OVERVIEW
The S12ZVML-MINIBRD and S12ZVML-MINIKIT are a motor control board and development kit optimized for automotive and industrial applications. Both S12ZML-MINIBRD and S12ZVML-MINIKIT are based on 16-bit S12 MagniV® S12Z core and integrate an automotive voltage regulator, a LIN physical interface, and a gate driver unit able to drive up to six external MOSFETs.

KEY FEATURES
- **S12ZVM MCU** — 16-bit S12Z based MCUs with integrated high-voltage capabilities targeted for automotive and high reliability industrial motor control applications
- **Integrated solution** — Integrated 6-channel Gate Driver Unit to control six power MOSFETs, 12V to 5V voltage regulator and LIN physical layer
- **Automotive Motor Control Algorithm** — Sensorless control of the PMSM motor based on Field Oriented Control (FOC) and Sensorless control of the BLDC motor based on Six-step commutation control technique allowing torque/speed control with low CPU load
- **Automotive Math and Motor Control Library Set** — control algorithm built on blocks of precompiled software library
- **FreeMASTER and MCAT** — Application tuning and variable tracking

TARGET AUTOMOTIVE APPLICATIONS
- Actuators and valve controls
- Blower fan in HVAC systems
- Electric fuel, water and oil pumps
- Engine cooling fans
- Wind shield wipers

Runtime Software:
- S12ZVML-MINIBRD_BLDC: Complete BLDC motor control application software package for S12ZVML-MINIBRD
- S12ZVML-MINIBRD_PMSM: Complete PMSM motor control application software package for S12ZVML-MINIBRD
- AUTOMATH_MCL: Automotive Math and Motor Control Library Set
- FreeMASTER Run-Time Debugging Tool
- MCATSW: Motor Control Application Tuning (MCAT) Tool
- CodeWarrior® for MCUs (Eclipse IDE)
- MCU peripherals initialization generated by Processor Expert

The S12ZML-MINIBRD and S12ZVML-MINIKIT demonstrate the advantages of the NXP S12ZVM MCU for 3-phase brushless DC motor (BLDC) and permanent magnet synchronous motor (PMSM) control applications.
**S12ZVML128 AND S12ZML-MINIBRD SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>S12ZVML128</th>
<th>S12ZML-MINIBRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash</td>
<td>128 KB</td>
<td>6 ch, 15-bit PWM</td>
</tr>
<tr>
<td>RAM</td>
<td>8 KB</td>
<td>12 V VREG</td>
</tr>
<tr>
<td>Core</td>
<td>S12Z</td>
<td>120 V / 70 mA, 170 mA with ballast</td>
</tr>
<tr>
<td>Speed</td>
<td>50 MHz</td>
<td>2x16 ch., 12-bit</td>
</tr>
<tr>
<td>Package</td>
<td>64LQFP</td>
<td>2 trigger input sources / 2 trigger output</td>
</tr>
<tr>
<td>LIN-PHY</td>
<td>1</td>
<td>Up to +150°C</td>
</tr>
<tr>
<td>Comms</td>
<td>2 SCI, 1 SPI</td>
<td>1 ch. 5 V / 20 mA (source)</td>
</tr>
</tbody>
</table>

**Part Number** | **Motor**  | **Kit Contains**
--- | --- | ---
S12ZVML-MINIBRD | BLDC, PMSM | Board, Cables |
S12ZVML-MINIKIT | BLDC, PMSM | Board, Cables, Power Supply, Motor |

**S12ZVML-MINIKIT BLDC/PMSM DEVELOPMENT KIT**

**Automotive Math and Motor Control Library Set for S12ZVML128**

**Motor Control Algorithm Concept**

**AMMCLIB Functions**

---

NXP and the NXP logo are trademarks of NXP B.V. All other product or service names are the property of their respective owners.
© 2019 NXP B.V.

Document Number: S12ZVMLMINIFS REV 1