

Adjustable Constant Current LED Driver HM7136

General Description

The HM7136 is a constant current regulator for driving LEDs with low quiescent current and low dropout voltage. The current is adjustable from 10mA to 1A with an external resistor.

Only one external resistor is required to achieve a constant current LED driver. Soft start, thermal protection and low voltage protection are also provided.

The driver pin EXT is provided for current and voltage extension. Adding an external NMOS or NPN transistor to this pin can extend current and voltage range.

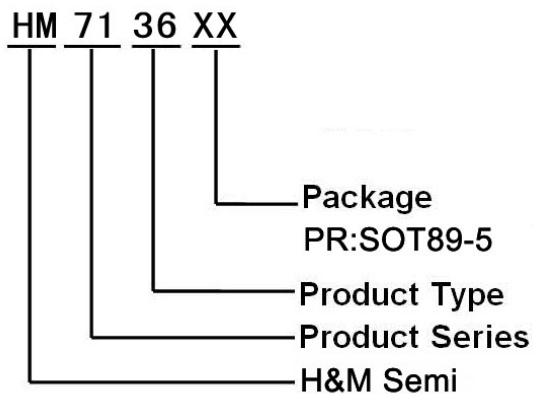
Features

- Sink current: 10mA to 1A adjustable with an external resistor
- Current and voltage range extendable by adding an external NMOS or NPN transistor
- Power supply voltage: 2.7-18V
- Low drop out voltage: 50mV@1A
- Low quiescent current: 80uA
- Thermal Shutdown protection: 165°C
- Soft start
- Low voltage protection: 2.5V
- Package: SOT89-5, ESOP8.

Typical Application

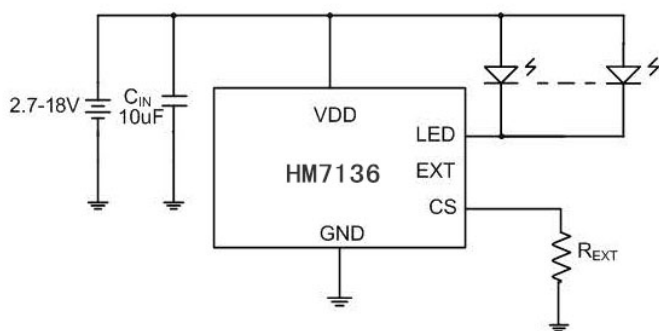
- Power Led driver

Selection Guide

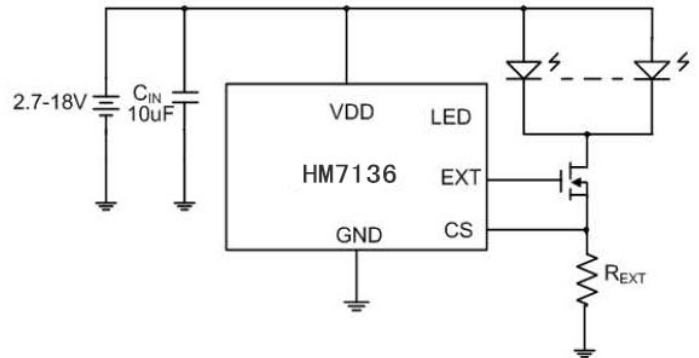


Typical Application Circuit

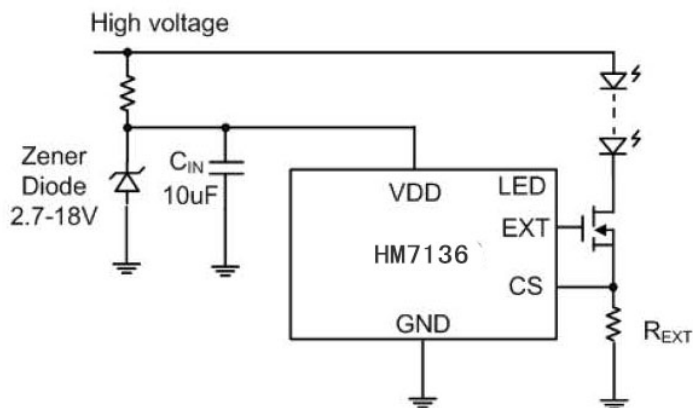
Low Voltage And Light Load (Under 1A)



Low Voltage And Heavy Load (Exceed 1A)



High Voltage Application

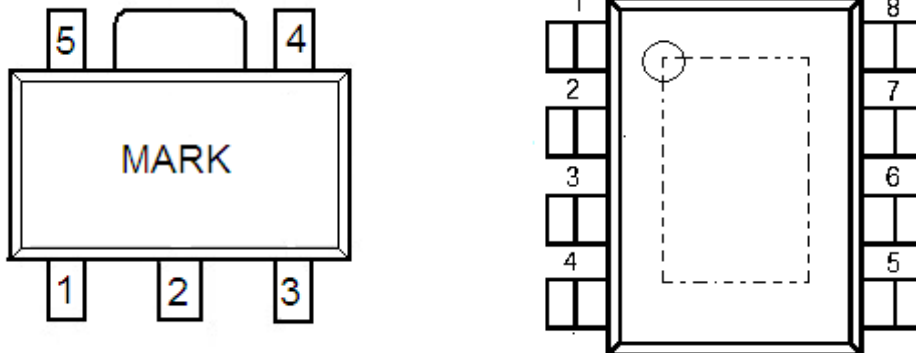


R_{EXT} Resistor Value selection:

R _{EXT} (Ω)	I _{LED} (mA)
10	10
1	100
0.286	350
0.1	1000

$$I_{LED} = \frac{V_{CS}}{R_{EXT}}$$

Pin Configuration



Pin Assignment

HM7136

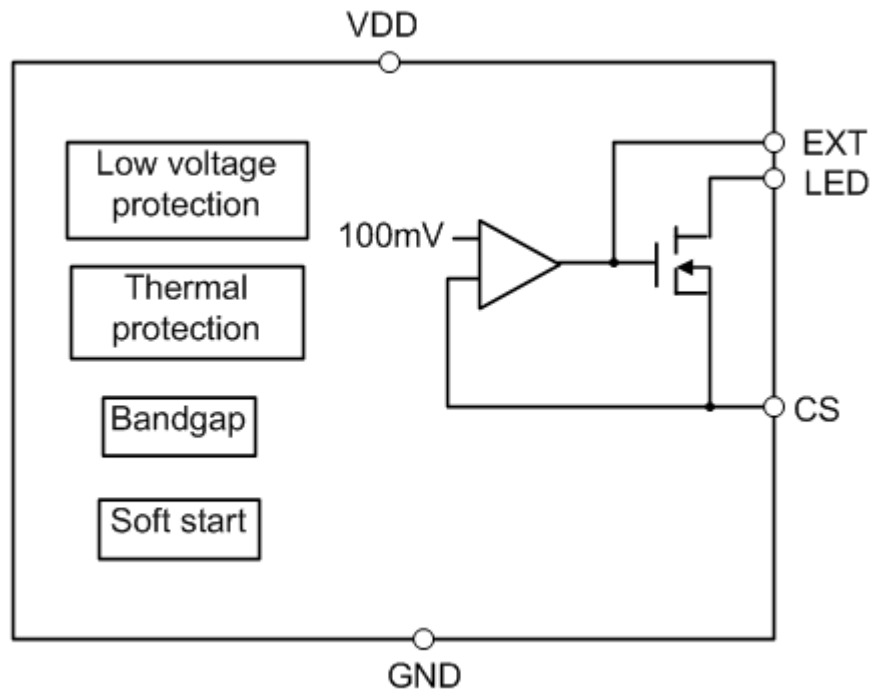
Pin Number		Pin Name	Functions
ESOP8	SOT89-5		
2	1	CS	Output current detection
1	2	D(LED)	The negative input feet of LED
3	3	VDD	Power Input
5	4	GND	Ground
7	5	EXT	Driving external NMOS
4,6,8		NC	No connection

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Input Voltage		V _{DD}	18	V
Voltage on LED,CS		V _{LED} , V _{CS} ,	-0.3~V _{DD} +0.3	V
Voltage on EXT		V _{EXT}	6	V
Output Current		I _{OUT}	1.5	A
Power Dissipation	SOT89-5	P _D	500	mW
			1300 (PCB mounted) ^(*)	
	ESOP8	P _D	400	mW (T=25℃)
			2000 (PCB mounted) ^(*)	
Operating Temperature Range		T _{OPR}	−40~+125	℃
Storage Temperature Range		T _{STG}	−40~+150	℃
Lead Temperature			260℃, 4sec	
ESD(ESD voltage for human body model)		V _{ESD}	2000	V

*1: The power dissipation figure shown in PCB mounted. Please refer to page 8-9 for details.

Block Diagram



Electrical Characteristics

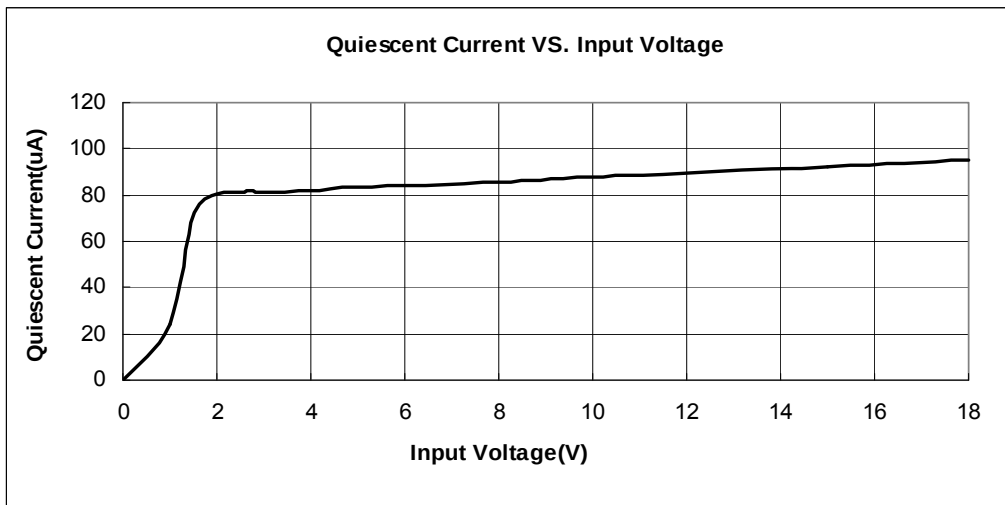
HM7136

($V_{DD}=3.6V$, $T_a=25^{\circ}C$, unless otherwise noted)

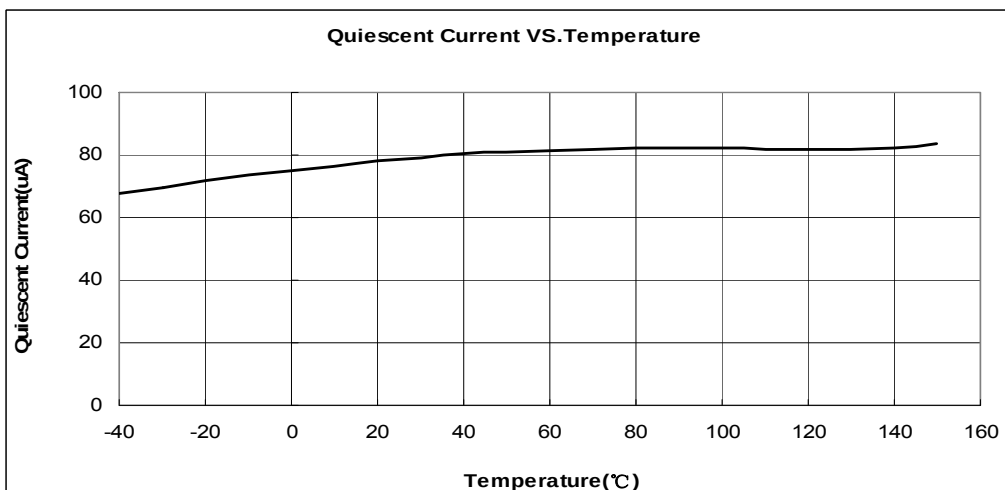
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Sink Current	I_{sink}	$V_{DD}=3.6V$	10		1000	mA
Input Voltage	V_{DD}	$I_{sink}=1A$	2.7		18	V
CS Voltage	V_{CS}		95	100	105	mV
Sink current accuracy	$\Delta I_{LED}/I_{LED}$	$I_{sink}=1A$	-5	-2.5	5	%
Load Regulation	LDR	$V_{LED}=0.2V$ to $3V$ $V_{DD}=3.6V$		0.1	2	mA/V
Line Regulation	LNR	$V_{LED}=3V$ $3.6V \leq V_{DD} \leq 18V$		0.4	2	mA/V
Output dropout voltage	V drop	$V_{DD}=3.6V$, $V_{LED}=0.5V$		50	100	mV
Quiescent Current	I_{SS}	$V_{DD}=3.6V$		80	100	uA
Low Voltage Protection			2.3	2.5	2.7	V
Low voltage hysteresis	V_{hys}			0.15		V
Thermal Shutdown protection:	T_{sd}			165		$^{\circ}C$

Type Characteristics

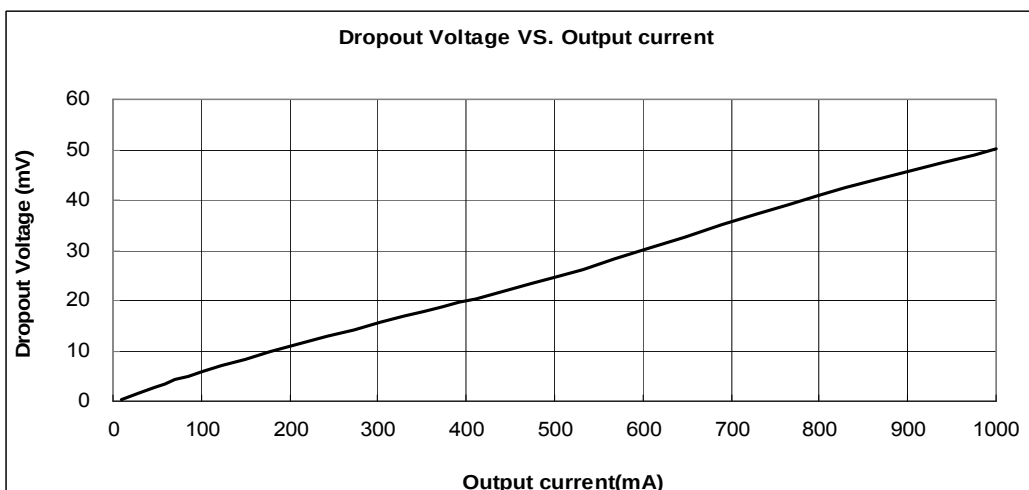
- (1) Quiescent Current VS. Input Voltage (No external component)



- (2) Quiescent Current VS. Temperature ($V_{DD}=3.6V$)



- (3) Dropout Voltage VS. Output Current ($V_{DD}=3.6V$)



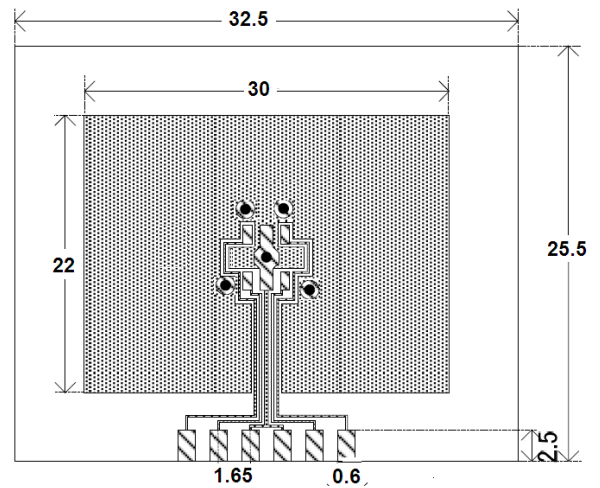
power dissipation

● SOT89-5 power dissipation

The power dissipation data for the SOT89-5 is shown as below. The value of power dissipation varies with the mount board conditions. Please use this data as the reference data taken in the following condions.

1. Measurement condition

Condition: Mount on a board
Ambient: Natural convection
Soldering: Lead(pb) free
Board: Dimensions 30*35mm (1050mm² in one side)
Copper(Cu) traces occupy 50% of the board
Area in top and back faces
Material: Glass Epoxy (FR-4)
Thickness: 1.6mm
Through-hole: 5*0.8 Diameter

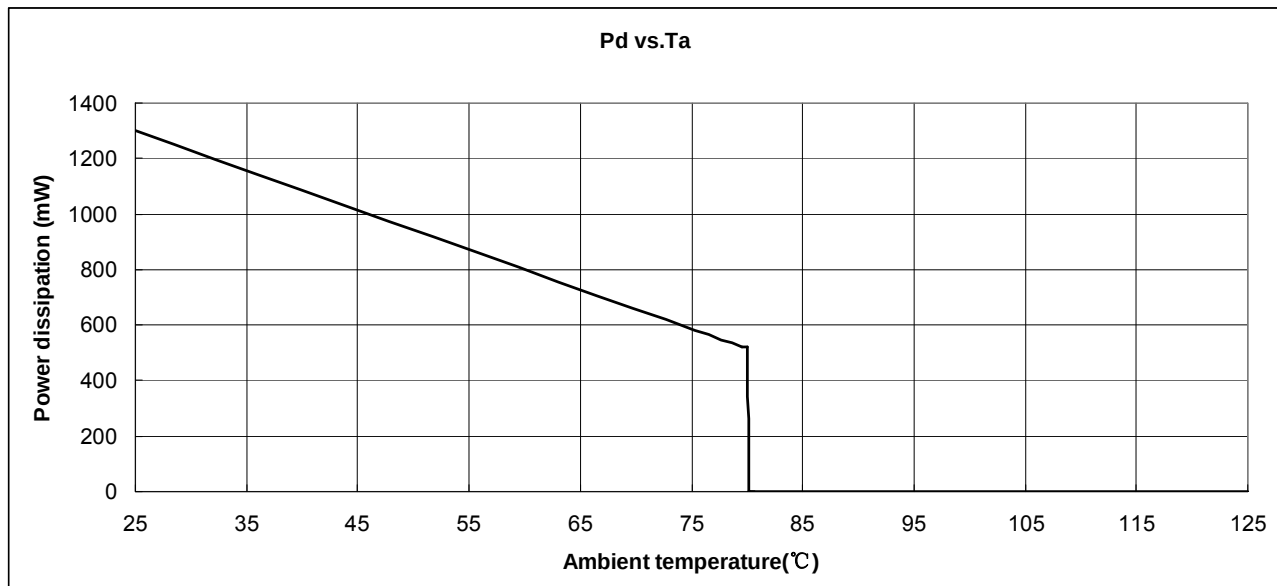


Evaluation Board(Unit:mm)

2. Power dissipation vs. Ambient temperature

Board Mount ($T_j \text{ max}=125^\circ\text{C}$)

Ambient Temperature($^\circ\text{C}$)	Power Dissipation(mW)	Thermal Resistance($^\circ\text{C}/\text{W}$)
25	1300	76.92
85	520	

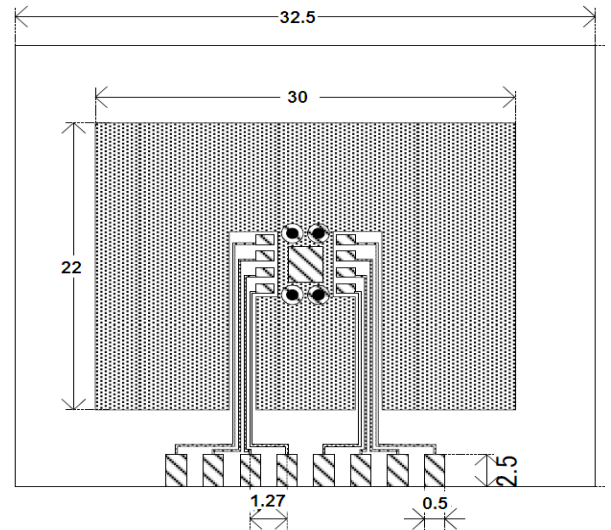


● ESOP8 power dissipation

The power dissipation data for the ESOP8 is shown as below. The value of power dissipation varies with the mount board conditions. Please use this data as the reference data taken in the following condions.

3. Measurement condition

Condition: Mount on a board
 Ambient: Natural convection
 Soldering: Lead(pb) free
 Board: Dimensions 30*35mm (1050mm² in one side)
 Copper(Cu) traces occupy 50% of the board
 Area in top and back faces
 Material: Glass Epoxy (FR-4)
 Thickness: 1.6mm
 Through-hole: 4*0.8 Diameter



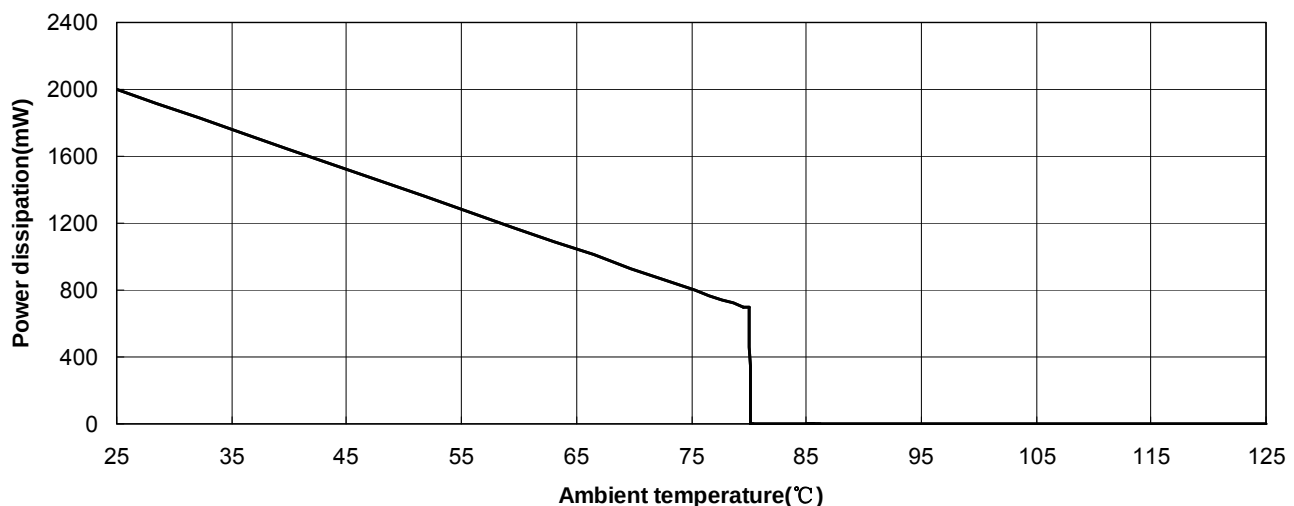
4. Power dissipation vs. Ambient temperature

Board Mount ($T_j \text{ max} = 125^\circ\text{C}$)

Evaluation Board(Unit:mm)

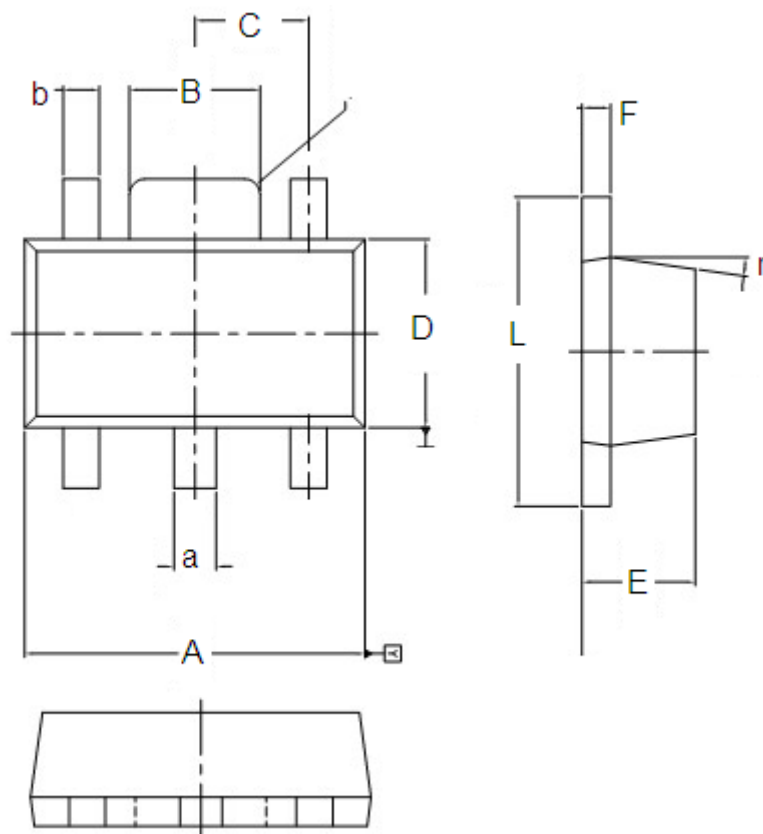
Ambient Temperature($^\circ\text{C}$)	Power Dissipation(mW)	Thermal Resistance($^\circ\text{C}/\text{W}$)
25	2000	66.67
85	700	

Pd vs.Ta



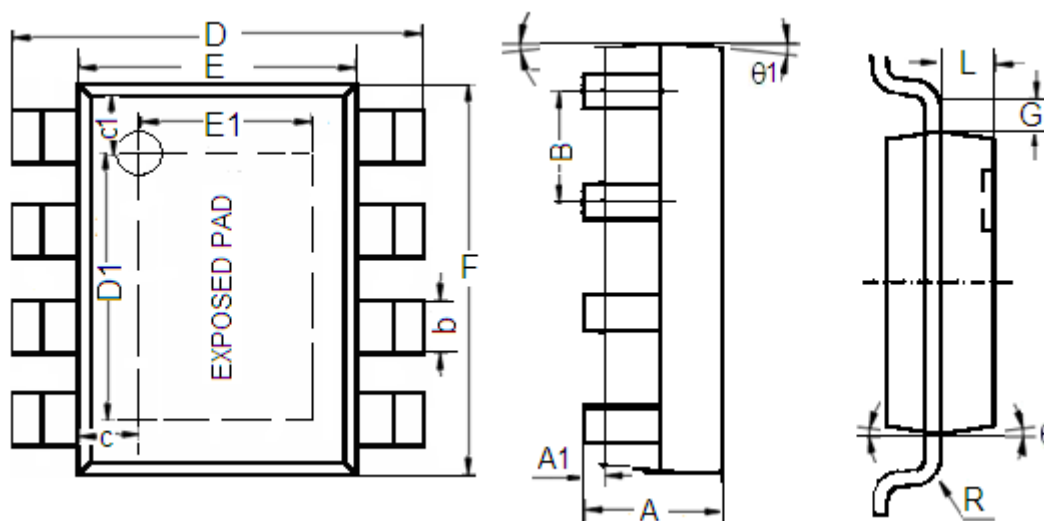
Packaging Information

- Packaging Type: SOT89-5



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.4	4.6	0.173	0.181
a	0.5	0.62	0.02	0.024
B	1.63	1.83	0.064	0.072
b	0.44	0.54	0.017	0.021
C	Type:1.5		Type:0.059	
D	2.4	2.6	0.094	0.102
E	1.4	1.6	0.054	0.063
F	0.35	0.43	0.013	0.017
L	3.95	4.25	0.155	0.167
r	Type:8 ⁰		Type:8 ⁰	

● Packaging Type: SOP8-PP



Character	Dimension (mm)		Dimension (Inches)	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.1	0.3	0.004	0.012
B	1.27(Typ.)		0.05(Typ.)	
b	0.330	0.510	0.013	0.020
c	0.9(Typ.)		0.035(Typ.)	
c1	1.0(Typ.)		0.039(Typ.)	
D	5.8	6.2	0.228	0.244
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	2.313	2.513	0.091	0.099
F	4.7	5.1	0.185	0.201
L	0.675	0.725	0.027	0.029
G	0.32(Typ.)		0.013(Typ.)	
R	0.15(Typ.)		0.006(Typ.)	
θ1	7°		7°	
θ	8°		8°	