

Electric Shock Protector For the Tube Light

Parameters Subject to Change Without Notice

DESCRIPTION

JW[®]JW1818B aimed at reducing the risk of electric shock during the re-lamping.

Patented protection strategies ensure the reliability of the human body detection, which makes the assembling safer.

Supplied from the line directly makes JW1818B a quick start-up and lower BOM cost, and the low consumption technics lowers the detection current to the minimum.

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

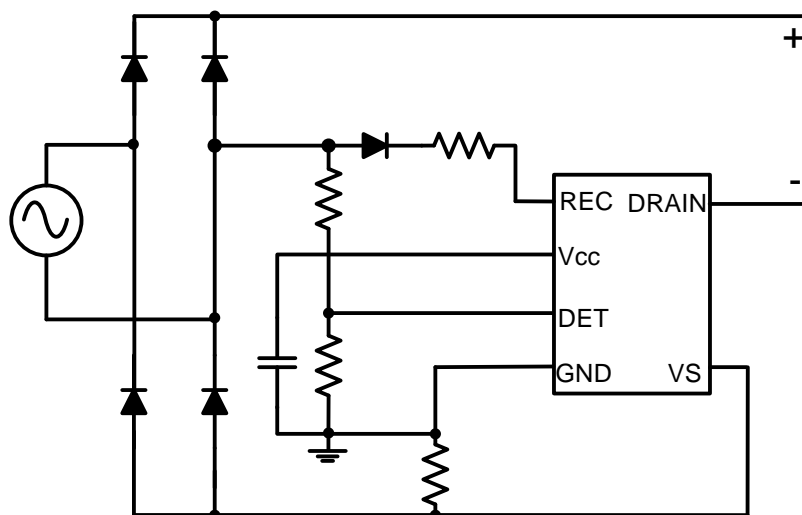
FEATURES

- Supplied from Line Directly
- Input Voltage Range 20V~500V
- 600V power MOSFET integrated
- Programmable Detection Threshold
- Ultra- low Quiescent Current
- Short Delay for the Load
- SOP8 Package

APPLICATIONS

- LED lighting

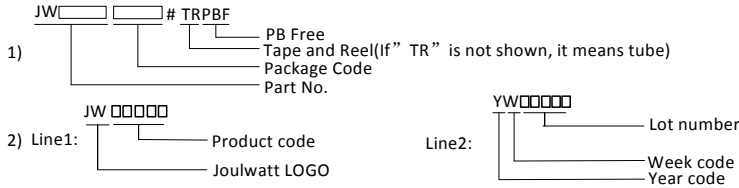
TYPICAL APPLICATION



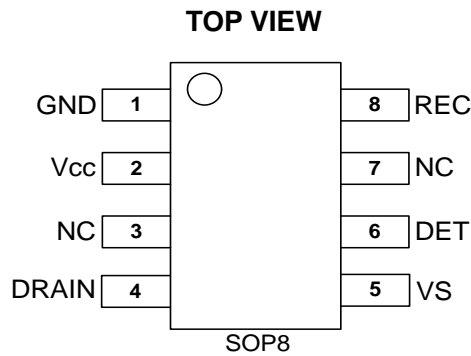
ORDER INFORMATION

DEVICE ¹⁾	PACKAGE	TOP MARKING ²⁾
JW1818BSOPB#TRPBF	SOP8	JW1818B YW□□□□□

Notes:



PIN CONFIGURATION



ABSOLUTE MAXIMUM RATING¹⁾

RECPIN.....	650V
DRAIN PIN.....	600V
DET PIN.....	-0.3V to 6V
VS PIN.....	-6V to 0.3V
VCC PIN	-0.3V to 15V
Junction Temperature ^{2) 3)}	150°C
Lead Temperature.....	260°C
Storage Temperature.....	-65°C to +150°C

RECOMMENDED OPERATING CONDITIONS

REC, DRAIN PIN.....	20V to 550V
DET PIN.....	-0.3V to 5V
VS PIN.....	-5V to 0.3V
VCC PIN	-0.3V to 14V
Junction Temperature (T _J).....	150°C

THERMAL PERFORMANCE⁴⁾

	θ_{JA}	θ_{JC}
SOP8.....	96	45°C/W

Note:

- 1) Exceeding these ratings may damage the device.
- 2) The JW1818B guarantees robust performance from -40°C to 150°C junction temperature. The junction temperature range specification is assured by design, characterization and correlation with statistical process controls.
- 3) The JW1818B includes thermal protection that is intended to protect the device in overload conditions. Thermal protection is active when junction temperature exceeds the maximum operating junction temperature. Continuous operation over the specified absolute maximum operating junction temperature may damage the device.
- 4) Measured on JESD51-7, 4-layer PCB.

ELECTRICAL CHARACTERISTICS

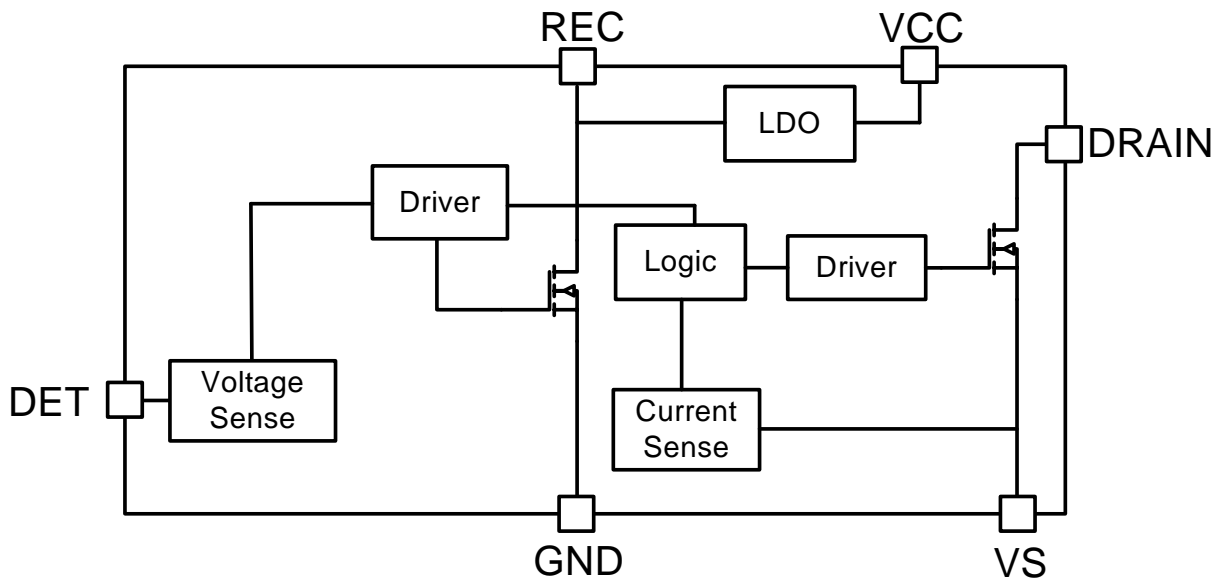
<i>VREC = 35V, TA = 25°C, unless otherwise stated.</i>						
Item	Symbol	Condition	Min.	Typ.	Max.	Units
Vcc Start –up Threshold	Vst		11	13	15	V
Vcc UVLO Threshold	VCCUVLO		7.6	8.2	8.8	V
Quiescent Current	IQ	REC =30V		55	100	μA
DET Threshold	VDET		0.94	1.0	1.06	V
VS Reference Voltage	VS		-1.05	-0.99	-0.93	V
Detection time	T1		32	37	42	uS
Detection MOSFET Rdson ⁵⁾	Rdson ₁			33	38	Ω
Detection MOSFET Saturation Current ⁵⁾	ISAT		530			mA
Detection MOSFET Break-down Voltage	V _{BV1}	Id=150uA, DET=0V.	650			V
Main circuit power MOSFET	Rdson ₂			1.9	2.4	Ω
	V _{BV2}		600			V

5) Guaranteed by design

PIN DESCRIPTION

Pin	Name	Description
1	GND	Ground Pin.
2	Vcc	Power supply pin. This pin supplies current to the internal start-up circuitry. This pin must be locally bypassed with a capacitor.
3,7	NC	No connection
4	DRAIN	Drain of the internal power MOSFET.
5	VS	Current sense pin. This pin set the current threshold to detect if there is leakage/electric shock or not.
6	DET	Input voltage detection pin. This pin set the impedance detection threshold of input voltage by a divider connected between REC and GND.
8	REC	High voltage power supply pin and the Drain of internal power MOSFET for impedance detection.

BLOCK DIAGRAM



FUNCTIONAL DESCRIPTION

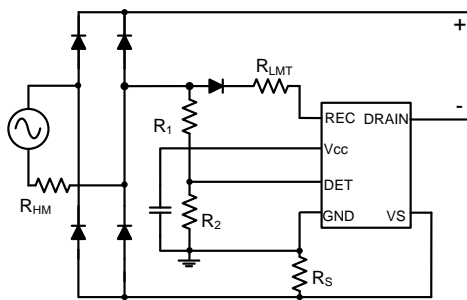
JW1818B is used to reduce the risk of electric shock during the re-lamping.

Start Up

JW1818B is supplied by line voltage directly. When REC charges VCC up to 13V, the internal detection circuit starts to work, and it will maintain VCC voltage to 13V. Once VCC is lower than 8V, system resets.

Electric Shock Protection

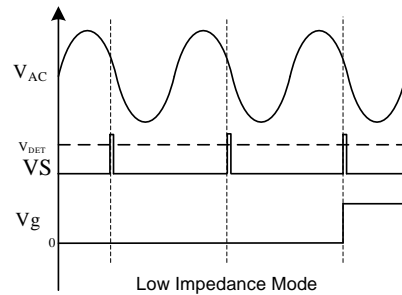
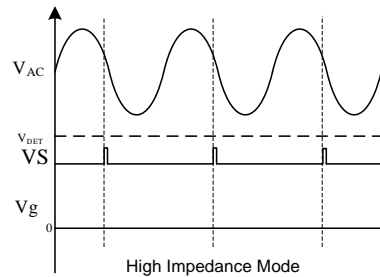
The impedance detection circuit samples the input current through VS pin.



When DET pin is lower than 1.0 V and the internal MOSFET will be turned on for about 35uS as the figure shows below. The detection threshold can be calculated as:

$$V_{DT} = V_{DET} \times \frac{R1 + R2}{R2}$$

Where V_{DET} is the DET threshold, 1.0V in typical. If VS is lower than -1V for consecutive three detection cycles, JW1818B works in low impedance mode. The internal main circuit power MOSFET will be turned on and the impedance detection function disabled until Vcc restarts. If VS is higher than -1V, JW1818B works in the high impedance mode, which means electric shock happens. The internal power MOSFET will be turned off until the next detection cycle. The time sequences of the key signals are shown below.



Vg is the gate signal of the main circuit power MOSFET.

To limit the peak input current and protect the internal detection MOSFET, R_{LMT} is necessary. The recommended detection current should be lower than 0.53A at all conditions.

$$\frac{V_{Bus_{PK}}}{R_{LMT} + R_{dson} + R_S} < 0.53A$$

Where,

$V_{Bus_{PK}}$ is the peak Value at the maximum input voltage. For example, $V_{Bus_{PK}}$ at 277V RMS line input

$$V_{Bus_{PK}} = 277V * \sqrt{2} = 391.7V$$

R_{dson} is the on resistance of the detection MOSFET, 33Ω in typical.

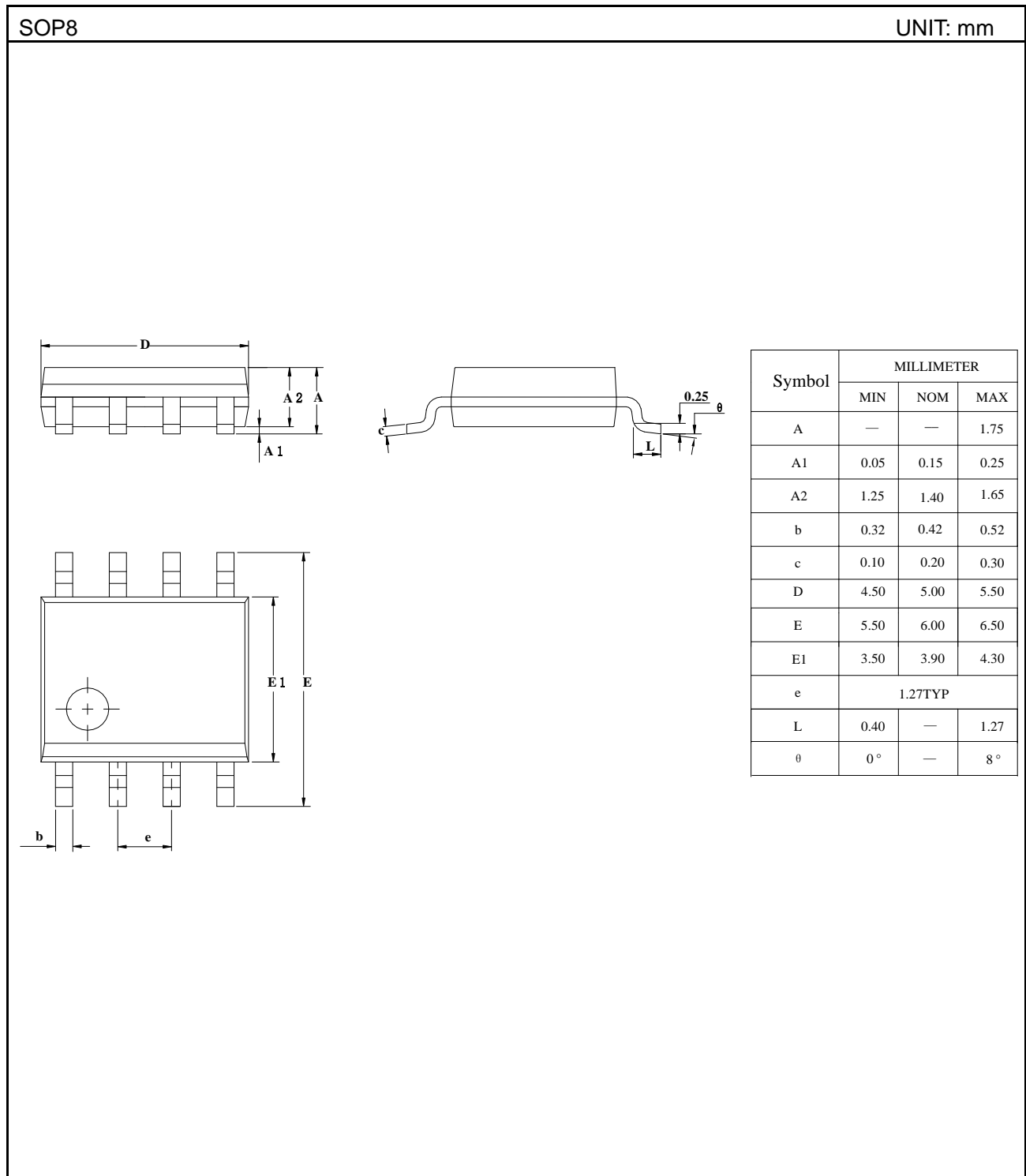
To ensure the reliable detection, make sure

$$\begin{cases} \frac{V_{DT} R_S}{R_{LMT} + R_{dson} + R_S} > 1.1V_{DET} \\ \frac{V_{DT} R_S}{R_{LMT} + R_{dson} + R_S + R_{HM}} < 0.9V_{DET} \end{cases}$$

PCB Design Guideline

1. JW1818B should be placed far away from the power devices for better thermal performance.
2. The VCC pin must be locally bypassed with a capacitor.
3. The area of LED current loop should be as small as possible.

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 © 2018 JW1818B Incorporated.

All rights are reserved by Joulwatt Technology Inc.