**: Converts **alpha, beta** to **d, q**.
 - Forward Clark Transformation**: Converts **a, b, c** to **alpha, beta**.
- Legend**:
 - Blue line: Sensorless
 - Orange line: Encoder sensor

The diagram shows the flow of signals and data between these components, including the **GD3000** driver, the **3-Phase Low-Voltage Power Stage**, and the **PMSM** motor.

View additional information for [S32K344ブラシレスDCおよび永久磁石同期モータ制御開発キット](#).

Note: The information on this document is subject to change without notice.

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