

## Descriptions

The DW8501 is an instant On/Off LED driver for high power LED applications. At DW8501 output stage, one regulated current port is designed to provide a uniform and constant current sink for driving LEDs within a large range of  $V_F$  variations. DW8501 easily provides users a consistent current source. User may adjust the output current from up to 1.5A through an external resistor,  $R_S$ , which gives users flexibility in controlling the light intensity of LEDs. In addition, users can precisely adjust LED brightness from 0% to 100% via output enable (EN) with Pulse Width Modulation. DW8501 also guarantees that LEDs can be cascaded to maximum 40V at the output port.

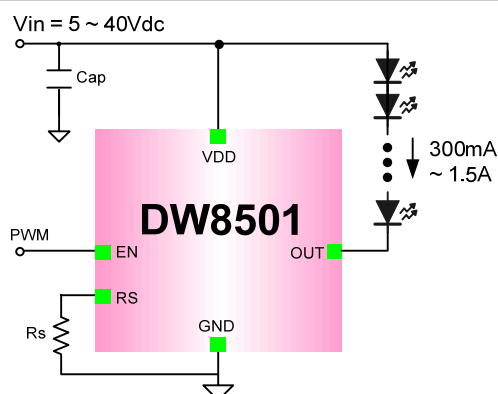
## Features

- Constant output current invariant to supply and load voltage change
- 5V to 40V supply voltage
- Up to 1.5A adjustable regulated output current
- Built-in thermal derating circuit
- Available PWM dimming control
- Output current adjusted through an external resistor
- TO-252, SOT-223 Package

## Applications

- LED light bulbs
- Signage and decorative LED lighting
- General lighting of flat panel displays
- RGB backlighting LED driver
- Current stabilizer with DC/DC or AC/DC
- Automotive lighting
- General purpose constant current source

## Typical Application Circuit



## Ordering Information

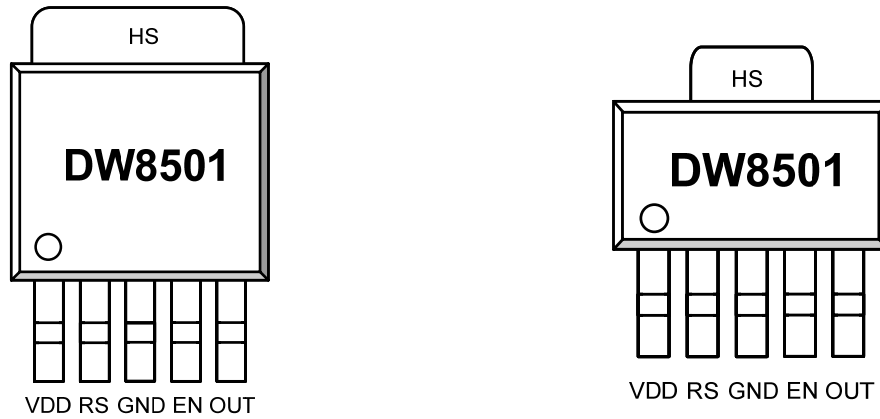
Device	Marking	Package	Operating Temp
DW8501	DW8501 XXXXXXXX YWW	TO-252	-35°C ~ +85°C
DW8501	DW8501 XXXXXXXX YWW	SOT-223	

## Package Information



Package	Size
TO-252-5L	6.5x5.5x2.3(mm)
SOT-223-5L	6.5x3.5x1.8(mm)

**Pin Connection**



**Pin Description**

Pin	Name	Description
1	VDD	Supply voltage input
2	RS	Output current set input. Connect a resistor from RS to GND to set the LED bias current
3	GND	Ground
4	EN	Output stage enable control pin. High enable the OUT pin. It can be left floating for normally on.
5	OUT	Output pin. Sink current is decided by the current on $R_{SET}$ connected to RS
6	HS	Heat sink, normally connected GND

### Absolute Maximum Ratings

Characteristics		Symbol	Value	Unit
Supply voltage		$V_{DD}$	41	V
Output voltage		$V_{OUT}$	23	V
Enable voltage		$V_{EN}$	41	V
Package thermal resistance	TO-252-5L	$\theta_{JA}$	90	°C/W
	SOT-223-5L	$\theta_{JA}$	100	°C/W
Operating temperature		$T_{OPR}$	-35~+85	°C
Storage Temperature		$T_{STG}$	-55~+150	°C

**Note** 1.  $\theta_{ja}$  is measured in the convection at  $T_a=25^\circ\text{C}$  on a high effective thermal conductivity test board(4 Layers, 2S2P) of JEDEC 51-7 thermal measurement standard.

### Recommended Operation Conditions

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{DD}$	5	-	40	V
Enable voltage	$V_{EN}$	-	-	40	V
Output sink current	$I_{OUT}$	-	-	1.5	A

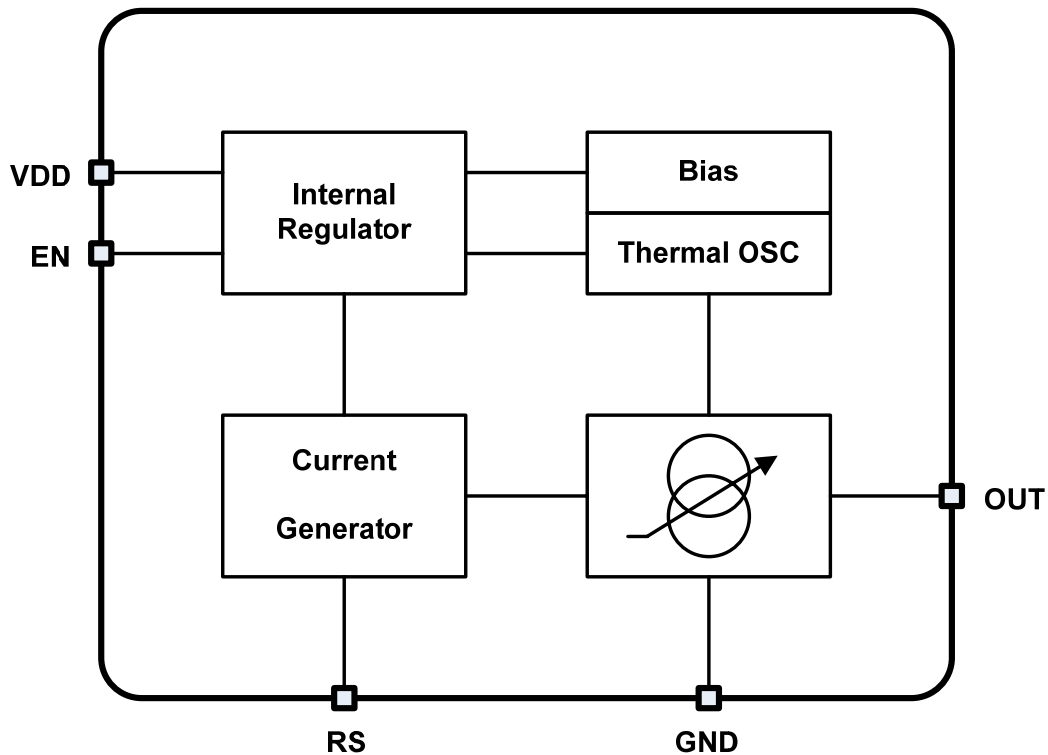
## Electrical Characteristics

$V_{DD} = 24V$ ,  $EN = 0 \sim 24V$ ,  $T_a = -35^{\circ}C \sim +85^{\circ}C$ , unless otherwise specified. Typical values are at  $T_A = +25^{\circ}C$

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input supply voltage	$V_{DD}$		5	-	40	V
Output linearity voltage	$V_{OUT\_LINE}$	$V_{DD}=24V$ , $I_{SET}=300mA$ ,	-	-	3	V
Output current	$I_{OUT}$		0.3	-	1.5	A
Quiescent Current	$I_{Q\_ON}$	$EN = 24V$	-	1.5	-	mA
	$I_{Q\_OFF}$	$EN = 0V$	-	150	-	$\mu A$
EN input leakage current	$I_{EN\_LIK}$		-	-	60	$\mu A$
Input high voltage	$V_{IH}$		2	-	-	V
Input low voltage	$V_{IL}$		-	-	0.8	V
LED output drop-out voltage	$V_{DROP}$	$V_{DD}=40V$ , $I_{SET}=1A$	-	1	-	V
Thermal derating	$T_D$		-	140	-	$^{\circ}C$
Thermal derating hysteresis	$T_{DHYS}$		-	15	-	$^{\circ}C$
Rset Voltage	$V_{SET}$		0.532	0.61	0.703	V
	$R_{SET}$	$2K\Omega$		300		mA
		$1K\Omega$		600		mA
		$600\Omega$		1000		mA
		$400\Omega$		1500		mA

**Note2** : Output dropout voltage :  $90\% \times I_{OUT}$

## Block Diagram



## Circuit Description

### Setting Output Current

$$I_{out} [\text{mA}] = (610(\text{mV})/R_{set} (\Omega)) \times 1000$$

**Typical Applications**

※ LED VF = 3.3V, 1W Power LED

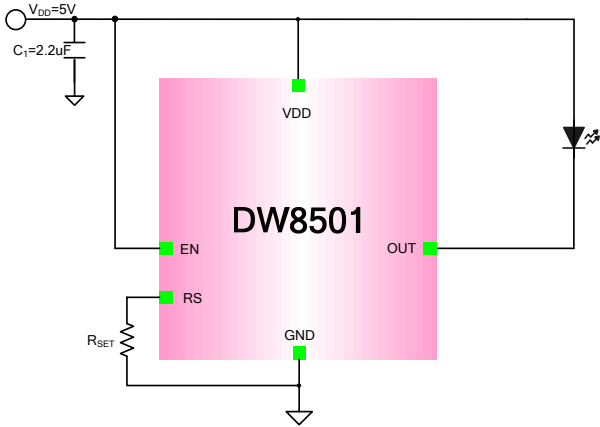


Figure 1. VDD=5V

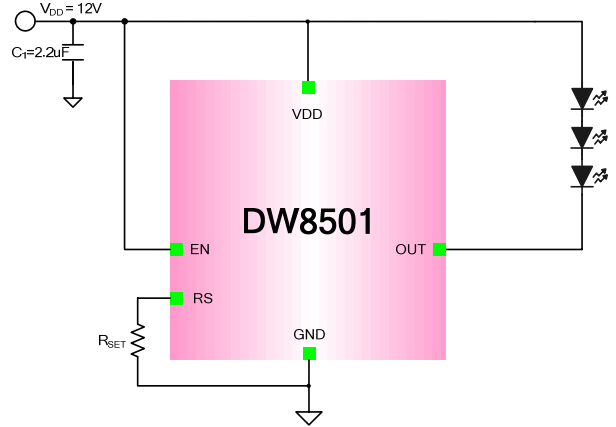


Figure 2. VDD=12V

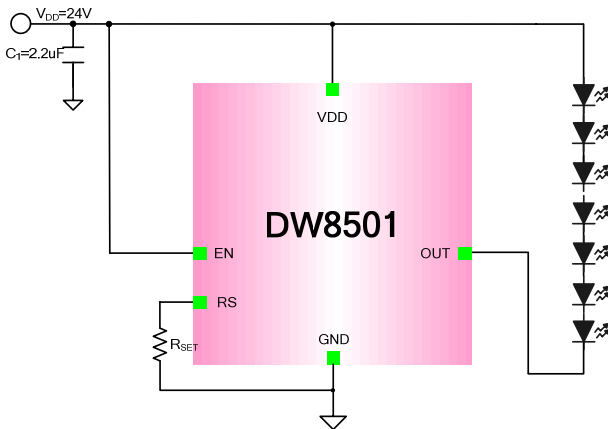


Figure 3. VDD=24V

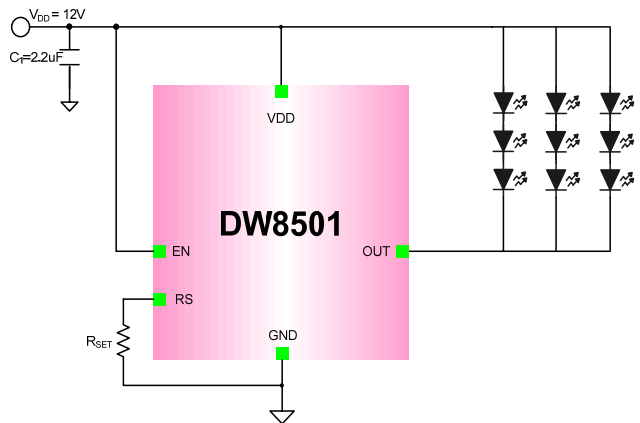


Figure 4. VDD=12V, 9 LED

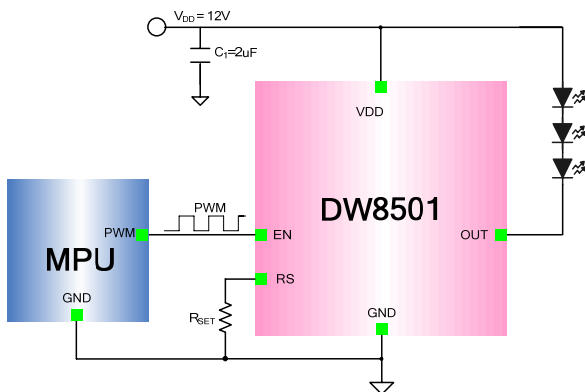


Figure 5. PWM Typical Application

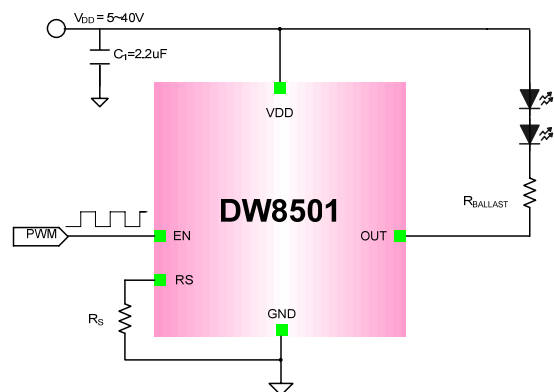
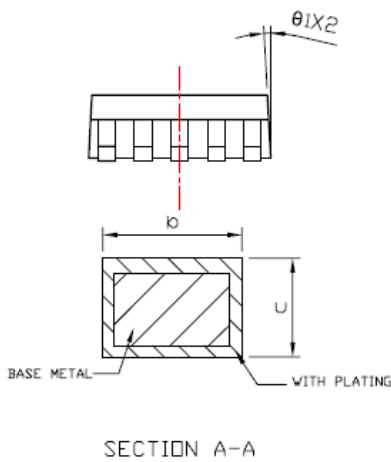
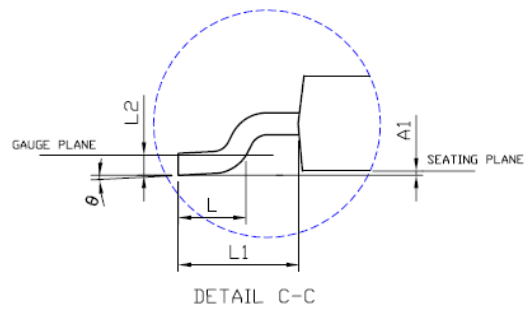
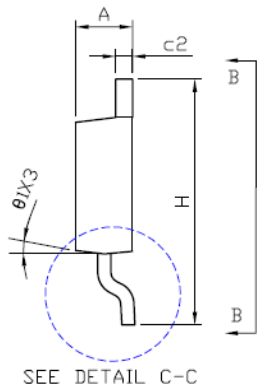
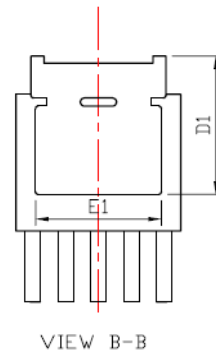
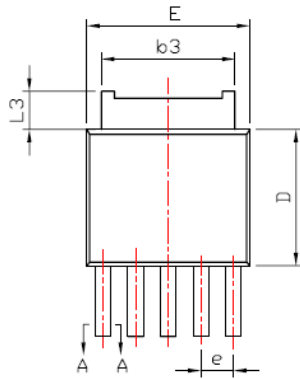


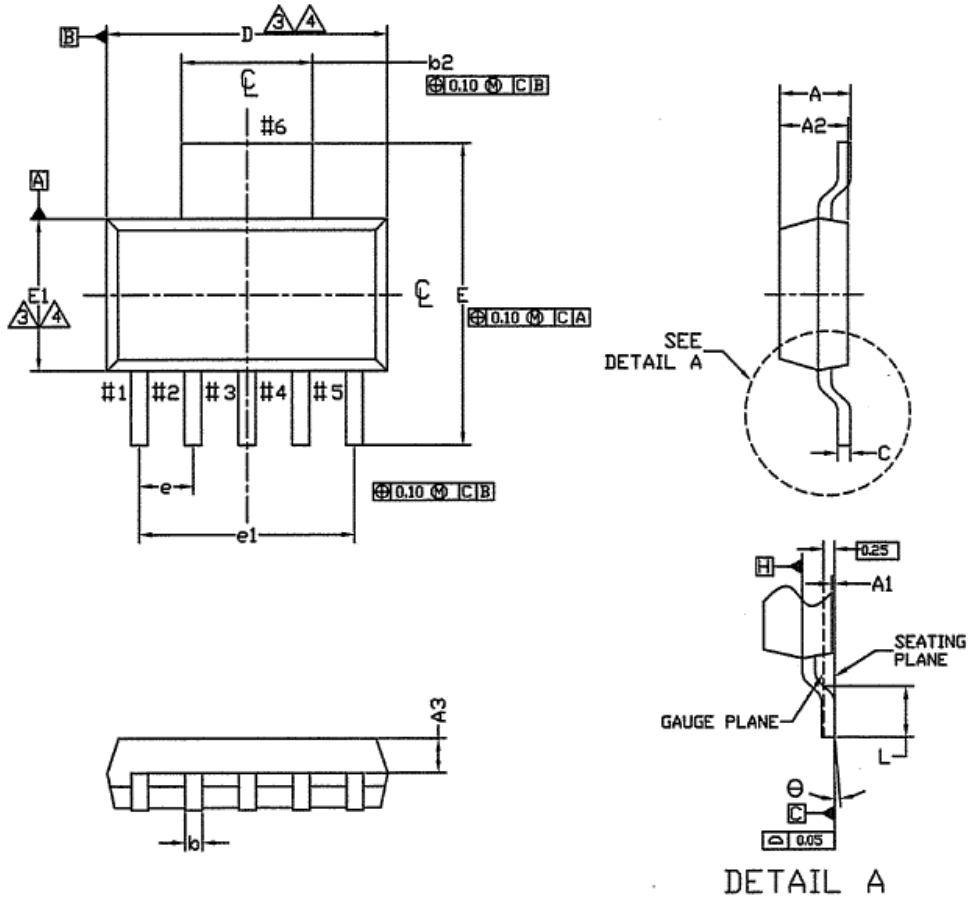
Figure 6. RvALLAST Application

**Package Dimension (TO-252-5L 6.5 x 5.5 x 2.3)**



SYMBOLS	DIMENSION (in mm)	
	Min.	Max.
A	2.19	2.38
A1	0	0.127
b	0.51	0.71
b3	4.32	5.46
c	0.46	0.61
c2	0.46	0.89
D	5.33 *	6.22
D1	4.83	--
E	6.35	6.73
E1	4.32	5.33
e	1.27 BSC	
H	9.4	10.41
L	1.4	1.78
L1	2.67 REF *	
L2	0.508 BSC	
L3	0.89	2.03 *
L4	--	1.02
$\theta$	0 °	8 ° *
$\theta 1$	0 °	15 °

**Package Dimension (SOT-223-5L 6.5 x 3.5 x 1.8)**



SYMBOL	ALL DIMENSIONS IN MILLIMETERS			ALL DIMENSIONS IN INCH		
	MINIMUM	NORMAL	MAXIMUM	MINIMUM	NORMAL	MAXIMUM
A	-	-	1.80	-	-	0.071
A1	0.02	0.06	0.10	0.001	0.002	0.004
A2	1.55	1.60	1.65	0.061	0.063	0.065
A3	0.90 REF.			0.035 REF.		
b	0.41	0.457	0.51	0.016	0.018	0.020
b2	2.95	3.00	3.05	0.116	0.118	0.120
c	0.24	0.28	0.32	0.009	0.011	0.013
D	6.45	6.50	6.55	0.254	0.256	0.258
E	6.86	7.00	7.26	0.270	0.275	0.286
E1	3.45	3.50	3.55	0.136	0.138	0.140
e	1.27 BSC.			0.050 BSC.		
e1	5.08 BSC.			0.200 BSC.		
L	0.91	-	1.14	0.036	-	0.045
θ	0°	4°	8°	0°	4°	8°