WD10-3111

Floating current driver IC for LED lighting

Rev1.0 – 18 Apr. 2022

1. General Description

The WD10-3111 is a high voltage floating current driver IC for regulating the current flowing through an LED string. WD10-3111 can be configured various LED driving topologies such as series, parallel or mixed types. WD10-3111 can work as voltage controlled current source and current regulator. The PCB layout is also very flexible to meet various shape requirements. It is especially suitable for replacing incandescent light bulbs and linear type fluorescent lamps. WD10-3111 is available in SOT-89-3L Package.

2. Features

- Floating current driver IC for LED lighting
- High current driving capability: Max 150mA
- No Electrolytic Capacitor, and Inductor Components
- High power Factor
- Low Total Harmonic Distortion
- Flexible PCB layout
- Compatible with TRIAC Dimming
- Thermal Protection

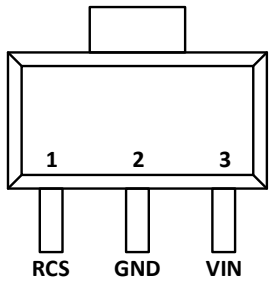
3. Applications

- AC LED light Applications
- Bulb/Tube/Down-light/Ceiling/Flat LED lightings

4. Package Information and Pin Information

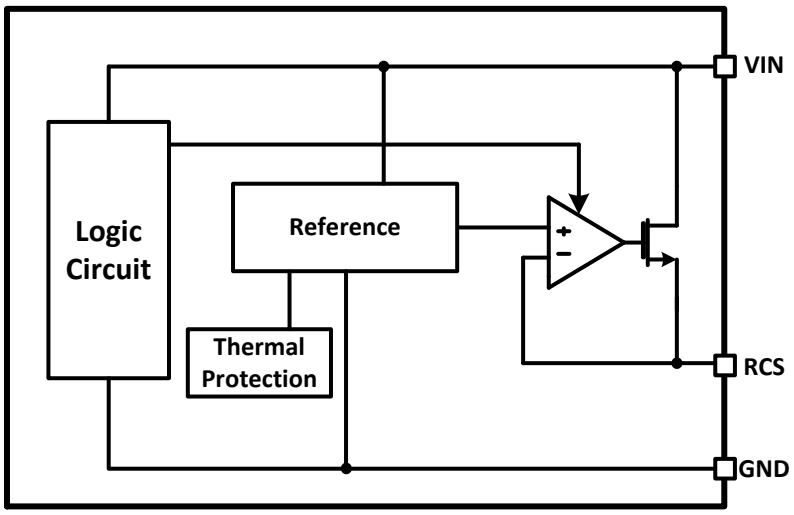
Type number	*Package*		
	Name	*Description*	*Marking*
WD10-3111	SOT-89-3L	SOT-89-3L	WD10-3111

Top View



Pin	*Symbol*	*I/O*	*Description*
1	RCS	I/O	LED Current Setting
2	GND	P	Ground
3	VIN	O	Supply Input

5. Block Diagram



6. Absolute Maximum Ratings

Parameter	*Symbol*	*Value*	*Unit*
V_{VIN} to V_{GND} Voltage	$V_{VIN.ABS}$	-0.3 ~ +700	V
V_{RCS} to V_{GND} Voltage	$V_{RCS.ABS}$	-0.3 ~ +6.5	V
Maximum Regulating Current	$I_{VIN.ABS}$	150	mA
Storage Temperature Range	T_{STG}	-55 ~ +150	°C
Power Dissipation (Note1)	P_D	0.765	W

Caution)

- Values beyond absolute ratings can cause the device to be prematurely damaged.
  Absolute maximum ratings are stress ratings only and functional device operation is not guaranteed.

Note 1)

- Package power dissipation is dependent on the PCB board type, size, layout, pattern and thermal heat sink. Therefore, it is strongly recommended to use the metal PCB as a board material.

7. Package Thermal Characteristics

Parameter	Symbol	Value	Unit
Junction to ambient thermal resistance	θ_{JA}	130	°C/W
Junction to case thermal resistance	θ_{JC}	65	°C/W

*Test conditions

- θ_{JA} : The package thermal impedance is calculated in accordance with JESD 51-7
- θ_{JC} : The package thermal impedance is calculated in accordance with JESD 51-1

8. Recommended Operating Conditions

Parameter	Symbol	Min	Typ.	Max	Unit
Bypass Current (with Adequate Heat Sinking)	I_{VIN}		100		mA
Maximum Junction Temperature	T_J			125	°C
Operating Free-Air Temperature Range	T_A	-20		85	°C

9. Electrical Characteristics

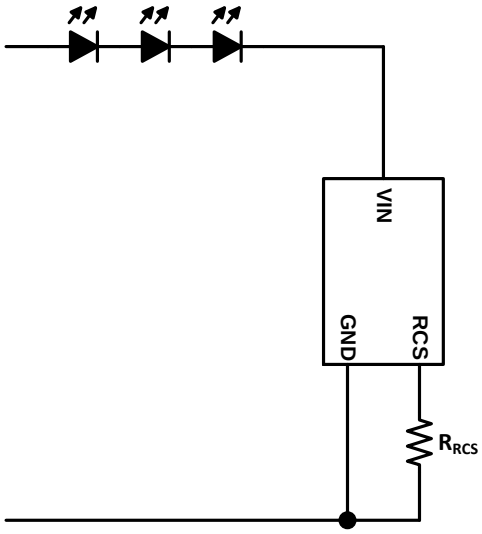
T_A = 25°C, unless otherwise specified

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
RCS Pin Reference Voltage	V_{RCS}			1.0		V
Thermal Shutdown Threshold		T_J Rising		160		°C

10. Functional Description

LED Current

An external resistor, R_{RCS} is connected between RCS to GND pins to determine the output current level as below



$$\text{LED Current } (I_{LED})\ [A] = \frac{V_{RCS}\ [V]}{R_{RCS}\ [\Omega]}$$

Figure 1. LED driver example and current setting.

Over Temperature Protection

When the temperature of the WD10-3111 rises to 160°C, the over temperature protection condition is met. Once the temperature exceeds 160°C level, WD10-3111 decreases LED current by approximately 50% from the normal current level as long as the temperature sustains over 70°C, where 70°C is the temperature hysteresis level. If the temperature decreases lower than the hysteresis level, the LED current recovers to the normal level.

10. Functional Description (Continued)

Minimum V_{IN} Voltage Selection

Below figure shows V_{IN} versus I_{VIN} characteristic curve. Internal current regulation circuit of WD10-3111 requires about 5V of V_{IN}. But for the stable current output, the required V_{IN} voltage should be higher than 5V. The required minimum V_{IN} voltage proportionally increases according to current level, I_{VIN} as dotted line in the figure. From the characteristic curve, the minimum required V_{IN} voltage can be estimated as:

$$V_{IN,\min} = 53 \times I_{VIN} + 8.7\ [V]. \qquad \text{[Equation 1]}$$

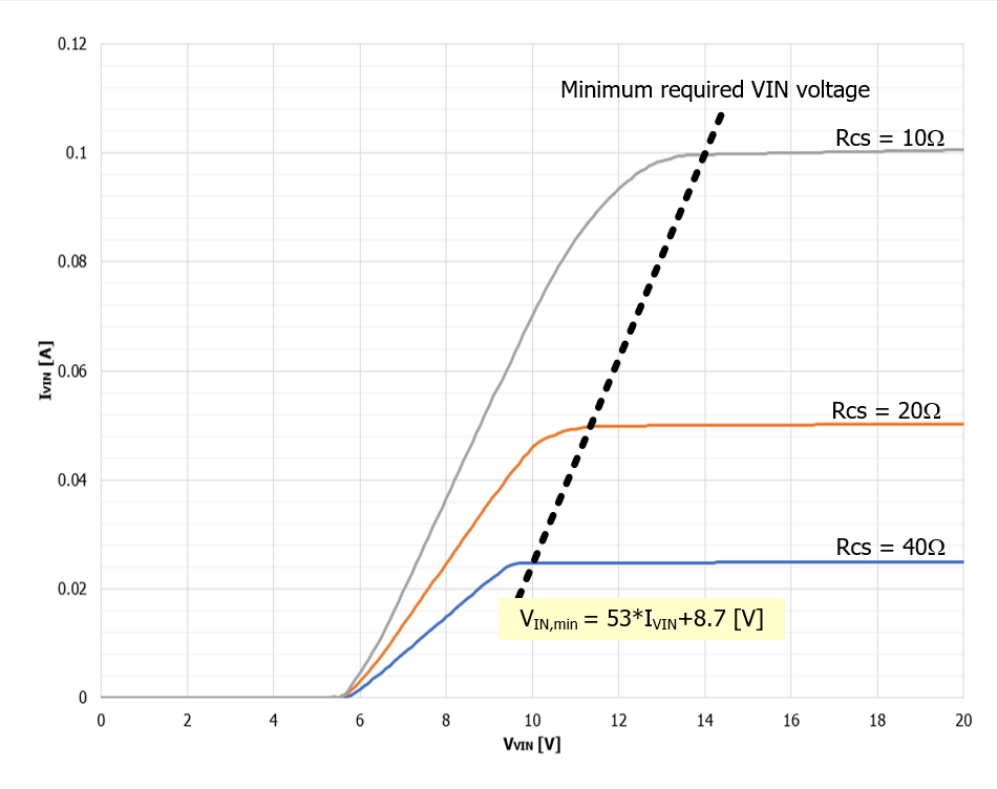


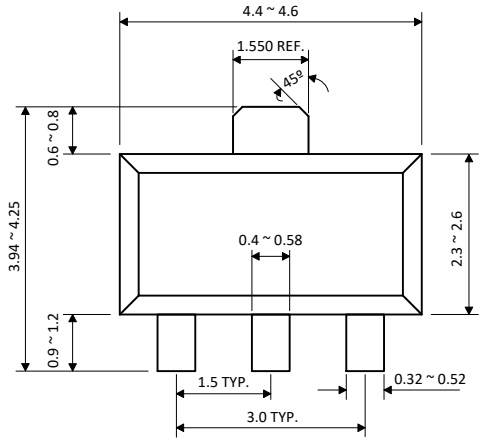
Figure 2. V_{IN} and I_{VIN} characteristic curve.

Converting the equation as a function of Rcs, it can be rewritten as:

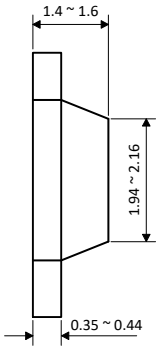
$$V_{IN,\min} = \frac{53}{R_{CS}[\Omega]} + 8.7\ [V]. \qquad \text{[Equation 2]}$$

11. Package Outline Dimensions

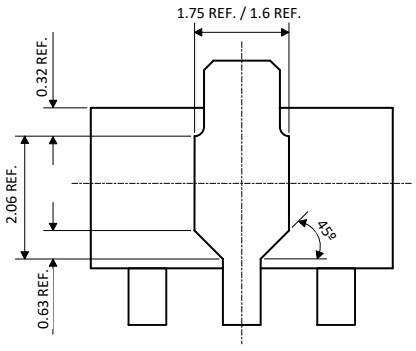
SOT-89-3L



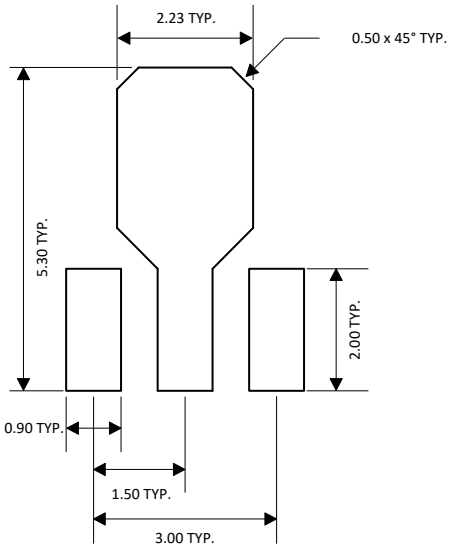
Top View



Side View



Bottom View



Recommend solder PAD

Note

1. Dimensions are in millimeters
2. Dimensions are exclusive of mold flash and interlead flash

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13. Contact information

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