



# DW8505A

Low Power LED Driver

Ver. 1.6  
2014-07-08

流明芯智能科技(深圳)有限公司

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## 1. General Description

The DW8505A is an instant On/Off LED driver for low power LED applications. At DW8505A 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.

DW8505A easily provides users a consistent current source. User may adjust the output current from up to 100mA 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.

DW8505A also guarantees that LEDs can be cascaded to maximum 40V at the output port.

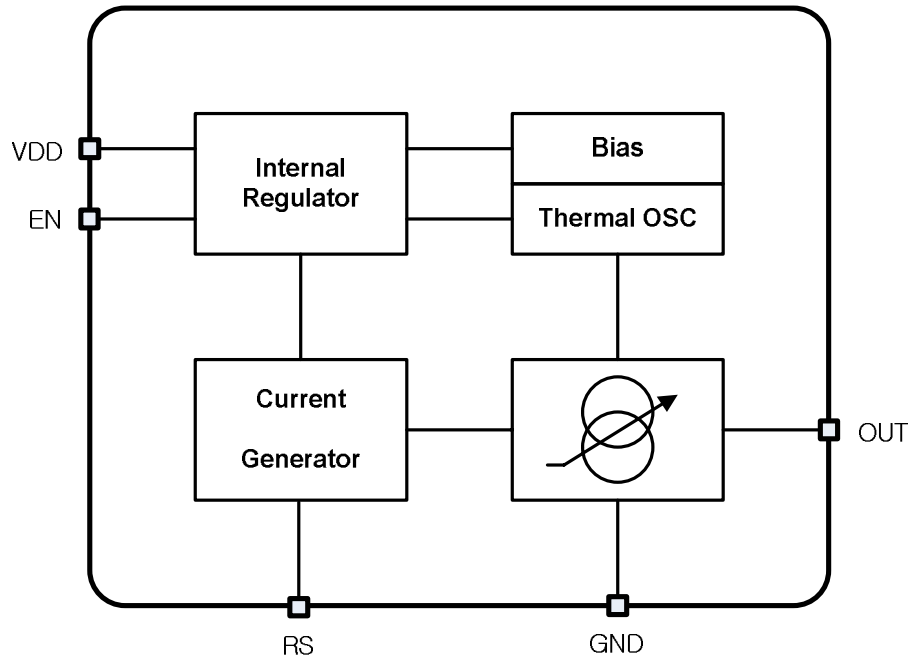
### ■ Features

- Constant output current invariant to supply and load voltage change
- 5V to 40V supply voltage
- Up to 100mA adjustable regulated output current
- Built-in thermal derating circuit
- Available PWM dimming control
- Output current adjusted through an external resistor
- SOT-23-5L Package

### ■ Applications

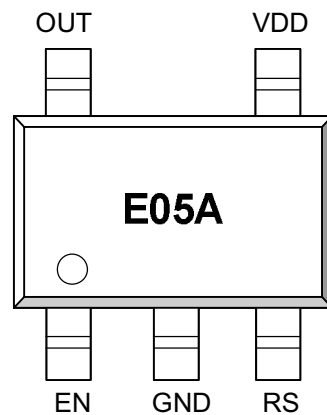
- LED light bulbs
- Signage and decorative LED lighting
- General lighting of flat panel displays
- RGB backlighting LED driver
- Current stabilizer with DC/DC or AC/DC
- Automotive lighting
- General purpose constant current source

## 2. Block Diagram



## 3. Pin Information

### ■ Pin placement and IC dimension



### ■ Pin Description

No.	Pin Name	Description	Note
1	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.	
2	GND	Ground	
3	RS	Output current set input. Connect a resistor from RS to GND to set the LED bias current.	
4	VDD	Supply voltage input.	
5	OUT	Output pin. Sink current is decided by the current on $R_{SET}$ connected to RS.	

#### 4. Absolute Maximum Ratings

Symbol	Parameter		Ratings
VDD	Supply voltage		41V
V <sub>EN</sub>	Enable voltage		41V
V <sub>OUT</sub>	Output voltage		23V
VRS	Reference voltage		5V
θ <sub>JA</sub>	Package thermal resistance	SOT-23-5L	38.59°C/W
T <sub>OPR</sub>	Operating temperature		-40~+85°C
T <sub>J</sub>	Junction temperature		+150°C
T <sub>STG</sub>	Storage Temperature		-55~+150°C

- Note** 1. θ<sub>JA</sub> 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<sub>J</sub>) 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 <sub>EN</sub>	Enable voltage			40	V
I <sub>OUT</sub>	Output sink current		60		mA

## 6. Electrical Specification

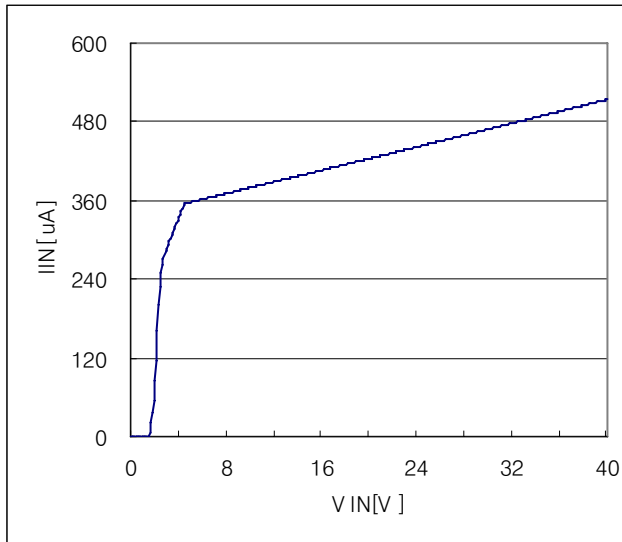
(VDD = 24V, TA = -35°C~+85°C, unless otherwise specified. Typical values are at TA=+25°C)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Input supply voltage	V <sub>DD</sub>		5	-	40	V
Output linearity voltage	V <sub>OUT_LINE</sub>	V <sub>DD</sub> =24V, I <sub>SET</sub> = 300mA,	-	-	3	V
Output current	I <sub>OUT</sub>		-	-	1.5	A
Quiescent current	I <sub>Q_ON</sub>	EN = 24V	0.3	0.45	1	mA
	I <sub>Q_OFF</sub>	EN = 0V	85	120	250	uA
EN input leakage current	I <sub>EN_LIK</sub>		30	45	60	uA
Input high voltage	V <sub>IH</sub>		2	-	-	V
Input low voltage	V <sub>IL</sub>		-	-	0.8	V
LED output drop-out voltage	V <sub>DROP</sub>	V <sub>DD</sub> =40V , I <sub>SET</sub> =300mA	-	100	-	mV
Thermal derating	T <sub>D</sub>		-	140	-	°C
Thermal derating hysteresis	T <sub>DHYS</sub>		-	15	-	°C
Rset Voltage	V <sub>SET</sub>		0.58	0.61	0.64	V
Output current	I <sub>OUT</sub>	11.91KΩ	58.2	60	61.8	mA

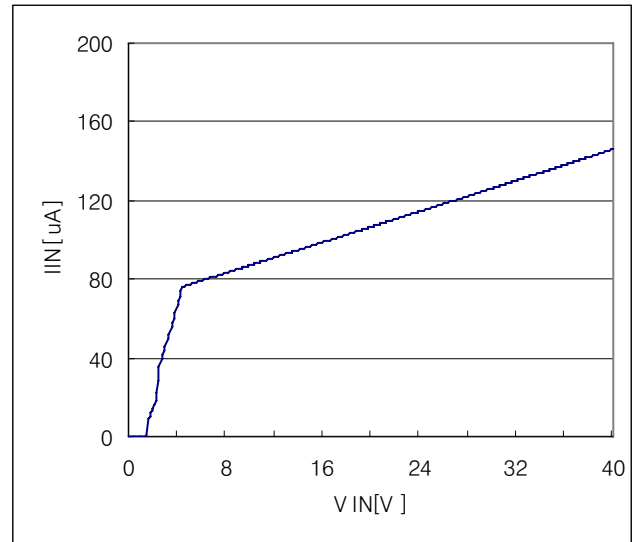
**Note** : Output dropout voltage : 90% x I<sub>OUT</sub>

## 7. Typical Operating Characteristics

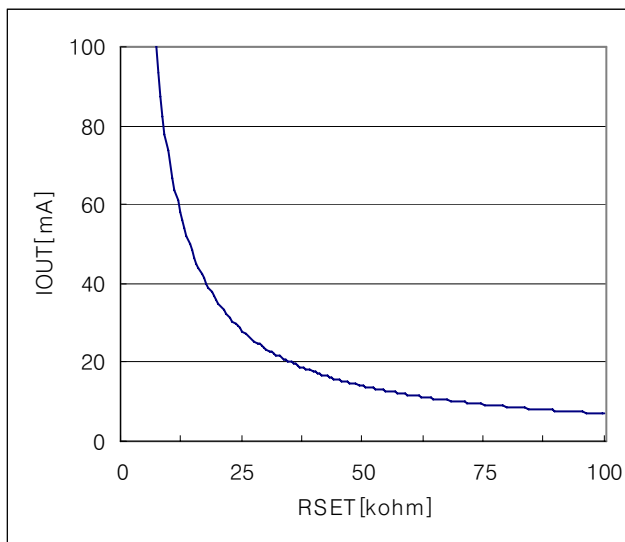
( $V_{DD} = 12V$ ,  $V_{OUT} = 2V$ ,  $T_a = -35^{\circ}C \sim +85^{\circ}C$ , unless otherwise specified. Typical values are at  $T_A = +25^{\circ}C$ )



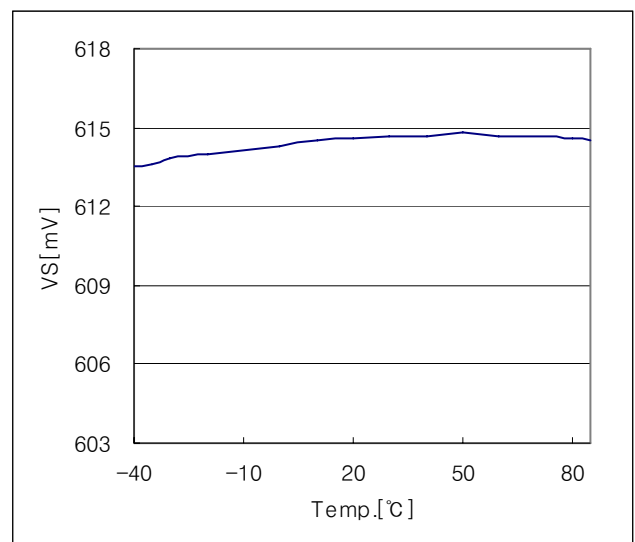
**Quiescent vs. VIN**



**Ishutdown vs. VIN**



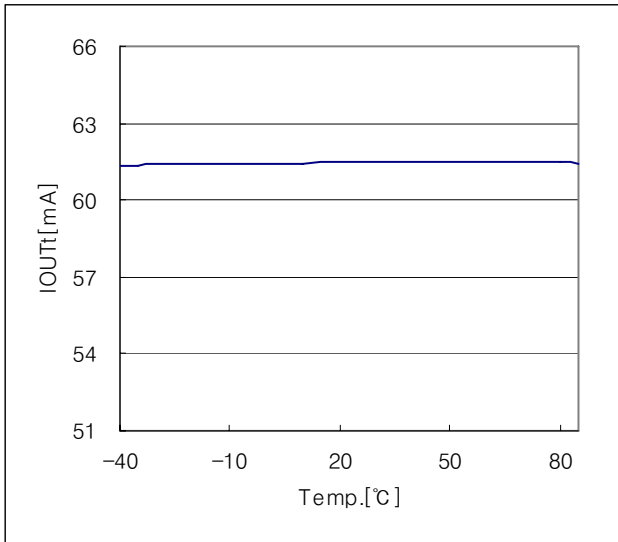
**IOUT vs. Rset**



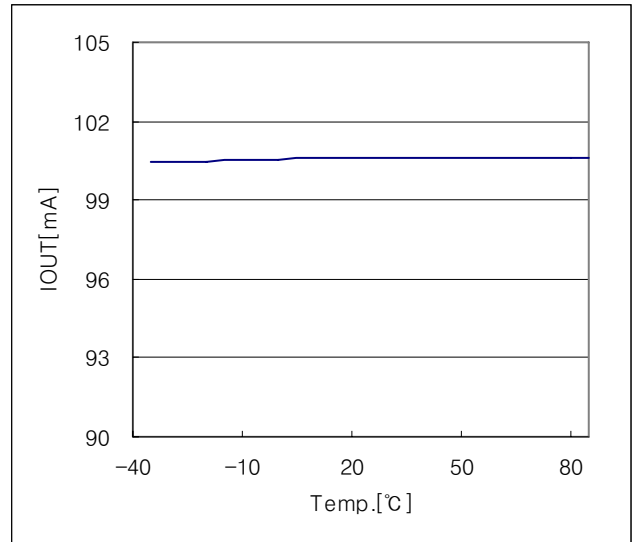
**Vreference vs. Temperature**

### 7.1. Typical Operating Characteristics (Continued)

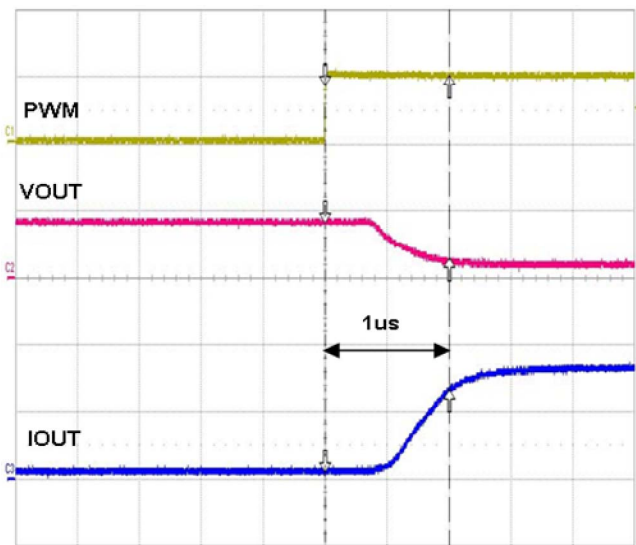
( $V_{DD} = 12V$ ,  $V_{OUT} = 2V$ ,  $T_a = -35^{\circ}C \sim +85^{\circ}C$ , unless otherwise specified. Typical values are at  $T_A = +25^{\circ}C$ )



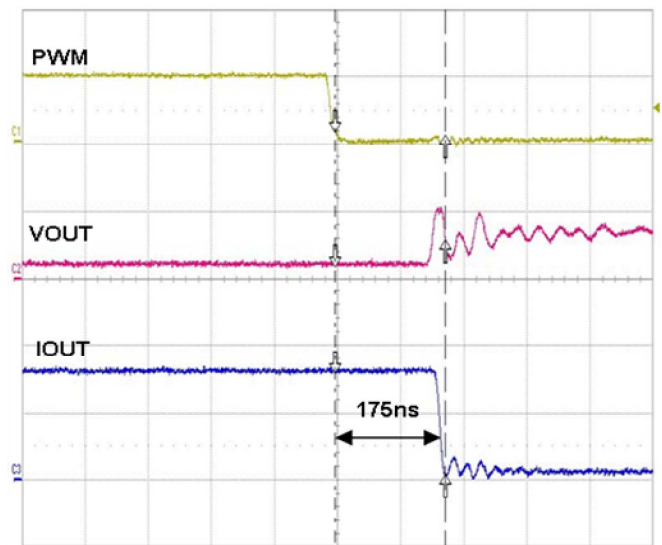
**IOUT vs. Temperature**



**IOUT vs. Temperature**



**PWM Rising Time**



**PWM Falling Time**



**8. Typical Applications circuit**

※ LED VF = 3.3V, IF = 20mA

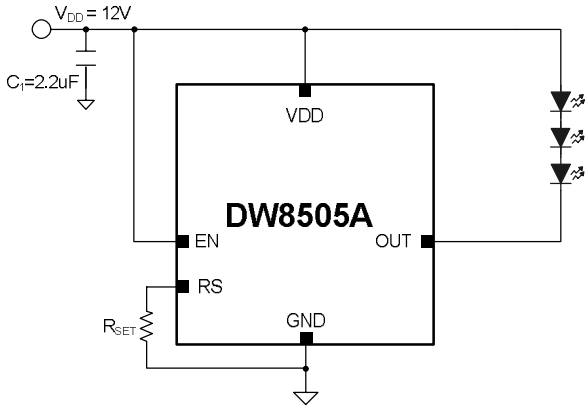


Figure 1. VDD=12V

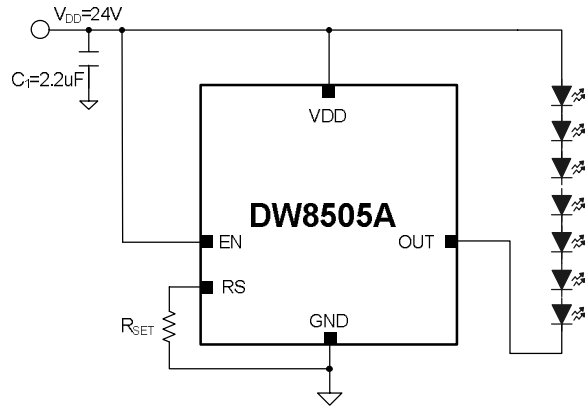


Figure 2. VDD=24V

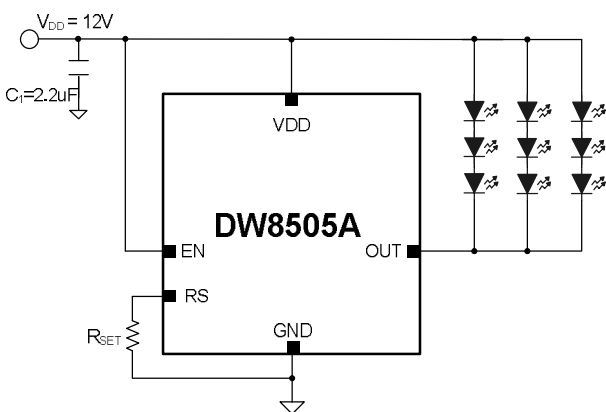


Figure 3. VDD=12V, 9 LED

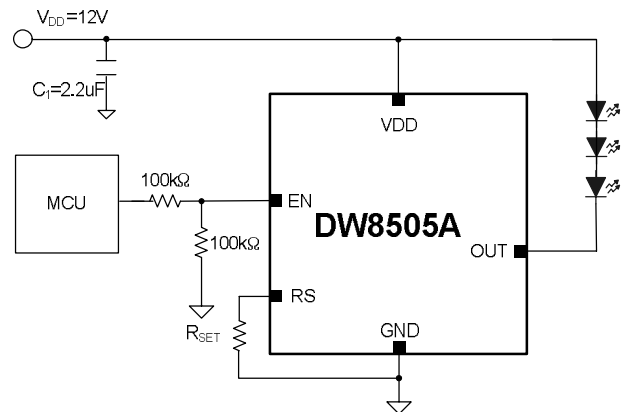


Figure 4. PWM Typical Application

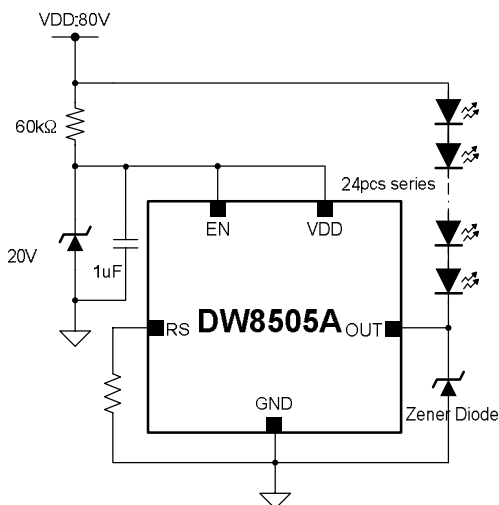


Figure 5. High Voltage Application (VDD=80V)

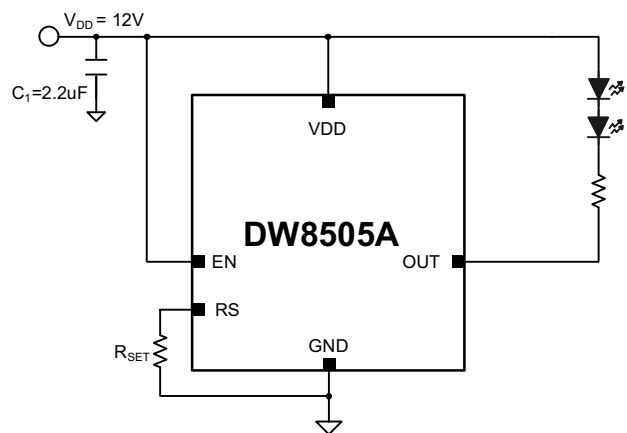


Figure 6. VDD=12V, 2 LED

## 9. Detailed Descriptions

### ■ Setting Output Current

Output Current is fixed by resistor, The value of resistor is as below.

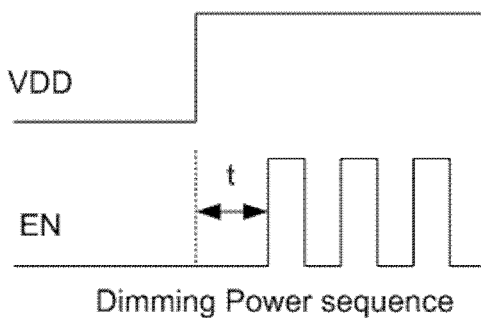
Current[mA]	Resistor[kohm]	Current[mA]	Resistor[kohm]	Current[mA]	Resistor[kohm]
10	75	33	22	61	11.6
12	62	36	20	65	11
15	51	40	18	70	10.2
17	43	45	16	71	10
19	39	48	15	78	9.1
20	36	50	14.39	80	8.82
22	33	51	14	87	8.2
24	30	55	13	90	7.78
27	27	59	12	94	7.5
30	24	60	11.91	100	7

### ■ Power sequence

There is an electrostatic diode between VDD and EN.

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

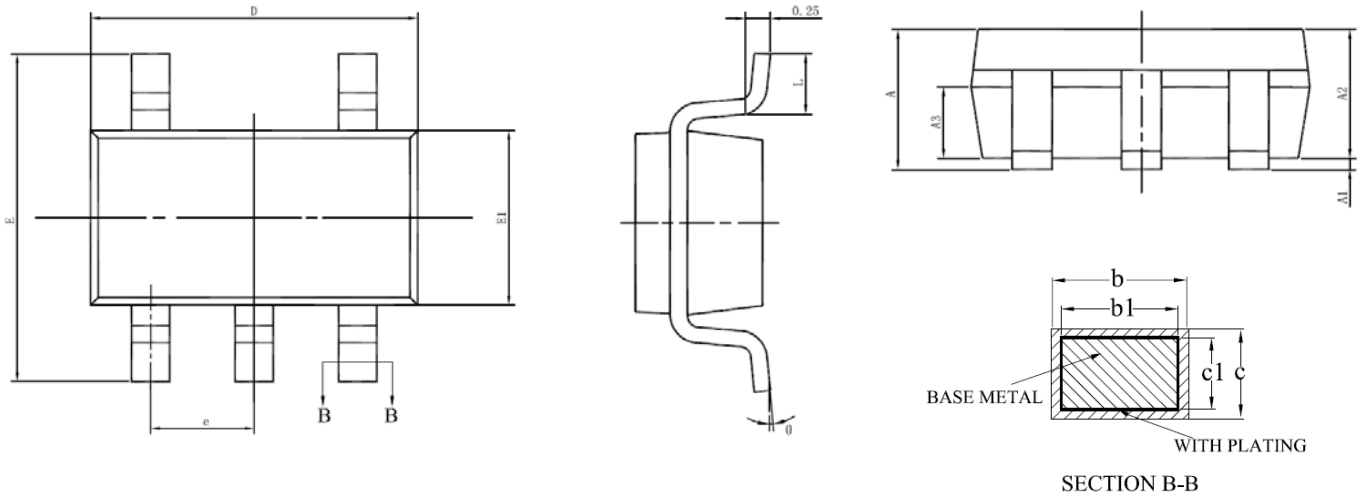
If not use Dimming control, EN connect to VDD.



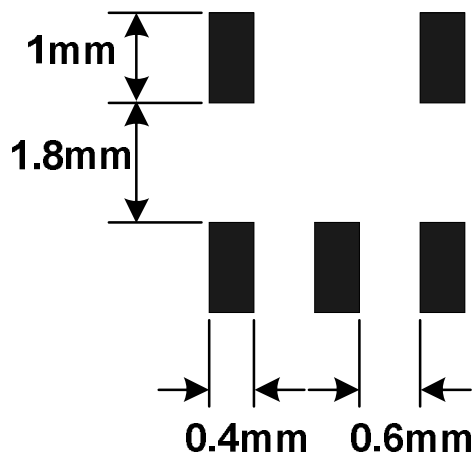
### 10. Package Dimension

Package Dimension

- Package Name : SOT-23-5L,
- Package Size : 2.92mm \* 2.8mm, Thickness : 1.3mm
- Pin Pitch : 0.95mm



Foot Print



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.30
A1	0.04	—	0.10
A2	1.00	1.10	1.20
A3	0.55	0.65	0.75
b	0.34	—	0.43
b1	0.33	0.35	0.38
c	0.15	—	0.21
c1	0.14	0.15	0.16
D	2.72	2.92	3.12
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.95BSC		
L	0.30	—	0.60
θ	0	—	8°