



PM8800

Integrated IEEE 802.3af compliant PoE-PD interface and PWM controller with support of external source

Preliminary Data

Features

- IEEE 802.3af compliant PD Interface
- Works with power supplied from Ethernet LAN cables or from local auxiliary sources
- Integrated 100V, 0.5Ω, 800mA Hot-Swap MOSFET
- Integrated signature resistor
- Programmable in-rush current limit
- Programmable classification current
- Programmable DC current limit up to 800 mA
- High voltage start-up bias regulator
- Thermal Shutdown protection
- Current mode pulse width modulator
- Programmable Oscillator Frequency
- Programmable Soft-start
- Power Good Indication
- 80% maximum duty cycle with internal slope compensation
- Supports both Isolated and Non-Isolated Applications.

Applications

- VoIP phones, WLAN access points
- Security cameras
- PoE Powered Device Appliances
- High power (>12.95W) powered devices



Description

The PM8800 integrates a standard Power over Ethernet (PoE) interface and a current mode PWM controller to simplify the design of the power supply sections of all Powered Devices.

The PoE interface incorporates all the functions required by the IEEE 802.3af including detection, classification, under-voltage lockout (UVLO) and in-rush current limitation.

PM8800 specifically targets PD with extended power requirement with respect to the limit imposed by the 802.3af standard, embedding a hot-swap MOSFET capable of sustaining twice the current of the 802.3af standard with a programmable DC current limit

The integrated switching regulator of the PM8800 has been designed to work with power either from the Ethernet cable connection or from an external power source such as AC adapter.

The DC/DC section of the PM8800 features a programmable oscillator frequency, soft-start, slope compensation and embeds a voltage output error amplifier allowing use in both isolated and non isolated configuration.

Table 1. Device summary

Order codes	Max duty	Package	Packaging
PM8800A	80%	HTSSOP16	Tube
PM8800A			Tape and reel

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1 Typical application circuit and block diagram

1.1 Application circuits

Figure 1. Simplified application schematic for powered device using PM8800 in isolated configuration

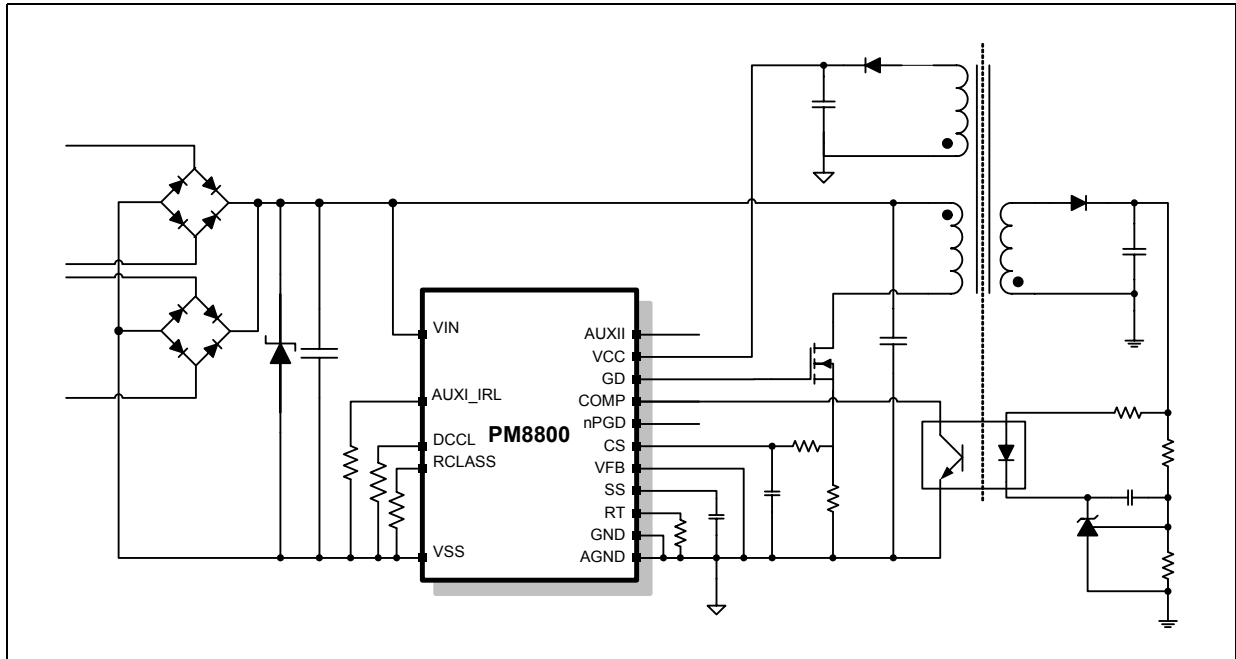
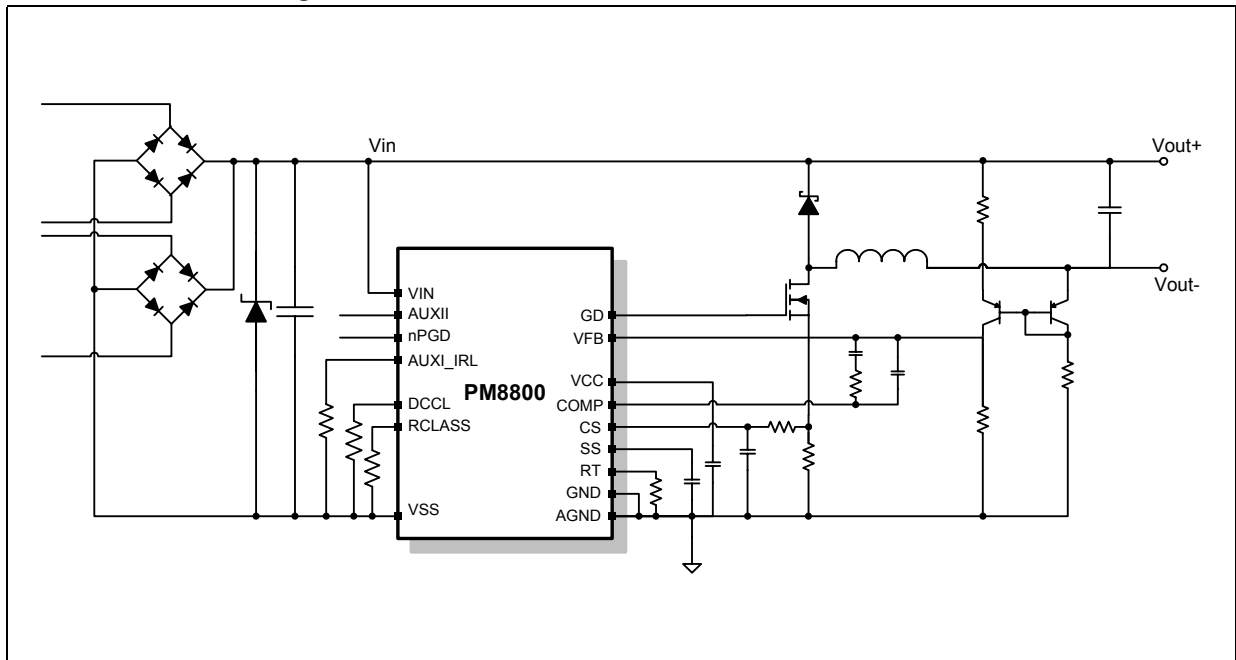
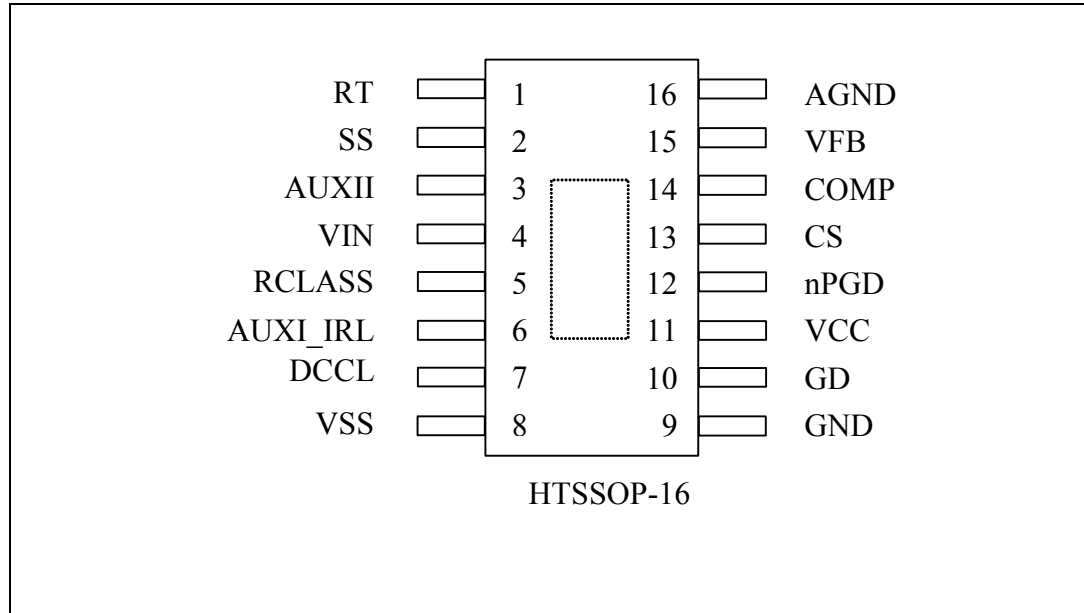


Figure 2. Simplified application schematic for Powered Device using PM8800 in non-isolated buck configuration



2 Pins description and connection diagrams

Figure 3. Pins connection (top view)



2.1 Pin descriptions

Table 1. Pin description

Pin n	Name	Function
1	RT/SYNC	Oscillator timing resistor pin and synchronization input. An external resistor connected from RT to AGND sets the oscillator frequency. This pin will also accept narrow ac-coupled synchronization pulses from an external clock.
2	SS	Soft-start input. An external capacitor and an internal 10uA current source set the soft-start ramp rate.
3	AUXII	Auxiliary source enable pin Use this pin to power up the DC/DC section only from the external source. The auxiliary source can prevail over the PoE source depending on the value of the resistor between this pin and the external source.
4	VIN	System high potential input. The diode "OR" of PoE line and auxiliary sources connected to the PD, it is the most positive input potential.
5	RCLASS	Classification resistor pin. Connect a classification programming resistor between this pin and VSS.

Table 1. Pin description (continued)

Pin n	Name	Function
6	AUXI_IRL	In-rush current limit and auxiliary source enable pin. Pulling up this pin to the auxiliary source will change the internal UVLO settings and allow PD to be powered with voltage lower than nominal PoE voltages. In this condition inrush current limit is set to default values. A resistance between this pin and VSS will set the level of inrush current limit.
7	DCCL	DC Current Limit. A resistor between DCCL and VSS will set the current limit for the interface section of the PM8800. It can be set to exceed the IEEE802.3af current limit . Leave the pin open for standard IEEE 802.3af applications
8	VSS	System low potential input.
9	GND	System return for the PWM converter. It is the drain of the internal hot-swap power MOSFET.
10	GD	Output of the PWM controller. External power MOSFET gate driver output
11	VCC	Output of the internal high voltage regulator. When the auxiliary transformer winding (if used) raises the voltage on this pin above the regulation set point, the internal regulator will be shutdown, reducing the controller power dissipation
12	nPGD	PowerGood, active low A high to low transition indicates that handshake with the PSE has been successfully terminated and the SMPS portion of the PM8800 can be activated
13	CS	Current sense input. Current sense input for current mode control and over-current protection. Current limiting is obtained with a dedicated current sense comparator. If the CS pin voltage exceeds 0.5V the GD pin switches low for cycle-by-cycle current limiting. Leading edge blanking is implemented to mask current spikes.
14	COMP	The output of the error amplifier and input of the Pulse Width Modulator. COMP pull-up is provided by an internal 2.5kΩ resistor which may be used to bias an opto-coupler transistor.
15	VFB	Feedback signal. Inverting input of the internal error amplifier. The non-inverting input is internally connected to a 1.25V reference.
16	AGND	Analog PWM supply return. GND for sensitive analog circuitry including the SMPS current limit circuitry. Must be connected to GND to improve noise immunity.
	EP	Exposed Pad. Connect this to a board plane to improve heat dissipation; must be electrically connected to VSS

3 Device description and operation

The PM8800 is a monolithic device embedding an IEEE 802.3af compliant PD interface together with a current mode pulse width modulator to be used in all Power over Ethernet Powered Devices.

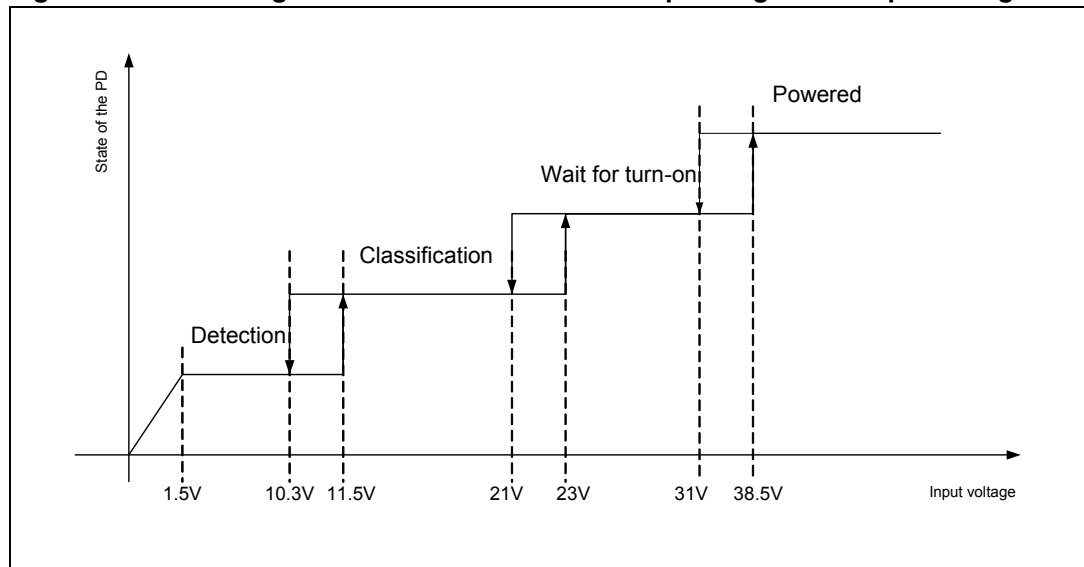
In addition to the standard .3af features, PM8800 anticipates some features of the forthcoming .3at standard, specifically targeting appliances or systems requiring higher power with respect to the 12.95W allowed by standard PSE.

The PD interface integrates the 24.5kΩ signature resistor used in detection and disabled during the rest of operating modes. Classification is done through an external resistor detached when classification is over, in order to save power.

The PM8800 integrates standard compliant UVLO thresholds to determine normal operating mode (UVLO rising) or recognize disconnection (UVLO falling).

A graphical representation of the voltage thresholds and hysteresis during all the operating phases is depicted in the following figure:

Figure 4. State diagram of the PM800 interface depending on the input voltage



Note: For input voltages in the range 1.5 to 11.5V, PM8800 exposes a 24.5kΩ resistance. After detection is over, the internal resistor is disabled and the external classification resistor is presented. When classification is over, the external resistor is disconnected and the PM8800 wait for the input voltage to overpass the UVLO voltage.

The hot-swap MOSFET is specifically designed to have a low RDSON to contain the conduction losses and sustain up to 800mA. A constant dissipated power method is used to limit the current in the in-rush phase. The integrated in-rush current limit controls in a safe manner the current flowing through the MOSFET, shortening the duration of the hot-swap event itself. Designers have the possibility to further limit the current in the in-rush by acting on the proper programming resistor.

Designers have the possibility to set the limit of the current through the interface during normal operation. For non standard application, this limit exceeds the 350mA foreseen by the 802.3af and can reach up to 800mA.

PM8800 can work with power either from PoE networks or from auxiliary sources - like AC adapters -. Alternative sources are present in PoE appliances where devices can work also outside the context of the PoE networks or to ensure normal operation even if PoE becomes unavailable. PM8800 limits the number of external components to handle the coexistence of both PoE and auxiliary supplies.

External sources can be connected so to exploit the in-rush current limitation provided by the MOSFET or enabling the PWM section, bypassing the interface section.

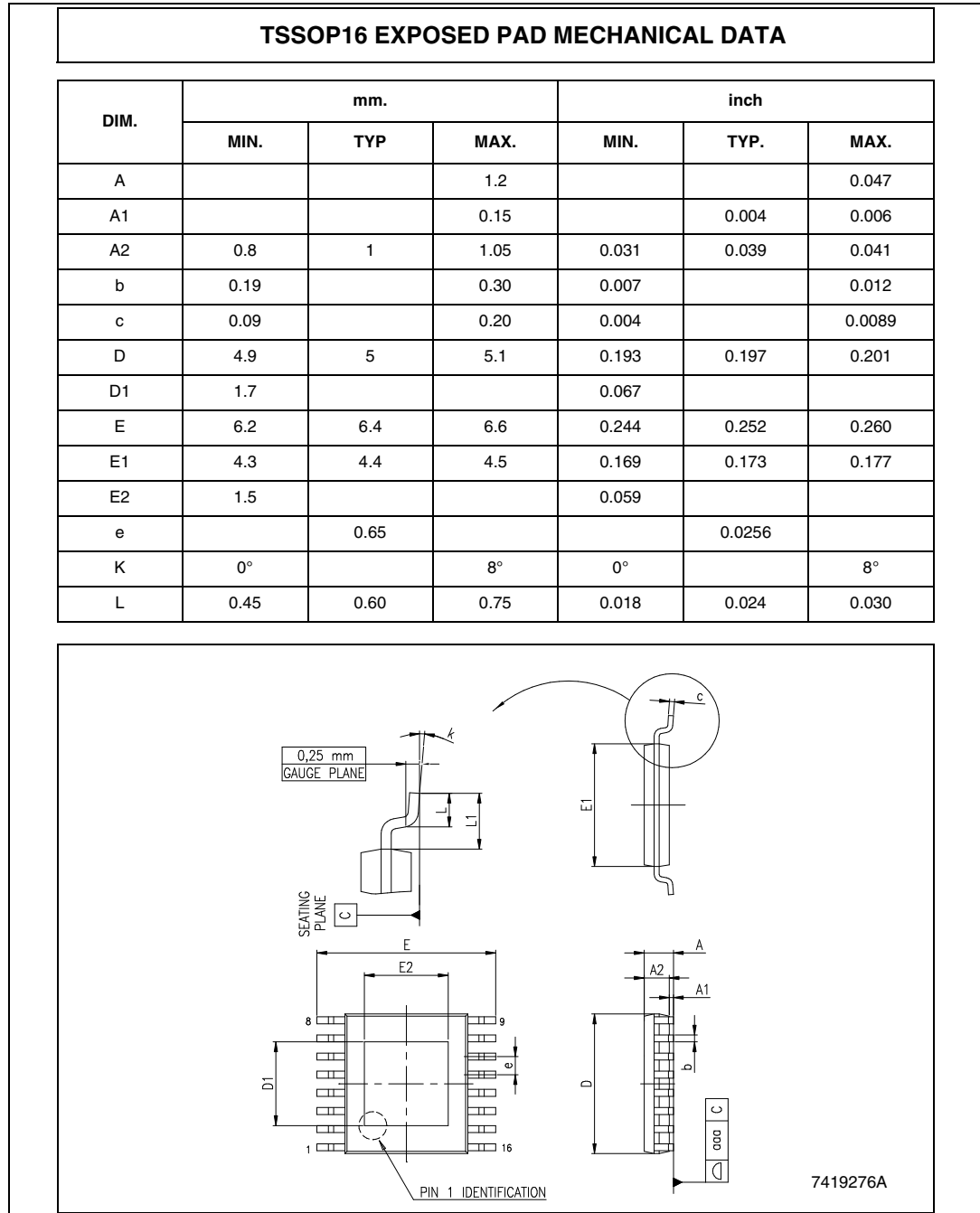
A state-of-the-art current mode pulse with modulator is embedded in the PM8800 to support low side single ended isolated and non isolated topologies. A high gain bandwidth product error amplifier is embedded for non isolated configuration.

The PWM switching frequency of PM8800 is programmable with an appropriate resistor and it is also capable of working with an external clock reference.

4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

Figure 5. HTSSOP16 package mechanical data



5 Revision history

Table 2. Document revision history

Date	Revision	Changes
17-Sep-2007	1	Internal release

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