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STEVAL-POE005V1

Data brief

12V/8A, active clamp forward converter, Power Over Ethernet (PoE) IEEE 802.3bt compliant reference design



Features

- Features of the PM8805 PoE-PD interface:
  - System in package integrating a double active bridge, a hot-swap MOSFET and a PoE-PD
  - Supports legacy high power, 4-pair applications
  - 100 V N-ch MOSFETs with 0.2 Ω total path resistance for each active bridge
  - Identifies which kind of PSE (standard or legacy) is connected to, and provides successful IEEE802.3 af /at /bt classification indication as combination of the T0, T1 and T2 signals (open drain)
  - Smart operational mode selection through the STBY, FAUX and RAUX control signals
  - QFN 56 8x8mm package with 43 pins and 6 exposed pads
- Features of the PM8804 PWM controller:
  - PWM peak current mode controller
  - Input operating voltage up to 75 V
  - Internal high voltage start up regulator with 20 mA capability
  - Programmable fixed frequency up to 1 Mhz
  - Soft start up with adjustable time
  - Soft turn off (optionally disabled)
  - Dual 1 A_{PK}, low side complementary gate drivers
  - GATE2 optionally turned off for reduced consumption
  - 80% maximum duty cycle with internal slope compensation
  - QFN 16 3x3mm package with exposed pad

Product summary	
High power PoE PD, 12 V up to 8 A active clamp forward evaluation board	STEVAL-POE005V1
PWM peak current mode controller for PoE and telecom systems	PM8804
IEEE802.3bt PoE-PD interface with integrated dual-active bridge	PM8805

Description

This reference design represents a 12 V, 8 A converter solution ideal for various applications including building safety and security or surveillance, with a PoE-PD interface and a DC-DC active clamp forward converter.

The PoE-PD interface is based on the PM8805 system in package device with two active bridges and an IEEE 802.3bt compliant Powered Device (PD) interface. It can be used in all medium-to-high power 2P and 4P high efficiency PoE and PoE+ applications.

The DC-DC active clamp forward converter is designed around the PM8804 PWM controller, which is an integrated solution for smart and efficient 48 V converters, featuring a programmable oscillator for the switching frequency, adjustable slope compensation, dual complementary low-side drivers with programmable dead time, programmable soft start, soft turn off and a programmable current sense blanking time.

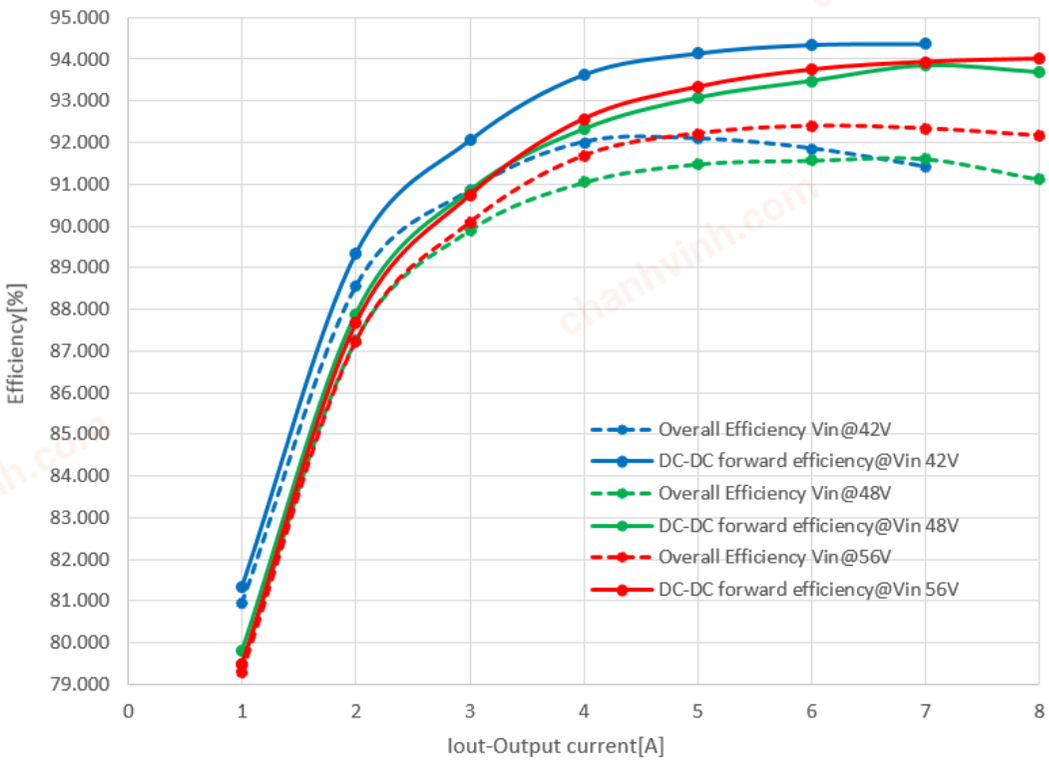
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1 Efficiency

The STEVAL-POE005V1 reference design consists of a PoE interface compliant with the IEEE 802.3bt standard and a forward active clamp DC-DC converter that receives DC voltage from the PoE interface.

The figure below shows the efficiency of a single forward converter and the overall efficiency including the PoE interface power losses.

Figure 1. STEVAL-POE005V1 overall and DC-DC forward efficiency



The dotted lines indicate the STEVAL-POE005V1 efficiency at different DC input voltages applied to RJ45 connector J1. The continuous line indicates the DC-DC forward efficiency, which does not include the following losses associated with the PoE interface section:

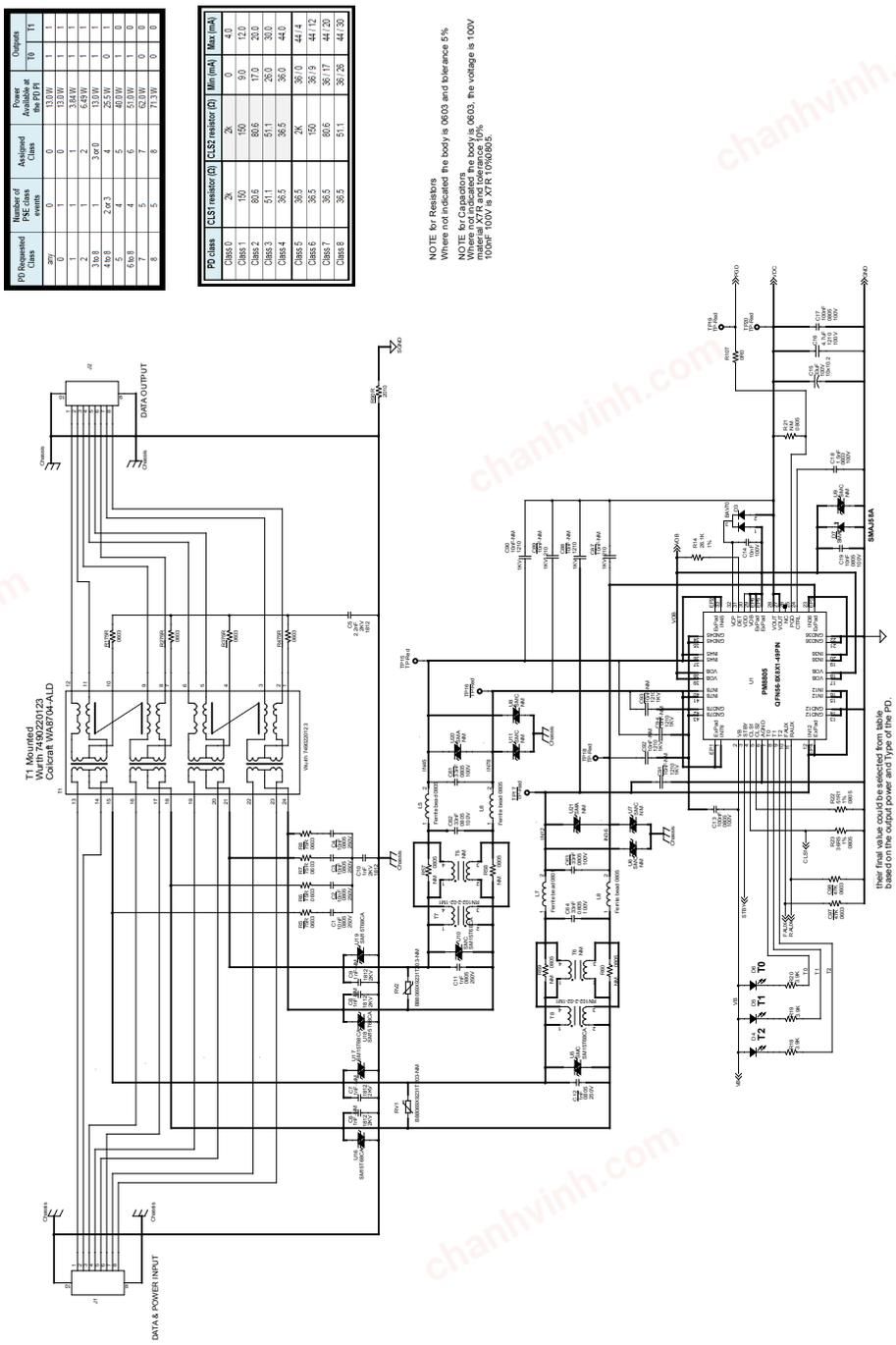
- RJ45 connector J1
- PoE data transformer T1
- common chokes T7 and T8 placed on the two power supply pairs
- PM8805 interface that integrates the dual power MOS bridges and a hot swap MOSFET
- Forward converter input filter

This efficiency is measured between output test points TP8/TP9 and input test points TP5/TP6 of the forward converter.

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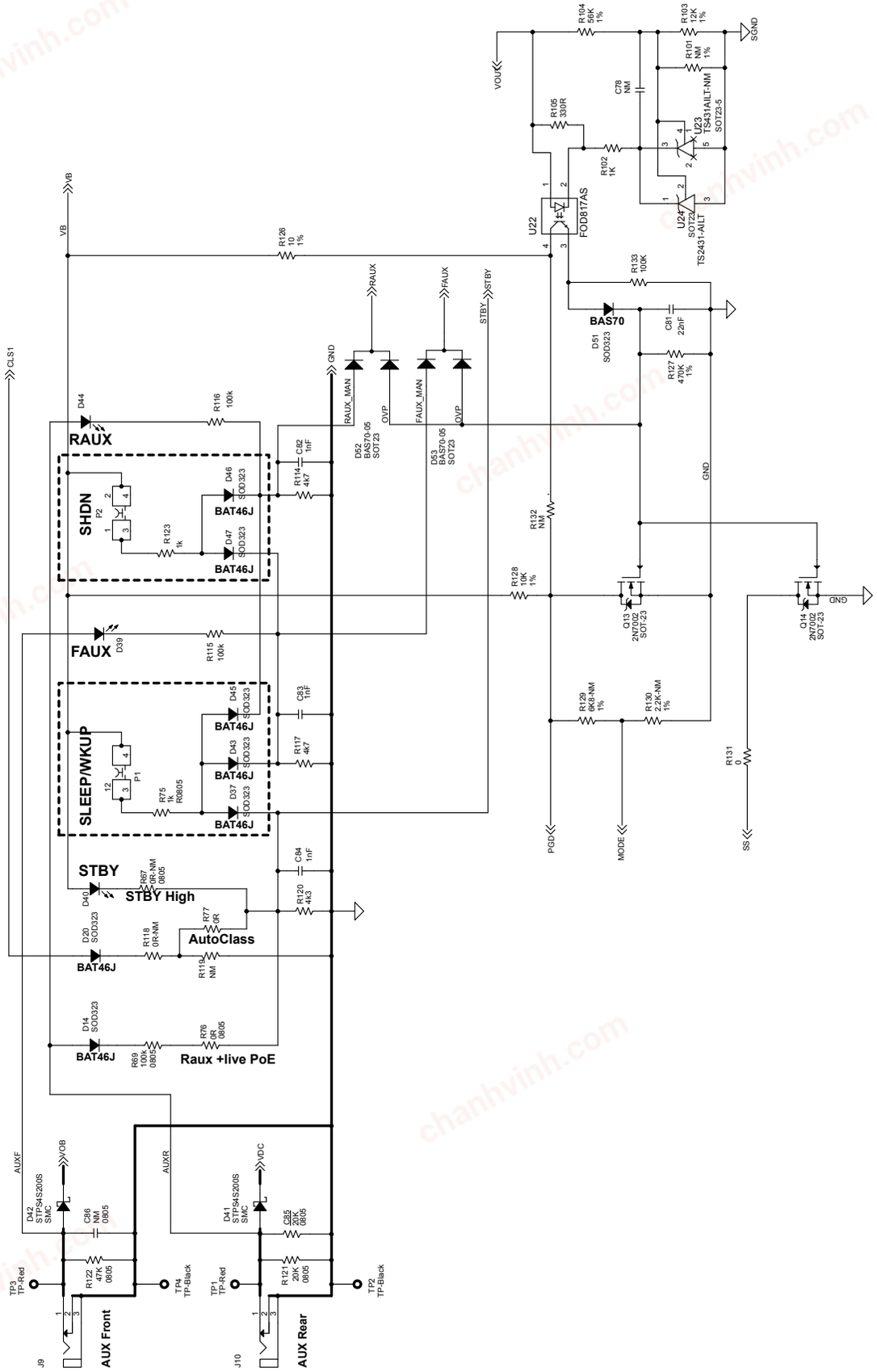
2 STEVAL-POE005V1 schematic diagrams

Figure 2. **STEVAL-POE005V1 circuit schematic (1 of 3)**



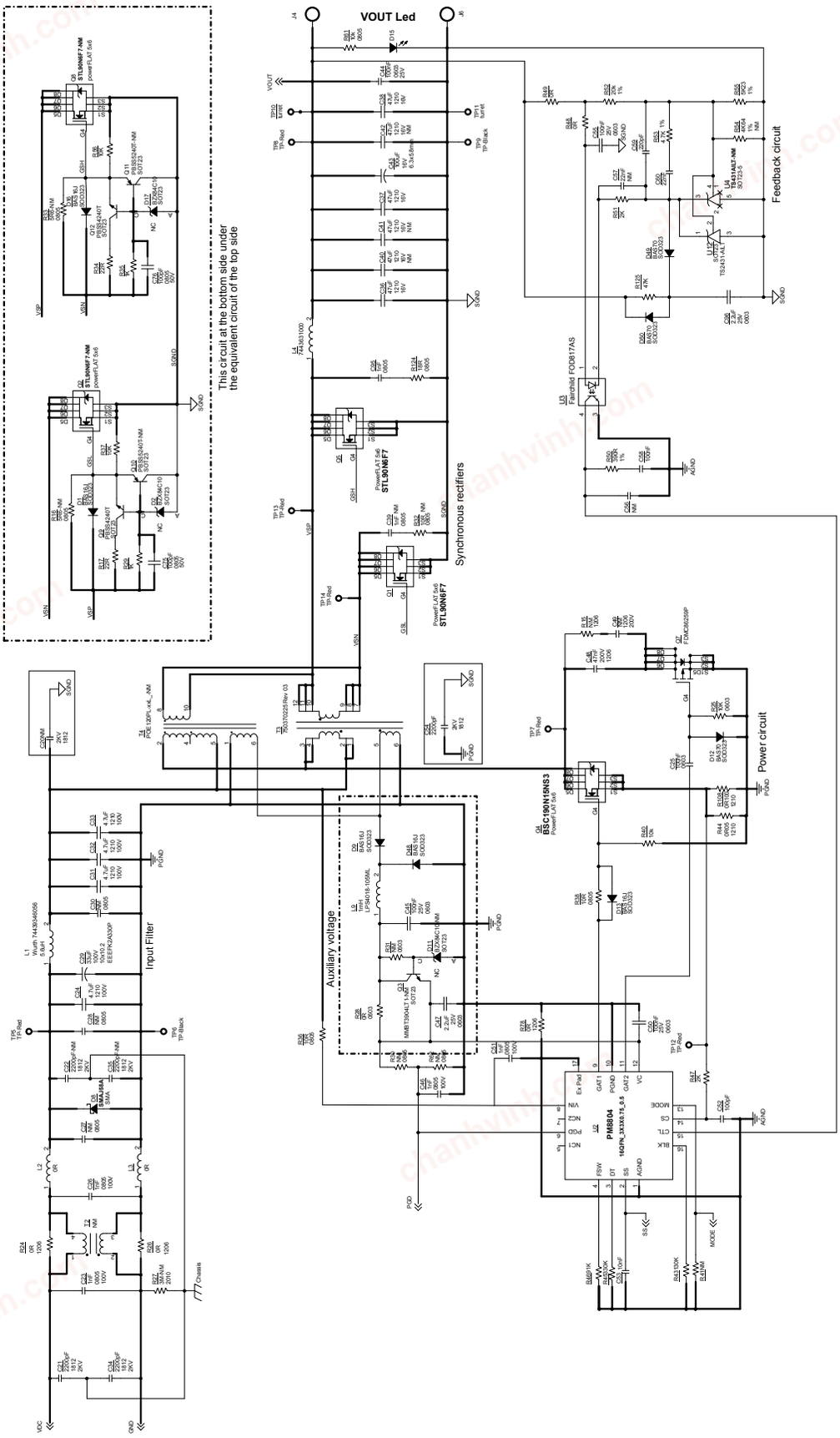
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Figure 3. **STEVAL-POE005V1 circuit schematic (2 of 3)**



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Figure 4. **STEVAL-POE005V1 circuit schematic (3 of 3)**



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Revision history

Table 1. **Document revision history**

Date	Version	Changes
05-Oct-2018	1	Initial release.
07-May-2019	2	Updated document title. Minor changes to cover page Features and Description.
14-Jun-2019	3	Updated cover page Features and Description.

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