DATA SHEET

GS5350

High Efficient Boost LED Driver Controller

Version：2.4

DESCRIPTION

GS5350 is a high efficient boost LED driver controller. The GS5350 uses fixed off-time control scheme and 1MHz swiching frequency can be achieved. The off-time can be set by an external capacitor.The LED current can be set by an external resistor.

The multi-protection features of GS5350 greatly enhance the system reliability and safety.The GS5350 features include Soft Start, Over Current Protection, Under Voltage Lock Output Protection.

APPLICATIONS

- White LED Backlight for LCD TV
- Solid State Lighting

FEATURES

- Soft Start
- Leading Edge Blanking
- Cycle by Cycle Over Current Limit
- Under Voltage Lock Output Protection
- High LED Current Range
- Up to 90％ Efficiency
- 1MHZ Swiching Frequency
- Wide Input Voltage Range：6.5V~24V
- SOP8 Halogen Free and RoHS Compliant Package

ABSOLUTE MAXIMUM RATINGS

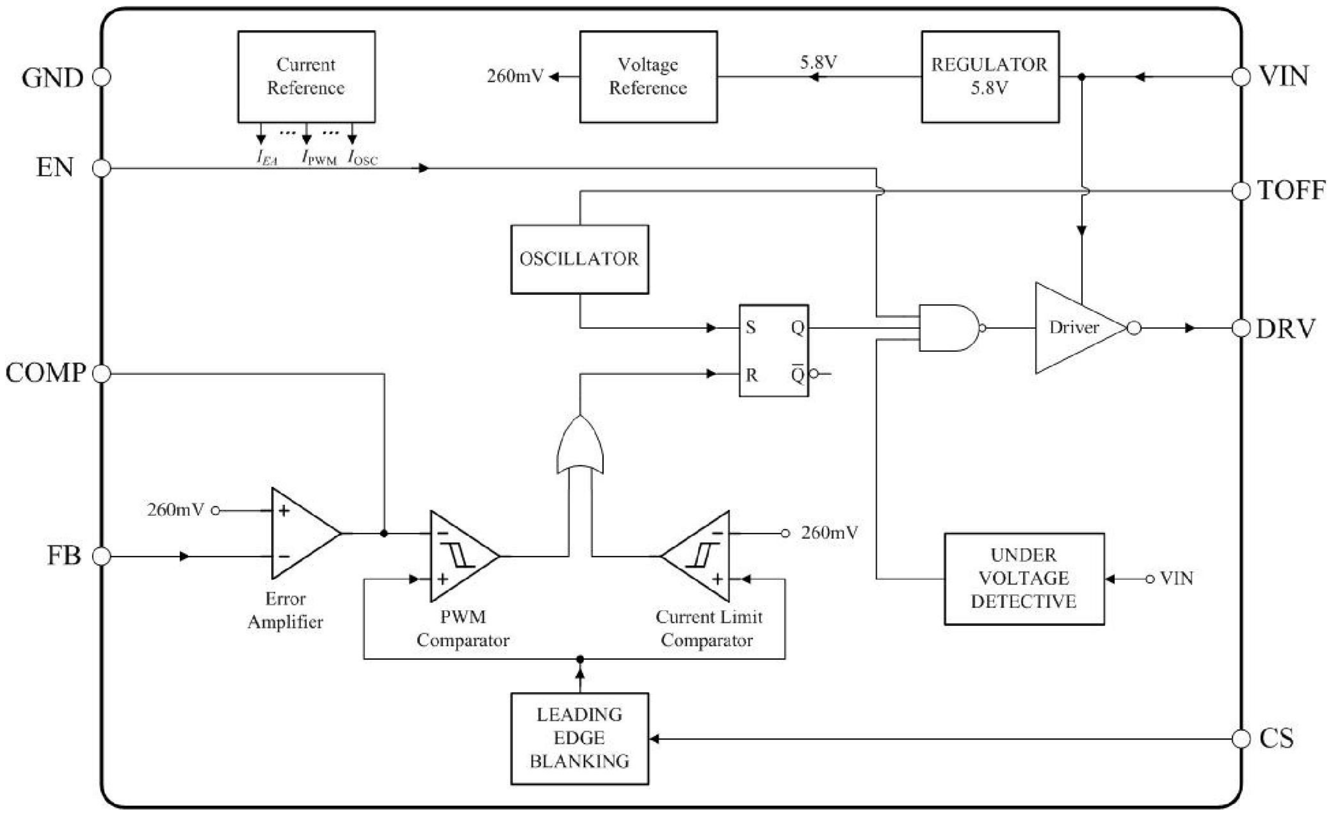
Symbol	Description	Value	Unit
VDD	Maximum VDD Input Voltage	30	V
VEN	EN Input Voltage Range	-0.3~6.5	V
VCS	CS Input Voltage Range	-0.3~6.5	V
VFB	FB Input Voltage Range	-0.3~6.5	V
TMIN-MAX	Operation Temperature Range Note 1	-20 to 85	℃
TSTORAGE	Storage Temperature Range	-40 to 165	℃
VESD	ESD Voltage for Human Body Model	2000	V

Note: Stresses beyond those listed under“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 under“recommended operating conditions”is ont implied.Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

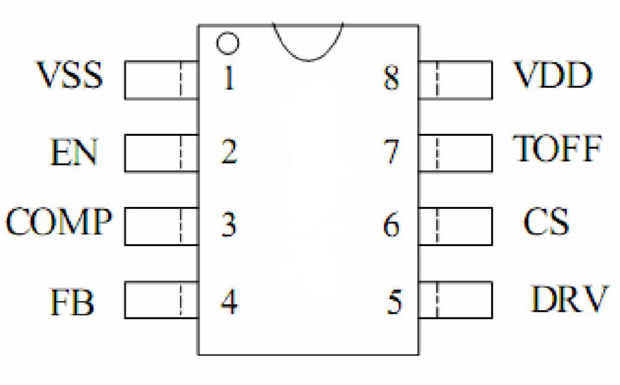
RECOMMEND WORK CONDITION

Symbol	Description	Value	Unit
VDD	VDD pin input voltage	7~15	V
TA	Operation Temperature Range	-20~85	℃

BLOCK DIAGRAM



PIN ASSIGNMENT

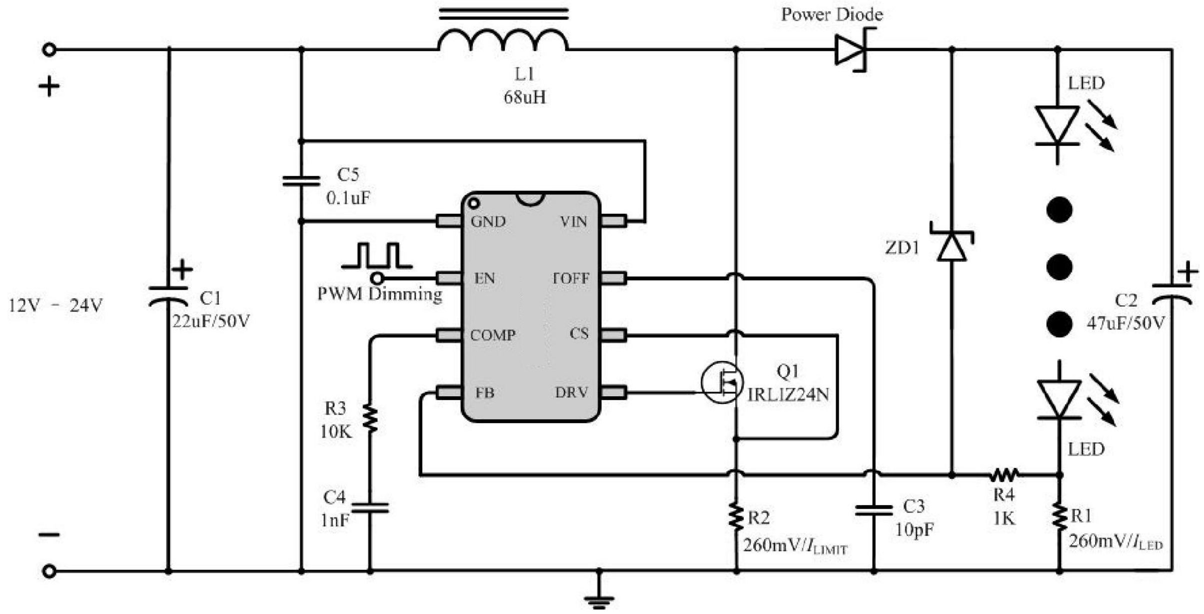


Pin No.	Pin Name	Description
1	VSS	Ground
2	EN	Chip Enable/PWM dimming
3	COMP	Frequency Compensation
4	FB	Voltage feedback
5	DRV	Driver
6	CS	Current sensing
7	TOFF	Off time selection
8	VDD	Power supply

ELECTRONIC CHARACTERISTICS

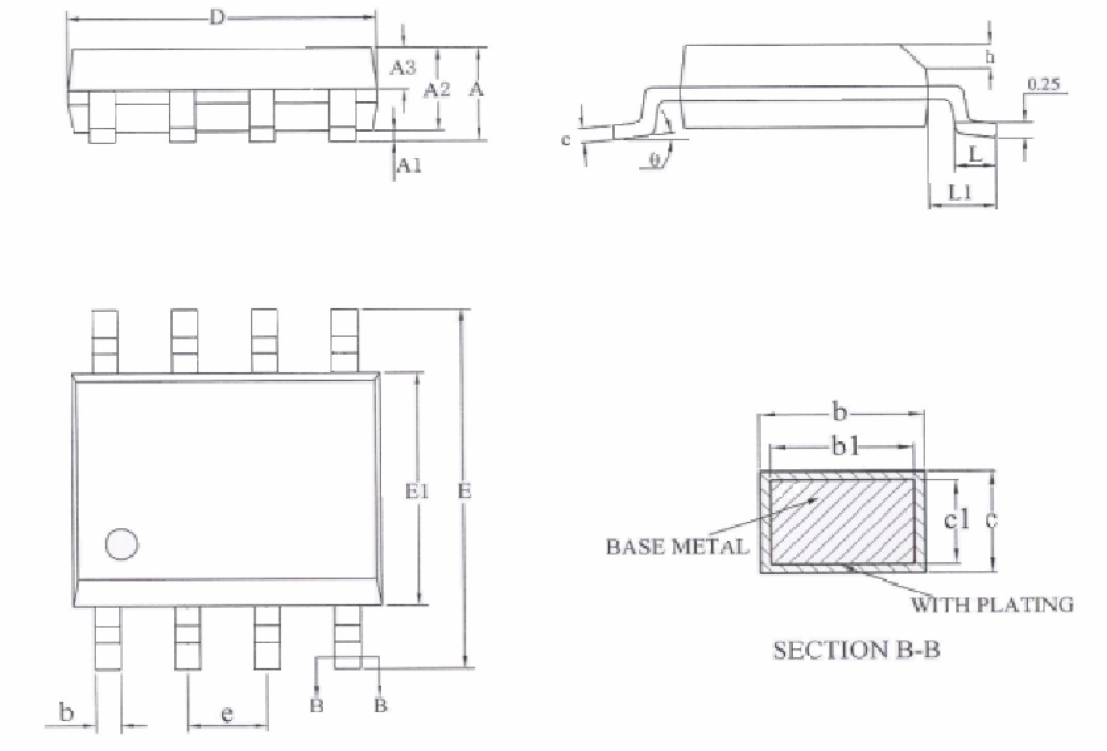
Parameter	Description	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Power supply		6.5		30	V
V_{DRV}	DRV pin drive voltage		4.5		13.5	V
I_{Q}	Quiescent Current	DRV pin no load Votage of VIN pin from 6.5V to 30V	0.4		1.5	mA
I_{SHD}	Shutdown Current	EN pin connect to GND Votage of VIN pin from 6.5V to 30V	0.2		0.4	mA
UVLO	Under Voltage of Lock Output threshold			6.0		V
V_{hys}	Hysteresis of UVLO			0.4		V
V_{ENH}	EN pin high level voltage		2			V
V_{ENL}	EN pin low level voltage				0.7	V
V_{FB}	FB pin Feedback voltage		250	260	270	mV
V_{CS}	CS pin Feedback voltage		250	260	270	mV
f_{OSC}	Frequency of OSC	DRV pin no load			1.1M	Hz
f_{SW}	Frequency of Switch	DRV pin drive MOSFET			650K	Hz
I_{sink}	COMP pin sink current			1		uA
I_{source}	COMP pin source current			1		uA
G_{EA}	Transconnductance of Error Amplifier			10		uS
R_{EA}	Ouput resistance of Error Amplifier			40M		Ω
I_{DRV}	Peak drive current	DRV pin connect to GND，VIN=12V			350	mA
DRV_{Rasing}	DRV Rising Time	1000pF cap on DRV pin		60		nsec
$DRV_{Falling}$	DRV Falling Time	1000pF cap on DRV pin		60		nsec

9. Typical Application



10. PACKAGE OUTLINE DIMENSIONS

SOP8 **Unit：mm**



Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	_	_	1.75	D	4.70	4.90	5.10
A1	0.05	_	0.15	E	5.80	6.00	6.20
A2	1.30	1.40	1.50	E1	3.70	3.90	4.10
A3	0.60	0.65	0.70	e	1.27BSC		
b	0.39	_	0.48	h	0.25	_	0.50
b1	0.38	0.41	0.43	L	0.50	_	0.80
c	0.21	_	0.26	L1	1.05BSC		
c1	0.19	0.20	0.21	θ	0	_	8°

DETAIL DESCRIPTION

The recommend work condition is that VIN input voltage range from 7V to 15V, DRV output voltage below 12V, switching frequency no more than 500KHz. Fig.1 is a typical application for TV backlighting.

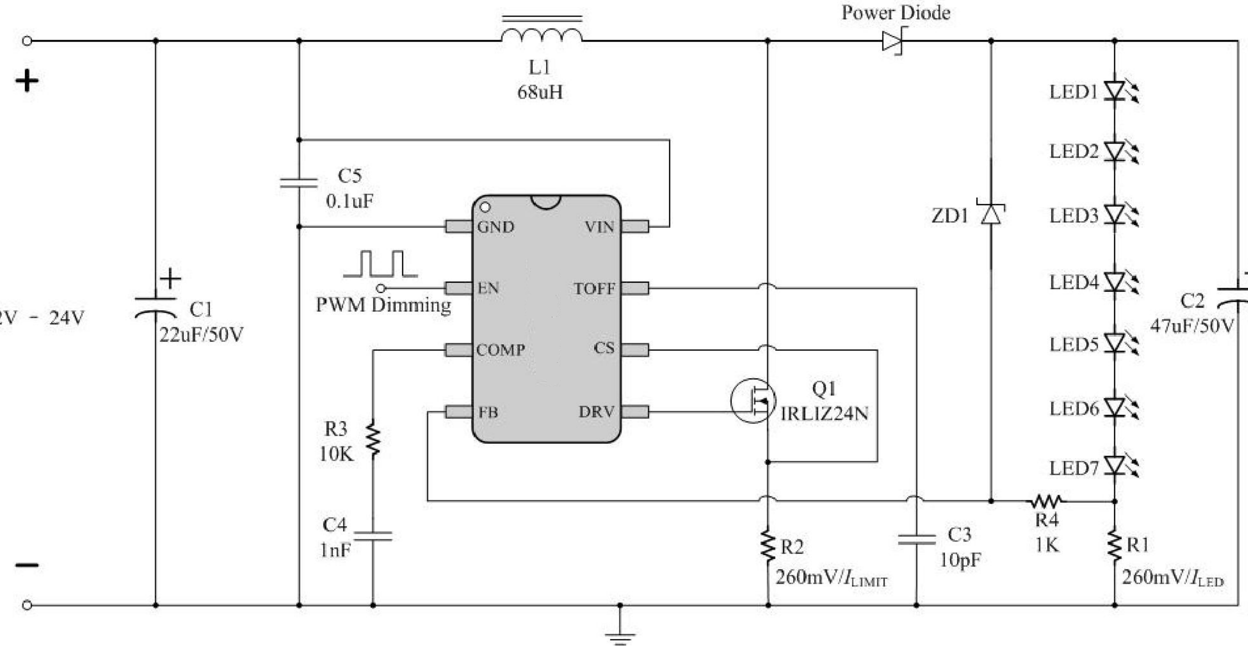


Fig.1 Typical Application for Backlighting

The 12V input voltage is generated by AC/DC power supply of TV. The value of inductance is set 68uH to ensure have enough energy tansfer to LEDs. We choose IRLIZ24N MOSFET as power switch. The continuous drain current of IRLIZ24N is 14A. The Drain-to-Source breakdown voltage of IRLIZ24N is 55V. Those characteristic of IRLIZ24N can satisfy most of applications. The LED current is setted by R1. The current of MOSFET is set by R2. The TOFF time is set by C3. The loop frequency compensation is set by R3 and C4.

- **Setting LED Current**

$$I_{LED} = \frac{260mV}{R_1}$$

- **Setting MOSFET current**

$$I_{LIMIT} = \frac{260mV}{R_2}$$

The recommended maximum current I_{LIMIT} of the pulse element is fixed about above 4 times than LED current.

- **TOFF** time’s Settings

Shut down time TOFF of the pulse element depends on capacity C3, and when this pin floating, TOFF is eqaule to 610ns, the current charging to C3 is 10uA.Users can choose C3’s size in terms of TOFF-pin’s charging current and set up the needed shut down time, but recommended turn-off time of pulse element may not be less than 1.5us for the reason to control the loss of pulse element.

- Loop Compensation

Fig.1 shows the typical application. And 2 poles totally exsiting in feedback compensation loop accordingly located in the load output, amplifier's output, but only one zero consists of R3 and C4 is another compensation system. Users should choose the reasonable size adjusting to the real load. Here, $A_{V,EA}$=400V/V， G_m=10uS.

$$f_{pout} = \frac{1}{\pi \cdot R_{LOAD} \cdot C_{OUT}}$$

$$f_{pEA} = \frac{G_{m,EA}}{2 \cdot \pi \cdot A_{V,EA} \cdot C_4}$$

$$f_z = \frac{1}{2 \cdot \pi \cdot R_3 \cdot C_4}$$

- **Inductance L1's Settings**

The size of L1 relates with the output power, switch frequency and so on. It is sured that the LED loads have enough energy when switch frequency is low. Consequently, the size of inductance is 68uH, because of the below estimating function:

$$L = \frac{V_{IN} \times (V_{OUT} - V_{IN})}{V_{OUT} \times F_{SW} \times \Delta I}$$

$$I_{IN(MAX)} = \frac{V_{OUT} \times I_{LOAD(MAX)}}{V_{IN} \times \eta}$$

$$\Delta I = (30\% \sim 50\%) I_{IN(MAX)}$$

RESTRICTIONS ON PRODUCT USE

- We are continually working to improve the quality and reliability of its products.Nevertheless,semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress.It is the

  standards of safety in making a safe design for the entire system,and to avoid situations in which a malfunction or failure of such GS products could cause loss of human life,bodily injury or damage to property.
- In developing your designs,please ensure that GS products are used within specified operating ranges as set forth in the most recent GS products specifications.
- The information contained herein is subject to change without notice.