

### Features

- Output voltage ranges: Fixed range of 1.8V, 2.5V, 2.7V, 3.0V, 3.3V, 5.0V type.
- Highly accuracy:  $\pm 2\%$
- Low voltage drop: 240mV (typ.),  $V_{OUT}=5.0V$  at 300mA
- Maximum Input Voltage: 8V
- Guaranteed output current: 300mA
- Low quiescent current: 5 $\mu$ A (typ.)
- Current limiting
- Over-temperature shutdown
- SOT-23, SOT-89, TO-92 Packages

### Applications

- Portable electronics
- Wireless devices
- Cordless phones
- PC peripherals
- Battery powered devices
- Electronic scales

### General Description

The HT72XX series of positive, linear regulators features low quiescent current (5 $\mu$ A typ.) with low dropout voltage, making them ideal for battery applications. The space-saving SOT-23 package is attractive for "Pocket" and "Hand Held" applications. The devices are capable of supplying 300mA of output current continuously.

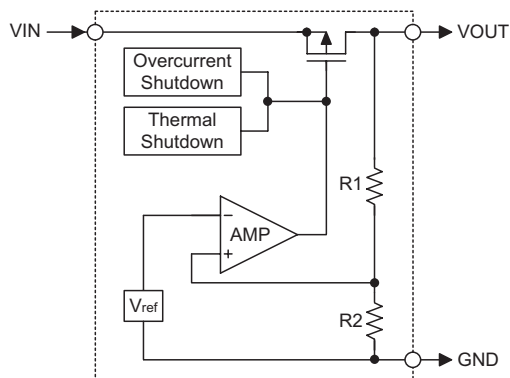
They are available with several fixed output voltages ranging from 1.8V to 5.0V. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

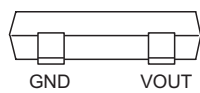
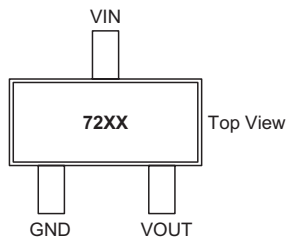
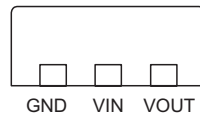
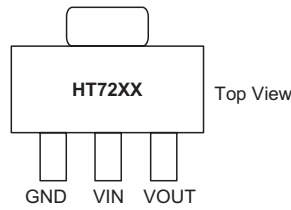
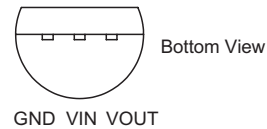
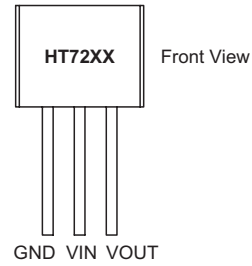
These rugged devices have Thermal Shutdown and Current Limiting to prevent device failure under the "Worst" of operating conditions.

### Selection Table

Part No.	Output Voltage	Tolerance	Package
HT7218	1.8V	$\pm 2\%$	SOT-23 SOT-89 TO-92
HT7225	2.5V		
HT7227	2.7V		
HT7230	3.0V		
HT7233	3.3V		
HT7250	5.0V		

### Block Diagram



**Pin Assignment**
**SOT-23**

**SOT-89**

**TO-92**


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

**Absolute Maximum Ratings\***

Maximum Supply Voltage ..... up to 8.5V      Storage Temperature .....-50°C to 125°C  
 Operating Temperature .....-40°C to 85°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.

**Thermal Information**

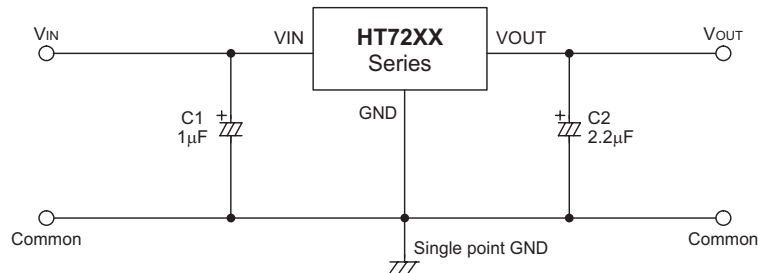
Symbol	Parameter	Package	Max.	Unit
$\theta_{JA}$	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT-23	667	°C/W
		SOT-89	200	°C/W
		TO-92	200	°C/W
$P_D$	Power Dissipation	SOT-23	0.15	W
		SOT-89	0.50	W
		TO-92	0.50	W

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

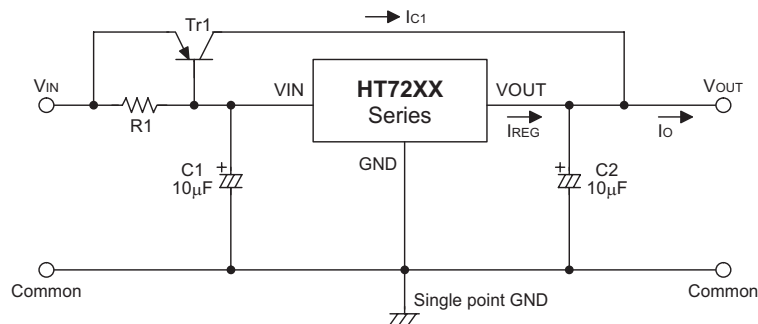
**Electrical Characteristics**
 $T_J=25^{\circ}\text{C}$ ,  $V_{IN}=V_{OUT}+1.0\text{V}$ ,  $I_O=1\text{mA}$ , unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
$V_{IN}$	Input Voltage	—	—	—	8	V	
$\Delta V_{OUT}$	Output Voltage Tolerance	—	-2	—	2	%	
$I_{SS}$	Quiescent Current	$I_O=0\text{mA}$	—	5	7	$\mu\text{A}$	
$\Delta V_{LOAD}$	Load Regulation (Note1)	$1\text{mA} \leq I_{OUT} \leq 300\text{mA}$	—	0.004	0.008	%/mA	
$V_{DROP}$	Dropout Voltage (Note2)	$\Delta V_{OUT}=2\%$ $I_{OUT}=300\text{mA}$	$V_O \leq 1.8\text{V}$	—	800	1200	mV
			$2.5\text{V} \leq V_O \leq 2.7\text{V}$	—	350	400	
			$3.0\text{V} \leq V_O \leq 5.0\text{V}$	—	240	300	
$\Delta V_{LINE}$	Line Regulation	$V_{OUT}+1.0\text{V} \leq V_{IN} \leq 8.0\text{V}$	—	0.2	0.3	%/V	
$I_{LIM}$	Current Limit (Note3)	$\Delta V_{OUT}=10\%$	300	—	—	mA	
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	$-40^{\circ}\text{C} < T_a < 85^{\circ}\text{C}$	—	$\pm 0.8$	—	mV/ $^{\circ}\text{C}$	

- Note:
1. 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  $P_D = (T_{J(MAX)} - T_a) / \theta_{JA}$ .
  2. 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  $V_{IN} = V_{OUT} + 1\text{V}$  with a fixed load.
  3. Current limit is measured by pulsing for a short time.

**Application Circuits**
**Basic Circuits**

**Typical Application Circuits**

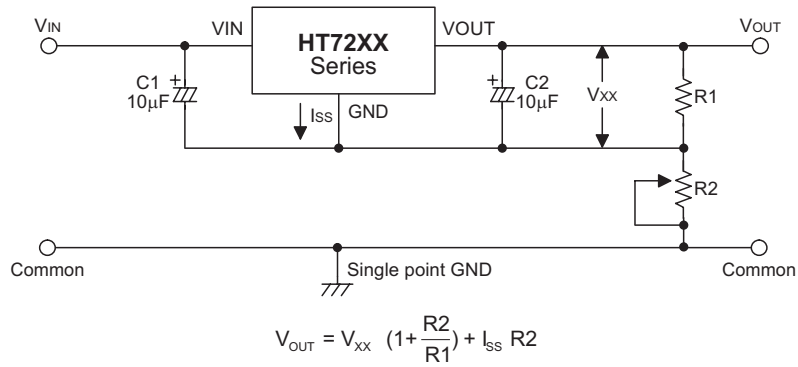
- High output current positive voltage regulator



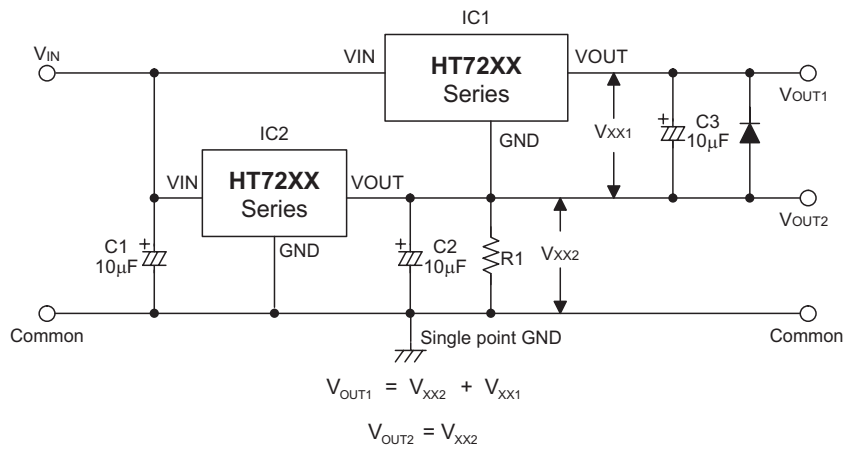
$$R_1 = \frac{V_{BE1}}{I_{REG} - \frac{I_{C1}}{(1+\beta)}}$$

$$I_O = I_{C1} + I_{REG}$$

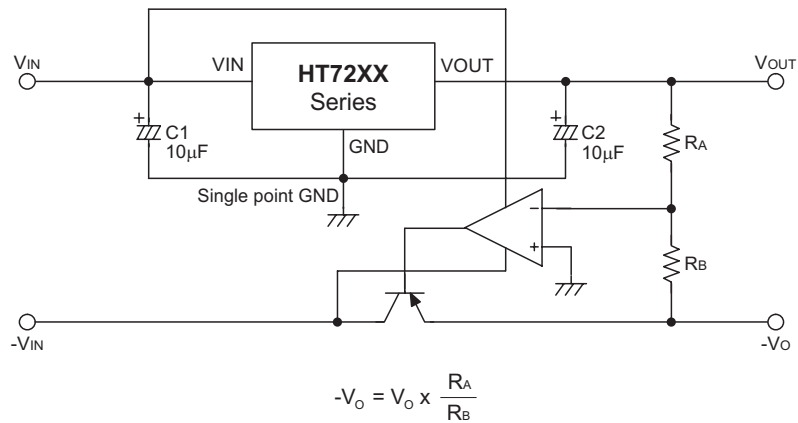
• Increased Output voltage Circuit



• Dual Supply Circuit

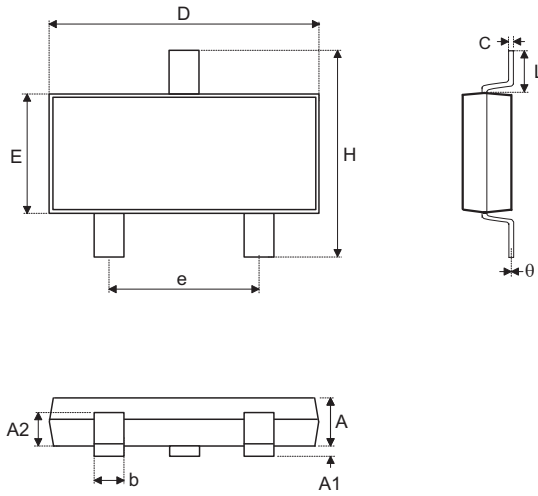


• Tracking Voltage Regulator



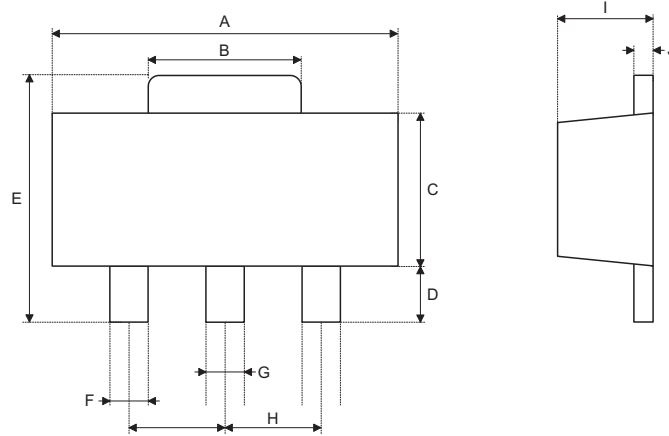
**Package Information**

**3-pin SOT-23 Outline Dimensions**



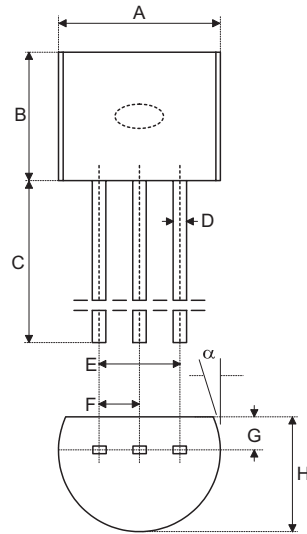
Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	1	—	1.3
A1	—	—	0.1
A2	0.7	—	0.9
b	0.35	—	0.5
C	0.1	—	0.25
D	2.7	—	3.1
E	1.4	—	1.8
e	—	1.9	—
H	2.6	—	3
L	0.37	—	—
$\theta$	1°	—	9°

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

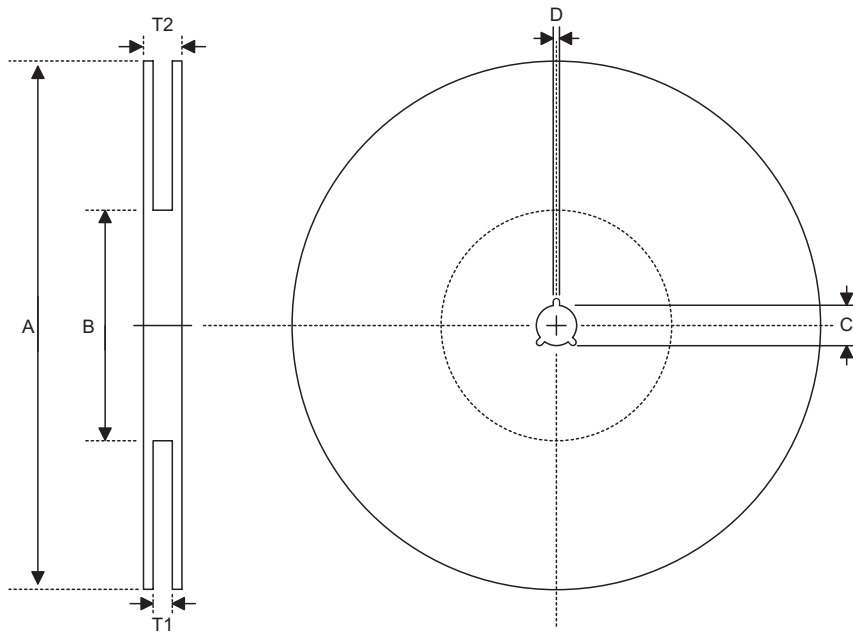


Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	173	—	181
B	64	—	72
C	90	—	102
D	35	—	47
E	155	—	167
F	14	—	19
G	17	—	22
H	—	59	—
I	55	—	63
J	14	—	17

**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-23**

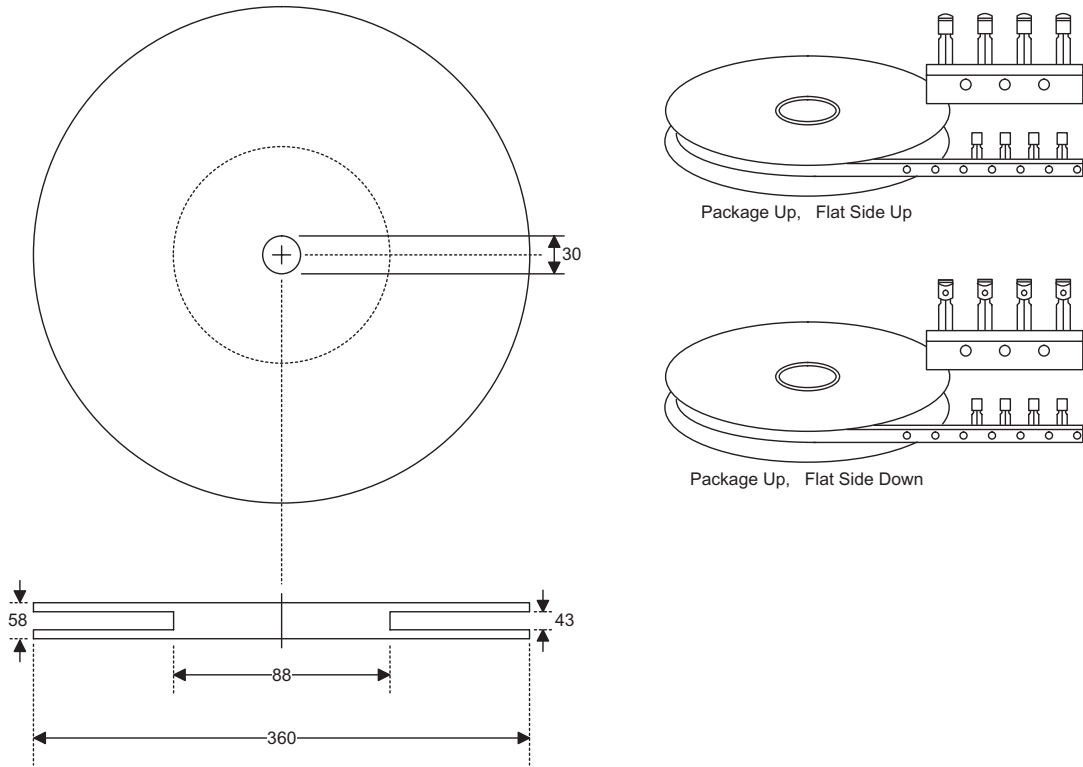
Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	178±1
B	Reel Inner Diameter	62±1
C	Spindle Hole Diameter	13±0.2
D	Key Slit Width	2.5±0.25
T1	Space Between Flange	8.4+1.5
T2	Reel Thickness	11.4+1.5

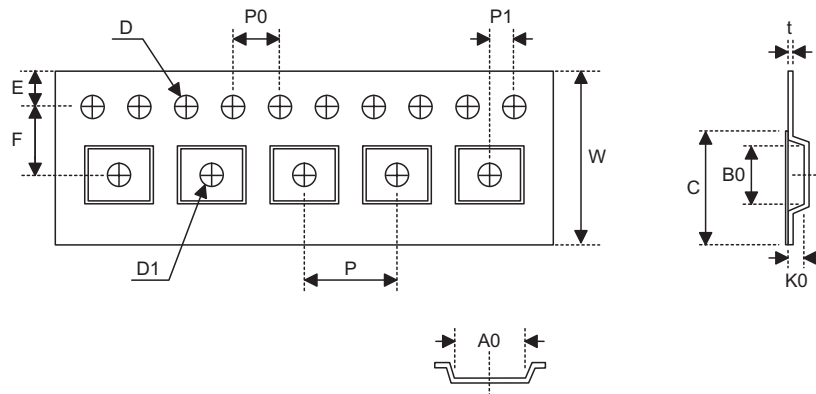
**SOT-89**

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)

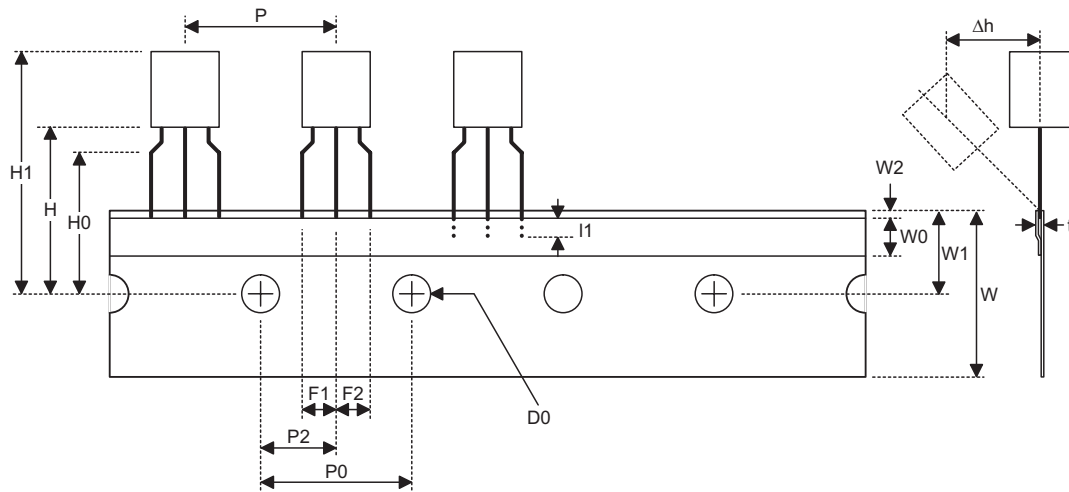


**Carrier Tape Dimensions**

**SOT-23**

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	8±0.3
P	Cavity Pitch	4
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
P1	Cavity to Perforation (Length Direction)	2
A0	Cavity Length	3.15
B0	Cavity Width	3.2
K0	Cavity Depth	1.4
t	Carrier Tape Thickness	0.2±0.03
C	Cover Tape Width	5.3

**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

**TO-92 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

**Holtek Semiconductor Inc. (Headquarters)**

No.3, Creation Rd. II, Science Park, Hsinchu, Taiwan  
Tel: 886-3-563-1999  
Fax: 886-3-563-1189  
<http://www.holtek.com.tw>

**Holtek Semiconductor Inc. (Taipei Sales Office)**

4F-2, No. 3-2, YuanQu St., Nankang Software Park, Taipei 115, Taiwan  
Tel: 886-2-2655-7070  
Fax: 886-2-2655-7373  
Fax: 886-2-2655-7383 (International sales hotline)

**Holtek Semiconductor Inc. (Shanghai Sales Office)**

7th Floor, Building 2, No.889, Yi Shan Rd., Shanghai, China 200233  
Tel: 86-21-6485-5560  
Fax: 86-21-6485-0313  
<http://www.holtek.com.cn>

**Holtek Semiconductor Inc. (Shenzhen Sales Office)**

5/F, Unit A, Productivity Building, Cross of Science M 3rd Road and Gaoxin M 2nd Road, Science Park, Nanshan District, Shenzhen, China 518057  
Tel: 86-755-8616-9908, 86-755-8616-9308  
Fax: 86-755-8616-9722

**Holtek Semiconductor Inc. (Beijing Sales Office)**

Suite 1721, Jinyu Tower, A129 West Xuan Wu Men Street, Xicheng District, Beijing, China 100031  
Tel: 86-10-6641-0030, 86-10-6641-7751, 86-10-6641-7752  
Fax: 86-10-6641-0125

**Holtek Semiconductor Inc. (Chengdu Sales Office)**

709, Building 3, Champagne Plaza, No.97 Dongda Street, Chengdu, Sichuan, China 610016  
Tel: 86-28-6653-6590  
Fax: 86-28-6653-6591

**Holtek Semiconductor (USA), Inc. (North America Sales Office)**

46729 Fremont Blvd., Fremont, CA 94538  
Tel: 1-510-252-9880  
Fax: 1-510-252-9885  
<http://www.holtek.com>

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