

## 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



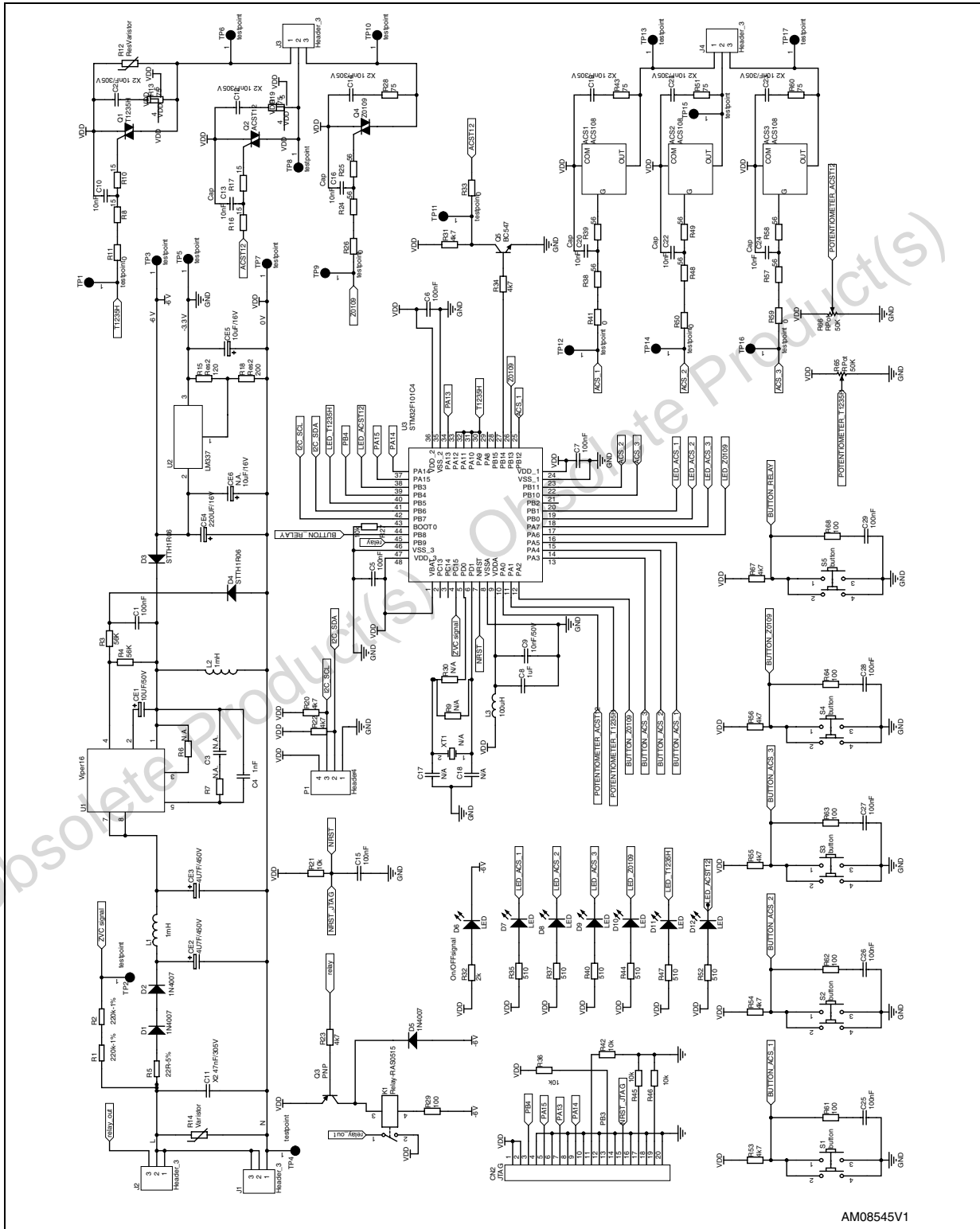
user-trimmable internal RC clock), featuring 16 kBytes of Flash memory, 12-bit A/D converter, 5 timers, communication interfaces, and 4 kBytes of SRAM.

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 ACSTM 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.

Obsolete Product(s) - Obsolete Product(s)

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2010 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)