



DW8502

High Power LED Driver

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1. General Description

The DW8502 is an instant On/Off LED driver for high power LED applications. At DW8502 output stage, one regulated current port is designed to provide a uniform and constant current sink for driving LEDs within a large range of VF variations. DW8502 easily provides users a consistent current source. User may adjust the output current from up to 2.5A through an external resistor ,RS, 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 en-able (EN) with Pulse Width Modulation. DW8502 also guarantees that LEDs can be cascaded to maximum 40V at the output port.

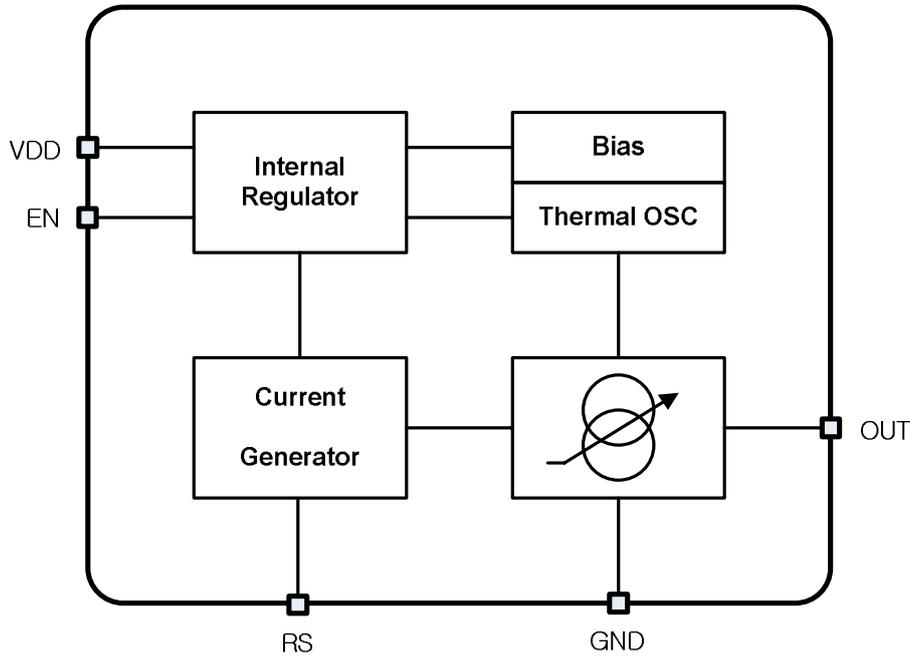
■ Features

- Constant output current invariant to supply and load voltage change
- 5V to 40V supply voltage
- Up to 2.5A adjustable regulated output current
- Built-in thermal derating circuit
- Available PWM dimming control
- Output current adjusted through an external resistor
- TO-263, TO-220 Package

■ Applications

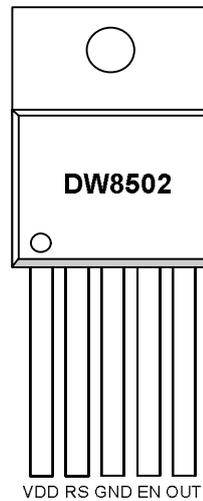
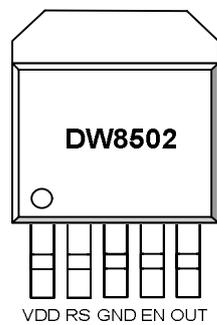
- LED light bulbs
- Signage and decorative LED lighting
- General lighting of flat panel displays
- RGB backlighting LED driver
- Current stabilizer with DC/DC or AC/DC
- General purpose constant current source

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-263-5L	22.85℃/W
		SOT-220-5L	62℃/W
T _{OPR}	Operating temperature		-40~+85℃
T _J	Junction temperature		+150℃
T _{STG}	Storage Temperature		-55~+150℃

- Note** 1. θ_{JA} is measured in the convection at Ta=30℃ 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			2.5	A

6. Electrical Specification

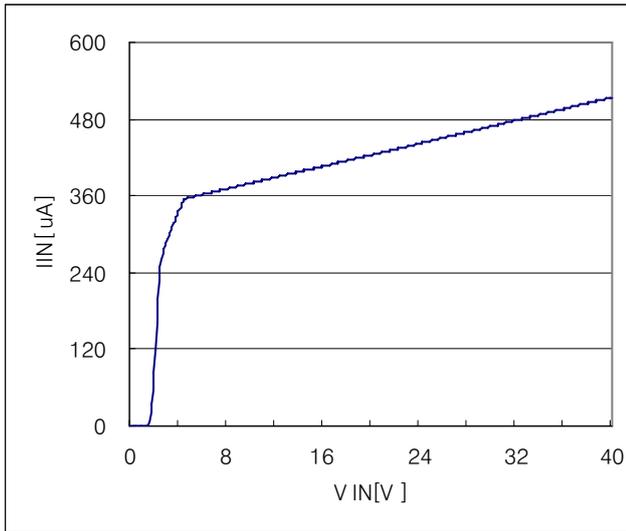
(VDD = 24V, TA = -35°C~+85°C, unless otherwise specified. Typical values are at TA=+25°C)

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	240	270	300	mV
Thermal derating	T _D		-	140	-	°C
Thermal derating hysteresis	T _{DHYS}		-	15	-	°C
Rset Voltage	V _{SET}		0.58	0.61	0.64	V
Output current	I _{OUT}	2KΩ	290	305	320	mA

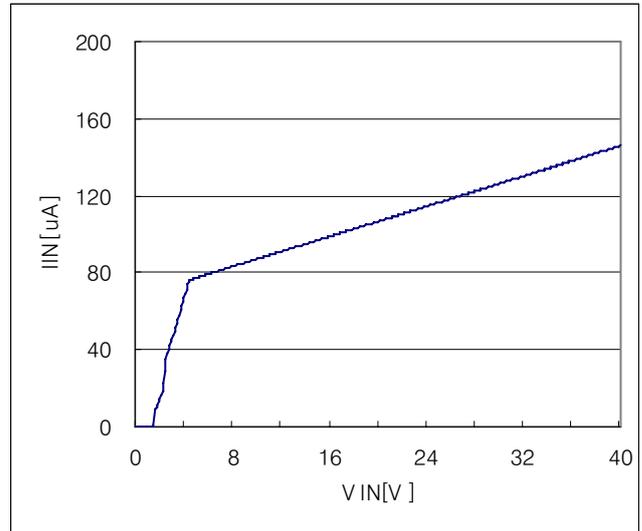
Note : Output dropout voltage : 90% x I_{OUT}

7. Typical Operating Characteristics

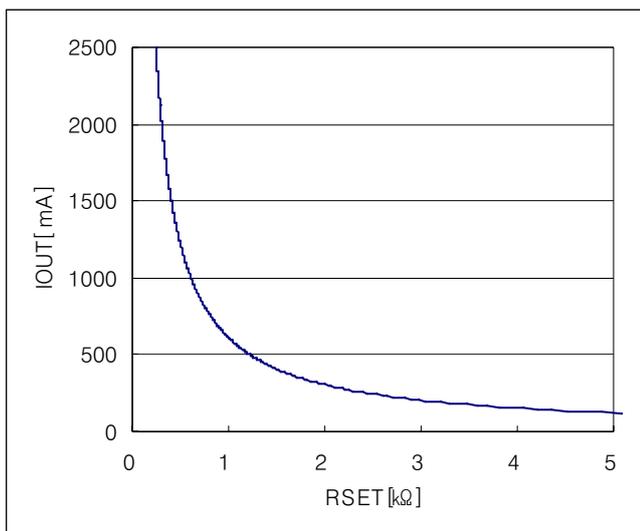
($V_{DD} = 12V$, $V_{OUT} = 2V$, $T_a = -35^{\circ}C \sim +85^{\circ}C$, unless otherwise specified. Typical values are at $T_A = +25^{\circ}C$)



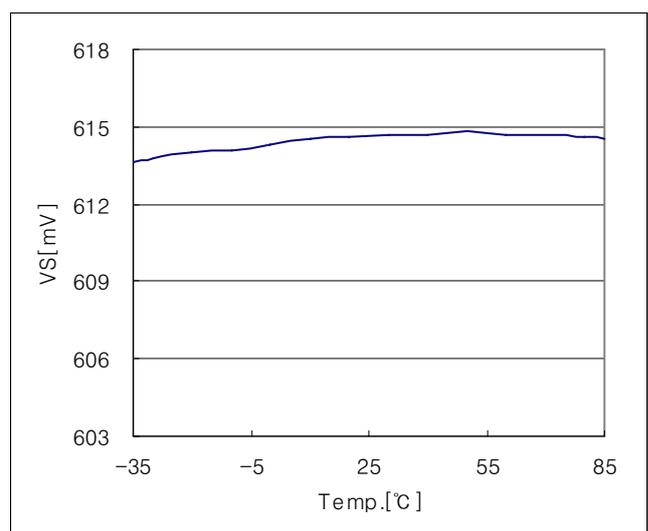
Quiescent vs. VIN



Ishutdown vs. VIN



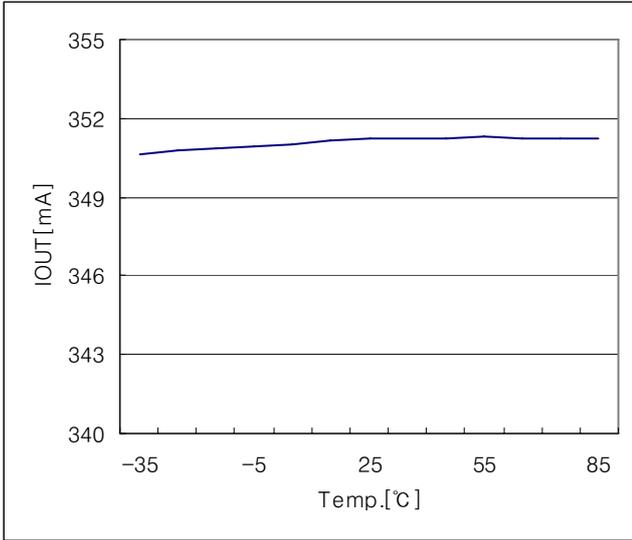
IOUT vs. Rset



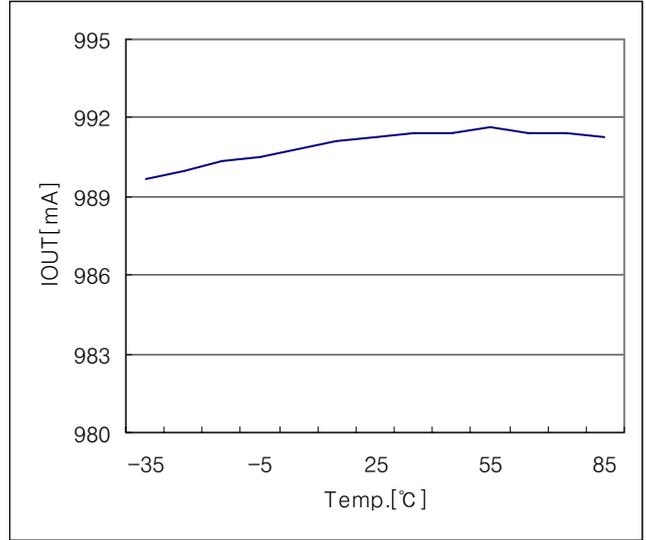
Vreference vs. Temperature

7.1. Typical Operating Characteristics (Continued)

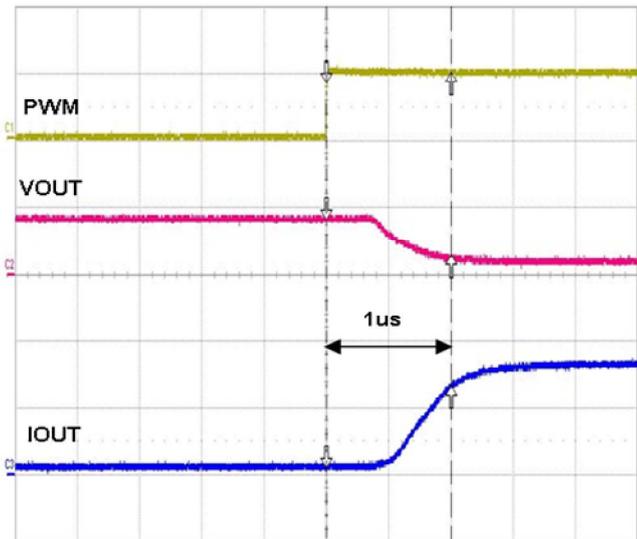
($V_{DD} = 12V$, $V_{OUT} = 2V$, $T_a = -35^{\circ}C \sim +85^{\circ}C$, unless otherwise specified. Typical values are at $T_A = +25^{\circ}C$)



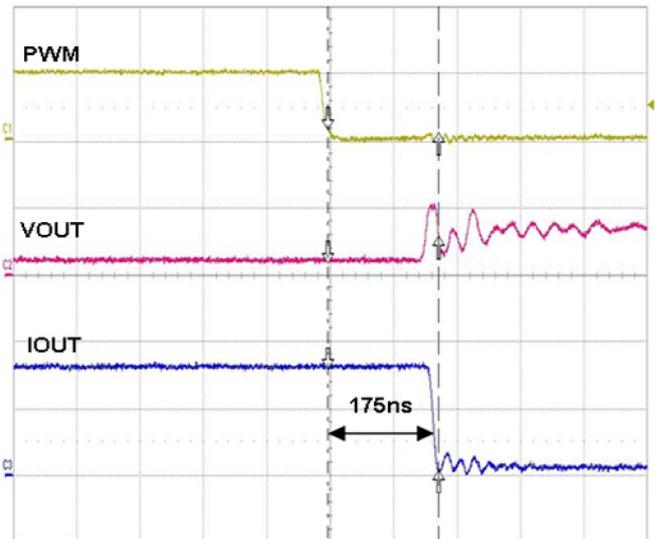
IOUT vs. Temperature



IOUT vs. Temperature



PWM Rising Time



PWM Falling Time

8. Typical Applications circuit

※ LED VF = 3.3V, IF = 20mA

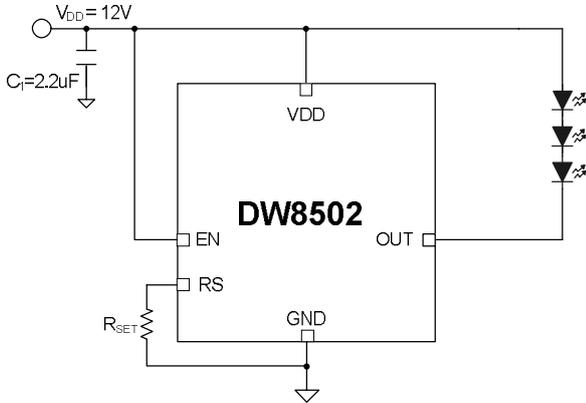


Figure 1. VDD=12V

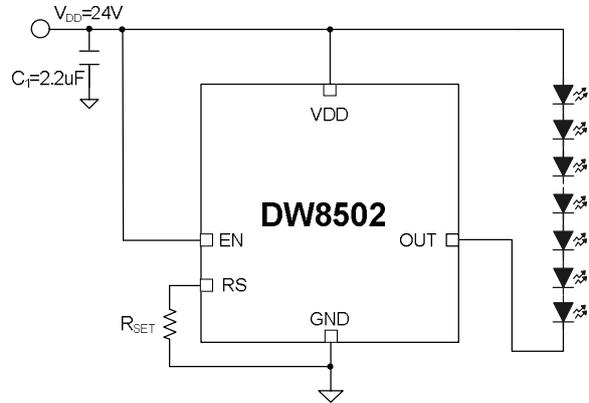


Figure 2. VDD=24V

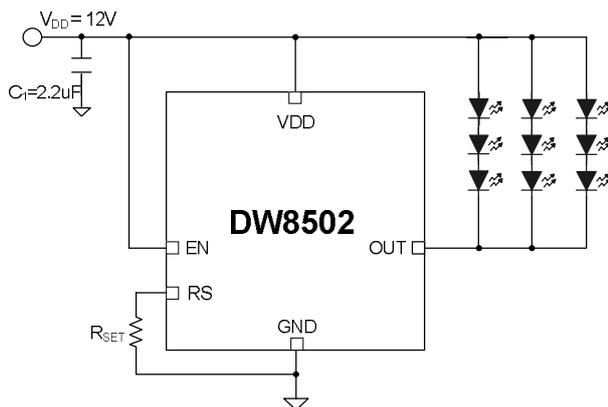


Figure 3. VDD=12V, 9 LED

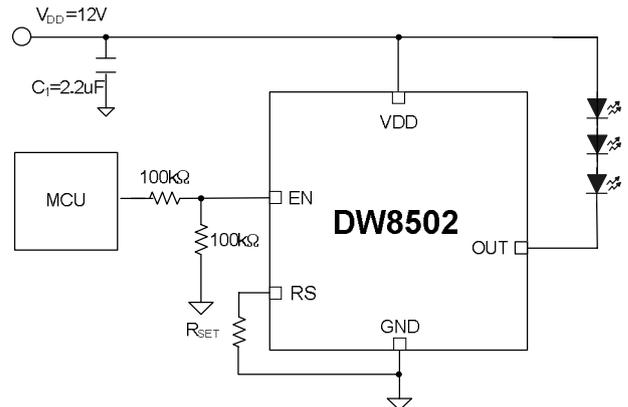


Figure 4. PWM Dimming Typical Application

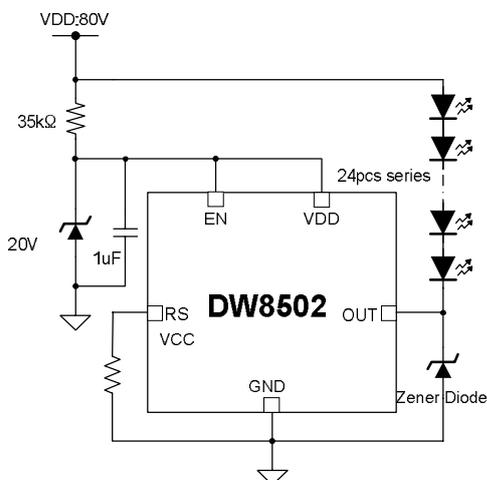


Figure 5. High Voltage Application (VDD≥35V)

9. Detailed Descriptions

■ Setting Output Current

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

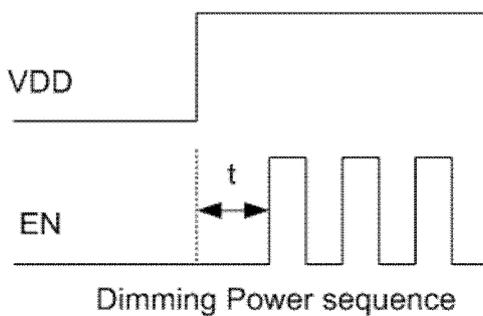
Rset (KΩ)	Iout (mA)
4	152
2	305
1.22	500
1.02	598
0.76	802
0.68	897
0.61	1000
0.41	1500
0.31	2000
0.24	2500

■ Power sequence

There is an electrostatic diode between VDD and EN.

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

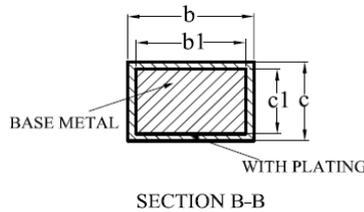
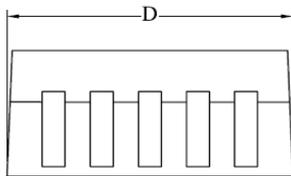
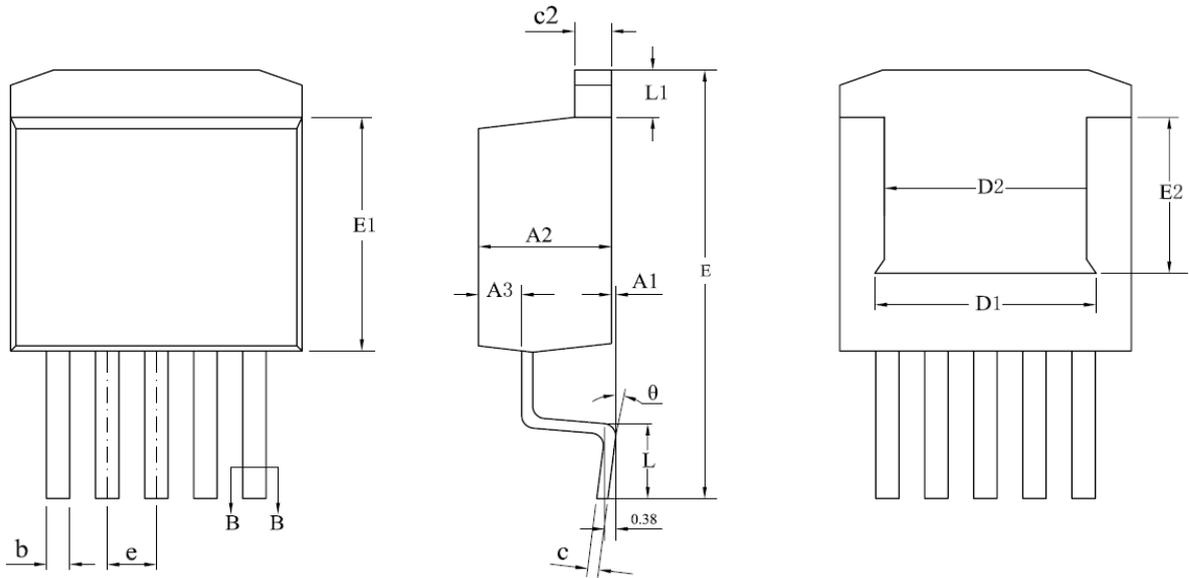
If not use Dimming control, EN connect to VDD.



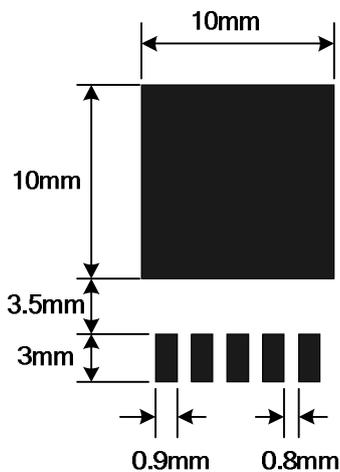
10. Package Dimension

Package Dimension

- Package Name : TO-263-5L,
- Package Size : 10.1mm * 14.85mm, Thickness : 4.57mm
- Pin Pitch : 1.7mm



Foot Print

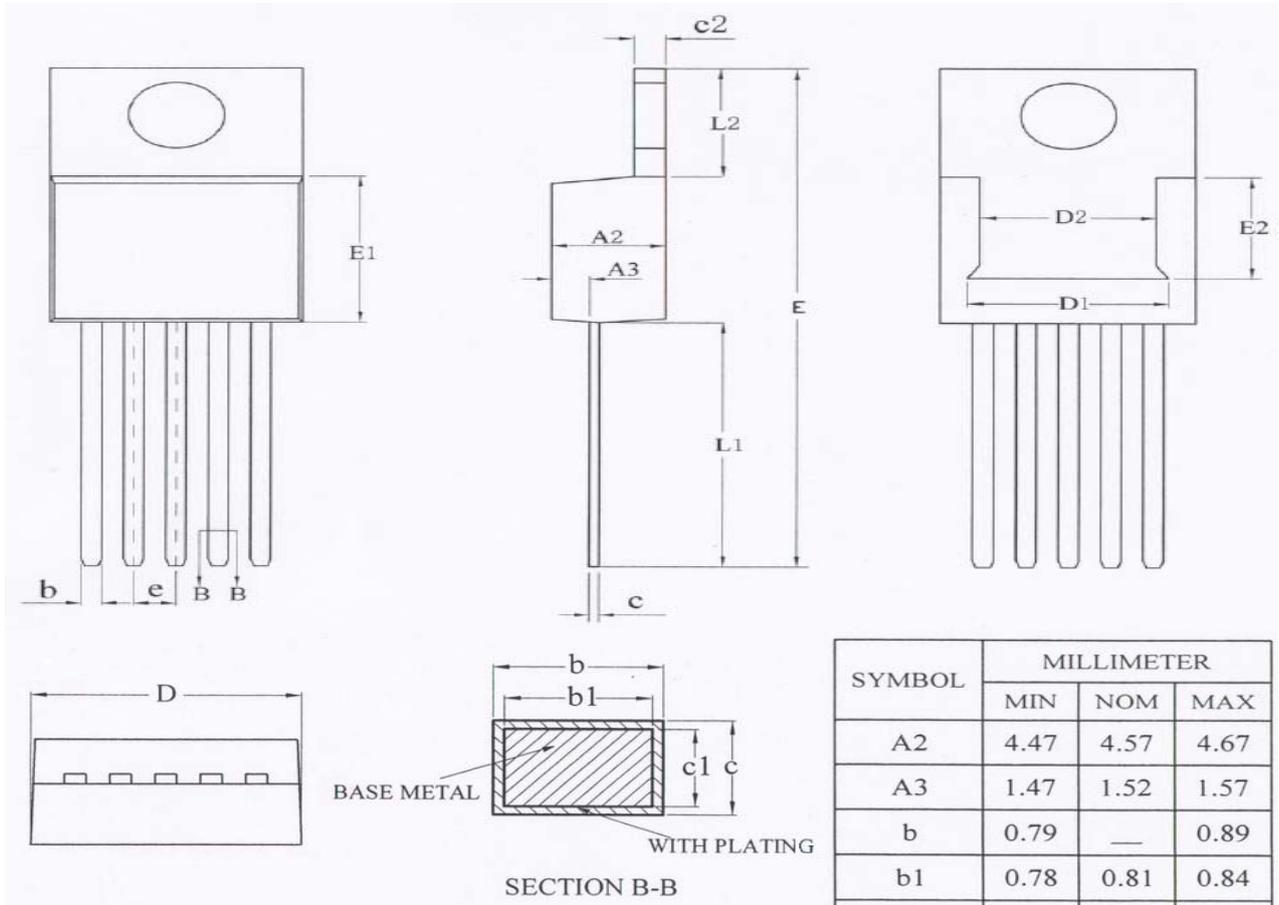


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A1	0.05	—	0.25
A2	4.47	4.57	4.67
A3	1.47	1.52	1.57
b	0.79	—	0.89
b1	0.78	0.81	0.84
c	0.37	—	0.45
c1	0.36	0.38	0.40
c2	1.27BSC		
D	10.00	10.10	10.20
D1	8.0REF		
D2	7.0REF		
E	14.65	14.85	15.05
E1	8.30	8.40	8.50
E2	5.80BSC		
e	1.70BSC		
L	1.84	—	2.24
L1	1.65BSC		
θ	0	—	8°

10.1. Package Dimension (Continued)

Package Dimension

- Package Name : TO-220-5L,
- Package Size : 10.1mm * 28.85mm, Thickness : 4.57mm
- Pin Pitch : 1.7mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A2	4.47	4.57	4.67
A3	1.47	1.52	1.57
b	0.79	—	0.89
b1	0.78	0.81	0.84
c	0.37	—	0.45
c1	0.36	0.38	0.40
c2	1.27BSC		
D	10.00	10.10	10.20
D1	8.0REF		
D2	7.0REF		
E	28.65	28.85	29.05
E1	8.30	8.40	8.50
E2	5.80REF		
e	1.70BSC		
L1	14.15BSC		
L2	6.30BSC		
L/F载体尺寸 (mil)	177*177		