Reference Design RD-351

Dual Switch Flyback Solution – 120W/12V Design

Featured Device	Application	Input Voltage Range	Output Voltage (Rated Current)	Rated Output Power	Topology
FAN6920MR **FAN7382** **FAN6204**	SMPS AIO PC Power	90~264V_{AC}	12V/10.0A	120W	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

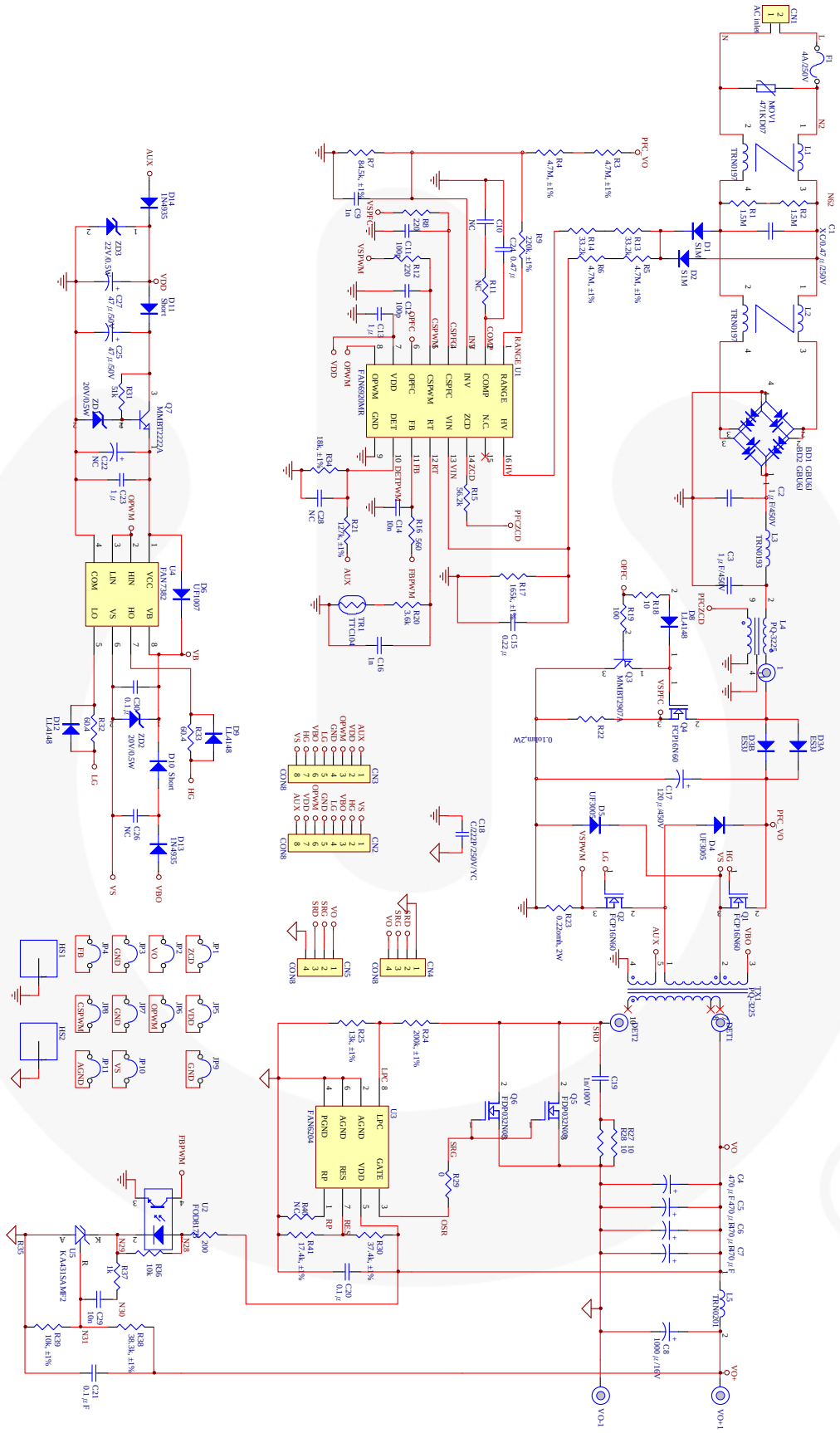

Figure 1. Dual Switch Flyback 120W Application Schematic

2. Transformer

2.1. Transformer Schematic Diagram

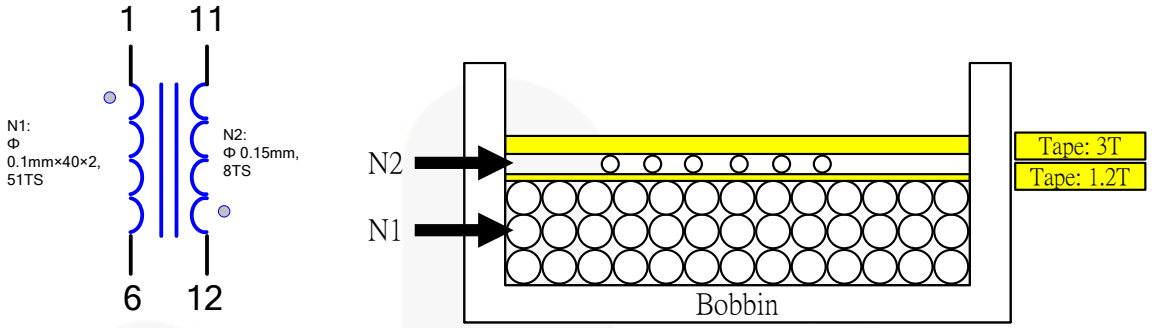

Figure 2. PFC Choke

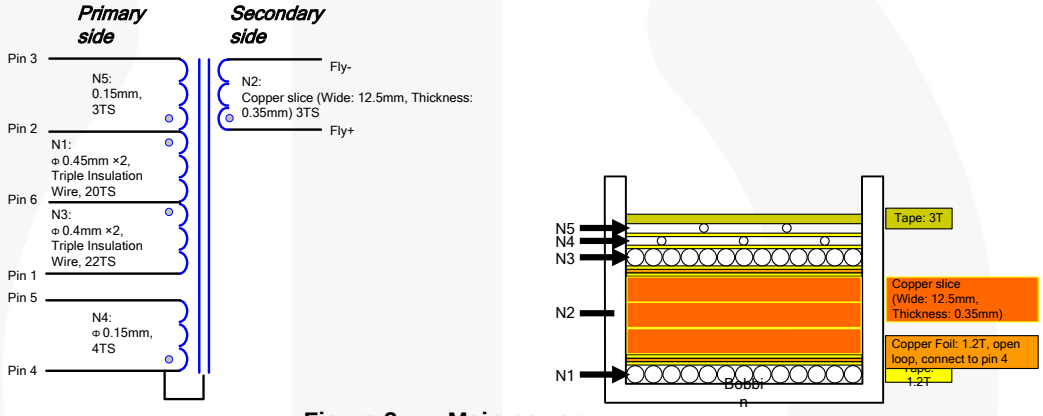

Figure 3. Main power

2.2. Winding Specification

	Pin(S → F)	Wire	Turns	Isolation Tape	Winding Method
PFC Choke					
N1	1 →6	0.1φ x 40 x 2	51	1.2	
N2	12 → 11	0.15φ	8	3	Space Winding
Main Transformer					
	Pin(S → F)	**Wire**	**Turns**	**Isolation Tape**	**Winding Method**
N1	2 → 6	0.45φ x 2 Triple insulation wire	20	1.2	
Shielding	4	Copper Foil	1.2 open	1.2	
N2	Fly+ → Fly-	Copper Slice 12.5 W x0.35 H		1.2	
	Fly+ → Fly-	Copper Slice 12.5 W x0.35 H		1.2	
	Fly+ → Fly-	Copper Slice 12.5 W x0.35 H		1.2	
Shielding	4	Copper Foil	1.2 open	1.2	
N3	6 → 1	0.4φ x 2 Triple insulation wire	22	1.2	
N4	4 → 5	0.15φ	4	1.2	Space Winding
N5	2 → 3	0.15φ	3	1.2	Space Winding

Notes:

PFC Choke

Core: 3C96

Bobbin: QP-3225

Main Transformer

Core: 3C96

Bobbin: QP-3225

2.3. Electrical Characteristics

PFC Choke	Pin	Spec.	Remark
Primary-Side Inductance	1 - 6	440μH ±5%	100kHz, 1V
Main Transformer	**Pin**	**Spec.**	**Remark**
Primary-Side Inductance	1 - 2	790μH ±5%	100kHz, 1V

3. Typical Performance

3.1. Power Consumption

Output Watt.		Actual Output Watt.	Input Watt.	Spec.
No load	115Vac		0.149	Input Watt <0.3W
	230Vac		0.168	
0.25W	115Vac	0.263	0.466	Input Watt <0.5W
	230Vac	0.264	0.482	
0.5W	115Vac	0.499	0.754	Input Watt <1W
	230Vac	0.499	0.756	
1W	115Vac	1.003	1.355	Input Watt <1.7W
	230Vac	1.002	1.348	
1.15W	115Vac	1.150	1.526	Input Watt <2.16W
	230Vac	1.147	1.518	
1.5W	115Vac	1.507	1.944	Input Watt <2.4W
	230Vac	1.506	1.942	
1.7W	115Vac	1.705	2.175	Input Watt <2.4W
	230Vac	1.701	2.136	

3.2. Efficiency

Output Watt	22.5W	45W	67.5W	90W	Avg.	Spec.
115V/60Hz	90.68%	92.18%	92.45%	92.10%	91.85%	Avg. > 87%
230V/50Hz	92.19%	91.80%	92.76%	92.95%	92.43%	

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