



EVL6699-150W-SR

12 V - 150 W resonant converter with synchronous rectification
based on the L6563H, L6699 and SRK2000

Data brief

Features

- Input mains range: 90 - 264 V_{AC} - frequency 45 - 65 Hz
- Output voltage: 12 V at 12.5 A continuous operation
- Mains harmonics: according to EN61000-3-2 Class-D or JEITA-MITI Class-D
- No load consumption: < 0.17 W at 230 V_{AC}
- Light load efficiency: according to ErP Lot 6 Tier 2 (> 50% @ 250 mW)
- Efficiency at nominal load: > 91% at 115 V_{AC}
- EMI: according to EN55022 Class-B
- Safety: according to EN60950
- Dimensions: 65 x 154 mm, 28 mm component maximum height
- PCB: double-side, 70 μm, FR-4, mixed PTH/SMT



1 Description

The EVL6699-150W-SR board is made up of two stages: a front-end PFC using the L6563H, an LLC resonant converter based on the L6699 and the SRK2000, controlling the SR MOSFETs on the secondary side. The SR driver and the rectifier MOSFETs are mounted on a daughterboard.

The L6563H is a current mode PFC controller operating in transition mode and implements a high voltage startup source to power on the converter.

The L6699 integrates all the functions necessary to properly control the resonant converter with a 50% fixed duty cycle and working with variable frequency.

The output rectification is managed by the SRK2000, an SR driver dedicated to LLC resonant topology.

The PFC stage works as pre-regulator and powers the resonant stage with a constant voltage of 400 V. The downstream converter operates only if the PFC is on and regulating. In this way, the resonant stage can be optimized for a narrow input voltage range.

The L6699's LINE pin (pin 7) is dedicated to this function. It is used to prevent the resonant converter from working with too low input voltage that can cause incorrect capacitive mode operation. If the bulk voltage (PFC output) is below 380 V, the resonant startup is not allowed. The L6699 LINE pin internal comparator has a hysteresis allowing the turn-on and turn-off voltage to be independently set. The turn-off threshold has been set to 300 V allowing the resonant stage to operate in the case of mains sag and consequent PFC output dip.

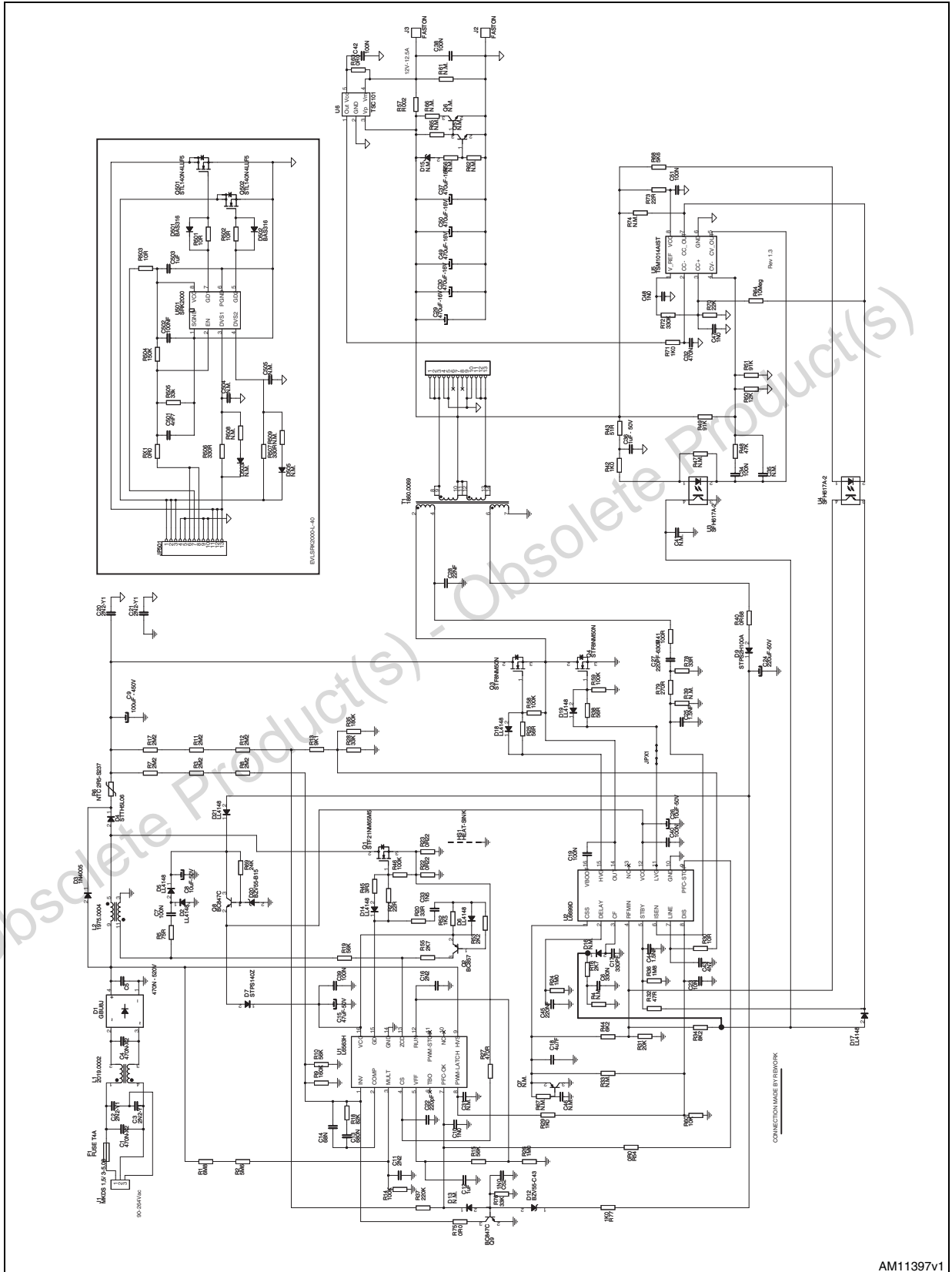
The transformer uses the integrated magnetic approach, incorporating the resonant series inductance. Therefore, no external, additional coil is needed for the resonance. The transformer configuration chosen for the secondary winding is centre tap.

On the secondary side, the SRK2000 core function switches on each synchronous rectifier MOSFET whenever the corresponding transformer half-winding starts conducting (i.e. when the MOSFET body diode starts conducting) and then switches it off when the flowing current approaches zero. For this purpose, the IC is provided with two pins (DVS1 and DVS2) sensing the MOSFETs drain voltage level.

The SRK2000 automatically detects light load operation and enters Sleep mode, disabling MOSFET driving and decreasing its own consumption. This function allows great power saving at light load with respect to benchmark SR solutions.

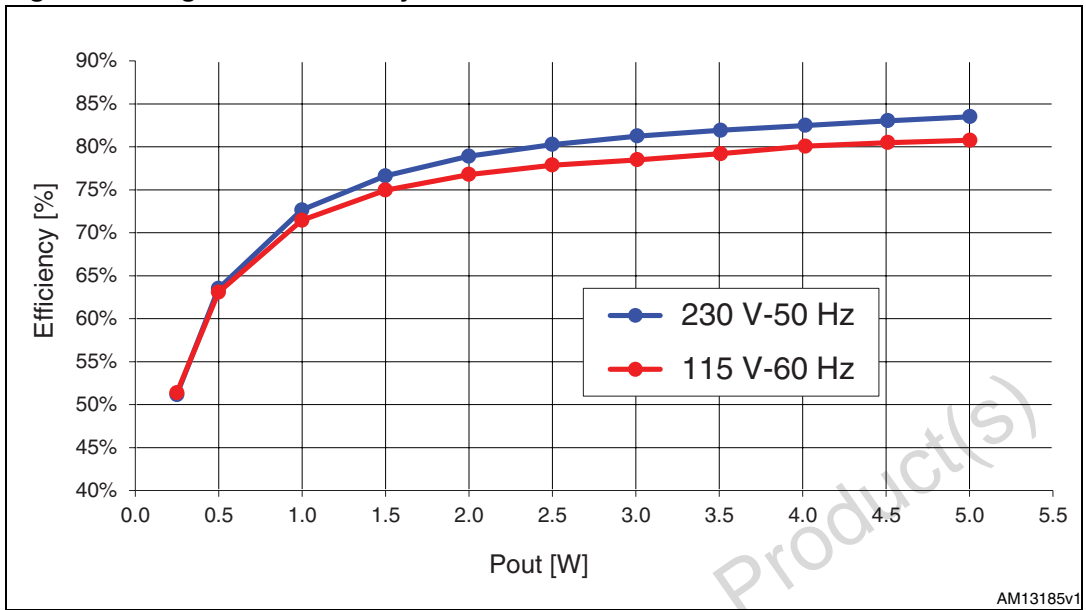
In order to decrease the output capacitor size, aluminium solid capacitors with very low ESR were preferred to standard electrolytic ones. Therefore, high frequency output voltage ripple is limited and output LC filter is not required. This choice allows the saving of output inductor power dissipation which can be significant in the case of high output current applications such as this.

Figure 1. EVL6699-150W-SR electrical diagram



AM11397v1

Figure 2. Light load efficiency measurements



Obsolete Product(s) - Obsolete Product(s)

2 Revision history

Table 1. Document revision history

Date	Revision	Changes
03-Jul-2012	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 TWO AUTHORIZED ST REPRESENTATIVES, 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.

© 2012 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