



STEVAL-IHM027V1

Power board with MC connector based on the STGIPS10K60A
10 A, 600 V intelligent power module

Data brief

Features

- Minimum input voltage: 125 VDC or 90 VAC
- Maximum input voltage: 350 VDC or 220 VAC
- Capable of using external +15 V supply voltage
- Maximum output power for motor: 1000 W
- Regenerative brake control feature
- Input inrush limitation with bypassing relay
- +15 V auxiliary power supply based on buck converter with VIPer16
- Fully-populated board with test points
- Motor control connector for interfacing with STM3210B-EVAL board and other ST motor control-dedicated kits
- Tachometer and Hall/encoder inputs
- Compatible with BEMF daughterboard for sensor-less six-step control of BLDC motors
- RoHS compliant



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Description

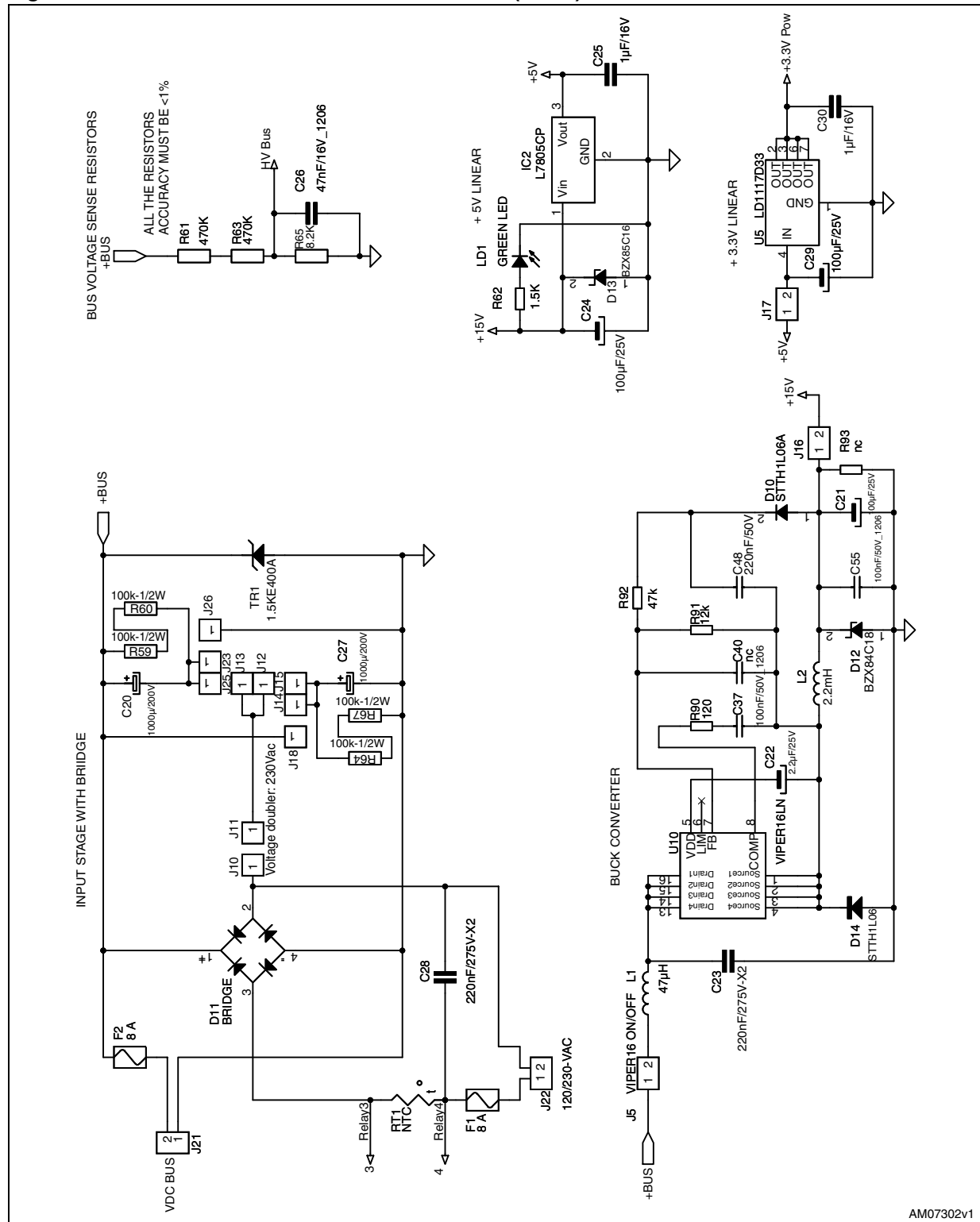
The STEVAL-IHM027V1 is a 1 kW, 3-phase motor control demonstration board featuring the STGIPS10K60A 600 V, 10 A IGBT intelligent power module (IPM) from STMicroelectronics.

The system is an AC/DC 3-phase inverter for driving an induction motor or PMSM motors up to 1000 W. The purpose of the application is to demonstrate the performance of the STGIPS10K60A IPM, housed in a 25-lead, small dual inline package.

The STEVAL-IHM027V1 demonstration board is designed to be compatible with single-phase AC supply from 90 to 220 V, or DC supply from 125 to 350 V.

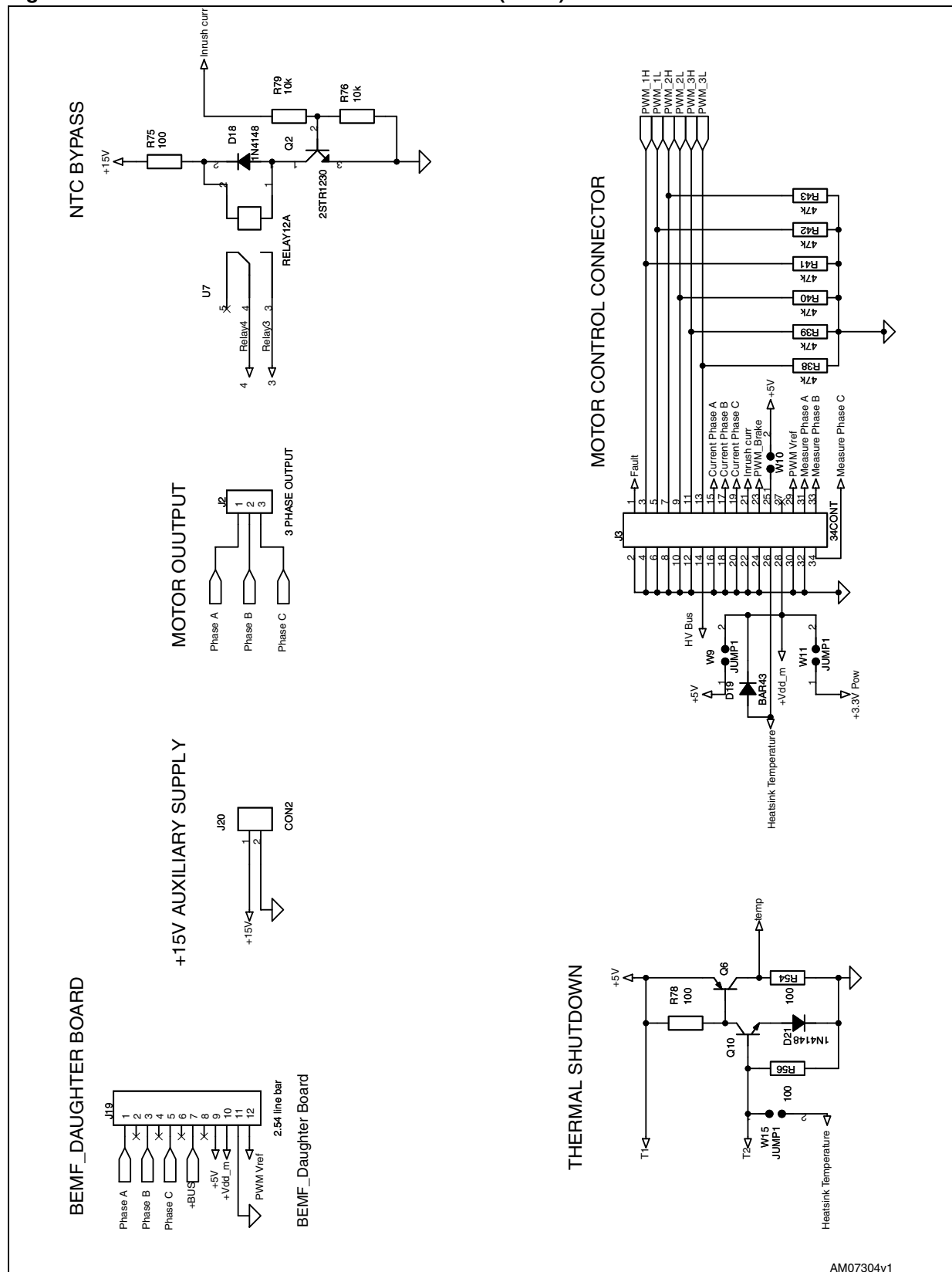
1 Schematic diagrams

Figure 1. STEVAL-IHM027V1 circuit schematics (1 of 5)



AM07302v1

Figure 2. STEVAL-IHM027V1 circuit schematics (2 of 5)

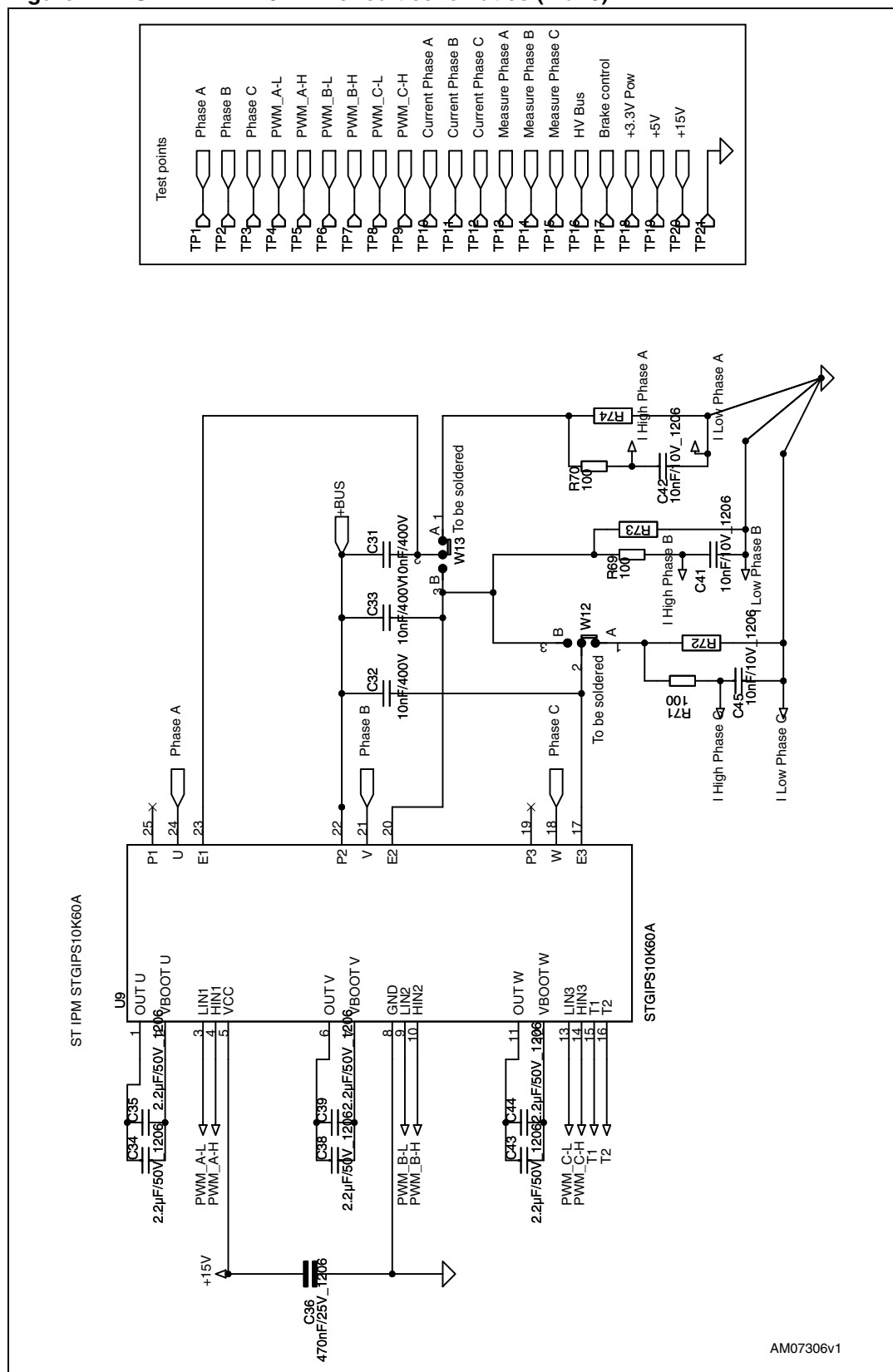


The schematic diagram illustrates the internal circuitry of the AM07305v1 motor driver, organized into three main functional blocks:

- HALL SENSORS/ENCODER:** This section interfaces with an M74HC08 (U2) logic chip. It includes pull-up resistors (R8, R9, R10) and a +5V/3.3V regulator (C5) for the logic supply. The chip's outputs are connected to the motor's Hall sensors (Hall1, Hall2, Hall3) and the encoder's Measure Phase A, B, and C signals (W1, W3, W7).
- TACHOMETER SENSOR:** This block uses a TACHO sensor (J24) to detect the motor's speed. It features a voltage divider (R3, R36), a 100nF/50V capacitor (C15), and a 2STR1230 transistor (T1) to generate the Measure Phase A signal (W6).
- BRAKE CONTROL:** This section manages the braking process. It includes a +15V regulator (C46), a TS391LT comparator (U6), and a 2STR1230 transistor (Q7) to drive the brake coil (J4). The circuit also includes a +5V regulator (C47) and a 100nF/50V capacitor (C48) for the logic supply.

The diagram also shows the connection of the motor's Hall sensors (Hall1, Hall2, Hall3) and the encoder's Measure Phase A, B, and C signals (W1, W3, W7) to the M74HC08 logic chip (U2). The chip's outputs are connected to the motor's Hall sensors and the encoder's Measure Phase A, B, and C signals. The schematic also includes a +5V/3.3V regulator (C5) and a 100nF/50V capacitor (C5) for the logic supply.

Figure 4. STEVAL-IHM027V1 circuit schematics (4 of 5)



The schematic diagram illustrates the internal circuitry of the AM07307v1 IC, organized into several functional blocks:

- CURRENT SENSING A:** This block uses two operational amplifiers, U1A and U1B, to sense current in Phase A and Phase B. It includes input resistors (R11, R12, R13, R14), feedback capacitors (C1, C2, C3, C4), and diodes (D1, D2) for current measurement. The output of U1A is labeled "OUT OP-amp1" and the output of U1B is labeled "OUT OP-amp2".
- CURRENT SENSING B:** This block uses two operational amplifiers, U1C and U1D, to sense current in Phase C. It includes input resistors (R21, R22, R23, R24), feedback capacitors (C5, C6), and diodes (D3, D4) for current measurement. The output of U1C is labeled "OUT OP-amp3" and the output of U1D is labeled "OUT OP-amp4".
- OVER CURRENT / OVER TEMPERATURE PROTECTION:** This block uses a single operational amplifier, U8, to monitor the current sense outputs and generate a fault signal. It includes input resistors (R51, R52, R53, R54), feedback capacitors (C7, C8), and diodes (D5, D6, D7, D8) for protection. The output of U8 is labeled "Fault".
- OCp protection OFF:** This block uses two operational amplifiers, U9A and U9B, to generate a protection signal. It includes input resistors (R61, R62, R63, R64), feedback capacitors (C9, C10), and diodes (D9, D10) for protection. The output of U9A is labeled "OCp protection OFF" and the output of U9B is labeled "temp".
- TEMPERATURE SENSING:** This block uses a single operational amplifier, U10, to sense temperature. It includes input resistors (R71, R72, R73, R74), feedback capacitors (C11, C12), and diodes (D11, D12) for temperature measurement. The output of U10 is labeled "TEMP".

The diagram also shows the internal structure of the IC, including the input pins (1-15) and the output pins (16-20). The input pins are labeled "PWM_1H", "PWM_1L", "PWM_2H", "PWM_2L", "PWM_3H", "PWM_3L", "PWM_4H", "PWM_4L", "PWM_5H", "PWM_5L", "PWM_6H", "PWM_6L", "PWM_7H", "PWM_7L", "PWM_8H", "PWM_8L", "PWM_9H", "PWM_9L", "PWM_10H", "PWM_10L", "PWM_11H", "PWM_11L", "PWM_12H", "PWM_12L", "PWM_13H", "PWM_13L", "PWM_14H", "PWM_14L", "PWM_15H", "PWM_15L", "PWM_16H", "PWM_16L", "PWM_17H", "PWM_17L", "PWM_18H", "PWM_18L", "PWM_19H", "PWM_19L", "PWM_20H", "PWM_20L". The output pins are labeled "OUT OP-amp1", "OUT OP-amp2", "OUT OP-amp3", "OUT OP-amp4", "Fault", "OCp protection OFF", "temp", "TEMP".

2 Revision history

Table 1. Document revision history

Date	Revision	Changes
13-Aug-2010	1	Initial release.

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