OVERVIEW

The MTRDEVKSNK144 development kit serves as an example of a motor control design using the the S32K144 family of automotive microcontrollers based on a 32-bit Arm® Cortex®-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 BLDC motor based on Six-Step commutation technique ensuring low CPU load
- **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

**S32K144 AND KIT SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash</td>
<td>512 KB</td>
</tr>
<tr>
<td>RAM</td>
<td>64 KB</td>
</tr>
<tr>
<td>Core</td>
<td>Arm Cortex – M4F, 32-bit CPU</td>
</tr>
<tr>
<td>ADC</td>
<td>2 modules, 12-bit</td>
</tr>
<tr>
<td>Speed</td>
<td>80 MHz</td>
</tr>
<tr>
<td>Trigger Unit</td>
<td>2 x PDB + TRGMUX</td>
</tr>
<tr>
<td>Package</td>
<td>LQFP-100</td>
</tr>
<tr>
<td>Comms</td>
<td>3xLPUART, 3xLPSP, 3xFlexCAN (1x with FD)</td>
</tr>
<tr>
<td>Temp</td>
<td>+125°C Tj</td>
</tr>
<tr>
<td>BEMF Fbc</td>
<td>YES</td>
</tr>
<tr>
<td>Clock</td>
<td>8 MHz – ext.</td>
</tr>
</tbody>
</table>

The MTRDEVKSNK144 development kit demonstrates the advantages of the NXP S32K144 MCU for motor control applications with a three-phase brushless DC (BLDC) motor.
TARGET AUTOMOTIVE APPLICATIONS
- Actuators and valve controls
- Electric fuel, water and oil pumps
- Engine cooling fans
- Windshield wipers
- Heating, ventilation and air conditioning (Hvac)
- 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 permanent magnet low-voltage motor
- 12 V / 5 A power supply

Runtime Software:
- Sensorless and Hall based Six-Step control of the PM motor
- Software example 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 support

3-PHASE BLDC DEVELOPMENT KIT WITH S32K144

MOTOR CONTROL ALGORITHM CONCEPT

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