Evaluation Board SY5802FAC_1

Single Stage Flyback And PFC Controller With Primary Side Control For LED Lighting

1. Introduction

The SY5802 is a single stage Flyback and PFC controller targeting at LED lighting applications with PWM/Analog dimming. It is a primary side controller without applying any secondary feedback circuit for low cost, and drives the Flyback converter in the quasi-resonant mode to achieve higher efficiency. It keeps the Flyback converter in constant on time operation to achieve high power factor.

2. Application

Provide 9W~12W output power with Analog dimming. Dimming signal frequency is above 100Hz, output current ranges from 10% to 100%.

3. Design Specifications

Item	Min	Typical	Max	Note
Input Voltage(V)	85	100-240	264	
Output Voltage (V) Current(mA) Power(W)	30	 36 300 10.8W	 44	
PF (110Vac，full load) (220Vac，full load)	>0.90	 0.99 0.95		
Efficiency （110Vac，full load） （220Vac，full load）	>84%	 86.1% 87.9%		
condition Working temperature	-20℃		75℃	

4. Schematic

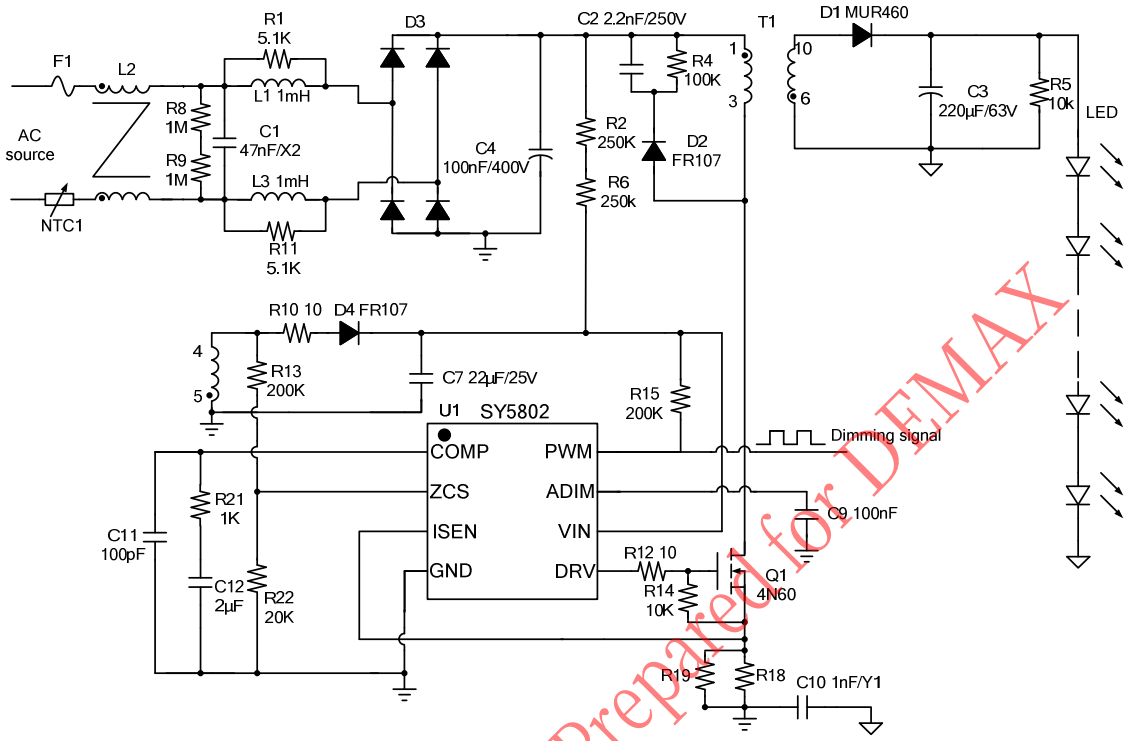


Figure 1. Schematic Diagram

5. PCB Layout

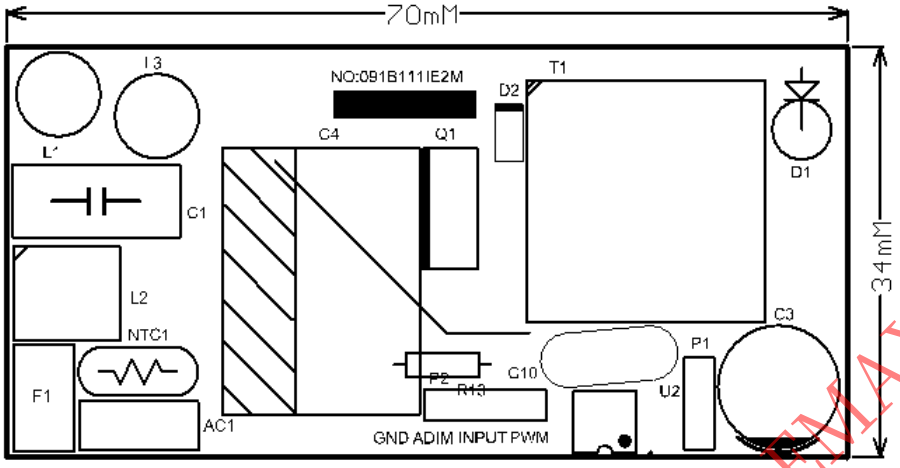
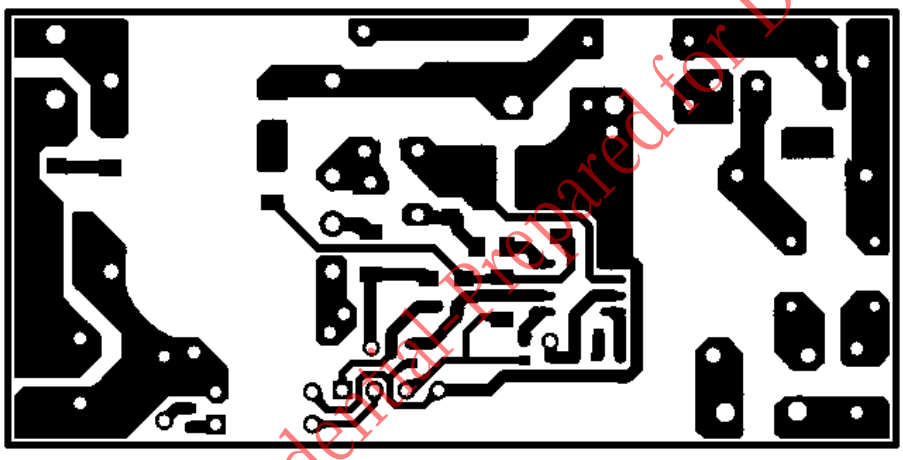


Figure 2. Top layer Silkscreen



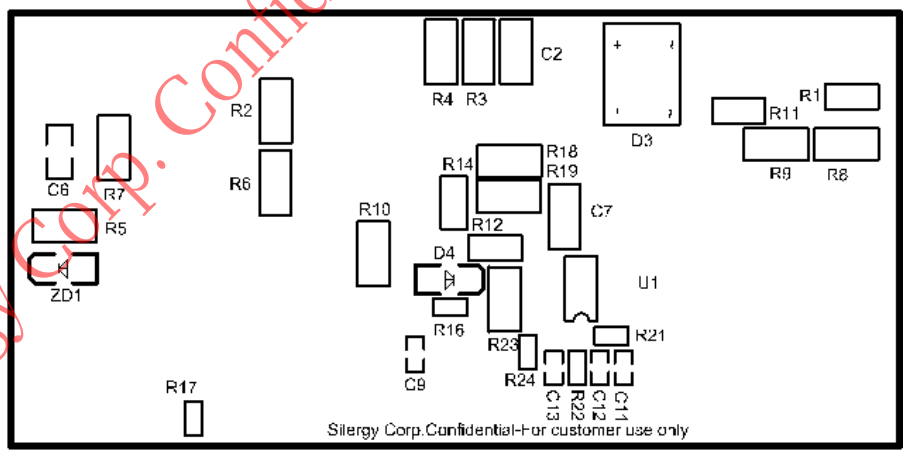
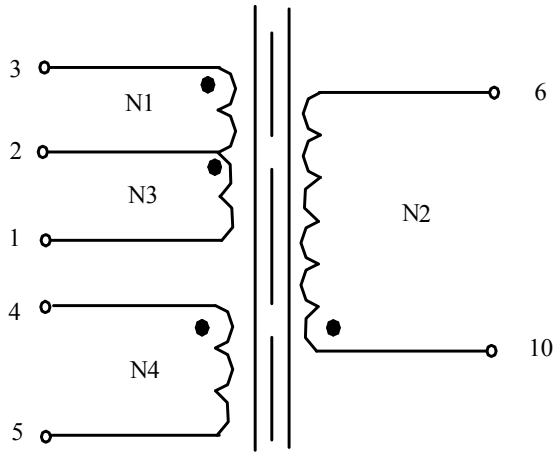


Figure 3. (a) bottom layer, (b) bottom layer

6. BOM List

Reference Designator	Description	Package Info
C1	47nF/275V	X2
C2	2.2nF/250V	1206
C3	220μF/63V	
C4	100nF/400V	CBB
C7	22μF/25V	1206
C9	100nF/50V	0805
C10	1nF/Y1	Y1
C11	100pF/50V	0603
C12	2μF/50V	0603
R1,R11	5.1KΩ	0805
R8,R9	1MΩ	1206
R2,R6	250KΩ	1206
R4	100KΩ	1206
R5	100KΩ	0805
R10,R12	10Ω	0805
R13	200KΩ	
R14	10KΩ	0805
R16,R17	1KΩ	0603
R18	2Ω	1206
R19	0.33Ω	1206
R21	1KΩ	0603
R22	20KΩ	0603
Q1	4N60	TO-220
L1,L3	>1.5mH	
L2	>10mH	EE8.3
D1	MURS460	DIP
D2	FR107	DIP
D3	DB107	SMD
D4	BAV21W	SMD

7. Transformer Design Specifications

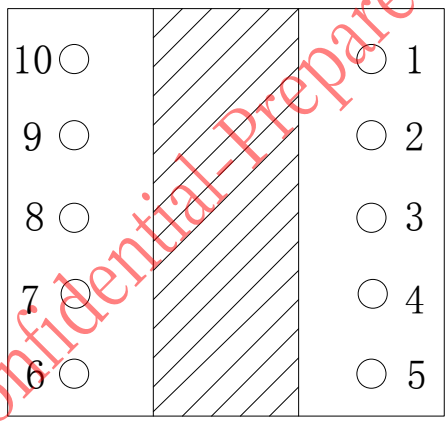


Temperature： 25±5℃ Humidity： 65±25%

Test Condition：40KHz ,1V

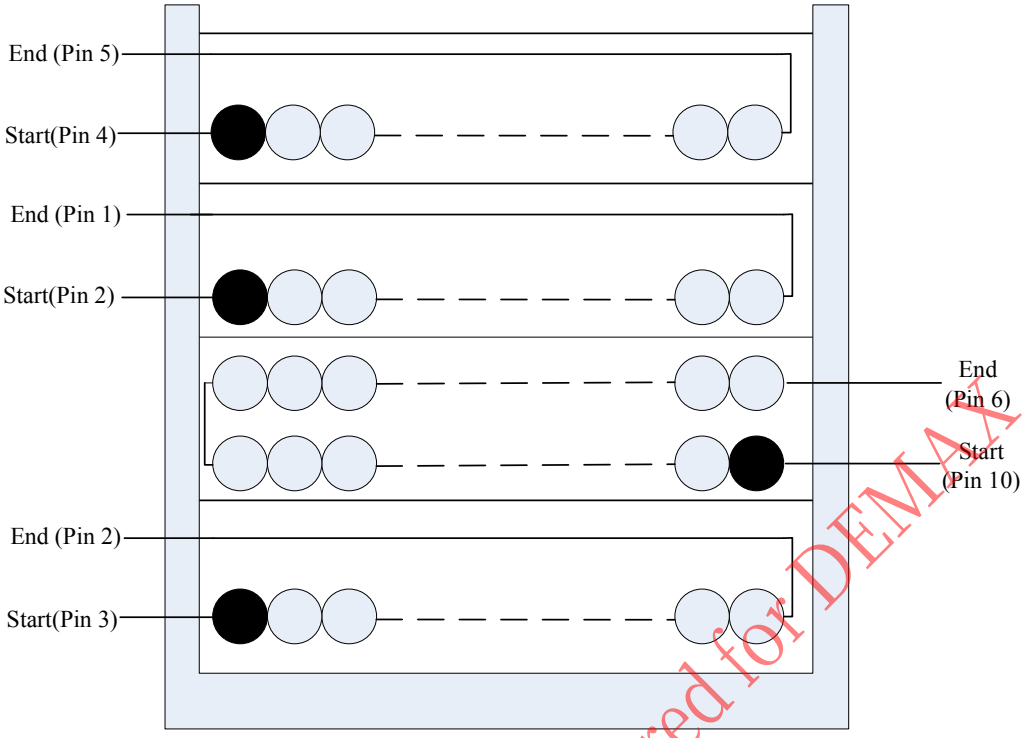
L：PIN(1-3) =600μH±5%

LK：PIN(1-3) =10μH/MAX,(SHORT SEC)



Bottom overview (EFD20 core with air gap)

Winding	Wire diameter*Number	Pin		PTFE tube		TS	Insulating Tape 9.5mm(TS)	Notes
		IN	OUT	IN	OUT			
N1	Ø0.25*1(2UEW)	3	2			46	2	Close wound
N2	Ø0.35*1(TEX-E)	10	6			46	2	Close wound
N3	Ø0.25*1(2UEW)	4	5			46	2	Close wound
N4	Ø0.19*1(2UEW)	2	1			16	2	Close wound



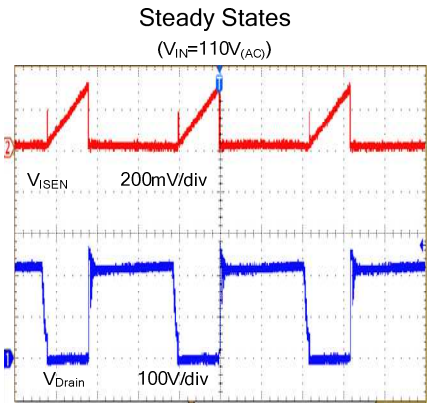
Transformer Structure

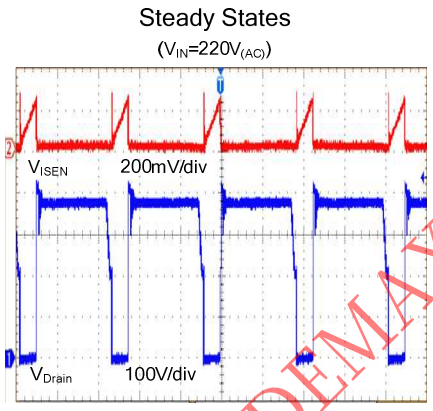
8. Quick Start Guide

1. Connect the input supply to L and N input connectors.
2. Connect the LED load between LED+ and LED- output connectors.
3. Preset the input supply to a voltage between 85V and 264Vac.
4. Turn on the input supply and measure the LED Current.
5. Connect the dimming signal to “ADIM ” and “ GND ” connectors.

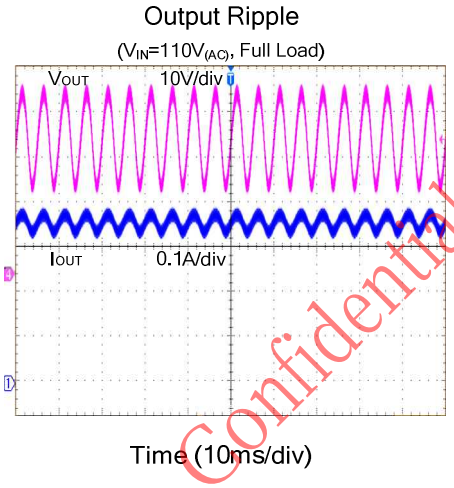
9. Operation Performances

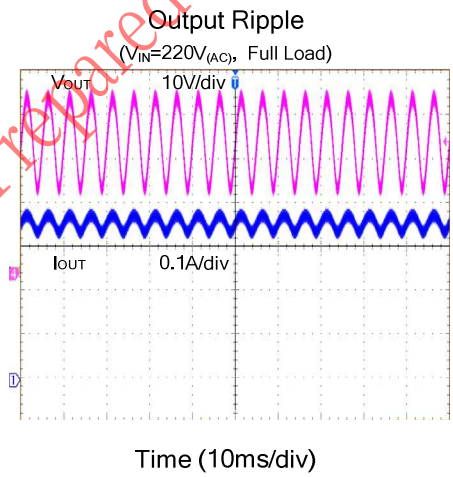
9.1 Steady States



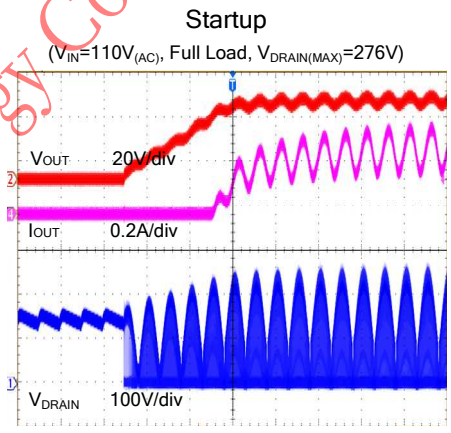


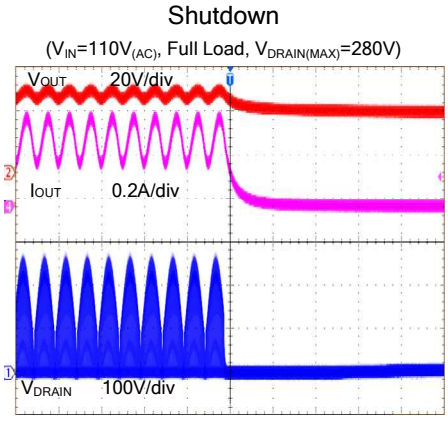
9.2 Output Ripple





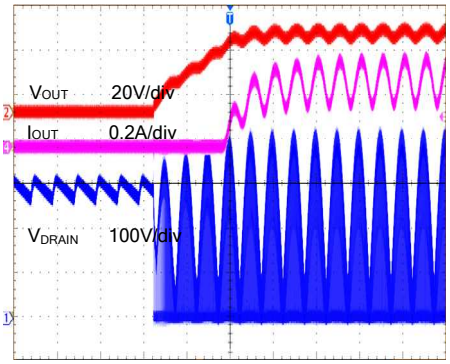
9.3 Start Up & Shut Down





Startup

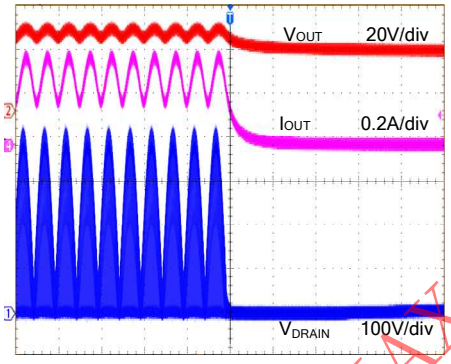
(V_{IN}=220$V_{(AC)}$, Full Load, $V_{DRAIN(MAX)}$=432V)



Time (20ms/div)

Shutdown

(V_{IN}=220$V_{(AC)}$, Full Load, $V_{DRAIN(MAX)}$=436V)

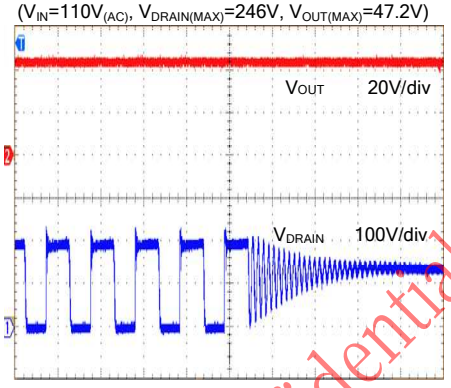


Time (20ms/div)

9.4 Open LED Protection

Open LED Protection

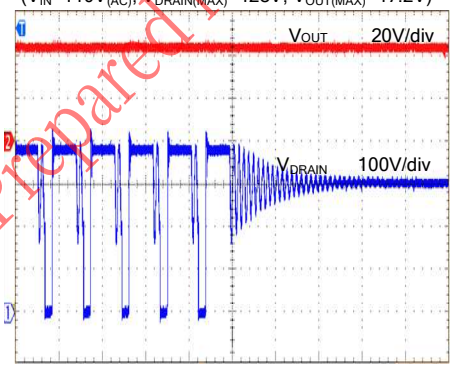
(V_{IN}=110$V_{(AC)}$, $V_{DRAIN(MAX)}$=246V, $V_{OUT(MAX)}$=47.2V)



Time (10us/div)

Open LED Protection

(V_{IN}=110$V_{(AC)}$, $V_{DRAIN(MAX)}$=428V, $V_{OUT(MAX)}$=47.2V)

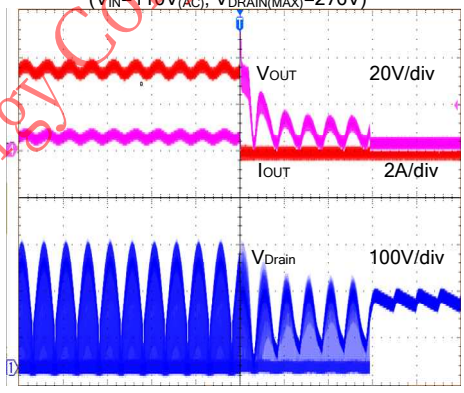


Time (20ms/div)

9.5 Short Circuit Protection

Short Circuit Protection

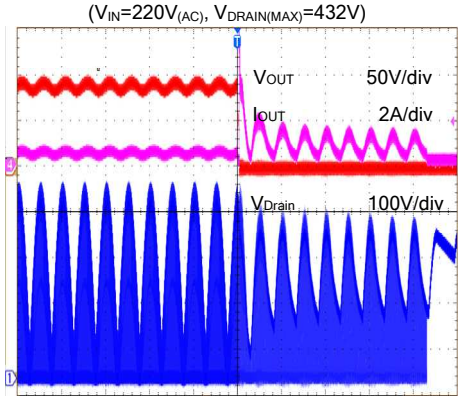
(V_{IN}=110$V_{(AC)}$, $V_{DRAIN(MAX)}$=276V)



Time (20ms/div)

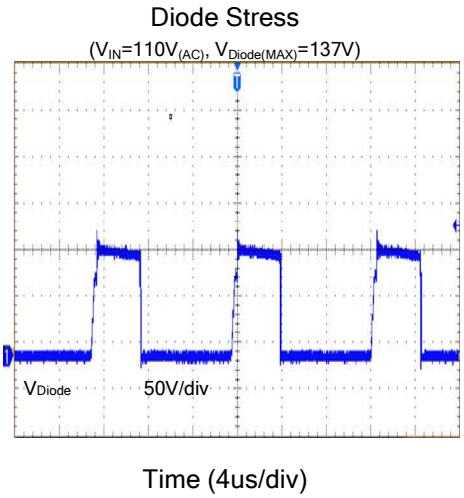
Short Circuit Protection

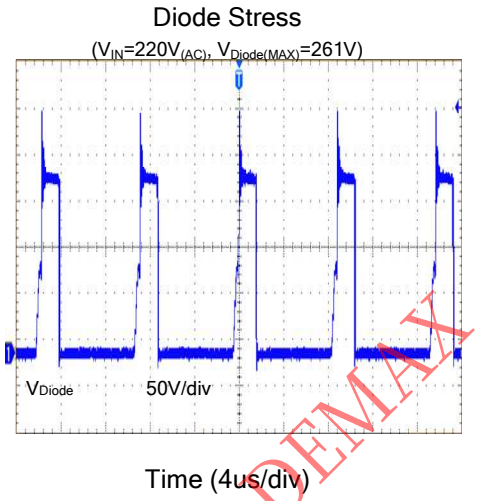
(V_{IN}=220$V_{(AC)}$, $V_{DRAIN(MAX)}$=432V)



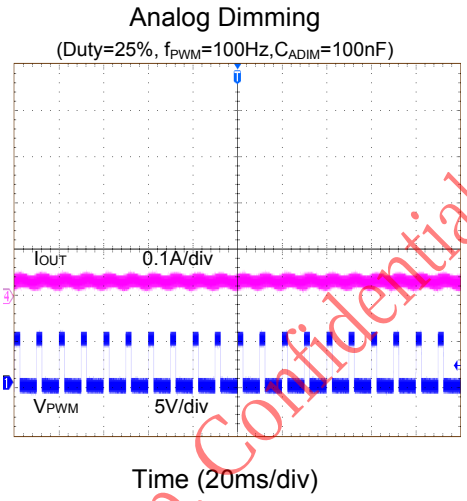
Time (20ms/div)

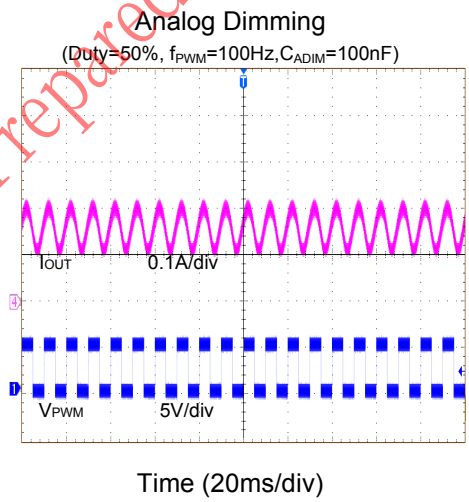
9.6 Diode Stress

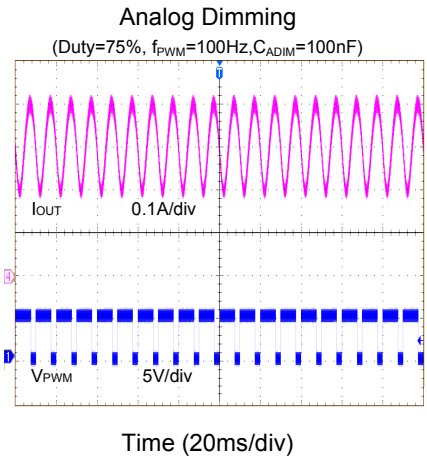




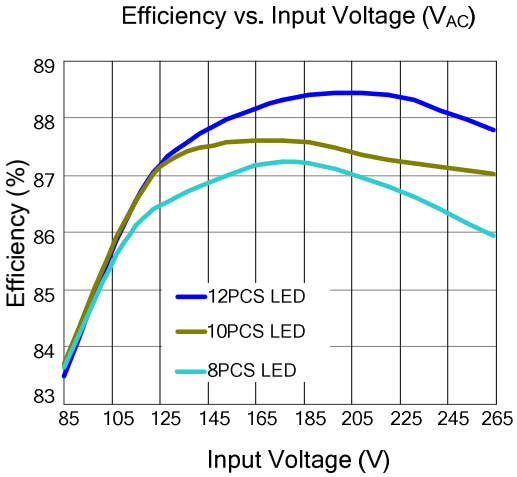
9.7 Analog Dimming



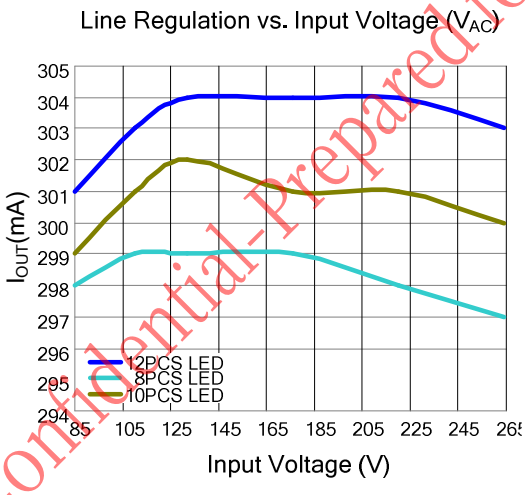




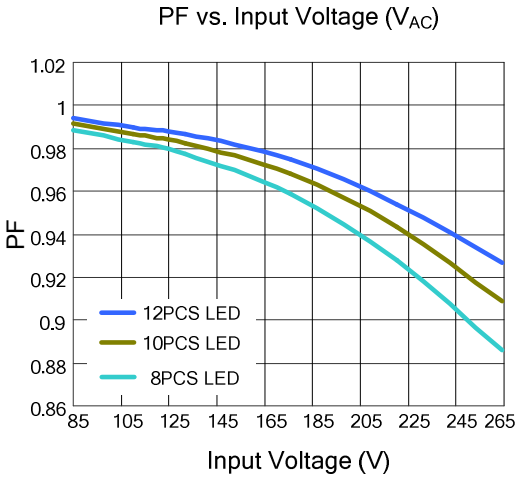
9.8 Efficiency



9.9 Line Regulation



9.10 Power Factor



9.11 Analog dimming curve