

Fairchild Reference Design

The following reference design supports inclusion of FEB-L013 in design of LED SMPS. It should be used in demo board with the FL7930B, FAN7621S and discrete datasheet as well as Fairchild's application notes and technical support team. Please visit Fairchild's website at <http://www.fairchildsemi.com>.

Application	Fairchild Device	Input Voltage Range	Output Power	Output Voltage (Rated Current)
LED SMPS	FAN7930B FAN7621S FCPF11N60NT FDPF7N60NZ	85-277VAC@300VAC _{MAX}	150W	103V(1.46A)

Key Features

- Constant-Voltage (C.V) and Constant-Current (C.C) Control with Secondary-Feedback Circuitry
- Low EMI through zero current switching of PFC and zero voltage switching of DC-DC converter
- Precise Adjustable Output over-voltage Protection
- Internal Soft start and overshoot-less control
- Internal Total Harmonic Distortion(THD) Optimizer
- Variable frequency control with 50% duty cycle for half-bridge resonant converter topology
- Fixed dead time(350ns)
- Up to 300kHz operating frequency
- Auto-restart operation for all protections with an external LV_{CC}
- Low gate charge
- Low Crss
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- ESD Improved capability
- Protection Functions: UVLO, Over-Voltage, Over-Current

1. Schematics

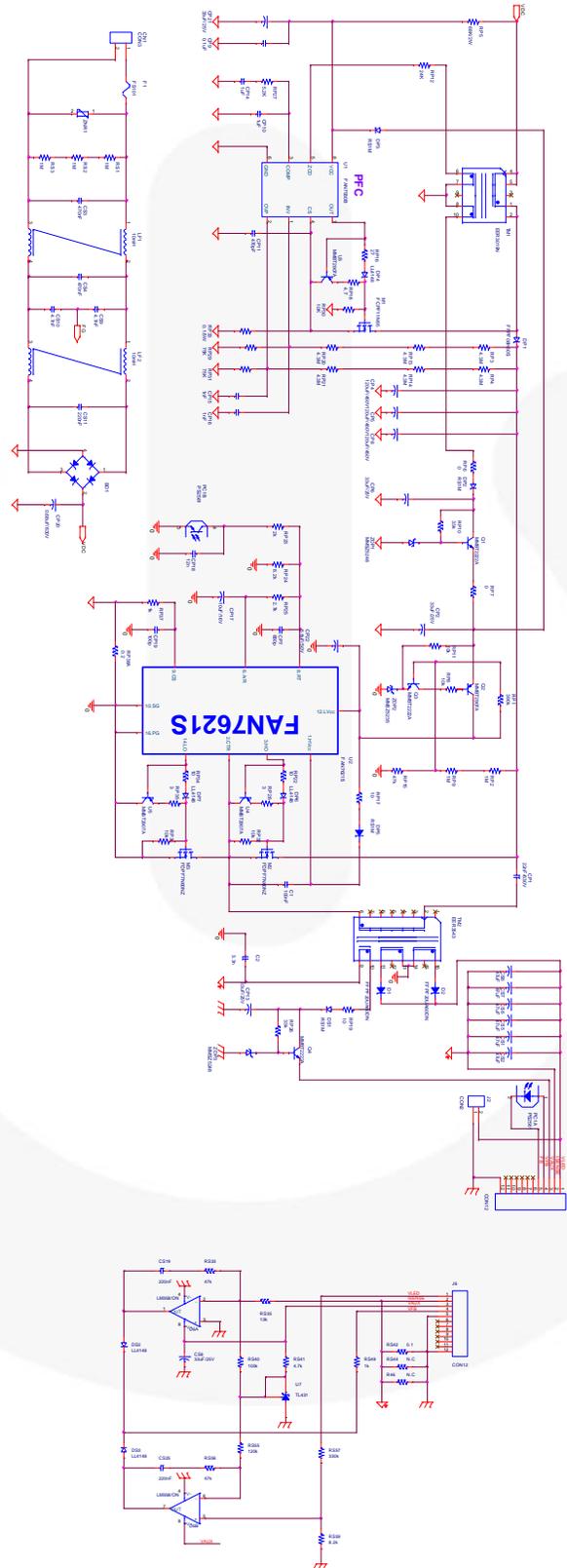


Figure 1. Schematic

2. Transformer

2.1 Connections PFC Transformer and Winding Specifications

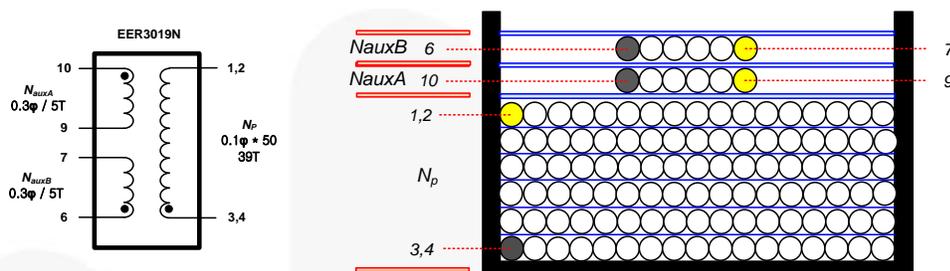


Figure 2. Transformer specifications & construction.

Table 1. Winding specifications.

No	Winding	Pin(S → F)	Wire	Turns	Winding Method
1	Np	3,4 → 1,2	0.1φ×50	39 Ts	Solenoid winding
2	Insulation : Polyester Tape t = 0.025mm, 3Layers				
3	NauxA	10 → 9	0.3φ	5 Ts	Solenoid winding
4	Insulation : Polyester Tape t = 0.025mm, 3Layers				
5	NauxB	6 → 7	0.3φ	5Ts	Solenoid winding
6	Insulation : Polyester Tape t = 0.025mm, 3Layers				

Table 2. Electrical Characteristics.

	Pin	Spec.	Remark
Inductance	3,4 → 1,2	194uH ±5%	100KHz, 1V

2.2 Connections PFC Transformer and Winding Specifications

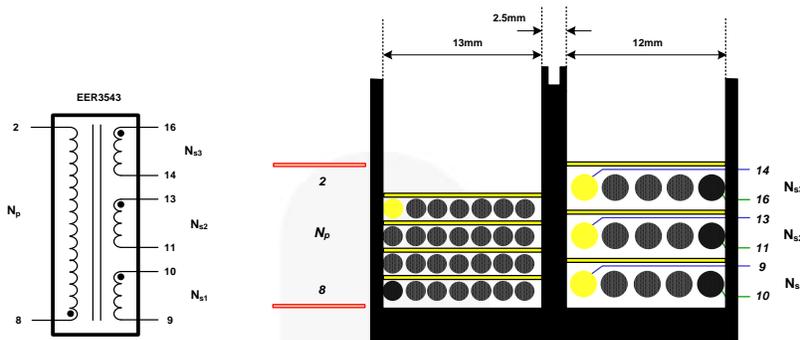


Figure 3. Transformer specifications & construction.

Table 3. Winding specifications.

No	Winding	Pin(S → F)	Wire	Turns	Winding Method
1	Np	8 → 2	0.1φ×20	36Ts	Solenoid winding
2	Insulation : Polyester Tape t = 0.025mm, 3Layers				
3	Ns1	10 → 9	0.3φ	3 Ts	Solenoid winding
4	Insulation : Polyester Tape t = 0.025mm, 3Layers				
5	Ns2	13 → 11	0.1φ×20	19 Ts	Solenoid winding
6	Insulation : Polyester Tape t = 0.025mm, 3Layers				
7	Ns3	16 → 14	0.1φ×10	19Ts	Center Solenoid winding
8	Insulation : Polyester Tape t = 0.025mm, 3Layers				

Table 4. Electrical Characteristics.

	Pin	Spec.	Remark
Primary-Side Inductance (Lp)	2 – 8	690uH ±5%	100KHZ, 1V
Primary-Side Effective Leakage (LR)	2 – 8	122uH Max	Short one of the secondary windings

2.1. Winding Specification

No.	Winding	Pin (S → F)	Wire	Turns	Winding Method
1	Np1	4 → 3	0.25 Φ * 1	50	Solenoid Winding
2	Insulation: Polyester Tape t = 0.05 mm, 3 Layers				
3	Ns	10 → 9	0.32 Φ (TEX) * 1	22	Solenoid Winding
4	Insulation: Polyester Tape t = 0.05 mm, 3 Layers				
5	Np2	3 → 5	0.25 Φ * 1	22	Solenoid Winding
6	Insulation: Polyester Tape t = 0.05 mm, 3 Layers				
7	Naux	2 → 1	0.20 Φ * 1	11	Center Solenoid winding
8	Outer Insulation: Polyester Tape t = 0.05 mm, 3 Layers				

2.2. Electrical Characteristics

	Pin	Spec.	Remark
Inductance	4 - 5	0.59mH ± 10%	1kHz, 1V

3. Performance

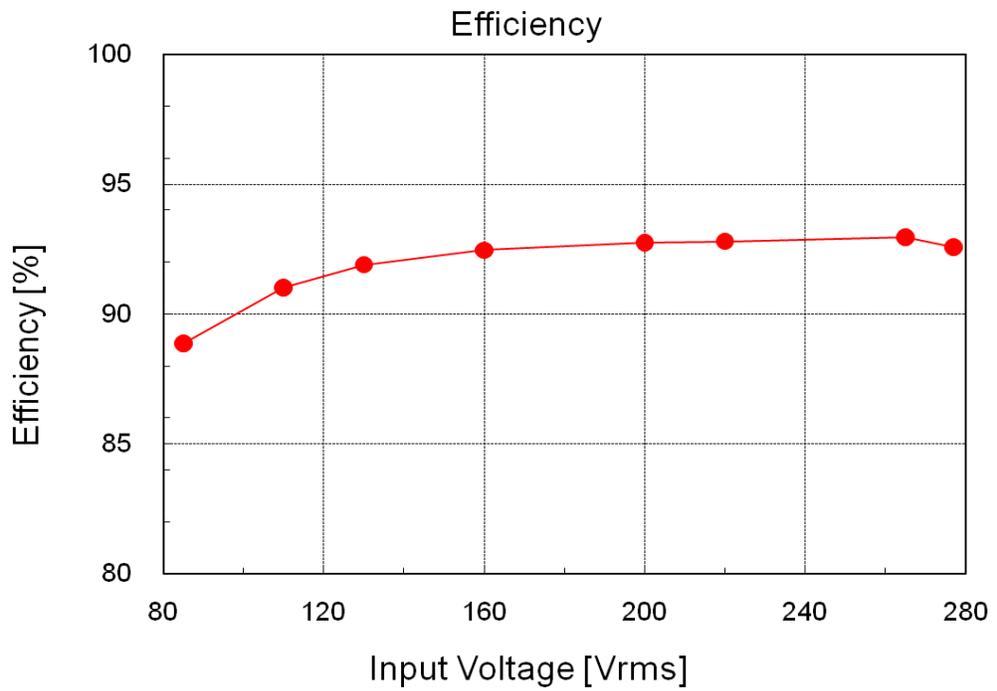


Figure 4. Efficiency Curve

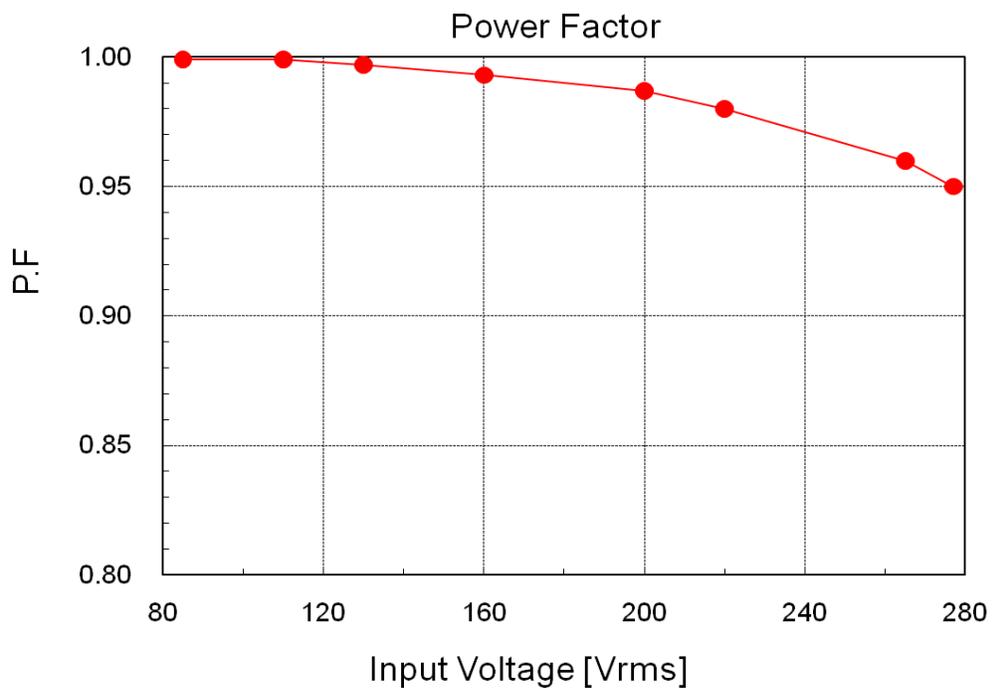


Figure 5. Power Factor

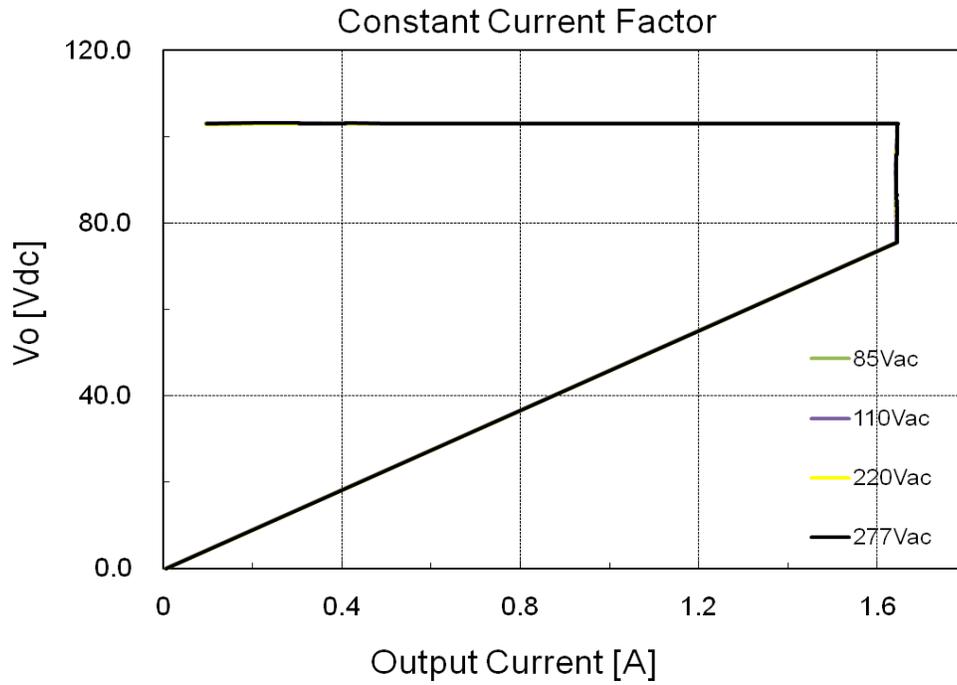


Figure 6. C.C/C.V Curve

4. Related Resources

[Datasheet link FAN7930B](#)

[Datasheet link FAN7621S](#)

[Datasheet link FCPF11N60NT](#)

[Datasheet link FDPF7N60NZ](#)

<http://www.fairchildsemi.com/referencedesign/>

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