AT5250/AT5250A/AT5250E

500mA CMOS Ultra-Low Dropout Positive Voltage Regulator

Immense Advance Tech.

FEATURES

- **Maximum Output Current:** 500mA (Within Maximum Power Dissipation)
- **Output voltage Range:** from 1.5V to 5.0V in 0.1V Increments
- **Output Accuracy**
  AT5250/AT5250E = V_{OUT} ±2%
  AT5250A= V_{OUT} ±1%
- **Highly Accurate:** Output Voltage ±2%
- **Low Power Consumption:**
  Typ.1.0μA @V_{OUT} =5.0V
- **Input Stability:** Typ. 0.2% / V
- **Small Input-Output Differential:**
  0.4V at 160mA (V_{OUT} = 3.3V)
- **Ultra Small Packages:**
  SOT-23 (400mW)
  SOT-89 (640mW)
  TO-92 (625mW)

DESCRIPTION

The AT5250/AT5250A/AT5250E series voltage regulators are specifically designed for use as a power source for video instruments, handheld communication equipment, and battery powered equipment.

The AT5250/AT5250A/AT5250E series voltage regulator ICs feature a high accuracy output voltage and low GND current. Each device contains a voltage reference unit, and error amplifier, a driver transistor, and resistors for setting output voltage, and a current limit circuit. These devices are allow construction of an efficient, constant voltage power supply circuit.

The AT5250/AT5250A/AT5250E is available in fixed and adjustable output voltage versions in a small SOT-25 surface mount package. The fixed version also available in SOT-89 surface mount packages.

APPLICATION

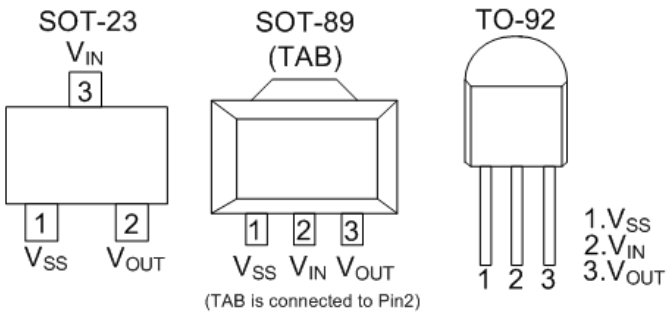
- Battery Powered Equipment
- Palmtops
- Portable Cameras and video Recorders
- Reference Voltage Sourced

ORDER INFORMATION

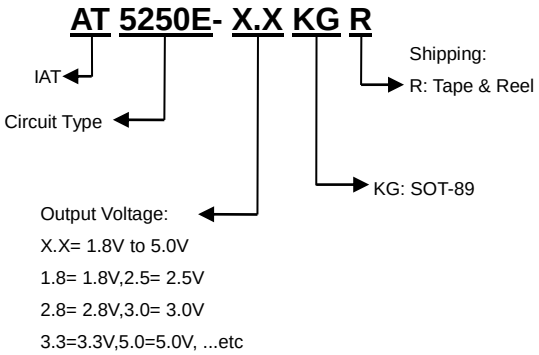
AT 5250- X.X KD R

- IAT
- Circuit Type
  AT5250= V_{OUT} ±2%
  AT5250A= V_{OUT} ±1%
- Output Voltage:
  X.X= 1.8V to 5.0V
  1.8= 1.8V,2.5= 2.5V
  2.8= 2.8V,3.0= 3.0V
  3.3=3.3V,5.0=5.0V, ...etc
- KD: SOT-23
  KG: SOT-89
  TD: TO-92
- Shipping:
  R: Tape & Reel

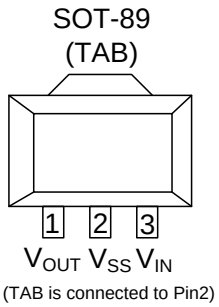
PIN CONFIGURATIONS (TOP VIEW)



ORDER INFORMATION



PIN CONFIGURATIONS (TOP VIEW)



(TAB is connected to Pin2)

PIN DESCRIPTIONS

Pin Name	Pin Description
V_{SS}	Ground.
V_{IN}	Supply Voltage Input.
V_{OUT}	Regulator Voltage Output.

TYPICAL APPLICATION CIRCUITS

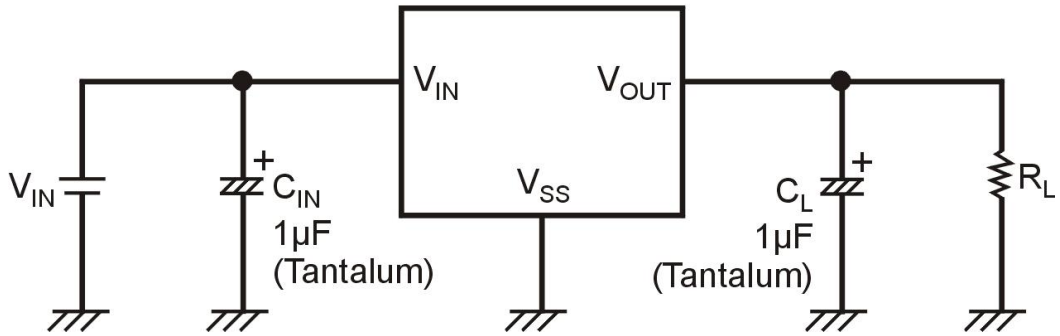


Figure 1.

BLOCK DIAGRAM

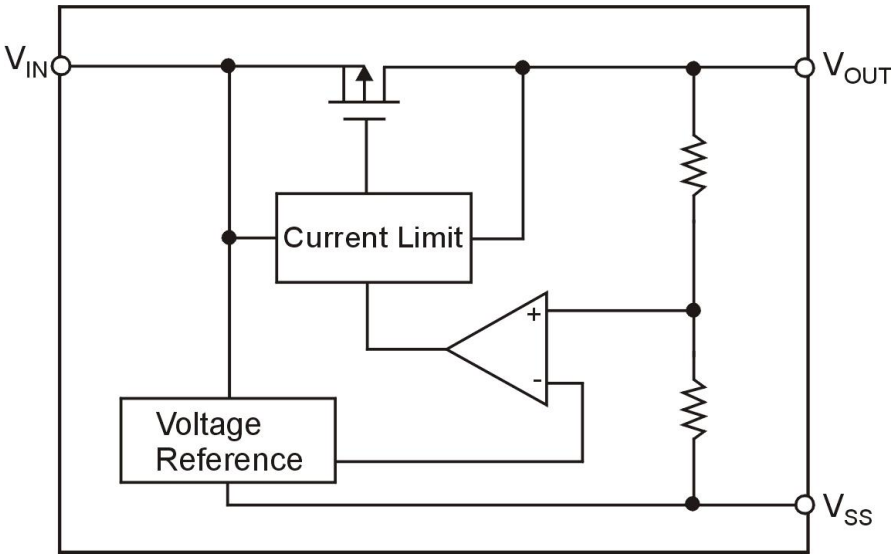


Figure 2.

ABSOLUTE MAXIMUM RATINGS (Note 1)

Parameter		Symbol	Max Value	Unit
Input Voltage		V_{IN}	12	V
Output Current		I_{OUT}	500	mA
Output Voltage		V_{OUT}	V_{SS} -0.3 to V_{IN}+0.3	V
Maximum Junction Temperature		T_J	125	°C
Storage Temperature Range		T_{STG}	-60 to +150	°C
Lead Temperature(Soldering) 5 Sec.		T_{LEAD}	260	°C
Power Dissipation P_D @ T_A=25°C (Note 2)	SOT-23	P_D	400	mW
	SOT-89		640	
	TO-92		625	
Thermal Resistance Junction to Ambient	SOT-23 (Note 2)	θ_{JA}	250	°C/W
	SOT-89		156	
	TO-92		160	
Thermal Resistance Junction to Case	SOT-23	θ_{JC}	106.6	°C/W
	SOT-89		100	

RECOMMENDED OPERATING CONDITIONS (Note 3)

Parameter	Symbol	Operation Conditions	Unit
Supply Input Voltage	V_{IN}	2.5 to 10	V
Operating Junction Temperature Range	T_J	-30 to +125	°C
Operating Ambient Temperature Range	T_{OPA}	-30 to +85	°C

Note 1: Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2: θ_{JA} is measured in the natural convection at T_A = 25°C on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

Note 3: The device is not guaranteed to function outside its operating conditions.

ELECTRICAL CHARACTERISTICS

T_A= 25°C, V_{IN} = V_{OUT} +1V, unless otherwise noted.

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Circuit
Output Voltage	AT5250/AT5250E	V_{OUT}	I_{OUT} = 40mA, V_{IN} = V_{OUT} + 1V (Note 4)	-2.0	—	+2.0	%	1
	AT5250A			-1.0	—	+1.0	%	
Line Regulation		$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT} = 40mA, V_{OUT} + 1V ≤ V_{IN} ≤ 10V (Note 5)	—	0.2	0.3	%/V	
Load Regulation		$\frac{\Delta V_{OUT}}{\Delta I_{OUT} \times V_{OUT}}$	V_{IN} = V_{OUT} + 1V, 1mA ≤ I_{OUT} ≤ 80mA (Note 5)	—	0.02	0.03	%/mA	
Supply Current		I_{SS}	V_{IN} = V_{OUT} + 1V	—	1.0	2.9	μA	2
Dropout Voltage V_{OUT}>2.5V		V_D	I_{OUT} = 160mA (Note 5,6)	—	400	700	mV	1
for 2.0V < V_{OUT} ≤ 2.5V				—	550	850		
for V_{OUT} ≤ 2.0V				—	900	1300		

Note 4: Output Voltage from 1.5V to 5.0V in 0.1V increments are available.

Note 5: Load and Line Regulation are measured at constant junction temperature by low duty cycle pulse testing.

Note 6: The dropout voltage for AT5250/AT5250A is tested by minimum power voltage. The specifications represent the minimum input/ output voltage required to maintain 2% regulation.

TEST CIRCUIT

Circuit 1

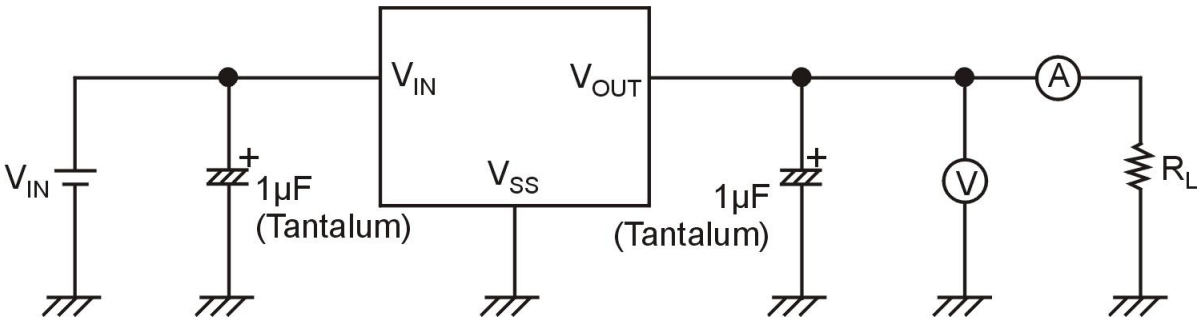


Figure 3.

Circuit 2

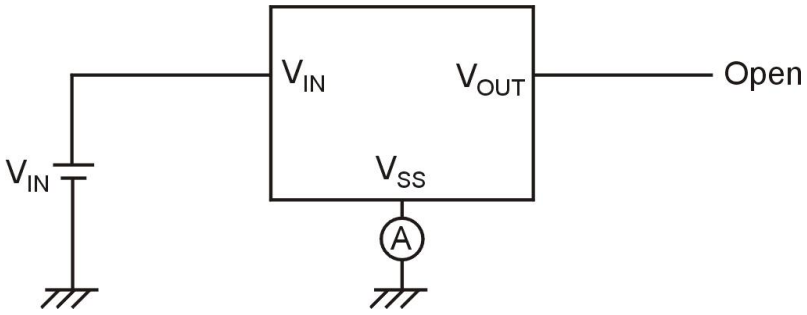
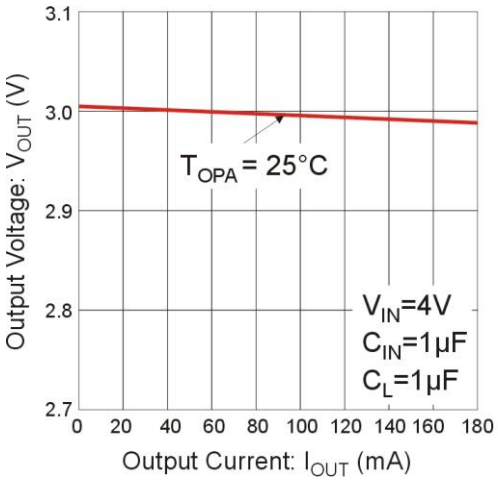


Figure 4.

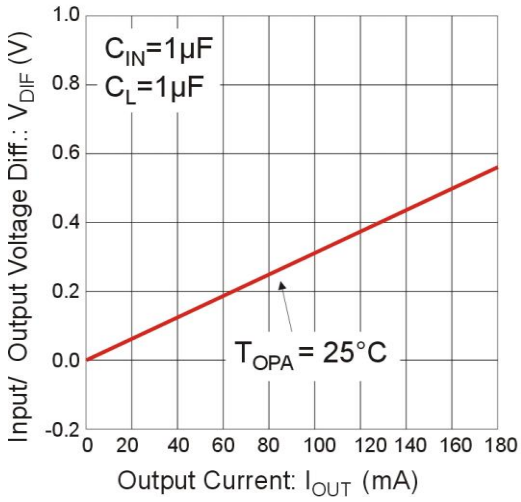
TYPICAL CHARACTERISTICS

FOR AT5250/AT5250E/AT5250A-3.0

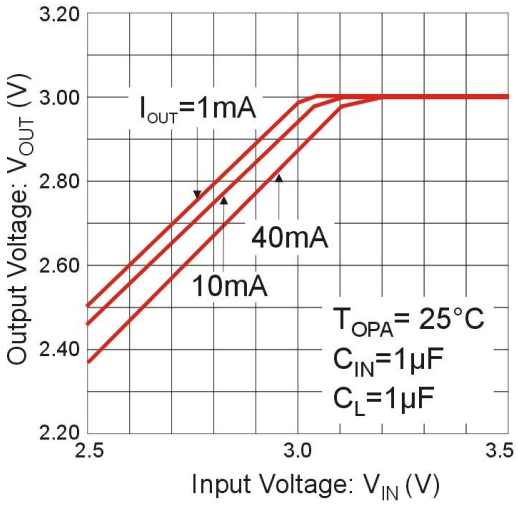
(1) Output Voltage vs. Output Current



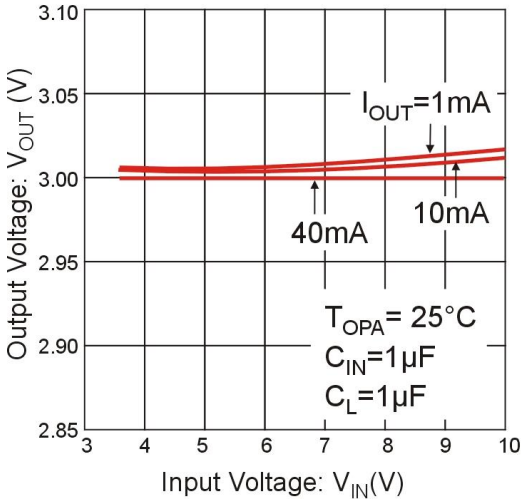
(2) Input/ Output Voltage differential vs. Output Current



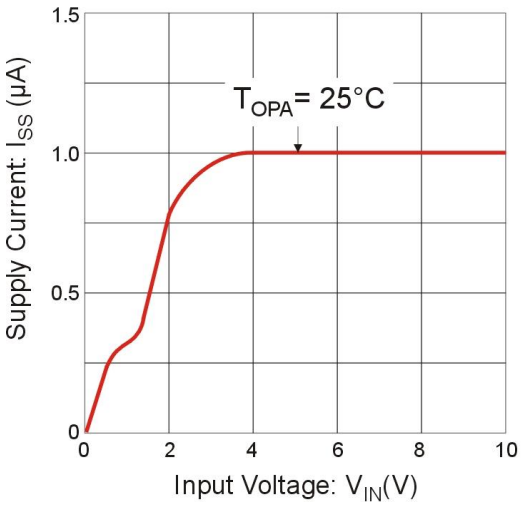
(3) Output Voltage vs. Input voltage



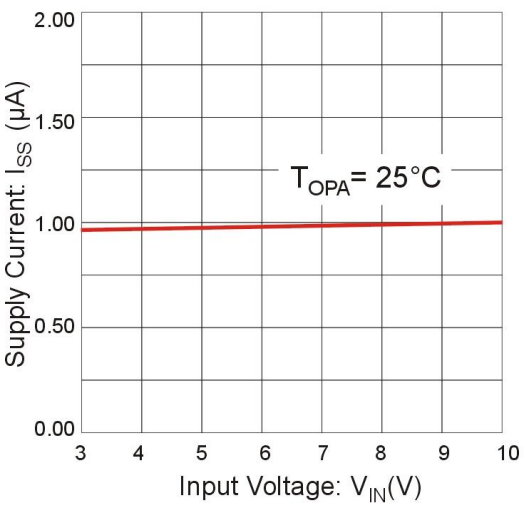
(4) Output Voltage vs. Input voltage



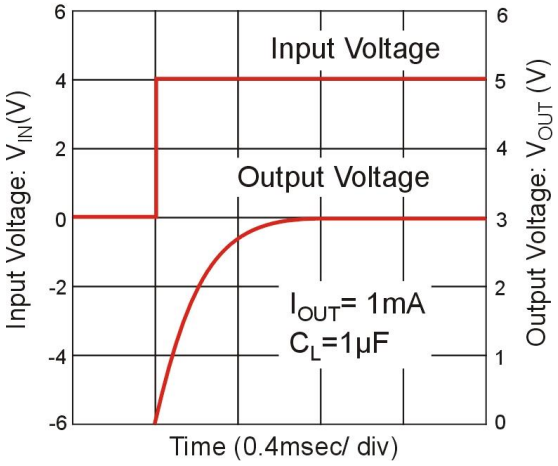
(5) Supply Current vs. Input Voltage



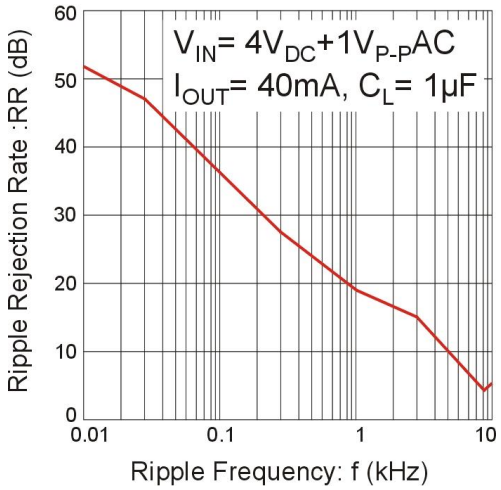
(6) Supply Current vs. Input Voltage



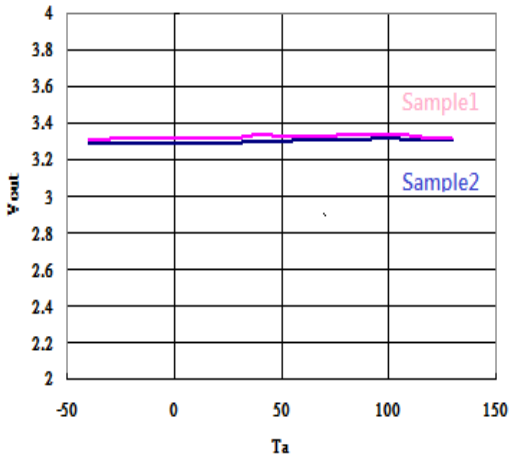
(7) Input Transient Response



(8) Ripple Rejection Rate



(9) Out put Voltage VS Ambient Temperature



DIRECTIONS FOR USAGE

Notes on Usage

1. Please use this IC within the stipulated absolute maximum ratings as the IC is liable to malfunction outside of such parameters.

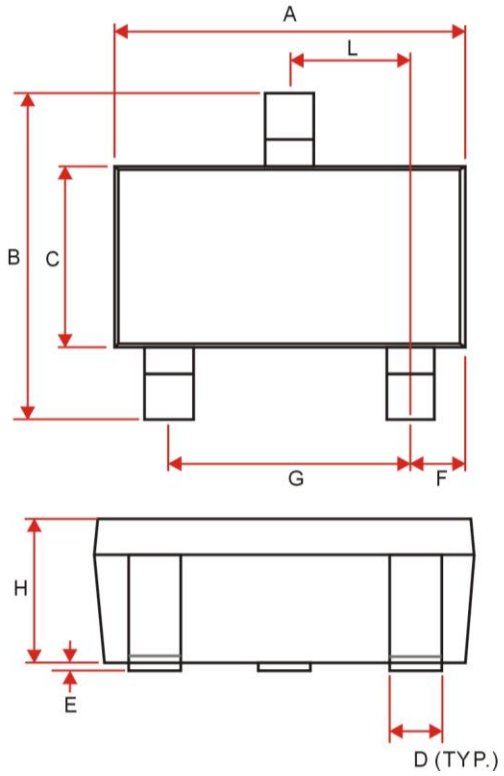
2. There is a possibility that, oscillation may occur as a result of the impedance present between the power supply and the IC's input. Where impedance is 10Ω or more, please use a capacitor (C_{IN}) of at least 1μF.

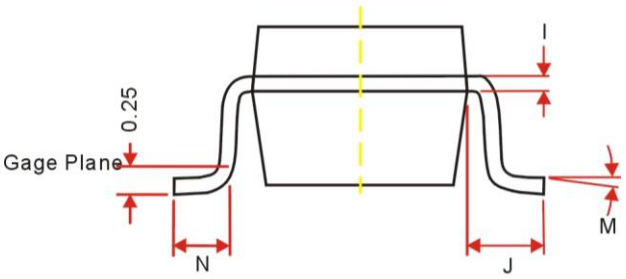
   With a large output current, operations can be stabilized by increasing capacitor size (C_{IN}). If C_{IN} is small and capacitor size (C_L) is increased, there is a possibility of oscillation due to input impedance.

   In such cases, operations can be stabilized by either increasing the size of C_{IN} or decreasing the size of C_L.

3. Please ensure that output current (I_{OUT}) is less than Pd/(V_{IN}-V_{OUT}) and does not exceed the stipulated continuous Total Power Dissipation value (Pd) for the package.

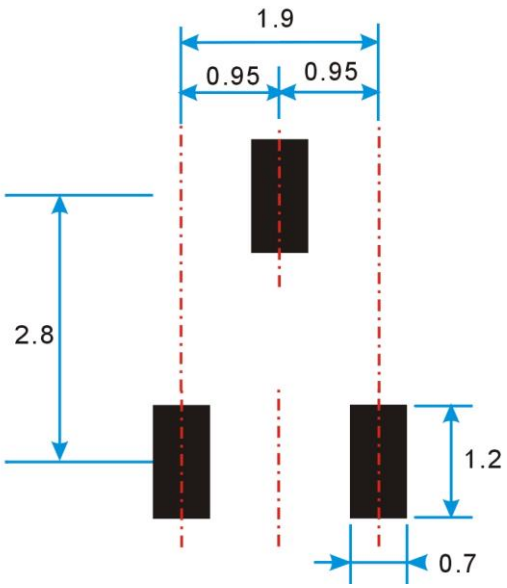
PACKAGE OUTLINE DIMENSIONS
SOT-23



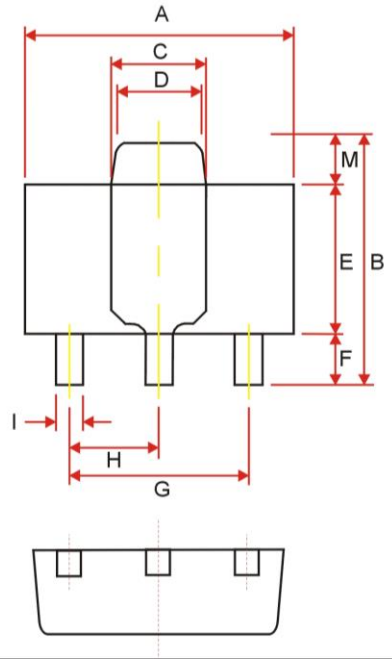


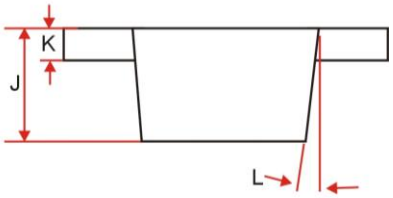
Symbol	Dimensions In Millimeters	
	Min.	Max.
A	2.70	3.10
B	2.10	2.95
C	1.20	1.70
D	0.30	0.50
E	0	0.15
F	0.45	0.55
N	0.30	0.60
G	2.10 REF.	
H	0.70	1.30
I	0.10	0.20
J	0.54 REF.	
L	0.95 REF.	
M	0°	10°

SOT-23 PACKAGE FOOTPRINT (mm)



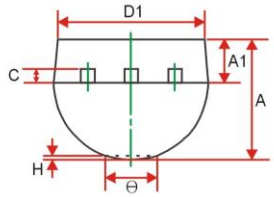
PACKAGE OUTLINE DIMENSIONS
SOT-89

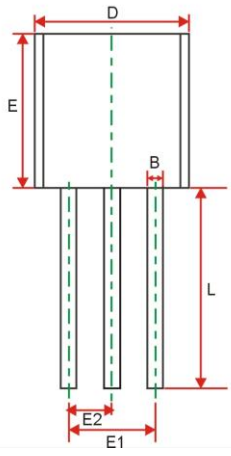




REF.	Dimensions In Millimeters	
	Min.	Max.
A	4.40	4.60
B	3.94	4.25
C	1.50	1.70
D	1.30	1.50
E	2.29	2.60
F	0.89	1.20
G	3.00 REF.	
H	1.50 REF.	
I	0.40	0.56
J	1.40	1.60
K	0.35	0.44
L	5°TYP.	
M	0.70 REF.	

TO-92





REF.	Dimensions In Millimeters	
	Min.	Max.
A	3.30	3.70
A1	1.10	1.40
B	0.38	0.55
C	0.36	0.51
D	4.40	4.70
D1	3.43	-
E	4.30	4.70
E1	2.44	2.64
E2	1.27 REF.	
L	14.1	14.5
θ	-	1.60
H	0.00	0.38

Note :

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