

### Features

- Output voltage ranges: Fixed range of 1.5V, 1.8V, 2.5V, 3.3V, 5.0V or adjustable type.
- High accuracy:  $\pm 2\%$
- Low voltage drop: 1.1V (typ.),  $V_{OUT}=5.0V$  at 0.5A
- Guaranteed output current: 0.5A
- Low quiescent current: 8mA (typ.)
- Integrated current limit & thermal protection circuits
- SOT-89, TO-92 packages

### Applications

- Active SCSI terminations
- Post regulator for switching power supplies
- Low voltage microcontrollers
- Motherboard clock supplies
- Battery chargers

### General Description

The HT1087 devices are a series of three-terminal high current low voltage regulators. They can deliver an output current of 0.5A and can accept input voltages up to 12V. The devices are available in both adjustable and

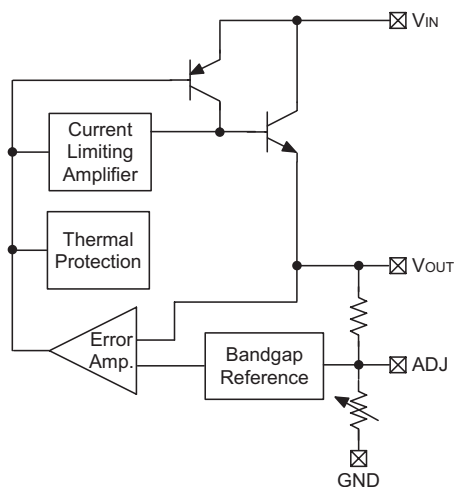
fixed output voltage type with a range of 1.5V to 5.0V. Internal current limit and thermal protection circuits provide protection against overload conditions that could create excessive junction temperatures.

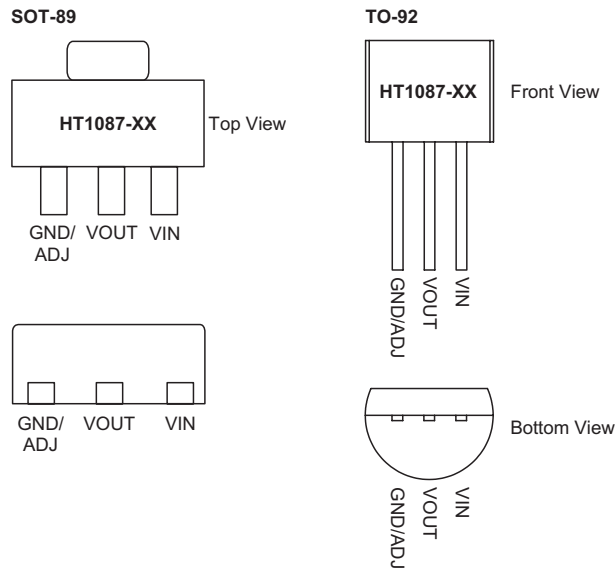
### Selection Table

Part No.	Output Voltage	Package	Marking
HT1087-ADJ	Adjust	SOT-89 TO-92	HT1087-ADJ HT1087-15 HT1087-18 HT1087-25 HT1087-33 HT1087-50
HT1087-15	1.5V		
HT1087-18	1.8V		
HT1087-25	2.5V		
HT1087-33	3.3V		
HT1087-50	5.0V		

Note: For lead free devices, a "#" mark is suffixed at the end of the date code.

### Block Diagram



**Pin Assignment**

**Absolute Maximum Ratings\***

Input Supply Voltage ..... $V_{SS}-0.3V$  to  $V_{SS}+13V$       Storage Temperature ..... $-50^{\circ}C$  to  $125^{\circ}C$

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

\*\*\* Absolute maximum ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. The guaranteed specifications apply only for the test conditions listed.

**Recommended Operating Conditions**

Input Supply Voltage ..... $V_{SS}-0.3V$  to  $V_{SS}+12V$       Ambient Temperature ..... $-40^{\circ}C$  to  $85^{\circ}C$

**Thermal Information**

Symbol	Parameter	Package	Max.	Unit
$\theta_{JA}$	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT-89	200	$^{\circ}C/W$
		TO-92	200	$^{\circ}C/W$
$P_D$	Power Dissipation	SOT-89	0.5	W
		TO-92	0.5	W

Note:  $P_D$  is measured at  $T_a = 25^{\circ}C$

**Electrical Characteristics**
 $T_J=25^{\circ}\text{C}$ ,  $V_{IN}=V_{OUT}+1.5\text{V}$ ,  $I_O=10\text{mA}$ , unless otherwise specified (see note 1)

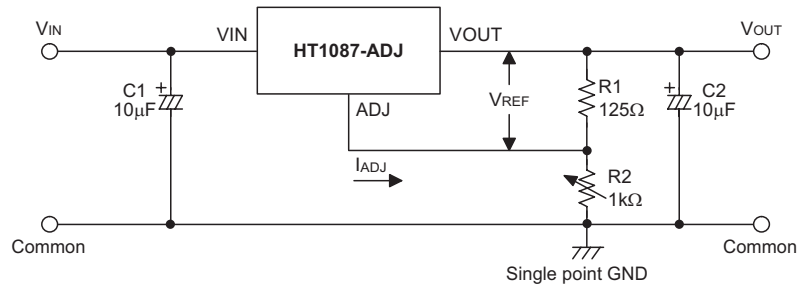
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{REF}$	Reference Voltage	$2.75\text{V} \leq V_{IN} \leq 12\text{V}$	1.225	1.250	1.275	V
$V_{OUT}$	Output Voltage	HT1087-15	1.470	1.500	1.530	V
		HT1087-18	1.764	1.800	1.836	V
		HT1087-25	2.450	2.500	2.550	V
		HT1087-33	3.234	3.300	3.366	V
		HT1087-50	4.900	5.000	5.100	V
$\Delta V_{LOAD}$	Load Regulation (see note 2)	$I_{OUT}=0.5\text{A}$	1	—	20	mV
$\Delta V_{LINE}$	Line Regulation	$2.75\text{V} \leq V_{IN} \leq 12\text{V}$	—	0.015	0.15	%/V
$V_{DIF}$	Dropout Voltage (see note 3)	$\Delta V_{OUT}=2\%$ , $I_{OUT}=0.5\text{A}$	—	1.1	1.3	V
$I_{LIMIT}$	Current Limit (see note 4)	$\Delta V_{OUT}=10\%$	0.5	1.5	—	A
$I_{ADJ}$	Adjust Pin Current (Variable Version)	$2.75\text{V} \leq V_{IN} \leq 12\text{V}$	—	55	120	$\mu\text{A}$
$I_{SS}$	Quiescent Current (Fixed Version)	$2.75\text{V} \leq V_{IN} \leq 12\text{V}$	—	8	13	mA
RR	Ripple Rejection	120Hz input ripple $C_{OUT}=22\mu\text{F}$	—	60	—	dB
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	$-40^{\circ}\text{C} < T_a < 85^{\circ}\text{C}$	—	$\pm 0.4$	—	mV/ $^{\circ}\text{C}$

- Note:
- Specifications are production tested at room temperature,  $T_a$ . Specifications within the  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).
  - Load regulation is measured at a constant junction temperature, using pulse testing with a low ON time and is guaranteed up to the maximum power dissipation. Power dissipation is determined by the input/output differential voltage and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range. The maximum allowable power dissipation at any ambient temperature is  $P_D = (T_{J(MAX)} - T_a) / \theta_{JA}$ .
  - Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at  $V_{IN} = V_{OUT} + 1.5\text{V}$  with a fixed load.
  - Current limit is measured by pulsing for a short time.

**Application Circuits**

**Basic Circuits**

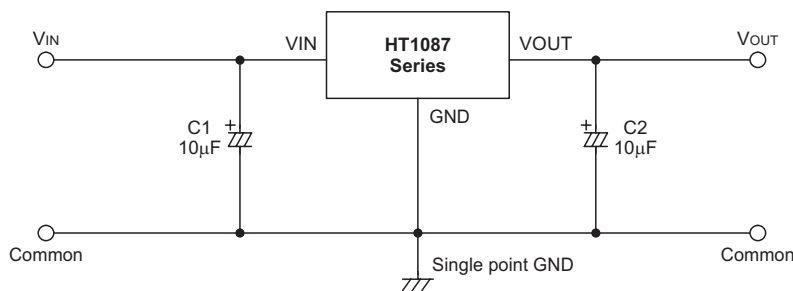
- Variable voltage type



$$V_{OUT} = V_{REF} \left( 1 + \frac{R2}{R1} \right) + I_{ADJ} R2$$

Note: C1 is required if the needed if the device is located far from filter capacitors, the recommended value is 10µF.  
 C2 is required for stability, the recommended value is 10µF.  
 R1 is required for regulation, the recommended value is 125Ω.

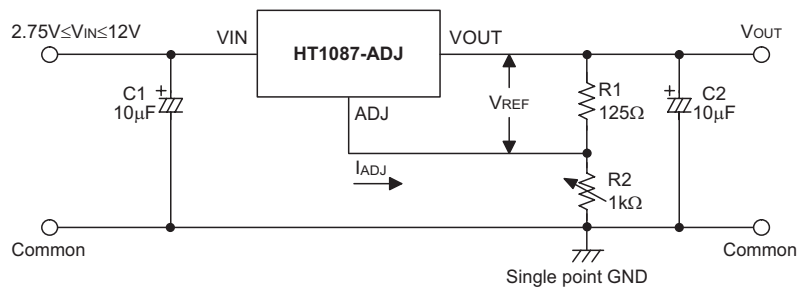
- Fixed voltage type



Note: C1 is required if the needed if the device is located far from filter capacitors, the recommended value is 10µF.  
 C2 is required for stability, the recommended value is 10µF.

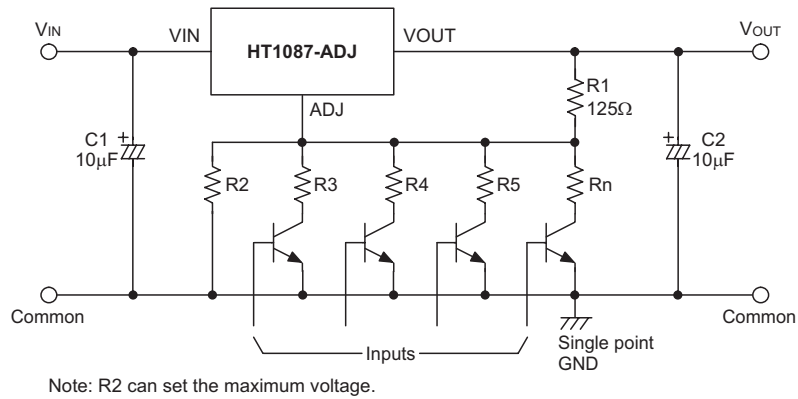
**Typical Application Circuits**

- 1.25~10.5V regulator

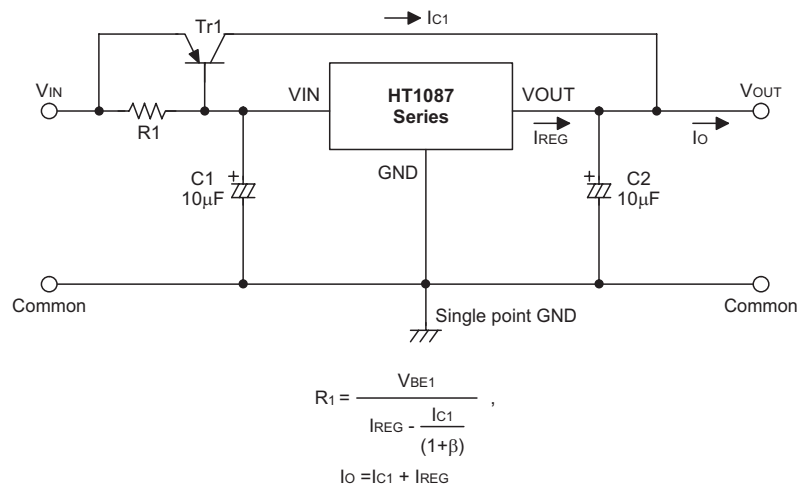


$$V_{OUT} = V_{REF} \left( 1 + \frac{R2}{R1} \right) + I_{ADJ} R2$$

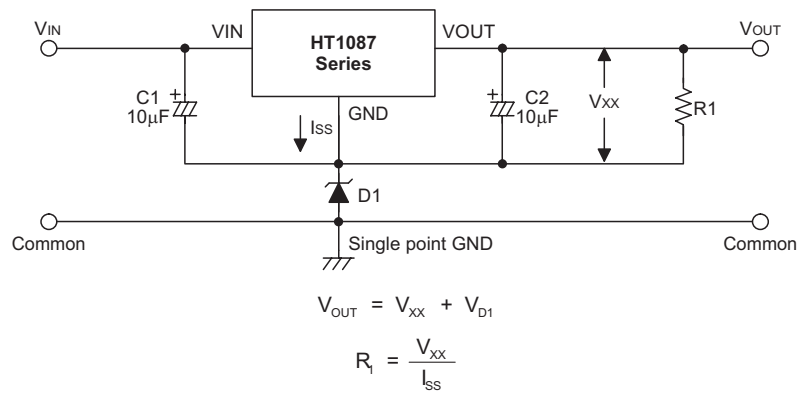
- Digitally selected outputs



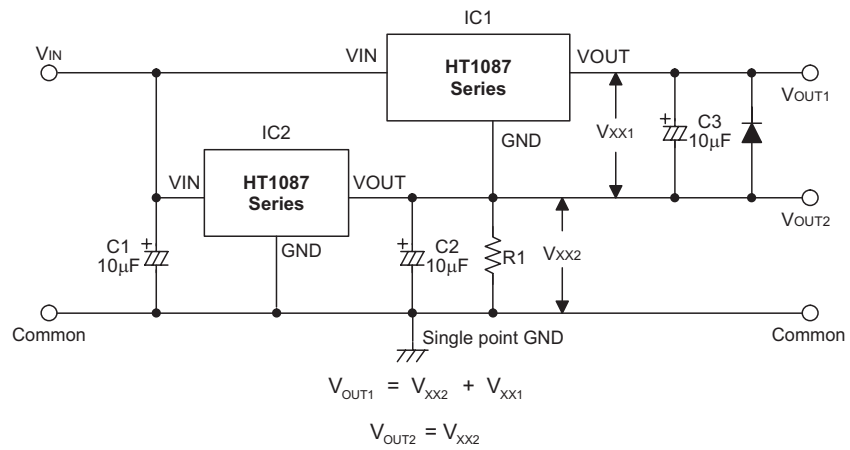
- High output current positive voltage regulator



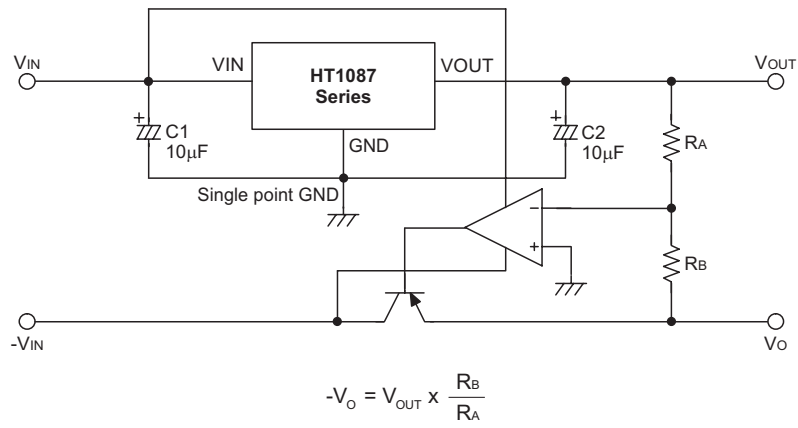
- Increased Output voltage Circuit



• Dual Supply Circuit

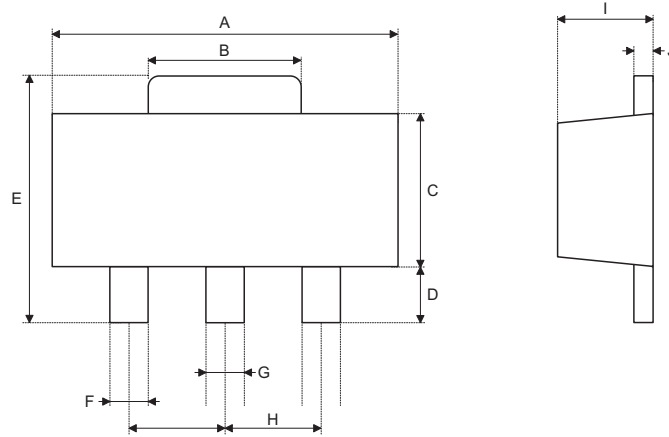


• Tracking Voltage Regulator



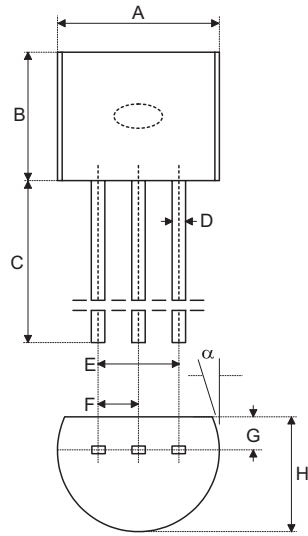
**Package Information**

**3-Pin SOT-89 Outline Dimensions**



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	173	—	181
B	64	—	72
C	90	—	102
D	35	—	47
E	155	—	167
F	14	—	19
G	17	—	22
H	—	59	—
I	55	—	63
J	14	—	17

**3-Pin TO-92 Outline Dimensions**

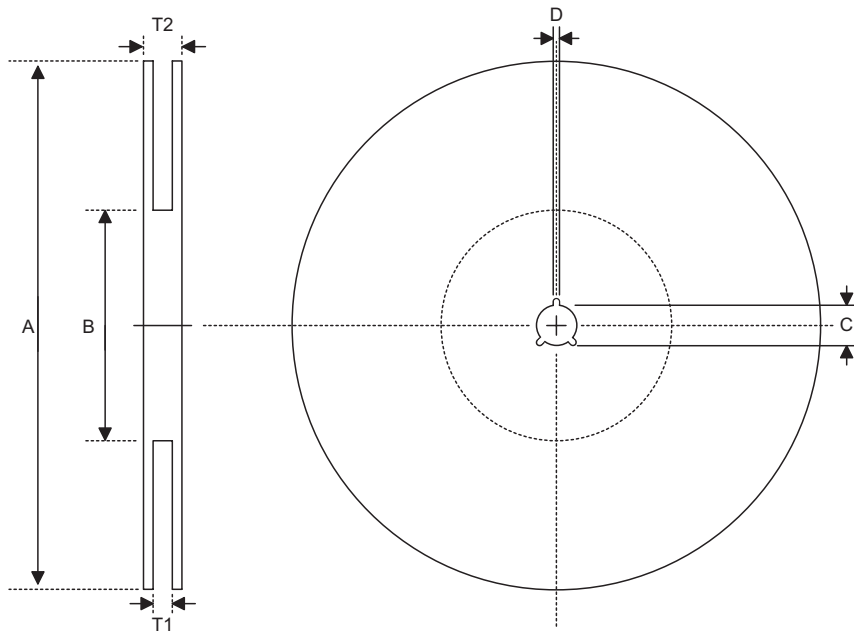


Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	170	—	200
B	170	—	200
C	500	—	—
D	11	—	20
E	90	—	110
F	45	—	55
G	45	—	65
H	130	—	160
I	8	—	18
$\alpha$	4°	—	6°



**Product Tape and Reel Specifications**

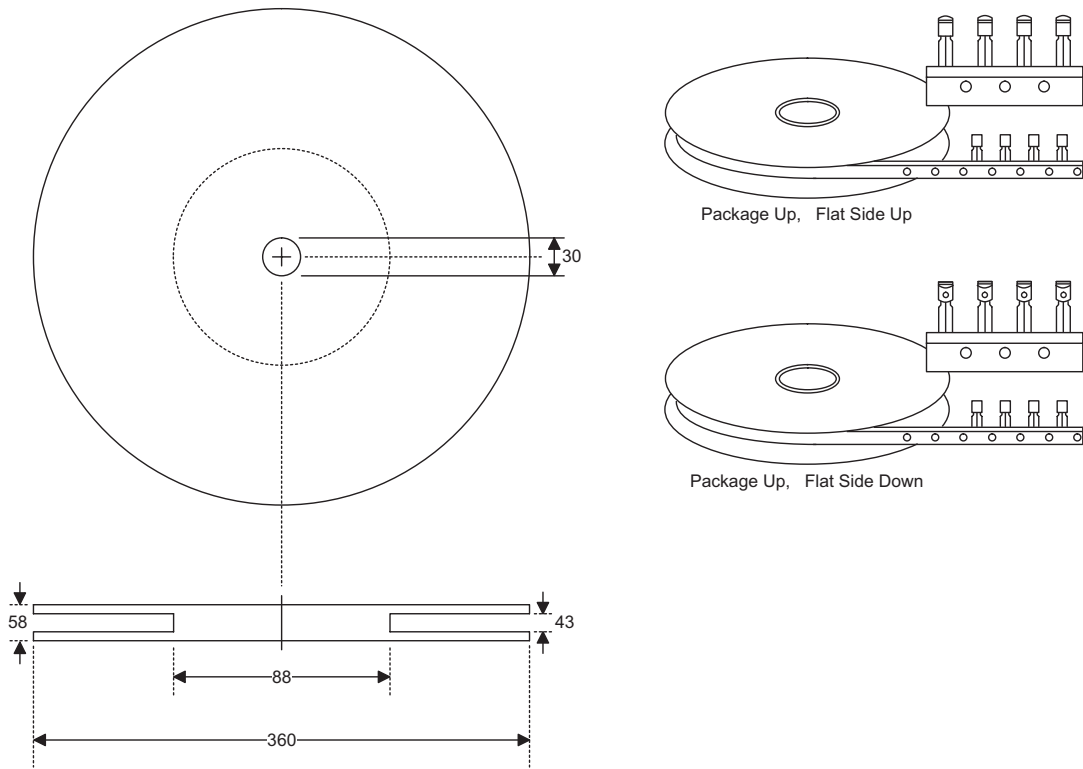
**Reel Dimensions**



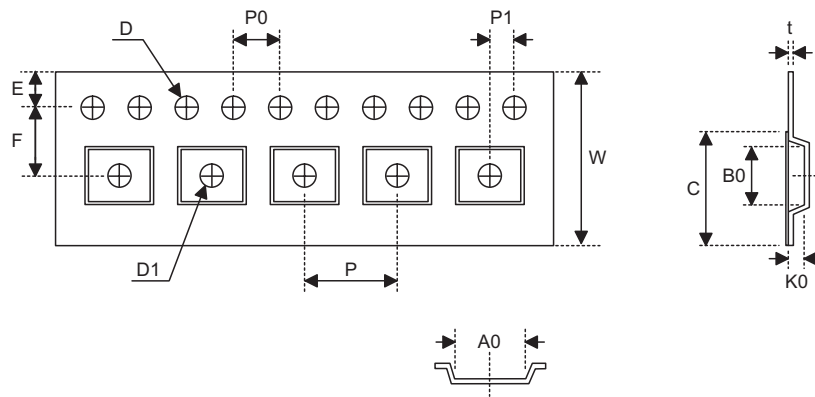
SOT-89

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	180±1.0
B	Reel Inner Diameter	62±1.5
C	Spindle Hole Diameter	12.75+0.15
D	Key Slit Width	1.9±0.15
T1	Space Between Flange	12.4+0.2
T2	Reel Thickness	17-0.4

TO-92 Reel Dimensions (Unit: mm)

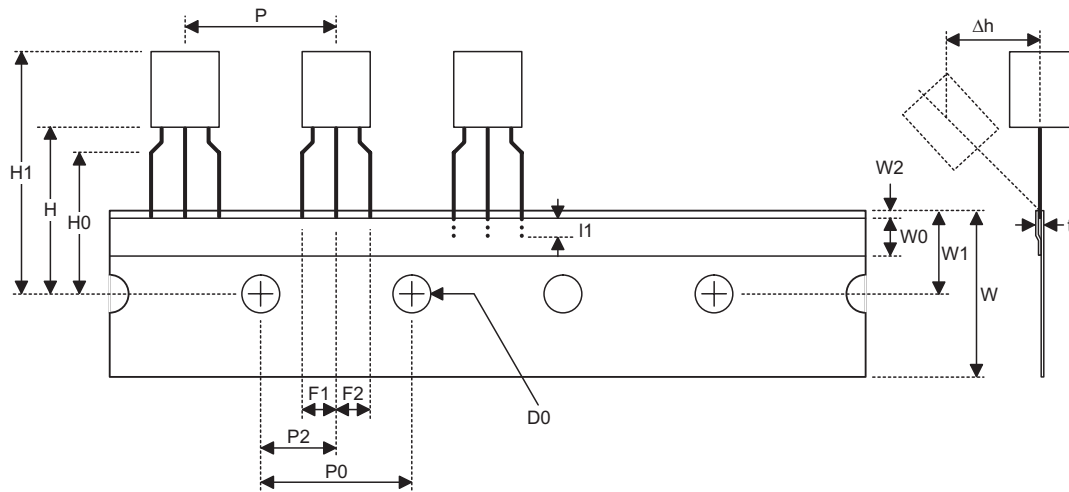


**Carrier Tape Dimensions**



**SOT-89**

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	12.0+0.3 -0.1
P	Cavity Pitch	8.0±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	5.5±0.05
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.1
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.10
A0	Cavity Length	4.8±0.1
B0	Cavity Width	4.5±0.1
K0	Cavity Depth	1.8±0.1
t	Carrier Tape Thickness	0.30±0.013
C	Cover Tape Width	9.3

**Carrier Tape Dimensions**

**TO-92**

Symbol	Description	Dimensions in mm
l1	Taped Lead Length	(2.5)
P	Component Pitch	12.7±1.0
P <sub>0</sub>	Perforation Pitch	12.7±0.3
P <sub>2</sub>	Component to Perforation (Length Direction)	6.35±0.4
F <sub>1</sub>	Lead Spread	2.5+0.4 -0.1
F <sub>2</sub>	Lead Spread	2.5+0.4 -0.1
Δh	Component Alignment	0±0.1
W	Carrier Tape Width	18.0+1.0 -0.5
W <sub>0</sub>	Hold-down Tape Width	6.0±0.5
W <sub>1</sub>	Perforation Position	9.0±0.5
W <sub>2</sub>	Hold-down Tape Position	(0.5)
H <sub>0</sub>	Lead Clinch Height	16.0±0.5
H <sub>1</sub>	Component Height	Less than 24.7
D <sub>0</sub>	Perforation Diameter	4.0±0.2
t	Taped Lead Thickness	0.7±0.2
H	Component Base Height	19.0±0.5

Note: Thickness less than 0.38±0.05mm~0.5mm

P<sub>0</sub> Accumulated pitch tolerance: ±1mm/20pitches.

( ) Bracketed figures are for consultation only

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