

Power-PoE-1-1.2

**OEM power supply module with IEEE 802.3af Power-Over-Ethernet front end and DC/DC buck converter.**

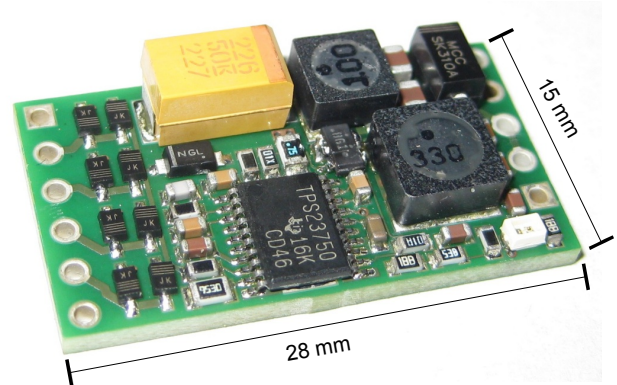
## AVAILABLE OPTIONS

Module Name	Voltage Regulator	Continuous Output Current	Output Voltage Options
power-PoE-1 V1.2	TPS23750 integrated 100-V IEEE 802.3af PD and DC/DC controller	500mA max.	5.0V 3.3V (optionally by adding a resistor)

## POWER-POE-1 MODUL DESCRIPTION

The Power-PoE-1 module (see picture right) includes a complete PoE front end as well as a non-isolated DC/DC buck switching voltage regulator. It provides a Class 1 power rating and can supply 500mA continuously at 5.0V output voltage. It has a tiny form factor of approx. 15mm x 28mm and was designed as an add-on board for the chip45.com embedded ethernet module CrumbX1-NET (<http://go.chip45.com/crumbx1-net-1.2>), but it can also be used stand alone in other applications.

The second picture right shows the Power-PoE-1 module stacked onto the CrumbX1-NET, thus providing one of the smallest PoE-powered embedded ethernet platform available.



## PD CONTROLLER

The PoE front end is included in the TPS23750 device (<http://www.ti.com/product/tps23750>). It has all necessary IEEE 802.3af functions including detection, classification, undervoltage lockout and inrush control. Also the PoE input switch is included in the TPS23750. The Power-PoE-1 module uses PD class 1 (0.44W – 3.84W).

## DC/DC BUCK VOLTAGE REGULATOR

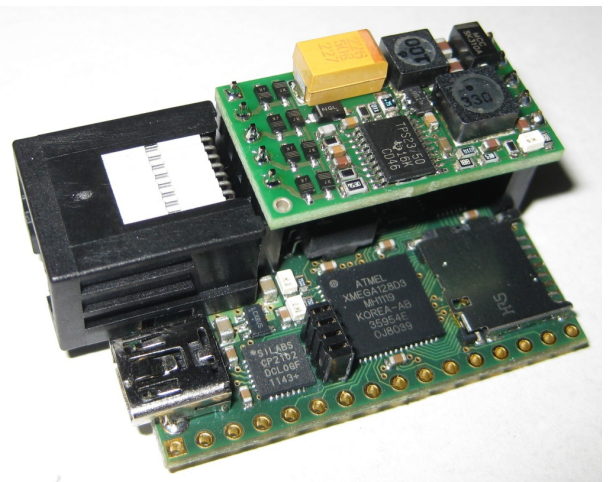
The DC/DC controller is also included in the TPS23750 device and provides programmable soft-start, hiccup type fault limiting, 50% maximum duty cycle, programmable constant switching frequency and a true voltage-output error amplifier. On the Power-PoE-1 module it is used in non-isolated buck configuration with a switching frequency of 250kHz.

## INPUT VOLTAGE

According to PoE standard the voltage can be supplied on either the unused cable pairs (which is mainly used by so-called PoE-injectors) or on the used ethernet RX+/- and TX+/- cable pairs and then extracted through the RX/TX center taps of the ethernet transformer (mainly used by PoE ethernet switches/hubs). The Power-PoE-1 module supports both methods.

Alternatively an auxiliary supply voltage can be connected between pins Vin and RTN (0V), in case non-PoE operation should be possible alternatively. This voltage has to be decoupled from the PoE voltage(s) with the Schottky diode D5 on the bottom of the module. A suitable diode is included with the module and can be soldered optionally. See the pictures under “pin configuration and optional parts locations” for position of the D5.

**Note: Please note, that RTN is kind of a “virtual ground” potential of the buck switching voltage regulator and is not connected – and must not be connected !!! – to GND of the output voltage!!! See the TPS23750 datasheet (<http://www.ti.com/lit/gpn/tps23750>) for details.**



## OUTPUT VOLTAGE

The output voltage is set to 5.0V fixed and is available on pins VCC and GND. By adding an optional 3.6kOhms resistor R11 on the bottom of the modul, the output voltage can be set to 3.3V. A suitable resistor is included with the module. See the pictures under “pin configuration and optional parts locations” for position of the R11. At high output currents the ripple of the output voltage might increase due to small output capacitors on the module.

If ripple voltage is too high for your application, you can add a 100 $\mu$ F (6.3V) tantalum output capacitor C12 on the bottom of the module to reduce ripple voltage. A suitable capacitor is included with the module. See the pictures under “pin configuration and optional parts locations” for position of the C12.

## OUTPUT CURRENT

The maximum continous output current is 500mA. At higher currents the DC/DC converter will turn off.

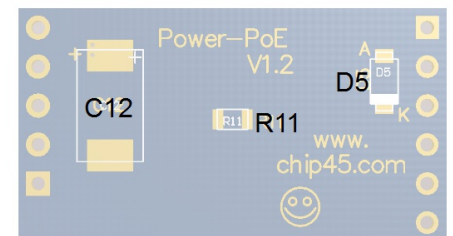
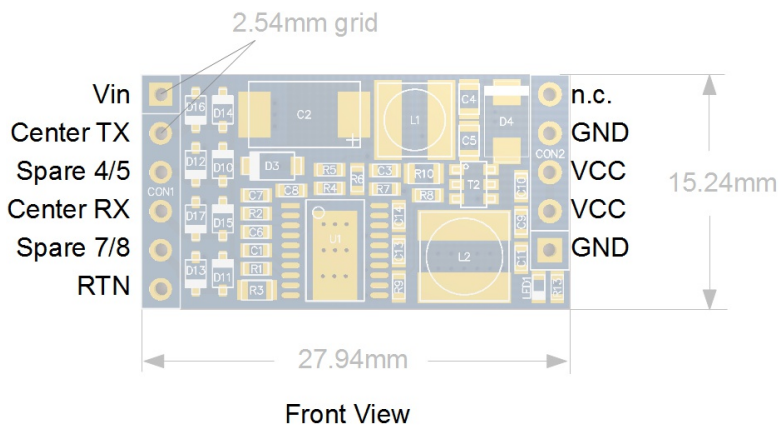
According to PoE standard PD class 1 (0.44W to 3.84W), the PoE supply has to be loaded with 0.44W minimum to avoid turn off of the PoE voltage. This leads to a a minimum output current of t.b.d at 5.0V output voltage.

If the Power-PoE-1 is stacked on the CrumbX1-NET module, you don't have to care about minimum load, since the module draws enough current.

## STATUS LED

A green status LED is located near the voltage ouput pins and indicates, that the DC/DC buck regulator is working and output voltage is present.

## PIN CONFIGURATION AND OPTIONAL PARTS LOCATIONS



## DESIGN AND HANDLING GUIDELINES

This module – just like any other semiconductor devices – is susceptible to damage by ESD. Suitable precautions should be taken when handling and transporting devices. The possible damage to devices depends on the circumstances of the handling and transporting, and the nature of the device. The extent of damage can vary from immediate functional or parametric malfunction to degradation of function or performance in use over time. Devices suspected of being affected should be replaced.

## OPERATING CHARACTERISTICS

Symbol	Parameter	Condition	Min	Typ	Max	Units
UVLO	Under Voltage Lockout	standard	30.5		39.3	V
Vcc	Supply Voltage	through PoE	36 (42)		67	V
		aux Vin		t.b.d.		V
Icc	Power Supply Current	classification	26		30	mA
		inrush current limit	100		180	mA
T	Operating Temperature (industrial temperature range on request)		-20		+70	°C

## SCOPE OF DELIVERY

This module is being shipped without pin headers (THT components) preinstalled. A Connector Kit with standard pin headers and receptacles can be ordered optionally.

## Declaration of Electro Magnetic Conformity of the CHIP45 „Power-PoE-1 V1.2“



CHIP45 embedded microcontroller modules (henceforce products) are designed for installation in electrical appliances or as dedicated evaluation boards (i.e.: for use as a test and prototype platform for hardware/software development) in laboratory environments.

### Caution:

CHIP45 products lacking protective enclosures are subject to damage by ESD and, hence, may only be unpacked, handled or operated in environments in which sufficient precautionary measures have been taken in respect to ESD-dangers. It is also necessary that only appropriately trained personnel (such as electricians, technicians and engineers) handle and/or operate these products. Moreover, CHIP45 products should not be operated without protection circuitry if connections to the product's pin header rows are longer than 3m.

CHIP45 products fulfill the norms of European Union's Directive for Electro Magnetic Conformity only in accordance to the descriptions and rules of usage indicated in this document (particularly in respect to the pin header row connectors, power connector and serial interface to a host-PC).

Implementation of CHIP45 products into target devices, as well as user modifications and extensions of CHIP45 products, is subject to renewed establishment of conformity to, and certification of, Electro Magnetic Directives. Users should ensure conformance following any modifications to the products as well as implementation of the products into target systems

## DISCLAIMER

In this manual are descriptions for copyrighted products that are not explicitly indicated as such. The absence of the trademark (™) and copyright (©) symbols does not imply that a product is not protected. Additionally, registered patents and trademarks are similarly not expressly indicated in this manual.

The information in this document has been carefully checked and is believed to be entirely reliable. However, chip45 GmbH & Co. KG assumes no responsibility for any inaccuracies. chip45 GmbH & Co. KG neither gives any guarantee nor accepts any liability whatsoever for consequential damages resulting from the use of this manual or its associated product. chip45 GmbH & Co. KG reserves the right to alter the information contained herein without prior notification and accepts no responsibility for any damages which might result.

Additionally, chip45 GmbH & Co. KG offers no guarantee nor accepts any liability for damages arising from the improper usage or improper installation of the hardware or software. chip45 GmbH & Co. KG further reserves the right to alter the layout and/or design of the hardware without prior notification and accepts no liability for doing so.

© Copyright 2010 chip45 GmbH & Co. KG, D-35440 Linden.

Rights - including those of translation, reprint, broadcast, photomechanical or similar reproduction and storage or processing in computer systems, in whole or in part - are reserved. No reproduction may occur without the express written consent from chip45 GmbH & Co. KG.

## CONTACT INFORMATION

Address:	chip45 GmbH & Co. KG Am Pfad 8 D-35440 Linden Germany
Ordering Information:	+49 (6403) 9299-406 <a href="mailto:info@chip45.com">info@chip45.com</a>
Technical Support:	+49 (6403) 9299-406 <a href="mailto:support@chip45.com">support@chip45.com</a>
Fax:	+49 (6403) 9253-50
Web Site:	<a href="http://www.chip45.com">http://www.chip45.com</a>