

Descriptions

The DW3505 is an instant On/Off LED driver for low power LED applications. At DW3505 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.

DW3505 easily provides users a consistent current source. User may adjust the output current from up to 300mA 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.

DW3505 also guarantees that LEDs can be cascaded to maximum 40V at the output port.

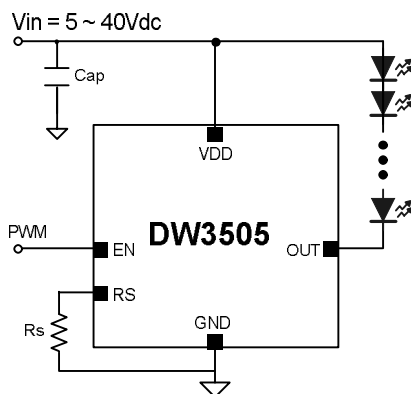
Features

- Constant output current invariant to supply and load voltage change
- 5V to 40V supply voltage
- Up to 300mA adjustable regulated output current
- Built-in thermal derating circuit
- Available PWM dimming control
- Output current adjusted through an external resistor
- SOT89-5L 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

Typical Application Circuit



Ordering Information

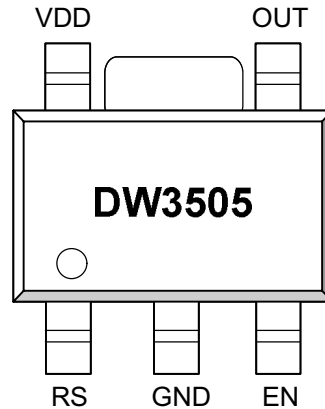
Device	Marking	Package
DW3505	DW3505	SOT89-5L

Package Information



Package	Size
SOT89-5L	4.5 x 2.45 x 1.5(mm)

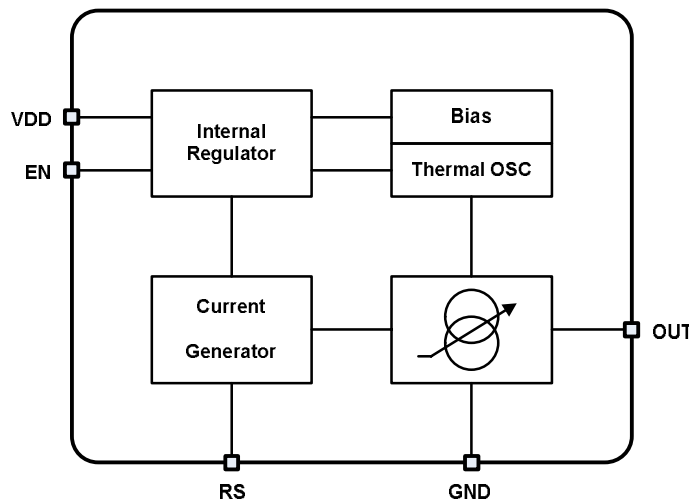
Pin Connection



Pin Description

Pin	Name	Description
1	RS	Output current set input. Connect a resistor from RS to GND to set the LED bias current.
2	GND	Ground.
3	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.
4	OUT	Output pin. Sink current is decided by the current on R_{SET} connected to RS.
5	VDD	Supply voltage input.

Block Diagram



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
Reference voltage	V_{RS}	5	V
Package thermal resistance	θ_{JA}	TBD	$^{\circ}C/W$
Operating junction temperature	T_{OPR}	-40~+125	$^{\circ}C$
Junction temperature	T_J	+150	$^{\circ}C$
Storage temperature	T_{STG}	-55~+150	$^{\circ}C$

Note 1. θ_{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}	-	-	300	mA

Electrical Characteristics

$V_{DD} = 24V$, $T_J = -40^{\circ}C \sim +125^{\circ}C$, unless otherwise specified. Typical values are at $T_J = +25^{\circ}C$

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input supply voltage	V_{DD}		5	-	40	V
Output linearity voltage	V_{OUT_LINE}	$V_{DD}=24V$, $I_{SET}=60mA$,	-	-	3	V
Quiescent Current	I_{Q_ON}	EN = 24V	0.3	0.45	1	mA
	I_{Q_OFF}	EN = 0V	85	120	250	uA
EN Input leakage current	I_{EN_LIK}		30	45	60	uA
EN Input high voltage	V_{IH}		2	-	-	V
EN Input low voltage	V_{IL}		-	-	0.8	V
LED output drop-out voltage	V_{DROPO}	$V_{DD}=24V$, $I_{SET}=60mA$	-	100	-	mV
Thermal derating	T_D	T_J	-	140	-	$^{\circ}C$
Thermal derating hysteresis	T_{DHYS}		-	15	-	$^{\circ}C$
Rset Voltage	V_{SET}		0.58	0.61	0.64	V
Output current by Rset	R_{SET}	6.6K Ω	-	100	-	mA

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

Application notice

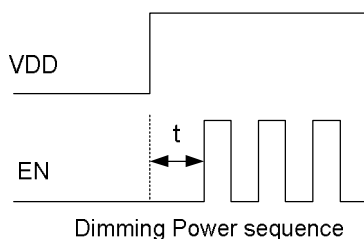
Setting Output Current

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	48	15	94	7.5
12	62	50	14.39	100	7
15	61	51	14	103	6.8
17	43	55	13	115	6.04
19	39	59	12	124	5.6
20	36	60	11.91	136	5.1
22	33	61	11.6	148	4.7
24	30	65	11	161	4.3
27	27	70	10.2	177	3.9
30	24	71	10	209	3.3
33	22	78	9.1	229	3
36	20	80	8.82	254	2.7
40	18	87	8.2	285	2.4
45	16	90	7.78	303	2.26

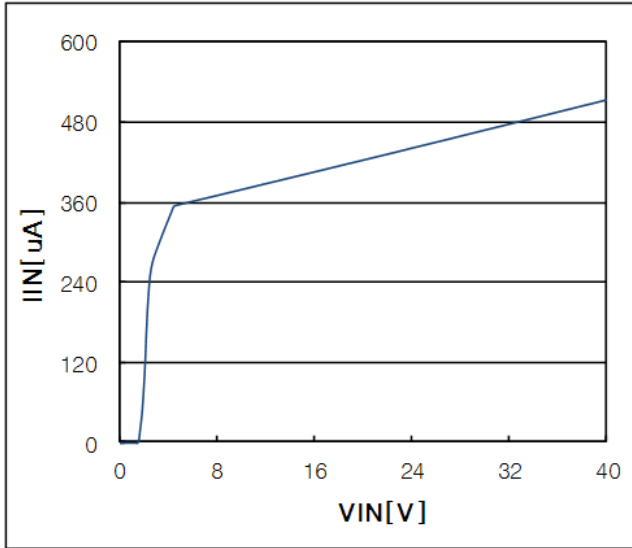
Powersequence

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.

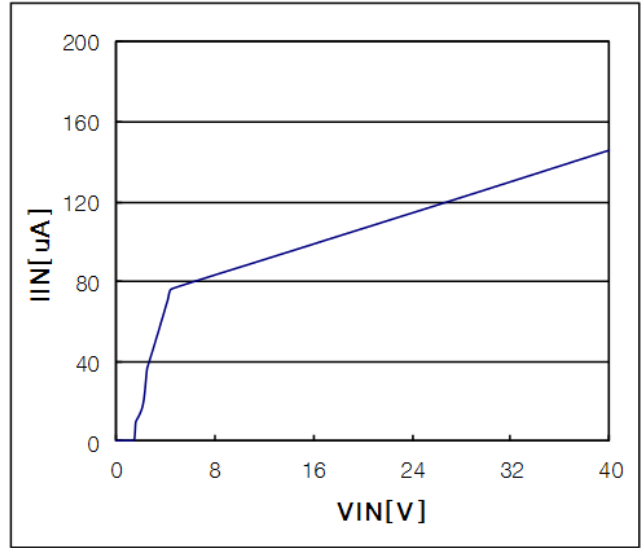


Electrical Characteristics Curves

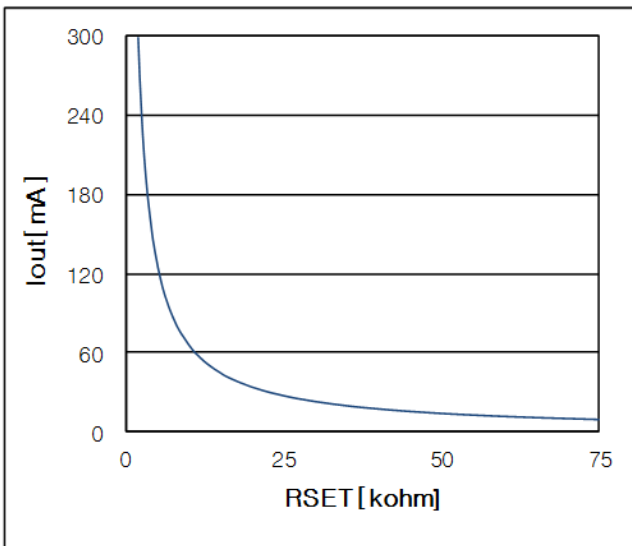
$V_{DD} = 12V, V_{OUT} = 2V, T_J = -40^{\circ}C \sim +125^{\circ}C$, unless otherwise specified. Typical values are at $T_J = +25^{\circ}C$



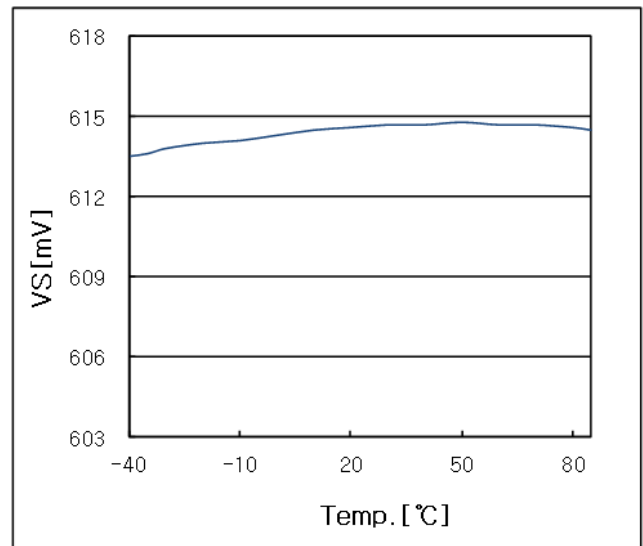
Quiescent vs. VDD



Ishutdown vs. VDD



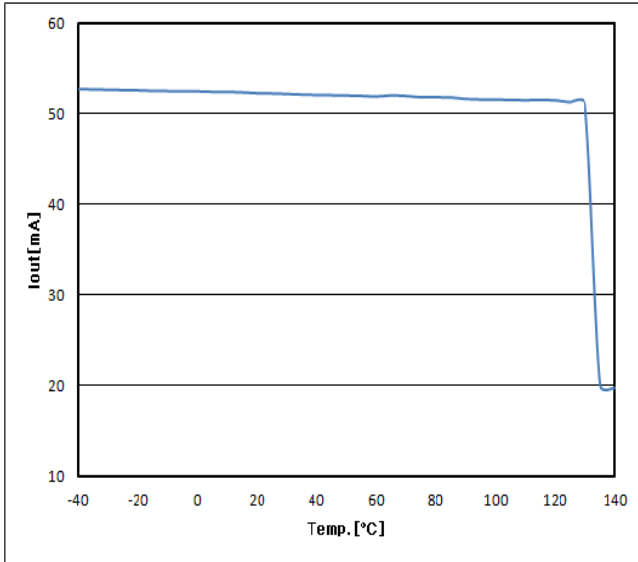
IOUT vs. RSET



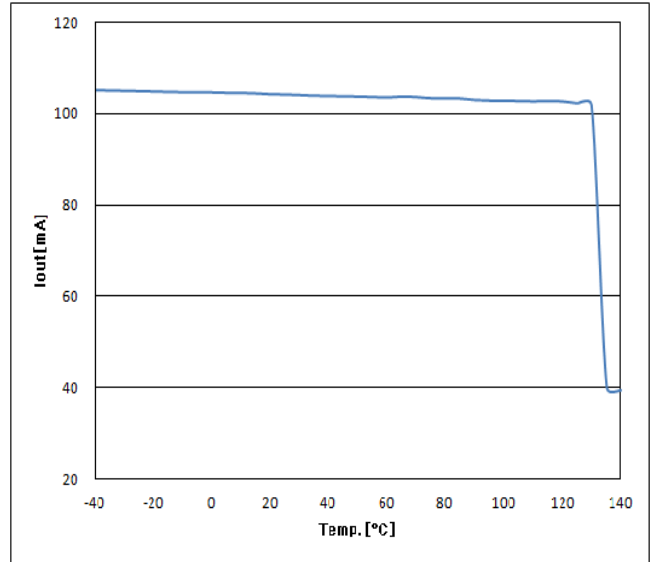
Vreference vs. Temperature

Electrical Characteristics Curves

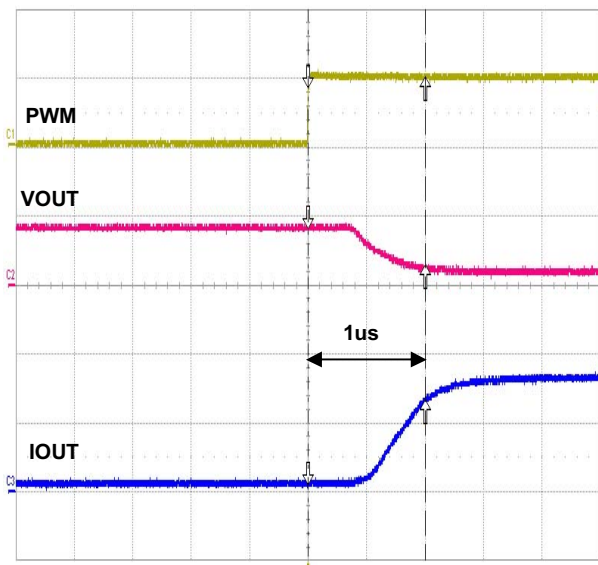
$V_{DD} = 12V, V_{OUT} = 2V, T_J = -40^{\circ}C \sim +125^{\circ}C$, unless otherwise specified. Typical values are at $T_J = +25^{\circ}C$



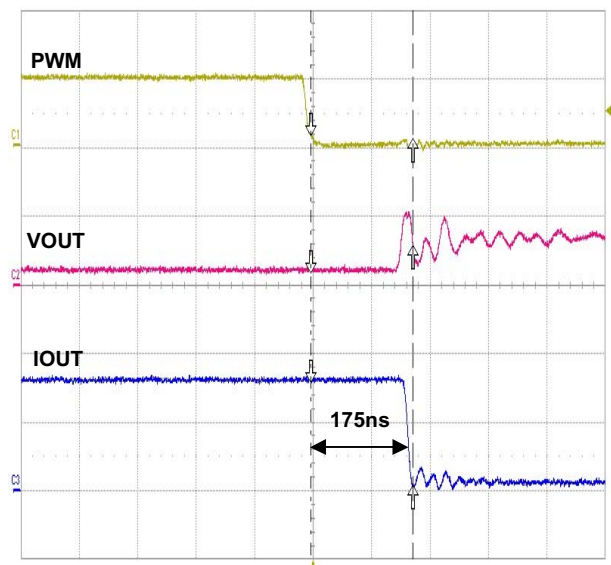
IOUT vs. Temperature



IOUT vs. Temperature



PWM Rising Time



PWM Falling Time

Typical Applications

※ LED VF = 3.3V, IF = 20mA

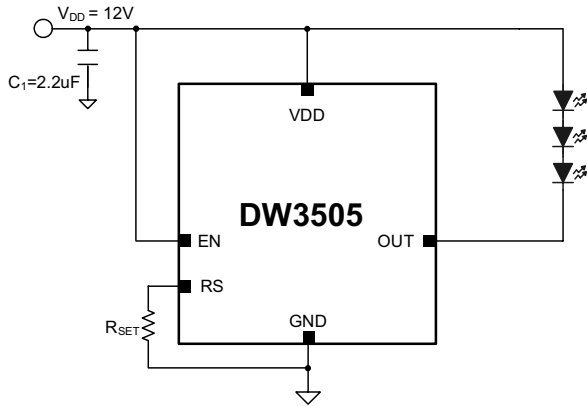


Figure 1. VDD=12V

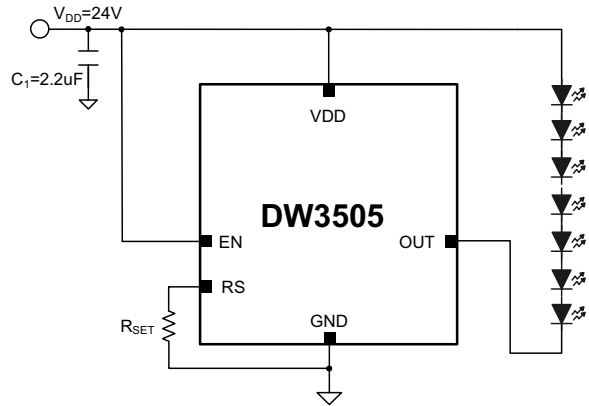


Figure 2. VDD=24V

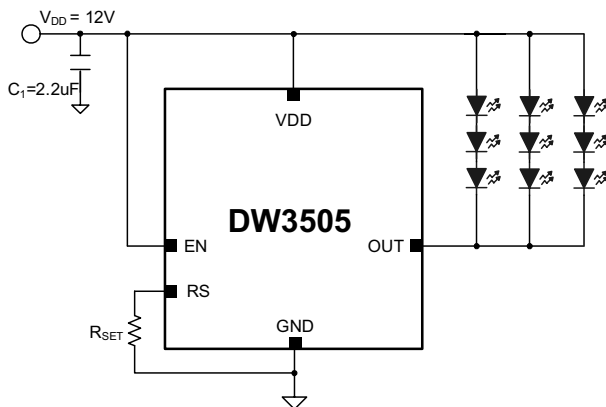


Figure 3. VDD=12V, 9 LED

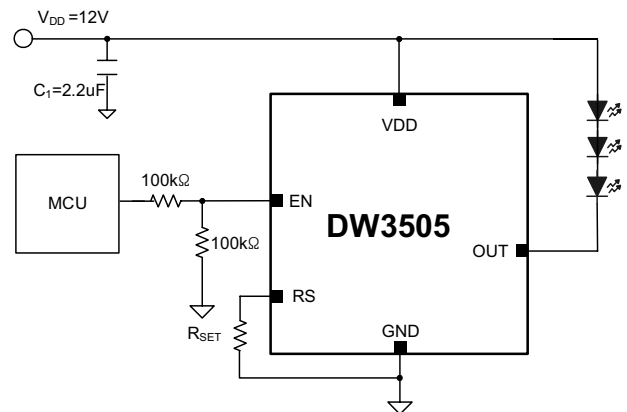


Figure 4. PWM Typical Application

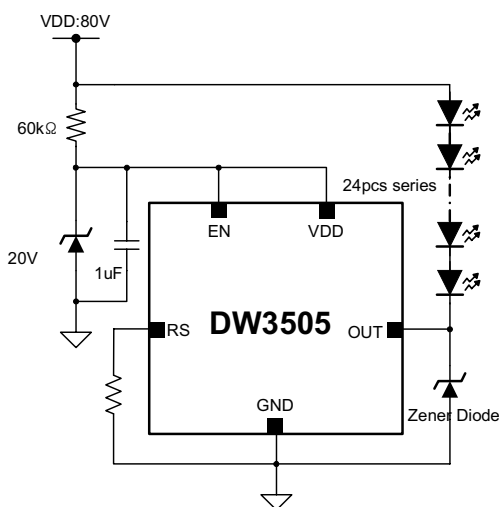


Figure 5. High Voltage Application (VDD=80V)

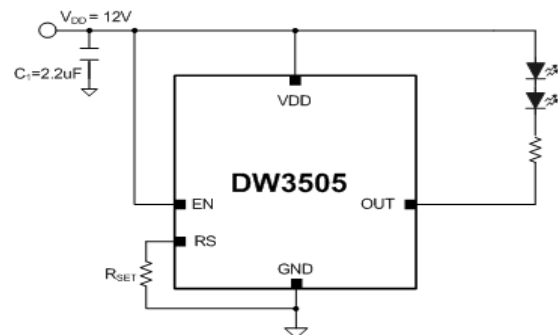
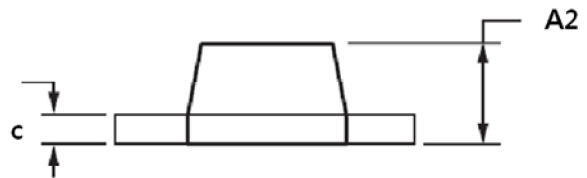
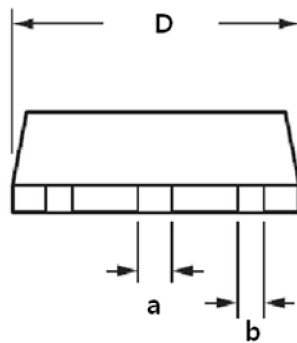
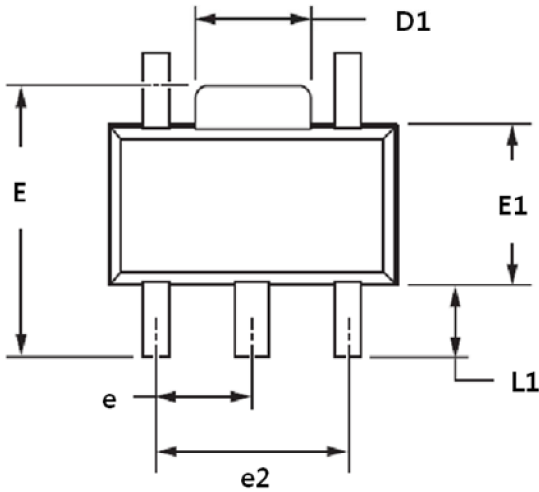
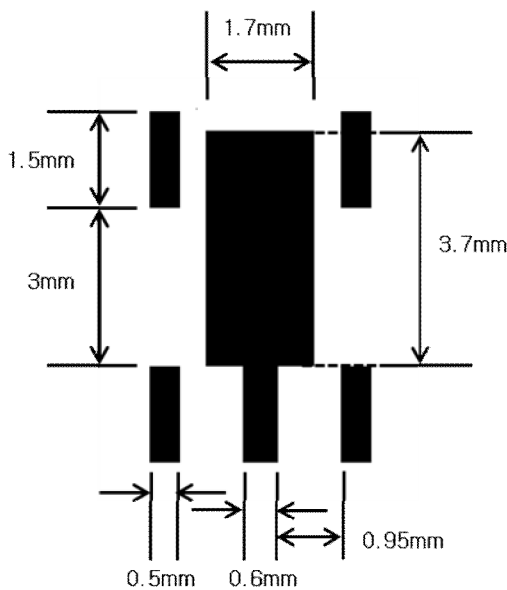


Figure 6. VDD=12V, 2 LED

Package Dimension (SOT89-5L 4.5 x 2.45 x 1.5)



Foot Print



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A2	1.40	1.50	1.60
a	0.46	-	0.56
b	0.38	-	0.47
c	0.36	-	0.46
D	4.30	4.50	4.70
D1	1.70REF		
E	4.00	4.20	4.40
E1	2.30	2.50	2.70
e	1.50BSC		
e2	3.00BSC		
L1	0.80	1.00	1.20