SY5802

Single Stage Flyback And PFC Controller With Primary Side Control For LED Lighting and PWM Dimming or Analog Dimming device option

Preliminary datasheet

General Description

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.

Ordering Information

SY5802 □(□□)□

- Temperature Code
- Package Code
- Optional Spec Code

Temperature Range: -40°C to 85°C

Ordering Number	Package type	Note
SY5802FBC	MSOP10	----
SY5802FAC	SO8	----

Features

- Primary side control eliminates the opto-coupler.
- PWM or Analog Dimming.
- Valley turn-on of the primary MOSFET to achieve low switching losses
- 0.3V primary current sense reference voltage leads to a lower sense resistance thus a lower conduction loss.
- Internal high current MOSFET driver: 1A sourcing and 2A sinking
- Low start up current: 15uA typical
- Reliable short LED and Open LED protection
- Power factor >0.90 with single-stage conversion.(Analog dimming only)
- Compact package: SO8

Applications

- LED lighting
- Down light
- Tube lamp
- PAR lamp
- Bulb lamp

Typical Applications

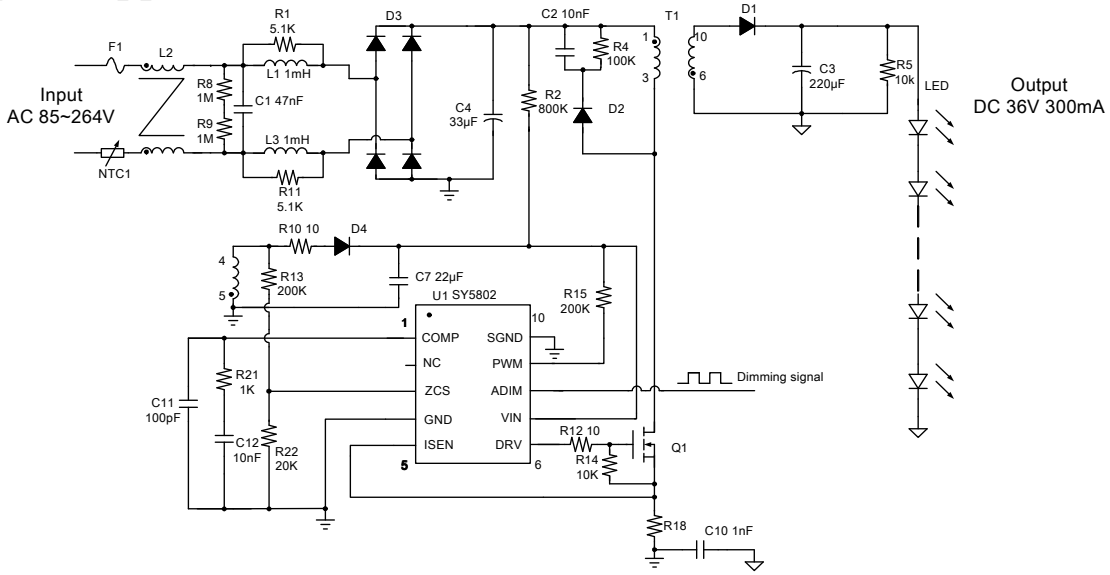


Figure 1a. PWM dimming Schematic Diagram MSOP10

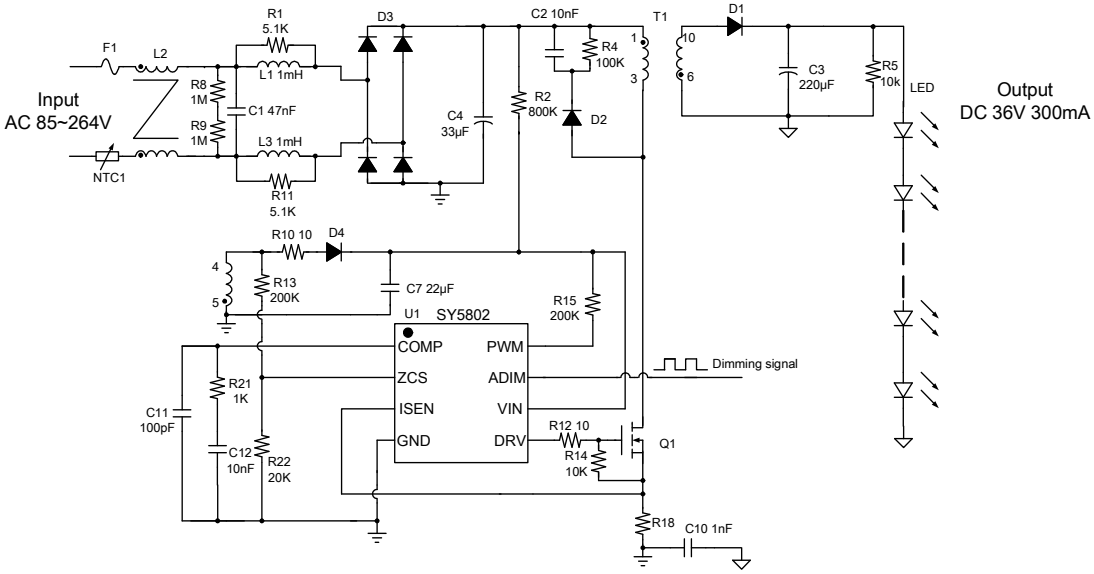


Figure 1b. PWM dimming Schematic Diagram SO8

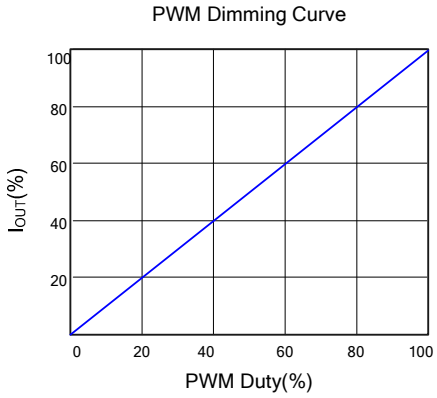


Figure 1c. PWM dimming curve

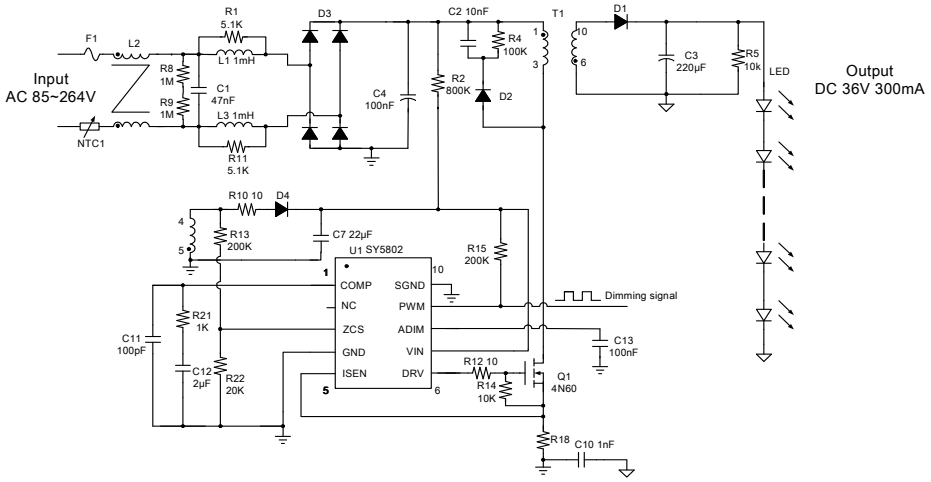


Figure 2a. Analog dimming Schematic Diagram MSOP10

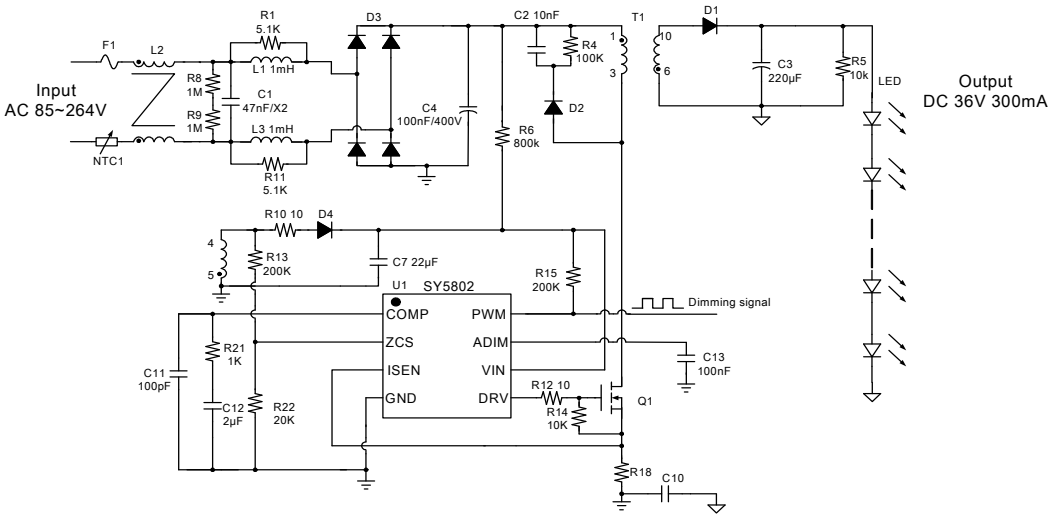


Figure 2b. Analog dimming Schematic Diagram SO8

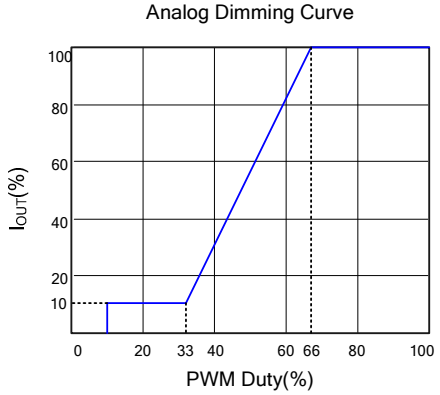
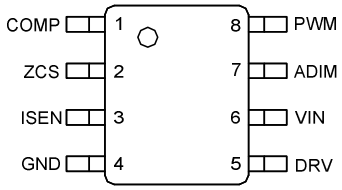
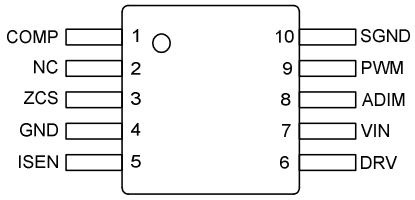


Figure 2c. Analog dimming curve

Pinout (top view)



（SOP8）



（MSOP10）

Top Mark: AEF*xyz* (device code: AEF, ***x=year code, y=week code, z= lot number code***)
ADX*xyz* (device code: ADX, ***x=year code, y=week code, z= lot number code***)

Pin Name	Pin number		Pin Description
	SO8	MSOP10	
COMP	1	1	Loop compensation pin. Connect a RC network across this pin and ground to stabilize the control loop.
ZCS	2	3	Inductor current zero-crossing detection pin. This pin receives the auxiliary winding voltage by a resister divider and detects the inductor current zero crossing point. This pin also provides over voltage protection and line regulation modification function simultaneously. If the voltage on this pin is above $V_{ZCS,OVP}$, the IC would enter over voltage protection mode. Good line regulation can be achieved by adjusting the upper resistor of the divider.
ISEN	3	5	Current sense pin. Connect this pin to the source of the primary switch. Connect the sense resistor across the source of the primary switch and the GND pin. (current sense resister R_S: $R_S = k\frac{V_{REF} \times N_{PS}}{I_{OUT}}$, k=0.167)
GND	4	4	Ground pin
DRV	5	6	Gate driver pin. Connect this pin to the gate of primary MOSFET.
VIN	6	7	Power supply pin. This pin also provides output over voltage protection along with ZCS pin.
ADIM	7	8	Bypass this pin to GND with enough capacitance to hold on internal voltage reference.
PWM	8	9	PWM dimming input pin, this pin detects the PWM dimming signal
SGND	-	10	Signal ground.

Absolute Maximum Ratings (Note 1)

VIN, DRV ---------- -0.3V~19V
Supply Current I_{VIN} ---------- 30mA
ADIM, ZCS ---------- V_{IN}+0.3V
ISEN, COMP, PWM ---------- 3.6V
Power Dissipation, @ T_A = 25°C MSOP10/SO8 ---------- 0.8W/1.1W
Package Thermal Resistance (Note 2)
MSOP10/SO8, θ JA ---------- 125°C/W /88°C/W
MSOP10/SO8, θ JC ---------- 60°C/W /45°C/W
Temperature Range ---------- -45°C to 150°C
Lead Temperature (Soldering, 10 sec.) ---------- 260°C
Storage Temperature Range ---------- -65°C to 150°C

Recommended Operating Conditions (Note 3)

VIN, DRV ---------- 8V~15.4V
Junction Temperature Range ---------- -40°C to 125°C
Ambient Temperature Range ---------- -40°C to 105°C

Block Diagram

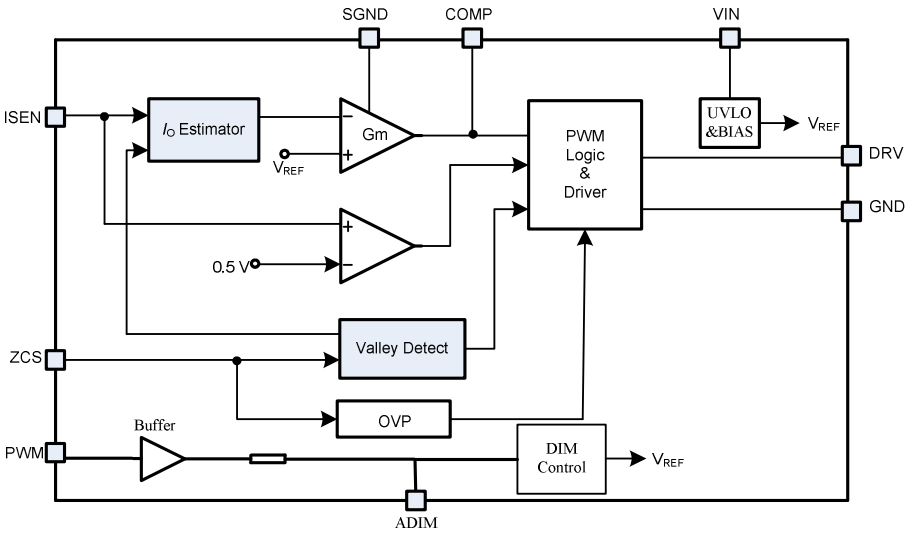


Figure3. Block Diagram

Electrical Characteristics

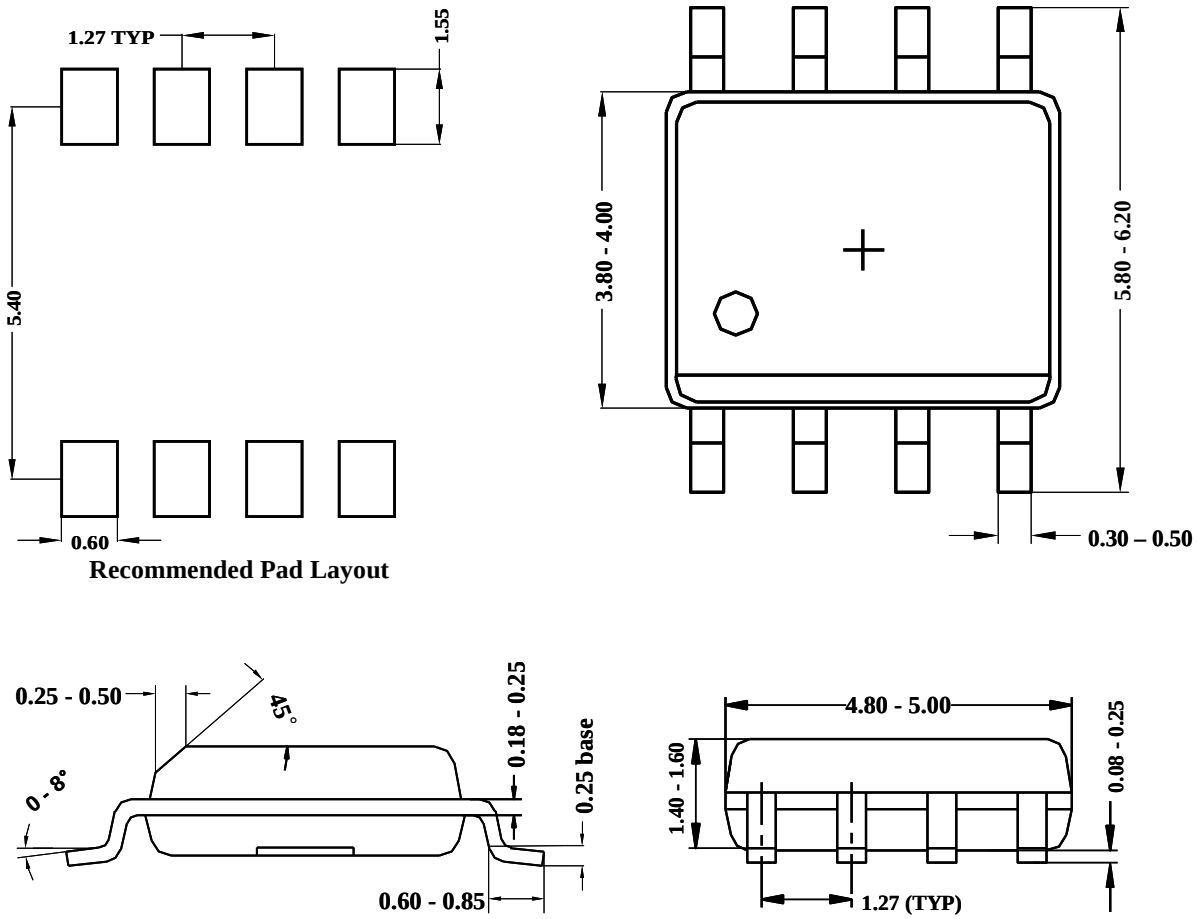
(V_{IN} = 12V (Note 3), T_A = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Power Supply Section						
Input voltage range	V_{VIN}		8		15.4	V
VIN turn-on threshold	$V_{VIN,ON}$				17.6	V
VIN turn-off threshold	$V_{VIN,OFF}$		6.0		7.9	V
VIN OVP voltage	$V_{VIN,OVP}$			$V_{VIN,ON}$+0.85		V
Start up Current	I_{ST}	$V_{VIN}<V_{VIN,OFF}$		15		μA
Operating Current	I_{VIN}	C_L=100pF,f=15kHz		1		mA
Shunt current in OVP mode	$I_{VIN,OVP}$	$V_{VIN}>V_{VIN,OVP}$	1.6	2	2.5	mA
Error Amplifier Section						
Internal reference voltage	V_{REF}		0.294	0.3	0.306	V
Current Sense Section						
Current limit reference voltage	$V_{ISEN,MAX}$			0.5		V
ZCS pin Section						
ZCS pin OVP voltage threshold	$V_{ZCS,OVP}$			1.42		V
Gate Driver Section						
Gate driver voltage	V_{Gate}			V_{VIN}		V
Maximum source current	I_{SOURCE}			1		A
Minimum sink current	I_{SINK}			2		A
Max ON Time	$T_{ON,MAX}$	V_{COMP}=1.5V		24		μs
Min ON Time	$T_{ON,MIN}$			400		ns
Max OFF Time	$T_{OFF,MAX}$			39		μs
Min OFF Time	$T_{OFF,MIN}$			2		μs
Maximum switching frequency	f_{MAX}			120		kHz
Thermal Section						
Thermal Shutdown Temperature	T_{SD}			150		°C
PWM function Section						
PWM ON current	$I_{PWM,ON}$			20		μA
PWM OFF current	$I_{PWM,OFF}$			10		μA
PWM current Range	I_{ADIM}				1	mA

Note 1: Stresses beyond the "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Note 2: Θ_{JA} is measured in the natural convection at T_A = 25°C on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Test condition: Device mounted on 2" x 2" FR-4 substrate PCB, 2oz copper, with minimum recommended pad on top layer and thermal vias to bottom layer ground plane.
Note 3: Increase VIN pin voltage gradually higher than $V_{VIN,ON}$ voltage then turn down to 12V.

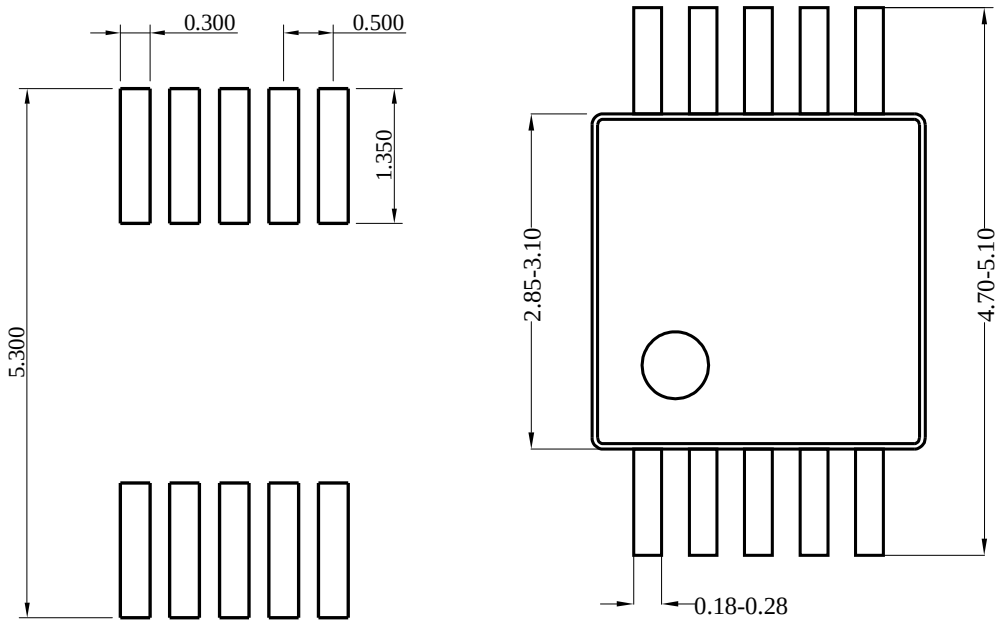
SO8 Package Outline & PCB Layout Design



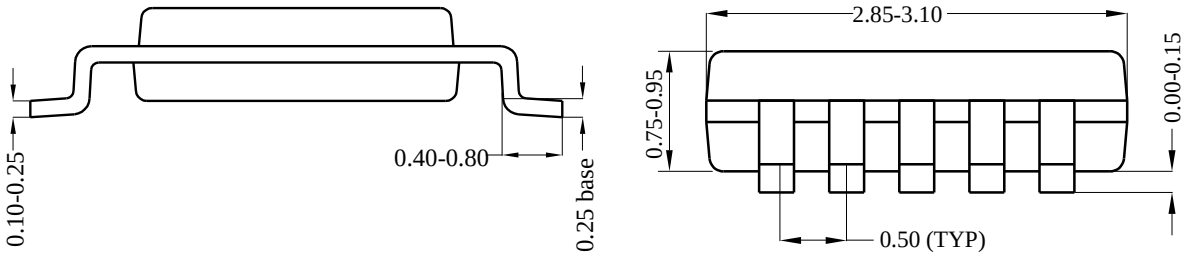
Recommended Pad Layout

Notes: All dimensions are in millimeters.
All dimensions don't include mold flash & metal burr.

MSO10 Package outline & PCB layout



Recommended Pad Layout



Notes: **All dimension in MM**
All dimension do not include mold flash & metal burr