Industrial-grade 60W+ PoE Splitter module v.3: PD. PoE

by ProtoDevs® GmbH

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PD.PoE module description

PoE_v3 module is an Ethernet PoE splitter for 10/100/1000Mbps LAN networks which supports such standards as IEEE 802.3bt with PoE high-power PD interface with automatic MPS & auto class recognition and have 2x (double) DC voltages outputs: **12V** + **5.1V** at the same time.

This is convenient solution for any type of PoE powering with a speed up to 1 Gbps and a need of having two output voltages simultaneously. For example, **Raspberry Pi 4** or **Raspberry Pi 5** will work without any problem having 5.1V @ 3A as a power input, 12V could be used to control **motors** from that Raspberry PCB.

Module supports **9V to 75V** PoE wide input voltage range together with power Levels for up **Type-3 60W** Operation, power modes higher than 25W must be implemented together with appropriate cooling solutions / additional heatsink.

The Automatic MPS function of the module enables applications requiring very low power standby modes. The PoE_v3 module automatically generates the necessary pulsed current to maintain the PSE power.

The PoE_v3 module also implements a delay function to allow the remote PSE to complete its inrush phase before releasing the Power Good (PG) output. This ensures that the **IEEE802.3bt** (draft) startup requirements are met. The Auto class enable input also allows advanced system power optimization modes compliant with IEEE802.3bt (draft) standard.

There are several PD.PoE module variants available:

PDCharger v.3 : up to 60W , two outputs : **12V** (5A max) and **5V** (3A max)
PDCharger v.3.1 : up to 60W , two outputs : **12V** (5A max) and **3.3V** (4A max)

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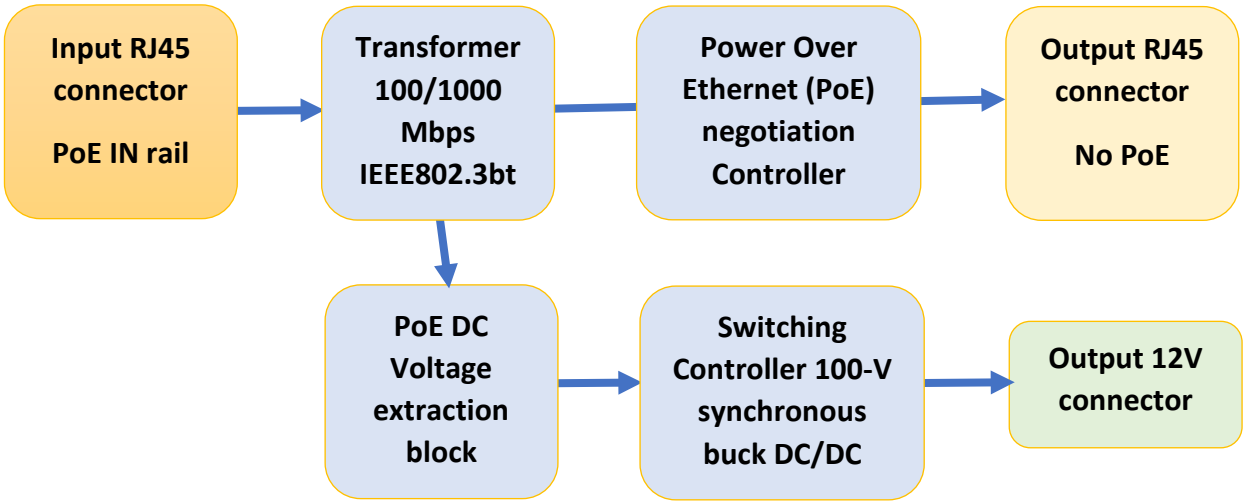
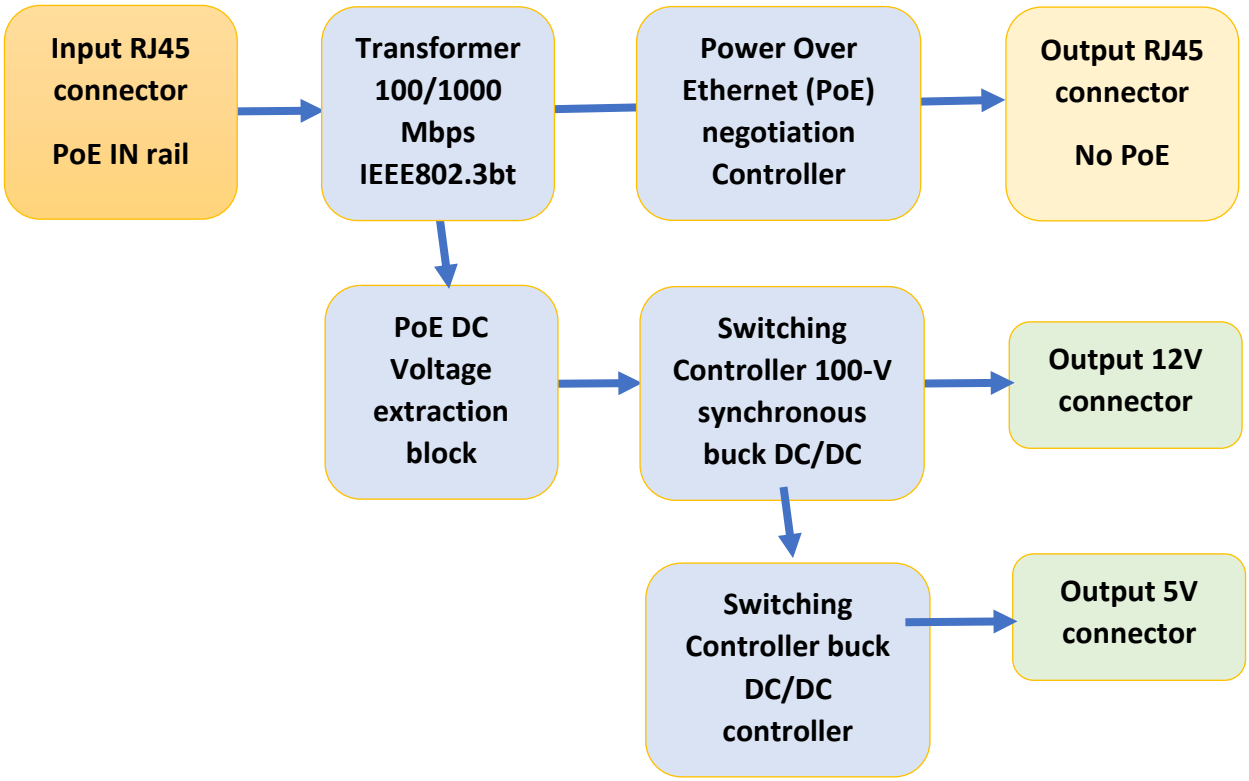
Simplified block diagram

(For PD.PoE v.1.2 and v.1.3)

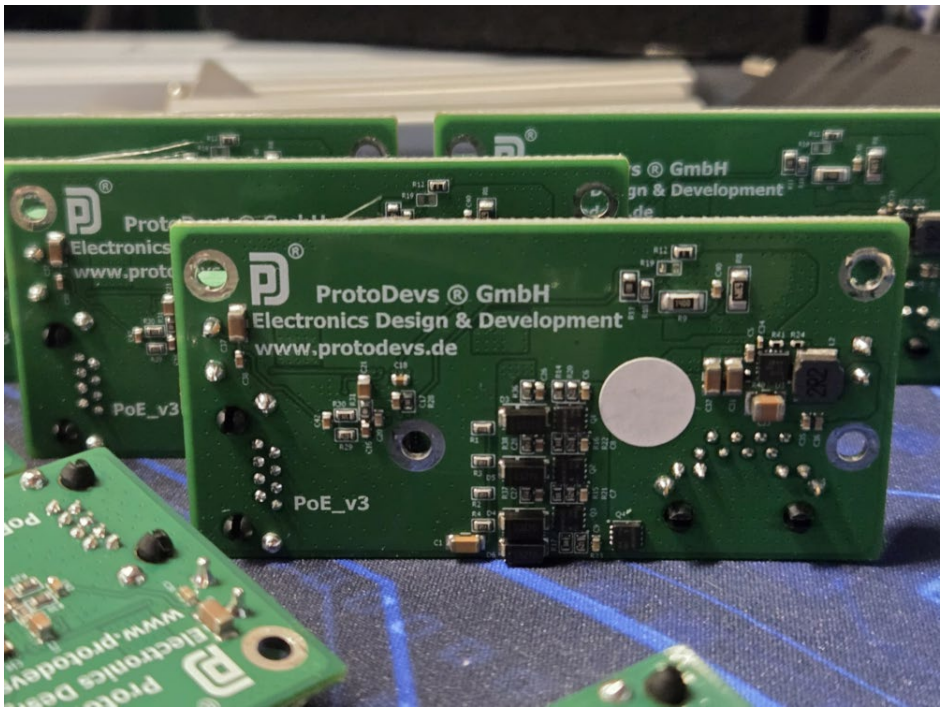


(For **PD.PoE v.3**)



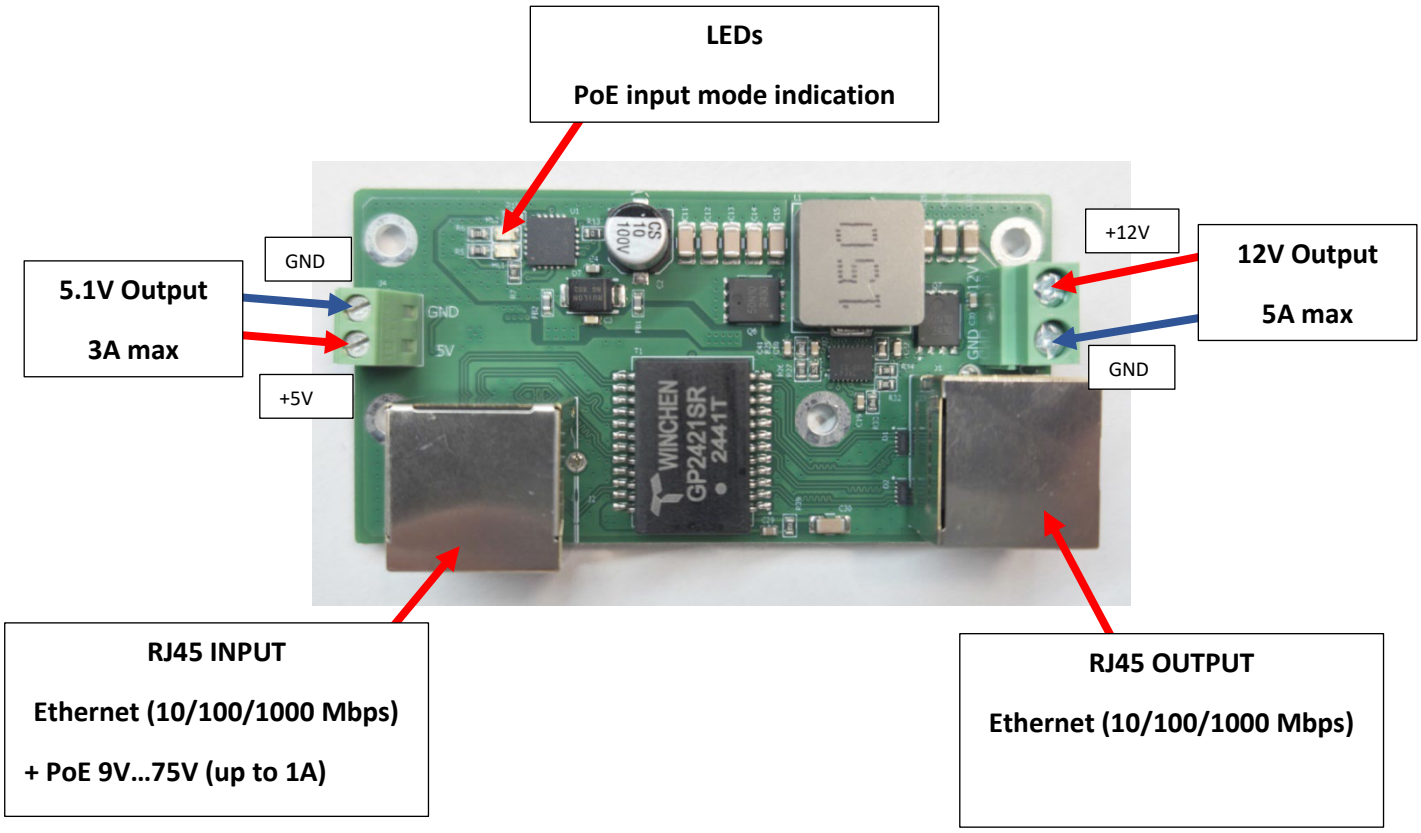
Operational conditions

Operational temperature:	-40 … 85 C
Storage temperature:	-55 to 150 C
Input voltages range (J2 connector) :	9V to 75V PoE wide input voltage range
ESD rating:	Charged device model (CDM), per JEDEC specification JESD22-C101, all V pins: +-250V
Max output current supported:	7A@**12V** for v.1.2 7A@**12V** for v.1.3 5A@**12V** + 3A@5**.1V** for **v.3**
Mass:	31 grams for v.1.2 33 grams for v.1.3 32 grams for v.3
Communication speed (Ethernet):	up to 1 Gigabit per second (1 Gbps) 10/100/1000 Mbps supported



Connection diagram

(For PD.PoE v3)



Part numbers of the connectors

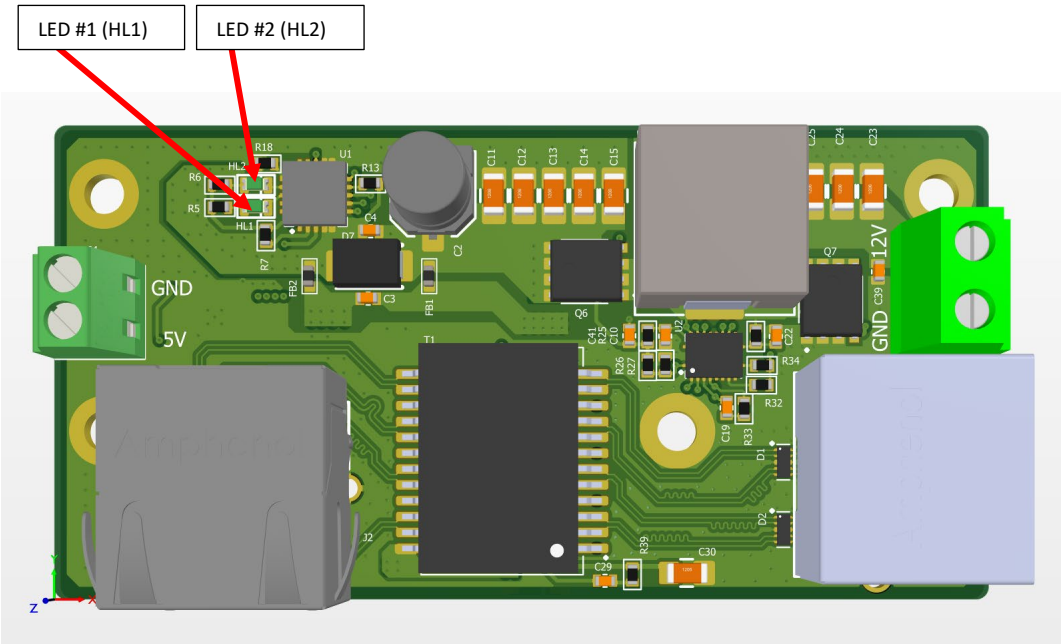
PD.PoE splitter v.3 module has the next connectors:

1) RJ45 input (+PoE) : HC-RJ45-056A-1-2
2) RJ45 output : XDRJ-5605-026
3) 12V output : WJ126V-5.0-2P
4) 5.1V output : 1751248

LED PoE codes description

There are 2x LEDs on the PCB indicating the PoE modes

Power Demotion class	LED#1 state	LED#2 state	Allocated Power
4-8 (PSE type 1-4)	OFF	OFF	3W .. 12.95W
5-8 (PSE type 3-4)	OFF	ON	14W … 40W
5-8 (PSE type 3-4)	ON	OFF	51W .. 62W
7-8 (PSE type 4)	ON	ON	63W .. 90W



General specifications

PD.PoE v3 module has the next blocks:

1) A switching controller 100-V with synchronous buck DC/DC controller with wide duty-cycle range -40 to 150 C. Functional Safety-Capable – Documentation available to aid functional safety system design

2) 12V Versatile synchronous buck DC/DC controller – Wide input voltage range of 5.5 V to 100 V – 150°C maximum junction temperature – 0.8-V reference with ±1% feedback accuracy – Adjustable output voltage from 0.8 V to 60 V – 40-ns tON(min) for high VIN / VOUT ratio – 140-ns tOFF(min) for low dropout – Lossless RDS(on) or shunt current sensing – Optimized for CISPR 11 and CISPR 32 Class B EMI requirements • Switching frequency from 100 kHz to 1 MHz – SYNC in and SYNC out capability – Selectable diode emulation or FPWM • 7.5-V gate drivers for standard VTH MOSFETs – 14-ns adaptive dead-time control – 2.3-A source and 3.5-A sink capability • Fast line and load transient response – Voltage-mode control with line feedforward – High gain-bandwidth error amplifier • Inherent protection features for robust design – Adjustable output voltage soft start – Hiccup-mode overcurrent protection – Input UVLO with hysteresis – VCC and gate-drive UVLO protection – Precision enable input and open-drain PGOOD indicator for sequencing and control – Thermal shutdown protection with hysteresis

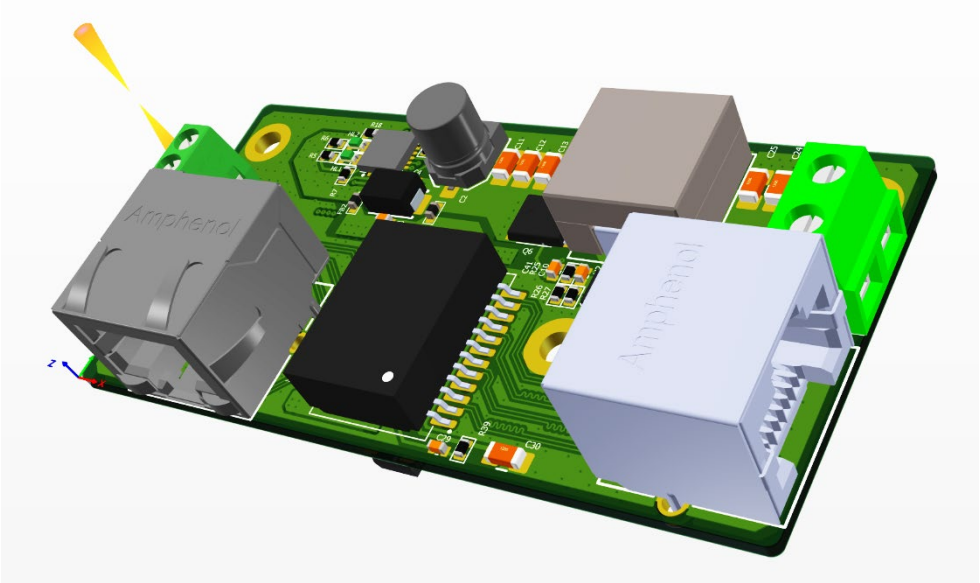
3) Power Over Ethernet (PoE) Controller ROHS range -40 to 125 C Features 1• IEEE 802.3bt (Draft) PD Solution for Type 3 or Type 4 PoE • Supports Power Levels for Type-4 90-W and Type-3 60-W Operation • Robust 100 V Hotswap MOSFETs • Allocated Power Indicator Outputs • PG Output with Inrush Completion Delay – Compliant to PSE Inrush • Automatic Maintain Power Signature (MPS) – Auto-adjust MPS for Type 1-2 or 3-4 PSE – Supports Ultra-Low Power Standby Modes • Supports Autoclass Operation • Supports PoE++ PSE

4) 5V synchronous step down DC-DC converters optimized for applications with high power density. Features : DCS-Control™ topology ,Input voltage range: 3 V to 17 V, Up to 3-A output current, Adjustable output voltage from 0.9 V to 6 V, Pin-selectable output voltage (nominal, + 5%), Programmable soft start and tracking, Seamless power save mode transition, Quiescent current of 17 µA (typical), Short circuit protection, Overtemperature protection.

5) SMD Pulse Transformer (LAN) IEEE802.3bt ROHS range -40 to 85 C

Mechanical dimensions (PD.PoE module)

(For PD.PoE v.3)



Module dimensions: 75mm x 35mm x 18mm (max)

3D CAD STEP file for the PD.PoE module v.3 could be downloaded from here : [LINK]

Features summary

Module features:

- Double output voltages: **12V** + **5.1V**
- PG Output with Inrush Completion Delay
- Compliant to PSE Inrush
- Automatic Maintain Power Signature (MPS)
- Auto-adjust MPS for Type 1-2 or 3-4 PSE
- Supports Ultra-Low Power Standby Modes
- Supports Autoclass Operation
- Supports PoE++ PSE

PoE specification details:

- PoE standards supported: IEEE 802.3bt /.3at /3.af or passive
- Input voltages range: **9V**-**75V** DC (special input switching controller installed)
- **Double** output voltage: **12V** DC + **5.1V** DC
- Custom voltage configurations are possible (MOQ 30pcs) with the next output voltages: 3V3, 5V, 9V, 12V, 24V, 48V

