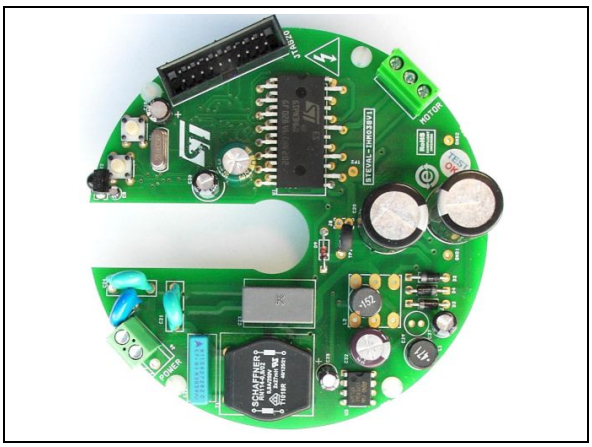
STEVAL-IHM038V1

BLDC ceiling fan controller based on the STM32 and SLLIMM-nano

Data brief



Features

- Maximum input voltage: 265 V AC or 375 V DC
- Minimum input voltage: 90 V AC or 128 V DC
- Output power for applied motor: up to 50 W
- +15 V auxiliary power supply based on the VIPER16 in a non-isolated buck configuration
- Compact design using the SLLIMM™-nano STGIPN3H60 consisting of 600 V IGBTs with gate drivers, op amp for current sensing and comparator
- Passive PFC circuit for power factor correction
- On-board infrared (IR) receiver/demodulator for speed and on/off control using IR remote
- External EEPROM M24C01 for recovery of last speed setting
- Hardware overcurrent protection
- Overtemperature protection with NTC thermistor
- Overvoltage and undervoltage detection
- Based on 32-bit ARM® Cortex™-M3 core-based microcontroller STM32F100C6T6B
- Firmware based on STM32 PMSM FOC SDK 3.0 motor control firmware library and fully customized for the ceiling fan application
- FOC (field oriented control) sensorless algorithm
- PCB size customized for ceiling fan design
- PCB diameter: 105 mm
- Double-sided layout
- RoHS compliant

Description

The STEVAL-IHM038V1 system evaluation board implements a BLDC/PMSM fan controller board which is based on the SLLIMM™-nano (small low-loss intelligent molded module) STGIPN3H60 and STM32F100C6T6B microcontroller. The STEVAL-IHM038V1 incorporates a complete inverter stage and a control stage to drive a 3-phase BLDC fan motor with a power range of 30-35 W with FOC (field oriented control) sensorless mode for the ceiling fan applications. For power factor correction, a passive PFC stage is implemented to achieve a power factor up to 0.90, which is the minimum recommended for ceiling fan applications, particularly for the Indian market. To set the speed by remote control, an on-board IR demodulator is available.

The inverter stage is implemented using the intelligent power module SLLIMM™-nano STGIPN3H60 which embeds 600 V IGBTs with gate drivers, op amp for current sensing and a comparator in a single NDIP-26L package, resulting in a reliable and compact system design.

The control part includes field oriented control with sensorless control algorithm, fault detection and speed setting via remote control (IR receiver), all handled by the STM32F100C6T6B microcontroller from ST's ARM® Cortex™-M3 core-based low density STM32™ MCU family.

1 Schematic diagrams

Figure 1. Microcontroller

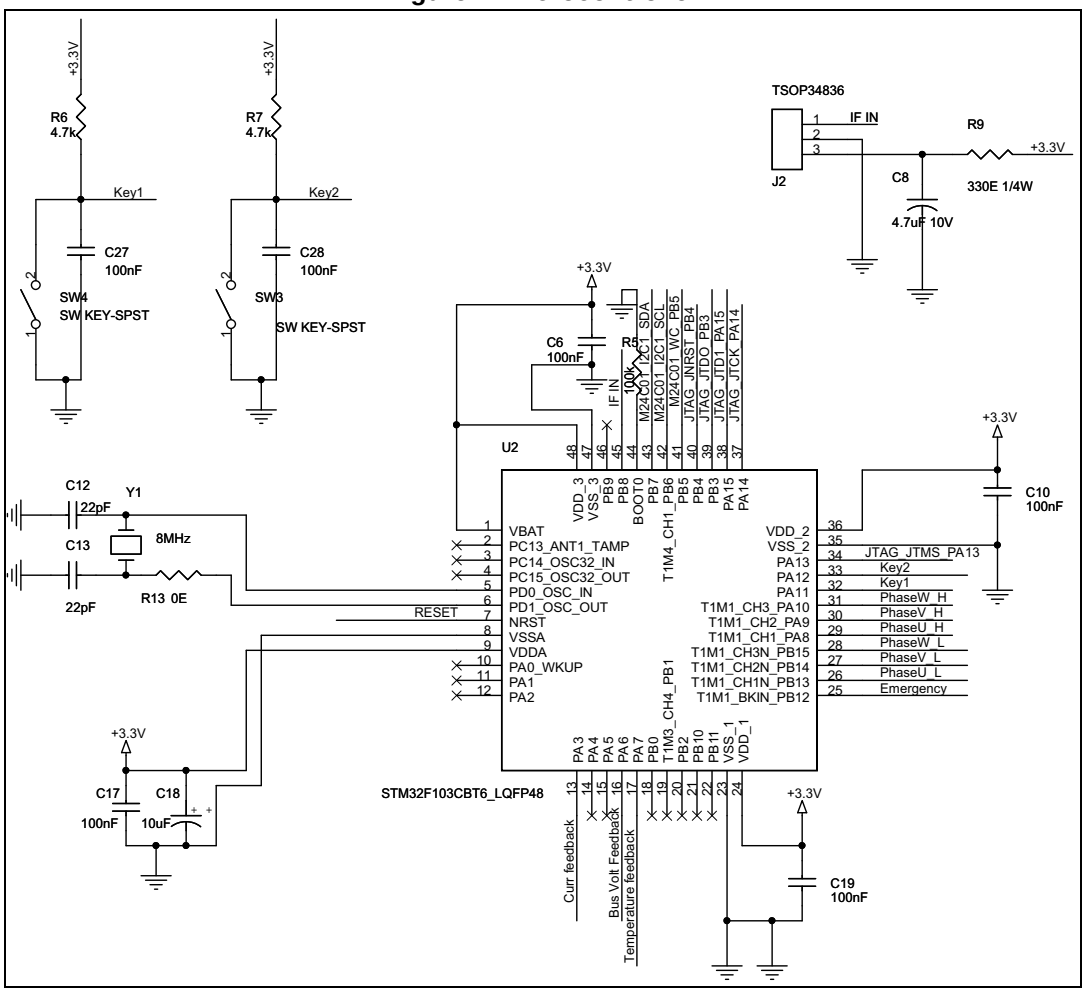


Figure 2. JTAG connector

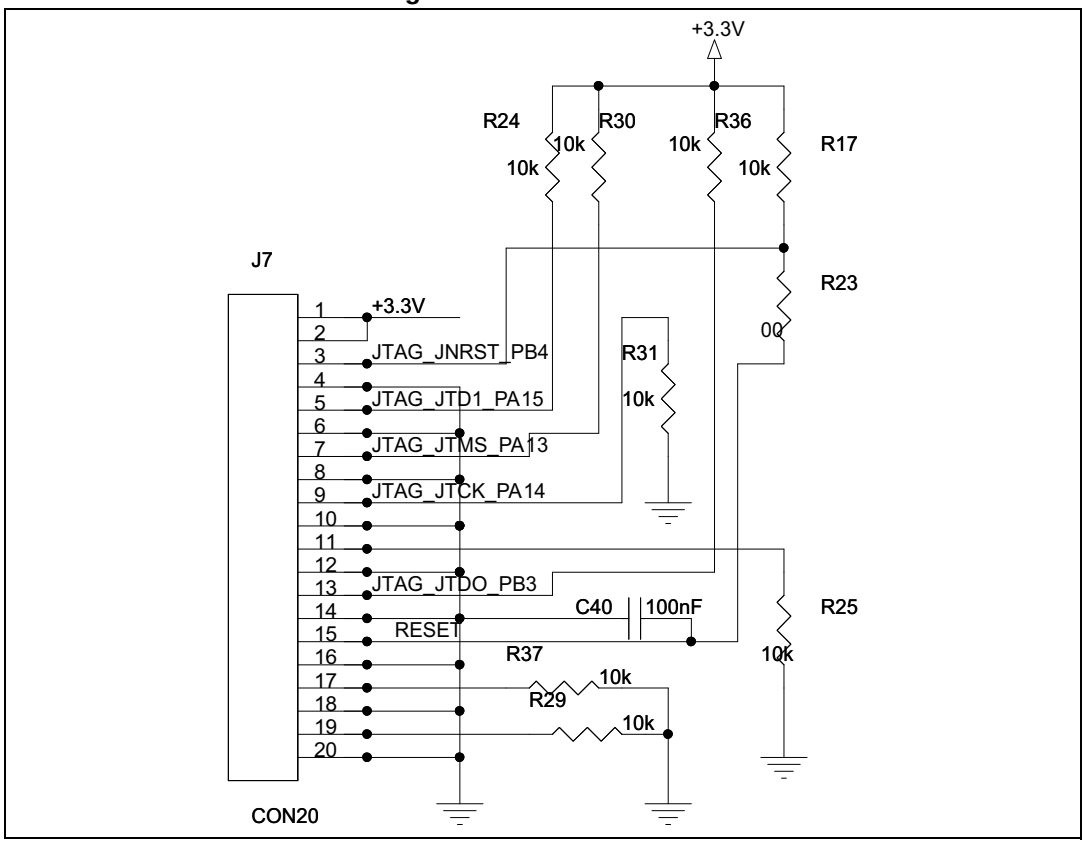


Figure 3. EEPROM section

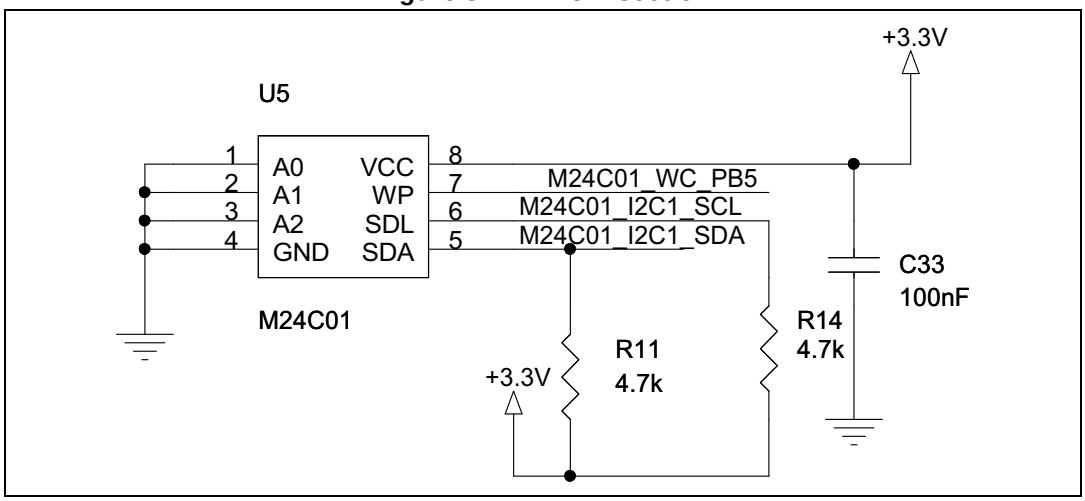


Figure 4. Power section

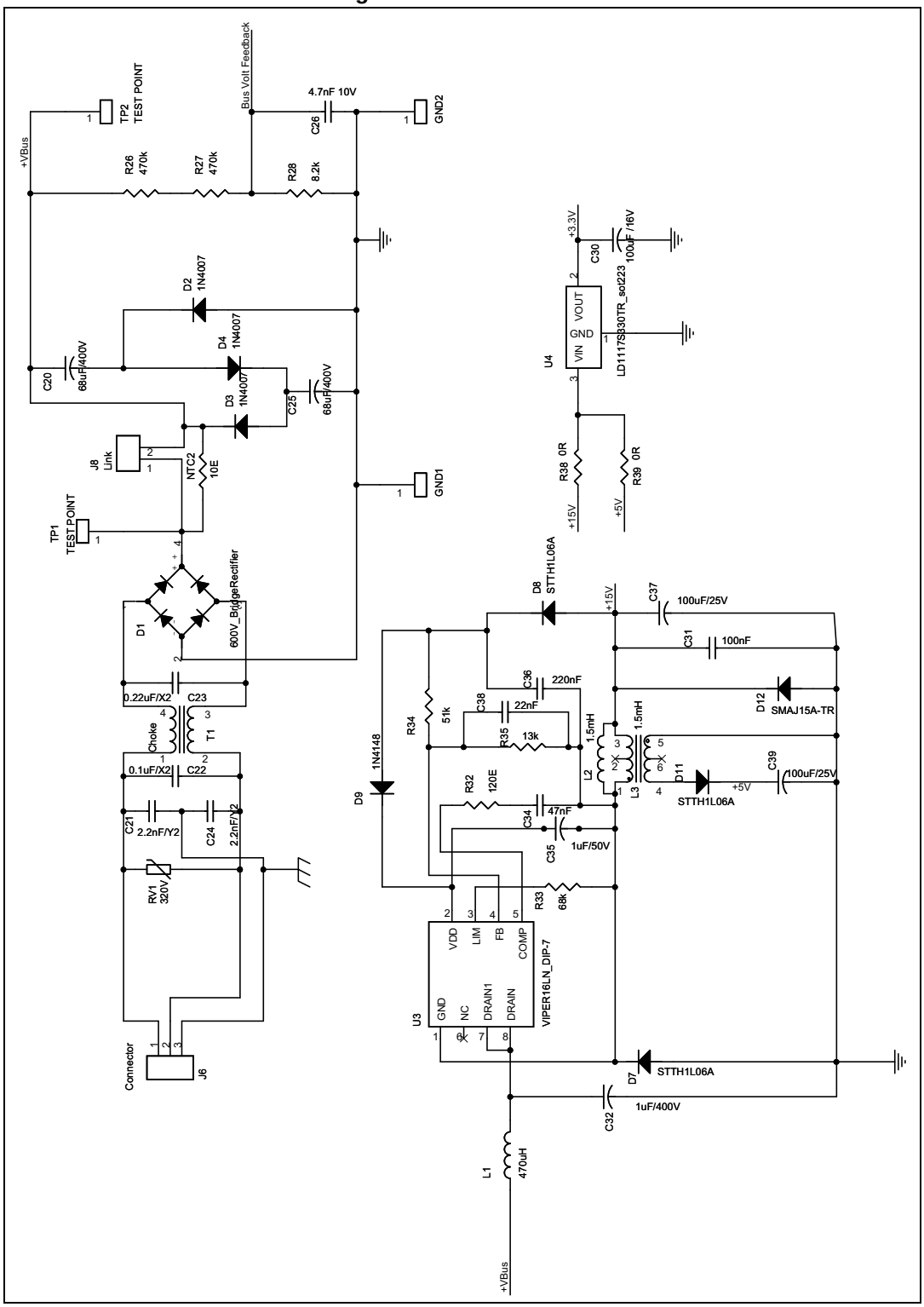
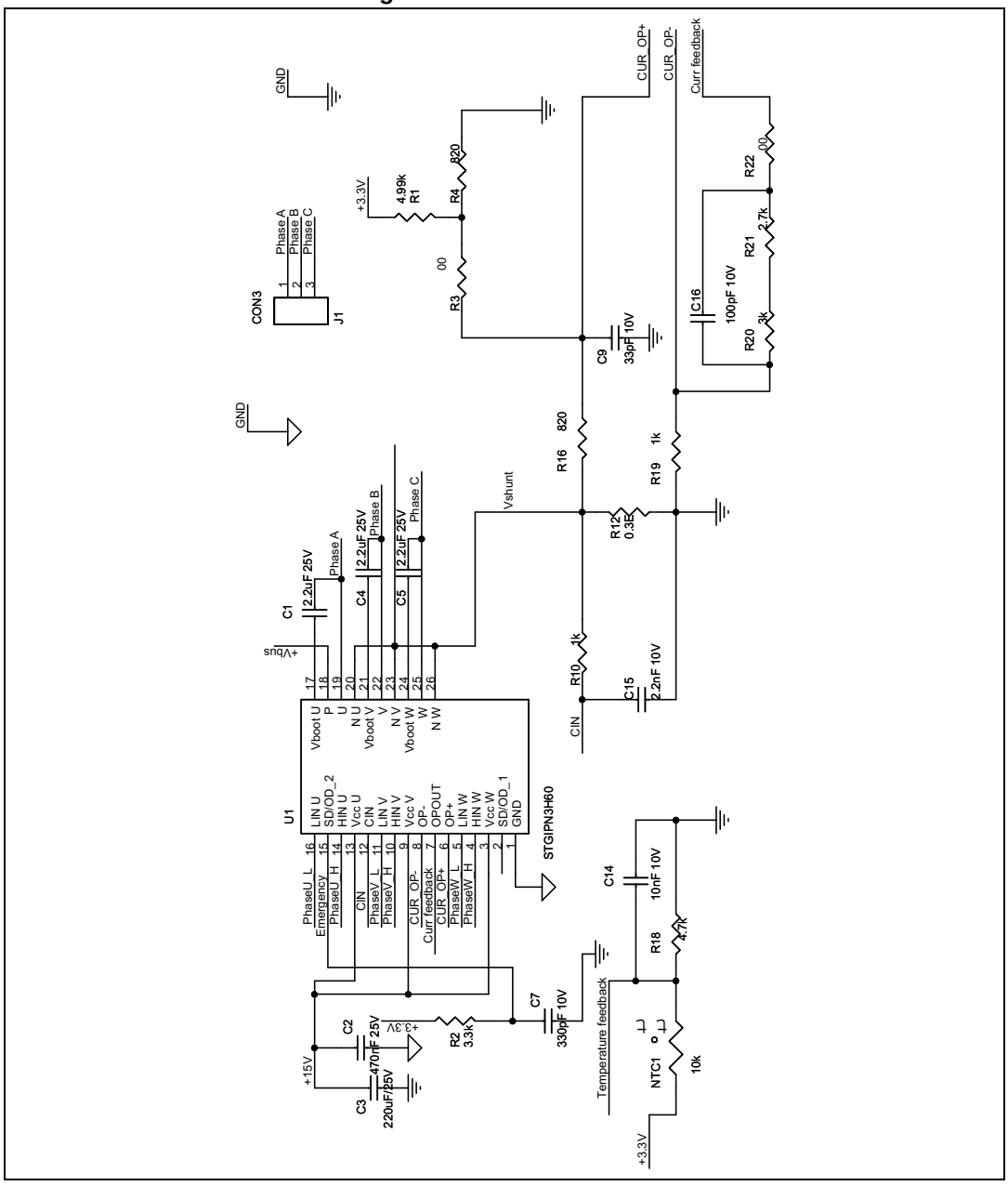


Figure 5. Inverter section



2 Revision history

Table 1. Document revision history

Date	Revision	Changes
12-Feb-2013	1	Initial release.
19-Nov-2013	2	Document status promoted from confidential to public.

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