

3.3 V control of ACS/Triac with STM32

Data brief

Features

- Complete solution for -3.3 V control
- Input voltage range: 90-265 VAC, 50/60 Hz
- Negative 6 V/3.3 V VDC auxiliary power supply based on the Viper16L in buck-boost topology
- Total power consumption in standby mode is lower than 0.3 W for 264 V / 50 Hz
- 48-pin, 32-bit value line family STM32F100C4T6B MCU as main controller
- Zero voltage switching (ZVS) interrupt to synchronize MCU events with voltage mains
- 1x T1235H-6T and ACST12-7C for phase control of high power loads
- 5 discrete power level states with soft change for phase angle controlled devices
- 1x Z0109 and 3x ACS108 for full wave control of low power loads
- 1x relay for demonstration of the board noise robustness
- “Red” LED to show the board is supplied from mains
- “Green” LED for each ACS/ACST/Triac to show the device is turned on
- IEC 61000-4-4 pre-compliance test passed (burst up to 8 kV)
- IEC 61000-4-5 pre-compliance test passed (surge up to 2 kV)
- RoHS compliant

Description

The STEVAL-IHT005V1 demonstration board is designed for the home appliance market, with a focus on the demonstration of a robust solution with a 3.3 V supplied 32-bit MCU. Target applications are mid-end and high-end washing machines, dishwashers, and dryers, with different kinds of ACS/Triacs. The demonstration board is based on the 48-pin 32-bit STM32F100C4T6BMCU, running at 24 MHz (RC



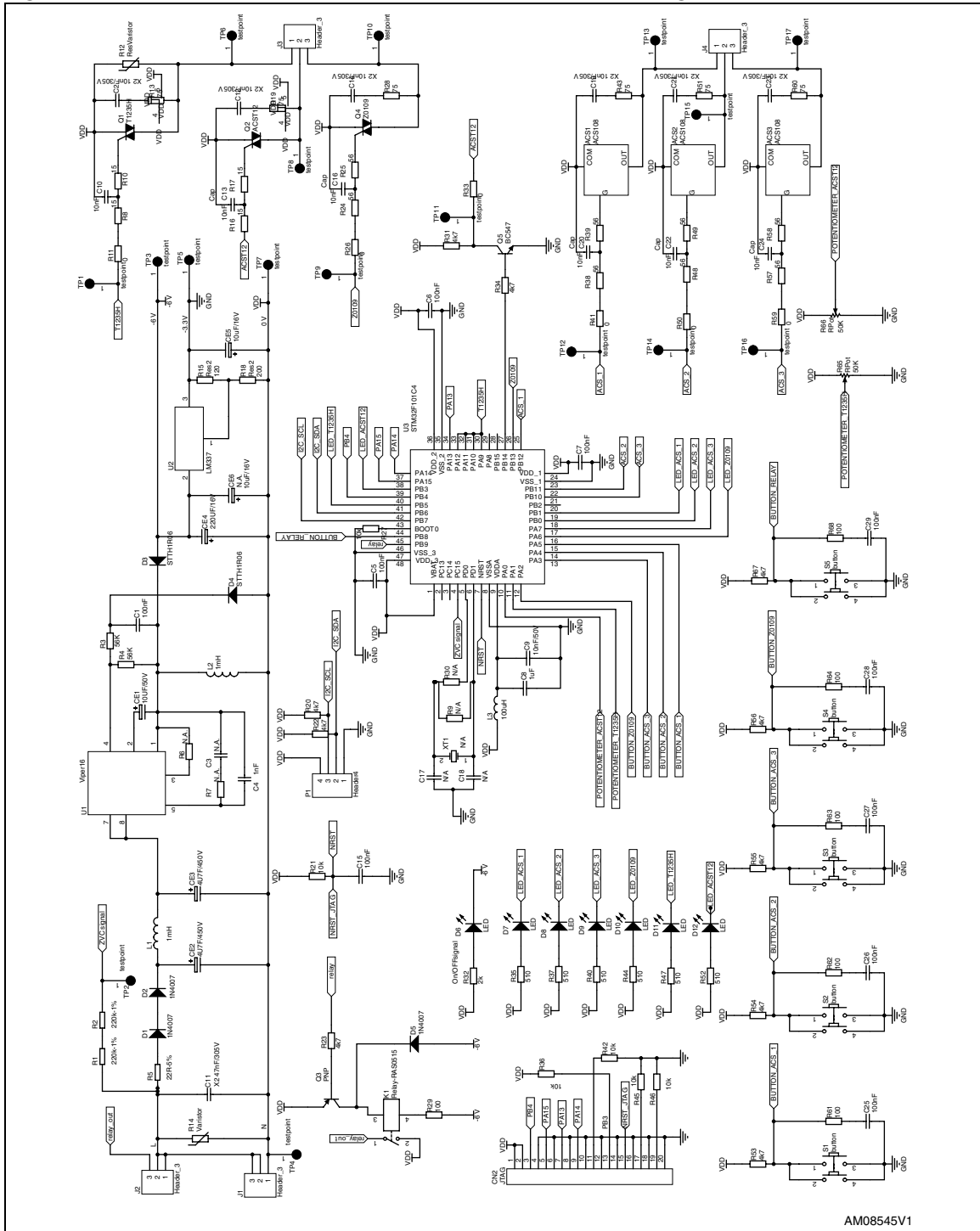
user-trimmable internal RC clock), featuring 16 kBytes of Flash memory, 12-bit A/D converter, 5 timers, communication interfaces, and 4 kBytes of SRAM.

The power supply circuitry is based on VIPer16L, an offline converter with an 800 V avalanche rugged power section, operating at 60 kHz. The power supply provides negative 6 V in buck-boost topology. The STEVAL-IHT005V1 can control two high power loads up to 2640 W, thanks to the T1235H, a 12 A 600 V high temperature Triac, and up to 1840 W ACST12-7C, 12 A 700 V overvoltage protected ACSTTM device. The high power load control is based on phase angle control. To limit the in-rush current and possible current peaks, the demonstration board features a soft-start routine and a smooth power change function for the high power loads. The STEVAL-IHT005V1 can also control 4 low power loads up to 100 W, thanks to 3 ACS108-6S, 0.8 A 600 V overvoltage protected ACSTM devices and a Z0109, 1 A standard 4 quadrant 600 V Triac. The demonstration board passed the pre-compliance tests for EMC directives IEC 61000-4-4 (burst up to 8 kV) and IEC 61000-4-5 (surge up to 2 kV).

When put in standby mode, the STEVAL-IHT005V1 has an overall standby power consumption below 300 mW at 264 V / 50 Hz.

1 Circuit schematic

Figure 1. STEVAL-IHT005V1 demonstration board schematic diagram



2 Revision history

Table 1. Document revision history

Date	Revision	Changes
15-Dec-2010	1	Initial release.

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