HT71XX-1
30mA Voltage Regulator

Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- High input voltage (up to 24V)
- Output voltage accuracy: tolerance ±3%
- TO-92, SOT-89 and SOT-25 package

Applications

- Battery-powered equipment
- Communication equipment
- Audio/Video equipment

General Description

The HT71XX-1 series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 24V. They are available with several fixed output voltages ranging from 3.0V to 5.0V. CMOS technology ensures low voltage drop and low quiescent current.

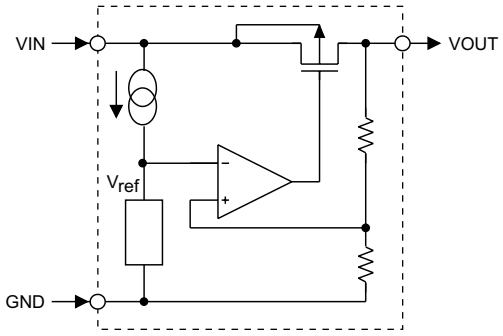
Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

Selection Table

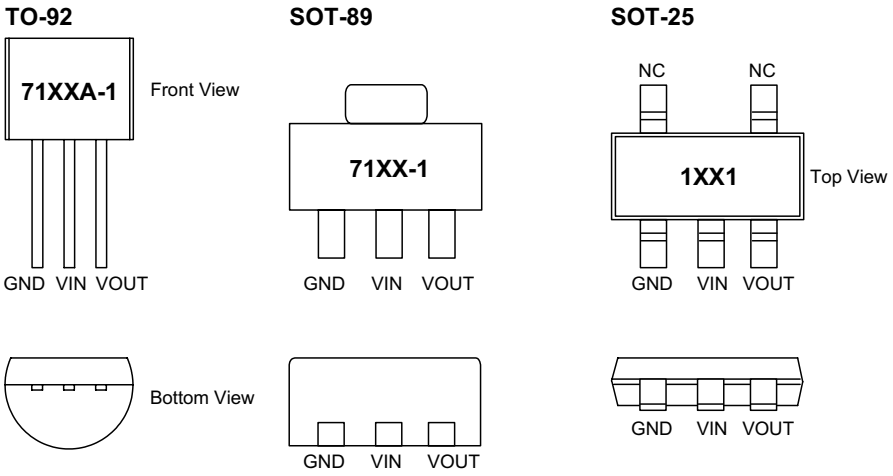
Part No.	Output Voltage	Tolerance	Package	Marking
HT7130-1	3.0V	±3%	TO-92 SOT-89 SOT-25	71XXA-1 (for TO-92) 71XX-1 (for SOT-89) 1XX1 (for SOT-25)
HT7133-1	3.3V	±3%		
HT7136-1	3.6V	±3%		
HT7144-1	4.4V	±3%		
HT7150-1	5.0V	±3%		

Note: "XX" stands for output voltages.

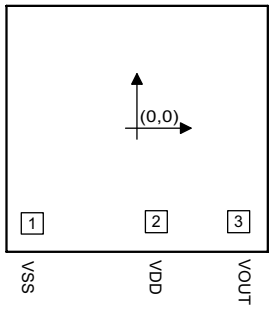
Block Diagram



Pin Assignment



Pad Assignment



Chip size: 1111×1051 $(\mu m)^2$

* The IC substrate should be connected to VDD in the PCB layout artwork.

Pad Coordinates

Unit: μm

Pad No.	X	Y
1	–429.00	–401.00
2	123.50	–401.00
3	416.00	–401.00

Absolute Maximum Ratings

Supply Voltage .....–0.3V to 26V

Power Consumption (*1) 200mW

Power Consumption (*2) 150mW

Storage Temperature .....–50°C to 125°C

Operating Temperature .....0°C to 70°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.

*1: applied to SOT-89 and TO-92

*2: applied to SOT-25

Electrical Characteristics

HT7130-1, +3.0V output type Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5V	I_{OUT}=10mA	2.91	3	3.09	V
I_{OUT}	Output Current	5V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	5V	1mA≤I_{OUT}≤20mA	—	60	100	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	5V	No load	—	3	6	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.45	—	mV/°C

HT7133-1, +3.3V output type Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5.5V	I_{OUT}=10mA	3.201	3.3	3.399	V
I_{OUT}	Output Current	5.5V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	5.5V	1mA≤I_{OUT}≤30mA	—	60	100	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	5.5V	No load	—	3	6	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4.5V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.5V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.5	—	mV/°C

HT7136-1, +3.6V output type Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	5.6V	I_{OUT}=10mA	3.492	3.6	3.708	V
I_{OUT}	Output Current	5.6V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	5.6V	1mA≤I_{OUT}≤30mA	—	60	100	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	60	—	mV
I_{SS}	Current Consumption	5.6V	No load	—	3	6	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	4.6V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.6V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.6	—	mV/°C

HT7144-1, +4.4V output type Ta=25°C

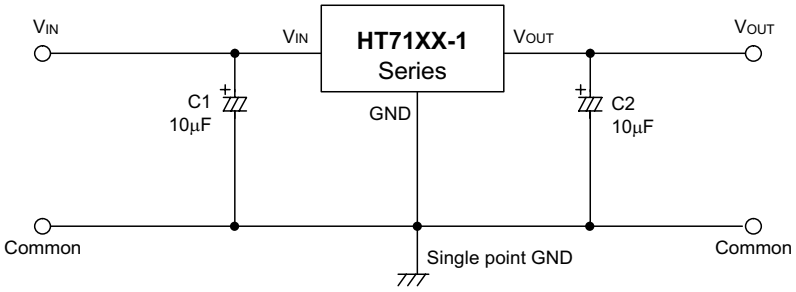
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	6.4V	I_{OUT}=10mA	4.268	4.4	4.532	V
I_{OUT}	Output Current	6.4V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	6.4V	1mA≤I_{OUT}≤30mA	—	60	100	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	6.4V	No load	—	3	6	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	5.4V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	6.4V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.7	—	mV/°C

HT7150-1, +5.0V output type Ta=25°C

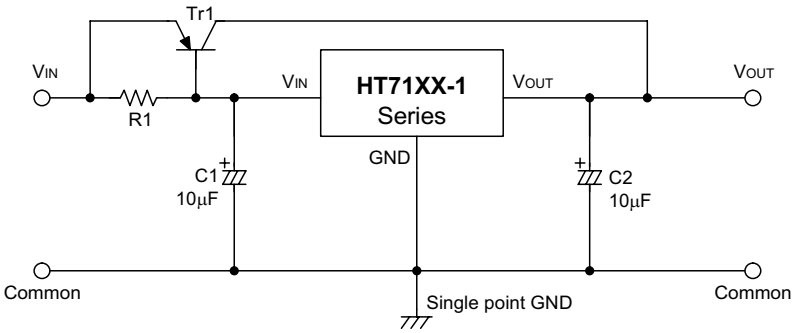
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	7V	I_{OUT}=10mA	4.85	5	5.15	V
I_{OUT}	Output Current	7V	—	20	30	—	mA
ΔV_{OUT}	Load Regulation	7V	1mA≤I_{OUT}≤30mA	—	60	100	mV
V_{DIF}	Voltage Drop	—	I_{OUT}=1mA	—	100	—	mV
I_{SS}	Current Consumption	7V	No load	—	3	6	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	6V≤V_{IN}≤24V I_{OUT}=1mA	—	0.2	—	%/V
V_{IN}	Input Voltage	—	—	—	—	24	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	7V	I_{OUT}=10mA 0°C<Ta<70°C	—	±0.75	—	mV/°C

Application Circuits

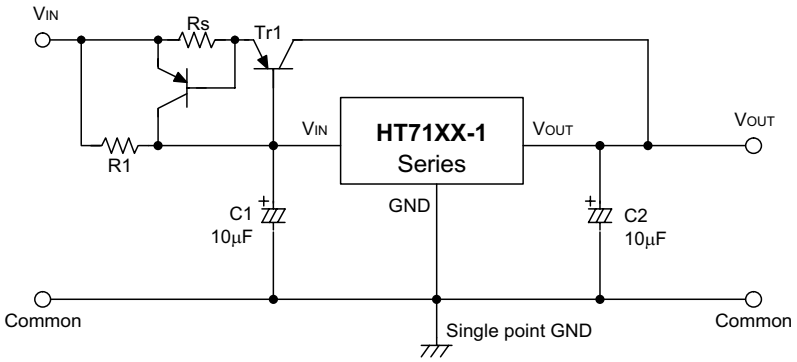
Basic circuits



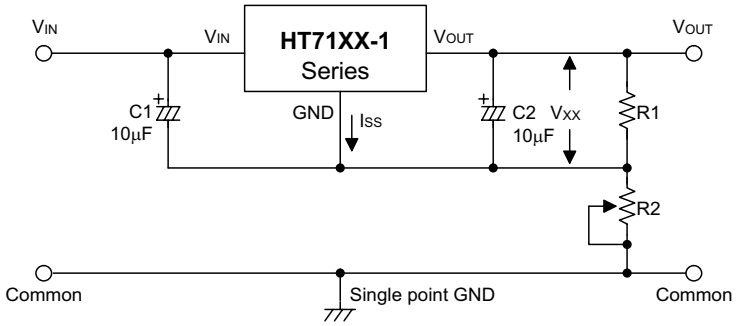
High output current positive voltage regulator



Short-Circuit protection by Tr1

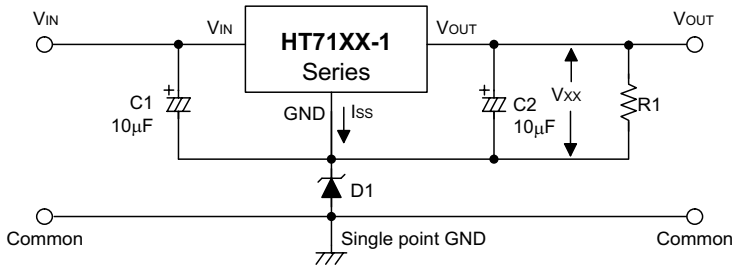


Circuit for increasing output voltage



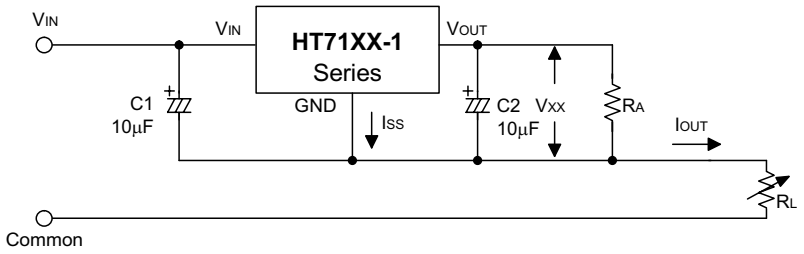
$$V_{OUT} = V_{XX}\ (1+\frac{R2}{R1}) + I_{SS}\ \ R2$$

Circuit for increasing output voltage



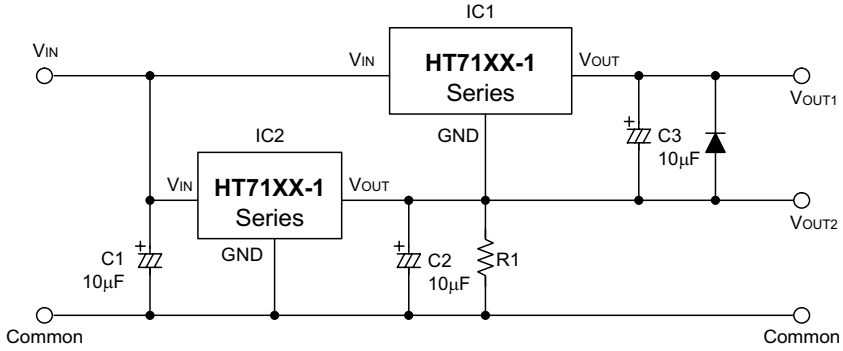
$$V_{OUT}=V_{XX}+V_{D1}$$

Constant current regulator



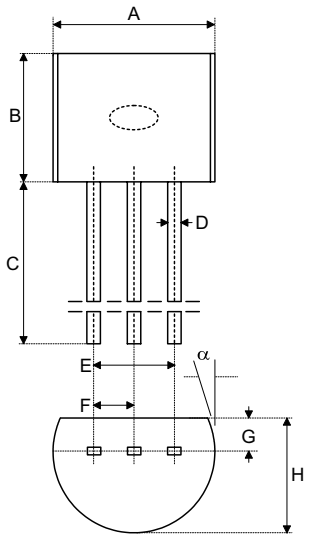
$$I_{OUT} = \frac{V_{XX}}{R_A} + I_{SS}$$

Dual supply



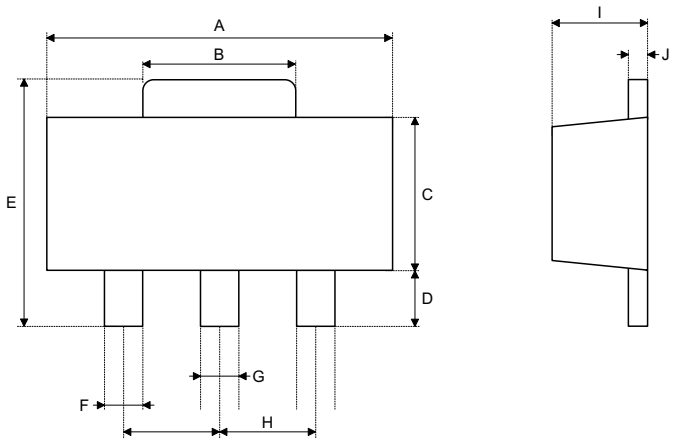
Package Information

3-pin TO-92 outline dimensions



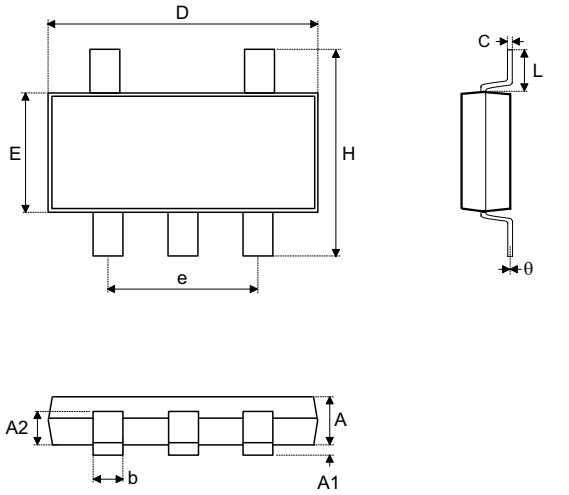
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	170	—	200
B	170	—	200
C	500	—	—
D	11	—	20
E	90	—	110
F	45	—	55
G	45	—	65
H	130	—	160
I	8	—	18
α	4°	—	6°

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

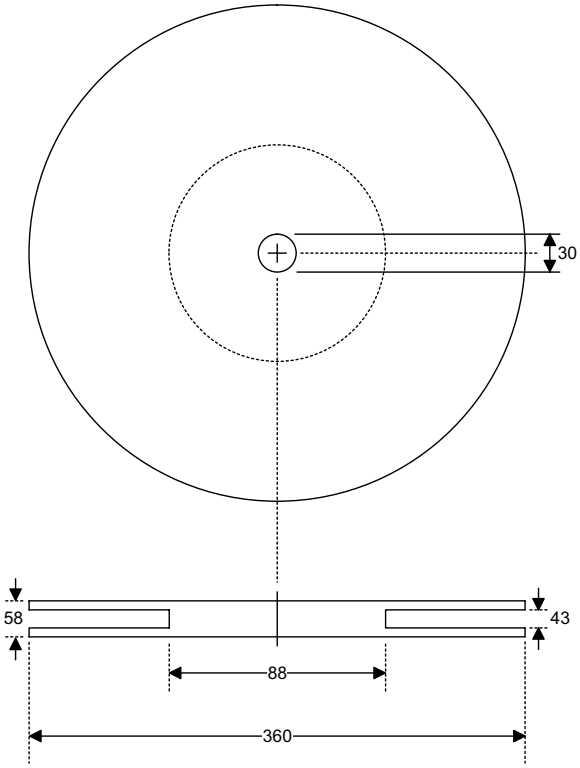
5-pin SOT-25 outline dimensions

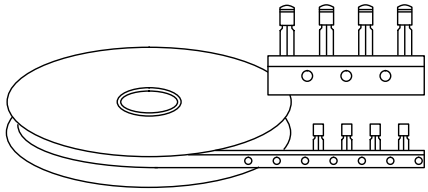


Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	1.00	—	1.30
A1	—	—	0.10
A2	0.70	—	0.90
b	0.35	—	0.50
C	0.10	—	0.25
D	2.70	—	3.10
E	1.40	—	1.80
e	—	1.90	—
H	2.60	—	3
L	0.37	—	—
θ	1°	—	9°

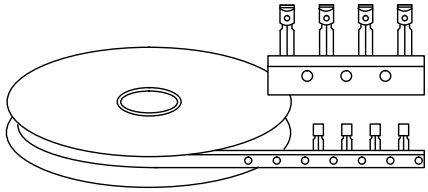
Product Tape and Reel Specifications

TO-92 reel dimensions (Unit: mm)



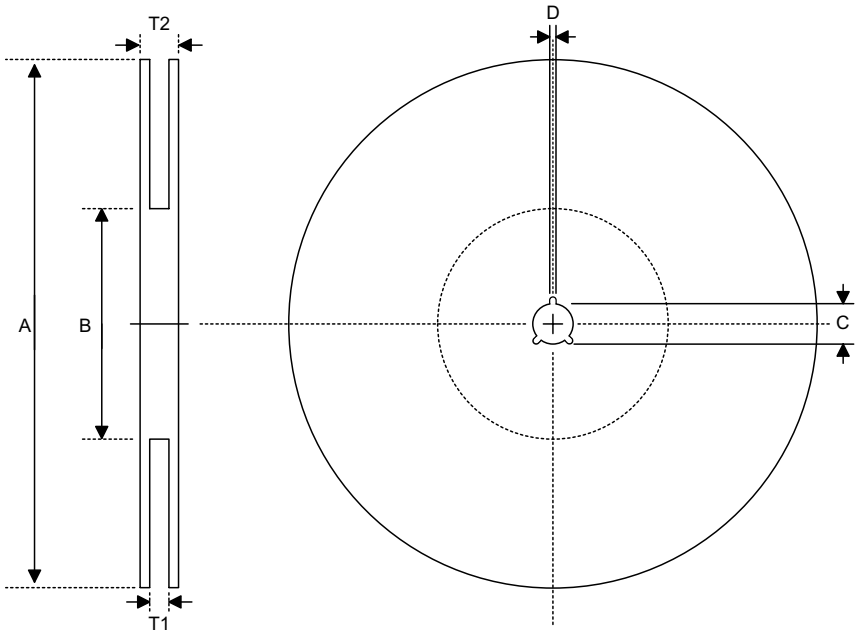


Package Up, Flat Side Up



Package Up, Flat Side Down

SOT-89 & SOT-25 reel dimensions



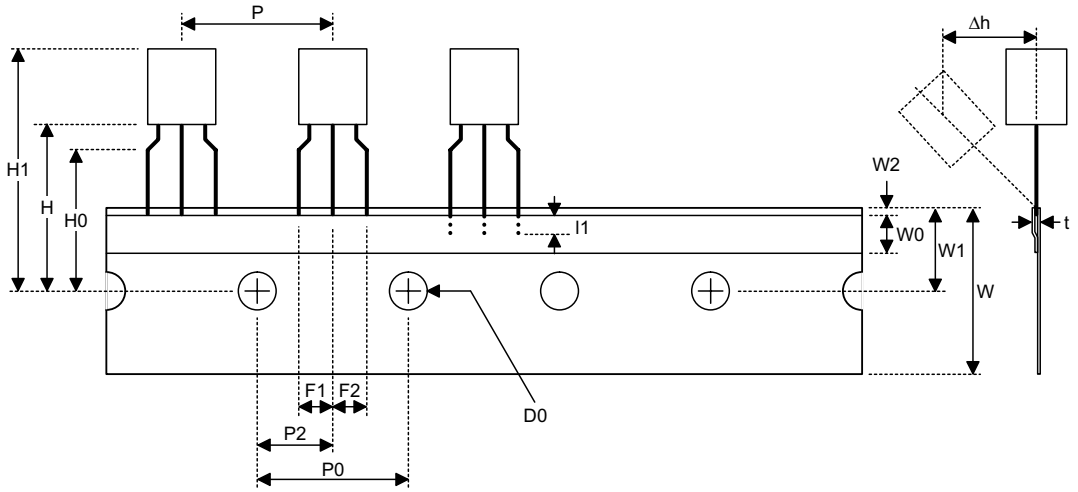
SOT-89

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

SOT-25

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	178±1.0
B	Reel Inner Diameter	62±1.0
C	Spindle Hole Diameter	13.0±0.2
D	Key Slit Width	2.5±0.25
T1	Space Between Flange	8.4+1.5 −0.0
T2	Reel Thickness	11.4+1.5

TO-92 carrier tape dimensions



TO-92

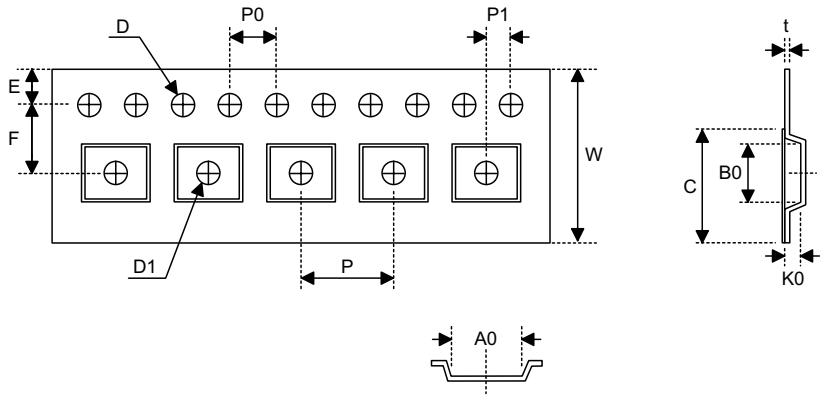
Symbol	Description	Dimensions in mm
I1	Taped Lead Length	(2.5)
P	Component Pitch	12.7±1.0
P_0	Perforation Pitch	12.7±0.3
P_2	Component to Perforation (Length Direction)	6.35±0.4
F_1	Lead Spread	2.5+0.4 −0.1
F_2	Lead Spread	2.5+0.4 −0.1
Δh	Component Alignment	0±0.1
W	Carrier Tape Width	18.0+1.0 −0.5
W_0	Hold-down Tape Width	6.0±0.5
W_1	Perforation Position	9.0±0.5
W_2	Hold-down Tape Position	(0.5)
H_0	Lead Clinch Height	16.0±0.5
H_1	Component Height	Less than 24.7
D_0	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

P0 Accumulated pitch tolerance: ±1mm/20pitches.

( ) Bracketed figures are for consultation only

SOT-89 & SOT-25 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

SOT-25

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	8.0+0.3 −0.3
P	Cavity Pitch	4.0
E	Perforation Position	1.75
F	Cavity to Perforation (Width Direction)	3.5±0.05
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.1
P0	Perforation Pitch	4.0
P1	Cavity to Perforation (Length Direction)	2.0
A0	Cavity Length	3.15
B0	Cavity Width	3.2
K0	Cavity Depth	1.4
t	Carrier Tape Thickness	0.20±0.03
C	Cover Tape Width	

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