Reference Design RD-353

This user guide supports the reference design for the FAN6920MR, FAN7382, and FAN6204 in a dual-switch flyback application. It should be used in conjunction with the product datasheets as well as Fairchild's application notes and technical support team. Please visit Fairchild's website at www.fairchildsemi.com.

Dual Switch Flyback Solution – 120 W/19 V Design

Featured Device	Application	Input Voltage Range	Output Voltage (Rated Current)	Rated Output Power	Topology
FAN6920MR FAN7382 FAN6204	SMPS AIO PC Power	90~264 V_{AC}	19 V / 6.32 A	120 W	Dual Switch Flyback

Featured Fairchild Products: FAN6920MR, FAN7382, FAN6204

- Ultra-Low Standby Power: Under 0.2 W at 230 V_{AC} meet with 2013 ErP Requirement
- Zero-Current Detection for PFC Stage
- Quasi-Resonant Operation for PWM Stage with 5 ms 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 Standby Power Stage Necessary

1. Schematic

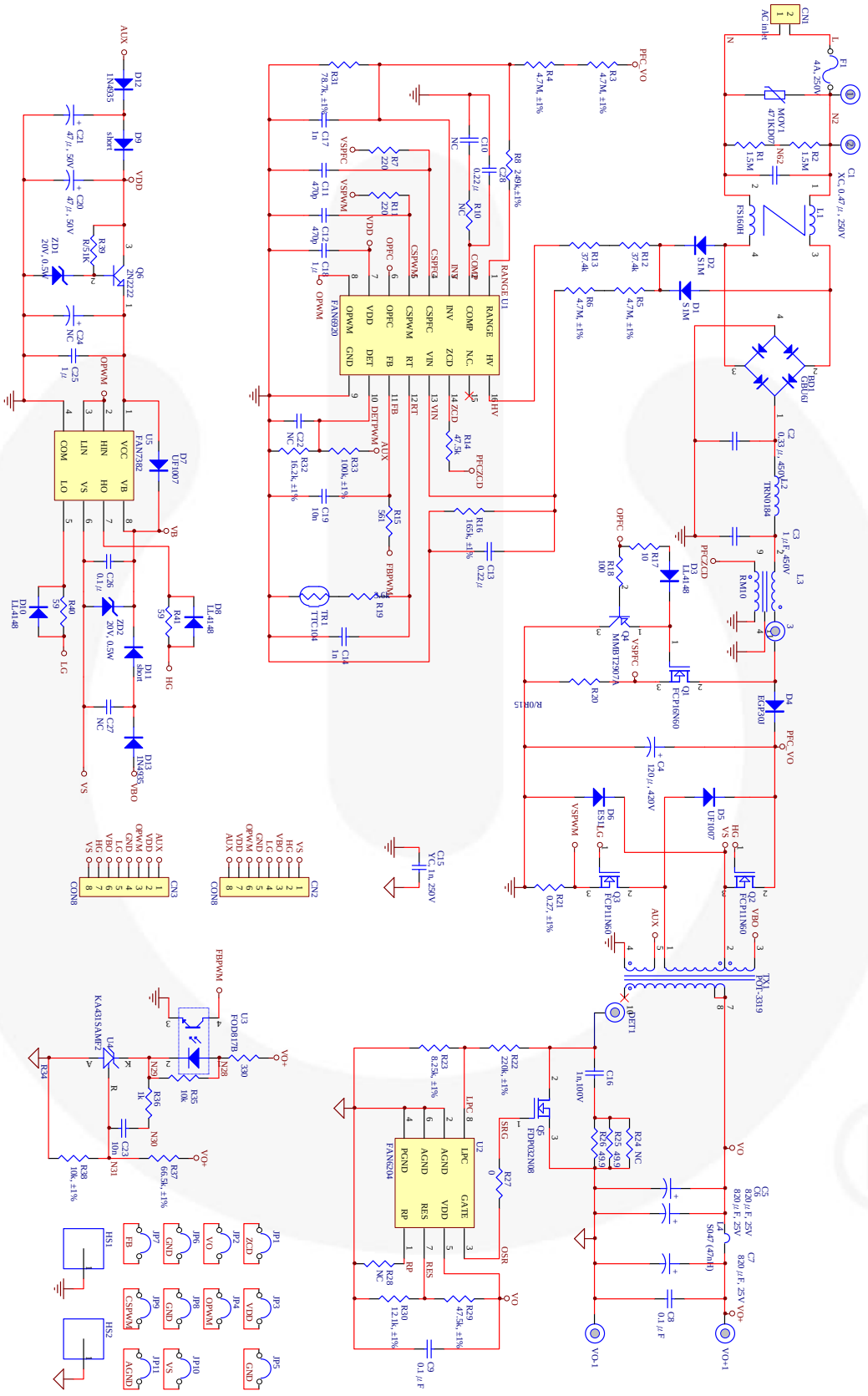
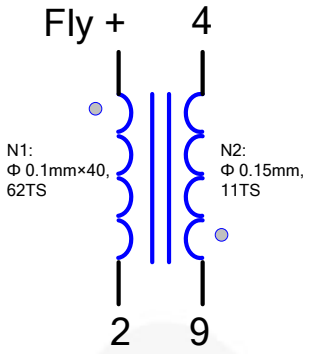


Figure 1. Dual Switch Flyback 120 W Application Schematic

2. Transformer

2.1. Transformer Schematic Diagram



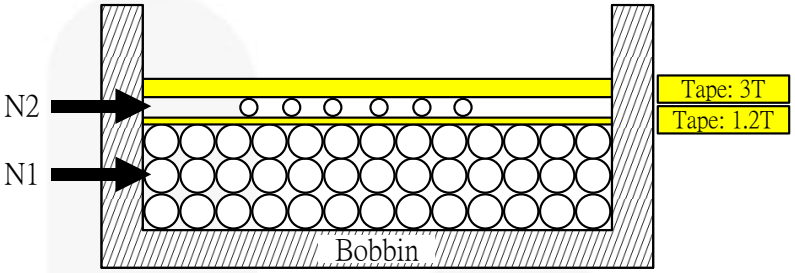
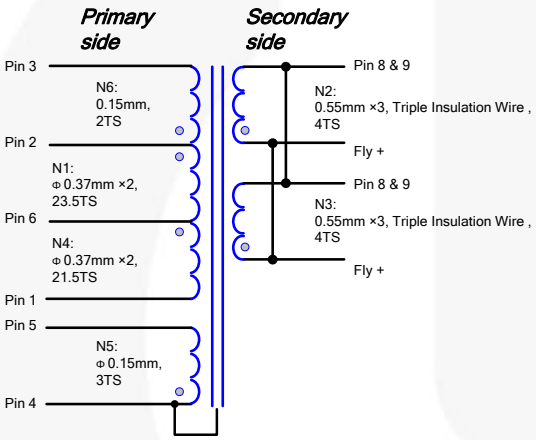


Figure 2. PFC Choke



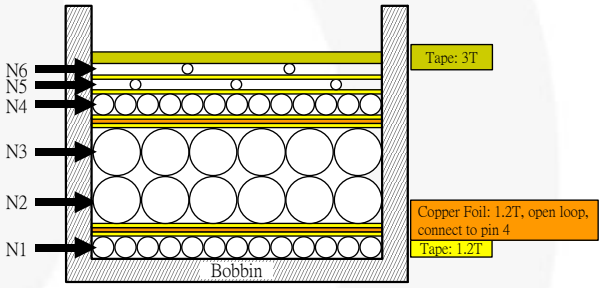


Figure 3. Main Power

2.2. Winding Specification

	Pin (S → F)	Wire	Turns	Isolation Tape	Winding Method
PFC Choke					
N1	2→Fly+	0.1φ x 40	62	1.2	
N2	4 → 9	0.15φ	11	3	Space Winding
Main Transformer					
	Pin (S → F)	**Wire**	**Turns**	**Isolation Tape**	**Winding Method**
N1	2 → 6	0.37φ x 2	23.5	1.2	
Shielding	4	Copper Foil	1.2 Open	1.2	
Isolation				1.2	
N2	8,9→Fly+	0.55φ x 3 Triple Isolation Wire	4		Parallel Winding
N3	8,9→Fly+	0.55φ x 3 Triple Isolation Wire	4	1.2	Parallel Winding
Shielding	4	Copper Foil	1.2 Open	1.2	
N4	6 → 1	0.37φ x 2	21.5	1.2	
N5	5 → 4	0.15φ	3	1.2	Space Winding
N6	3 → 2	0.15φ	2	3	Space Winding

PFC Choke

- Core: 3C96
- Bobbin: RM-10

Main Transformer

- Core: 3C96
- Bobbin: POT-3319

2.3. Electrical Characteristics

PFC Choke	Pin	Specification	Remark
Primary-Side Inductance	Fly+ - 2	400 µH ±5%	100 kHz, 1 V
Main Transformer	**Pin**	**Specification**	**Remark**
Primary-Side Inductance	1 - 2	1000 µH ±5%	100 kHz, 1 V

3. Typical Performance

3.1. Power Consumption

Output Wattage		Actual Output Wattage	Input Wattage	Specification
No Load	115 V_{AC}		0.168	Input Watt. <0.3 W
	230 V_{AC}		0.190	
0.25 W	115 V_{AC}	0.247	0.456	Input Watt. <0.5 W
	230 V_{AC}	0.247	0.473	
0.5 W	115 V_{AC}	0.502	0.772	Input Watt. <1 W
	230 V_{AC}	0.502	0.776	
1 W	115 V_{AC}	1.011	1.387	Input Watt. <1.7 W
	230 V_{AC}	1.011	1.369	
1.15 W	115 V_{AC}	1.155	1.564	Input Watt. <2.16 W
	230 V_{AC}	1.155	1.538	
1.5 W	115 V_{AC}	1.499	1.980	Input Watt. <2.4 W
	230 V_{AC}	1.499	1.937	
1.7 W	115 V_{AC}	1.704	2.213	Input Watt. <2.4 W
	230 V_{AC}	1.704	2.177	

3.2. Efficiency

Output Wattage	30 W	60 W	90 W	120 W	Avg.	Specification
115 V/ 60 Hz	88.42%	92.02%	92.51%	92.18%	91.28%	Avg. > 87%
230 V / 50 Hz	90.15%	91.58%	93.03%	93.51%	92.07%	

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