

High Power Factor & Accuracy Constant Current LED Driver

Features

- TM (Transition Mode) Fixed On -Time PFC Control
- Accuracy Constant Current
- Low BOM Cost
- Inductor Size Reduction
- CT Pin Adjust Frequency Range for Optimization
- Over Voltage Protection (OVP)-Auto Recovery
- LED Short Protection (SCP) -Auto Recovery
- Over Load Protection (OLP) -Auto Recovery
- SOT-26 Package
- Compatible Inductance Ballast
- Incompatible Electronic Ballast

Description

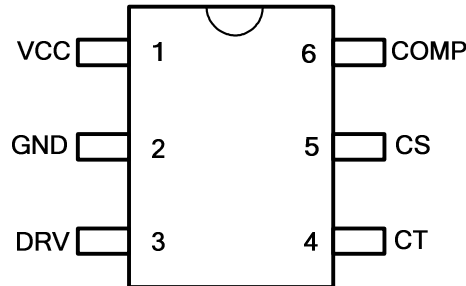
The BW7385A is a highly-integrated, low startup current, TM (Transition Mode), fixed on- time PFC control and PWM controller. These functions enable the LED driver to easily meet the accuracy average LED current and high power factor requirements. The integrated functions also include the LED short protection, over voltage protection, over load protection. The COMP pin controls the duty by connected an RC compensation network to ground and forming the closed loop feedback control.

The BW7385A improves the performance and reduces the cost of the LED driver. It is a 6-pin SOT-26 package.

Application

- GU10 /E14 LED Bulb
- Others LED Lighting Applications

Pin Configuration



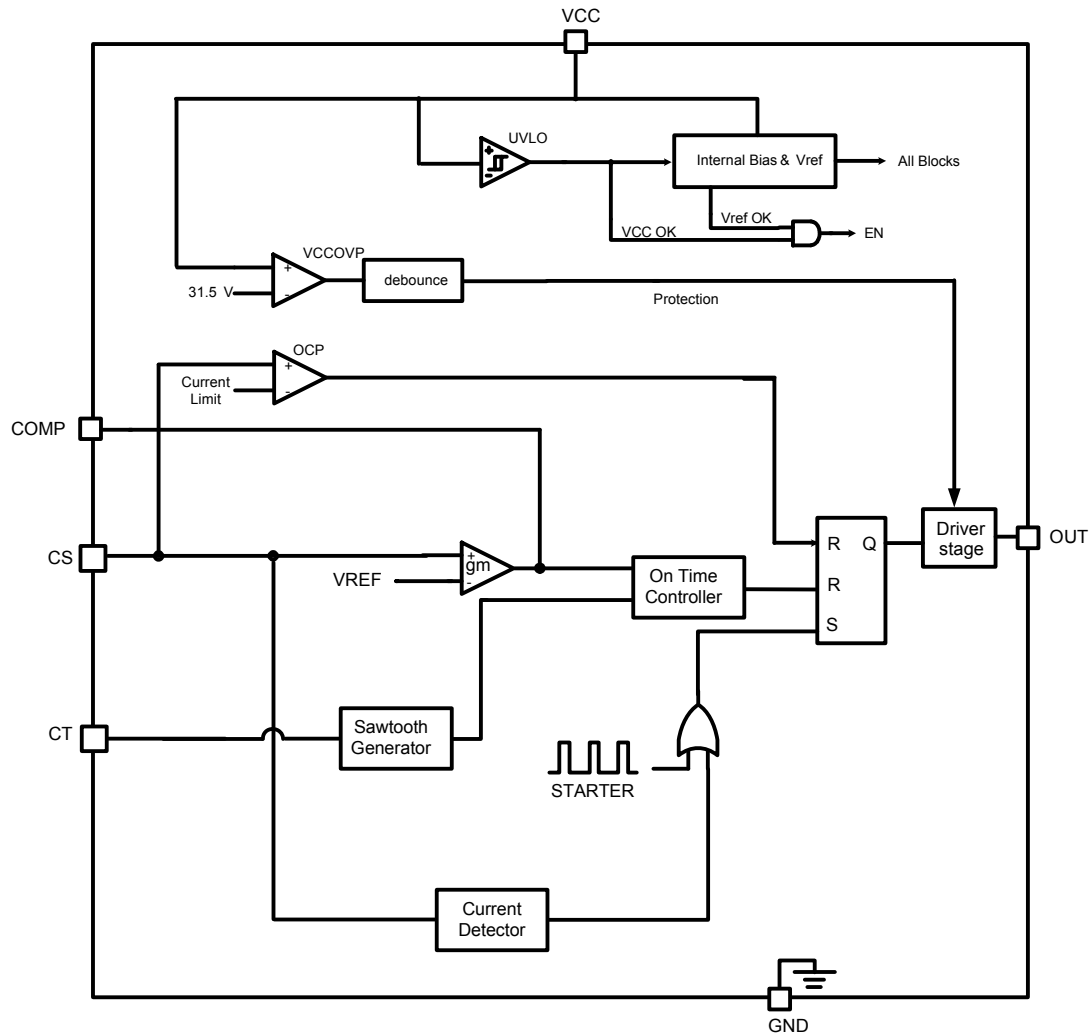
Pin Description

Pin No.	Name	Function
1	VCC	Power Supply Pin
2	GND	Ground Pin
3	DRV	The DRV pin is connected to the totem pole gate driver to drive the external power switch.
4	CT	The CT pin is connected to the current source to charge the external capacitor and compare the COMP voltage to terminate the power switch.
5	CS	Current Sense Pin
6	COMP	Feedback Compensation Network

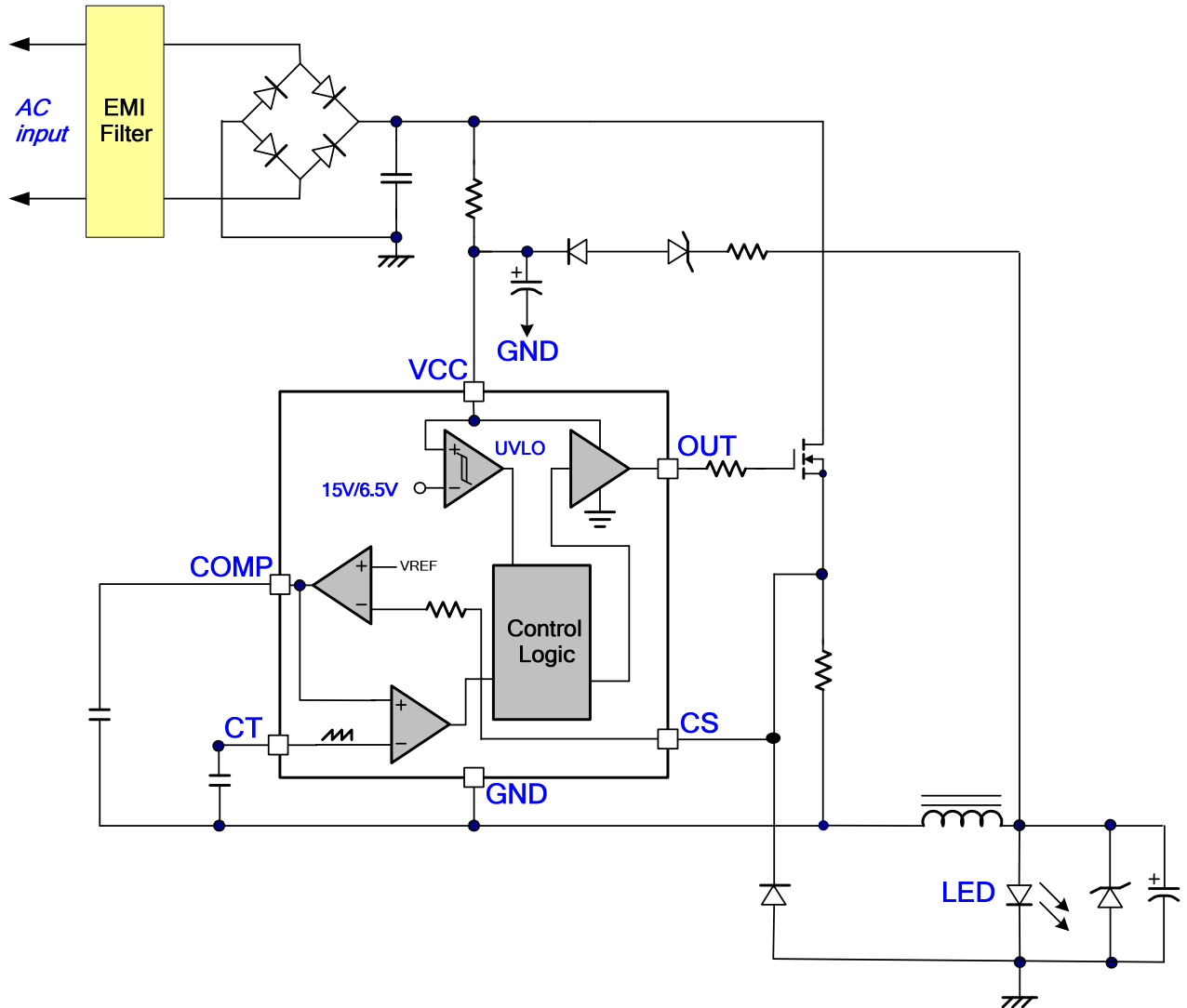
Absolute Maximum Ratings

Supply Voltage VCC	30V
CT, COMP, CS	-0.3V ~ 7V
DRV	15V
Junction Temperature	150°C
Operating Ambient Temperature	-20°C ~ 85°C
Storage Temperature Range	-65°C ~ 150 °C
SOT-26 Package Thermal Resistance (junction to ambient)	250°C/W
Power Dissipation (SOT-26, at ambient temperature = 85°C)	250mW
Lead Temperature (All Pb free packages, soldering, 10 sec)	260°C
ESD Voltage Protection, Human Body Model	2KV
ESD Voltage Protection, Machine Model	200V

Function Block



Application Circuit



Electrical Characteristics (VCC = 15.0V & TA = +25°C, unless otherwise specified.)

Parameter	Pin	Min.	Typ.	Max.	Unit
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SUPPLY VOLTAGE

Startup Current (VCC=UVLO on - 1V)	1		10	50	uA
Operating Current (with 1nF load on OUT pin), Vcomp = 2.5V	1		2.5	3.2	mA
Operating Current (with 1nF load on OUT pin), Protection Tripped (OVP, SCP,)	1		1.6	2.5	mA
UVLO(off)	1	5.5	6.5	7.5	V
UVLO(on)	1	14	15	16	V
OVP Level on VCC Pin	1	29.5	31.5	33.5	V
OVP De-Bounce Time	1		40		us

VOLTAGE FEEDBACK

Feedback Reference Voltage	6	0.195	0.200	0.205	V
Tran-Conductance	6		300		uS
Output Sink Current	6		300		uA
Output Source Current	6		60		uA

CURRENT SENSING

Input Over Voltage Protection	5	1.8	2.0	2.2	V
Open Loop Voltage, CS Pin Open	5		5		V
Leading-Edge Blanking Time	5		450		nS
Delay to Output	5		130	220	nS

GATE DRIVER OUTPUT

Rising Time, Load Capacitance = 1000pF	3		280	500	nS
Falling Time, Load Capacitance = 1000pF	3		80	150	nS
VGATE-Clamp (VCC = 25V)	3		12.5	15	V

CT OUTPUT SECTION

CT Pin Current	4	160	180	200	uA
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Application Information

Start-up Current

The typical start-up current is around 10uA. Very low start-up current allows the PWM controller to increase the value of start-up resistor and then reduce the power dissipation on it.

UVLO (Under Voltage Lockout)

A hysteresis UVLO comparator is implemented in BW7385A, then the turn-on and turn-off thresholds level are fixed at 15V and 6.5V respectively. This hysteresis shown in Fig.1 ensures that the start-up capacitor will be adequate to supply the chip during start-up. For quickly startup the LED driver, the start-up resistor should be matched with the startup capacitor. Due to the low UVLO on level, so the turn-on delay time will also never greater than the general PWM IC.

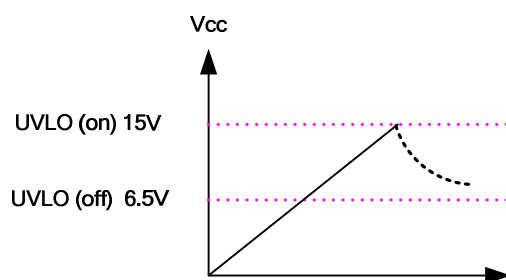


Fig.1

LEB (Leading-Edge Blanking)

Each time the power MOSFET is switched on, a turn-on spike will inevitably occur at the sense resistor. To avoid fault trigger, a 450ns leading-edge blanking time is built in. Conventional RC filtering can therefore be omitted. During this blanking period, the current-limit comparator is disabled and can not switch off the gate driver.

OVP (Over Voltage Protection) on VCC

To prevent the LED driver from being damaged, the BW7385A is implemented an OVP function on VCC. When the VCC voltage is higher than the

threshold voltage 31.5V, the output gate driver circuit will be shut down immediately to stop the switching of power MOSFET. The VCC pin OVP function is an auto recovery type protection. If the OVP condition happens, the pulses will be stopped and never recovery unless the VCC pin voltage is down to the UVLO off level. The BW7385A is working in an auto-recovery mode as shown in Fig.2.

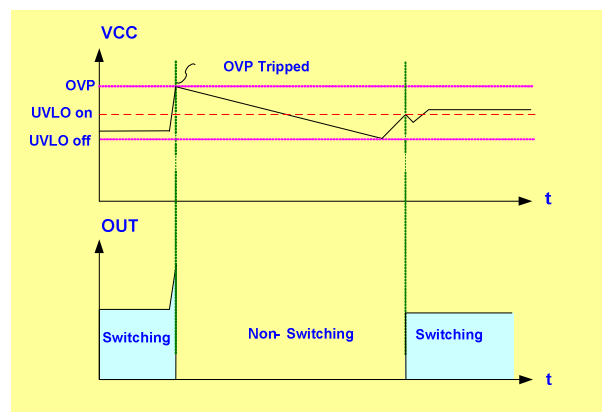


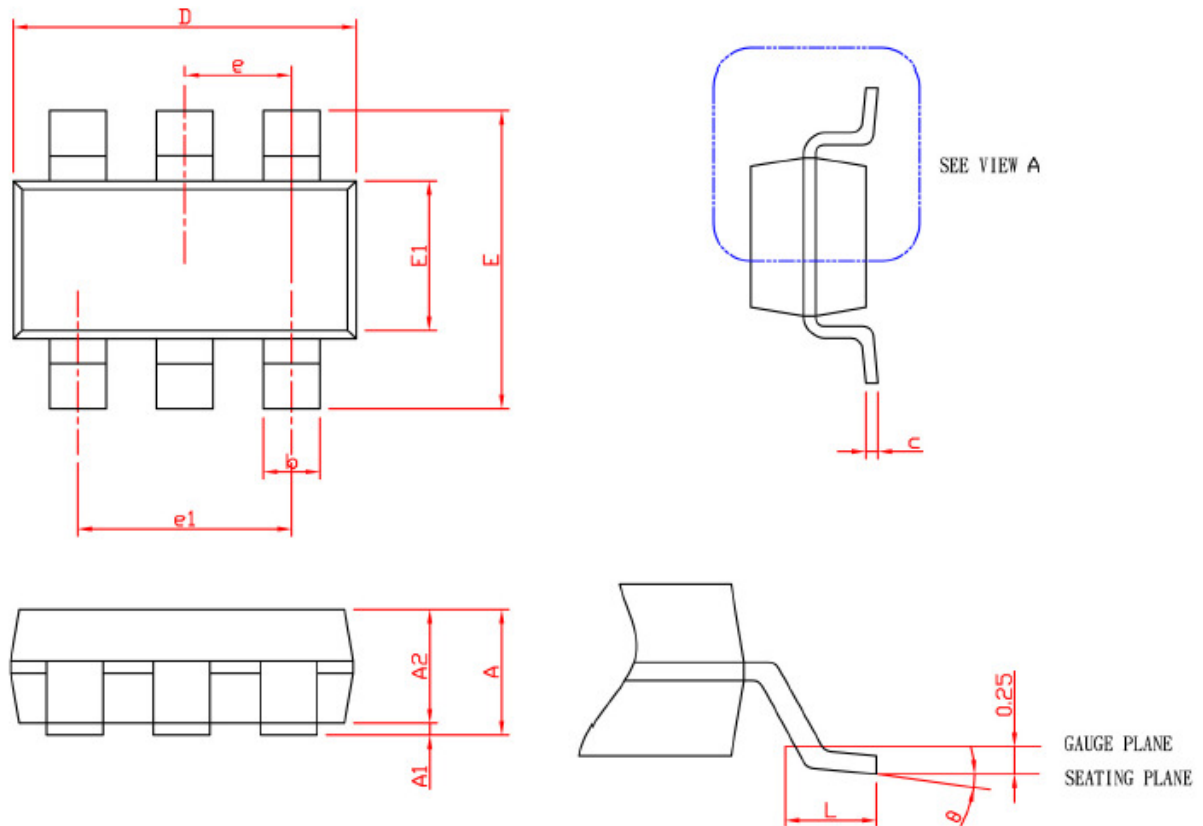
Fig. 2

Gate Clamp

Driver is clamped to 15V by an internal clamping circuit. Those damages usually come from undesired over-voltage gate signals. Under the conditions listed below, the gate output will turn off immediately to protect the power circuit.

Package Information

SOT-26



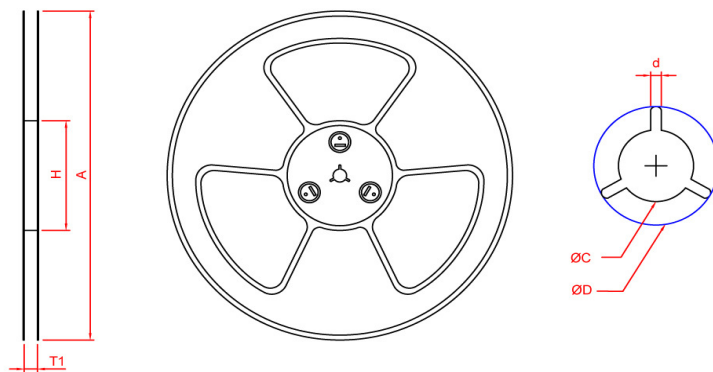
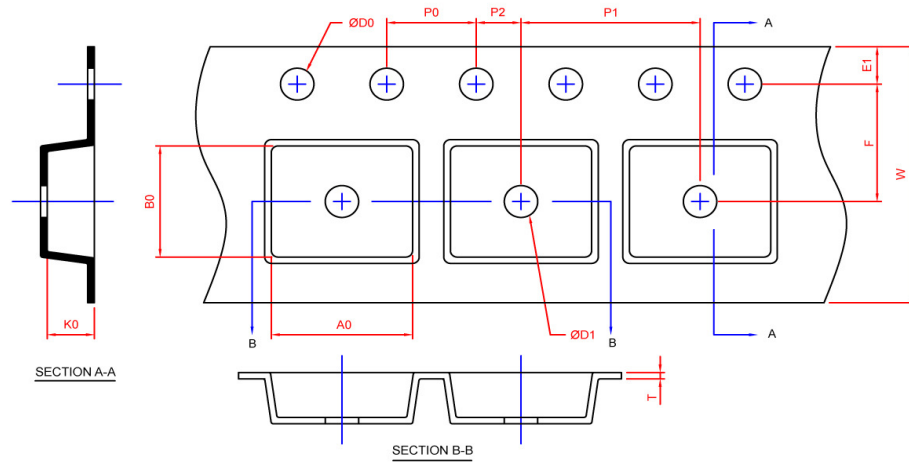
SYMBOL	SOT-26			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.45		0.057
A1	0.00	0.15	0.000	0.006
A2	0.90	1.30	0.035	0.051
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.70	3.10	0.106	0.122
E	2.60	3.00	0.102	0.118
E1	1.40	1.80	0.055	0.071
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°

Note: 1. Followed from JEDEC TO-178 AB.

2. Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 10 mil per side

Carrier Tape & Reel Dimensions

SOT-26



Application	A	H	T1	C	d	D	W	E1	F
SOT-26	178.0±2.00	50 MIN.	8.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	8.0±0.30	1.75±0.10	3.5±0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0±0.10	4.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.0 MIN.	0.6+0.00 -0.40	3.20±0.20	3.10±0.20	1.50±0.20

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOT -26	8	5.3	3000

(mm)

Tape and Specification Reel

SOT 26

