

Fairchild Reference Design

The following user guide supports the reference design for the FL7732. It should be used in conjunction with the FL7732 datasheet as well as Fairchild's application notes and technical support team. Please visit Fairchild's website at <u>www.fairchildsemi.com</u>.

Application	Fairchild Device	Input Voltage Range	Output Power	Output Voltage (Rated Current)
LED SMPS	FL7732	90-265V _{AC}	16.8W	24V(0.7A)

Key Features

- Cost-Effective Solution: No Input Bulk Capacitor or Feedback Circuitry
- Power Factor Correction (PFC)
- Accurate Constant-Current (CC) Control
- Linear Frequency Control Improves Efficiency and Simplifies Design
- Constant Current Regulation vs. Output Voltage Change (11~28V): <±2.38%
- Constant Current Regulation vs. line voltage change (90~265V_{AC}): <±2.79%
- Output-Open & Short-Circuit Protection with Auto Restart
- System Efficiency Up to 89%
- PF and THD at Nominal Voltages (90 ~ $265V_{AC}$): PF (>0.90), THD (<20%)



1. Schematic





2. Bill of Material

Item No.	Part Reference	Value	Qty.	Description (Manufacturer)
1	BD1	DF06S	1	Bridge Diode (Fairchild Semiconductor)
2	CF1	104/275V	1	X-Capacitor
3	CF2	473/275V	1	X-Capacitor
4	CS1	103 /1kV	1	SMD Capacitor 3216
5	CY1	472/250V	1	Y-Capacitor
6	CO1,CO2	470µF/35V	2	Electrolytic Capacitor
7	C1	104/630V	1	MPE Film Capacitor
8	C2	22µF/35V	1	Electrolytic Capacitor
9	C3	104/2012	1	SMD Capacitor 2012
10	C4	200/2012	1	SMD Capacitor 2012
11	C5	225/2012	1	SMD Capacitor 2012
12	DS1	RS1M	1	1000V/1A Ultra Fast Recovery Diode (Fairchild Semiconductor)
13	DO1	ES3D	1	200V/3A, Fast Rectifier (Fairchild Semiconductor)
14	D1	1N4003	1	200V/1A, General Purpose Rectifier (Fairchild Semiconductor)
15	F1	250V/1A	1	Fuse
16	LF1	4mH	1	Inductor, 10Ø
17	MOV1	7D471	1	Varistor
18	Q1	FDD5N60NZ	1	600V/5A, N-Channel MOSFET (Fairchild Semiconductor)
19	RG1, R6	100/3216	2	SMD Resistor 3216
20	RS1,RS2	204/3216	2	SMD Resistor 3216
21	RCS1,RCS2	1R0/3216	2	SMD Resistor 3216
22	RCS3	2R4/3216	1	SMD Resistor 3216
23	RO1	203/3216	1	SMD Resistor 3216
24	R4	154/3216	1	SMD Resistor 3216
25	R1,R2,R3	683/3216	3	SMD Resistor 3216
26	R5	243/3216	1	SMD Resistor 3216
27	T1	RM8	1	12pin, Transformer
28	U1	FL7732M	1	High Frequency PSR PWM Controller (Fairchild Semiconductor)



3. Transformer







Figure 3. Transformer Winding Structure

Table 1.Winding Specification

No.	Winding	$\text{Pin}(\textbf{S} \rightarrow \textbf{F})$	Wire	Turns	Winding Method
1	N _{P1}	12 → 1	0.25φ	30 Ts	Solenoid Winding
2	Insulation: Polyester Tape t = 0.025mm, 3-Layer				
3	Ns	7- → 8	0.5φ (TIW)	20 Ts	Solenoid Winding
4	Insulation: Polyester Tape t = 0.025mm, 3-Layer				
5	N _{P2}	1 → 2	0.25φ	30 Ts	Solenoid Winding
6	Insulation: Polyester Tape t = 0.025mm, 3-Layer				
7	N _A	$6 \rightarrow 5$	0.25φ	15 Ts	Solenoid Winding
8	Insulation: Polyester Tape t = 0.025mm, 3-Layer				

Table 2. Electrical Characteristics

	Pin	Specification	Remark
Inductance	12– 2	750µH ± 10%	60kHz, 1V
Leakage	1–2	6µH	60kHz, 1V Short All Output Pins



4. Performance



Figure 4. Constant Current Regulation – Measured by E-Load [LED Mode]



Figure 5. Power Factor and System Efficiency





Figure 6. Total Harmonic Distortion

5. Related Resources

<u>FL7732 — Single-Stage FPC Primary-Side-Regulation Offline LED Driver</u> http://www.fairchildsemi.com/referencedesign/



Reference Design Disclaimer

Fairchild Semiconductor Corporation ("Fairchild") provides these reference design services as a benefit to our customers. Fairchild has made a good faith attempt to build for the specifications provided or needed by the customer. Fairchild provides this product "as is" and without "recourse" and MAKES NO WARRANTY, EXPRESSED, IMPLIED OR OTHERWISE, INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Customer agrees to do its own testing of any Fairchild reference designs in order to ensure design meets the customer needs. Neither Fairchild nor Customer shall be liable for incidental or consequential damages, including but not limited to, the cost of labor, requalifications, rework charges, delay, lost profits, or loss of goodwill arising out of the sale, installation or use of any Fairchild product.

Subject to the limitations herein, Fairchild will defend any suit or proceeding brought against Customer if it is based on a claim that any product furnished hereunder constitutes an infringement of any intellectual property rights. Fairchild must be notified promptly in writing and given full and complete authority, information and assistance (at Fairchild's expense) for defense of the suit. Fairchild will pay damages and costs therein awarded against Customer but shall not be responsible for any compromise made without its consent. In no event shall Fairchild's liability for all damages and costs (including the costs of the defense by Fairchild) exceed the contractual value of the products or services that are the subject of the lawsuit. In providing such defense, or in the event that such product is held to constitute infringement and the use of the product is enjoined, Fairchild, in its discretion, shall procure the right to continue using such product, or modify it so that it becomes noninfringing, or remove it and grant Customer a credit for the depreciated value thereof. Fairchild's indemnity does not extend to claims of infringement arising from Fairchild's compliance with Customer's design, specifications and/or instructions, or the use of any product in combination with other products or in connection with a manufacturing or other process. The foregoing remedy is exclusive and constitutes Fairchild's sole obligation for any claim of intellectual property infringement and Fairchild makes no warranty that products sold hereunder will not infringe any intellectual property rights.

All solutions, designs, schematics, drawings, boards or other information provided by Fairchild to Customer are confidential and provided for Customer's own use. Customer may not share any Fairchild materials with other semiconductor suppliers.