

RDFC topology – benefits for external hard disk drive



An RDFC power controller for External Hard Disk Drives

- Low cost design
- Enables the meeting of all new efficiency and no load power requirements for external power supplies.
- Easy enabling of peak power requirements for disk spin up.

Overview

The C2470 series of power controllers offers a novel approach to offline AC:DC power conversion. These devices replace linear-type power supplies with a low cost switch-mode Resonant Discontinuous Forward Converter (RDFC) topology.

This new approach brings significant benefits over current linear or flyback supplies for external hard disk drives in terms of:

- Low cost
- High Efficiency to meet new ENERGY STAR 2.0 requirements
- Low No-Load Power to meet new ENERGY STAR 2.0 requirements.
- Low EMI
- Easy use of peak power for disk drive spin up.

Applications



External Hard Disk Drive

ENERGY STAR



The CamSemi controller, used in conjunction with the RDFC topology exceeds ENERGY STAR targets for efficiency and no-load

Low Cost

CamSemi's RDFC solution is primary side sensing and requires no feedback circuit, reducing the BoM by a Y-capacitor, 1 optocoupler, 1 programmable zener and 10 passive components.

Simplified Hard Disk Drive

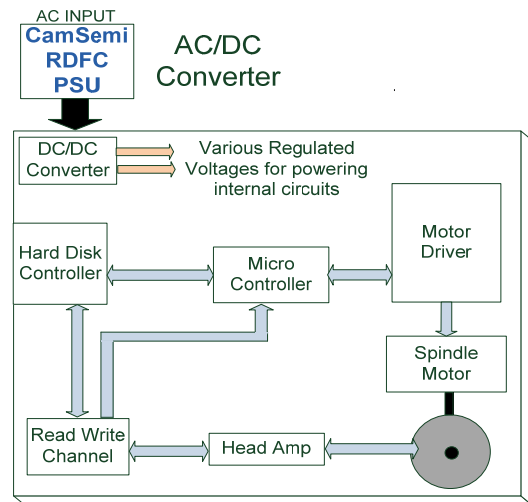


Figure 1: Block Diagram of external hard disk drive

The RDFC topology makes use of the internal DC/DC converter, to give a tight regulated output within the external hard disk drive, giving a cost effective solution.

Topology

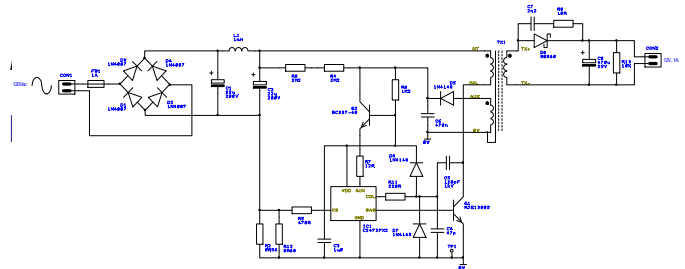


Figure 2: 12 W external Hard Disk Adapter Circuit

Efficiency Graph

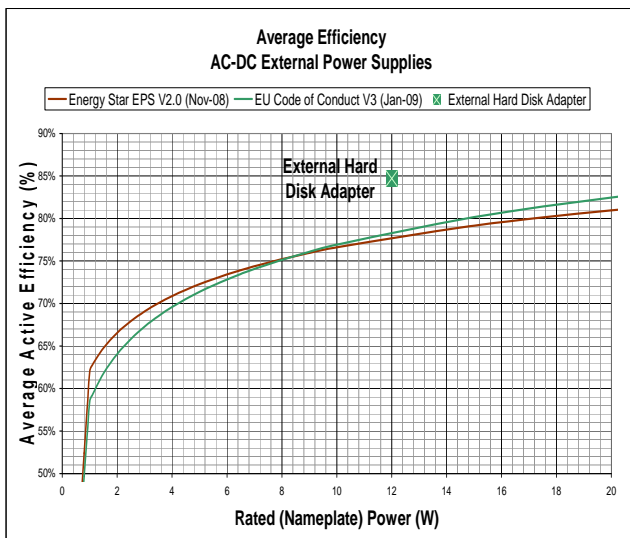


Figure 3: Efficiency achieved against ENERGY STAR and EU requirements

Efficiency Table – achieved efficiency

Output Power	Efficiency achieved	ENERGY STAR 2.0 Requirement
12W	84.7	77.7

No Load Power Table – achieved no load

Output Power	No Load Power achieved	ENERGY STAR 2.0 No Load Requirement
12W	185mW	300mW

Easy peak power achievement

The external hard disk adapter requires that a peak power is delivered for a short period of time at start-up to help spin up the hard disk.

The RDFC topology easily allows for this requirement to deliver extra power for a short period of time.

Peak Power required at start up could be as much as 36 W required over the first 10-15 seconds. (For a 12 W standard supply).

How Efficiency is achieved

The RDFC circuit efficiency comes from a number of features, the most important being zero voltage switching:

- Zero voltage switching eliminates energy loss due to rapidly charging or discharging stray capacitance when the switch turns on.
- The resonant nature of operation means the collector voltage does not rise significantly until the current has fallen to near zero.
- These characteristics lead to very little energy loss per switching cycle.

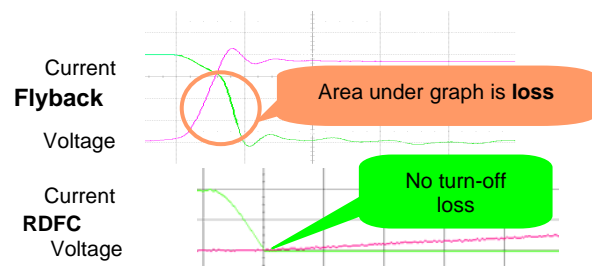


Figure 4: Zero voltage switching improves efficiency

Controller Series

The following controller options are available:

Part Number	Package
C2472PX2	SOT23-6

For more Information

For details of our channel partners and information on future product, technology or corporate announcements, visit www.camsemi.com

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