

Reference Design RD-353

Dual Switch Flyback Solution– 90W Slim Type Design

Featured Device	Application	Input Voltage Range	Output Voltage (Rated Current)	Rated Output Power	Topology
FAN6920MR FAN7382 FAN6204	SMPS NB Adapter	90~264V _{AC}	12V/4.74A	90W	Dual Switch Flyback

Featured Fairchild Product: FAN6920MR, FAN7382, FAN6204

- Ultra-Low Standby Power: Under 0.2W @ 230V_{AC} meet with 2013 ErP requirement
- Zero-Current Detection for PFC Stage
- Quasi-Resonant Operation for PWM Stage with 5ms Soft-start
- High-Voltage Startup
- Protection Functions (V_{DD} OVP/UVLO, OCP, OLP, Line voltage sensing and OTP)
- Secondary Synchronous Rectifier with CCM/DCM operation
- No need standby power stage

1. Schematic

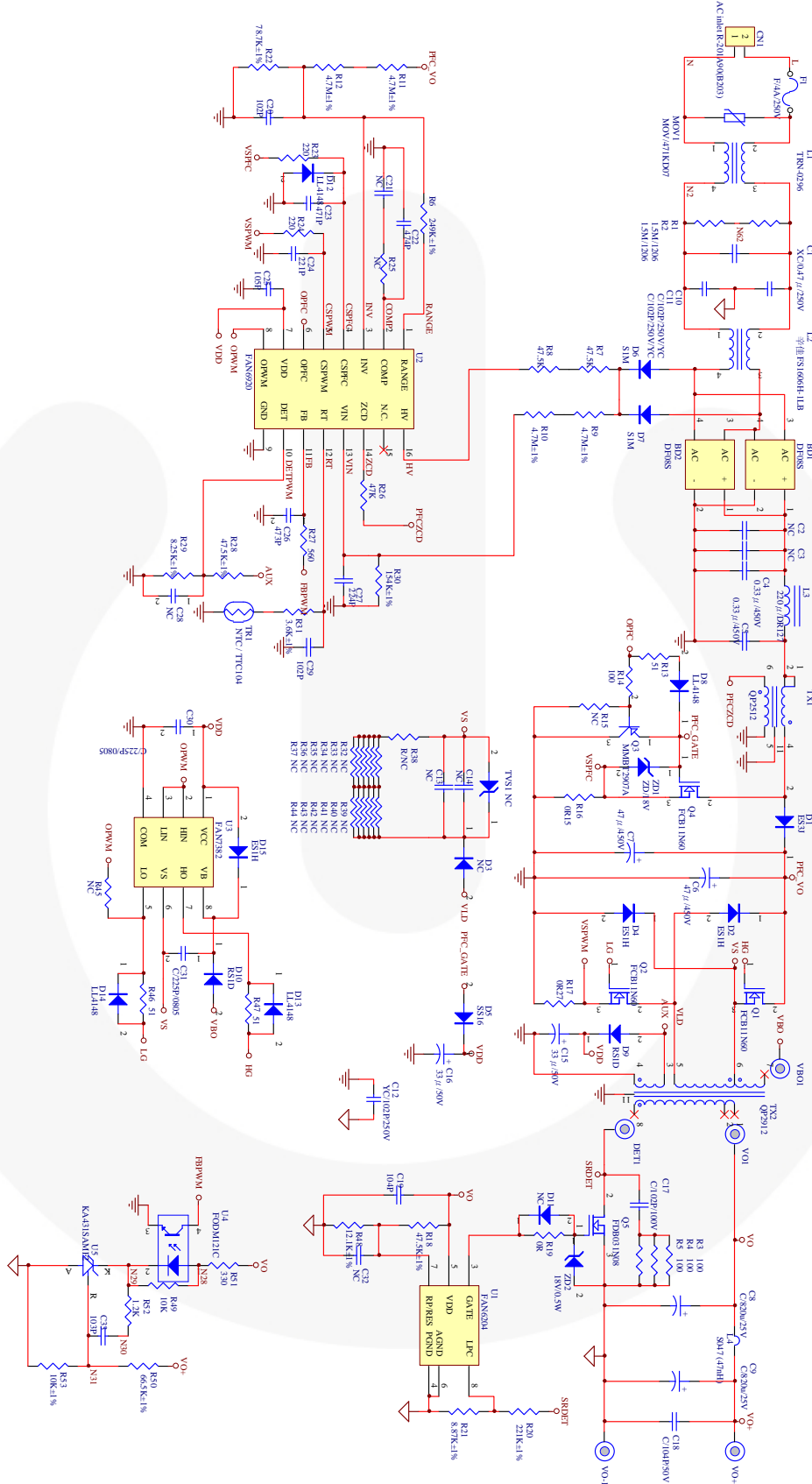


Figure 1. Dual Switch Flyback 90W Application Schematic

2. Transformer

2.1. Transformer Schematic Diagram

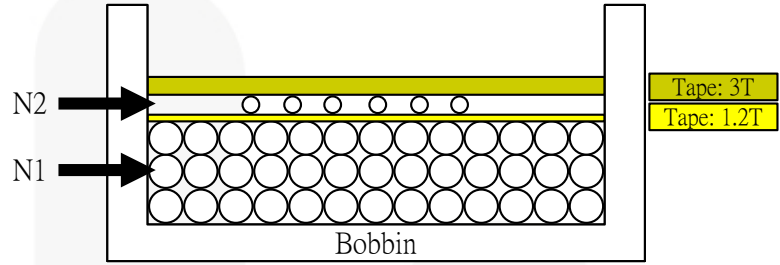
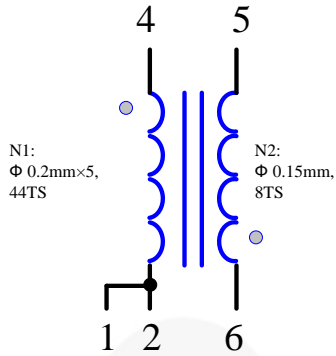


Figure 2. PFC Choke

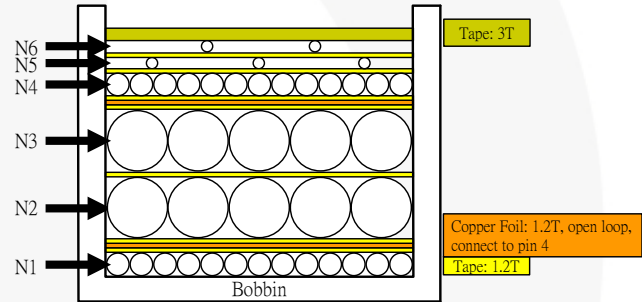
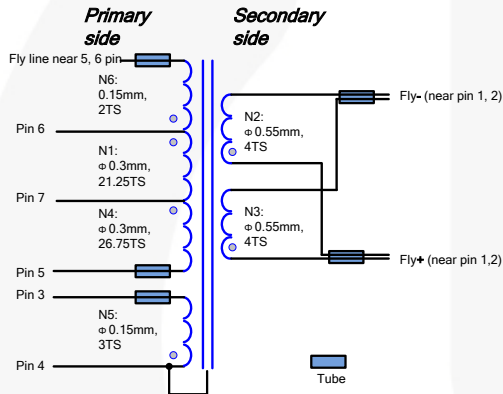


Figure 3. Main power

2.2. Winding Specification

	Pin(S → F)	Wire	Turns	Isolation Tape	Winding Method
PFC Choke					
N1	<u>4-1,2</u> → <u>4,24</u>	0.2φ x 5	44	1.2	
N2	<u>6-5</u> → <u>56</u>	0.15φ	8	3	Space Winding
Main Transformer					
	Pin(S → F)	Wire	Turns	Isolation Tape	Winding Method
N1	6 → 7	0.3φ	21.25	1.2	
Shielding	4	Copper Foil	1.2 open	1.2	
Isolation				1.2	
N2	Fly+ → Fly-	0.55φ	4	1.2	Sandwich Winding
N3	Fly+ → Fly-	0.55φ	4	1.2	Sandwich Winding
Shielding	4	Copper Foil	1.2 open	1.2	
Isolation				1.2	
N4	7 → 5	0.3φ	26.75	1.2	
N5	4 → 3	0.15φ	3	1.2	Space Winding
N6	<u>7-6</u> → <u>5Fly</u>	<u>0.30.15φ</u>	<u>26.752</u>	3	Space Winding

Notes:

PFC Choke

Core: 3C96

Bobbin: QP-2512

Main Transformer

Core: 3C96

Bobbin: QP-2912

2.3. Electrical Characteristics

PFC Choke	Pin	Spec.	Remark
Primary-Side Inductance	1,2 - 4	450μH ±5%	100kHz, 1V
Main Transformer	Pin	Spec.	Remark
Primary-Side Inductance	6 - 5	1150μH ±5%	100kHz, 1V

3. Typical Performance

3.1. Power Consumption

Output Watt.		Actual Output Watt.	Input Watt.	Spec.
No load	115Vac		0.178	Input Watt <0.3W
	230Vac		0.195	
0.25W	115Vac	0.248	0.482	Input Watt <0.5W
	230Vac	0.248	0.486	
0.5W	115Vac	0.504	0.795	Input Watt <1W
	230Vac	0.504	0.800	
1W	115Vac	1.022	1.380	Input Watt <1.7W
	230Vac	1.022	1.390	
1.15W	115Vac	1.169	1.554	Input Watt <2.16W
	230Vac	1.169	1.543	
1.5W	115Vac	1.515	1.950	Input Watt <2.4W
	230Vac	1.515	1.934	
1.7W	115Vac	1.716	2.185	Input Watt <2.4W
	230Vac	1.717	2.163	

3.2. Efficiency

Output Watt	22.5W	45W	67.5W	90W	Avg.	Spec.
90V/60Hz	86.04%	90.15%	89.65%	88.30%	88.62%	Avg. > 87%
115V/60Hz	87.37%	90.93%	90.80%	89.94%	89.76%	
230V/50Hz	89.53%	90.52%	91.25%	91.27%	90.64%	
264V/50Hz	89.14%	90.84%	91.36%	91.45%	90.70%	

Related Resources

[FAN6920MR — Integrated Critical Mode PFC and Quasi-Resonant Current Mode PWM Controller](#)

[FAN7382 — Half Bridge Gate driver](#)

[FAN6204 — Secondary Synchronous Rectifier Controller for Flyback Topology and Forward Freewheeling Rectification](#)

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