SY5868

Dimming Interface Converter Compatible With 0/1~10V Dimming Resistor Dimming And PWM Dimming Adaptive LED Current Filter

Advanced Design Specification

General Description

SY5868 is a dimming interface converter whose input signal can be a 0/1~10V dimming signal, resistor, or PWM signal. It recognizes the dimming signal automatically. The final output of SY5868 is PWM signal which is used to control a dimmable CC regulator or drive an opto-coupler to achieve isolated dimming. The frequency of the PWM signal and the source current for driving 0~10V dimmer/Resistor can be set by external capacitor and resistor.

SY5868 integrates an LED current filter to eliminate low frequency current ripple, which is compatible with dimming. It adopts adaptive control scheme and no additional electrical design is needed.

Features

- Compatible with 0/1~10V dimming, resistor dimming and PWM dimming.
- Recognize different dimming signal automatically.
- Integrate a 60V LDO module to simplify external circuit.
- The source current for passive 0~10V dimmer can be set.
- The frequency of output can be set.
- Current filter for single stage LED driver to eliminate current ripple
- Current filter Suitable for dimming application.
- External MOS for different output specification.
- Compact package: SOP14

Ordering Information

SY5868 □(□□)□

- Temperature Code
- Package Code
- Optional Spec Code

Ordering Number	Package type	Note
SY5868FKC	SOP14	--

Applications

- LED Dimming

Typical Applications

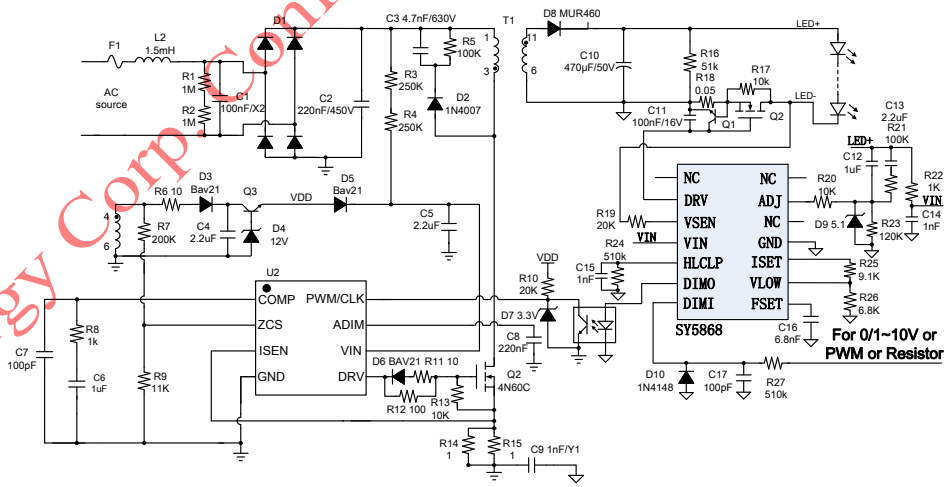

Figure .Schematic Diagram

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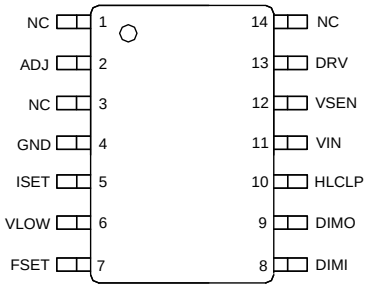
Pinout (top view)



(SOP14)

Top Mark: **BPU*xyz*, (**Device code: **BPU**; ***x=year code, y=week code, z= lot number code*****)**

Pin Name	Pin number	Pin Description
NC	1	No connect.
ADJ	2	This pin receives ripple info to regulate the output.
NC	3	No connect.
GND	4	Ground pin.
ISET	5	Source current setting pin. This pin is used to set the source current of DIMI pin for passive dimmer. $I_{sr}=\frac{7.5}{R_{ISET}}$
VLOW	6	The lowest input setting pin. This pin is used to set the lowest input voltage which corresponds to 0% duty. The real minimum 0~10V input is $V_{LOWI}=1.55\cdot V_{LOW}-0.726$
FSET	7	Dimming frequency setting pin. This pin is used to set the frequency of DIMO pin. $f_{DIM}=\frac{30u}{(6.6-V_{LOW})\cdot C_{FSET}}$
DIMI	8	Dimming input pin. Dimming signal is connected to this pin. It maybe is a 0/1~10 analog signal, resistor or a PWM signal.
DIMO	9	Dimming output pin. This pin will output a PWM signal to driver opto-coupler for separation dimming.
HLCLP	10	High clamp and low clamp setting pin. If the voltage of HLCLP pin is larger than 100mV during IC start-up, it enters into low clamp mode, else it works in high clamp mode. In low clamp mode, if V_{DIMI} is less than the setting value, it is clamped internally. $V_{LCLP}=\frac{9.3}{2}\cdot(V_{HLCLP}-0.2)+0.2$ In High clamp mode, the clamp voltage is 9.5V fixedly, and the resistor connected to HLCLP is used to adjust the max duty . $D_{MAX}=\frac{67.79\cdot R_{HCLP}}{67.43\cdot R_{HCLP}+770.59}$ For Example R_{HCLP}=510k ohm $D_{MAX}=\frac{67.79\cdot 510}{67.43\cdot 510+770.59}=98.3\%$

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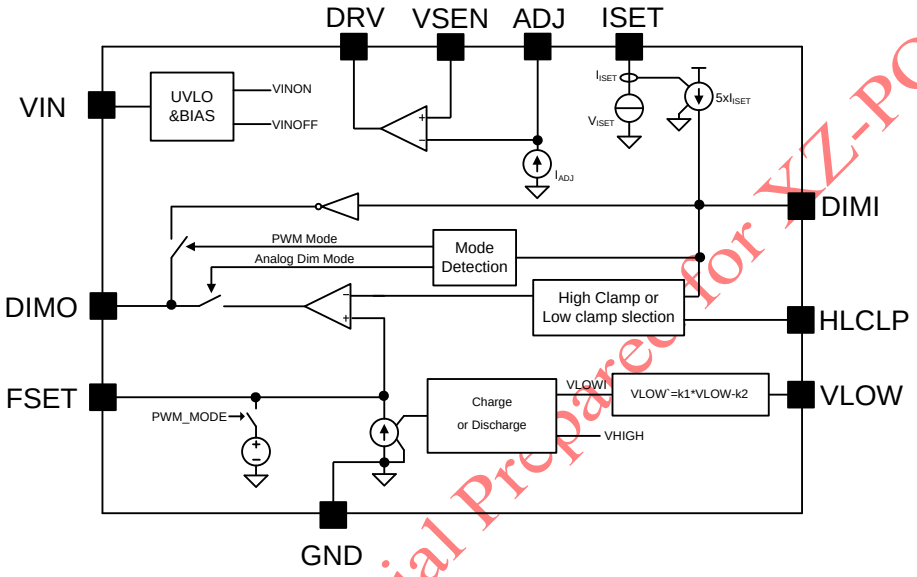
VIN	11	Power supply pin. This pin provides power supply for IC.
VSEN	12	LED negative sample pin. This pin receives negative node of LED waveform
DRV	13	Gate driver pin. Connect this pin to the gate of primary MOSFET.
NC	14	No connect.

Block Diagram



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Absolute Maximum Ratings (Note 1)

VIN ---------- -0.3V~60V
ADJ, VSEN, DRV---------- -0.3V~20V
ISET, FSET, VLOW, HLCLP---------- -0.3V~3.6V
DIMI,DIMO ---------- 0.3V~20V
Power Dissipation, @ TA = 25°C SO14 ---------- 1.3W
Package Thermal Resistance (Note 2)
SO14,θ_{JA}----------94°C/W
SO14, θ_{JC}----------52°C/W
Maximum Junction Temperature ---------- 125°C
Lead Temperature (Soldering, 10 sec.) ---------- 260°C
Storage Temperature Range ---------- -65°C to 150°C

Recommended Operating Conditions

VIN ---------- 10V~55V
Junction Temperature Range ---------- -40°C to 125°C

Electrical Characteristics

(V_{IN} = 15V, T_A = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Power Supply Section						
VIN Voltage Range	V_{VIN}		10		55	V
VIN Turn-on Threshold	V_{VIN_ON}			9.3		V
VIN Turn-off Threshold	V_{VIN_OFF}			7.7		V
DIMI Section						
MAX DIMI Source Current	I_{SR_MAX}			2		mA
MIN DIMI Source Current	I_{SR_MIN}			0		mA
Voltage of ISET Pin	V_{ISET}			1.5		V
Maximum Dimming Voltage	V_{HIGH}			9.5		V
Max Duty of PWM	D_{PWM_MAX}			99(note 3)		%
Min Duty of PWM	D_{PWM_MIN}			0		%
PWM ON Voltage Threshold	V_{PWM_ON}		2.2			V
PWM OFF Voltage Threshold	V_{PWM_OFF}				0.8	V
Minimum PWM Frequency	f_{PWM_MIN}		400			Hz
CURRENT Filter						
Internal Current Source	I_{ADJ}			10		μA
High Voltage Protection	V_{VSEN_HV}			7		V
Thermal Section						
Thermal Shut Down Temperature	T_{SD}			145		°C

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: If PWM duty is 100% and its amplitude is not 10V, SY5868 could not recognize the current state is PWM mode or not. But if the amplitude of PWM is 10V, the maximum duty is 100%.

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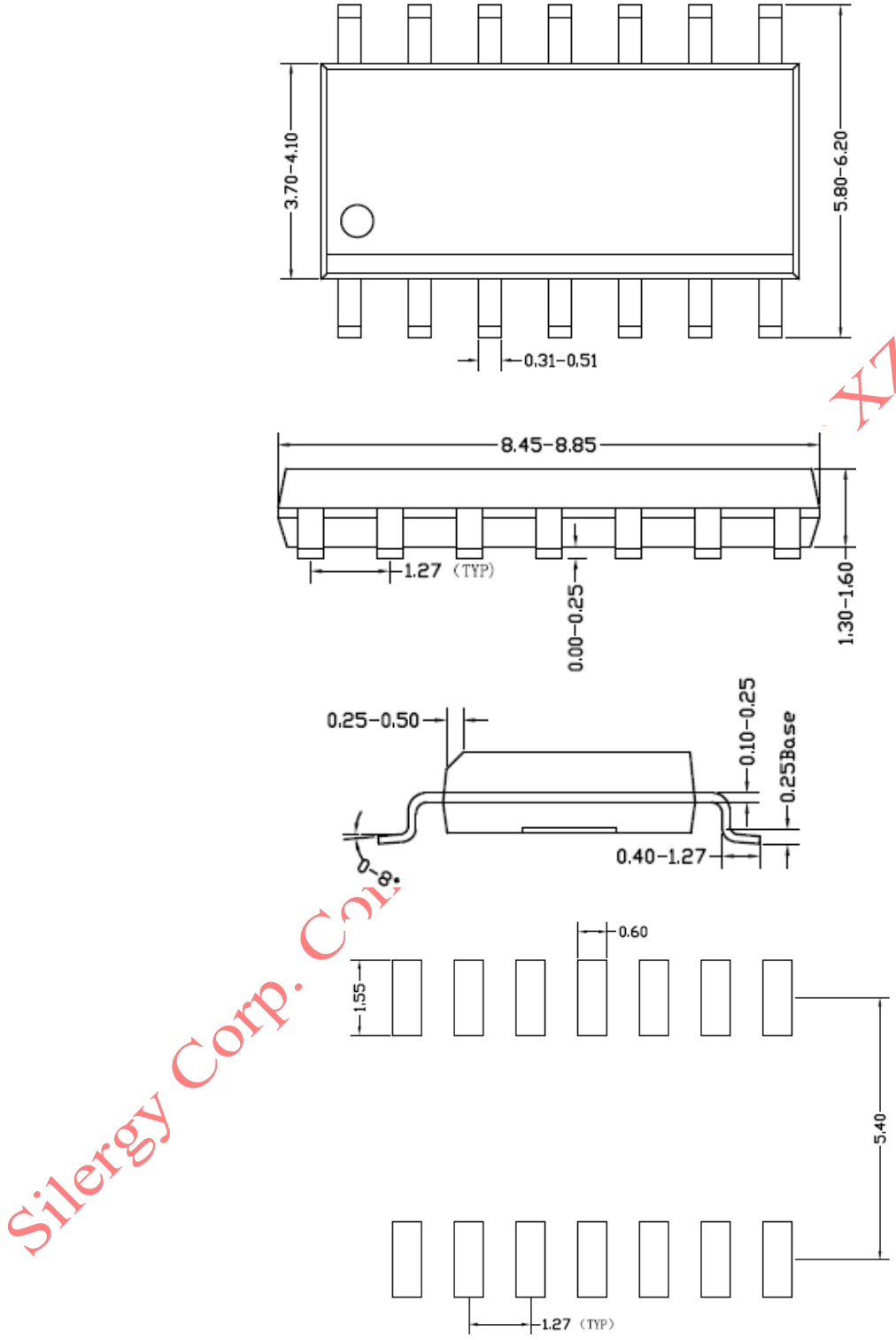
SOP14 Package Outline Drawing & PCB Layout



PCB layout (Recommended)

XZ-POWER
Silergy Corp. Co

Notes: **All dimension in MM and exclude mold flash & metal burr.**