

*Parameters Subject to Change Without Notice*

## DESCRIPTION

JW<sup>®</sup>16979C is a TRIAC dimmable single channel linear LED driver with patented Smart Bleeder technics.

JW16979C supplies from the line voltage directly which enables the normal operation in all dimming range.

With patented algorithms, JW16979C can largely decrease the power loss of the bleeder circuit with a good dimming performance, which can dramatically lower the system thermal stress and enhance the reliability of the LED lighting system. JW16979C provides over temperature protection. When temperature inside chip exceeds 150°C, LED current deceases, which can help chip cooling.

*Company's Logo is Protected, "JW" and "JOULWATT" are Registered  
Trademarks of JoulWatt technology Inc.*

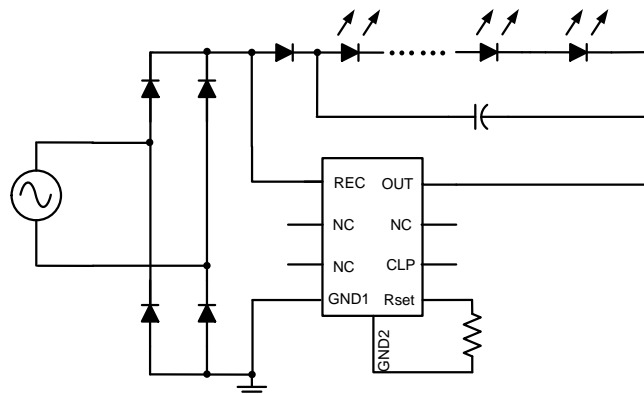
## FEATURES

- Direct Line Operation
- Integrated 500V Bleeder
- High Efficiency Bleeding Technics
- Dimmer Detection Integrated
- Good Dimmer Compatibility
- No EMI Issues.
- Low BOM Cost
- Over Thermal Protection
- ESOP8 Package

## APPLICATIONS

- LED lighting

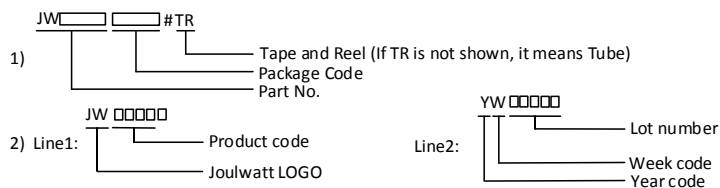
## TYPICAL APPLICATION



## ORDER INFORMATION

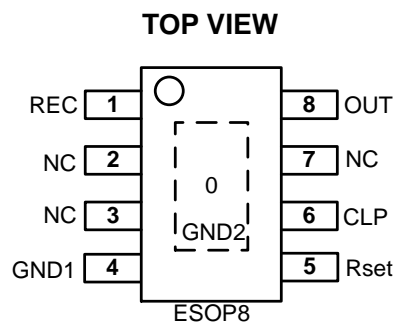
DEVICE <sup>1)</sup>	PACKAGE	TOP MARKING <sup>2)</sup>	ENVIRONMENTAL <sup>3)</sup>
JW16979CESOP#TR	ESOP8	JW16979C YW□□□□□	Green

## Note:



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

## PIN CONFIGURATION

ABSOLUTE MAXIMUM RATING<sup>1)</sup>

REC Voltage.....	500V
OUT Voltage.....	400V
Others PIN Voltage.....	-0.3V to 5.5V
Junction Temperature <sup>2) 3)</sup> .....	150°C
Lead Temperature .....	260°C
Storage Temperature.....	-65°C to +150°C

RECOMMENDED OPERATING CONDITIONS

REC Voltage.....	400V
OUT Voltage.....	320V
Junction Temperature (T <sub>J</sub> ).....	125°C

THERMAL PERFORMANCE<sup>4)</sup>

$\theta_{JA}$      $\theta_{JC}$

ESOP8 .....	50 ...10°C/W
-------------	--------------

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 JW16979C 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.
- 4) Measured on JESD51-7, 4-layer PCB.

## ELECTRICAL CHARACTERISTICS

<i>TA=25 °C, unless otherwise stated</i>						
Item	Symbol	Condition	Min.	Typ.	Max.	Units
REC Start –up Threshold	V <sub>st</sub>	REC Rising	10.8	12	13.2	V
Bleeder Current	IBL		26	28	30	mA
Quiescent Current1	I <sub>Q1</sub>			110	140	μA
ZV Threshold	ZV	REC falling		50		V
TRIAC Detection voltage threshold	V <sub>TR</sub>	REC Rising		30		V
Bleeder Enable delay time	T <sub>BLDEN</sub>			550	650	μS
Minimum bleeding time after ZVN	T <sub>BLDmin</sub>			850		μS
TRIAC dimmer Detection time	T <sub>det</sub>			60		μS
Bleeding Current decreasing time	T <sub>BDD</sub>		30	50		μS
Zero LED current threshold	I <sub>LED_L</sub>			6		mA
Current Sensing resistor clamp voltage	V <sub>RSCLP</sub>		0.18	0.2	0.22	V
Bleeding MOS Saturation Current	I <sub>sat</sub>	V <sub>g</sub> =5V@ REC=V <sub>st</sub> , 125 °C	30			mA
Bleeding MOS BV	BV		500			V
OUT Minimum Input Voltage	V <sub>out_min</sub>	I <sub>OUT</sub> =30mA		5.6	6	V
OUT Maximum Voltage	V <sub>out_BV</sub>	I <sub>OUT</sub> =0mA	400			V
Quiescent Current2	I <sub>Q2</sub>	V <sub>OUT</sub> =10V, V <sub>RS</sub> =3.3V		36	67	μA
Reference Voltage	V <sub>REF</sub>	V <sub>OUT</sub> =10V	484	500	516	mV
CLP Voltage	V <sub>clp</sub>	V <sub>OUT</sub> =50V, V <sub>EXT</sub> =1V	0.44	0.45	0.46	V
Thermal Protection Threshold <sup>5)</sup>	OTP <sub>CHIP</sub>			150		°C

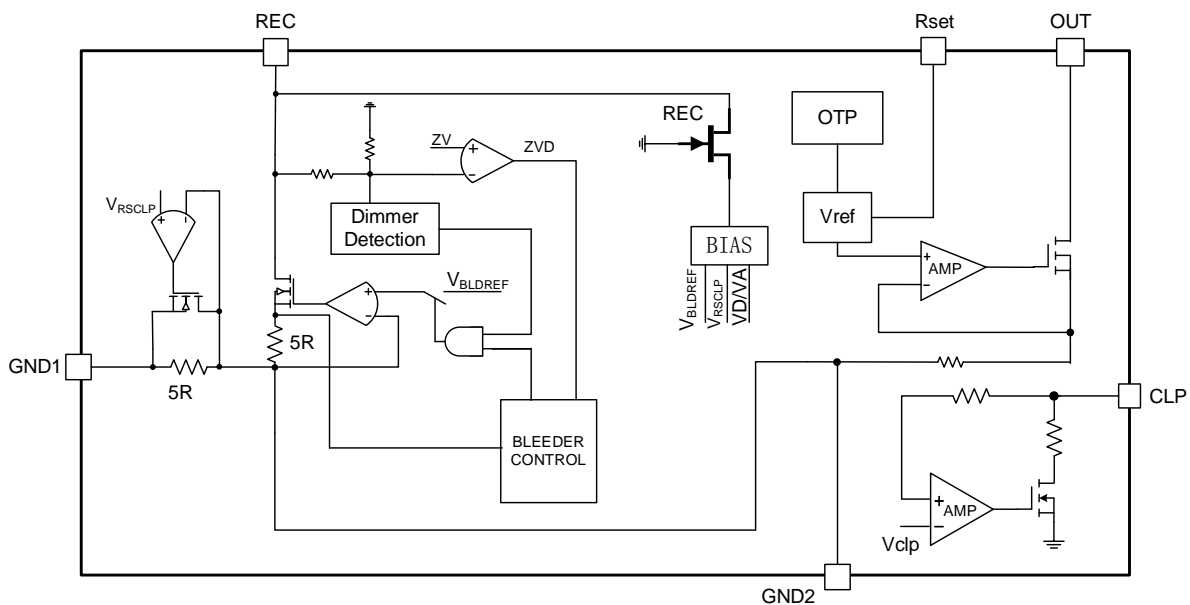
**Note:**

- 1) Guaranteed by design

## PIN DESCRIPTION

PIN No. ESOP8	PIN Name	PIN Description
1	REC	High voltage power supply pin, Bleeder current input pin.
2,3,7	NC	No connection.
4	GND1	Bleeder ground pin.
5	Rset	Current set Pin.
6	CLP	Voltage clamping pin
8	OUT	LED cathode pin.
Expose PAD	GND2	Linear regulator ground.

## BLOCK DIAGRAM



## FUNCTIONAL DESCRIPTION

JW16979C is a single channel linear LED driver for TRIAC dimmable LED lighting system. With the patented control strategy, ultra-low power loss bleeding will be achieved.

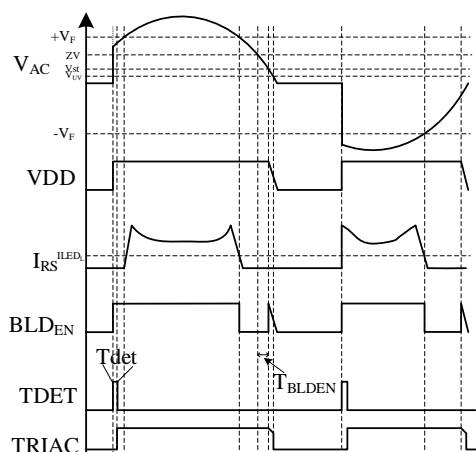
### Theory of Operation

JW16979C is supplied from REC pin that connected to the DC Bus. When REC is higher than  $V_{ST}$ , the normal operation mode enters.

After the start-up, JW16979C will perform the TRIAC dimmer detection. During the detection time  $T_{det}$ , if the REC voltage is always lower than  $V_{TR}$ , JW16979C works in non-dimming mode, otherwise, JW16979C works in TRIAC dimming mode, in which a series of bleeding control will be done. When the internal VDD goes below  $V_{UV}$ , bleeder is default enabled. The LED current will be regulated when OUT pin is higher than  $V_{out\_min}$ .

### TRIAC Dimming Mode

JW16979C senses the zero-input voltage internally. The bleeder is enabled after a delay time  $T_{BLDEN}$  after zero-input voltage. The bleeding is disabled after the LED current is lower than the minimum input current  $I_{LED\_L}$ . The waveforms of key signals are as below shown.



Where,

$V_{AC}$ - the dimmer output voltage.

$V_{DD}$  - the internal power supply.

$I_{RS}$ - input current injected to RS pin.

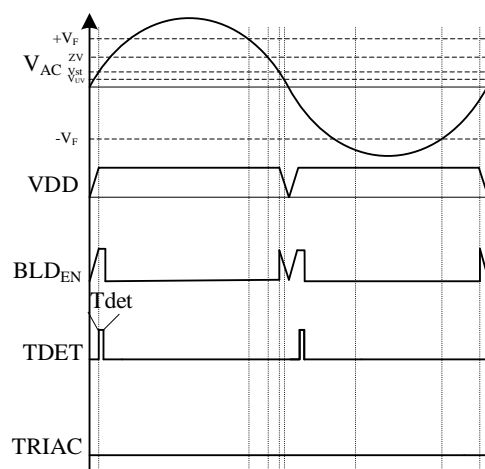
$BLD_{EN}$  – Enable signal of bleeding current control.

$T_{DET}$  – TRIAC dimmer detection signal.

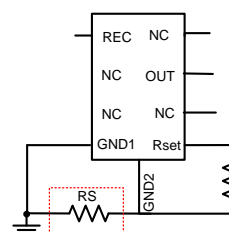
TRIAC – TRIAC dimming mode signal.

### Non-dimming Mode

JW16979C works in non-dimming mode when there is no dimmer in the loop to minimize the bleeding loss. The bleeder will be in off state after the dimmer detection. Key waveforms are shown below.



### Bleeder Current Control



JW16979C controls the bleeder current from the

information of the current sensing resistor.

RS is the current sensing resistor connected between GND1 and GND2. When RS is NC, I<sub>Bleed</sub> is 28mA typ.

### **Constant Peak Current Control**

JW16979C controls the LED peak current from the information of the current sensing resistor. The output LED peak current can be calculated as:

$$I_{\text{peak}} = 4000V_{\text{REF}}/R_{\text{Set}}$$

Where

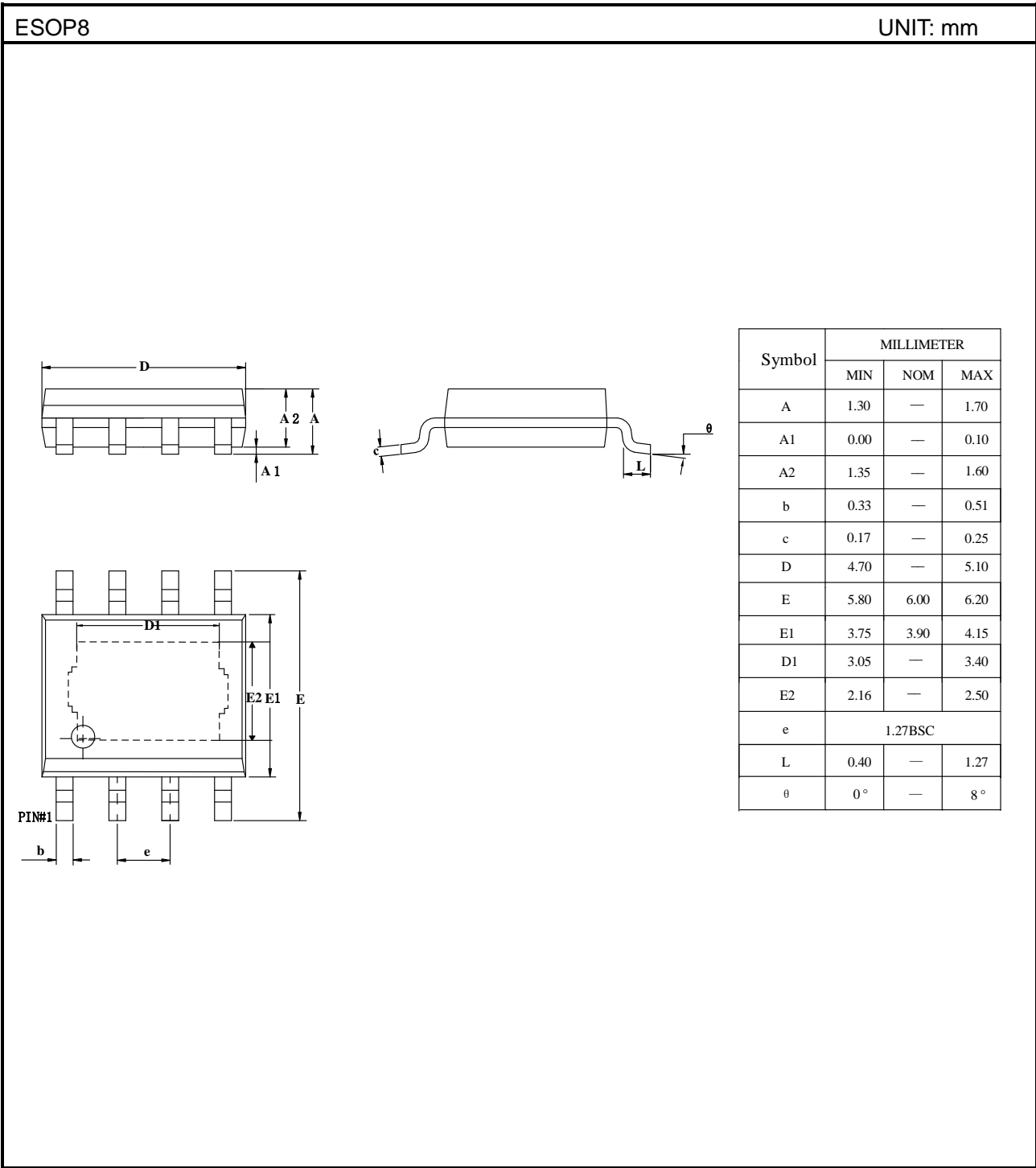
V<sub>REF</sub> is the reference voltage;

Rset is the current sensing resistor connected between Rset and GND2.

### **Over Thermal Protection**

When the junction temperature of JW16979C is higher than OTP<sub>CHIP</sub>, LED current reduces.

PACKAGE OUTLINE





## IMPORTANT NOTICE

- Joulwatt Technology Inc. reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein.
- Any unauthorized redistribution or copy of this document for any purpose is strictly forbidden.
- Joulwatt Technology Inc. does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

*Copyright © 2020 JW16979C Incorporated.*

*All rights are reserved by Joulwatt Technology Inc.*