

Reference Design RD-267

Fairchild Power Switch (FPS™) FSQ510 – 4.2W Design

| Featured Device | Application | Input Voltage Range | Output Voltage (Rated Current) | Rated Output Power | Topology |
|-----------------|---|-----------------------|--------------------------------|--------------------|-------------------|
| FSQ510 SB340 | Auxiliary Power Supply for LCD and PDP TV | 85~265V _{AC} | 5.2V (0.8A) | 4.16W | Flyback Converter |

Key Features

FSQ510

- Uses an LDMOS Integrated Power Switch
- Optimized for Valley Switching Converter (VSC)
- Low EMI through Variable Frequency Control and Inherent Frequency Modulation
- High-Efficiency through Minimum Drain Voltage Switching
- Extended Valley Switching for Wide Load Ranges
- Small Frequency Variation for Wide Load Ranges
- Advanced Burst-Mode Operation for Low Standby Power Consumption
- Various Protection Functions: Pulse-by-Pulse Current Limit, Overload Protection (OLP), and Internal Thermal Shutdown (TSD) with Hysteresis
- Under-Voltage Lockout (UVLO) with Hysteresis
- Internal Startup Circuit
- Internal High-Voltage SenseFET: 700V
- Built-in Soft-Start: 5ms

SB340

- 40V/3A Schottky Barrier Rectifier
- Low Forward Voltage Drop: 0.5V, T_A=25°C, 3A

1. Schematic

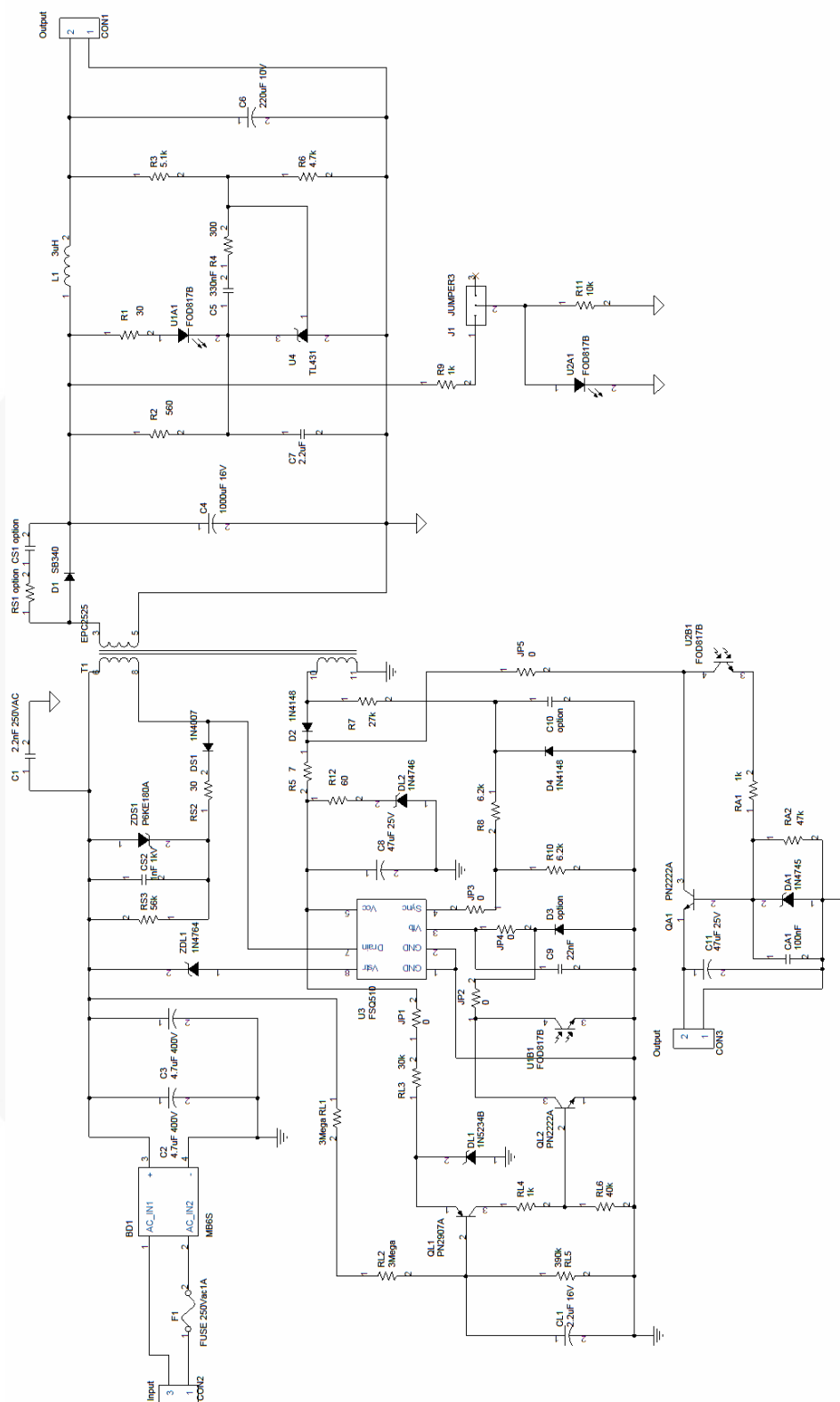


Figure 1. Schematic

2. Transformer

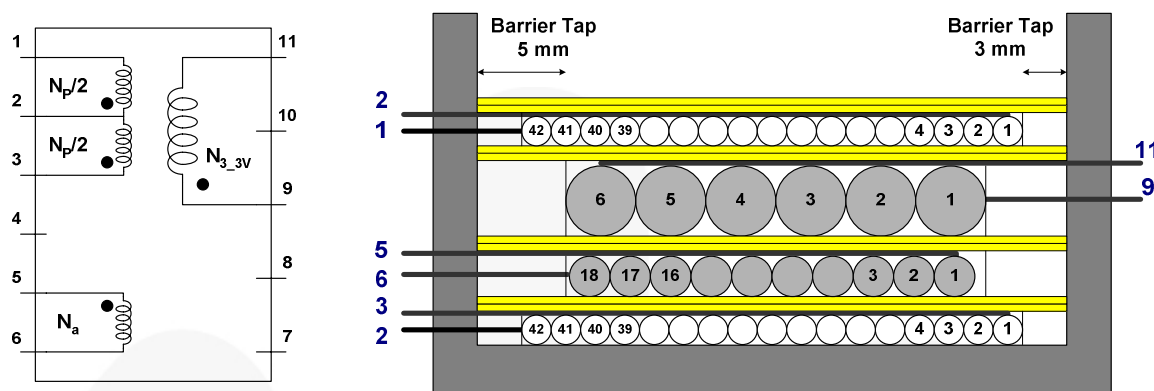


Figure 2. Transformer Schematic Diagram

2.1. Winding Specification

| | Pin (S → F) | Wire | Turns | Winding Method |
|----------|-------------|---------------------|-------|-------------------------|
| $N_p/2$ | 3 → 2 | $0.16\phi \times 1$ | 42 | Solenoid Winding |
| N_a | 5 → 6 | $0.16\phi \times 1$ | 18 | Solenoid Winding |
| N_{5V} | 9 → 11 | $0.6\phi \times 1$ | 6 | Center Solenoid Winding |
| $N_p/2$ | 2 → 1 | $0.16\phi \times 1$ | 42 | Solenoid Winding |

Core: EPC25: $A_e = 46.4 \text{ mm}^2$

Bobbin: EPC25

2.2. Electrical Characteristics

| | Pin | Specification | Remark |
|---------------------------------|-------|--------------------------|--------------------------------------|
| Primary-Side Inductance | 3 – 1 | $2.3 \text{ mH} \pm 5\%$ | 100kHz, 1V All Other Pins Open |
| Primary-Side Leakage Inductance | 3 – 1 | 30μH Max. | 100kHz, 1V All Other Pins Shorted |

3. Standby Power Consumption

3.1. Standby Power Consumption without Line Sense

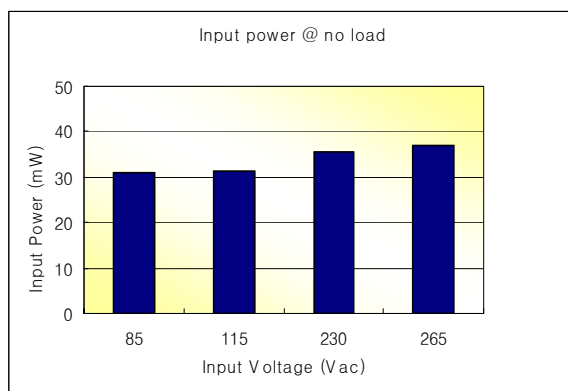


Figure 3. Input Power at No Load

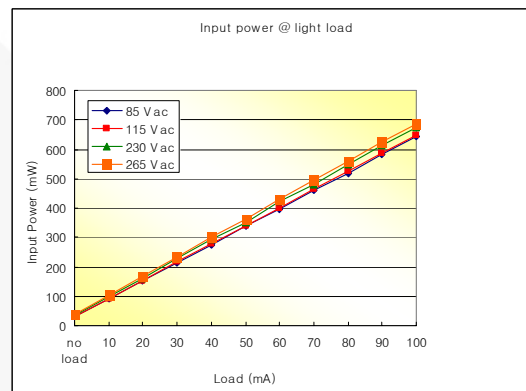


Figure 4. Input Power at Light Load

3.2. Standby Power Consumption with Line Sense

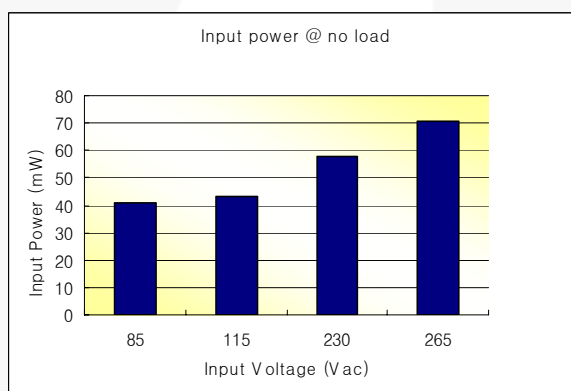


Figure 5. Input Power at No Load

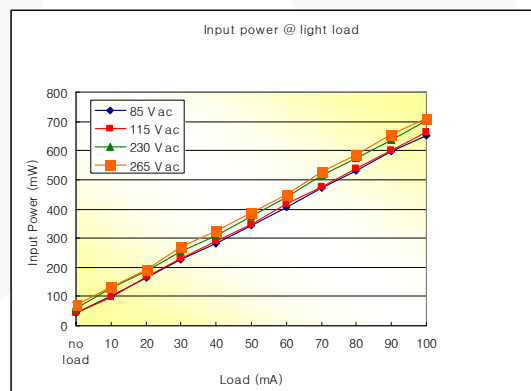


Figure 6. Input Power at Light Load

4. Typical Efficiency

4.1. Measured Efficiency without Line Sense

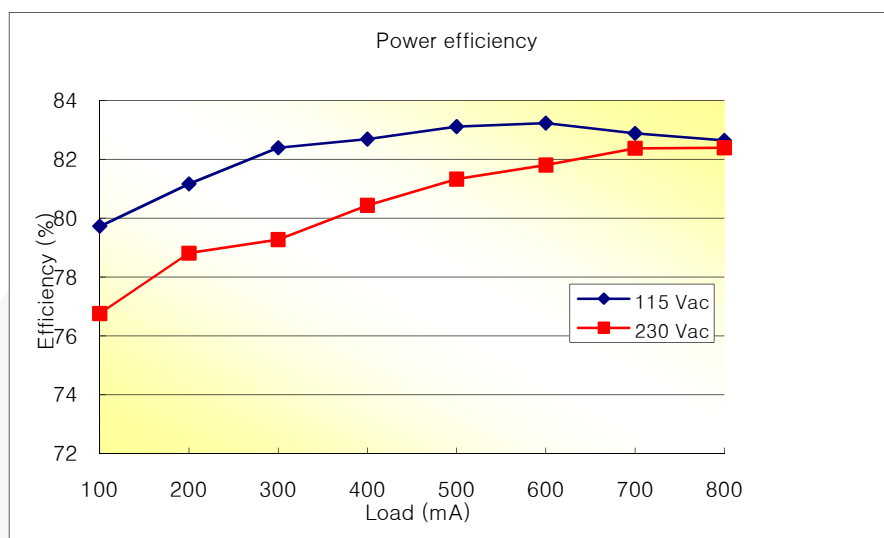


Figure 7. Power Efficiency

4.2. Measured Efficiency with Line Sense

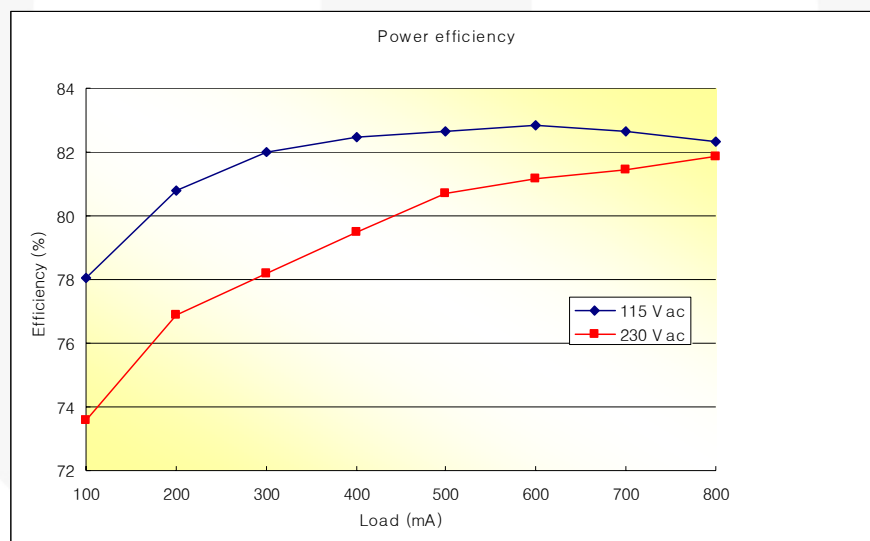


Figure 8. Power Efficiency

5. Related Resources

[FSQ510 — Green Mode Fairchild Power Switch \(FPS™\) for Valley Switching Converter – Low-EMI and High-Efficiency Datasheet](#)

[AN-4150 — Design guidelines for Flyback Converters using FSQ-Series Fairchild Power Switches \(FPS™\)](#)

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