



DW8501

High Power LED Driver



CONTENTS

1. GENERAL DESCRIPTION	1
■ Features.....	1
■ Applications.....	1
2. BLOCK DIAGRAM	2
3. PIN INFORMATION	2
■ Pin placement and IC dimension	2
■ Pin Description	2
4. ABSOLUTE MAXIMUM RATINGS	3
5. RECOMMENDED OPERATING CONDITION	3
6. ELECTRICAL SPECIFICATION.....	4
7. TYPICAL OPERATING CHARACTERISTICS	5
7.1. Typical Operating Characteristics (Continued)	6
8. TYPICAL APPLICATIONS CIRCUIT	7
9. DETAILED DESCRIPTIONS	8
■ Setting Output Current	8
■ Power sequence.....	8
10. PACKAGE DIMENSION.....	9
10.1. Package Dimension (Continued)	10



1. General Description

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.

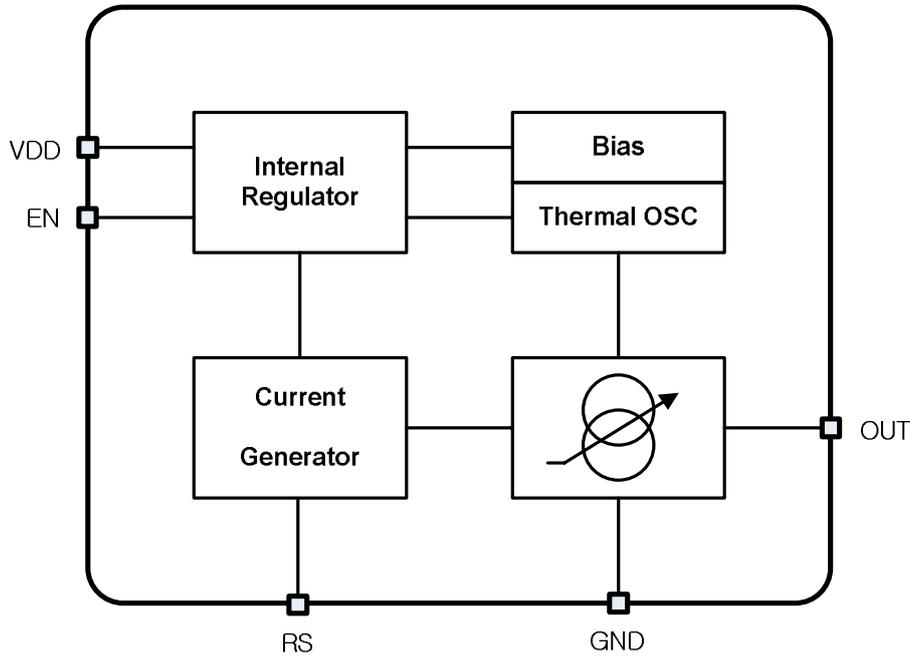
■ Features

- 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

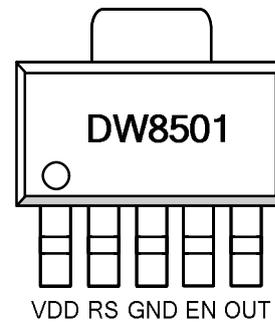
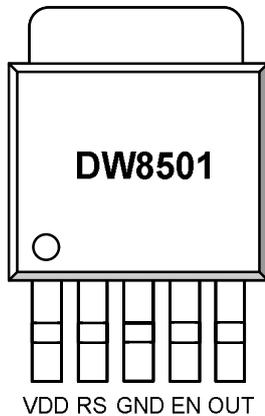
- LED light bulbs
- Signage and decorative LED lighting
- General lighting of flat panel displays
- RGB backlighting LED driver
- Current stabilizer with DC/DC or AC/DC
- General purpose constant current source

2. Block Diagram



3. Pin Information

■ Pin placement and IC dimension



■ Pin Description

No.	Pin Name	Description	Note
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. Dimming control is possible by PWM(Pulse width modulation). Typically, It operates under 30KHz.	
5	OUT	Output pin. Sink current is decided by the current on R _{SET} connected to RS	
6	HS	Heat sink, normally connected GND	



4. Absolute Maximum Ratings

Symbol	Parameter		Ratings
VDD	Supply voltage		41V
V _{EN}	Enable voltage		41V
V _{OUT}	Output voltage		23V
VRS	Reference voltage		5V
θ _{JA}	Package thermal resistance	TO-252-5L	38.59°C/W
		SOT-223-5L	80°C/W
T _{OPR}	Operating temperature		-40~+85°C
T _J	Junction temperature		+150°C
T _{STG}	Storage Temperature		-55~+150°C

- Note** 1. θ_{ja} is measured in the convection at Ta=30°C on a high effective thermal conductivity test board(4 Layers, 2S2P) of JEDEC 51-7 thermal measurement standard.
2. PCB dimension is 100x100x1.6mm and 4 layers.

■ Absolute Maximum Ratings

Use of the IC in excess of absolute maximum ratings such as the applied voltage or operating temperature range (T_J) may result in IC damage. Assumptions should not be made regarding the state of the IC (short mode or open mode) when such damage is suffered. The implementation of a physical safety measure such as a fuse should be considered when use of the IC in a special mode when the absolute maximum ratings may be exceeded is anticipated.

5. Recommended Operating Condition

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD	Supply voltage	5		40	V
V _{EN}	Enable voltage			40	V
I _{OUT}	Output sink current			1.5	A

6. Electrical Specification

(VDD = 24V, TA = -35°C~+85°C, unless otherwise specified. Typical values are at TA=+25°C)

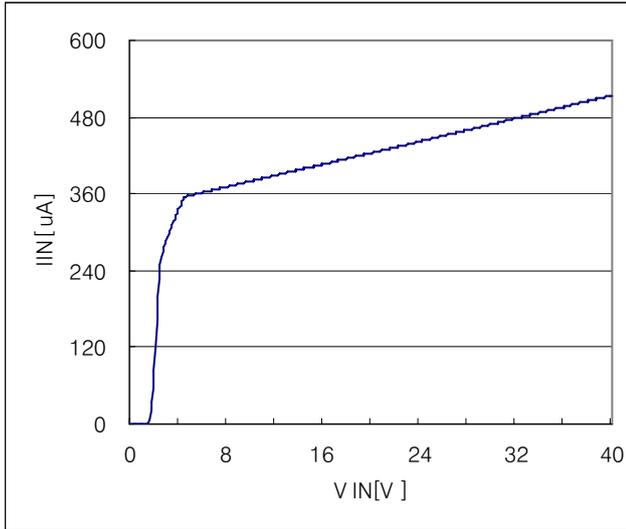
Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Input supply voltage	V _{DD}		5	-	40	V
Output linearity voltage	V _{OUT_LINE}	V _{DD} =24V, I _{SET} = 300mA,	-	-	3	V
Output current	I _{OUT}		-	-	1.5	A
Quiescent current	I _{Q_ON}	EN = 24V	0.8	1	1.5	mA
	I _{Q_OFF}	EN = 0V	85	120	250	uA
EN input leakage current	I _{EN_LIK}		30	45	60	uA
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} =300mA	-	270	-	mV
Thermal derating	T _D		-	140	-	°C
Thermal derating hysteresis	T _{DHYS}		-	15	-	°C
Rset Voltage	V _{SET}		0.59	0.61	0.63	V
Output current	I _{OUT}	2KΩ	295	305	315	mA

Note : Output dropout voltage : 90% x I_{OUT}

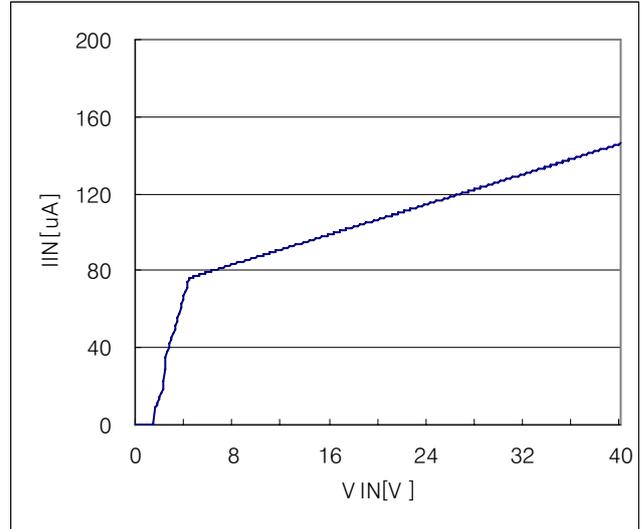


7. Typical Operating Characteristics

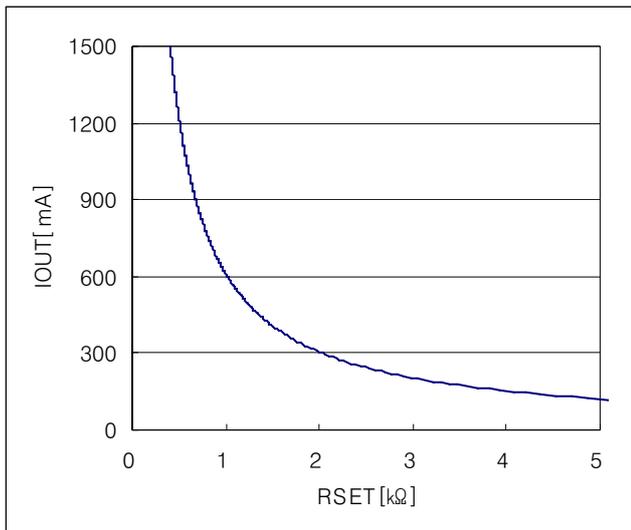
($V_{DD} = 12V$, $V_{OUT} = 2V$, $T_a = -35^{\circ}C \sim +85^{\circ}C$, unless otherwise specified. Typical values are at $T_A = +25^{\circ}C$)



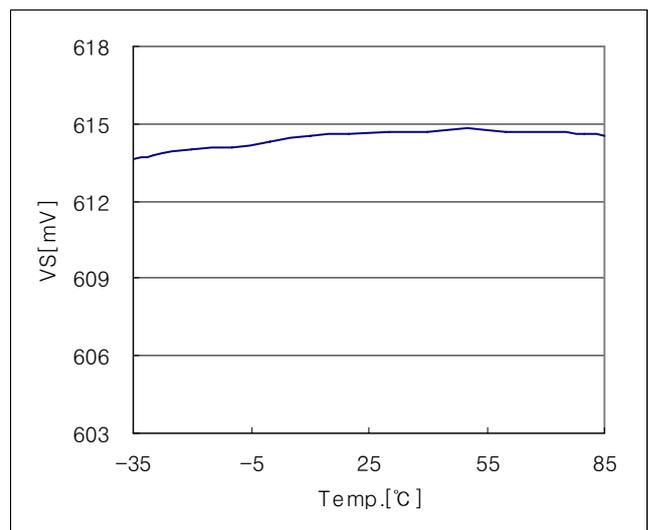
Quiescent vs. VIN



Ishutdown vs. VIN



IOUT vs. Rset

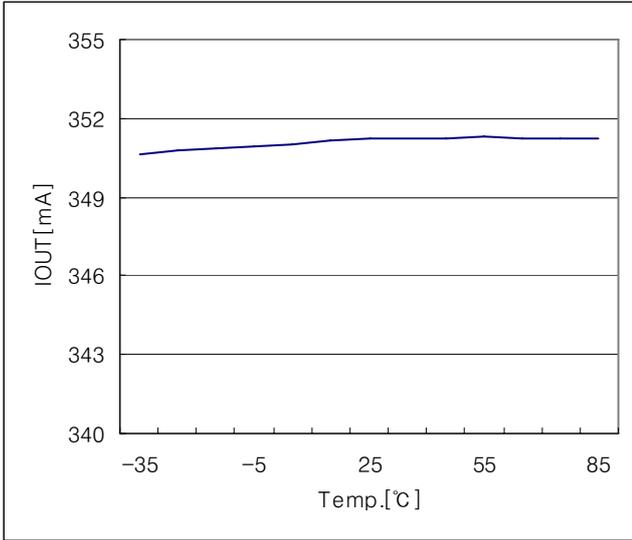


Vreference vs. Temperature

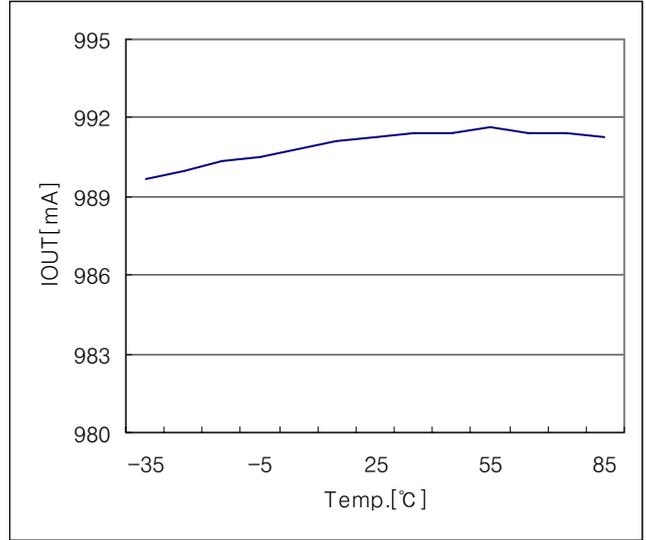


7.1. Typical Operating Characteristics (Continued)

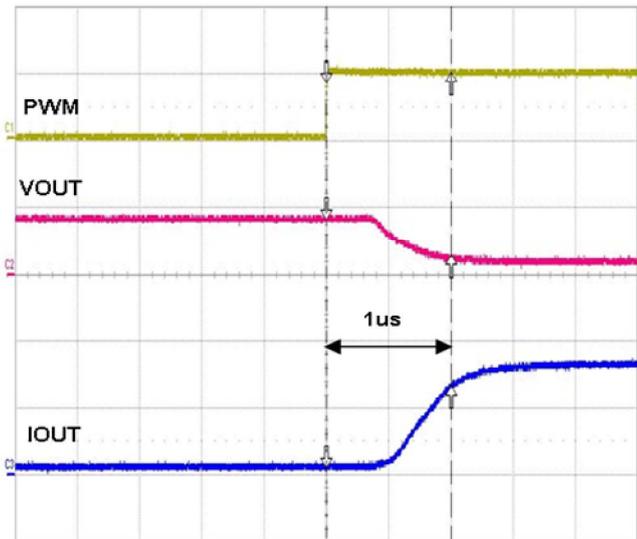
($V_{DD} = 12V$, $V_{OUT} = 2V$, $T_a = -35^{\circ}C \sim +85^{\circ}C$, unless otherwise specified. Typical values are at $T_A = +25^{\circ}C$)



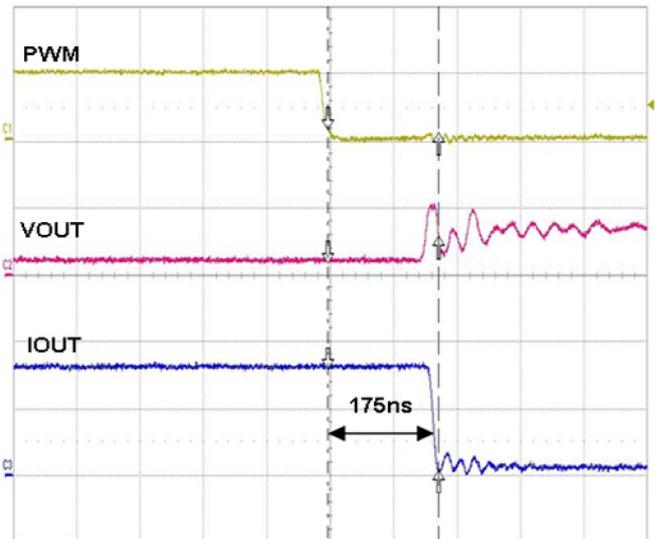
IOUT vs. Temperature



IOUT vs. Temperature



PWM Rising Time



PWM Falling Time

8. Typical Applications circuit

※ LED VF = 3.3V, IF = 20mA

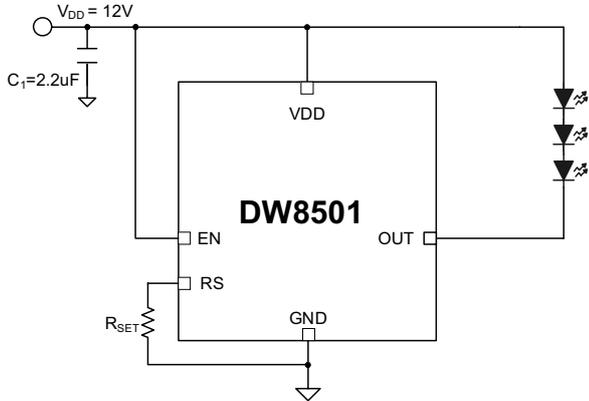


Figure 1. VDD=12V

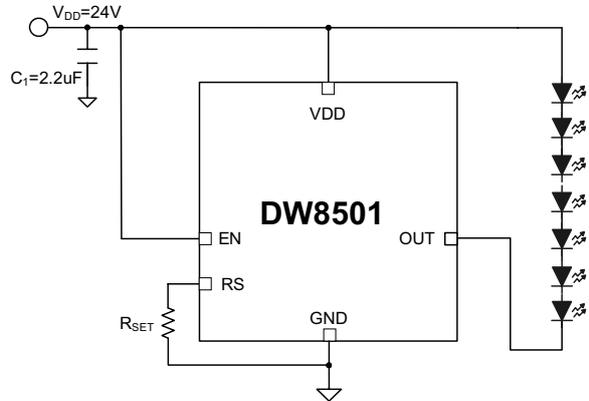


Figure 2. VDD=24V

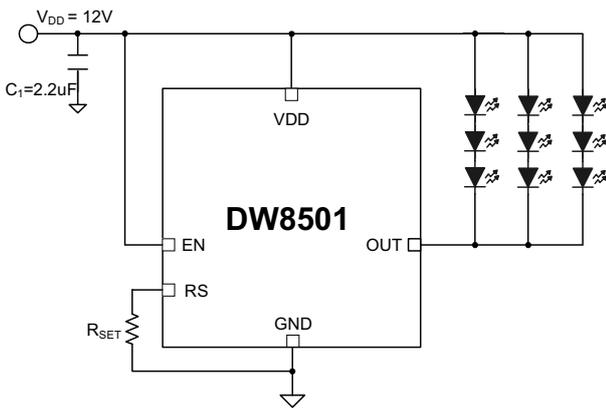


Figure 3. VDD=12V, 9 LED

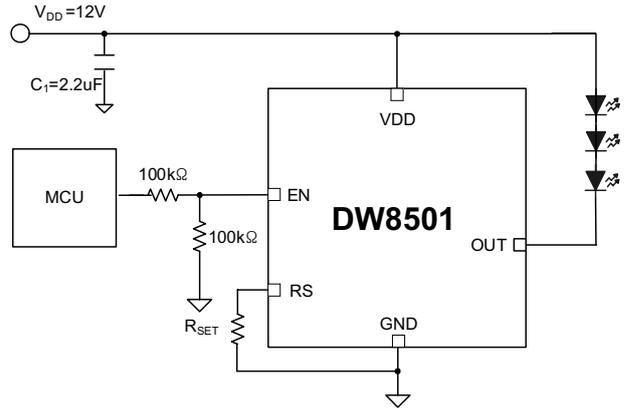


Figure 4. PWM Dimming Typical Application

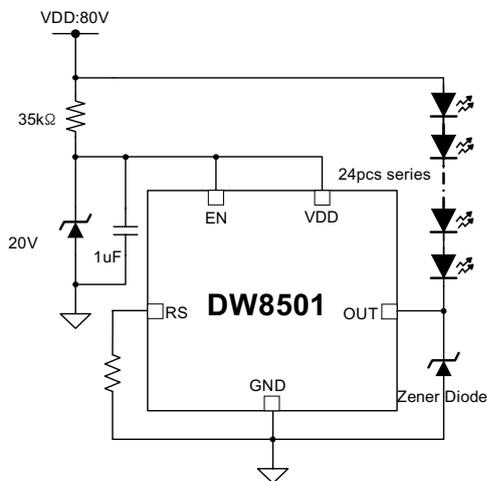


Figure 5. High Voltage Application (VDD≥35V)



9. Detailed Descriptions

■ Setting Output Current

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

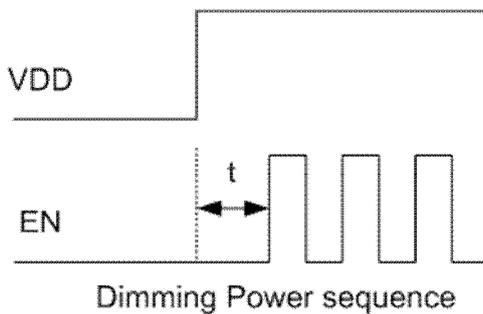
Rset (KΩ)	Iout (mA)
4	152
2	305
1.22	500
1.02	598
0.76	802
0.68	897
0.61	1000

■ Power sequence

There is an electrostatic diode between VDD and EN.

When dimming control, It must input EN signal after inputs VDD. ($t \geq .1ms$)

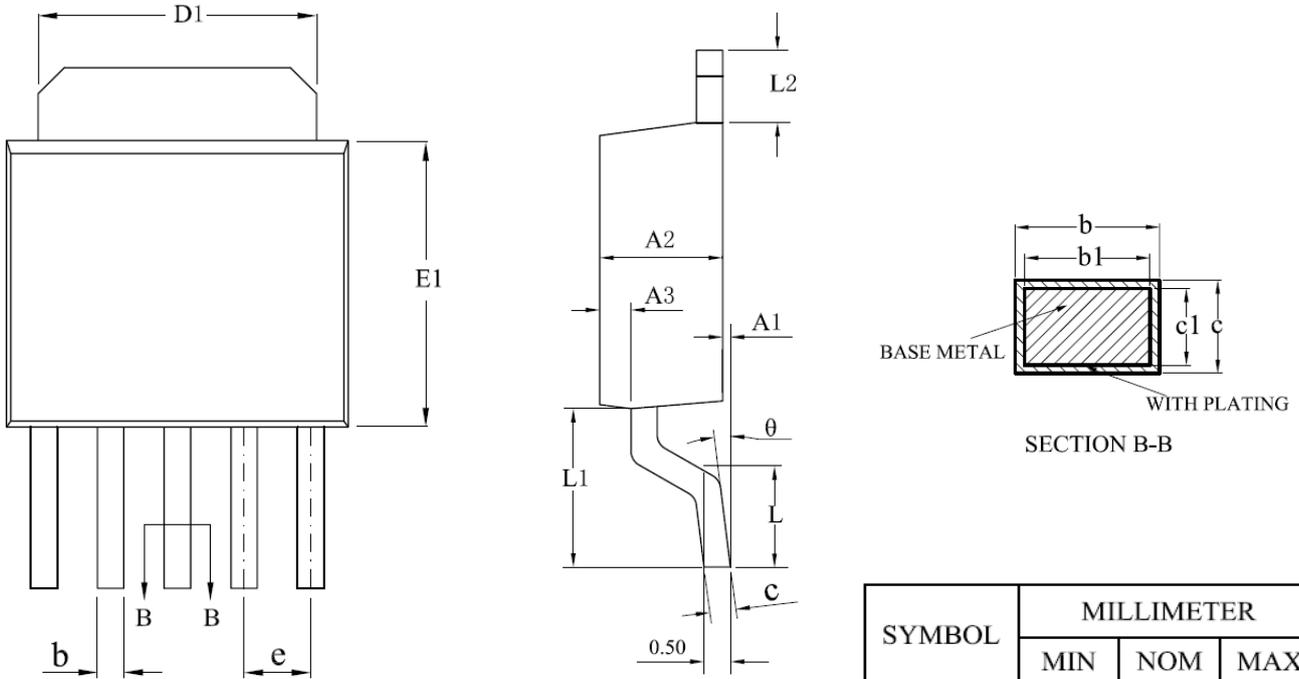
If not use Dimming control, EN connect to VDD.



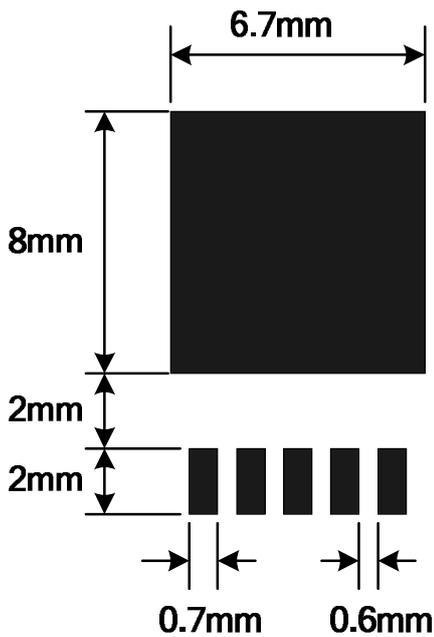
10. Package Dimension

Package Dimension

- Package Name : TO-252-5L
- Package Size : 6.5mm * 10mm, Thickness : 2.3mm
- Pin Pitch : 1.27mm



Foot Print

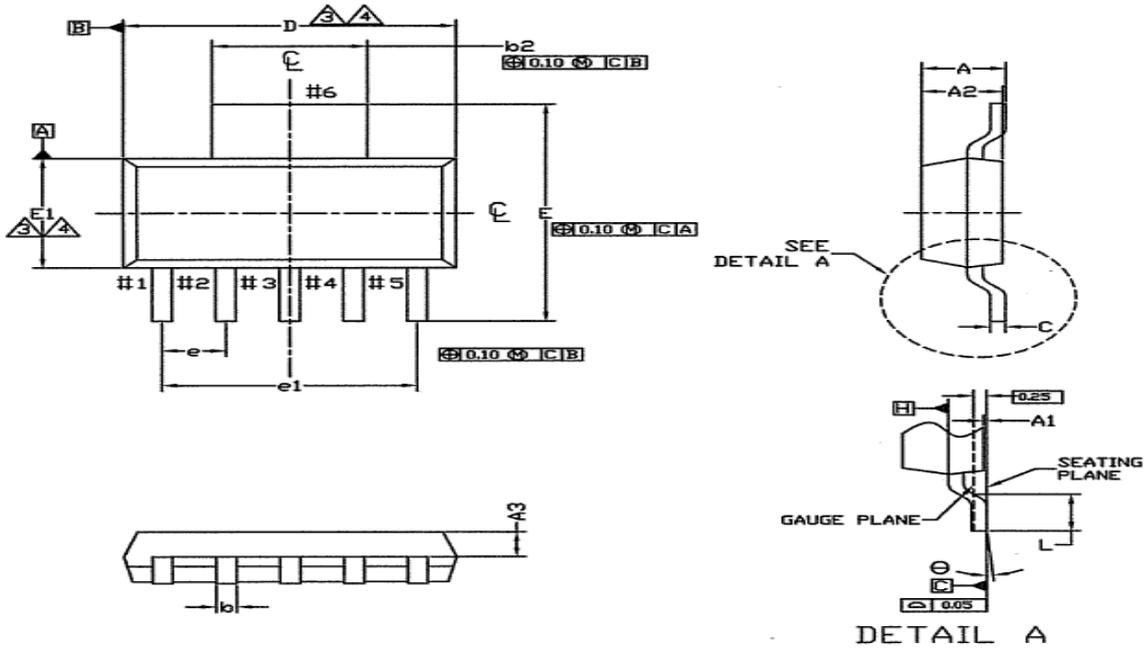


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A1	0.05	0.15	0.25
A2	2.10	2.30	2.50
A3	0.50	0.60	0.70
b	0.46	—	0.60
b1	0.45	0.50	0.55
c	0.49	—	0.56
c1	0.48	0.50	0.52
D	6.30	6.50	6.70
D1	5.30REF		
E1	5.30	5.50	5.70
e	1.27BSC		
L	1.40	1.50	1.60
L1	3.00	3.10	3.20
L2	1.40BSC		
θ	0	—	8°

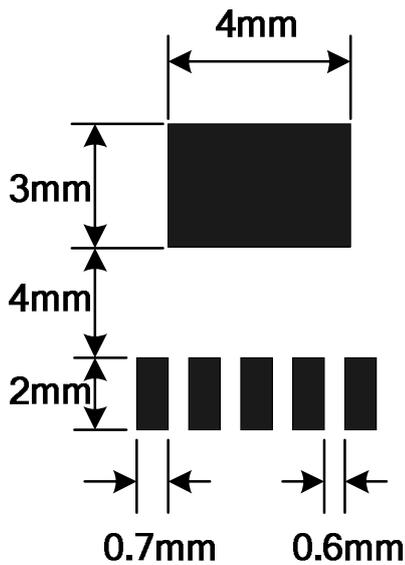
10.1. Package Dimension (Continued)

Package Dimension

- Package Name : SOT-223-5L
- Package Size : 6.5mm * 7mm, Thickness : 1.8mm
- Pin Pitch : 1.27mm



Foot Print



SYMBOL	ALL DIMENSIONS IN MILLIMETERS		
	MINIMUM	NORMAL	MAXIMUM
A	-	-	1.80
A1	0.02	0.06	0.10
A2	1.55	1.60	1.65
A3	0.90 REF.		
b	0.41	0.457	0.51
b2	2.95	3.00	3.05
c	0.24	0.28	0.32
D	6.45	6.50	6.55
E	6.86	7.00	7.26
E1	3.45	3.50	3.55
e	1.27 BSC.		
e1	5.08 BSC.		
L	0.91	-	1.14
θ	0°	4°	8°

