RDFC topology – benefits for digital picture frames

An RDFC power controller for Digital Picture Frame

- Low cost design
- Enables meeting of all new efficiency requirements for external power supplies such as ENERGY STAR 2.0
- Enables meeting new no load power requirements for external power supplies such as ENERGY STAR 2.0

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 Digital Picture Frame applications including:

- Low cost
- High Efficiency to meet new Energy Star 2.0 requirements
- Low No-Load Power to meet new Energy Star 2.0 requirements.

Applications

Digital picture or Photo Frame:

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 1 optocoupler, 1 programmable zener and 10 passive components.

Digital Photoframe Block Diagram

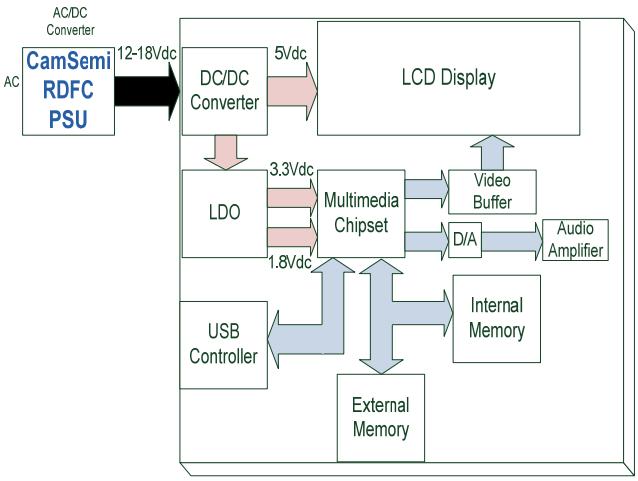

Figure 1: Basic Block Diagram of a Digital Photoframe

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

Topology

Figure 1 illustrates a simple and efficient RDFC circuit suitable for a variety of applications from 3 W to 60 W.

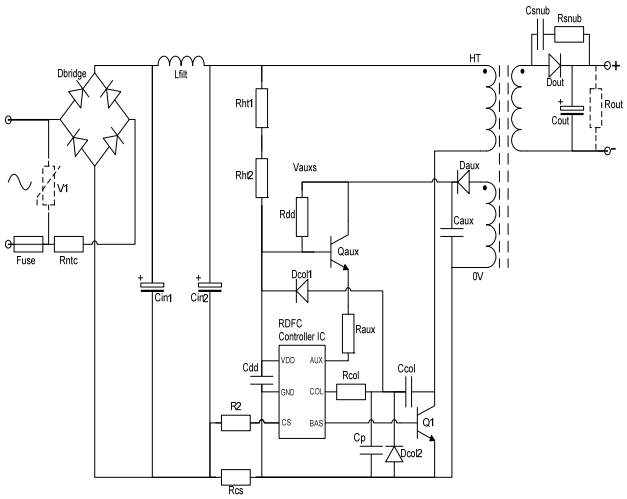

Figure 2: Schematic diagram of an RDFC application

Efficiency and No Load

Efficiency Graph

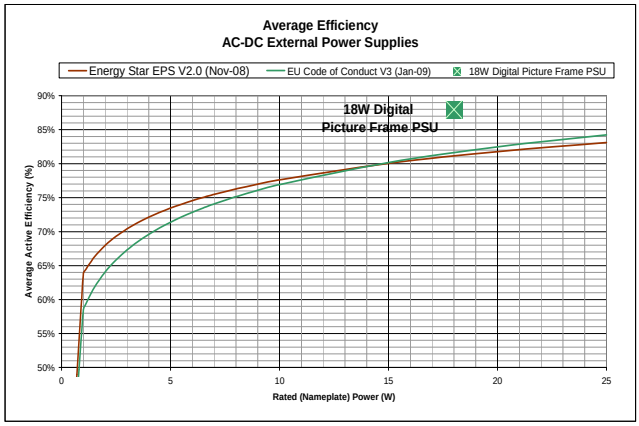

Figure 3: Efficiency achieved against ENERGY STAR and EU requirements

Efficiency Table – achieved efficiency

Input Voltage	Output Power	Efficiency achieved	ENERGY STAR 2.0 Requirement
115V	18W	87.96	80.3

No Load Power Table – achieved no load

Input Voltage	Output Power	No Load Power achieved	ENERGY STAR 2.0 No Load Requirement
115V	18W	122.8mW	300mW

How High 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.

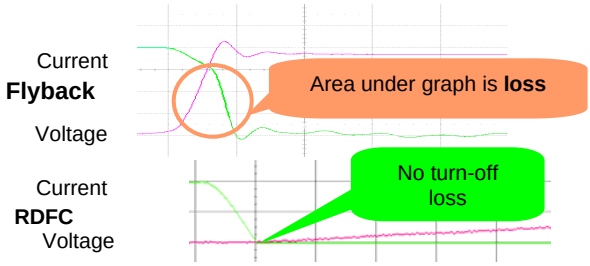

Figure 4: Zero voltage switching improves efficiency

How Low No-load Power is achieved

The CamSemi controller achieves low no-load power by:

- Reducing power at low loads, by progressively reducing the on-time and then increasing the off-time as the load decreases.
- The use of a low voltage 3.3 V CMOS process for the IC means that the power consumption of the controller is low.
- The supply voltage for the controller is derived from the auxiliary winding and associated components.

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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