

## 30V 100mA Linear Regulator

### General Description

The EHP878L three terminal positive regulator is available with 3.3V or 5V fixed output voltage, making it useful in a wide range of applications. Used as a Zener-diode and resistor combination replacement, the EHP878L usually provides an effective output impedance improvement of two orders of magnitude and lower quiescent current. These regulators can provide local, on-card regulation, eliminating distribution problems associated with single-point regulation. The available voltages allow the EHP878L to be used in logic systems, instrumentation and other solid-state electronic equipment.

The EHP878L is available in TO-92 package, SOT-23-3 package, SOT-89-3 package, and SOP-8 package. With adequate heat sinking, the regulator can deliver 100mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors is provided to limit internal power dissipation. If internal power dissipation is too high for the heat sinking provided, the thermal shutdown circuit prevents the IC from overheating.

### Applications

- Portable, Battery Powered Equipment
- Low Power Microcontrollers
- LED Lighting
- Low Wattage Power Supplies

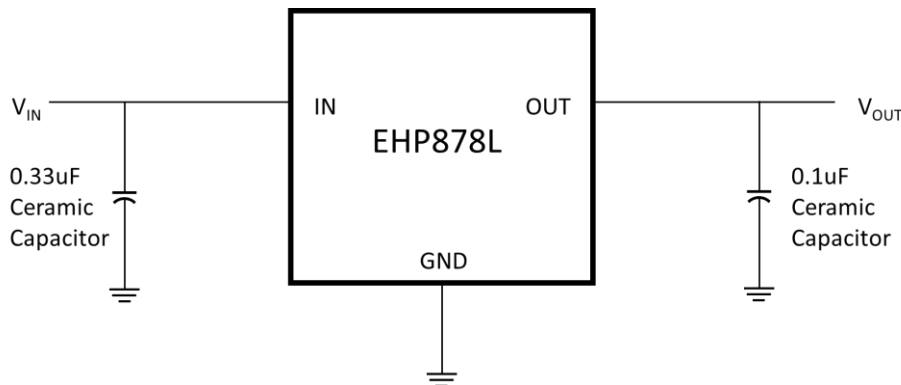
### Features

- Output voltage tolerances of  $\pm 5\%$  over the temperature range
- 100 mA output current driving capacity
- Output transistor safe area protection
- Internal thermal shutdown protection
- Internal short-circuit current limit
- Available in TO-92, SOT-23-3, SOT-89-3 and SOP-8 packages

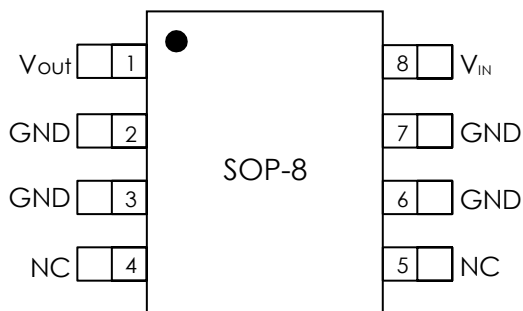
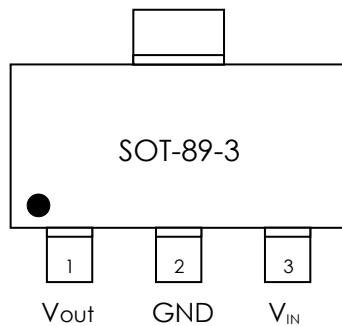
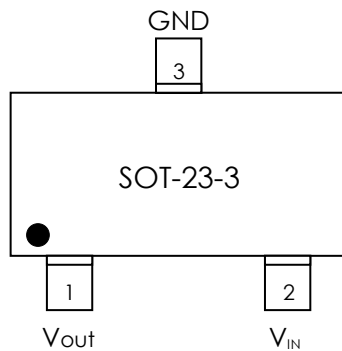
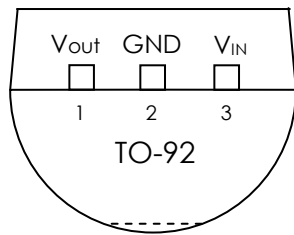
### Ordering Information

Part Number	Remark
EHP878L-XXTN03NRR	$\pm 5\%$ output voltage tolerance
EHP878L-XXVD03NRR	$\pm 5\%$ output voltage tolerance
EHP878L-XXVL03NRR	$\pm 5\%$ output voltage tolerance
EHP878L-XXSO08NRR	$\pm 5\%$ output voltage tolerance

### Typical Application



## Connection Diagrams



## Order information

EHP878L-XXTN03NRR

XX Output voltage

TN03 TO-92 Package

NRR RoHS & Halogen free package  
Rating: -40 to 85°C  
Package in Tape

EHP878L-XXVD03NRR

XX Output voltage

VD03 SOT-23-3 Package

NRR RoHS & Halogen free package  
Rating: -40 to 85°C  
Package in Tape & Reel

EHP878L-XXVL03NRR

XX Output voltage

VN03 SOT-89-3 Package

NRR RoHS & Halogen free package  
Rating: -40 to 85°C  
Package in Tape & Reel

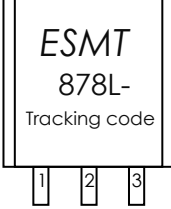
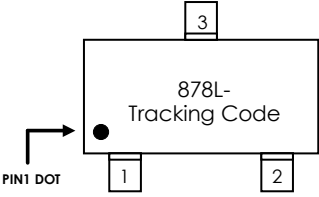
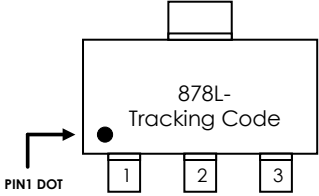
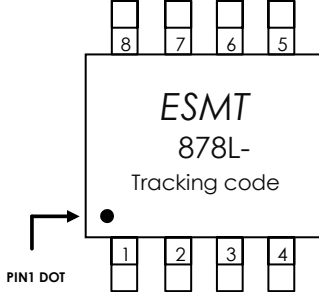
EHP878L-XXSO08NRR

XX Output voltage

08 SOP-8 Package

NRR RoHS & Halogen free package  
Rating: -40 to 85°C  
Package in Tape & Reel

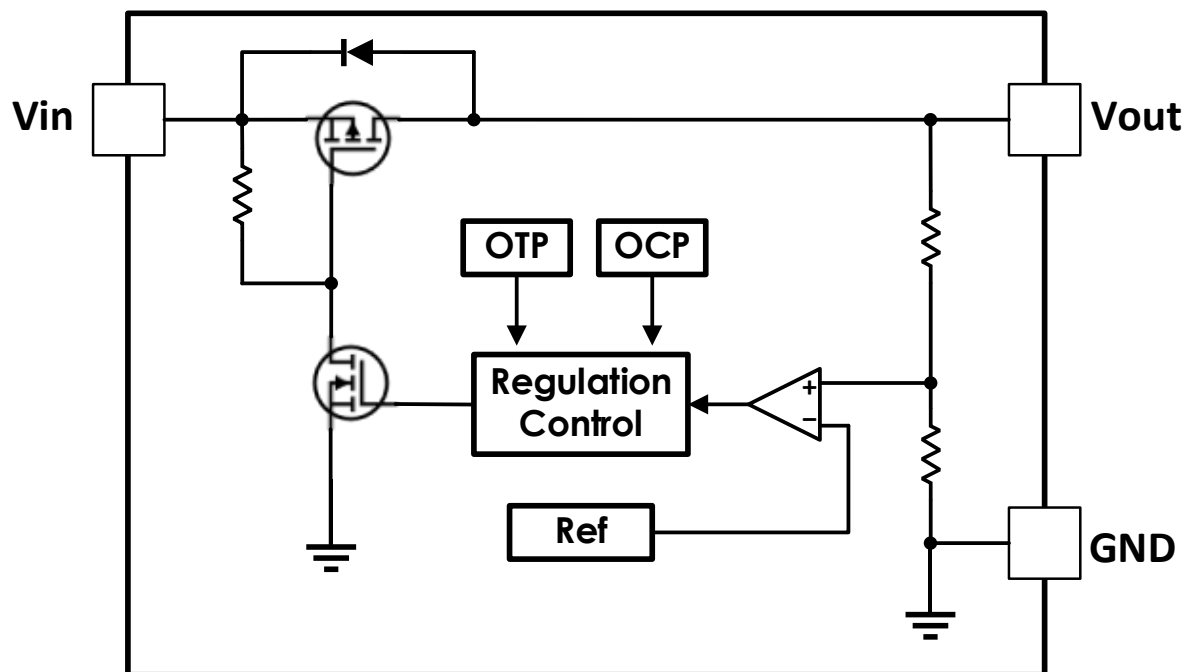
## Order, Marking & Packing Information

Package	Vout	Product ID.	Marking	Packing
TO-92	3.3V	EHP878L-33TN03NRR		Tape Box 2Kpcs
	5.0V	EHP878L-50TN03NRR		
SOT-23-3	3.3V	EHP878L-33VD03NRR		Tape & Reel 3Kpcs
	5.0V	EHP878L-50VD03NRR		
SOT-89-3	3.3V	EHP878L-33VL03NRR		Tape & Reel 1Kpcs
	5.0V	EHP878L-50VL03NRR		
SOP-8	3.3V	EHP878L-33SO08NRR		Tape & Reel 3Kpcs
	5.0V	EHP878L-50SO08NRR		

## Pin Functions

Name	TO-92	SOT-23-3	SOT-89-3	SOP-8	Function
V <sub>IN</sub>	3	2	3	8	<b>Supply Voltage Input</b> Require a minimum input capacitor of close to 0.33μF to ensure stability and sufficient decoupling from the ground pin.
GND	2	3	2,4	2,3,6,7	<b>Ground Pin</b>
NC	N/A	N/A	N/A	4,5	<b>No connection</b>
V <sub>OUT</sub>	1	1	1	1	<b>Output Voltage</b>

## Function Block Diagram



## Absolute Maximum Ratings (Notes 1, 2)

$V_{IN}$	-0.3V to 35V	Lead Temperature (Soldering, 10 sec.)	260 °C
Storage Temperature Range	-65°C to 150°C	ESD Rating	
Junction Temperature	150°C	Human Body Model	2KV

## Operating Ratings (Note 1, 2)

Supply Voltage	7V to 30V
Junction Temperature Range	-40°C to 125°C

## Thermal Resistance:

Symbol	$\theta_{JA}$ (Note 3)	$\theta_{JC}$ (Note 4)
TO-92	159(°C/W)	76(°C/W)
SOT-23-3	250(°C/W)	81(°C/W)
SOT-89-3	152(°C/W)	81(°C/W)
SOP-8	90(°C/W)	52(°C/W)

## Electrical Characteristics

$V_{IN}=10V$ ,  $I_{OUT}=40mA$ ,  $C_{IN}=0.33\mu F$ ,  $C_{OUT}=0.1\mu F$ ,  $T_J=25^\circ C$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_{OUT}$	EHP878L-33 Output Voltage	$T_J = 25^\circ C$	3.168	3.3	3.432	V
		$V_{IN} = 7V$ to $20V$ , $I_{OUT} = 1mA$ to $40mA$ $T_J = 0^\circ C$ to $125^\circ C$ (Note 5)	3.135		3.465	
		$I_{OUT} = 1mA$ to $70mA$ $T_J = 0^\circ C$ to $125^\circ C$ (Note 5)	3.135		3.465	
$V_{OUT}$	EHP878L-50 Output Voltage	$T_J = 25^\circ C$	4.8	5	5.2	V
		$V_{IN} = 8V$ to $20V$ , $I_{OUT} = 1mA$ to $40mA$ $T_J = 0^\circ C$ to $125^\circ C$ (Note 5)	4.75		5.25	
		$I_{OUT} = 1mA$ to $70mA$ $T_J = 0^\circ C$ to $125^\circ C$ (Note 5)	4.75		5.25	
$\Delta V_{LINE}$	Line Regulation	$V_{IN} = 8V$ to $20V$ ,		15	30	mV
$\Delta V_{LOAD}$	Load Regulation	$I_{OUT} = 1mA$ to $100mA$		20	60	mV
		$I_{OUT} = 1mA$ to $40mA$		10	30	
$I_Q$	Quiescent Current	$T_J = 25^\circ C$		0.3		mA
		$T_J = 125^\circ C$			1	
$\Delta I_Q$	Quiescent Current Change	$V_{IN} = 8$ to $20V$ , $T_J = 0^\circ C$ to $125^\circ C$			0.2	mA
		$I_{OUT} = 1mA$ to $40mA$ $T_J = 0^\circ C$ to $125^\circ C$			0.1	
PSRR	Ripple Rejection	$f = 120Hz$ , $V_{IN} = 8V$ to $20V$ , $T_J = 25^\circ C$		60		dB
$V_{DROP}$	Dropout Voltage			0.8		V
$\Delta V_{OUT}/\Delta T$	$V_{OUT}$ Temp. Coefficient	$I_{OUT} = 5mA$		0.5		mV/ $^\circ C$
$I_{PK}$	Peak Output Current			170		mA
$T_{SD}$	Thermal Shutdown			165		$^\circ C$
$T_{HY}$	Thermal Shutdown Hysteresis			25		$^\circ C$

**Note 1:** Absolute Maximum ratings indicate limits beyond which damage may occur. Electrical specifications do not apply when operating the device outside of its rated operating conditions.

**Note 2:** All voltages are with respect to the potential at the ground pin.

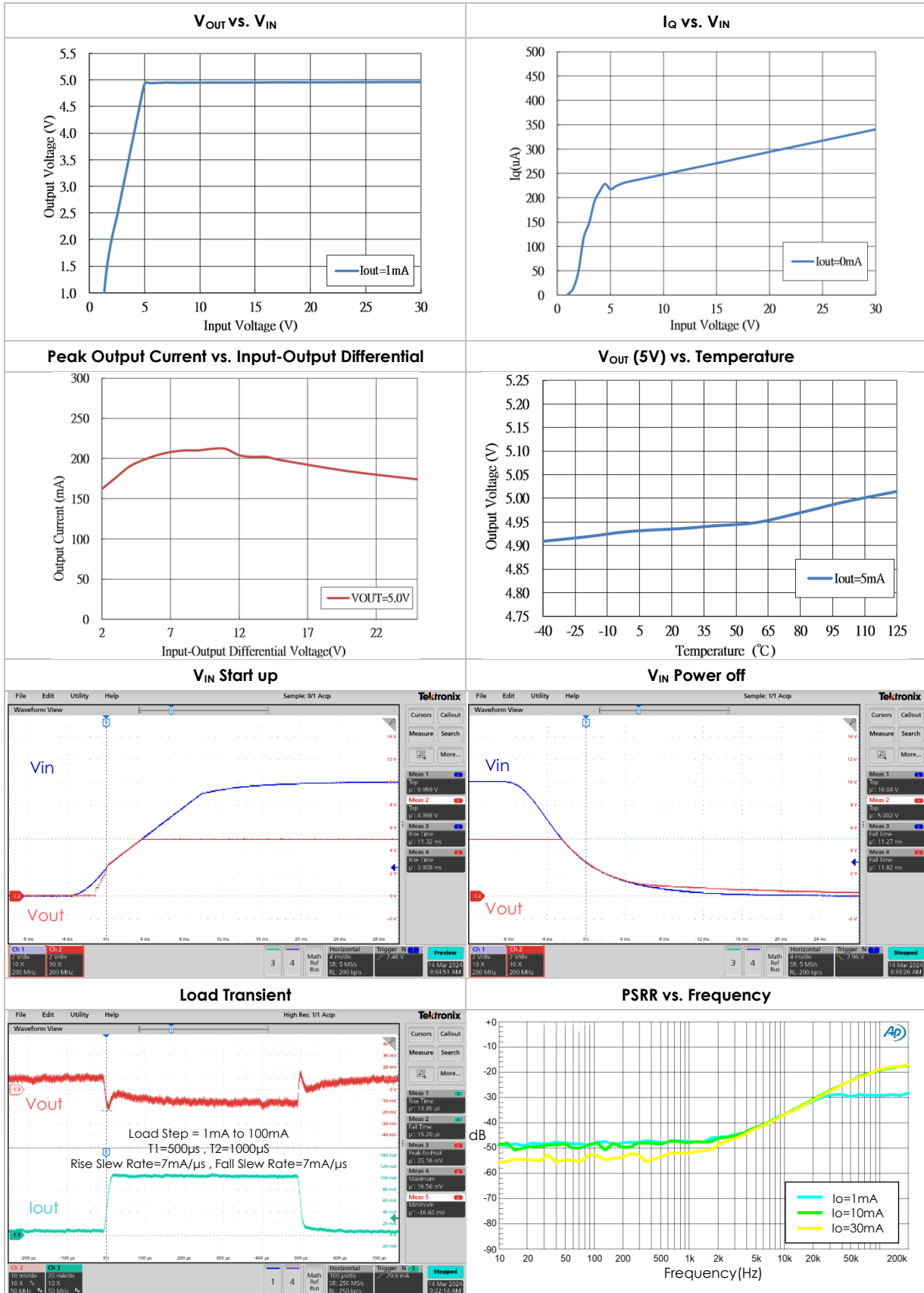
**Note 3:**  $\theta_{JA}$  is measured in the natural convection at  $T_J=25^\circ C$  on a high effective thermal conductivity test board (2 layers, 2SOP).

**Note 4:**  $\theta_{JC}$  represents the resistance to the heat flows the chip to package top case.

**Note 5:** Power dissipation < 0.5W

## Typical Performance Characteristics

$V_{IN}=10V$ ,  $I_{OUT}=40mA$ ,  $C_{IN}=0.33\mu F$ ,  $C_{OUT}=0.1\mu F$ ,  $T_J=25^\circ C$ , Unless otherwise specified.



## Application Information

### Input Capacitor

Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators. A 0.33 $\mu$ F capacitor on the input is suitable for most applications.

### Output Capacitor

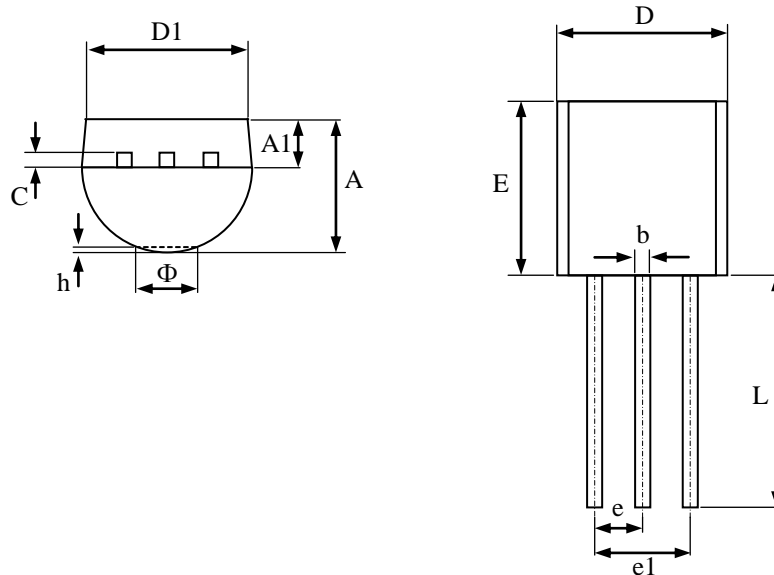
A minimum load capacitance of 0.1 $\mu$ F to limit high-frequency noise.

### Shutdown

The device automatically shuts down if its internal temperature becomes too high

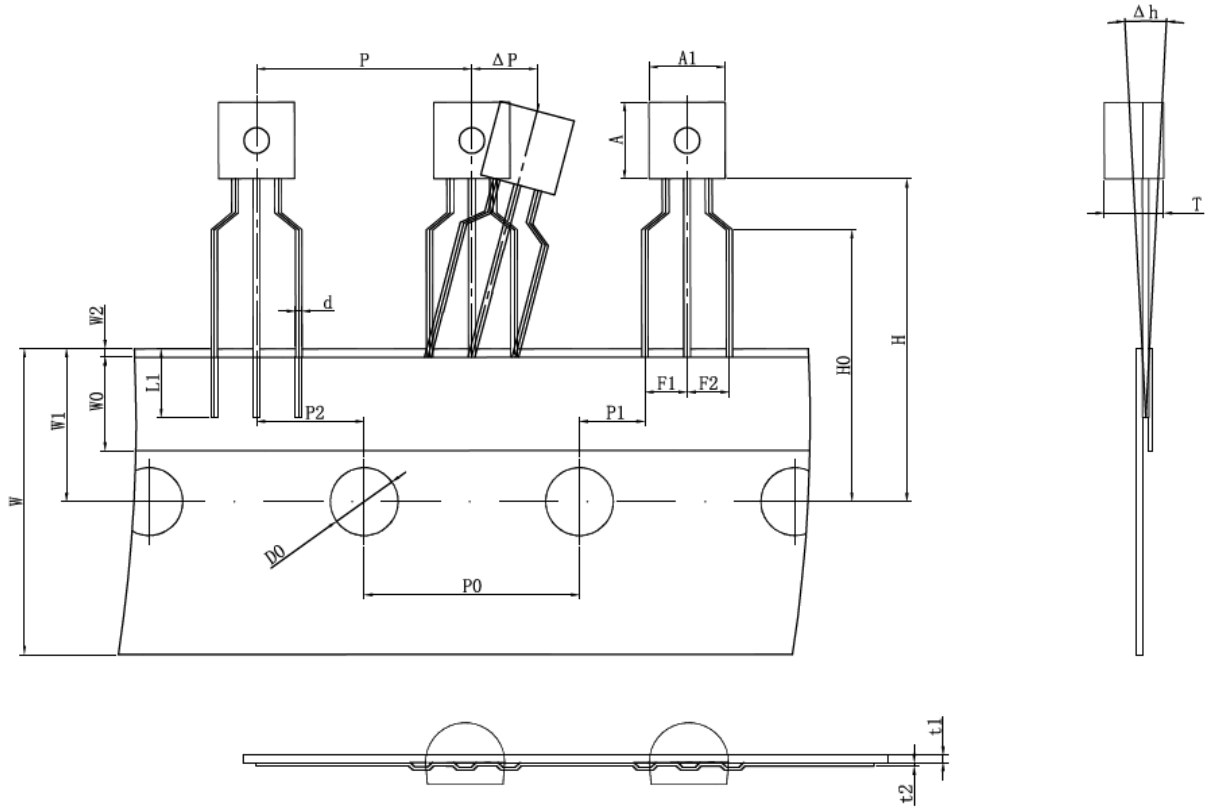


## Package Outline Drawing TO-92 (Bulk pack)



Symbol	Dimension in mm	
	Min.	Max.
A	3.30	3.70
A1	1.10	1.40
b	0.36	0.56
c	0.28	0.51
D	4.30	4.70
D1	3.43	4.30
E	4.30	4.70
e	1.27 TYP.	
e1	2.44	2.64
L	14.10	14.50
Φ		1.60
h	0.00	0.38

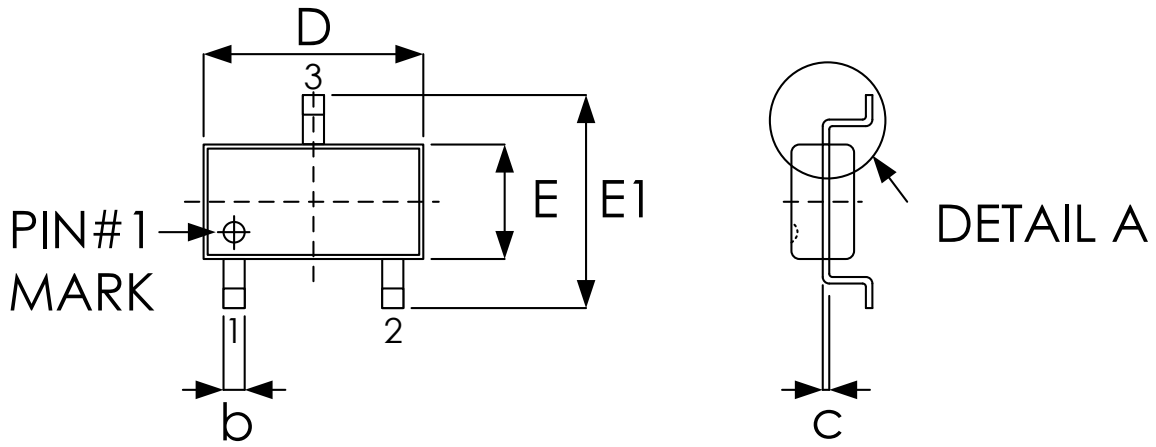
## Package Outline Drawing TO-92 (Ammono pack)



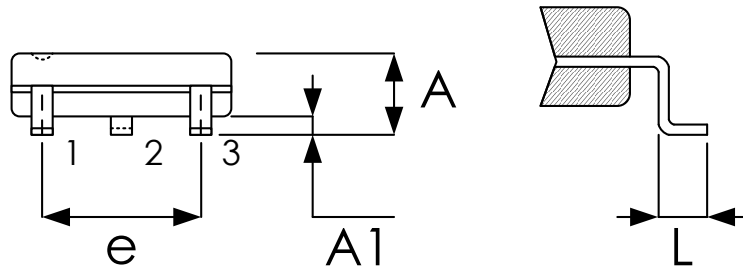
Item	Symbol	Value & Tolerance
Body width	A1	4.5 ± 0.2
Body height	A	4.5 ± 0.2
Body thickness	T	3.5 ± 0.1
Lead wire diameter	d	0.46 +0.09,-0.08
Pitch of component	P	12.7 ± 0.3
Feed hole pitch	P0	12.7 ± 0.2
Hole center to component center	P2	6.35 ± 0.3
Lead to lead distance	F1,F2	2.5 ± 0.3
Component alignment, F-R	Δh	0 ± 1.0
Type width	W	18.0 + 1.0, - 0.5
Hole down tape width	W0	6.0 ± 0.5
Hole position	W1	9.0 ± 0.5
Hole down tape position	W2	1.0 MAX.
Height of component from tape center	H	19.0 +2.0,-1.0
Lead wire clinch height	H0	16.0 ± 0.5
Lead wire(tape portion)	L1	2.5 MIN.
Feed hole diameter	D0	4.0 ± 0.2
Taped Lead Thickness	t1	0.4 ± 0.05
Carrier Tape Thickness	t2	0.2 ± 0.05
Position of hole	P1	3.85 ± 0.3
Component alignment	ΔP	0 ± 1.0

Unit: mm

Package Outline Drawing  
SOT-23-3



**TOP VIEW**

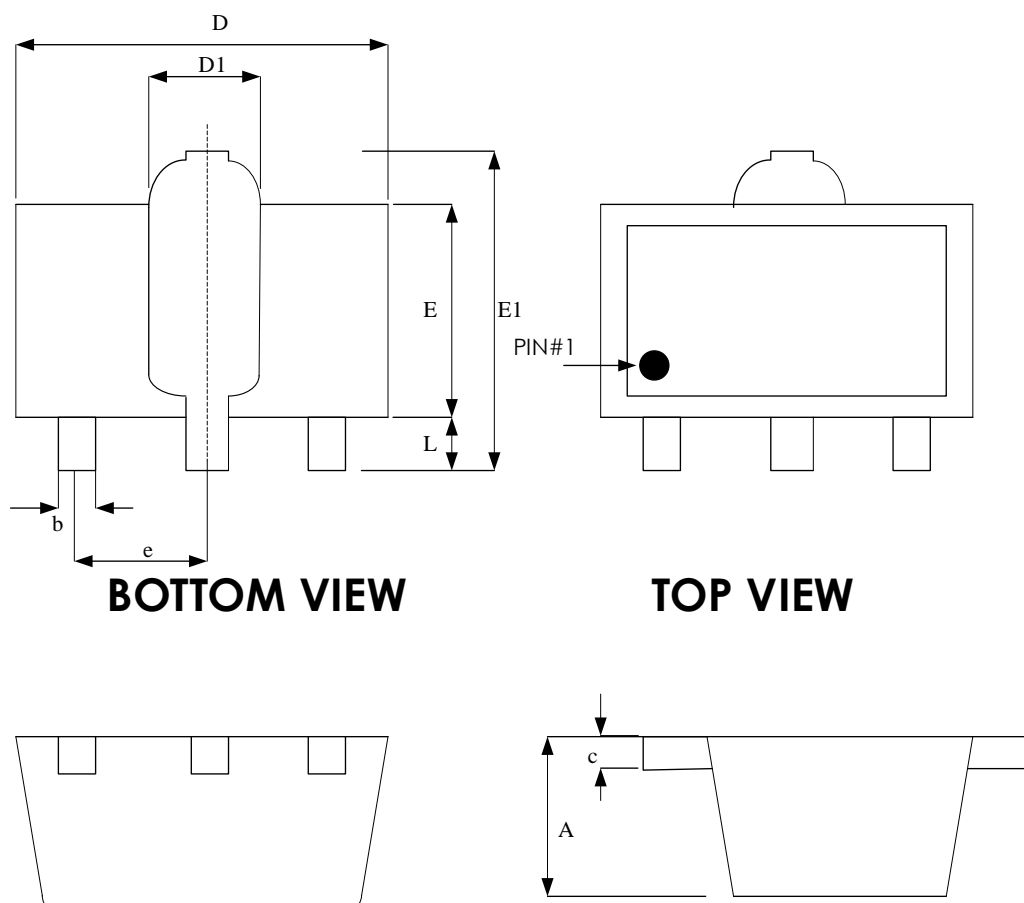


**SIDE VIEW**

**DETAIL A**

Symbol	Dimension in mm	
	Min.	Max.
A	0.90	1.45
A1	0.00	0.15
b	0.30	0.50
c	0.08	0.25
D	2.7	3.10
E	1.04	1.80
E1	2.60	3.00
E	1.50 BSC	
L	0.30	0.60

## Package Outline Drawing SOT-89-3



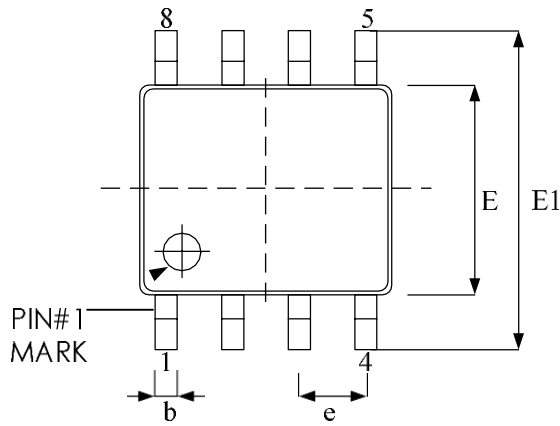
**BOTTOM VIEW**

**TOP VIEW**

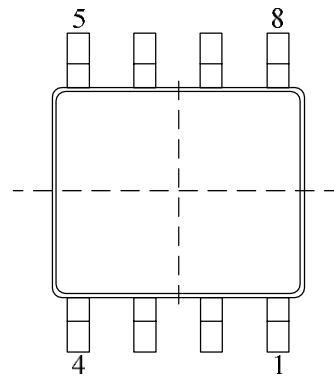
**SIDE VIEW**

Symbol	Dimension in mm	
	Min.	Max.
A	1.40	1.60
b	0.40	0.56
c	0.35	0.41
D	4.40	4.60
D1	1.50	1.83
E	2.29	2.60
E1	3.94	4.25
e	1.50 BSC	
L	0.89	1.20

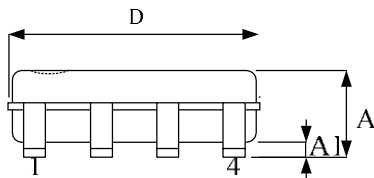
## Package Outline Drawing SOP-8 (150mil)



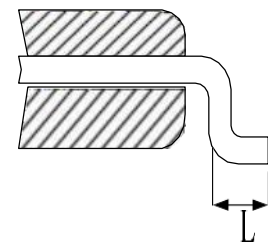
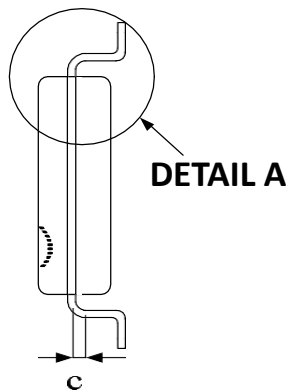
**TOP VIEW**



**BOTTOM VIEW**



**SIDE VIEW**



**DETAIL A**

Symbol	Dimension in mm	
	Min.	Max.
A	-	1.70
A1	0.00	0.15
b	0.31	0.51
c	0.10	0.25
D	4.80	5.00
E	3.81	4.00
E1	5.79	6.20
e	1.27 BSC	
L	0.40	1.27

**Revision History**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
1.0	2024.04.12	Original

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