

APPLICATION NOTE 4940

High-Performance Class 2 Powered Device (PD) is Customizable for Class 3 Designs

Abstract: This reference design is for a highly efficient, flyback 3.3V and 5V Class 2 powered device (PD). The design features the MAX5969B as its controller. The design also uses the MAX5974A, which controls current-mode PWM converters and provides frequency foldback for PoE applications. Using these devices, this reference design is IEEE® 802.3af/at compliant, and a high-performance, compact, and cost efficient solution for a Class 2 PD. The design can also be customized to 3.3V/2A and 5V/1A Class 3 PD.

General Description

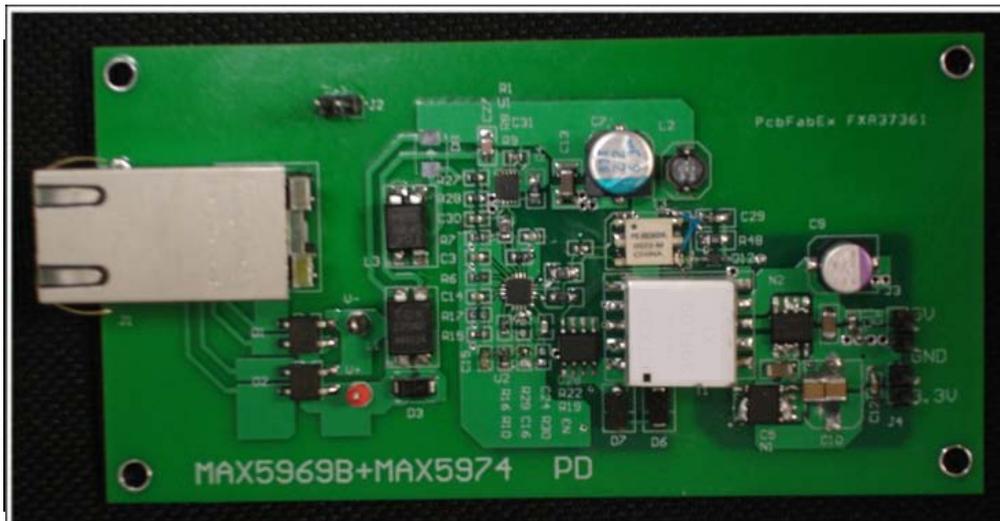
This reference design is for a highly efficient, flyback 3.3V and 5V Class 2 powered device (PD) that is IEEE 802.3af/at compliant and cost-effective. The reference design can be customized to a 3.3V/2A and 5V/1A Class 3 PD.

The design features the [MAX5969B](#) and [MAX5974A](#). The MAX5969B controller is fully compliant with the IEEE 802.3af/at standard in a power-over-Ethernet (PoE) system. The device can also get power from a wall adapter (WAD). The MAX5974A provides both control for wide-input-voltage, active-clamped, inductive feedback, current-mode PWM converters and frequency foldback for PoE applications. Using these devices, this reference design is IEEE 802.3af/at compliant. It is also a high-performance, compact, and cost-effective solution for a Class 2 PD or a Class 3 PD.

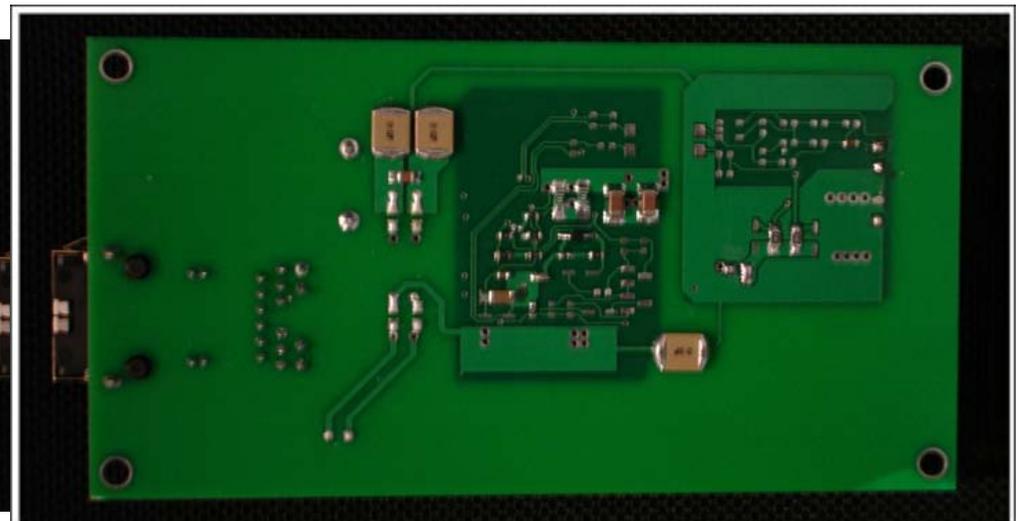
Specifications:

The 3.3V/1A, 5V/0.8A PD is designed to meet the following specifications:

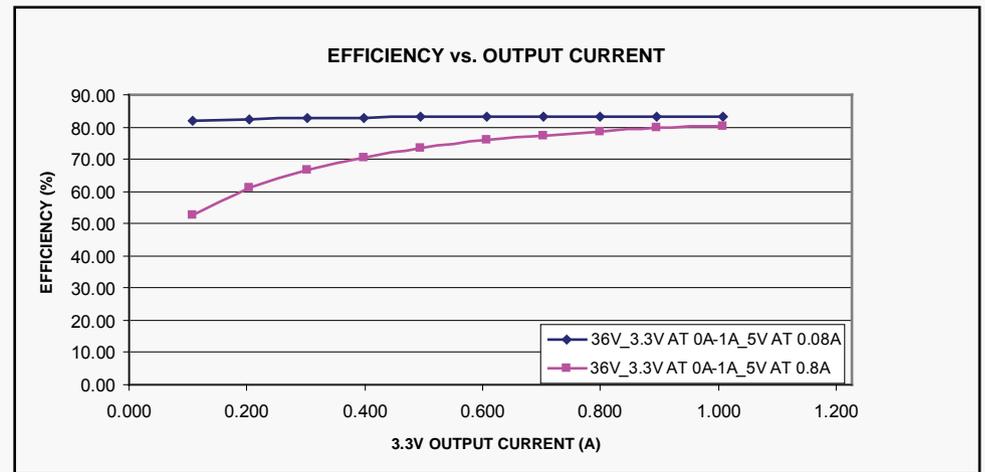
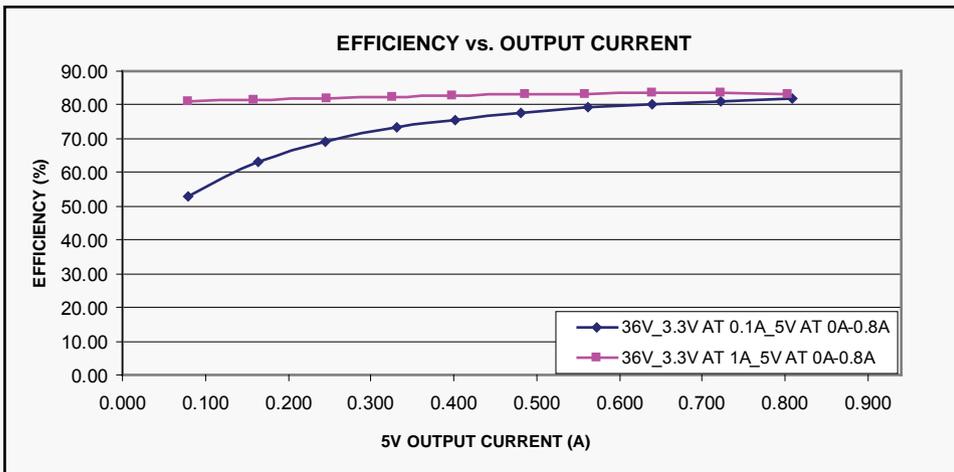
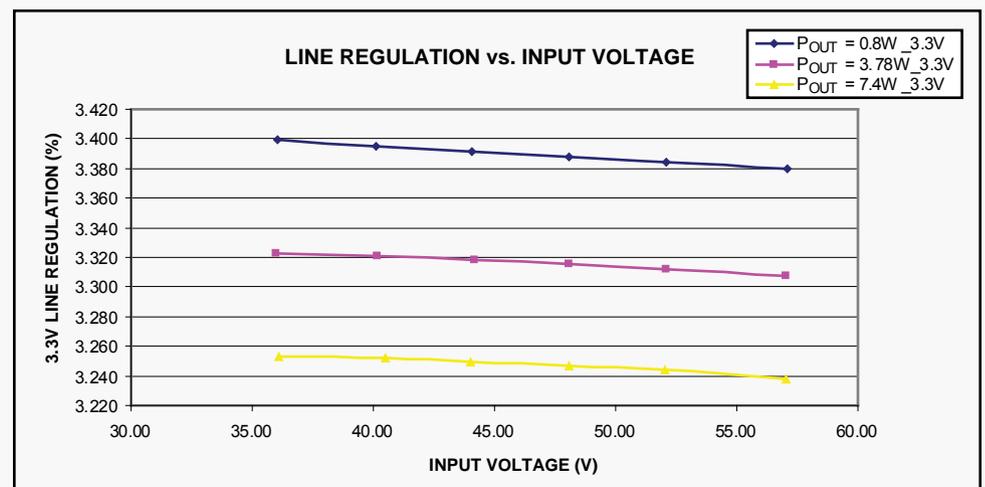
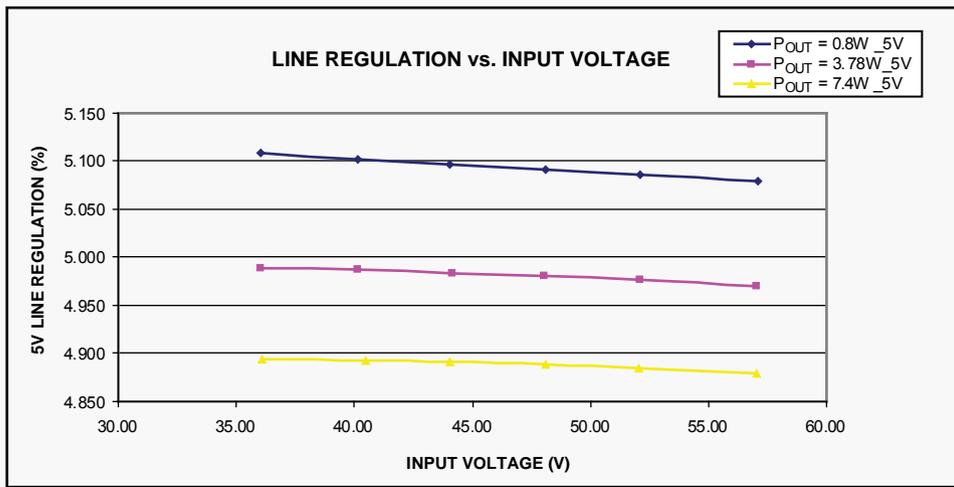
- Input voltage: 36V to 57V
- WAD input voltage: 36V up to 57V (note: the voltage can be 10V to 57V with a different transformer.)
- V_{OUT1} : 3.3V/1A
- V_{OUT2} : 5V/0.8A
- Output ripples: $\pm 2\%$
- Load transient V_{p-p} : $\pm 3\%$ (50% step-load)
- Line and load regulation: $\pm 2\%$
- Total efficiency with load of 1A at 3.3V, 0.8A at 5V, and 48V input: 84.5% (including input LAN transformer and diode bridge).



Top view of the reference design.



Bottom view of the reference design.



Transient Response at 36V Input Voltage

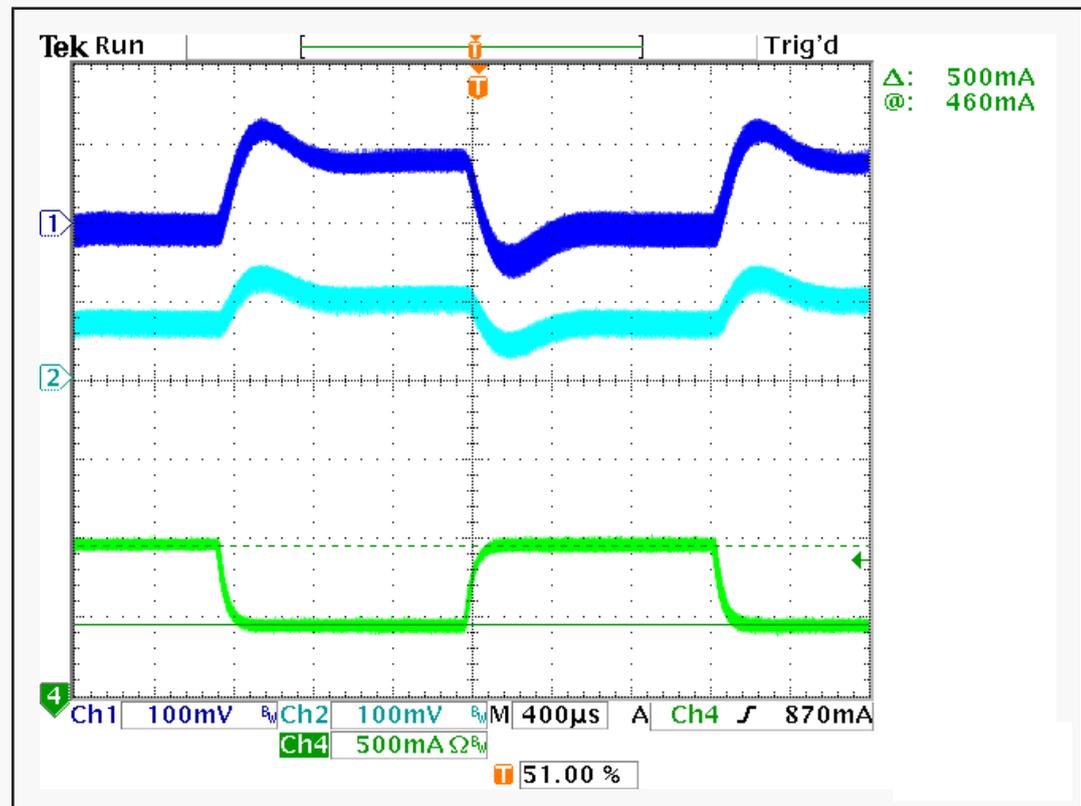
$V_{IN} = 36V$, $I_{OUT1} = 1A$, $I_{OUT2} = 0.4A-0.8A-0.4A$

Ch1: 100mV/div, 5V output voltage

Ch2: 100mV/div, 3.3V output voltage

Ch4: 0.5A/div, output current

Time base: 400 μ s/div



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Related Parts

[MAX5969B](#) IEEE 802.3af/at-Compliant, Powered Device Interface Controllers with Integrated Power MOSFET

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