

## Fairchild Reference Design

This reference design supports inclusion of FL7701 in LED illumination. It should be used in conjunction with the FL7701 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	Rated Output Power	Output Voltage (Rated Current)
LED Illumination	FL7701	90V <sub>AC</sub> -264V <sub>AC</sub>	18.3W	39V <sub>MAX</sub> (0.47A)

**Note:**

1. The FL7701 has small phase differences between output voltage and current, so the real output power is slightly lower than a simple calculation provides (for apparent power):  
( $P_{OUT} \neq V_{OUT} \times I_{OUT}$ ).

### Key Features

- Digital Implemented Active PFC Function
- Built in HV Supplying Circuit: Self Biasing
- AOCF Function with Auto-Restart Mode
- Cycle-by-Cycle Current Limit
- Current Sense Pin Open Protection
- Low Operating Current: 0.85mA (Typical)
- Programmable Oscillation Frequency
- Programmable LED Current
- Analog Dimming Function

# 1. Schematic

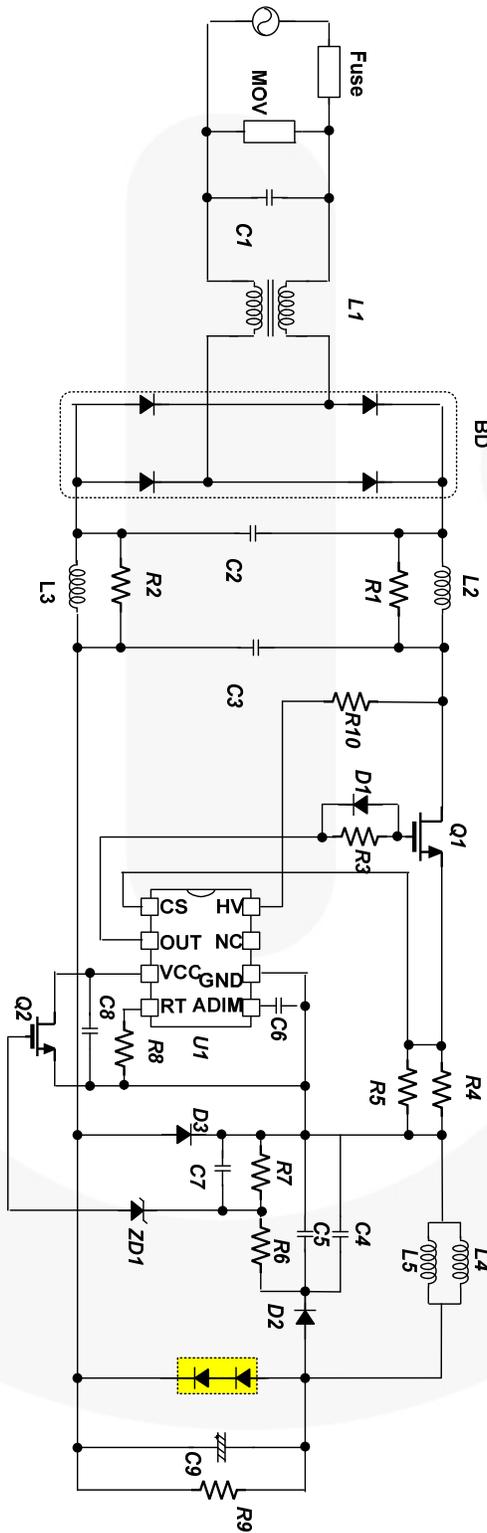
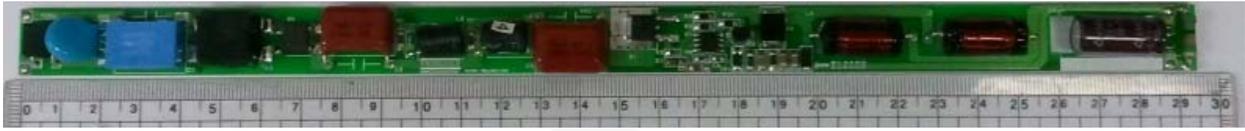


Figure 1. Schematic

## 2. Bill of Materials

Item No.	Part Reference	Part Number	Qty.	Description	Manufacturer
1	U1	FL7701	1	Controller	Fairchild Semiconductor
2	Fuse	SS-5-1A	1	1A / 250V Fuse	Cooper Bussmann
3	MOV	MOV-10D471K	1	VARISTOR 470V 10MM RADIAL	Bourns Inc.
4	L1	LF-1480-253	1	Line Filter	Sejin Telecom (www.sejintel.com)
5	L2, L3	RFB0810-472	2	4.7mH Inductor	Coil Craft
6	L4, L5	PCH-45x-475	2	4.7mH Inductor	Coil Craft
7	BD	DF04S	1	400V / 1.5A, Bridge Rectifier	Fairchild Semiconductor
8	D1	1N4148	1	100V / 200mA, Small Signal Diode	Fairchild Semiconductor
9	D2	RS1M	1	1000V / 1A, Fast Rectifier	Fairchild Semiconductor
10	D3	ES3J	1	600V / 3A, Fast Rectifier	Fairchild Semiconductor
11	ZD1	MMSZ5230B	1	4.7V / 0.5W Zener Diode	Fairchild Semiconductor
12	Q1	FQD2N60	1	2A / 600V MOSFET	Fairchild Semiconductor
13	Q2	FQN1N50C	1	1A / 500V MOSFET	Fairchild Semiconductor
14	C1	PCX2 335M MKP 100nF	1	100nF / 275V <sub>AC</sub> , X-Cap	PILKOR
15	C2	MPE 630V104K	1	0.1μF / 630V <sub>AC</sub> , 10%, Polypropylene	Sungho
16	C3	MPE 400V334K	1	0.33μF / 400V <sub>AC</sub> , 10%, Polypropylene	Sungho
17	C4, C5	C1206C225K5PACTU	2	2.2μF / 50V SMD Capacitor 3216	Kemet
18	C6	C0805C104K3RACTU	1	0.1μF / 25V SMD Capacitor 2012	Kemet
19	C7	C1206C102K5PACTU	1	1nF / 50V SMD Capacitor 3216	Kemet
20	C8	C1206C105K5PACTU	1	1μF / 50V SMD Capacitor 3216	Kemet
21	C9	KMG 330μF / 63V	1	330μF/63V Electrolytic Capacitor	SamYoung
22	R1, R2	RC1106JR-07151RL	2	150Ω Resistor, SMD, 1/4W, 3216	Yageo
23	R3	RC0805JR-07331RL	1	330Ω Resistor, SMD, 1/8W, 2012	Yageo
24	R4, R5	RC1106JR-070R9RL	2	0.9Ω Resistor, SMD, 1/4W, 3216	Yageo
25	R6	RC1106JR-07204RL	1	200kΩ Resistor, SMD, 1/4W, 3216	Yageo
26	R7	RC1106JR-07153RL	1	15kΩ Resistor, SMD, 1/4W, 3216	Yageo
27	R8	RC0805JR-07823RL	1	82kΩ Resistor, SMD, 1/8W, 2012	Yageo
28	R9	10.0KBZTB-ND	1	10kΩ /1W Resistor	Yageo
29	R10	RC1106JR-07000RL	1	0Ω Resistor, SMD, 1/4W, 3216	Yageo

### 3. Photographs



**Figure 2. Top View, Length: 295mm**



**Figure 3. Width: 18mm**



**Figure 4. Height: 10mm (Include PCB Height)**

## 4. Performance

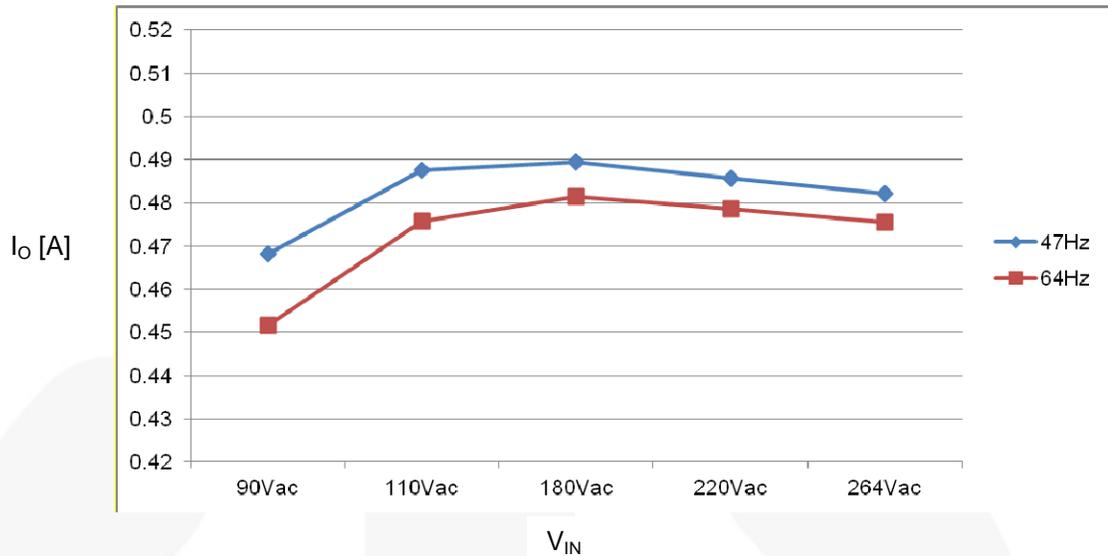


Figure 5. CC Deviation Curve

Table 1. Output Characteristics by Input Voltage and Frequency

	47Hz		64Hz	
	$V_{LED(RMS)}$	$I_{LED(RMS)}$	$V_{LED(RMS)}$	$I_{LED(RMS)}$
<b>90V<sub>AC</sub></b>	37.73V	468.2mA	37.78V	451.6mA
<b>110V<sub>AC</sub></b>	38.07V	487.6mA	38.13V	475.7mA
<b>180V<sub>AC</sub></b>	38.25V	489.4mA	38.23V	481.4mA
<b>220V<sub>AC</sub></b>	38.25V	485.6mA	38.26V	478.7mA
<b>264V<sub>AC</sub></b>	38.18V	482.1mA	38.20V	475.4mA
<b>Deviation</b>		4.33%		6.19%

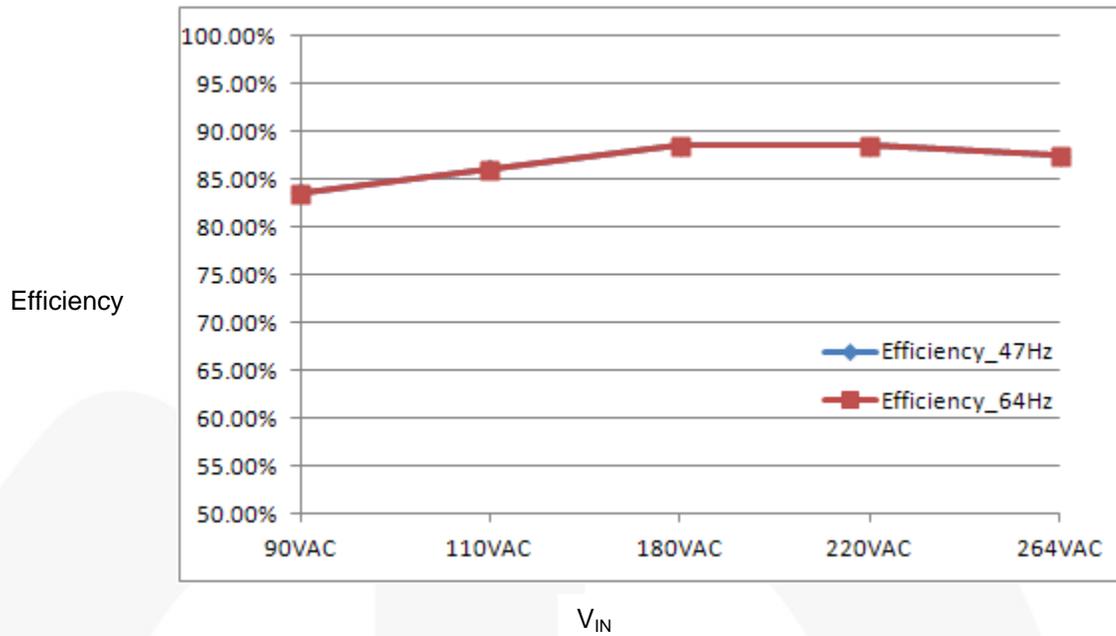


Figure 6. System Efficiency

Table 2. Efficiency Test Result

Input Voltage		Efficiency (%)
90V <sub>AC</sub>	47Hz	83.63
	64Hz	83.55
110V <sub>AC</sub>	47Hz	86.18
	64Hz	86.06
180V <sub>AC</sub>	47Hz	88.52
	64Hz	88.56
220V <sub>AC</sub>	47Hz	88.58
	64Hz	88.52
264V <sub>AC</sub>	47Hz	87.53
	64Hz	87.51

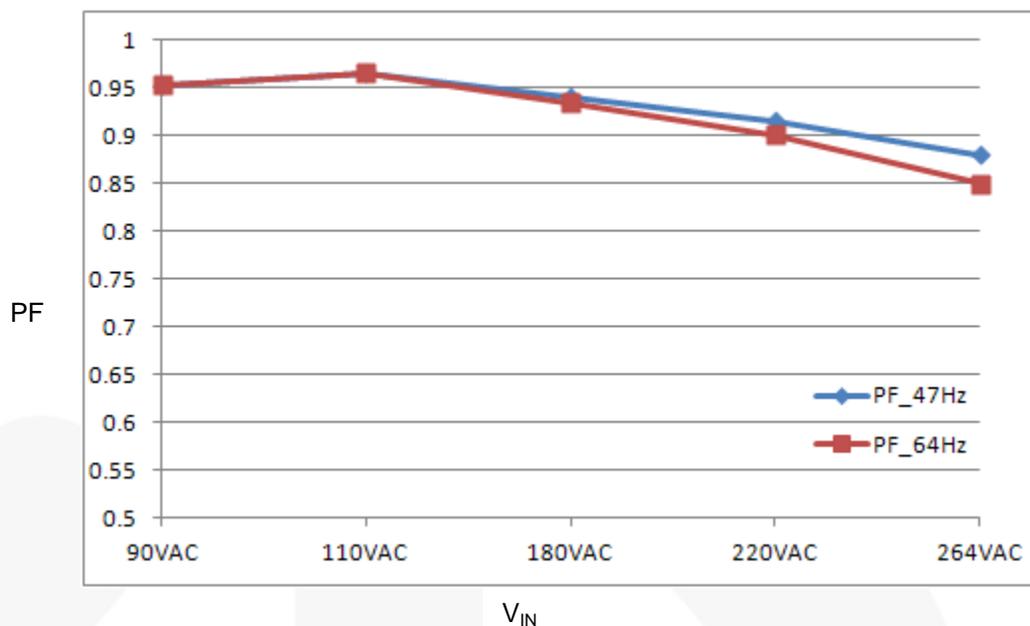


Figure 7. Power Factor

Table 3. PF Test Results

Input Voltage		Power Factor
90V <sub>AC</sub>	47Hz	0.95
	64Hz	0.95
110V <sub>AC</sub>	47Hz	0.96
	64Hz	0.96
180V <sub>AC</sub>	47Hz	0.94
	64Hz	0.93
220V <sub>AC</sub>	47Hz	0.91
	64Hz	0.90
264V <sub>AC</sub>	47Hz	0.88
	64Hz	0.85

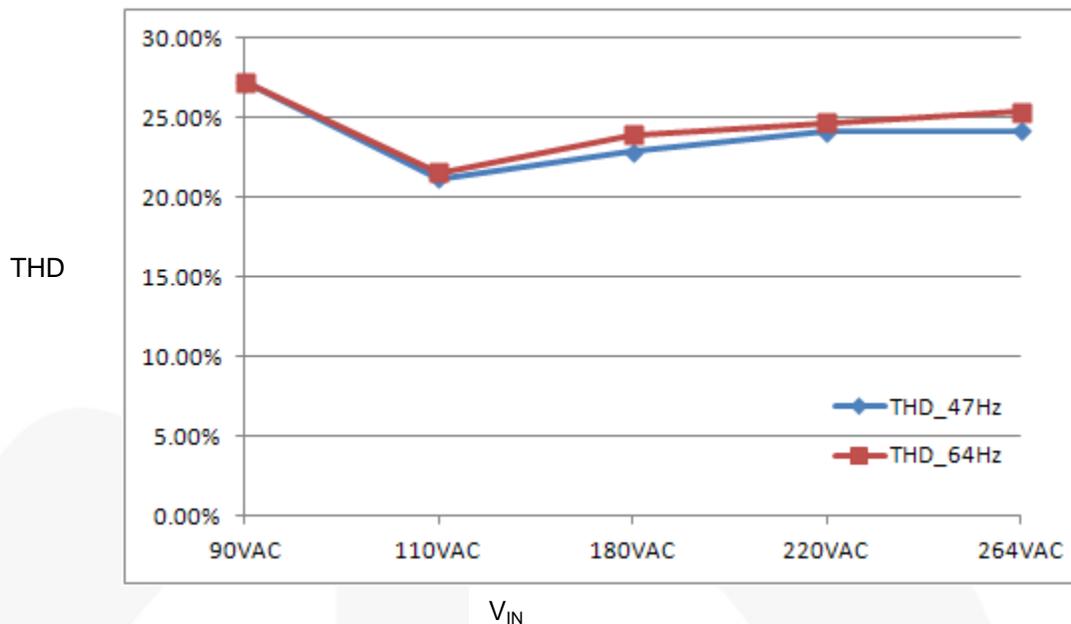


Figure 8. Total Harmonic Distortion

Table 4. THD Test Result

Input Voltage		THD (%)
90V <sub>AC</sub>	47Hz	27.24
	64Hz	27.25
110V <sub>AC</sub>	47Hz	21.18
	64Hz	21.54
180V <sub>AC</sub>	47Hz	22.88
	64Hz	23.97
220V <sub>AC</sub>	47Hz	24.10
	64Hz	24.71
264V <sub>AC</sub>	47Hz	24.19
	64Hz	25.40

## 5. Related Resources

[FL7701 — Smart LED Lamp Driver IC with PFC Function](#)

[Reference Designs — http://www.fairchildsemi.com/support/referencedesign](http://www.fairchildsemi.com/support/referencedesign)

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