# HT73XX
# Low Power Consumption LDO

## Features

- Ultra low quiescent current: 4μA (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 ±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 4μA. 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.
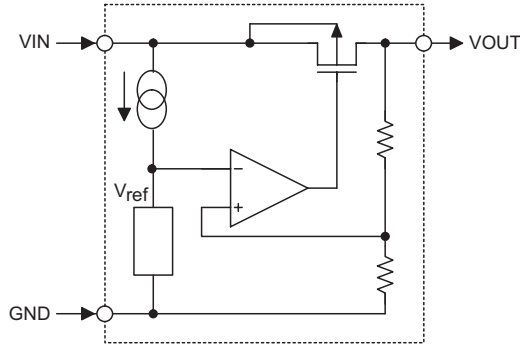
## Selection Table

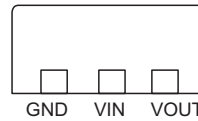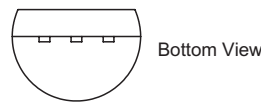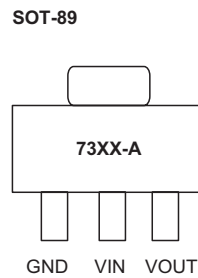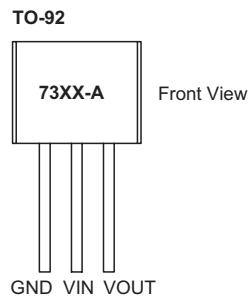| Part No. | Output Voltage | Package | Marking |
|----------|----------------|---------|---------|
| HT7318 | 1.8V | | |
| HT7325 | 2.5V | | |
| HT7327 | 2.7V | | |
| HT7330 | 3.0V | TO-92<br>SOT-89 | 73XX-A (for TO-92)<br>73XX-A (for SOT-89) |
| HT7333 | 3.3V | | |
| HT7335 | 3.5V | | |
| HT7350 |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

Power Consumption (*1) .................................. 500mW

Power Consumption (*2) ...................................500mW

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.
  *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 |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage | 2.8V | $I_{OUT}$=40mA | 1.746 | 1.8 | 1.854 | V |
| $I_{OUT(MAX)}$ | Maximum Output Current | 2.8V | $V_{OUT}$≥1.62V | 150 | — | — | mA |
| $\Delta V_{OUT}$* | Load Regulation | 2.8V | 1mA≤$I_{OUT}$≤60mA | — | 45 | 90 | mV |
| $V_{DROP}$** | Dropout Voltage | — | $I_{OUT}$=40mA | — | 170 | — | mV |
| $I_{SS}$ | Quiescent Current | 2.8V | No load | — | 4 | 8 | μA |
| $\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | $I_{OUT}$=40mA 2.8V≤$V_{IN}$≤12V | — | 0.2 | 0.3 | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 12 | V |
| $\dfrac{\Delta V_{OUT}}{\Delta Ta}$ | Temperature Coefficient | 2.8V | $I_{OUT}$=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 |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage | 3.5V | $I_{OUT}$=40mA | 2.425 | 2.5 | 2.575 | V |
| $I_{OUT(MAX)}$ | Maximum Output Current | 3.5V | $V_{OUT}$≥2.25V | 180 | — | — | mA |
| $\Delta V_{OUT}$* | Load Regulation | 3.5V | 1mA≤$I_{OUT}$≤60mA | — | 45 | 90 | mV |
| $V_{DROP}$** | Dropout Voltage | — | $I_{OUT}$=40mA | — | 110 | — | mV |
| $I_{SS}$ | Quiescent Current | 3.5V | No load | — | 4 | 8 | μA |
| $\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | $I_{OUT}$=40mA 3.5V≤$V_{IN}$≤12V | — | 0.2 | 0.3 | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 12 | V |
| $\dfrac{\Delta V_{OUT}}{\Delta Ta}$ | Temperature Coefficient | 3.5V | $I_{OUT}$=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 |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage | 3.7V | $I_{OUT}$=40mA | 2.619 | 2.7 | 2.781 | V |
| $I_{OUT(MAX)}$ | Maximum Output Current | 3.7V | $V_{OUT}$≥2.43V | 200 | — | — | mA |
| $\Delta V_{OUT}$* | Load Regulation | 3.7V | 1mA≤$I_{OUT}$≤80mA | — | 45 | 90 | mV |
| $V_{DROP}$** | Dropout Voltage | — | $I_{OUT}$=40mA | — | 100 | — | mV |
| $I_{SS}$ | Quiescent Current | 3.7V | No load | — | 4 | 8 | μA |
| $\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | $I_{OUT}$=40mA 3.7V≤$V_{IN}$≤12V | — | 0.2 | 0.3 | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 12 | V |
| $\dfrac{\Delta V_{OUT}}{\Delta Ta}$ | Temperature Coefficient | 3.7V | $I_{OUT}$=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 |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage | 4V | $I_{OUT}$=40mA | 2.91 | 3 | 3.09 | V |
| $I_{OUT(MAX)}$ | Maximum Output Current | 4V | $V_{OUT}$≥2.7V | 250 | — | — | mA |
| $\Delta V_{OUT}$* | Load Regulation | 4V | 1mA≤$I_{OUT}$≤80mA | — | 45 | 90 | mV |
| $V_{DROP}$** | Dropout Voltage | — | $I_{OUT}$=40mA | — | 95 | — | mV |
| $I_{SS}$ | Quiescent Current | 4V | No load | — | 4 | 8 | μA |
| $\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | $I_{OUT}$=40mA<br>4V≤$V_{IN}$≤12V | — | 0.2 | 0.3 | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 12 | V |
| $\dfrac{\Delta V_{OUT}}{\Delta Ta}$ | Temperature Coefficient | 4V | $I_{OUT}$=40mA<br>−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 |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage | 4.3V | $I_{OUT}$=40mA | 3.201 | 3.3 | 3.399 | V |
| $I_{OUT(MAX)}$ | Maximum Output Current | 4.3V | $V_{OUT}$≥2.97V | 250 | — | — | mA |
| $\Delta V_{OUT}$* | Load Regulation | 4.3V | 1mA≤$I_{OUT}$≤80mA | — | 45 | 90 | mV |
| $V_{DROP}$** | Dropout Voltage | — | $I_{OUT}$=40mA | — | 90 | — | mV |
| $I_{SS}$ | Quiescent Current | 4.3V | No load | — | 4 | 8 | μA |
| $\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | $I_{OUT}$=40mA<br>4.3V≤$V_{IN}$≤12V | — | 0.2 | 0.3 | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 12 | V |
| $\dfrac{\Delta V_{OUT}}{\Delta Ta}$ | Temperature Coefficient | 4.3V | $I_{OUT}$=40mA<br>−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 |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage | 4.5V | $I_{OUT}$=40mA | 3.395 | 3.5 | 3.605 | V |
| $I_{OUT(MAX)}$ | Maximum Output Current | 4.5V | $V_{OUT}$≥3.15V | 250 | — | — | mA |
| $\Delta V_{OUT}$* | Load Regulation | 4.5V | 1mA≤$I_{OUT}$≤80mA | — | 45 | 90 | mV |
| $V_{DROP}$** | Dropout Voltage | — | $I_{OUT}$=40mA | — | 80 | — | mV |
| $I_{SS}$ | Quiescent Current | 4.5V | No load | — | 4 | 8 | μA |
| $\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | $I_{OUT}$=40mA<br>4.5V≤$V_{IN}$≤12V | — | 0.2 | 0.3 | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 12 | V |
| $\dfrac{\Delta V_{OUT}}{\Delta Ta}$ | Temperature Coefficient | 4.5V | $I_{OUT}$=80mA<br>−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 |
|---|---|---|---|---|---|---|---|
| | | $V_{IN}$ | Conditions | | | | |
| $V_{OUT}$ | Output Voltage | 6V | $I_{OUT}$=40mA | 4.85 | 5 | 5.15 | V |
| $I_{OUT(MAX)}$ | Maximum Output Current | 6V | $V_{OUT} \geq 4.5V$ | 250 | — | — | mA |
| $\Delta V_{OUT}$* | Load Regulation | 6V | $1mA \leq I_{OUT} \leq 100mA$ | — | 45 | 90 | mV |
| $V_{DROP}$** | Dropout Voltage | — | $I_{OUT}$=40mA | — | 60 | — | mV |
| $I_{SS}$ | Quiescent Current | 6V | No load | — | 4 | 8 | μA |
| $\dfrac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation | — | $I_{OUT}$=40mA $6V \leq V_{IN} \leq 12V$ | — | 0.2 | 0.3 | %/V |
| $V_{IN}$ | Input Voltage | — | — | — | — | 12 | V |
| $\dfrac{\Delta V_{OUT}}{\Delta Ta}$ | Temperature Coefficient | 6V | $I_{OUT}$=80mA $-40°C<Ta<85°C$ | — | ±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 $V_{OUT}$ inside target value ±2%.
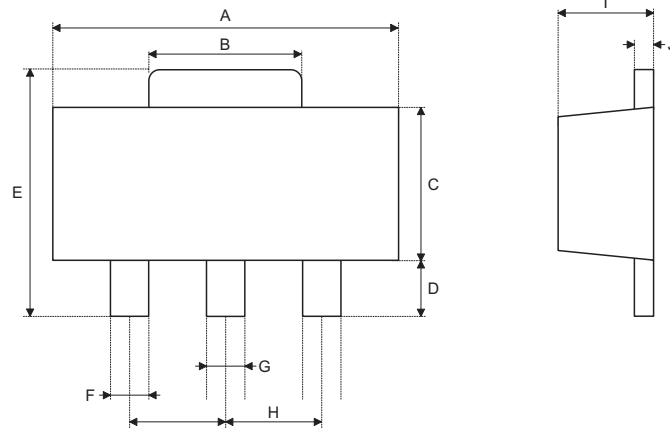
## Application Circuits
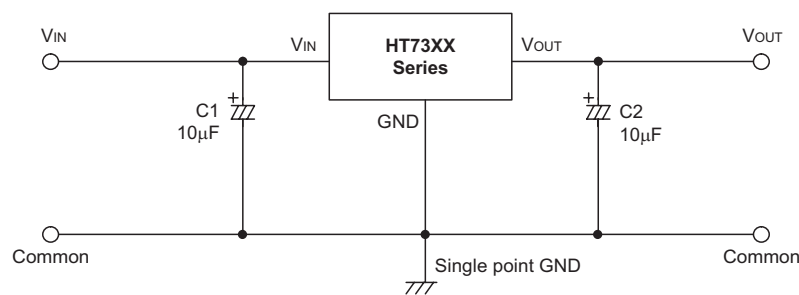
## Package Information

**TO-92 Outline Dimensions**
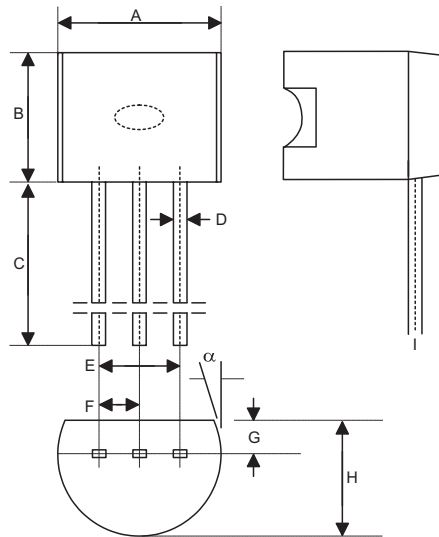


| Symbol | Dimensions in mil | | |
|---|---|---|---|
| | **Min.** | **Nom.** | **Max.** |
| A | 170 | — | 200 |
| B | 170 | — | 200 |
| C | 500 | — | — |
| D | 11 | — | 20 |
| E | 90 | — | 110 |
| F | 45 | — | 55 |
| G | 45 | — | 65 |
| H | 130 | — | 160 |
| I | 8 | — | 18 |
| $\alpha$ | 4° | — | 6°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

**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)**

Package Up,　Flat Side Up

Package Up,　Flat Side Down
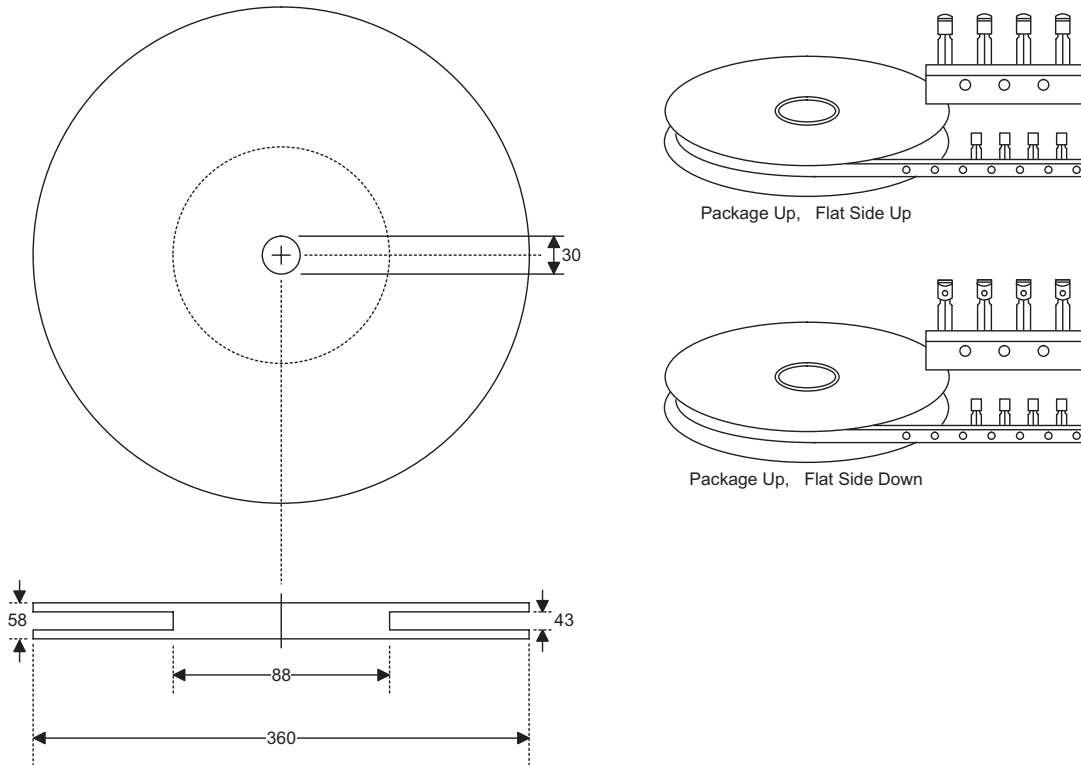
**SOT-89 Reel Dimensions**
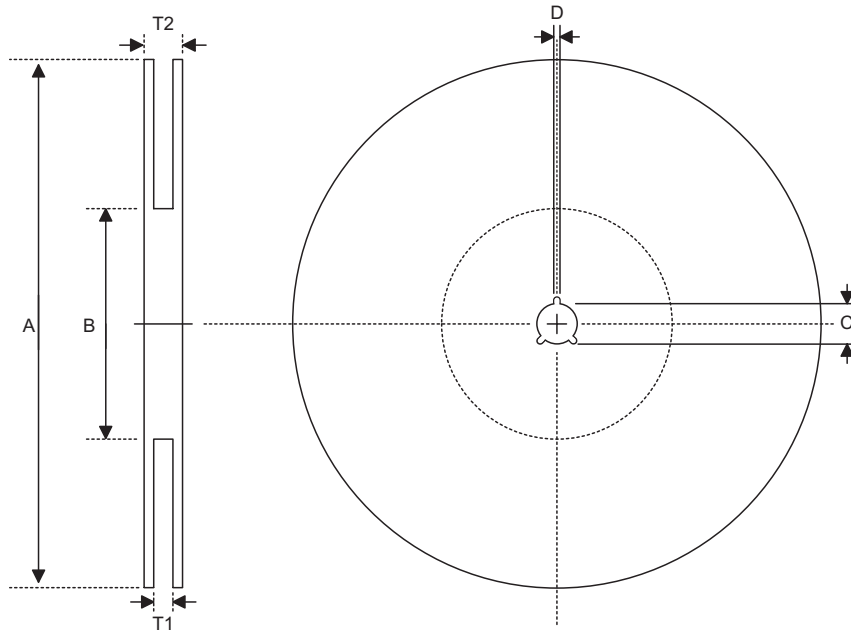


SOT-89

| 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**
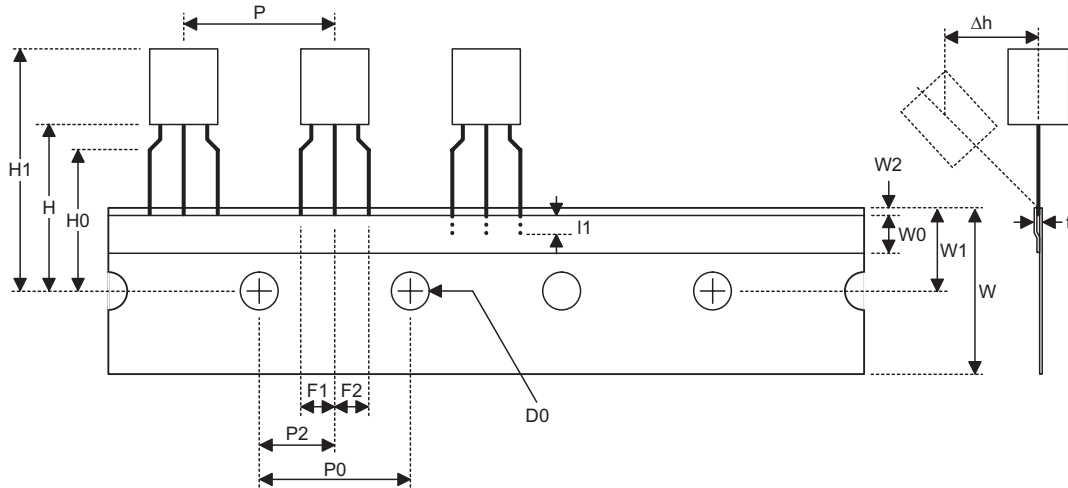


TO-92

| Symbol | Description | Dimensions in mm |
|--------|-------------|------------------|
| I1 | Taped Lead Length | (2.5) |
| P | Component Pitch | $12.7 \pm 1.0$ |
| $P_0$ | Perforation Pitch | $12.7 \pm 0.3$ |
| $P_2$ | Component to Perforation (Length Direction) | $6.35 \pm 0.4$ |
| $F_1$ | Lead Spread | 2.5+0.4 −0.1 |
| $F_2$ | Lead Spread | 2.5+0.4 −0.1 |
| $\Delta h$ | Component Alignment | $0 \pm 0.1$ |
| W | Carrier Tape Width | 18.0+1.0 −0.5 |
| $W_0$ | Hold-down Tape Width | $6.0 \pm 0.5$ |
| $W_1$ | Perforation Position | $9.0 \pm 0.5$ |
| $W_2$ | Hold-down Tape Position | (0.5) |
| $H_0$ | Lead Clinch Height | $16.0 \pm 0.5$ |
| $H_1$ | Component Height | Less than 24.7 |
| $D_0$ | Perforation Diameter | $4.0 \pm 0.2$ |
| t | Taped Lead Thickness | $0.7 \pm 0.2$ |
| H | Component Base Height | $19.0 \pm 0.5$ |

Note:   Thickness less than $0.38 \pm 0.05$mm~0.5mm

P0 Accumulated pitch tolerance: $\pm 1$mm/20pitches.

( ) Bracketed figures are for consultation only

**SOT-89 Carrier Tape Dimensions**
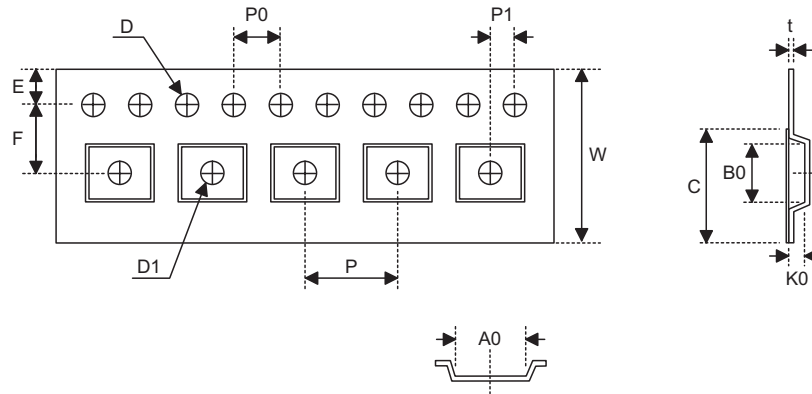


SOT-89

| 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 |

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