

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.

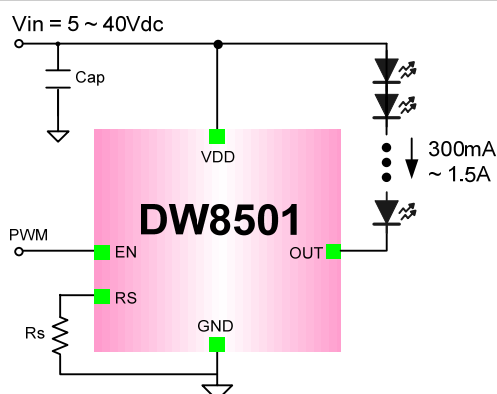
Features

- 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

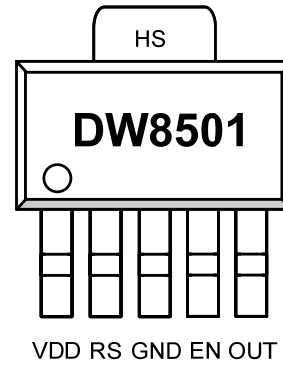
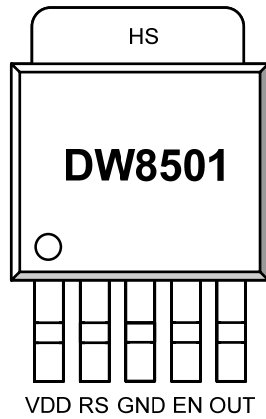
Device	Marking	Package	Operating Temp
DW8501	DW8501 XXXXXXXX YWW	TO-252	-35°C ~ +85°C
DW8501	DW8501 XXXXXXXX YWW	SOT-223	

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	θ_{JA}	90	°C/W
	SOT-223-5L	θ_{JA}	100	°C/W
Operating temperature		T_{OPR}	-35~+85	°C
Storage Temperature		T_{STG}	-55~+150	°C

Note 1. θ_{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

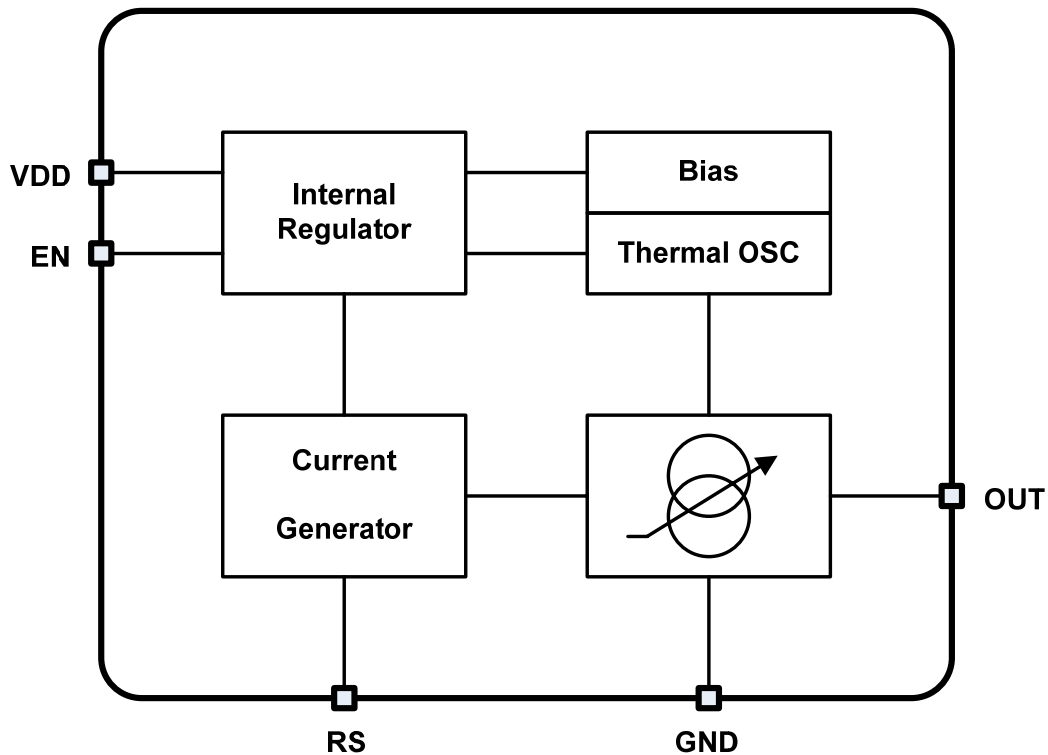
Electrical Characteristics

$V_{DD} = 24V$, $EN = 0 \sim 24V$, $T_a = -35^{\circ}C \sim +85^{\circ}C$, 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	-	μA
EN input leakage current	I_{EN_LIK}		-	-	60	μA
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 Ω		300		mA
		1K Ω		600		mA
		600 Ω		1000		mA
		400 Ω		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

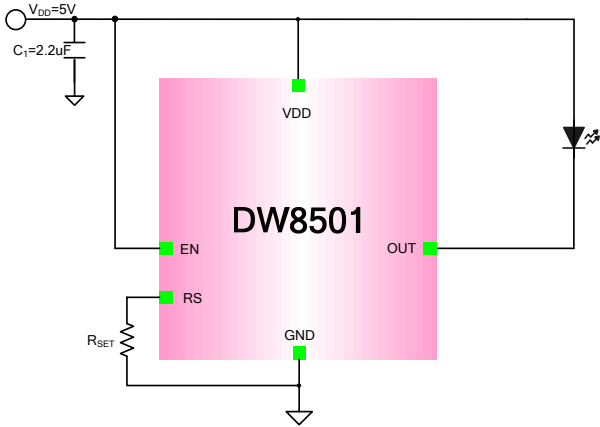


Figure 1. VDD=5V

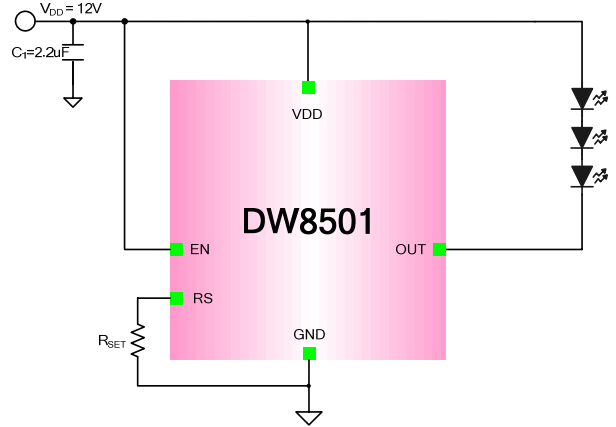


Figure 2. VDD=12V

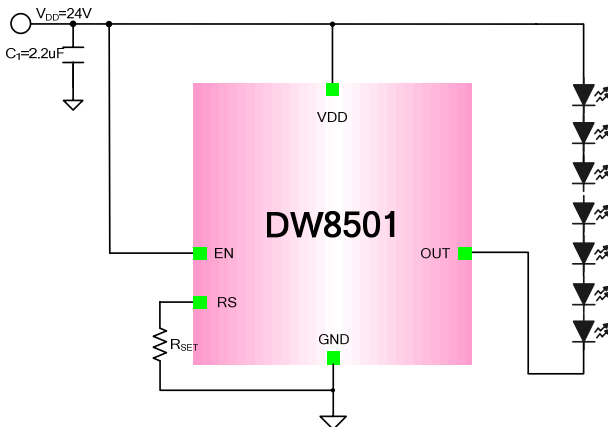


Figure 3. VDD=24V

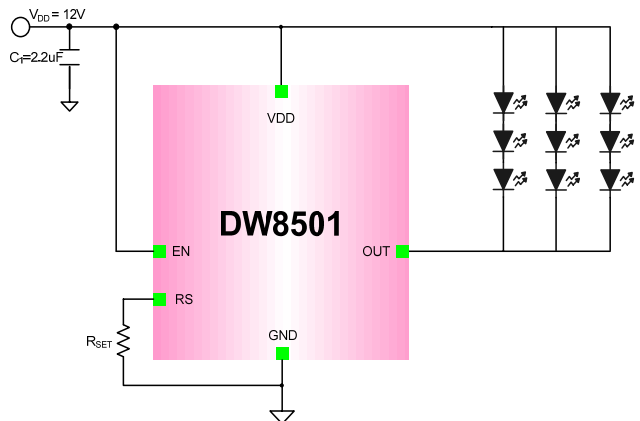


Figure 4. VDD=12V, 9 LED

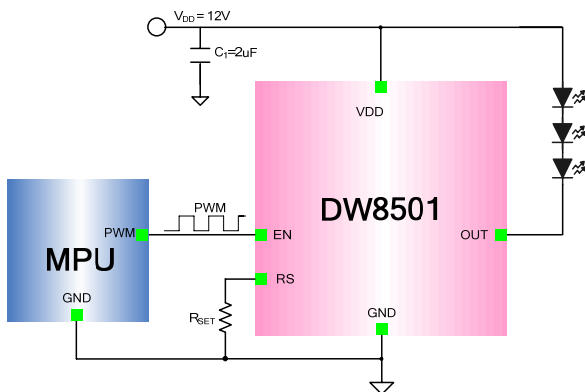


Figure 5. PWM Typical Application

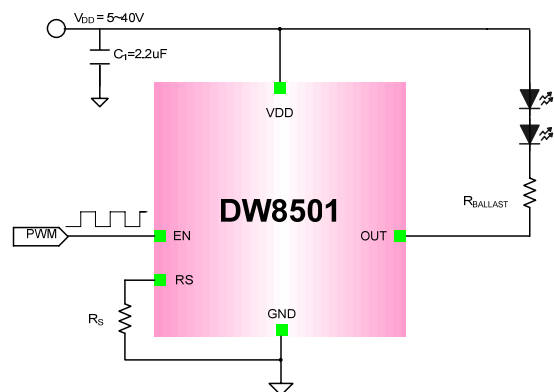
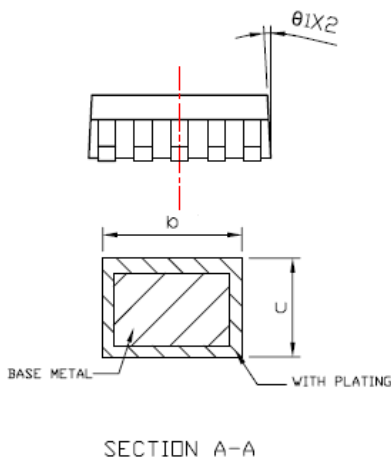
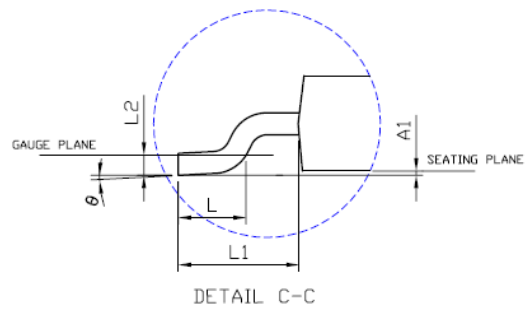
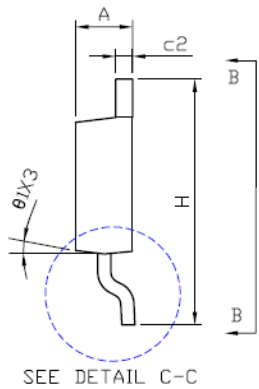
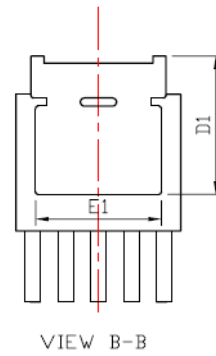
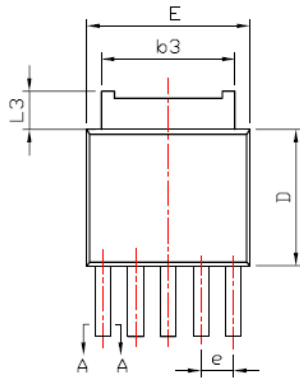


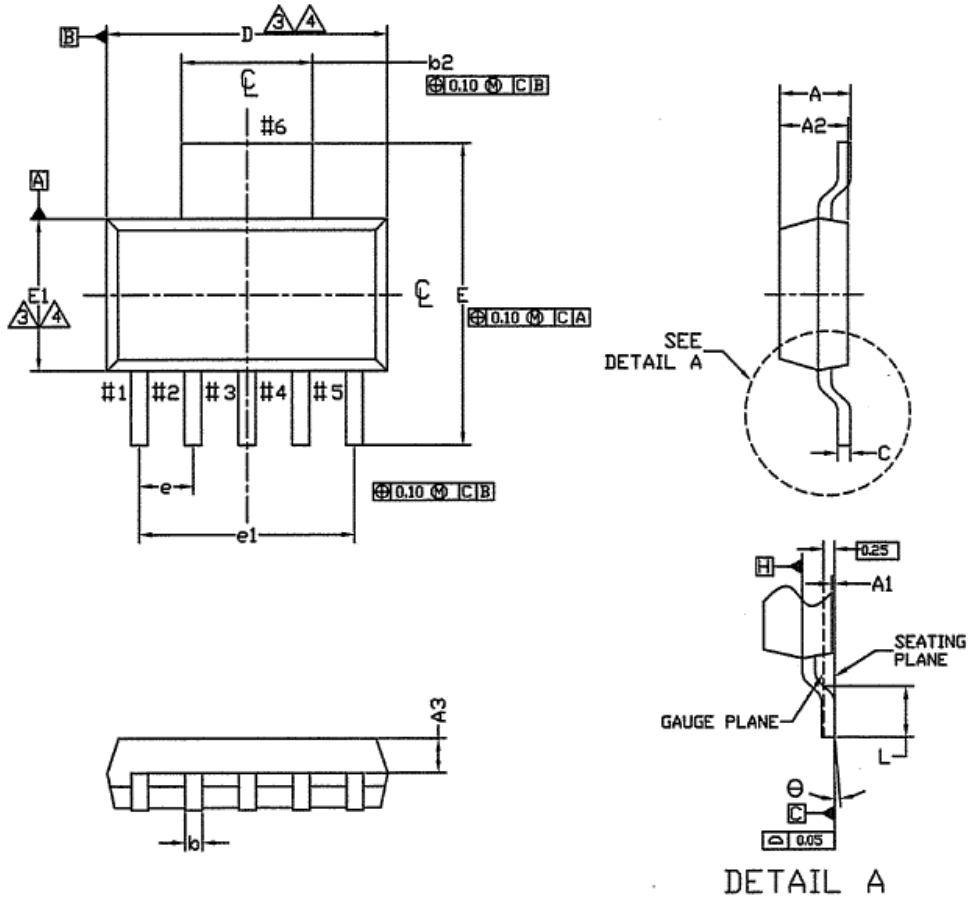
Figure 6. R_{vALLAST} Application

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
θ	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°

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