100 W motor control power board based on STIPNS2M50T-H SLLIMM™-nano SMD IPM MOSFET

Features

- Input voltage: from 125 to 400 VDC
- Nominal power: up to 100 W
- Nominal current: up to 1.2 A
- Input auxiliary voltage: up to 20 VDC
- Single- or three-shunt resistors for current sensing (with sensing network)
- Three options for current sensing: dedicated external op-amps, internal SLLIMM-nano SMD op-amp (single) or via MCU
- Overcurrent hardware protection
- IPM temperature monitoring and protection
- Hall sensor or encoder input
- MOSFETs intelligent power module:
  - SLLIMM-nano IPM (STIPNS2M50T-H) - SMD package
- Motor control connector (32 pins) interfacing with ST MCU boards
- Universal design for further evaluation with breadboard and testing pins
- Very compact size
- WEEE compliant
- RoHS compliant

Description

The STEVAL-IPMnM2S is a compact motor drive power board based on SLLIMM-nano SMD (small low-loss intelligent molded module) (STIPNS2M50T-H). It provides an affordable and easy-to-use solution for driving high power motors in a wide range of applications such as power white goods, air conditioning, compressors, power fans and 3-phase inverters for motor drives in general.

The IPM itself consists of six MOSFETs, three high voltage half-bridge gate driver ICs and a wide range of features like undervoltage lockout, smart shutdown, internal temperature sensor and NTC, overcurrent protection and internal op-amp.

The main characteristics of this evaluation board are small size, minimal BOM and high efficiency. It features an interface circuit (BUS and VCC connectors), bootstrap capacitors, snubber capacitor, hardware short-circuit protection, fault event signal and temperature monitoring. It is designed to work in single- or three-shunt configuration and with triple current sensing options: three dedicated on-board op-amps, op-amps embedded on MCU or single internal IPM op-amp. The Hall/Encoder part completes the circuit.

The system is designed to achieve accurate and fast conditioning of current feedback to satisfy the typical requirements for field oriented control (FOC).

The STEVAL-IPMnM2S is compatible with ST’s control board based on STM32, providing a complete platform for motor control.
1  Schematic diagrams

Figure 2. STEVAL-IPMnM2S - circuit schematic (1 of 5)
Figure 3. STEVAL-IPMnM2S - circuit schematic (2 of 5)
Figure 4. STEVAL-IPMnM2S - circuit schematic (3 of 5)
Figure 5. STEVAL-IPMnM2S - circuit schematic (4 of 5)
Figure 6. STEVAL-IPMnM2S - circuit schematic (5 of 5)
Revision history

Table 1. Document revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-Aug-2018</td>
<td>1</td>
<td>Initial release.</td>
</tr>
<tr>
<td>21-Sept-2018</td>
<td>2</td>
<td>Updated Section features and Section 1 schematic</td>
</tr>
</tbody>
</table>