

FSQ0565R, FSQ0765R

Green-Mode Fairchild Power Switch (FPS™) for Quasi-Resonant Operation - Low EMI and High Efficiency

Features

- Optimized for Quasi-Resonant Converter (QRC)
- Low EMI through Variable Frequency Control and AVS (Alternating Valley Switching)
- High-Efficiency through Minimum Voltage Switching
- Narrow Frequency Variation Range over Wide Load and Input Voltage Variation
- Advanced Burst-Mode Operation for Low Standby Power Consumption
- Simple Scheme for Sync Voltage Detection
- Pulse-by-Pulse Current Limit
- Various Protection functions: Overload Protection (OLP), Over-Voltage Protection (OVP), Abnormal Over-Current Protection (AOCP), Internal Thermal Shutdown (TSD) with Hysteresis, Output Short Protection (OSP)
- Under-Voltage Lockout (UVLO) with Hysteresis
- Internal Start-up Circuit
- Internal High-Voltage Sense FET (650V)
- Built-in Soft-Start (17.5ms)

Applications

- Power Supply for LCD TV and Monitor, VCR, SVR, STB, and DVD & DVD Recorder
- Adapter

Related Resources

Visit: <http://www.fairchildsemi.com/apnotes/> for:

- AN-4134: *Design Guidelines for Offline Forward Converters Using Fairchild Power Switch (FPS™)*
- AN-4137: *Design Guidelines for Offline Flyback Converters Using Fairchild Power Switch (FPS™)*
- AN-4140: *Transformer Design Consideration for Offline Flyback Converters Using Fairchild Power Switch (FPS™)*
- AN-4141: *Troubleshooting and Design Tips for Fairchild Power Switch (FPS™) Flyback Applications*
- AN-4145: *Electromagnetic Compatibility for Power Converters*
- AN-4147: *Design Guidelines for RCD Snubber of Flyback*
- AN-4148: *Audible Noise Reduction Techniques for Fairchild Power Switch Fairchild Power Switch(FPS™) Applications*
- AN-4150: *Design Guidelines for Flyback Converters Using FSQ-Series Fairchild Power Switch (FPS™)*

Description

A Quasi-Resonant Converter (QRC) generally shows lower EMI and higher power conversion efficiency than a conventional hard-switched converter with a fixed switching frequency. The FSQ-series is an integrated Pulse-Width Modulation (PWM) controller and SenseFET specifically designed for quasi-resonant operation and Alternating Valley Switching (AVS). The PWM controller includes an integrated fixed-frequency oscillator, Under-Voltage Lockout (UVLO), Leading-Edge Blanking (LEB), optimized gate driver, internal soft-start, temperature-compensated precise current sources for a loop compensation, and self-protection circuitry. Compared with a discrete MOSFET and PWM controller solution, the FSQ-series can reduce total cost, component count, size, and weight; while simultaneously increasing efficiency, productivity, and system reliability. This device provides a basic platform for cost-effective designs of quasi-resonant switching flyback converters.

Ordering Information

Product Number	PKG. ⁽⁵⁾	Operating Temp.	Current Limit	R _{DS(ON)} Max.	Maximum Output Power ⁽¹⁾				Replaces Devices
					230V _{AC} ±15% ⁽²⁾		85-265V _{AC}		
					Adapter ⁽³⁾	Open Frame ⁽⁴⁾	Adapter ⁽³⁾	Open Frame ⁽⁴⁾	
FSQ0565R	TO-220F-6L	-40 to +85°C	3.0A	2.2Ω	70W	80W	41W	60W	FSCM0565R FSDM0565RB
FSQ0765R	TO-220F-6L	-40 to +85°C	3.5A	1.6Ω	80W	90W	48W	70W	FSCM0765R FSDM0765RB

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 temperature.
4. Maximum practical continuous power in an open-frame design at 50°C ambient.
5. These parts are RoHS compliant.

Application Diagram

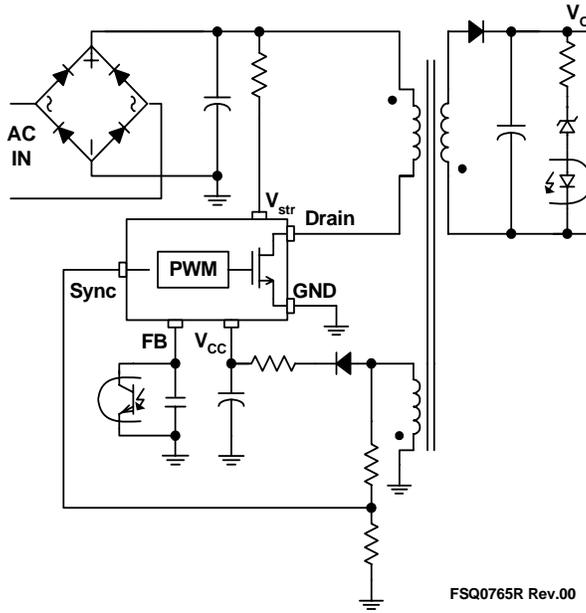


Figure 1. Typical Flyback Application

Internal Block Diagram

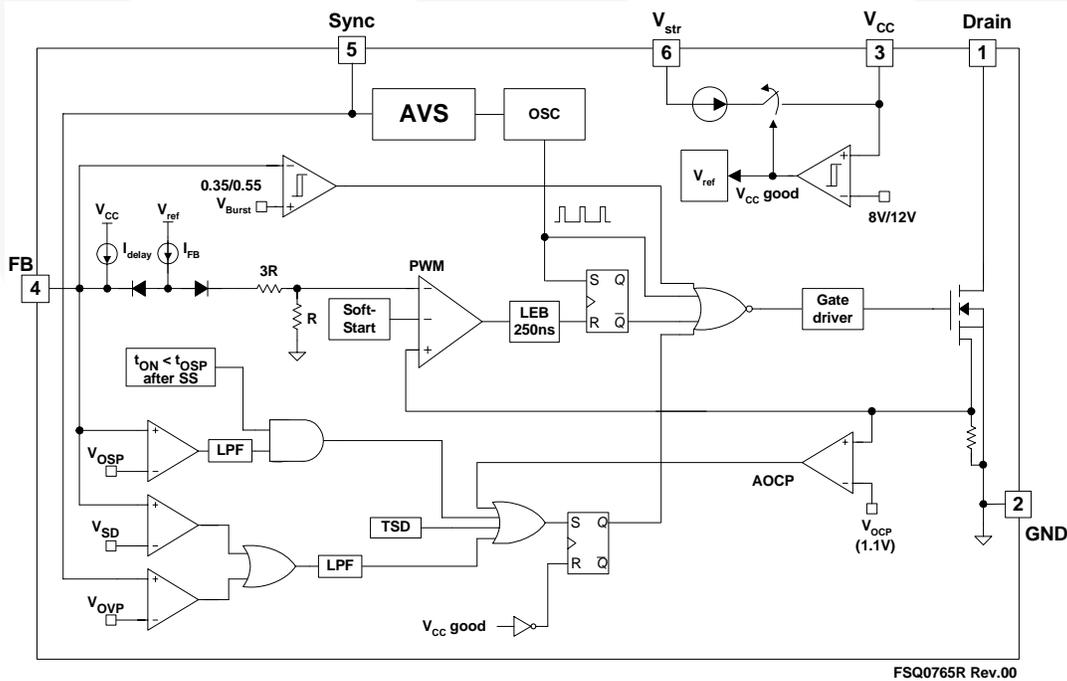


Figure 2. Internal Block Diagram

Pin Configuration

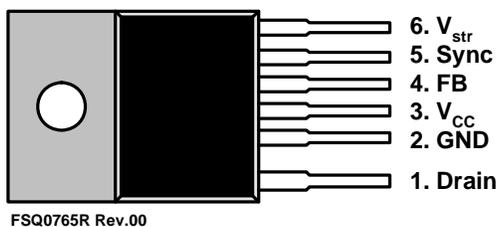


Figure 3. Pin Configuration (Top View)

Pin Definitions

Pin #	Name	Description
1	Drain	SenseFET drain. High-voltage power SenseFET drain connection.
2	GND	Ground. This pin is the control ground and the SenseFET source.
3	V_{CC}	Power Supply. This pin is the positive supply input. This pin provides internal operating current for both start-up and steady-state operation.
4	FB	Feedback. This pin is internally connected to the inverting input of the PWM comparator. The collector of an opto-coupler is typically tied to this pin. For stable operation, a capacitor should be placed between this pin and GND. If the voltage of this pin reaches 6V, the overload protection triggers, which shuts down the FPS.
5	Sync	Sync. This pin is internally connected to the sync-detect comparator for quasi-resonant switching. In normal quasi-resonant operation, the threshold of the sync comparator is 1.2V/1.0V.
6	V_{str}	Start-up. This pin is connected directly, or through a resistor, to the high-voltage DC link. At start-up, the internal high-voltage current source supplies internal bias and charges the external capacitor connected to the V_{CC} pin. Once V_{CC} reaches 12V, the internal current source is disabled. It is not recommended to connect V_{str} and Drain together.