VIPower™ VNH5 series
Fully-protected, eco-friendly motor control solutions

Automotive-qualified full bridges covering a wide range of motor control applications

The VNH5 series of fully-integrated H-bridges offers a dedicated power stage and controls to drive DC motors. The series uses ST’s proprietary VIPower™ M0-5 technology. Featuring advanced diagnostics and protection, this automotive-qualified product family offers best-in-class reliability. The combination of $R_{\text{DS(on)}}$ and packages covers a multitude of applications having different power requirements.

KEY FEATURES
- Cross-conduction protection
- Current limitation
- Over-temperature shutdown
- Power limitation (ST IP)
- PWM operation up to 20 kHz
- Charge pump output for reverse polarity protection
- Analog current sense output
- Overvoltage clamp and undervoltage shutdown
- Output protected against loss of ground and loss of $V_{\text{cc}}$
- Output protected against short to ground and short to $V_{\text{cc}}$
- Very low standby power consumption
- AEC-Q100 compliant

KEY BENEFITS
- Cost-effective and space-saving solution compared to discrete multi-package approach
- Embedded controls and protection for reduced microcontroller workload
- State-of-the-art reliability thanks to self-limiting fast thermal transient (power limitation)
- Robust solution designed to operate in the harsh automotive environment

TYPICAL APPLICATIONS
Door locks, fan control, wipers, sun roofs, seat adjustment, and door/trunk closure
The VNH5 series of H-bridges offers multiple solutions for actuating a wide range of DC motors, especially for automotive applications. Today, environmental regulations drive the market towards lighter and smaller silicon drivers ensuring reduced CO₂ emissions. The VNH5 series, compared to a mechanical relay or multi-package solid-state solutions, is an eco-friendly and cost-effective approach integrating the power stage (two high-side and two low-side switches) plus dedicated control and diagnostic functions within the same package.

VNH5 products can be easily driven by a microcontroller through dedicated input pins, compatible with 3 V CMOS. These define motor direction (clockwise or counter-clockwise), speed (PWM controlled) and active braking. An embedded non-dissipative current sense output enables torque control and load disconnection detection. Its advanced diagnostics and protection functions are ideal for robust applications able to protect themselves against hazardous conditions.

**TYPICAL APPLICATION DIAGRAM**

![TYPICAL APPLICATION DIAGRAM](image)

*Available on VNH5180A/VNH5050A/VNH5019A

**VNH5 SERIES MOTOR CONTROL ICS**

<table>
<thead>
<tr>
<th>Part number</th>
<th>On-state resistance $R_{DS(on)}$ typ (mΩ)</th>
<th>Current limitation $I_{lim}$ typ (A)</th>
<th>PWM operation</th>
<th>Package</th>
<th>Easy Board order code (*)</th>
<th>Evaluation board order code</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td>VNH5019A-E</td>
<td>18</td>
<td>50</td>
<td>•</td>
<td>MultiPowerSO-30</td>
<td>EVAL-VNH5019-P1, EVAL-VNH5019-P2</td>
<td>STEVAL-VNH5019A</td>
<td>Outstanding thermal performances</td>
</tr>
<tr>
<td>VNH5050A-E</td>
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<td>42</td>
<td>•</td>
<td>PowerSSO-36</td>
<td>EV-VNH5050A</td>
<td>STEVAL-VNH5050A</td>
<td>Best trade-off between thermal performance and cost</td>
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<tr>
<td>VNH5180A-E</td>
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<td>12</td>
<td>•</td>
<td>PowerSSO-36</td>
<td>EV-VNH5180A</td>
<td>STEVAL-VNH5180A</td>
<td>Best trade-off between thermal performance and cost</td>
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<td>8</td>
<td></td>
<td>SO-16N</td>
<td></td>
<td></td>
<td>Cost-optimized plastic package</td>
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</tbody>
</table>

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Note: *Easy Boards are simple evaluation tools assembling the device on optimized PCB for allowing simple connection to external environment

**EVALUATION TOOLS**

For information on the available evaluation tools, see [st.com/automotive_evalboards](http://st.com/automotive_evalboards)