

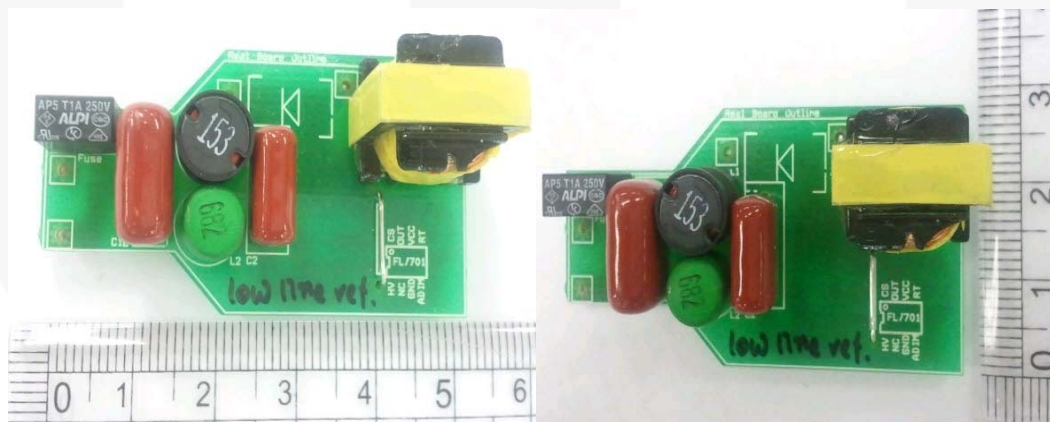
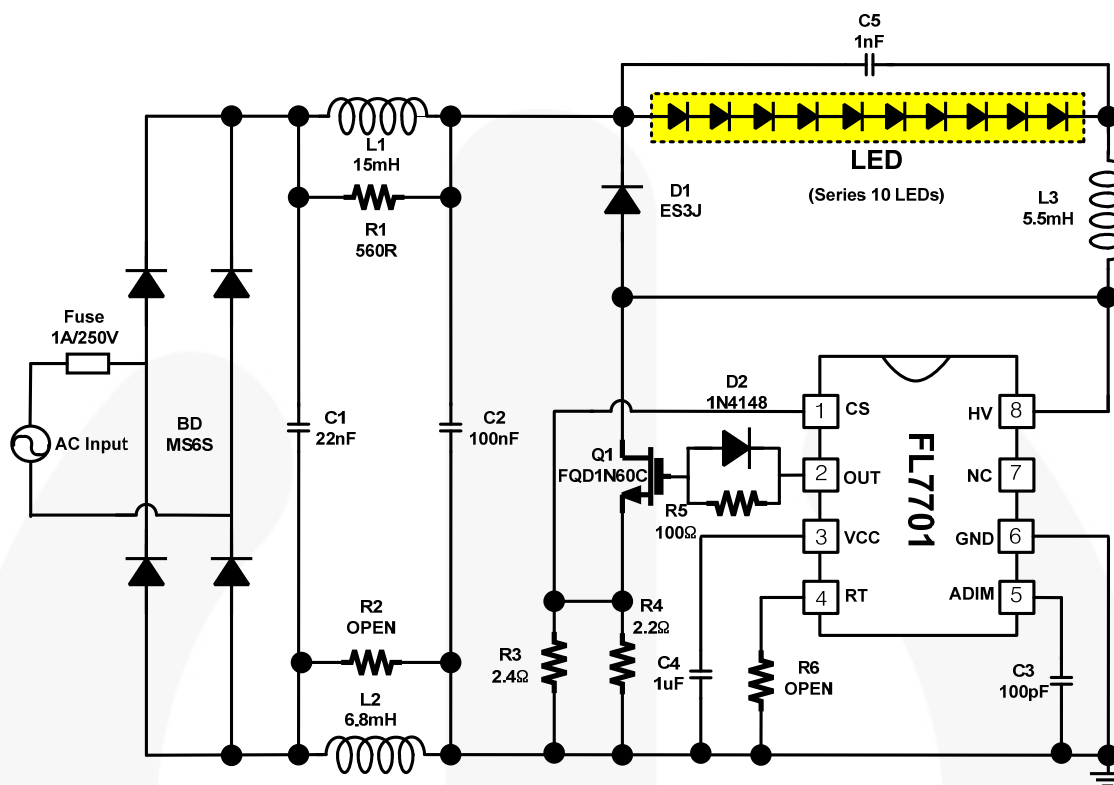
Fairchild Reference Design

The following reference design supports inclusion of FL7701 in design of 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 Bulb	FL7701M	90-150V _{AC}	7.8W	31.2V/(250mA)

Key Features

- Digital Implemented Active PFC function
- Built in HV Supplying Circuit: Self Biasing
- AOCF Function with Auto Restart Mode
- Built-in Over Temperature Protection (OTP)
- Cycle-by-Cycle Current Limit
- Current Sense Pin Open Protection
- Low Operating Current: 0.85mA (typ.)
- Under-Voltage Lockout with 5V Hysteresis.
- Programmable Oscillation Frequency
- Programmable LED Current
- Analog Dimming Function
- Soft-Start Function
- Precise Internal Reference: $\pm 3\%$



2. Bill of Materials

Item No.	Part Reference	Part Number	Qty.	Description	Manufacturer
1	U1	FL7701M	1	Controller	Fairchild Semiconductor
2	BD	MB6S	1	0.5A/600V, Bridge Diode	Fairchild Semiconductor
3	C1	MPE 630V223K	1	223/630V _{AC} , Film Capacitor	Sungho
4	C2	MPE 400V104K	1	104/400V _{AC} , Film Capacitor	Sungho
5	C3	C0805C104K3RACTU	1	104/25V SMD Capacitor 2012	Kemet
6	C4	C1206C105K3PACTU	1	105/25V SMD Capacitor 3216	Kemet
7	C5	C1206C102JBGACTU	1	102/630V SMD Capacitor 3216	Kemet
8	Q1	FQD1N60C	1	1A/600V D-PAK	Fairchild Semiconductor
9	D1	ES3J	1	3A/600V, Ultra-Fast Recovery	Fairchild Semiconductor
10	D2	1N4148	1	0.2A/200V Small Signal Diode	Fairchild Semiconductor
11	L1	RFB0810-153L	1	15mH, Filter Inductor	Coilcraft
12	L2	R06682KT00	1	6.8mH, Filter Inductor	Bosung
13	R1	RC1206JR-07511RL	1	510Ω, SMD Resistor 3216	Yageo
14	R2	-	0	Open	-
	R3	RC1206JR-072R4RL	1	2.4Ω, SMD Resistor 3216	Yageo
15	R4	RC1206JR-072R2RL	1	2.2Ω, SMD Resistor 3216	Yageo
16	R5	RC0805JR-07101RL	1	100Ω, SMD Resistor 2012	Yageo
17	R6	-	0	Open	-

3. Inductor Design

- Follow Safe Standard
- Inductor core : EE1614(TDK)
- N1 : 280 Turns
- Inductance value (1 → 6) : 5.5mH

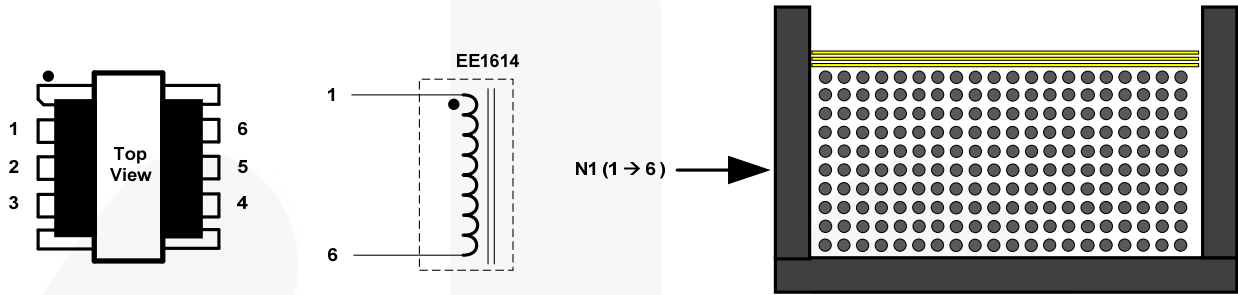


Table 1. Inductor Specification

No	Winding	Pin (S → F)	Wire	Turns	Winding Method
1	N1	1 → 6	0.2Ø	280Ts	Solenoid winding
2	Insulation : polyester Tape t = 0.025mm 3 layers				

4. Performance

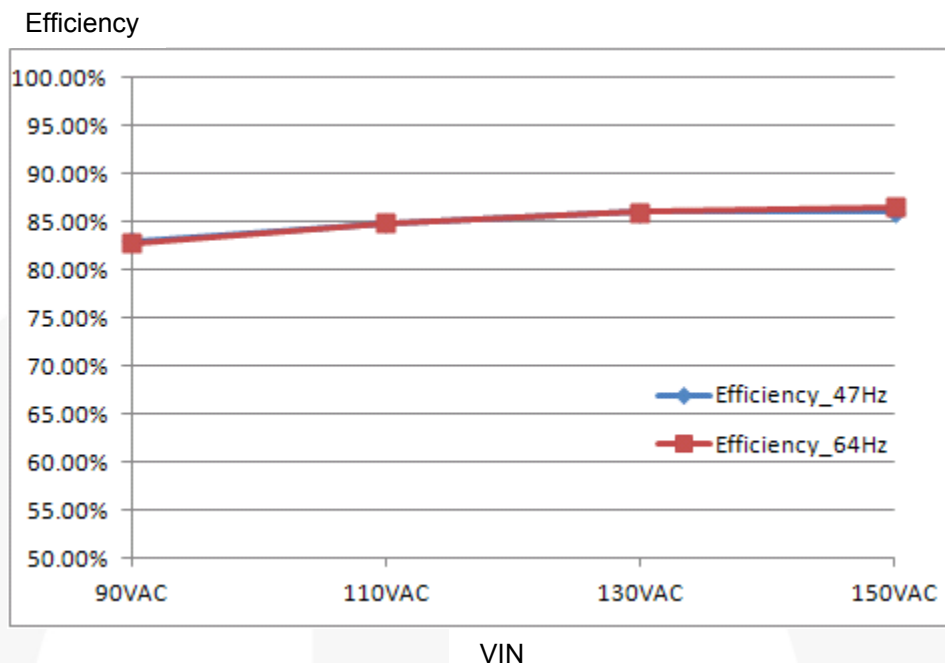
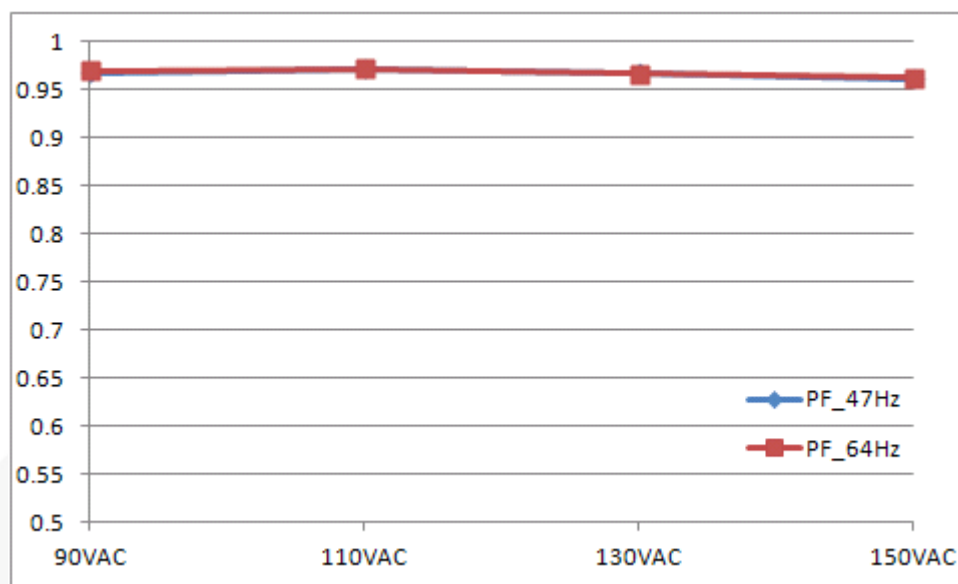


Figure 3. Efficiency Curve

Table 2. Efficiency test result

Input Voltage		Efficiency (%)
90V _{AC}	47Hz	82.97
	64Hz	82.81
110V _{AC}	47Hz	84.87
	64Hz	84.88
130V _{AC}	47Hz	86.04
	64Hz	86.08
150V _{AC}	47Hz	86.50
	64Hz	86.61

PF



VIN

Figure 4. Power Factor Performance

Table 3. PF Test Result

Input Voltage (V _{AC})	Frequency (Hz)	PF
90V _{AC}	47Hz	0.97
	64Hz	0.97
110V _{AC}	47Hz	0.97
	64Hz	0.97
130V _{AC}	47Hz	0.97
	64Hz	0.97
150V _{AC}	47Hz	0.96
	64Hz	0.96

THD

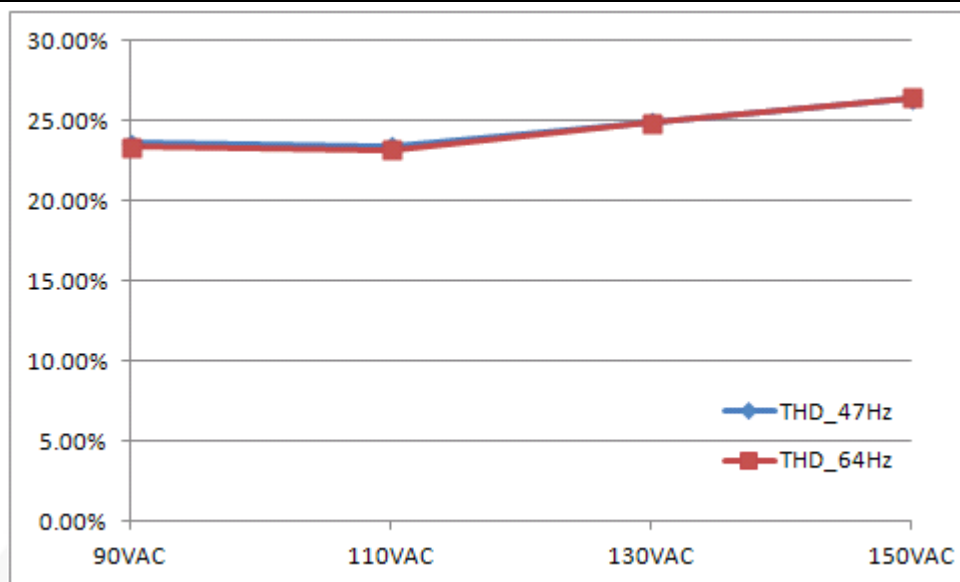


Figure 5. THD Performance

Table 4. THD Test Result

Input Voltage (V _{AC})	Frequency (Hz)	THD (%)
90V _{AC}	47Hz	23.60
	64Hz	23.39
110V _{AC}	47Hz	23.45
	64Hz	23.17
130V _{AC}	47Hz	24.92
	64Hz	24.90
150V _{AC}	47Hz	26.40
	64Hz	26.46

5. Related Resources

[Datasheet link FL7701](#)

<http://www.fairchildsemi.com/referencedesign/>

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