



## STEVAL-ILL016V2

15 Watt regulated Triac-dimmable LED driver  
for the North American (115 V) market

Data brief

### Features

- Line voltage range: 96-132 V 60 Hz
- Drives strings of 4 to 12 jumper-selectable white LEDs connected in series
- Current: 1 A max (preset for 350 mA, as shipped)
- Undimmed power factor: > 0.9
- LED current ripple: < 20% P-P
- Isolated output for safe LED heatsinking
- RoHS compliant

### Description

The STEVAL-ILL016V2 15 watt regulated Triac-dimmable LED driver is an upgraded version of the STEVAL-ILL016V1. Its purpose is to make development for different LED combinations easier to implement, and to incorporate improvements based on lessons learned from the first version.

Improvements from the previous version include easy configuration of the LED voltage and current, flexible input filter layout, and sufficient space for easy modification of the basic circuitry.



# 1 Using the STEVAL-ILL016V2

The STEVAL-ILL016V2 is shipped without the jumpers that select transformer taps for specific numbers of LEDs in each parallel string. Please refer to the schematic diagram in [Figure 1](#), and place the jumpers in the appropriate positions.

The board operates with any number of LEDs with the capacitors supplied at C14 and C15. LED ripple current is higher for smaller numbers of LEDs.

The LED voltage limit for open-load protection can be set with R30, instead of R32. Refer to [Figure 1](#) for voltage divider details.

## 1.1 Operation

This unit is based on a PFC-flyback power converter. Design equations are provided in application note AN1059 (available on [www.st.com](http://www.st.com)). It is strongly recommended that this application note be studied prior to modifying the design.

There are two current limits, one from the isolated secondary (optically coupled) and one on the primary side.

The primary side limit responds to the line voltage, and should dominate with the line lower than 102-108 V. The current limit is set by the parallel combination of R25 and R26. Values of parts at R10 and divider R5, R6, R11 also affect the primary current. Refer to the L6562A datasheet, and application notes for the L6561 and L6562 for guidance on modifying the input side characteristics.

The secondary side limit responds to the average LED current. It should take over when the line voltage is above 102-108 V. LED current is set with the resistors at R31 (shipped with 0.47  $\Omega$  wire-wound, topside) and R35-R38 (unmounted 0805 SMT, bottomside). The schematic contains a formula for selecting resistor values and guidance for resistor selection.

In dimmed operation, the primary side current limit dominates – the secondary side limit is saturated, calling for full output. Current to the LEDs is limited by the dimmer Triac's conduction angle.

## 1.2 Additional capabilities

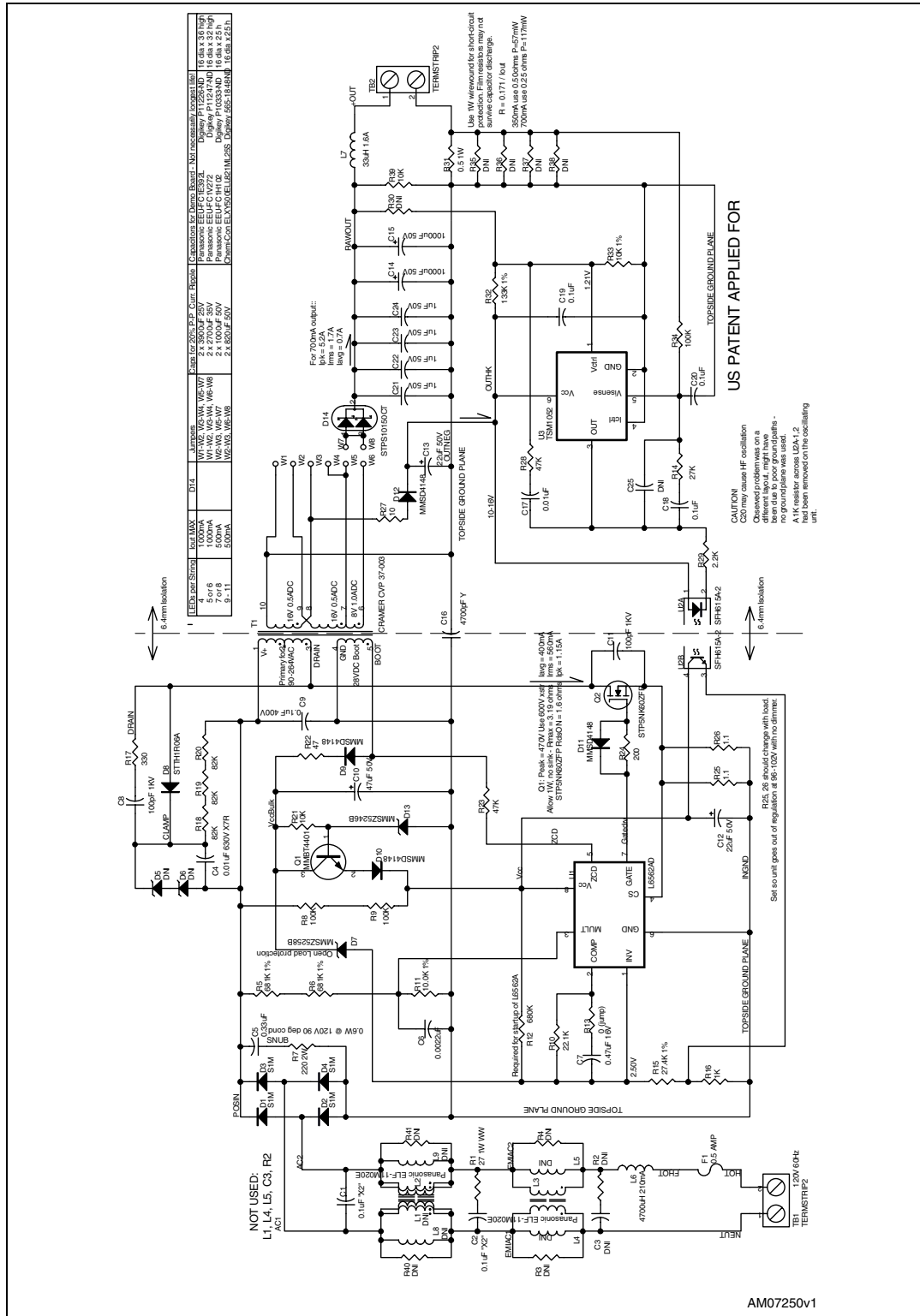
The demonstration board output can be extended to 30 watts, on the same PCB layout, with some component changes. Several flexible transformers and higher current input filters have been designed, and application guidance is available.

## 1.3 First sample run errata

If present, please remove the incorrect, unneeded components at locations D5 and D6. The RCD clamp consisting of D8, C4, and R18-20 perform their function. The schematic incorrectly shows a 133 kW resistor at R32. The sample has the correct value of 330 k $\Omega$

# 2 Schematic diagram

Figure 1. STEVAL-ILL016V2 circuit schematic



### 3 Revision history

**Table 1. Document revision history**

Date	Revision	Changes
16-Jun-2010	1	Initial release.

**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)