JWB1698D

Universal Input Linear LED Driver

Parameters Subject to Change Without Notice

DESCRIPTION

JW®B1698D is a linear LED driver applicated in universal mains input (127VAC/220VAC) voltage range. It can realize the constant power and output current in both low input voltage and high input voltage applications.

JWB1698D integrates with power MOSFETs and the output current is set by external resistors. Patented current control strategy ensures high output current accuracy.

Specially designed current sensing techniques help to satisfy output current or input power compensation easily.

JWB1698D provides over temperature protection. When temperature inside chip exceeds T_{OTP}, JWB1698D deceases LED current, which can help chip cooling.

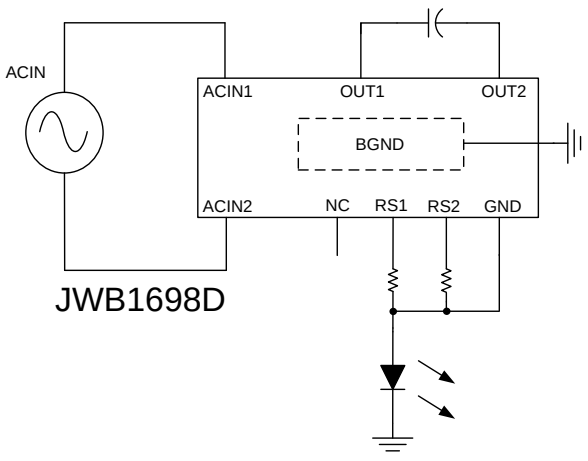
FEATURES

- 800V Bridge Rectifier Integrated
- Compatible with Universal Input (127VAC/ 220VAC) Voltage
- High-accuracy Output Current
- Over Temperature Protection
- No EMI Issues
- Low BOM Cost
- HSOP8 Package

APPLICATIONS

- LED Bulb Lamp
- Tube Lamp

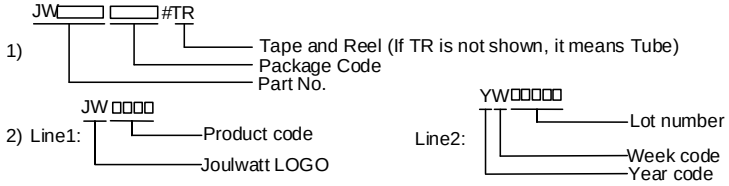
TYPICAL APPLICATION



ORDER INFORMATION

DEVICE[1)]	PACKAGE	TOP MARKING[2)]	ENVIRONMENTAL[3)]
JWB1698DHSOPD#TR	HSOP8	JWB1698D YW□□□□□	Green

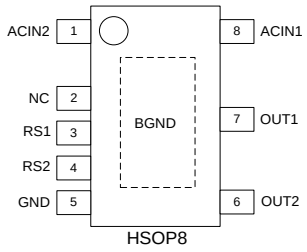
Notes:



3) All Joulwatt products are packaged with Pb-free and Halogen-free materials and compliant to RoHS standards.

PIN CONFIGURATION

TOP VIEW



HSOP8

ABSOLUTE MAXIMUM RATING[1)]

OUT1……..…….....650V
OUT2……..…….....500V
RS1,RS2……..... -0.3V to 5.5V
Junction Temperature[2)3)]..... 150ºC
Lead Temperature 260ºC
Storage Temperature .....-65ºC to +150ºC

RECOMMENDED OPERATING CONDITIONS

OUT1,OUT2.....400V
Operating Junction Temperature .....-40ºC to 125ºC

Note:

1) Exceeding these ratings may damage the device. These stress ratings do not imply function operation of the device at any other conditions beyond those indicated under RECOMMENDED OPERATING CONDITIONS.

2) The JWB1698D includes thermal protection that is intended to protect the device in overload conditions. Continuous operation over the specified absolute maximum operating junction temperature may damage the device.

3) The device is not guaranteed to function outside of its operating conditions.

ELECTRICAL CHARATERISTICS

Ta= 25℃, unless otherwise stated.

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply						
OUT1 Quiescent Current	I_Q	V_{OUT1}=30V		190	260	μA
Reference and Current Control						
Reference Voltage of CH1	V_{REF1_CH1}		580	600	620	mV
Reference Voltage of CH2	V_{REF1_CH2}		580	600	620	mV
Concave Start Bus Voltage of CH1	V_{CRBS1}		34	36	38	V
Concave to Zero-current Bus Voltage of CH1	V_{CRBS2}		108	114	120	V
Protections						
Thermal Foldback Temperature[4)]	T_{OTP}		140	150	160	℃
OUT1 Over Voltage Protection	$OUT1_{OVP}$			295		V
Power MOSFET						
Break-down Voltage of OUT1	V_{BV_1}	Id=250uA	650			V
Break-down Voltage of OUT2	V_{BV_2}	Id=250uA	500			V
Saturation Current of OUT1[4)]	I_{SAT_1}	V_G=5V,Vout1=20V, Tj=125℃	150			mA
Saturation Current of OUT2[4)]	I_{SAT_2}	V_G=5V,Vout2=20V Tj=125℃	90			mA

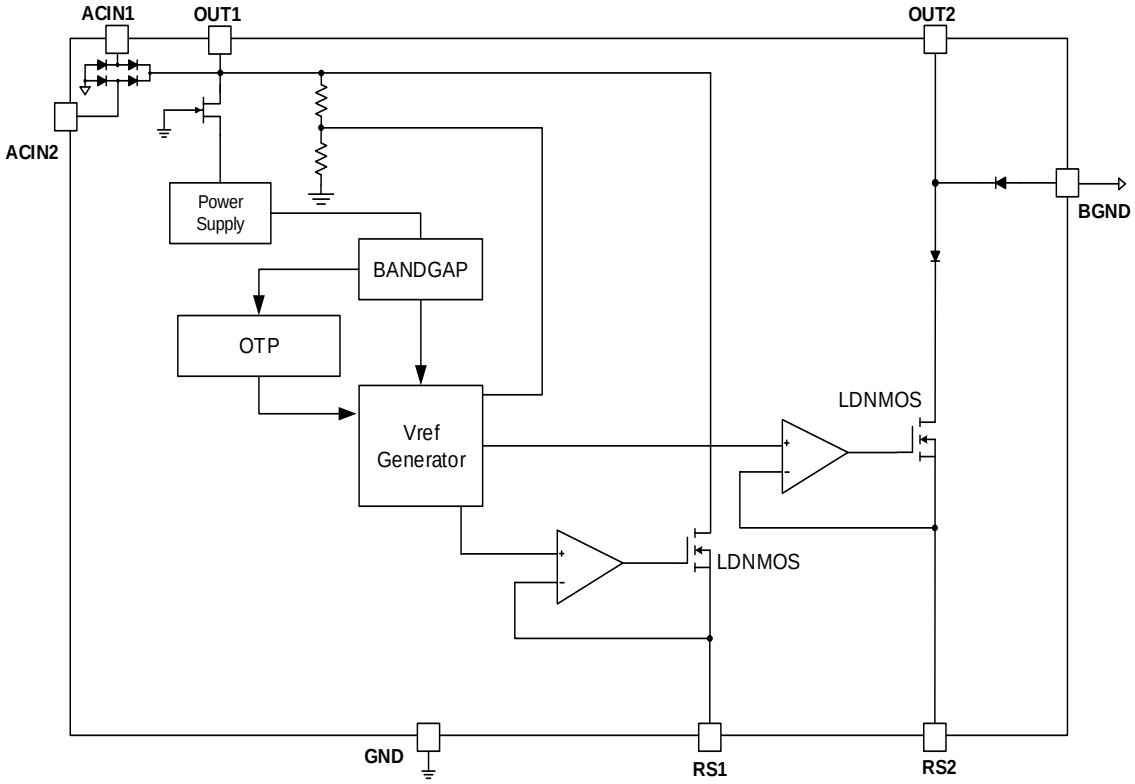
Note:

4) Guaranteed by design.

PIN DESCRIPTION

Pin HSOP8	Name	Description
1	ACIN2	AC input
2	NC	No connection
3	RS1	Current sense of channel 1(CH1)
4	RS2	Current sense of channel 2(CH2)
5	GND	Chip ground
6	OUT2	Drain of CH2
7	OUT1	High voltage DC bus and drain of CH1
8	ACIN1	AC input
EPAD	BGND	Analog ground

BLOCK DIAGRAM



FUNCTIONAL DESCRIPTION

JWB1698D is a linear LED driver applicated in universal mains input (127VAC/220VAC) voltage range. It can realize constant power and output current in both low input voltage and high input voltage application.

Theory of Operation

The input power is the rectified voltage from AC line by internal bridge rectifier. When V_{BUS} is higher than the forward voltage of the LEDs, the current of LEDs begins to increase. JWB1698D controls the LED peak current from the information of the current sensing resistor.

The CH1 peak current (Ipeak1) can be calculated with,

$$Ipeak1 = V_{REF1\_CH1}/RS1$$

Where,

V_{REF1_CH1} is the reference voltage of CH1.

RS1 is the current sensing resistor connected between pin RS1 and pin GND.

As the AC voltage rises, the current of OUT1 decreases when the voltage of OUT1 is higher than V_{CRBS1}.

The concave current (I_{cve1}) corresponds with the calculator,

$$I_{cve1} = \frac{V_{REF1\_CH1}}{RS1}\left(1 - \frac{V_{OUT1} - V_{CRBS1}}{V_{CRBS2} - V_{CRBS1}}\right)$$

Where,

V_{REF1_CH1} is the reference voltage of CH1.

V_{OUT1} is the drain voltage of CH1.

V_{CRBS1}/V_{CRBS2} is the bus concave thresholds of CH1.

The AC voltage continues to rise, the OUT2 current starts to build.

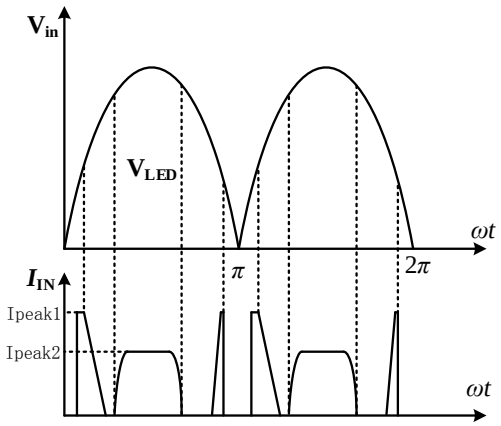
The CH2 peak current (Ipeak2) can be calculated with,

$$Ipeak2 = V_{REF1\_CH2}/RS2$$

Where,

V_{REF1_CH2} is the reference voltage of CH2.

RS2 is the current sensing resistor connected between pin RS2 and pin GND.



Over Temperature Protection

When the junction temperature of JWB1698D is higher than T_{OTP}, LED current reduces. The current derating slope is about 12%/10℃.

PCB Design Guideline

The distance between high voltage wire and low voltage wire (including the RS1, RS2 pin and its peripheral components) should be more than 1mm/200V.

OUT1, OUT2 pin should be far away from the RS1, RS2, GND, BGND pin, considering the creepage distance in application.

APPLICATION REFERENCE

This reference design is suitable for 8W non-isolated LED driver, using JWB1698D, with few external components.

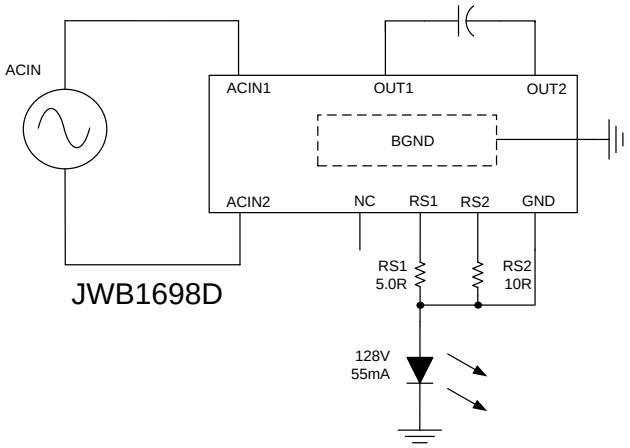
Reference ：

V_{IN}: 110VAC~260VAC

V_{OUT}: 128V

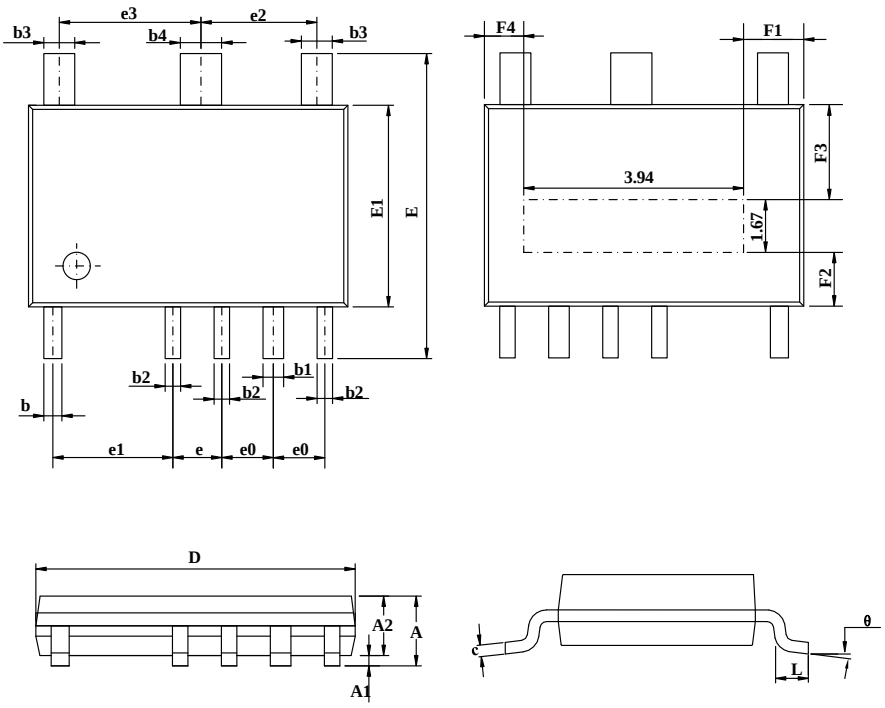
I_{OUT}: 55mA

PF: >0.7



PACKAGE OUTLINE

HSOP8 UNIT: mm



Symbol	MILLIMETER		
	MIN	NOM	MAX
A	1.25	—	1.45
A1	0.20REF		
A2	1.05	1.15	1.25
c	0.15	0.20	0.22
D	6.00	6.20	6.40
E	5.90	6.00	6.10
E1	3.70	3.90	4.10
e	0.90	0.95	1.00
e0	0.95	1.00	1.05
e1	2.28	2.33	2.38
e2	2.20	2.25	2.30
e3	2.70	2.75	2.80
b	0.30	0.35	0.40
b1	0.35	0.40	0.45
b2	0.25	0.30	0.35
b3	0.55	0.60	0.65
b4	0.75	0.80	0.85
L	0.40	—	0.80
F1	1.55	1.60	1.65
F2	0.75	0.80	0.85
F3	1.38	1.43	1.48
F4	0.61	0.66	0.71
θ	**0°**	—	**8°**

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