FAIRCHILD SEMICONDUCTOR®

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FSL116HR
Green Mode Fairchild Power Switch (FPS™)

Features

- Internal Avalanche-Rugged SenseFET (650V)
- Under 50mW Standby Power Consumption at $265V_{AC}$, No-load Condition with Burst Mode
- Precision Fixed Operating Frequency with Frequency Modulation for Attenuating EMI
- Internal Startup Circuit
- Built-in Soft-Start: 20ms
- Pulse-by-Pulse Current Limiting
- Various Protections: Over-Voltage Protection (OVP), Overload Protection (OLP), Output-Short Protection (OSP), Abnormal Over-Current Protection (AOCP), Internal Thermal Shutdown Function with Hysteresis (TSD)
- Auto-Restart Mode
- Under-Voltage Lockout (UVLO)
- Low Operating Current: 1.8mA
- Adjustable Peak Current Limit

Applications

- SMPS for VCR, STB, DVD, & DVCD Players
- SMPS for Home Appliance
- Adapter

Related Resources

- *AN-4137 — Design Guidelines for Offline Flyback Converters Using FPS™*
- *AN-4141 — Troubleshooting and Design Tips for Fairchild Power Switch (FPS™) Flyback Applications*
- *AN-4147 — Design Guidelines for RCD Snubber of Flyback*
- *Fairchild Power Supply WebDesigner — Flyback Design & Simulation - In Minutes at No Expense*

Description

The FSL116HR integrated Pulse Width Modulator (PWM) and SenseFET is specifically designed for high-performance offline Switched-Mode Power Supplies (SMPS) with minimal external components. FSL116HR includes integrated high-voltage power switching regulators that combine an avalanche-rugged SenseFET with a Current-Mode PWM control block.

The integrated PWM controller includes: Under-Voltage Lockout (UVLO) protection, Leading-Edge Blanking (LEB), a frequency generator for EMI attenuation, an optimized gate turn-on / turn-off driver, Thermal Shutdown (TSD) protection, and temperature-compensated precision current sources for loop compensation and fault-protection circuitry. The FSL116HR offers good soft-start performance. When compared to a discrete MOSFET and controller or RCC switching converter solution, the FSL116HR reduces total component count, design size, and weight; while increasing efficiency, productivity, and system reliability. This device provides a basic platform that is well suited for the design of cost-effective flyback converters.

Maximum Output Power[1]			
$230V_{AC}$ ±15%[2]		85-265V_{AC}	
Adapter[3]	Open Frame	Adapter[3]	Open Frame
11W	16W	10W	14W

Notes:
1. The junction temperature can limit the maximum output power.
2. $230V_{AC}$ or $100/115V_{AC}$ with doubler.
3. Typical continuous power in a non-ventilated enclosed adapter measured at 50°C ambient.

Ordering Information

Part Number	Operating Temperature Range	Top Mark	Package	Packing Method
FSL116HR	-40 to 105°C	FSL116HR	8-Lead, Dual Inline Package (DIP)	Rail

Typical Application Diagram

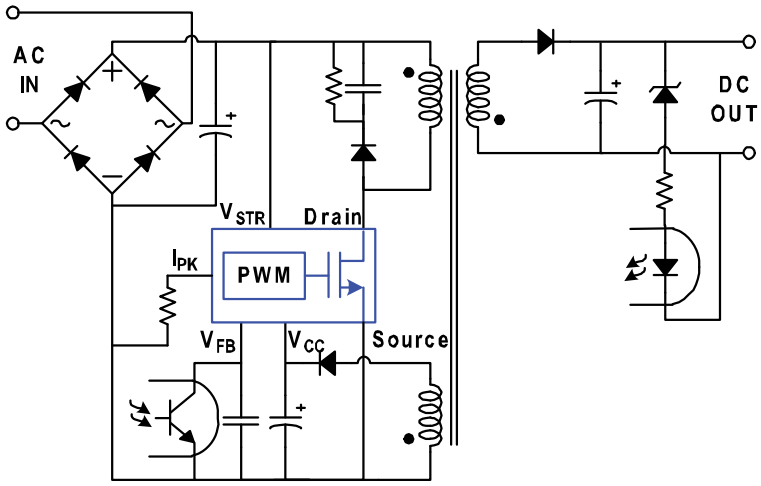

Figure 1. Typical Application

Internal Block Diagram

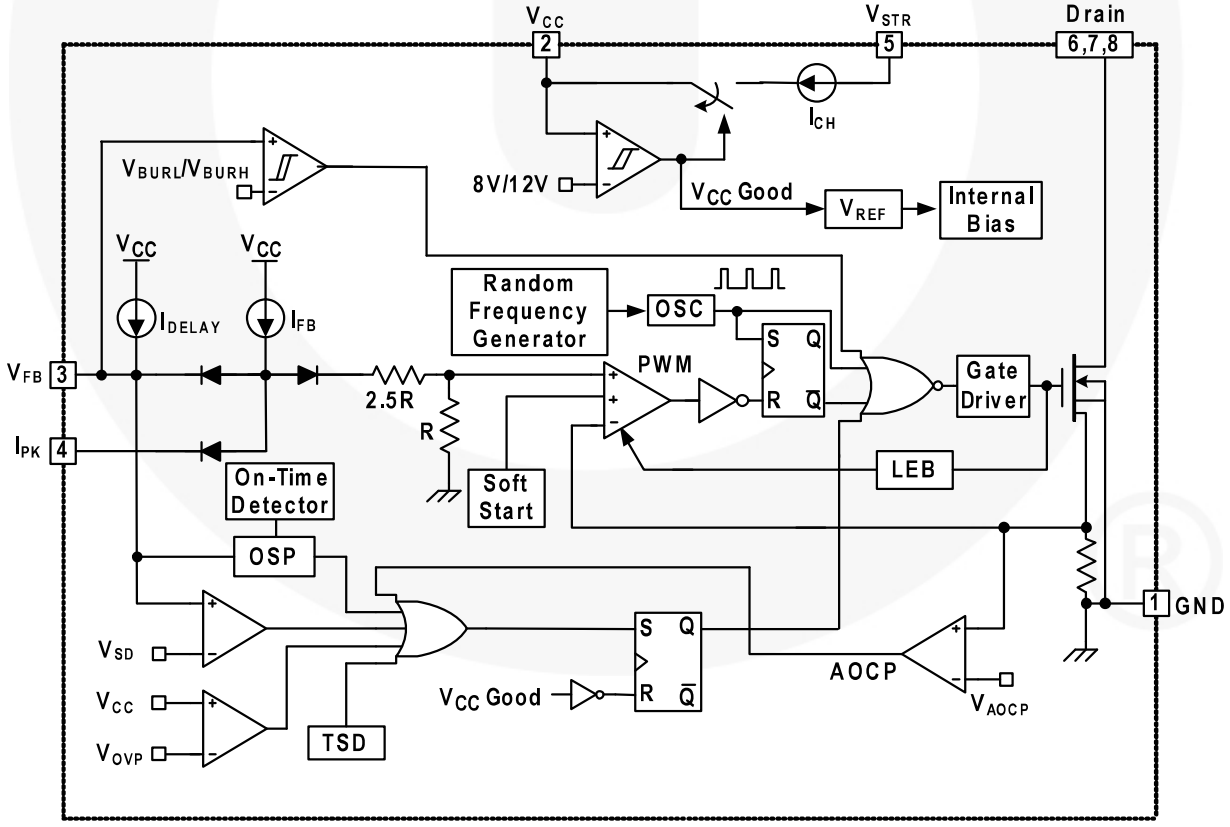

Figure 2. Internal Block Diagram

Pin Configuration

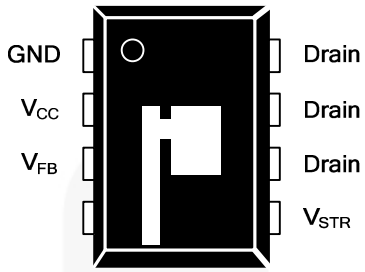

Figure 3. Pin Configuration

Pin Definitions

Pin #	Name	Description
1	GND	**Ground.** SenseFET source terminal on the primary side and internal control ground.
2	V_{CC}	**Positive Supply Voltage Input.** Although connected to an auxiliary transformer winding, current is supplied from pin 5 (V_{STR}) via an internal switch during startup (*see Figure 2)*. Once V_{CC} reaches the UVLO upper threshold (12V), the internal startup switch opens and device power is supplied via the auxiliary transformer winding.
3	V_{FB}	**Feedback Voltage.** The non-inverting input to the PWM comparator, it has a 0.4mA current source connected internally, while a capacitor and opto-coupler are typically connected externally. There is a delay while charging external capacitor C_{FB} from 2.4V to 6V using an internal 5μA current source. This delay prevents false triggering under transient conditions, but still allows the protection mechanism to operate under true overload conditions.
4	I_{PK}	**Peak Current Limit.** Adjusts the peak current limit of the SenseFET. The feedback 0.4mA current source is diverted to the parallel combination of an internal 6kΩ resistor and any external resistor to GND on this pin to determine the peak current limit.
5	V_{STR}	**Startup.** Connected to the rectified AC line voltage source. At startup, the internal switch supplies internal bias and charges an external storage capacitor placed between the V_{CC} pin and ground. Once V_{CC} reaches 12V, the internal switch is opened.
6, 7, 8	Drain	**Drain.** Designed to connect directly to the primary lead of the transformer and capable of switching a maximum of 650V. Minimizing the length of the trace connecting these pins to the transformer decreases leakage inductance.