

## Descriptions

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  $V_F$  variations. DW8502 easily provides users a consistent current source. User may adjust the output current from up to 2.5A 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. DW8502 also guarantees that LEDs can be cascaded to maximum 40V at the output port.

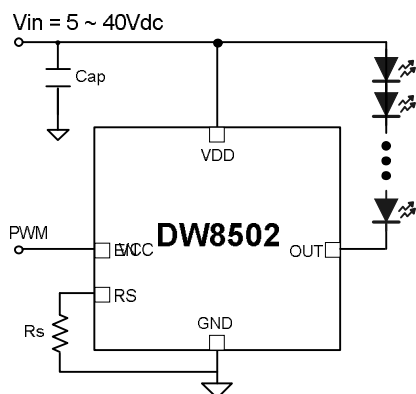
## Features

- 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 Package
- 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
- Automotive lighting
- General purpose constant current source

## Typical Application Circuit



## Ordering Information

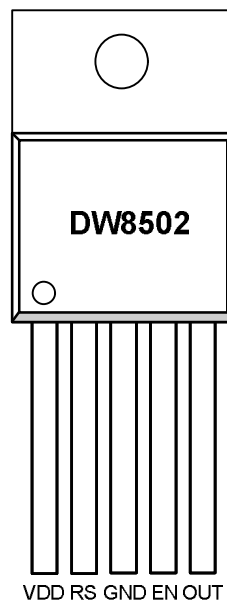
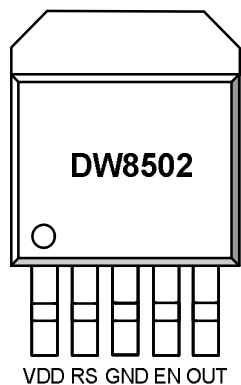
Device	Marking	Package	Operating Temp
DW8502-TO263	DW8502	TO-263	-35°C ~ +85°C
DW8502-TO220	DW8502	TO-220	-35°C ~ +85°C

## Package Information



Package	Size
TO-263-5L	10.1x14.85x4.57(mm)
TO-220-5L	10.1x28.85x4.57(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	
Enable voltage	$V_{EN}$	41	V	
Output voltage	$V_{OUT}$	23	V	
Reference voltage	$V_{RS}$	5	V	
Package thermal resistance	TO-263-5L	$\theta_{JA}$	22.85	$^{\circ}C/W$
	TO-220-5L	$\theta_{JA}$	62	$^{\circ}C/W$
Operating temperature	$T_{OPR}$	-35~+85	$^{\circ}C$	
Storage Temperature	$T_{STG}$	-55~+150	$^{\circ}C$	

**Note** 1.  $\theta_{ja}$  is measured in the convection at  $T_a=30^{\circ}C$  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.

### 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	$I_{OUT}$	-	-	2.5	A

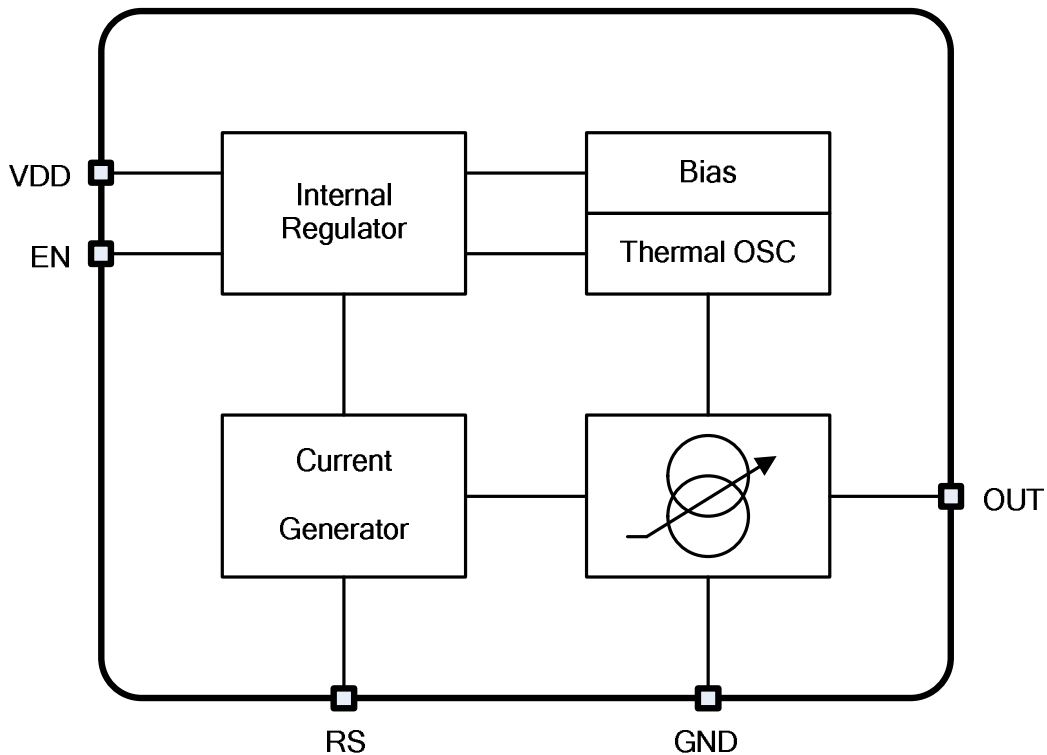
## Electrical Characteristics

$V_{DD} = 24V$ ,  $EN = 0 \sim 24V$ ,  $T_a = -35^{\circ}C \sim +85^{\circ}C$ , 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	$I_{OUT}$		-	-	1.5	A
Quiescent current	$I_{Q\_ON}$	$EN = 24V$	0.8	1	1.5	mA
	$I_{Q\_OFF}$	$EN = 0V$	85	120	250	$\mu A$
EN input leakage current	$I_{EN\_LIK}$		30	45	60	$\mu A$
Input high voltage	$V_{IH}$		2	-	-	V
Input low voltage	$V_{IL}$		-	-	0.8	V
LED output drop-out voltage	$V_{DROP}$	$V_{DD}=40V$ , $I_{SET}=300mA$	240	270	300	mV
Thermal derating	$T_D$		-	140	-	$^{\circ}C$
Thermal derating hysteresis	$T_{DHYS}$		-	15	-	$^{\circ}C$
Rset voltage	$V_{SET}$		0.58	0.61	0.64	V
Output current	$I_{OUT}$	$2K\Omega$	290	305	320	mA

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

## Block Diagram



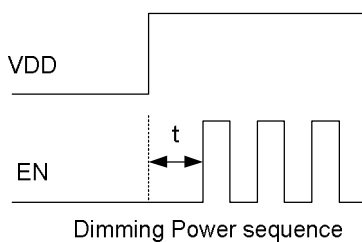
## Circuit Description

### Setting Output Current

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

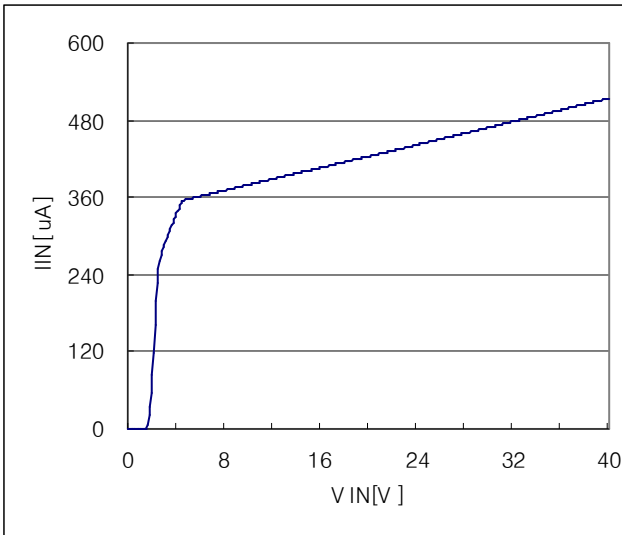
### Powersequence

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.

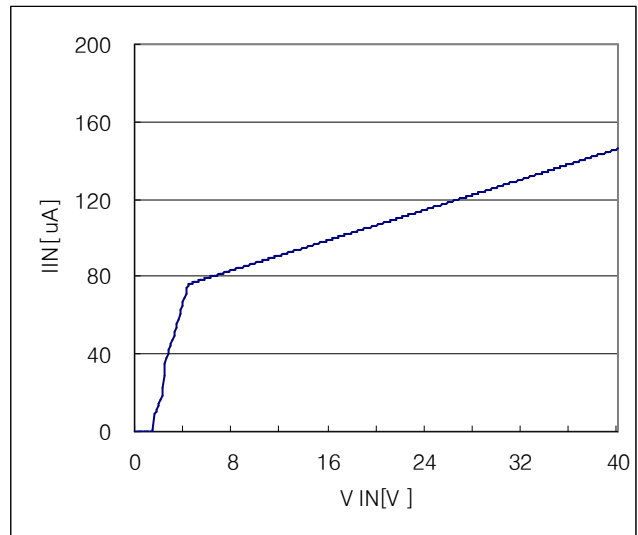


**Electrical Characteristics Curves**

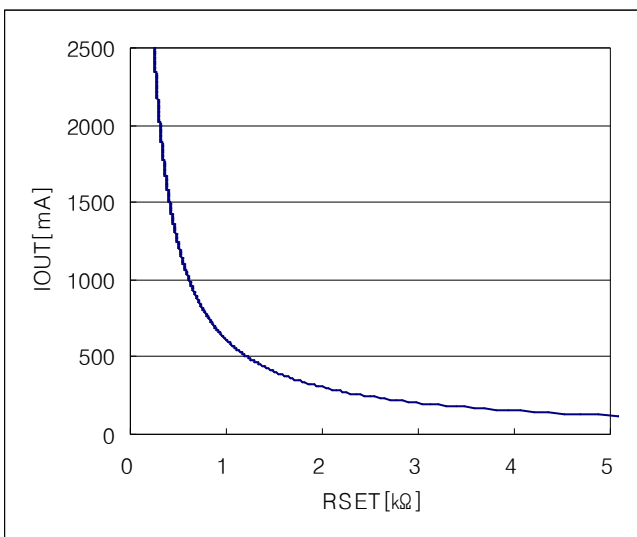
$V_{DD} = 12V, V_{OUT} = 2V, T_a = -35^{\circ}C \sim +85^{\circ}C$ , unless otherwise specified. Typical values are at  $T_A = +25^{\circ}C$



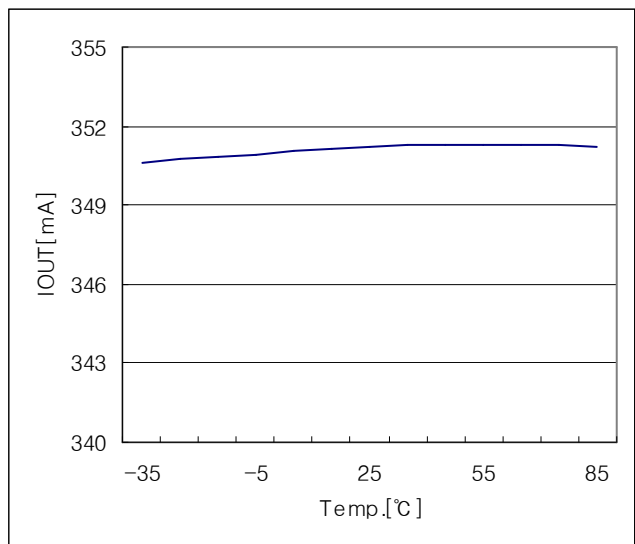
**Quiescent vs. VDD**



**Ishutdown vs. VDD**



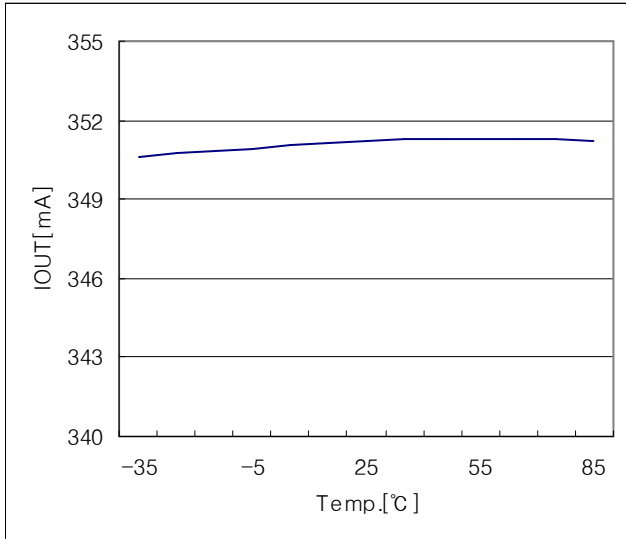
**IOUIT vs. RSET**



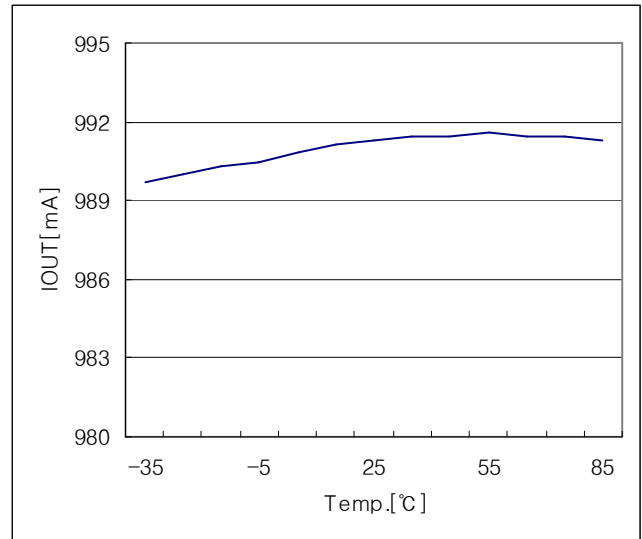
**IOUIT vs. Temperature**

**Electrical Characteristics Curves (continued)**

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



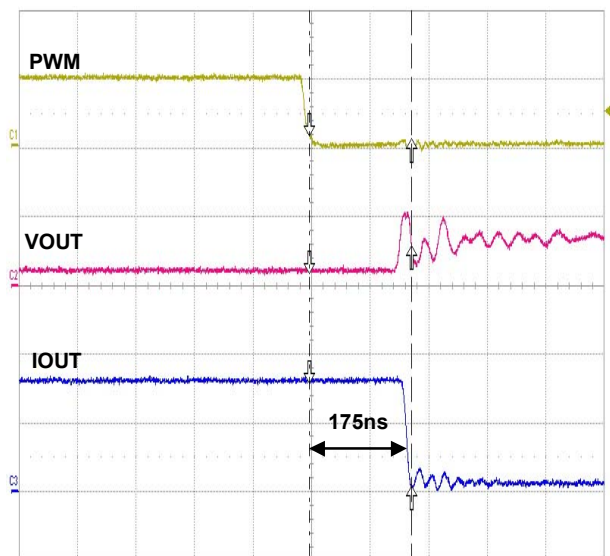
**IOUT vs. Temperature**



**IOUT vs. Temperature**



**PWM Rising Time**



**PWM Falling Time**

**Typical Applications**

※ LED VF = 3.3V, IF = 20mA

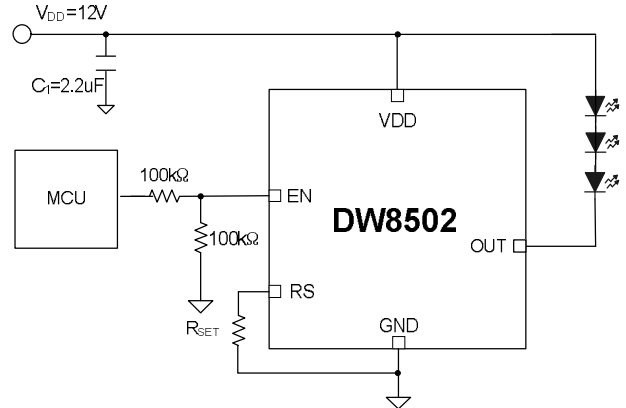
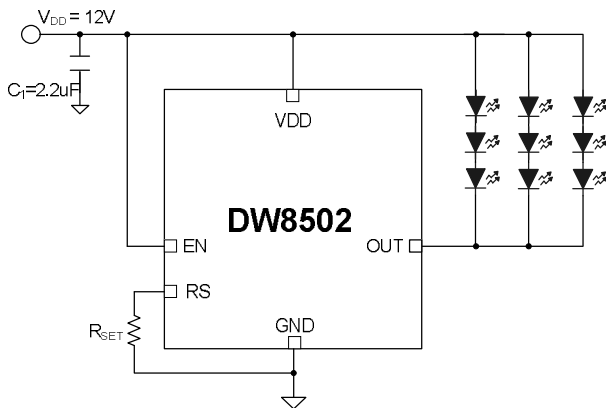
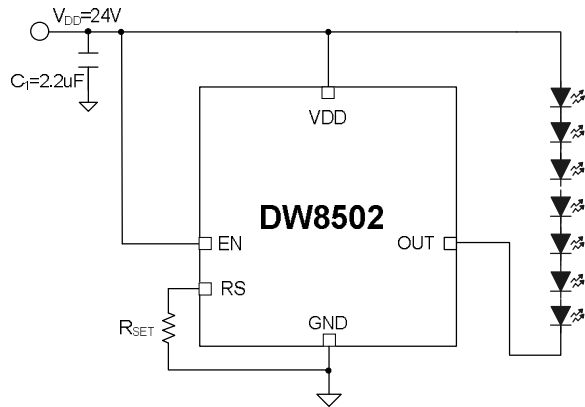
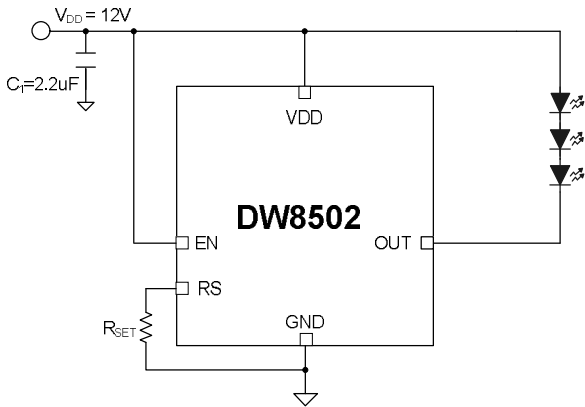


Figure 3. PWM Dimming Typical Application

Figure 4. VDD=12V, 9 LED

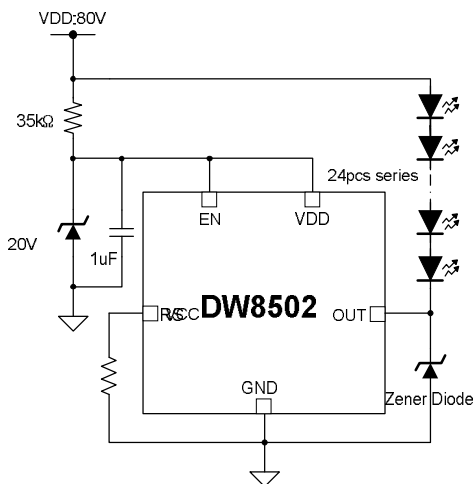
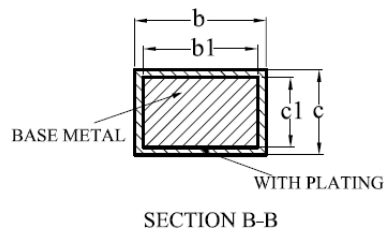
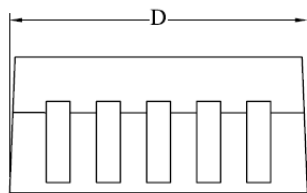
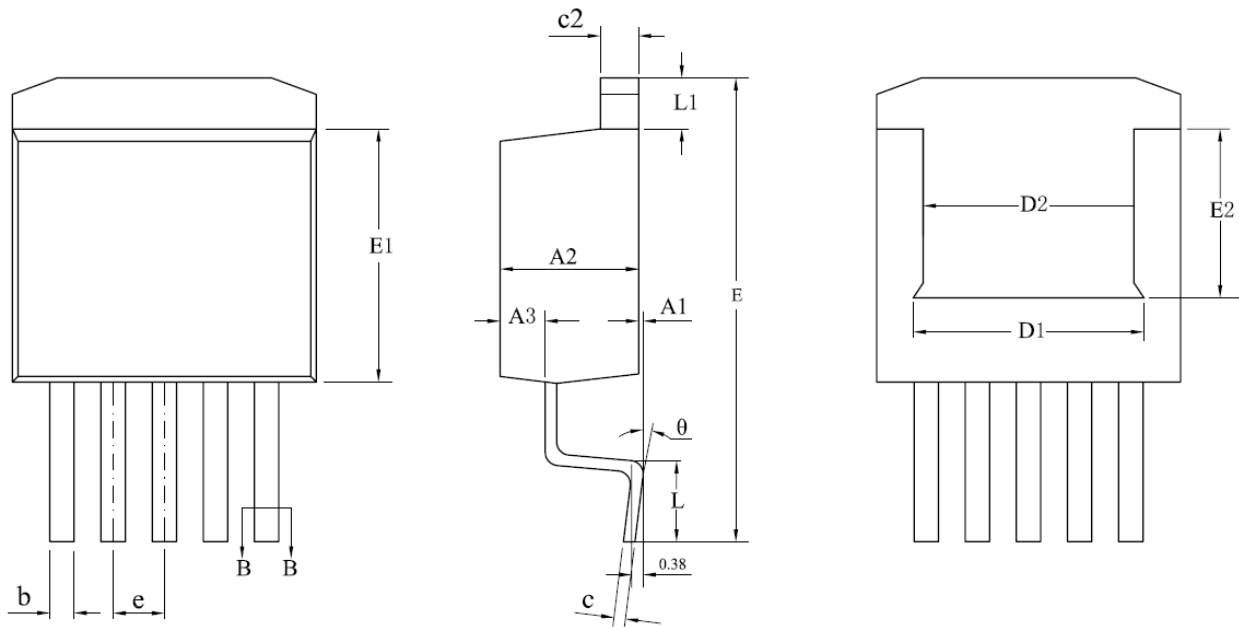


Figure 5. High Voltage Application (VDD=80V)

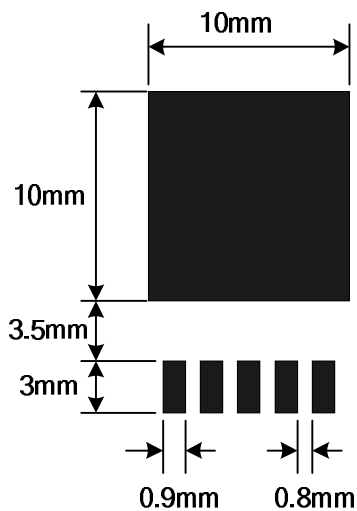


**Package Dimension (TO-263-5L 10.1 x 14.85 x 4.57)**



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°

**Foot Print**



**Package Dimension (TO-220-5L 10.1x28.85x4.57(mm))**

