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: ±2%
- Load transient $V_{p-p} : ±3% \ (50\% \ \text{step-load})$
- Line and load regulation: ±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).
**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: 400µs/div