Active-Clamped Forward, Dual-Output PD Provides High-Performance Solution for PoE Applications

Abstract: This reference design is for a highly efficient, active-clamped forward, dual 3.3V/8.8V-output powered device (PD). The design features the MAX5969A and MAX5900 as its controllers. The design also uses the MAX5974C, which controls current-mode PWM converters and provides zero-voltage switching (ZVS) and frequency foldback to enhance supply efficiency. Using these devices, this RD is IEEE® 802.3at compliant and is a high-performance, compact, and cost-efficient solution for PoE and nonstandard high-power PDs. The design can also support the auxiliary input voltage to provide maximum 55W output power.

General Description

The design features the MAX5969A, MAX5900, and MAX5974C. The MAX5969A is compliant with the IEEE 802.3at standard in a power-over-Ethernet (PoE) system. The device can also get power from a wall adapter (WAD). The MAX5900 hot-swap controller smoothly enables a nonstandard high power from a nonstandard Power Sourcing Equipment (PSE). The MAX5974C provides control for wide-input-voltage, ZVS active-clamped, current-mode PWM converters and frequency foldback for PoE and high-power applications. Using these devices, this reference design is IEEE 802.3at compliant. It is also a high-performance, compact, and cost-effective solution for a nonstandard high power PD.

Specifications

The 3.3V/3.35A and 8.8V/4.6A PD is designed to meet the following specifications:

- Input voltage: 42V to 57V
- Nonstandard PSE: 37V to 57V
- WAD input voltage: 30V up to 57V
- \( V_{\text{OUT1}} \): 3.3V/3.35A
- \( V_{\text{OUT2}} \): 8.8V/4.6A
- Output ripples: ±1%
- Line and load regulation: 3.3V = ±0.2%, 8.8V = ±2%
- Total efficiency with loads of 3A at 3.3V, 4.2A at 8.8V, and 48V input: 90.4% (including input LAN transformer and MOSFET bridge)
Top view of the reference design.
Related Parts

MAX5900 -100V, SOT23/TDFN, Simple Swapper Hot-Swap Controllers -- Free samples
MAX5969A IEEE 802.3af/at-Compliant, Powered Device Interface Controllers with Integrated Power MOSFET -- Free samples
MAX5974C Active-Clamped, Spread-Spectrum, Current-Mode PWM Controllers -- Free samples

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