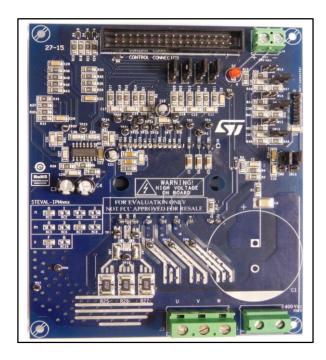


## STEVAL-IPM05F

# Motor control power board based on the SLLIMM™ 2nd series of IGBT IPMs

Data brief



#### **Features**

- Input voltage: 125 400 V<sub>DC</sub>
  Nominal power: up to 700 W
- 1 Norminal power, up to 700 W
- Input auxiliary voltage: up to 20 V DC
   Single or three-shunt resistors for current sensing (with sensing network)
- Two options for current sensing: dedicated op-amps or through MCU
- Overcurrent hardware protection
- IPM temperature monitoring and protection
- Hall sensor or encoder input
- Uses the STGIF5CH60TS-L IGBT intelligent power module from the 2<sup>nd</sup> series of SLLIMM™ IPMs
- 32-pin motor control connector for interfacing with ST MCU boards
- Universal conception for further evaluation with breadboard and testing pins
- Very compact size
- RoHS compliant

### **Description**

The STEVAL-IPM05F is a compact motor drive power board based on the SLLIMM™ (small low-loss intelligent molded module) 2<sup>nd</sup> series product, STGIF5CH60TS-L. It provides an affordable and easy-to-use solution for driving high power motors for a wide range of applications such as white goods, air conditioning, compressors, power fans, high-end power tools and generally 3-phase inverters for motor drives. The IPM itself consists of short-circuit rugged IGBTs and a wide range of features including undervoltage lockout, smart shutdown, temperature sensing and NTC, and overcurrent protection.

The main characteristics of this evaluation board are its small size, minimal BOM and high efficiency. It consists of an interface circuit (BUS and Vcc connectors), bootstrap capacitors, snubber capacitor, hardware short-circuit protection, fault event signal and temperature monitoring. In order to increase flexibility, it has been designed to work in single or three-shunt configuration and with double current-sensing options such as using three dedicated on-board op-amps, or op-amps embedded in the MCU. The Hall/Encoder part completes the circuit.

Thanks to these advanced characteristics, the system has been specifically designed to achieve fast and accurate current feedback conditioning, satisfying the typical requirements for field-oriented control (FOC).

The STEVAL-IPM05F is compatible with ST's STM32-based control board, enabling designers to build a complete platform for motor control.

March 2016 DocID028540 Rev 3 1/8

Schematic diagrams STEVAL-IPM05F

# 1 Schematic diagrams

GSPG2110151505SG 1.65√ C4 47u/35V 4 3.3√ U1D TSV994 R5 1k0 RC4 RC8 + C3 47u/35V KBus\_voltage RC3 RC7 D1 BAT48JFILM ₹ 3.3∨ 45 45 55 sng+ → R3 120 R RC2 RC6 RC10 R1 470K R2 470K 7k5 STEVAL-IPMnmx decoder Input 1000u /400 V ပ P. C. RC5 ည္ရ ရ DC\_bus\_ voltage INPUT-dc ≥ Z × 5

Figure 1: STEVAL-IPM05F circuit schematic (1 of 5)

Bus\_voltage Control Conne ctor NTC\_b ypass\_relay EM\_STOP PWM-A-H PWM-B-H PWM-B-L PWM-C-H PWM-C-L Current\_C Current\_A 3 SW1  $\frac{1}{2}$  SW4 Current\_A\_a mp Current\_C\_a mp  $\sum_{0}^{\infty} S_{0}^{2}$ Current\_B\_a mp GSPG2110151515SG

Figure 2: STEVAL-IPM05F circuit schematic (2 of 5)

GSPG2110151530SG Current\_B\_amp R36 <del>\*</del> 75 3.3√ U1C TSV994 10 R34 2k1 R39 2k1 10n 100p 1k0 1k0 1.65√ 4 R35 R37 330p 330p R31 ₹ 3.3 <del>\*</del> R41 **\*** ₹ 3.3√ U1A TSV994 C21 +/ U1B TSV994 R29 2k1 R33 R43 R38 2k1 10n 100p \$ 198 \$ 198 1k0 1k0 1.65√ 4 R40 R42 R30 R32

Figure 3: STEVAL-IPM05F circuit schematic (3 of 5)

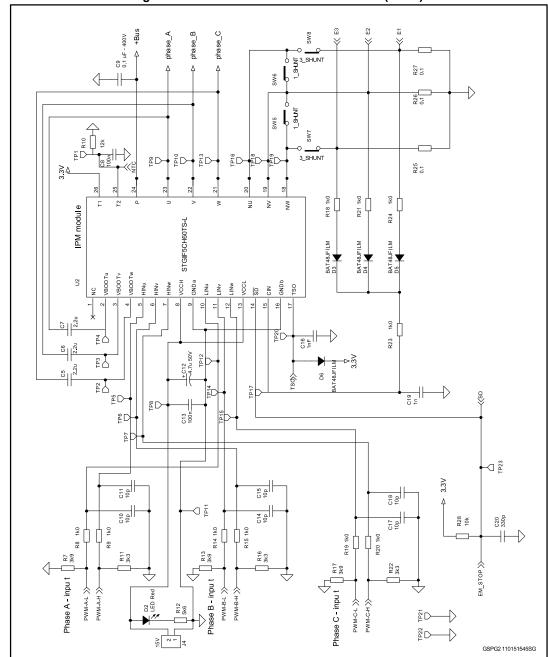


Figure 4: STEVAL-IPM05F circuit schematic (4 of 5)

GSPG2110151550SG M\_phase\_B M\_phase\_C M\_phase\_A SW15 R52 4k7 SW14 R51 4k7 SW13 R50 4K7 R46 4k7 C37 10p R45 4k7 C36 10p R44 4k7 C35 Hall/Encoder 2k4 2k4 2k4 SW10 SW12 SW11 C34 100n 6MS O s SW16 <u>-</u>1 Encoder/Hall C32 100n C33 H1/A+ H2/B+ H3/Z+ + 3.3/5V GND ±5V △ 3.3∨ △

Figure 5: STEVAL-IPM05F circuit schematic (5 of 5)

STEVAL-IPM05F Revision history

# 2 Revision history

**Table 1: Document revision history** 

Date	Version	Changes
23-Oct-2015	1	Initial release.
26-Oct-2015	2	Updated document title and part number references.
09-Mar-2016	3	Updated Section 1: "Schematic diagrams".

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