SY5800

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

Preliminary datasheet

General Description

The SY5800 is a single stage Flyback and PFC controller that targets at LED lighting applications. It receives the rectified AC input voltage up to 400V, and drives the Flyback converter in a quasi-resonant mode for high efficiency unified power factor applications.

Ordering Information

SY5800 □(□□)□

- Temperature Code
- Package Code
- Optional Spec Code

Temperature Range: -40° C to 85° C

Ordering Number	Package type	Note
SY5800FBC	MSOP10	----
SY5800FAC	SO8	----

Features

- Primary side control eliminate the opto-coupler.
- Internal high current MOSFET driver: 1A sourcing and 2A sinking
- Low quiescent current at start up mode: 10uA typical
- 16V rising UVLO with 9V hysteresis
- Valley turn-on of the primary MOSFET to achieve low switching loss
- 0.5V max sense voltage on the primary side to minimize the conduction loss.
- Reliable short LED and Open LED protection
- Good power factor(>0.90) with single-stage conversion.
- Compact package: MSOP10 and SO8

Applications

- LED Lighting
- Down light
- Lamp light

Typical Applications

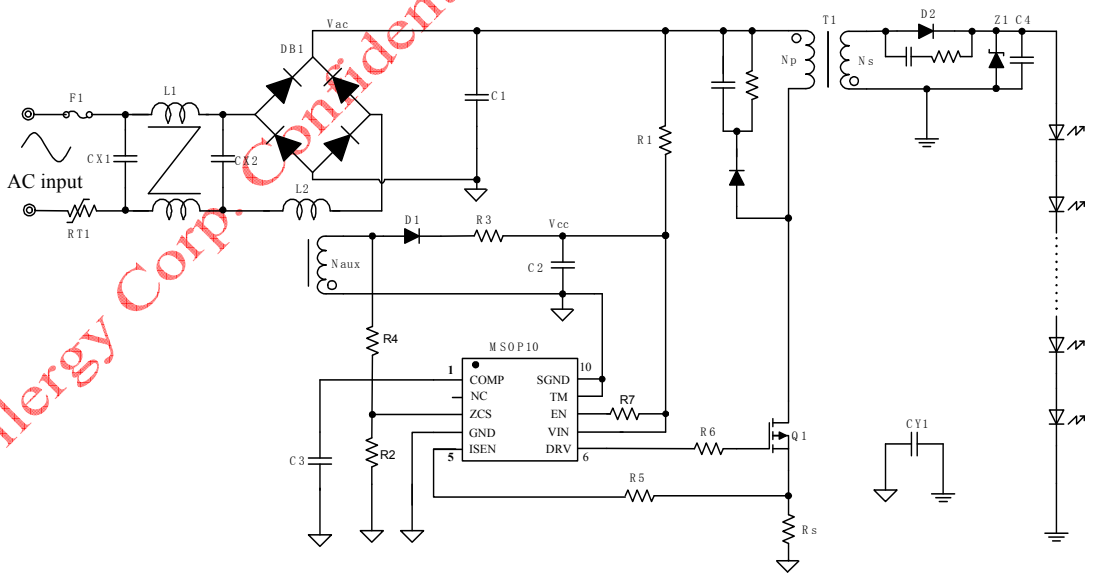


Figure 1. Schematic Diagram MSOP10

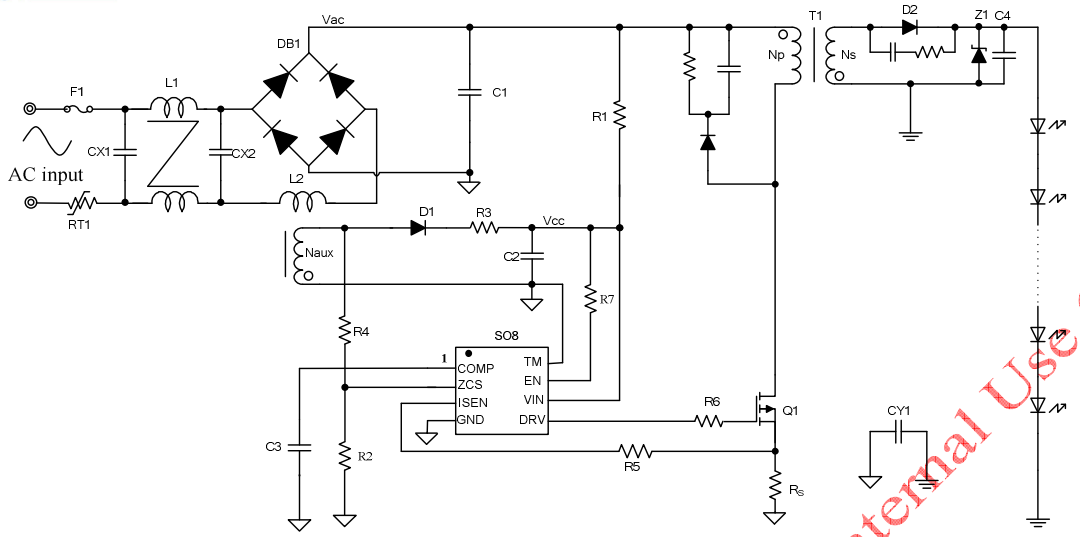
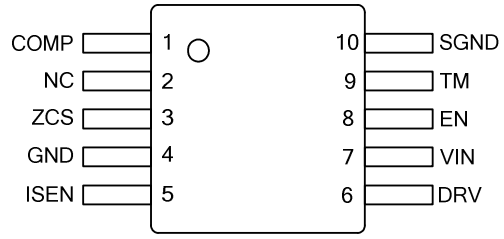
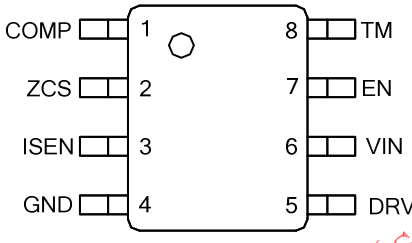


Figure 2. Schematic Diagram SO8

Pinout (top view)



(MSOP10)



(SO8)

Top Mark: ADR*xyz* for SY5800FBC(device code: ADR, ***x=year code, y=week code, z= lot number code***)
AEA*xyz* for SY5800FAC(device code: AEA, ***x=year code, y=week code, z= lot number code***)

Pin Name	Pin number SO8	Pin number MSOP10	Pin Description
VIN	6	7	Bypass this pin to ground with 4.7uF ceramic capacitor. There is an internal 18V shunt regulator to prevent this pin voltage from exceeding 18V. This pin also serves the function of the open LED feedback detection. If the voltage of the pin exceeds 18V, the open LED is flagged.
GND	4	4	Ground pin
ZCS	2	3	Inductor current Zero-crossing Detection pin. The input is a voltage divided from the transformer overwinding voltage. When the pin voltage is higher than 1.5V for more than 700nS, the over-voltage protection is enabled.
ISEN	3	5	Current sense input pin. Connect this pin to the source of the primary switch. Connect the sense resistor Rs from the source of the primary switch to GND. The maximum Switch current is: $I_{pri,max}$=0.5V/Rs
DRV	5	6	Gate drive pin. Connect this pin to the gate of primary MOSFET.
COMP	1	1	Current compensation pin. Connect a capacitor around 680nF network between this pin and ground to stabilize the control loop.
NC	----	2	No connection.
TM	8	9	Connected to ground.
SGND	----	10	Signal ground of the chip
EN	7	8	Enabled control pin. If the voltage of this pin is smaller than 0.3V, this chip is disabled. If the voltage on this pin is higher than 1.5V, the chip is enabled. If not used, connect this pin to VIN pin with a resistor having a recommending value of 470kΩ.

Absolute Maximum Ratings (Note 1)

VIN, DRV ---------- 18V
EN, ZCS ------- V_{IN}+0.3V
ISEN, COMP, TM---------- 3.6V
Power Dissipation, @ T_A = 25°C MSOP10/SO8----------0.8W/1.1W
Package Thermal Resistance (Note 2)
Junction Temperature Range ---------- 125°C
Lead Temperature (Soldering, 10 sec.) ---------- 260°C
Storage Temperature Range ---------- -65°C to 150°C

Recommended Operating Conditions (Note 3)

VIN, DRV ---------- 16V
EN, ZCS ---------- V_{IN}+0.3V
ISEN, COMP, TM----------3.3V
Junction Temperature Range ---------- -40°C to 125°C
Ambient Temperature Range ---------- -40°C to 85°C

Block Diagram

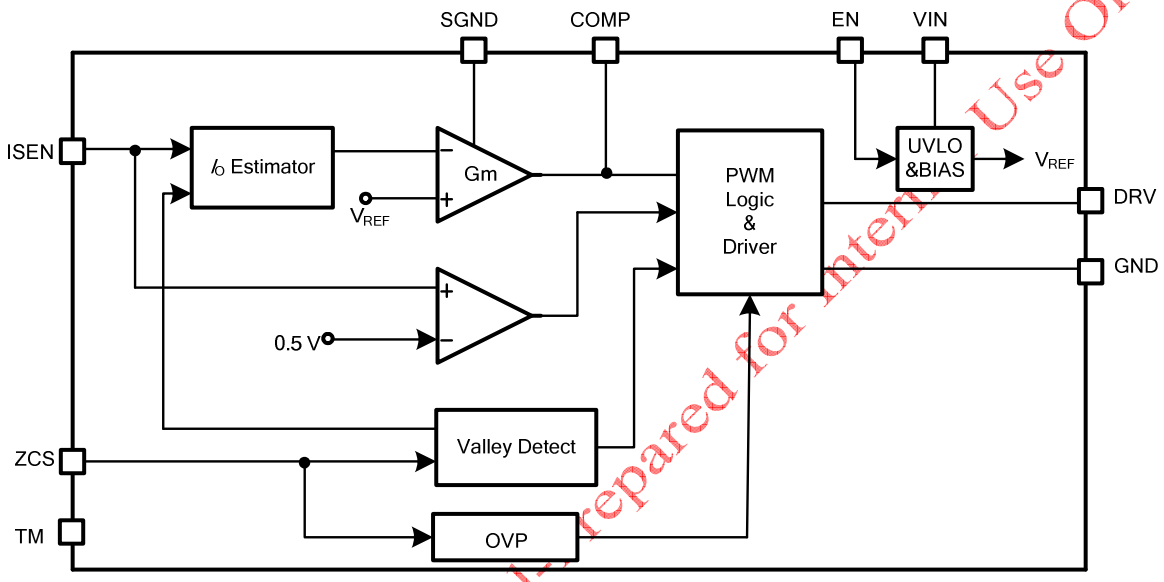


Figure3. Simplified Block Diagram

Electrical Characteristics

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

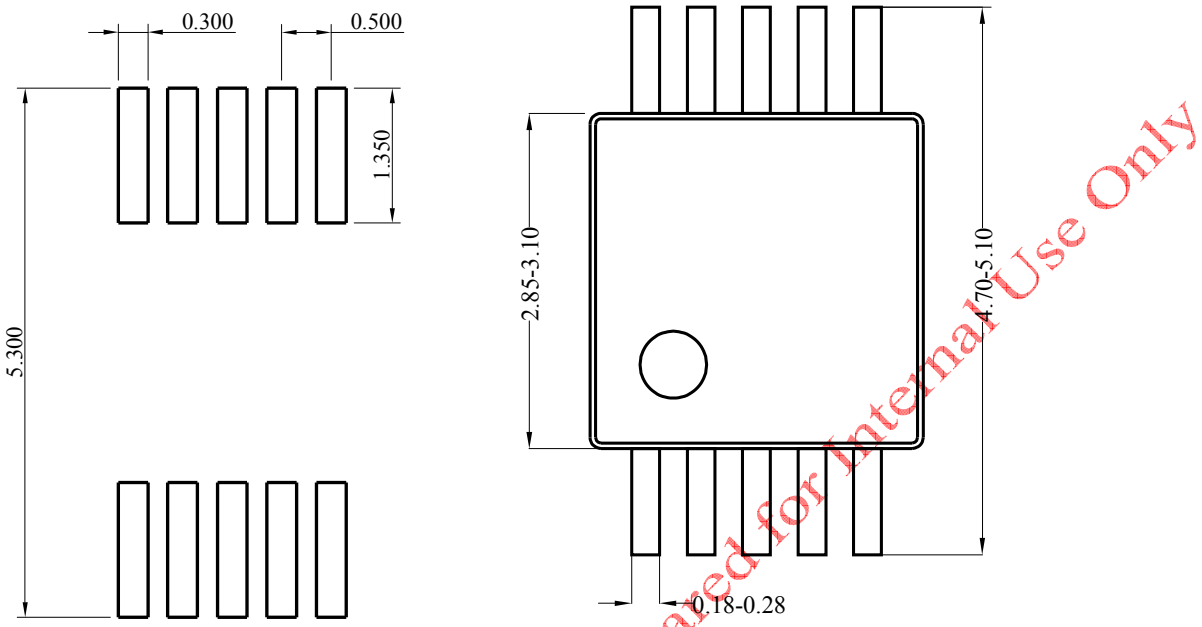
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		7		18	V
Start up Current	I_{START}			10		μA
Operating Current	I_{IN}				10	mA
Primary Current Sense Voltage	V_{SEN}	Peak Current Limit Voltage		0.5		V
Gate Driver Output peak current	I_{SOURCE}			1		A
	I_{SINK}			2		A
VIN Rising UVLO Threshold	$V_{UVLO,UP}$				17	V
VIN UVLO Hysteresis	$V_{UVLO,HYS}$			9		V
VIN Shunt Regulator Voltage	$V_{CC,REG}$		16	17	18	V
Maximum frequency	f_{MAX}			100		KHz
Min ON Time	$T_{ON,MIN}$	ON Leading Edge Blanking Time	240	400		ns
Thermal Shutdown Temperature	T_{SD}			150		C
Maximum on time	$T_{ON,MAX}$	Vcomp=1.5V		27		us
Maximum off time	$T_{OFF,MAX}$			33		us
Burst point	V_{COMPH}	Goes to burst mode		0.3		V
	V_{COMPL}	Out burst mode		0.38		V
Zero crossing detection	I_{SINK}				1	mA
	I_{SOURCE}				1	mA
Over voltage threshold	V_{OVP}	At ZCS pin		1.5		V
Internal Reference Voltage	V_{REF}	V_{EN}>1.5V		0.3		V
EN Pin Function	EN_{HIGH}	Enable on	1.5			V
	EN_{LOW}	Enable off			0.3	V

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

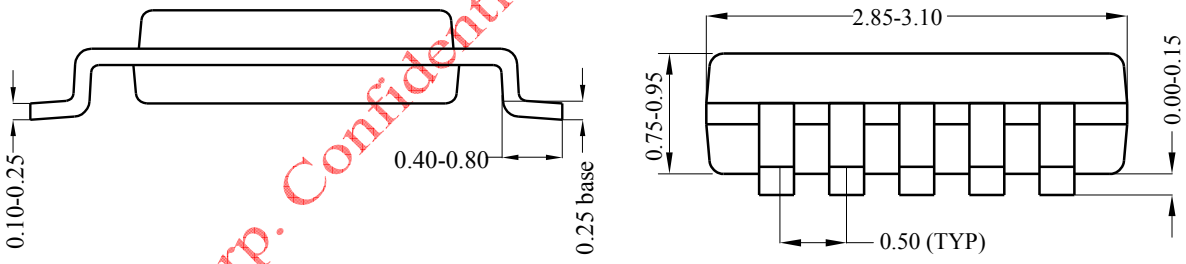
Note 2: Θ_{JA} is measured in the natural convection at T_A = 25°C on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Test condition: Device mounted on 2" x 2" FR-4 substrate PCB, 2oz copper, with minimum recommended pad on top layer and thermal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

Note 3: Turn VIN pin voltage gradually higher than UVLO up voltage then turn down to 12V.

MSOP10 Package outline & PCB layout

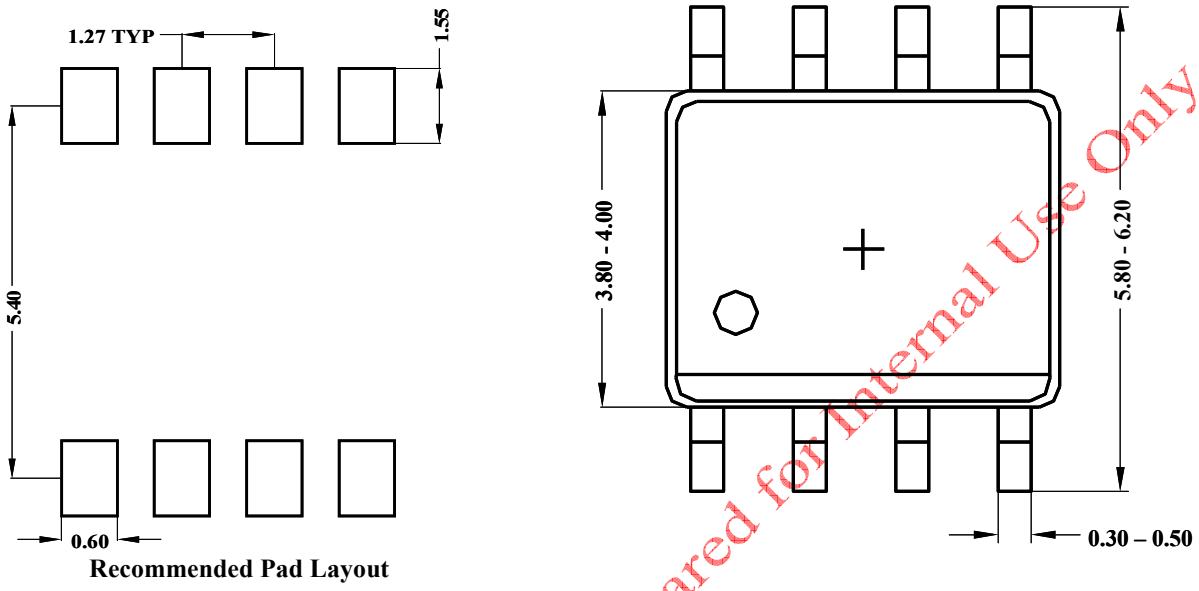


Recommended Pad Layout



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

SO8 Package Outline & PCB Layout Design



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