

# DT3100

Floating current driver IC for LED lighting

Rev1.3 – 28 Oct 2022

## 1. General Description

The DT3100 is a floating current driver IC for regulating the current flowing through an LED string. The application of DT3100 is configured in series or parallel with an LED string. The DT3100 can work as voltage controlled current source, current regulator, or cut-off. It is suitable for applications adopting periodical AC voltage source. The PCB layout is also very flexible to meet various shape requirements. It is especially suitable for replacing incandescent light bulb and linear type fluorescent lamp. The DT3100 provides the key protection function for short circuit between CS and VS pins to protect the LED string and the DT3100 itself from burning out. The DT3100 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, Inductor Components
- High power Factor
- Low Total Harmonic Distortion
- Flexible PCB layout
- Compatible with TRIAC Dimming
- Short Circuit Protection
- Thermal Protection

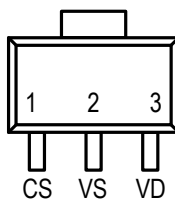
## 3. Applications

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

## 4. Package Information and Pin Information

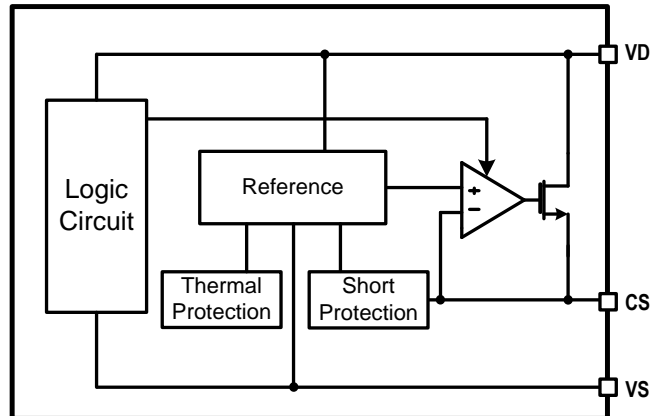
Type number	Package		
	Name	Description	Marking
DT3100	SOT-89-3L	SOT-89-3L	DT3100

Top View



Pin	Symbol	I/O	Description
1	CS	O	Current Sense pin
2	VS	O	MOSFET Source pin
3	VD	I	MOSFET Drain pin

## 5. Block Diagram



## 6. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
$V_{VD}$ to $V_{VS}$ Off-State Voltage	$V_{DSOFF}$	-0.3 ~ +450V	V
$V_{VD}$ to $V_{VS}$ On-State Voltage	$V_{DSON}$	-0.3 ~ +180V	V
$V_{CS}$ to $V_{VS}$	$V_{CS-VS}$	-0.3 ~ +6.5	V
Maximum Regulating Current	$I_{VD}$	150	mA
Maximum Operating Junction Temperature	$T_{JMAX}$	+150	°C
Storage Temperature Range	$T_{STG}$	-55 ~ +150	°C
ESD (HBM)	$V_{HBMV}$	2	kV
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	$\theta_{JA}$	130	°C/W
Junction to case thermal resistance	$\theta_{JC}$	65	°C/W

\*Test conditions

- $\theta_{JA}$  : The package thermal impedance is calculated in accordance with JESD 51-7
- $\theta_{JC}$  : 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)	$I_{VD}$		100		mA
Input Voltage	$V_{VD-VS}$			130	V
Maximum Junction Temperature	$T_J$			125	°C
Operating Free-Air Temperature Range	$T_A$	-20		85	°C

## 9. Electrical Characteristics

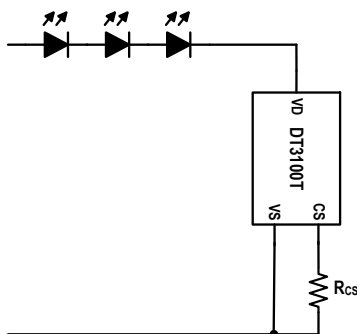
$T_A = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
CS Pin Reference Voltage	$V_{REF}$			1.0		V
Short Circuit Protection Voltage	$V_{CS\_SCP}$				0.2	V
Short Circuit Protection Mode Regulating Current	$I_{SCP}$			50		mA
Thermal Shutdown Threshold		$T_J$ Rising		160		°C
Thermal Protection Mode Regulating Current	$I_{TP}$	$T_J > 160^\circ\text{C}$		35		mA

## 10. Functional Description

### LED Current

The external Resistor,  $R_{CS}$  is added between CS and VS pins to change the regulating current as shown below.



$$\text{LED Current [mA]} = \frac{V_{CS(V_{ref}=1V)} [V]}{R_{CS} [\Omega]}$$

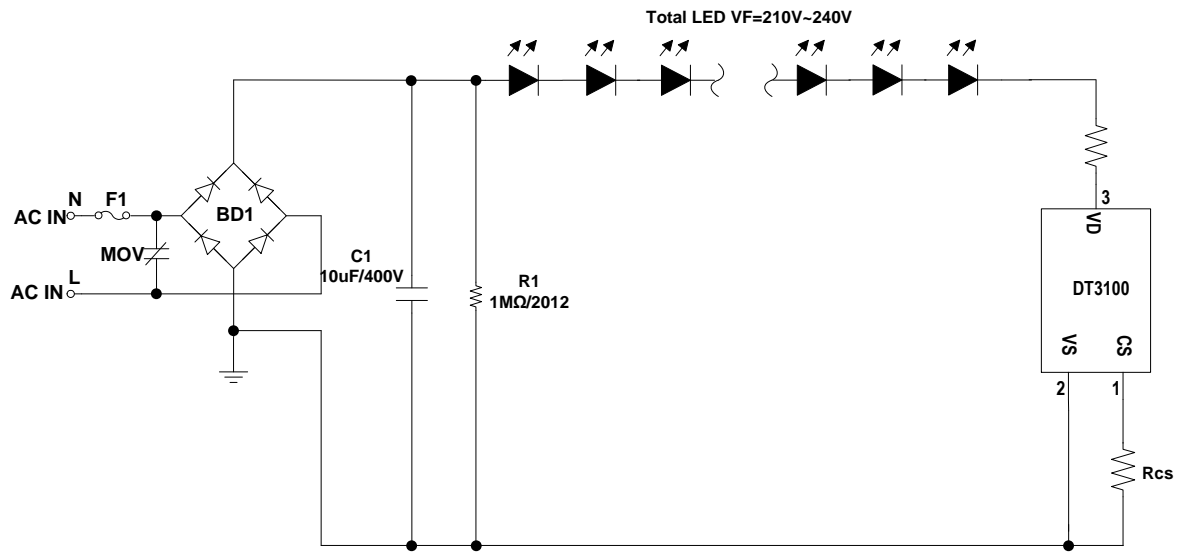
### Short Circuit Protection

The DT3100 monitors the voltage,  $V_{CS-VS}$  between CS and VS pins to determine the short circuit condition. If  $V_{CS-VS}$  is lower than 200mV, the DT3100 decides that condition as a short circuit, and regulates its driving current as 50mA for protecting the LED string and the DT3100 itself from burning out.

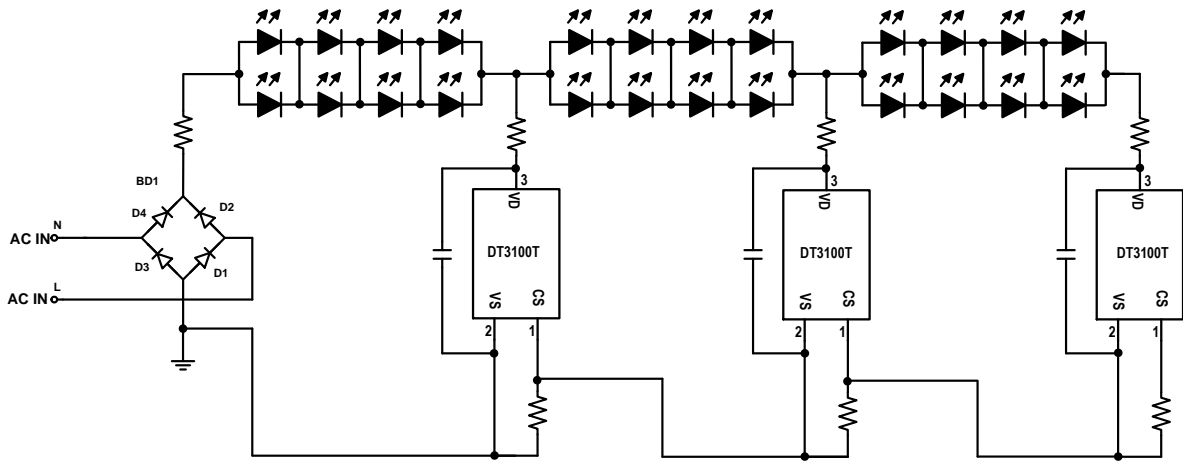
### Over Temperature Protection

When the temperature of the DT3100 rises up to 160°C, the over temperature protection condition is met. Then the DT3100 regulates its driving current as 35mA with the temperature hysteresis of 70°C. The temperature hysteresis is resumed at the next AC cycle, and the driving current is, thus, resumed to the current determined by the  $R_{CS}$  resistor.

### 11. Typical Application



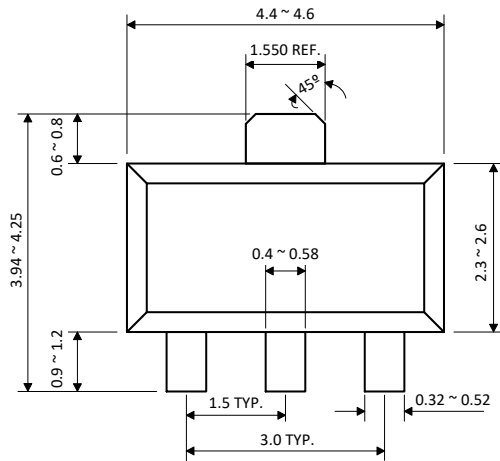
Low Cost Application Circuit



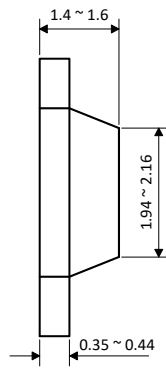
3-step Application Circuit (220V/10W, LED VF=21V)

## 12. Package Outline Dimensions

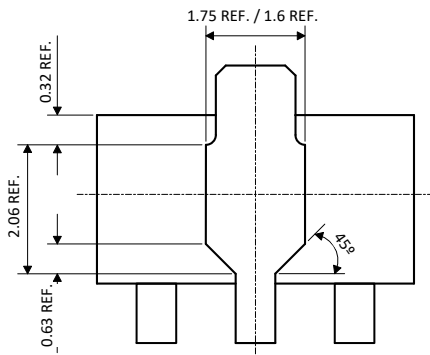
### SOT-89-3L



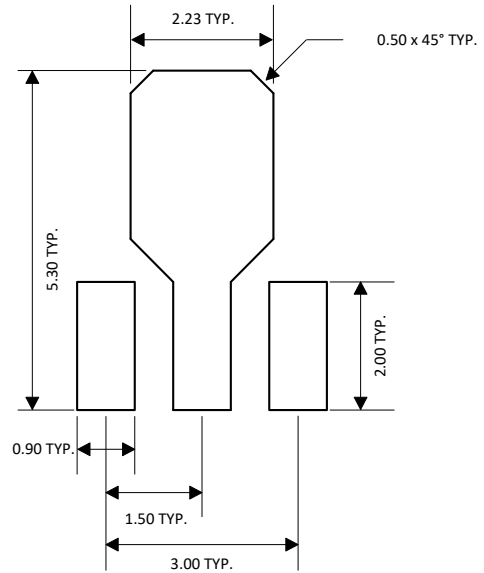
Top View



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. DISCLAIMER**

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### **14. Contact information**

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