

## 7 W dual output offline flyback converter for home appliances using VIPer0P



### Features

- Zero-power input consumption ratified as per IEC62301 Clause 4.5 ( $P_{IN\_ZPM} < 5$  mW at 230 V<sub>AC</sub>)
- Negative output voltage easily set through the voltage divider
- Five-star energy efficiency when operating with no load ( $P_{IN\_no\_load} < 10$  mW at 230 V<sub>AC</sub>)
- Meets ErP Lot 6 Tier 2 requirements for household and office equipment
- Meets European regulation 1275/2008 regarding eco-design requirements for standby and off-mode electric power consumption for household and office equipment
- Compliant with the ErP Lot 6 Tier 2 requirements in off-mode
- Compliant with the 10% load efficiency and 4-point average active-mode efficiency targets prescribed by the European CoC ver. 5 Tier 2
- Meets IEC55022 Class B conducted EMI even with reduced EMI filter, thanks to the frequency jittering feature
- VIPer0P 800 V avalanche rugged technology and its embedded protections ensure enhanced system reliability
- RoHS compliant

### Description

The key feature of this offline converter is Zero-Power Mode (ZPM). It is an idle state during which the device is totally shut down and the residual consumption from the mains at 230 V<sub>AC</sub> is kept below 10 mW. The IC enters ZPM by pulling the OFF pin to SGND for more than 10 ms and exits ZPM (resuming normal switching) by pulling the ON pin to SGND for more than 20  $\mu$ s. This function can be tested by acting on the tactile switches connected to the ON and OFF pins.

The negative voltage setup is extremely simplified thanks to an embedded error amplifier, whose accurate 1.2 V internal reference (FB pin) is referred to a separate ground (EAGND pin) that can drift down to -12.5 V with respect to the signal ground of the IC (SGND). The negative output (OUT1) is obtained by just connecting EAGND to the negative rail and a voltage divider between FB, EAGND and SGND. The positive output (OUT2) is obtained from OUT1 through the turn ratio of the secondary windings of the transformer.

To achieve extremely low input power consumption, the IC is biased through a diode coming from the OUT2, which maintains the V<sub>CC</sub> voltage high enough (> 4.5 V) to prevent the activation of the internal HV current source.

#### Product summary table

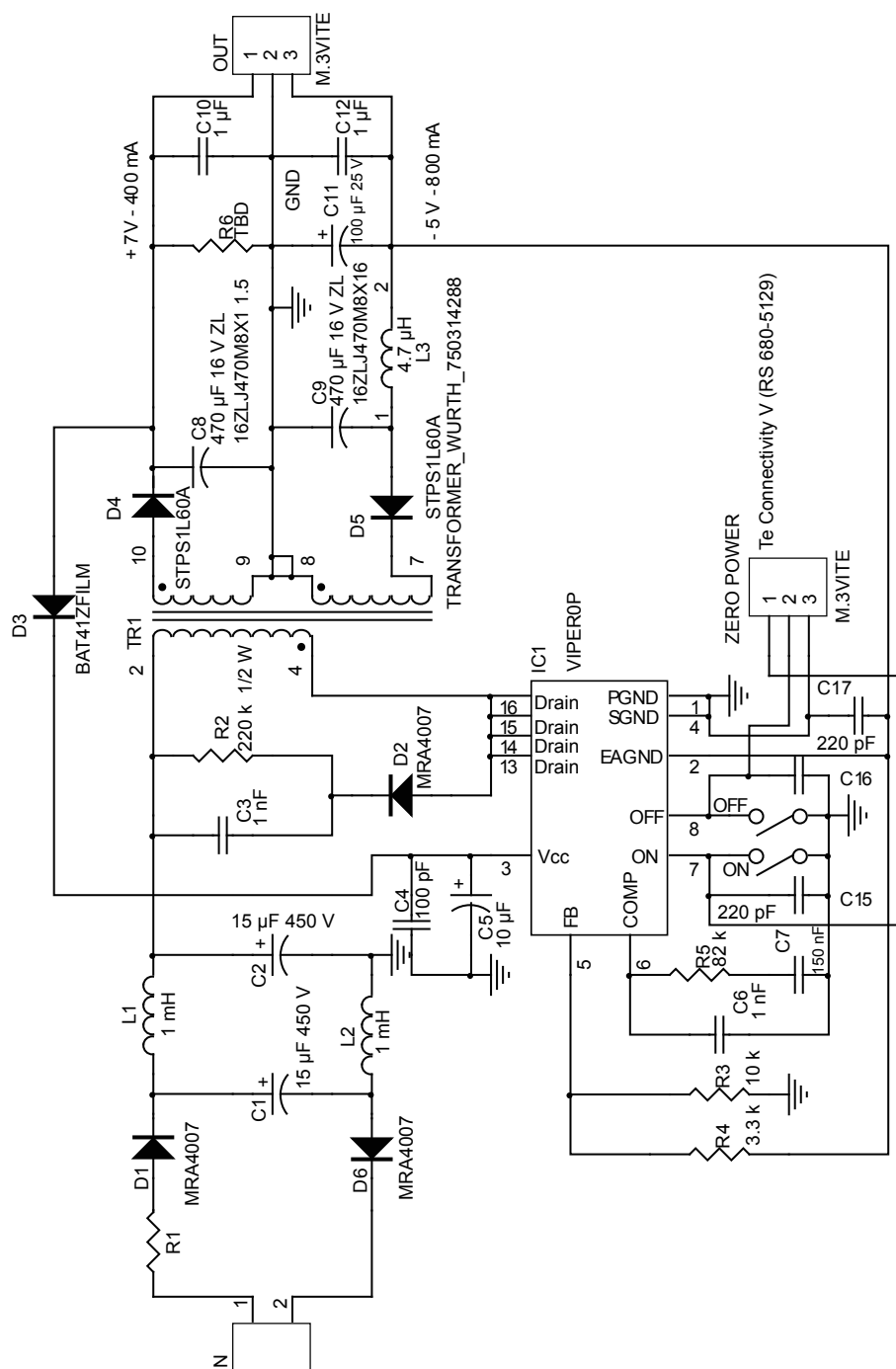
|                                                                             |                 |
|-----------------------------------------------------------------------------|-----------------|
| 7 W dual output offline flyback converter for home appliances using VIPer0P | STEVAL-ISA174V1 |
| VIPerPlus family: Zero-power off-line high voltage converter                | VIPer0P         |

## 1 Specifications

- Topology: Flyback
- Isolation: no
- Input power consumption:
  - Less than 5 mW at 230 V<sub>AC</sub> in Zero-Power Mode
  - Less than 10 mW at 230 V<sub>AC</sub> in no-load condition
  - Less than 400 mW at 230 V<sub>AC</sub> with 250 mW load
- Input Voltage: 85 - 265 V<sub>AC</sub>
- Output 1: -5 V , 840 mA
- Output 2: 7 V, 400 mA
- Frequency: 60 kHz with jittering ( $\pm 7\%$ )
- Max amb temp: 60 °C
- Automatic restart protections: OLP, VCC clamp, max duty cycle counter, thermal shutdown
- Pulse-skip protection to prevent the flux-runaway
- Dimensions: 69.6 mm x 28 mm

## 2 Schematic diagram

**Figure 1. STEVAL-ISA174V1 schematic diagram**



## Revision history

**Table 1. Document revision history**

| Date        | Version | Changes                                                             |
|-------------|---------|---------------------------------------------------------------------|
| 07-Aug-2015 | 1       | Initial release.                                                    |
| 10-Aug-2015 | 2       | Added: Section Specifications                                       |
| 20-Nov-2015 | 3       | Updated title on the cover page                                     |
| 22-Feb-2018 | 4       | Updated <a href="#">Figure 1. STEVAL-ISA174V1 schematic diagram</a> |

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