

# Low Power Consumption LDO

## Features

- Ultra low quiescent current: 3.5 $\mu$ A (typ.)
- High input voltage (up to 12V)
- Output voltage:  
1.8V, 2.5V, 2.7V, 3.0V, 3.3V, 3.5V, 5.0V
- Output voltage accuracy: tolerance  $\pm$ 3%
- Maximum output current: 250mA
- Low dropout voltage
- Low temperature coefficient
- TO-92, SOT-89 package

## Applications

- Battery-powered equipment
- Voltage regulator for microprocessor
- Voltage regulator for LAN cards
- Wireless Communication equipment
- Audio/Video equipment

## General Description

The HT73XX series is a set of three-terminal, low power, high voltage regulators implemented in CMOS technology. The series features extremely low quiescent current which is typically 3.5 $\mu$ A. They allow input voltages as high as 12V. The device provides large current with a significantly small dropout voltage.

The HT73XX consists of a high-precision voltage reference, an error correction circuit, and a current limited output driver. They are available with several fixed output voltages ranging from 1.8V to 5.0V. CMOS technology ensures low dropout voltage and low current consumption. Although designed primarily as fixed voltage regulators, these devices can be used with external components to generate variable voltages and currents.

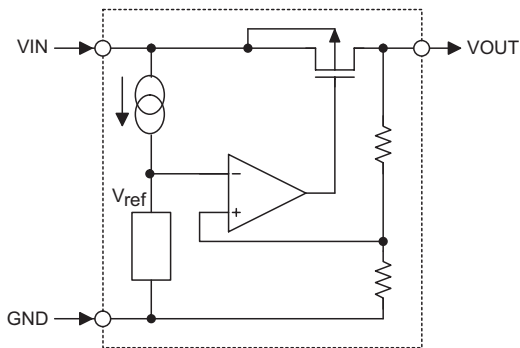
## Selection Table

Part No.	Output Voltage	Package	Marking
HT7318	1.8V	TO-92 SOT-89	73XX-A (for TO-92) 73XX-A (for SOT-89)
HT7325	2.5V		
HT7327	2.7V		
HT7330	3.0V		
HT7333	3.3V		
HT7335	3.5V		
HT7350	5.0V		

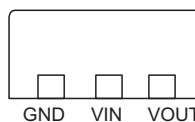
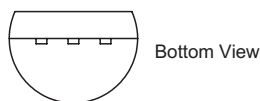
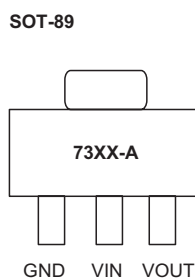
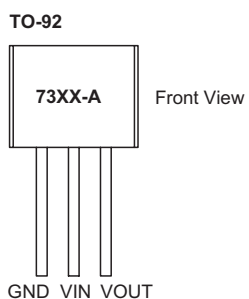
Note: "XX" stands for output voltages.

For lead free devices, TO-92 package will add a "#" mark at the end of the date code, whereas SOT-89 package will add a "#" mark at the end of the marking.

**Block Diagram**



**Pin Assignment**



**Absolute Maximum Ratings**

Supply Voltage .....	$V_{SS}-0.3V$ to $V_{SS}+14V$	Storage Temperature .....	$-50^{\circ}C$ to $125^{\circ}C$
Power Consumption (*1) .....	500mW	Operating Temperature .....	$-40^{\circ}C$ to $85^{\circ}C$
Power Consumption (*2) .....	500mW		

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 TO-92  
 \*2: applied to SOT-89

**Electrical Characteristics**
**HT7318, +1.8V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	2.8V	I <sub>OUT</sub> =40mA	1.746	1.8	1.854	V
I <sub>OUT(MAX)</sub>	Maximum Output Current	2.8V	V <sub>OUT</sub> ≥1.62V	150	—	—	mA
ΔV <sub>OUT</sub> *	Load Regulation	2.8V	1mA≤I <sub>OUT</sub> ≤60mA	—	45	90	mV
V <sub>DROP**</sub>	Dropout Voltage	—	I <sub>OUT</sub> =40mA	—	170	—	mV
I <sub>SS</sub>	Quiescent Current	2.8V	No load	—	3.5	7	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	I <sub>OUT</sub> =40mA 2.8V≤V <sub>IN</sub> ≤12V	—	0.2	0.3	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	2.8V	I <sub>OUT</sub> =40mA -40°C<Ta<85°C	—	±0.7	—	mV/°C

**HT7325, +2.5V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	3.5V	I <sub>OUT</sub> =40mA	2.425	2.5	2.575	V
I <sub>OUT(MAX)</sub>	Maximum Output Current	3.5V	V <sub>OUT</sub> ≥2.25V	180	—	—	mA
ΔV <sub>OUT</sub> *	Load Regulation	3.5V	1mA≤I <sub>OUT</sub> ≤60mA	—	45	90	mV
V <sub>DROP**</sub>	Dropout Voltage	—	I <sub>OUT</sub> =40mA	—	110	—	mV
I <sub>SS</sub>	Quiescent Current	3.5V	No load	—	3.5	7	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	I <sub>OUT</sub> =40mA 3.5V≤V <sub>IN</sub> ≤12V	—	0.2	0.3	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.5V	I <sub>OUT</sub> =40mA -40°C<Ta<85°C	—	±0.7	—	mV/°C

**HT7327, +2.7V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	3.7V	I <sub>OUT</sub> =40mA	2.619	2.7	2.781	V
I <sub>OUT(MAX)</sub>	Maximum Output Current	3.7V	V <sub>OUT</sub> ≥2.43V	200	—	—	mA
ΔV <sub>OUT</sub> *	Load Regulation	3.7V	1mA≤I <sub>OUT</sub> ≤80mA	—	45	90	mV
V <sub>DROP**</sub>	Dropout Voltage	—	I <sub>OUT</sub> =40mA	—	100	—	mV
I <sub>SS</sub>	Quiescent Current	3.7V	No load	—	3.5	7	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	I <sub>OUT</sub> =40mA 3.7V≤V <sub>IN</sub> ≤12V	—	0.2	0.3	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	3.7V	I <sub>OUT</sub> =40mA -40°C<Ta<85°C	—	±0.7	—	mV/°C

**HT7330, +3.0V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	4V	I <sub>OUT</sub> =40mA	2.91	3	3.09	V
I <sub>OUT(MAX)</sub>	Maximum Output Current	4V	V <sub>OUT</sub> ≥2.7V	250	—	—	mA
ΔV <sub>OUT</sub> *	Load Regulation	4V	1mA≤I <sub>OUT</sub> ≤80mA	—	45	90	mV
V <sub>DROP</sub> **	Dropout Voltage	—	I <sub>OUT</sub> =40mA	—	95	—	mV
I <sub>SS</sub>	Quiescent Current	4V	No load	—	3.5	7	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	I <sub>OUT</sub> =40mA 4V≤V <sub>IN</sub> ≤12V	—	0.2	0.3	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4V	I <sub>OUT</sub> =40mA -40°C<Ta<85°C	—	±0.7	—	mV/°C

**HT7333, +3.3V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	4.3V	I <sub>OUT</sub> =40mA	3.201	3.3	3.399	V
I <sub>OUT(MAX)</sub>	Maximum Output Current	4.3V	V <sub>OUT</sub> ≥2.97V	250	—	—	mA
ΔV <sub>OUT</sub> *	Load Regulation	4.3V	1mA≤I <sub>OUT</sub> ≤80mA	—	45	90	mV
V <sub>DROP</sub> **	Dropout Voltage	—	I <sub>OUT</sub> =40mA	—	90	—	mV
I <sub>SS</sub>	Quiescent Current	4.3V	No load	—	3.5	7	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	I <sub>OUT</sub> =40mA 4.3V≤V <sub>IN</sub> ≤12V	—	0.2	0.3	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4.3V	I <sub>OUT</sub> =40mA -40°C<Ta<85°C	—	±0.7	—	mV/°C

**HT7335, +3.5V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	4.5V	I <sub>OUT</sub> =40mA	3.395	3.5	3.605	V
I <sub>OUT(MAX)</sub>	Maximum Output Current	4.5V	V <sub>OUT</sub> ≥3.15V	250	—	—	mA
ΔV <sub>OUT</sub> *	Load Regulation	4.5V	1mA≤I <sub>OUT</sub> ≤80mA	—	45	90	mV
V <sub>DROP</sub> **	Dropout Voltage	—	I <sub>OUT</sub> =40mA	—	80	—	mV
I <sub>SS</sub>	Quiescent Current	4.5V	No load	—	3.5	7	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	I <sub>OUT</sub> =40mA 4.5V≤V <sub>IN</sub> ≤12V	—	0.2	0.3	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4.5V	I <sub>OUT</sub> =80mA -40°C<Ta<85°C	—	±0.7	—	mV/°C

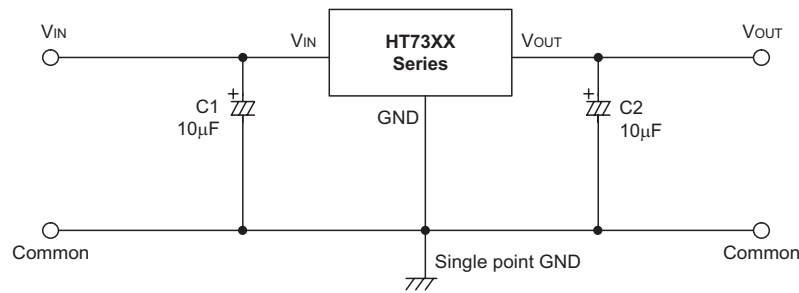
**HT7350, +5.0V Output Type**

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>IN</sub>	Conditions				
V <sub>OUT</sub>	Output Voltage	6V	I <sub>OUT</sub> =40mA	4.85	5	5.15	V
I <sub>OUT(MAX)</sub>	Maximum Output Current	6V	V <sub>OUT</sub> ≥4.5V	250	—	—	mA
ΔV <sub>OUT</sub> *	Load Regulation	6V	1mA≤I <sub>OUT</sub> ≤100mA	—	45	90	mV
V <sub>DROP</sub> **	Dropout Voltage	—	I <sub>OUT</sub> =40mA	—	60	—	mV
I <sub>SS</sub>	Quiescent Current	6V	No load	—	3.5	7	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	—	I <sub>OUT</sub> =40mA 6V≤V <sub>IN</sub> ≤12V	—	0.2	0.3	%/V
V <sub>IN</sub>	Input Voltage	—	—	—	—	12	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	6V	I <sub>OUT</sub> =80mA -40°C<T <sub>a</sub> <85°C	—	±0.7	—	mV/°C

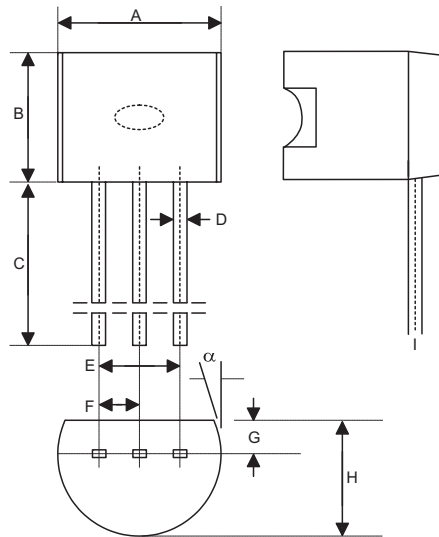
Note: \*\*\* Regulation is measured at constant junction temperature, using pulsed ON time.

\*\*\*\* Dropout is measured at constant junction temperature, using pulsed ON time, and the criterion is V<sub>OUT</sub> inside target value ±2%.

**Application Circuits**


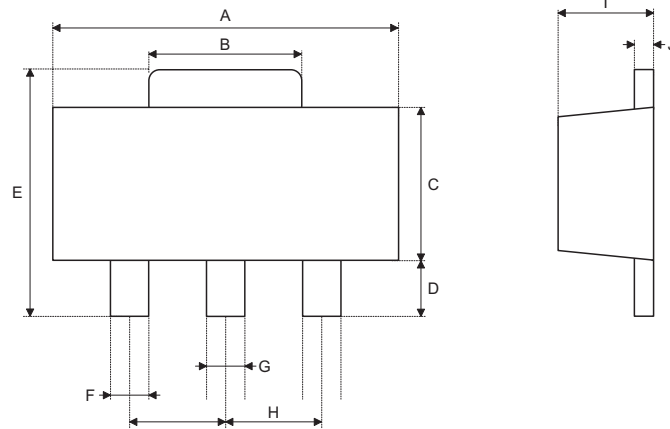
Package Information

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°

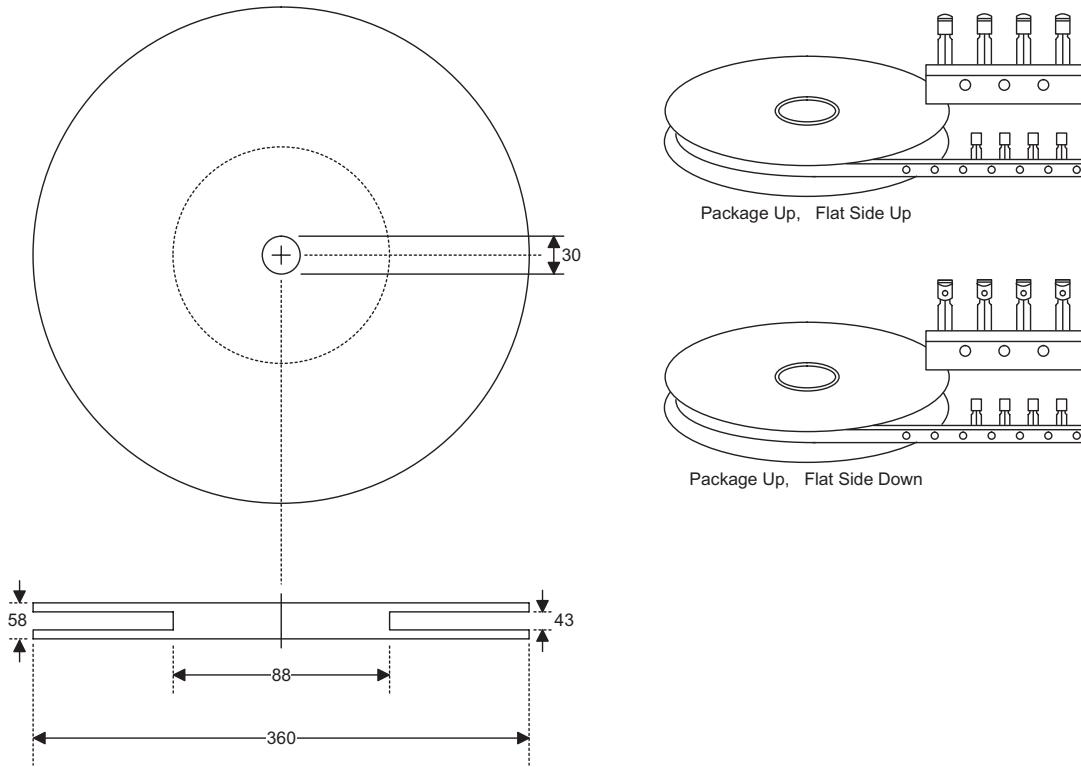
**SOT-89 Outline Dimensions**



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

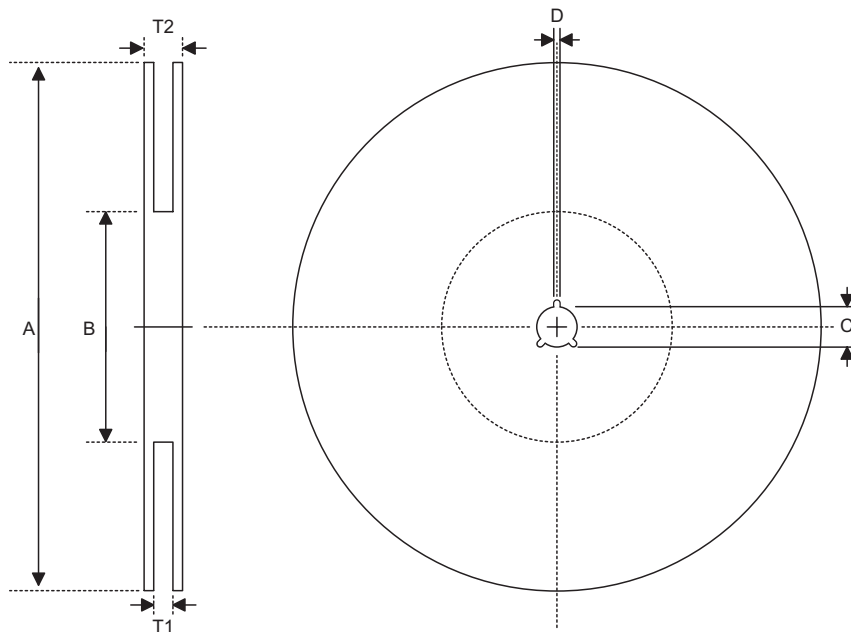
**Product Tape and Reel Specifications**

TO-92 Reel Dimensions (Unit: mm)





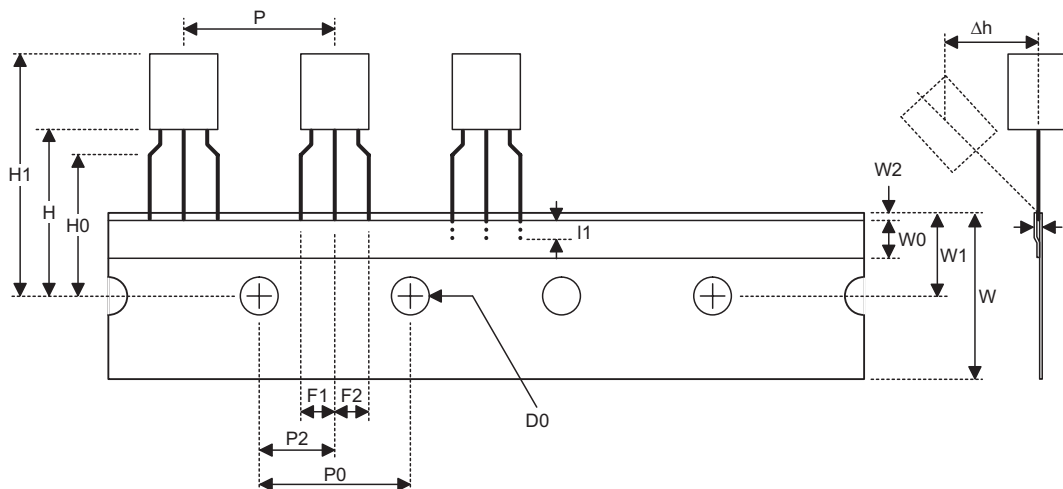
SOT-89 Reel Dimensions



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 Carrier Tape Dimensions

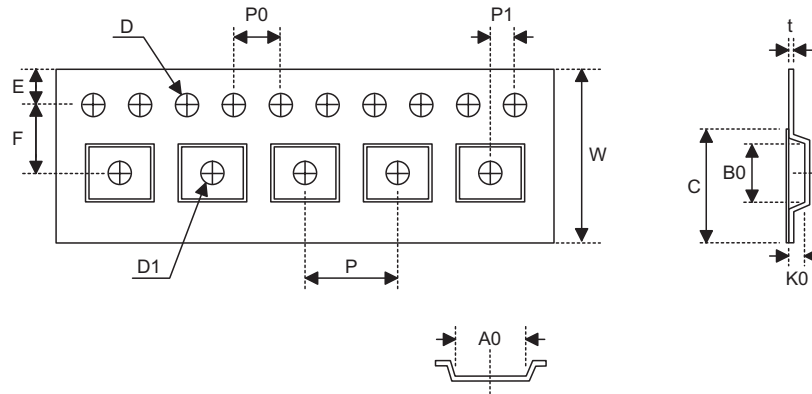


TO-92

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

**SOT-89 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

**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: 021-6485-5560  
Fax: 021-6485-0313  
<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: 0755-8616-9908, 8616-9308  
Fax: 0755-8616-9533

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

Suite 1721, Jinyu Tower, A129 West Xuan Wu Men Street, Xicheng District, Beijing, China 100031  
Tel: 010-6641-0030, 6641-7751, 6641-7752  
Fax: 010-6641-0125

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

709, Building 3, Champagne Plaza, No.97 Dongda Street, Chengdu, Sichuan, China 610016  
Tel: 028-6653-6590  
Fax: 028-6653-6591

**Holmate Semiconductor, Inc. (North America Sales Office)**

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

Copyright © 2006 by HOLTEK SEMICONDUCTOR INC.

The information appearing in this Data Sheet is believed to be accurate at the time of publication. However, Holtek assumes no responsibility arising from the use of the specifications described. The applications mentioned herein are used solely for the purpose of illustration and Holtek makes no warranty or representation that such applications will be suitable without further modification, nor recommends the use of its products for application that may present a risk to human life due to malfunction or otherwise. Holtek's products are not authorized for use as critical components in life support devices or systems. Holtek reserves the right to alter its products without prior notification. For the most up-to-date information, please visit our web site at <http://www.holtek.com.tw>.