

# HT75XX-1

## 100mA Low Power LDO

### Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- High input voltage (up to 24V)
- High output current : 100mA ( $P_d \leq 250\text{mW}$ )
- Output voltage accuracy: tolerance  $\pm 3\%$
- TO-92, SOT-89 and SOT-25 package

### Applications

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

### General Description

The HT75XX-1 series is a set of three-terminal high current low voltage regulator implemented in CMOS technology. They can deliver 100mA output current and allow an input voltage 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.

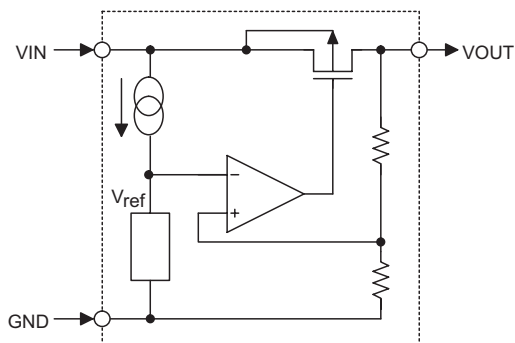
### Selection Table

| Part No. | Output Voltage | Package                   | Marking                                                        |
|----------|----------------|---------------------------|----------------------------------------------------------------|
| HT7530-1 | 3.0V           | TO-92<br>SOT-89<br>SOT-25 | 75XX-1 (for TO-92)<br>75XX-1 (for SOT-89)<br>5XX1 (for SOT-25) |
| HT7533-1 | 3.3V           |                           |                                                                |
| HT7536-1 | 3.6V           |                           |                                                                |
| HT7544-1 | 4.4V           |                           |                                                                |
| HT7550-1 | 5.0V           |                           |                                                                |

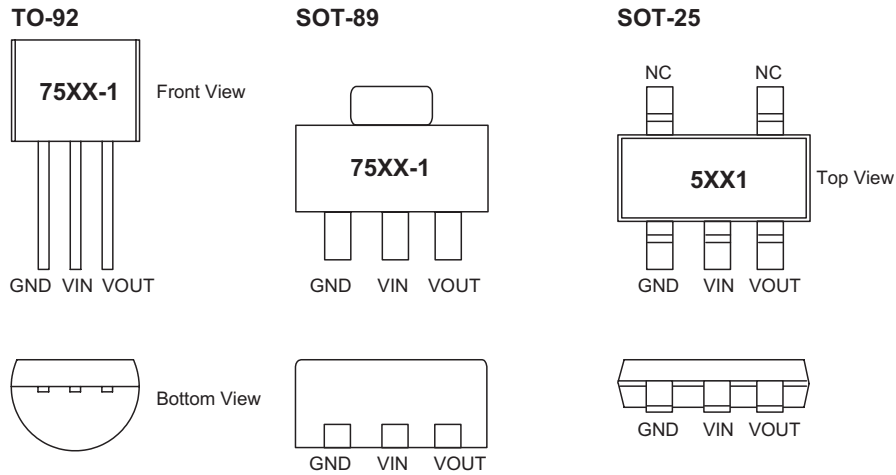
Note: "XX" stands for output voltages.

For lead free devices, TO-92 package will add a "#" mark at the end of the date code, whereas SOT-89 & SOT-25 packages will add a "#" mark at the end of the marking.

### Block Diagram



**Pin Assignment**



**Absolute Maximum Ratings**

|                              |              |                             |                |
|------------------------------|--------------|-----------------------------|----------------|
| Supply Voltage .....         | -0.3V to 26V | Storage Temperature .....   | -50°C to 125°C |
| Power Consumption (*1) ..... | 250mW        | Operating Temperature ..... | -40°C to 85°C  |
| Power Consumption (*2) ..... | 150mW        |                             |                |

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 SOT89 and TO-92

\*2: applied to SOT-25

**Electrical Characteristics**

HT7530-1, +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 Tolerance | 5V              | I <sub>OUT</sub> =10mA                                | 2.91 | 3.0   | 3.09 | V     |
| I <sub>OUT</sub>                                      | Output Current           | 5V              | —                                                     | 60   | 100   | —    | mA    |
| ΔV <sub>OUT</sub>                                     | Load Regulation          | 5V              | 1mA ≤ I <sub>OUT</sub> ≤ 50mA                         |      | 60    | 150  | mV    |
| V <sub>DIF</sub>                                      | Voltage Drop             | —               | I <sub>OUT</sub> =1mA                                 | —    | 100   | —    | mV    |
| I <sub>SS</sub>                                       | Current Consumption      | 5V              | No load                                               | —    | 2.5   | 5    | μA    |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation          | —               | 4V ≤ V <sub>IN</sub> ≤ 24V<br>I <sub>OUT</sub> =1mA   | —    | 0.2   | —    | %/V   |
| V <sub>IN</sub>                                       | Input Voltage            | —               | —                                                     | —    | —     | 24   | V     |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$                   | Temperature Coefficient  | 5V              | I <sub>OUT</sub> =10mA<br>0°C < T <sub>a</sub> < 70°C | —    | ±0.45 | —    | mV/°C |

**HT7533-1, +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 Tolerance | 5.5V            | I <sub>OUT</sub> =10mA                             | 3.201 | 3.3  | 3.399 | V     |
| I <sub>OUT</sub>                                      | Output Current           | 5.5V            | —                                                  | 60    | 100  | —     | mA    |
| ΔV <sub>OUT</sub>                                     | Load Regulation          | 5.5V            | 1mA≤I <sub>OUT</sub> ≤50mA                         | —     | 60   | 150   | mV    |
| V <sub>DIF</sub>                                      | Voltage Drop             | —               | I <sub>OUT</sub> =1mA                              | —     | 100  | —     | mV    |
| I <sub>SS</sub>                                       | Current Consumption      | 5.5V            | No load                                            | —     | 2.5  | 5     | μA    |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation          | —               | 4.5V≤V <sub>IN</sub> ≤24V<br>I <sub>OUT</sub> =1mA | —     | 0.2  | —     | %/V   |
| V <sub>IN</sub>                                       | Input Voltage            | —               | —                                                  | —     | —    | 24    | V     |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$                   | Temperature Coefficient  | 5.5V            | I <sub>OUT</sub> =10mA<br>0°C<Ta<70°C              | —     | ±0.5 | —     | mV/°C |

**HT7536-1, +3.6V Output Type**

Ta=25°C

| Symbol                                                | Parameter                | Test Conditions |                                                    | Min.  | Typ. | Max.  | Unit  |
|-------------------------------------------------------|--------------------------|-----------------|----------------------------------------------------|-------|------|-------|-------|
|                                                       |                          | V <sub>IN</sub> | Conditions                                         |       |      |       |       |
| V <sub>OUT</sub>                                      | Output Voltage Tolerance | 5.6V            | I <sub>OUT</sub> =10mA                             | 3.492 | 3.6  | 3.708 | V     |
| I <sub>OUT</sub>                                      | Output Current           | 5.6V            | —                                                  | 60    | 100  | —     | mA    |
| ΔV <sub>OUT</sub>                                     | Load Regulation          | 5.6V            | 1mA≤I <sub>OUT</sub> ≤50mA                         | —     | 60   | 150   | mV    |
| V <sub>DIF</sub>                                      | Voltage Drop             | —               | I <sub>OUT</sub> =1mA                              | —     | 100  | —     | mV    |
| I <sub>SS</sub>                                       | Current Consumption      | 5.6V            | No load                                            | —     | 2.5  | 5     | μA    |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation          | —               | 4.6V≤V <sub>IN</sub> ≤24V<br>I <sub>OUT</sub> =1mA | —     | 0.2  | —     | %/V   |
| V <sub>IN</sub>                                       | Input Voltage            | —               | —                                                  | —     | —    | 24    | V     |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$                   | Temperature Coefficient  | 5.6V            | I <sub>OUT</sub> =10mA<br>0°C<Ta<70°C              | —     | ±0.6 | —     | mV/°C |

**HT7544-1, +4.4V Output Type**

Ta=25°C

| Symbol                                                | Parameter                | Test Conditions |                                                    | Min.  | Typ. | Max.  | Unit  |
|-------------------------------------------------------|--------------------------|-----------------|----------------------------------------------------|-------|------|-------|-------|
|                                                       |                          | V <sub>IN</sub> | Conditions                                         |       |      |       |       |
| V <sub>OUT</sub>                                      | Output Voltage Tolerance | 6.4V            | I <sub>OUT</sub> =10mA                             | 4.268 | 4.4  | 4.532 | V     |
| I <sub>OUT</sub>                                      | Output Current           | 6.4V            | —                                                  | 60    | 100  | —     | mA    |
| ΔV <sub>OUT</sub>                                     | Load Regulation          | 6.4V            | 1mA≤I <sub>OUT</sub> ≤50mA                         | —     | 60   | 150   | mV    |
| V <sub>DIF</sub>                                      | Voltage Drop             | —               | I <sub>OUT</sub> =1mA                              | —     | 100  | —     | mV    |
| I <sub>SS</sub>                                       | Current Consumption      | 6.4V            | No load                                            | —     | 2.5  | 5     | μA    |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation          | —               | 5.4V≤V <sub>IN</sub> ≤24V<br>I <sub>OUT</sub> =1mA | —     | 0.2  | —     | %/V   |
| V <sub>IN</sub>                                       | Input Voltage            | —               | —                                                  | —     | —    | 24    | V     |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$                   | Temperature Coefficient  | 6.4V            | I <sub>OUT</sub> =10mA<br>0°C<Ta<70°C              | —     | ±0.7 | —     | mV/°C |

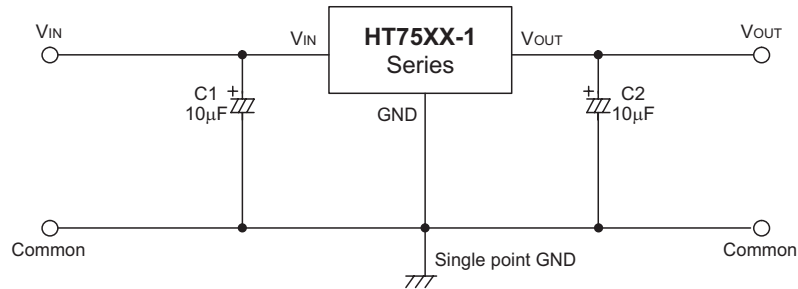
HT7550-1, +5.0V Output Type

Ta=25°C

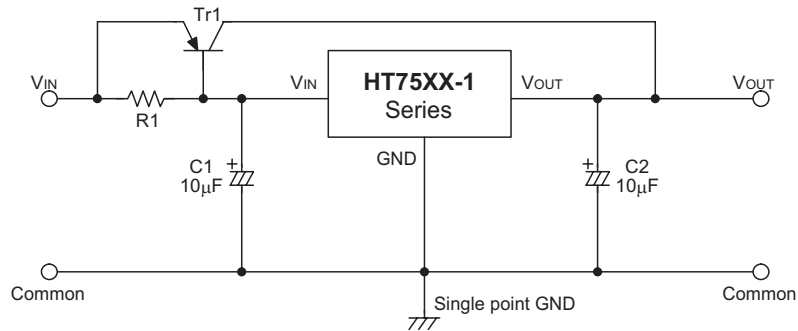
| Symbol                                                | Parameter                | Test Conditions |                                                     | Min. | Typ.  | Max. | Unit  |
|-------------------------------------------------------|--------------------------|-----------------|-----------------------------------------------------|------|-------|------|-------|
|                                                       |                          | V <sub>IN</sub> | Conditions                                          |      |       |      |       |
| V <sub>OUT</sub>                                      | Output Voltage Tolerance | 7V              | I <sub>OUT</sub> =10mA                              | 4.85 | 5.0   | 5.15 | V     |
| I <sub>OUT</sub>                                      | Output Current           | 7V              | —                                                   | 100  | 150   | —    | mA    |
| ΔV <sub>OUT</sub>                                     | Load Regulation          | 7V              | 1mA ≤ I <sub>OUT</sub> ≤ 70mA                       | —    | 60    | 150  | mV    |
| V <sub>DIF</sub>                                      | Voltage Drop             | —               | I <sub>OUT</sub> =1mA                               | —    | 100   | —    | mV    |
| I <sub>SS</sub>                                       | Current Consumption      | 7V              | No load                                             | —    | 2.5   | 5    | μA    |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | Line Regulation          | —               | 6V ≤ V <sub>IN</sub> ≤ 24V<br>I <sub>OUT</sub> =1mA | —    | 0.2   | —    | %/V   |
| V <sub>IN</sub>                                       | Input Voltage            | —               | —                                                   | —    | —     | 24   | V     |
| $\frac{\Delta V_{OUT}}{\Delta T_a}$                   | Temperature Coefficient  | 7V              | I <sub>OUT</sub> =10mA<br>0°C < Ta < 70°C           | —    | ±0.75 | —    | mV/°C |

Application Circuits

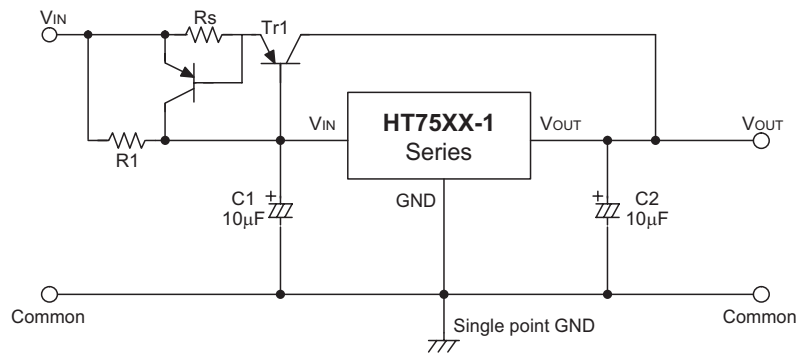
Basic Circuit



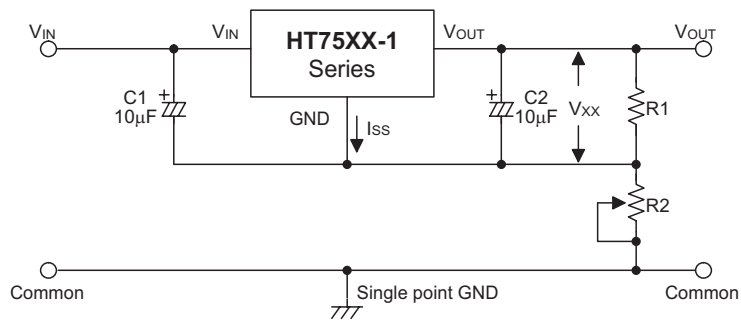
High Output Current Positive Voltage Regulator



for Tr1

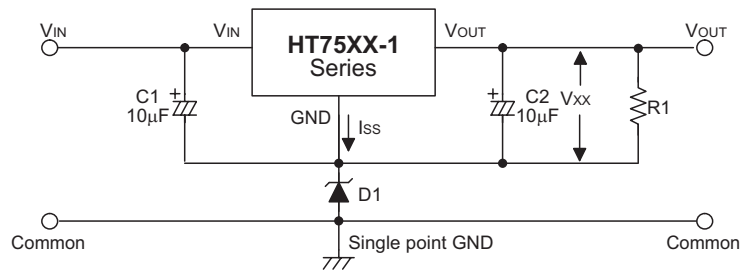


Circuit for Increasing Output Voltage



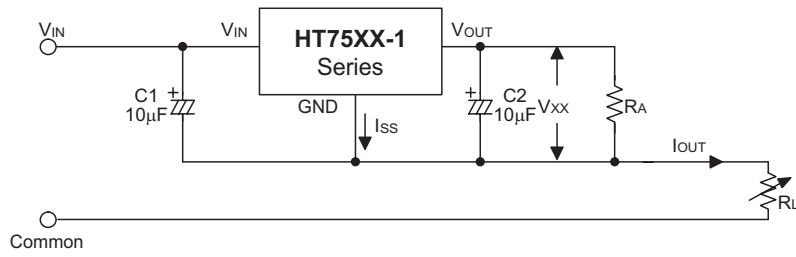
$$V_{OUT} = V_{xx} \left( 1 + \frac{R2}{R1} \right) + I_{ss} R2$$

Circuit for Increasing Output Voltage



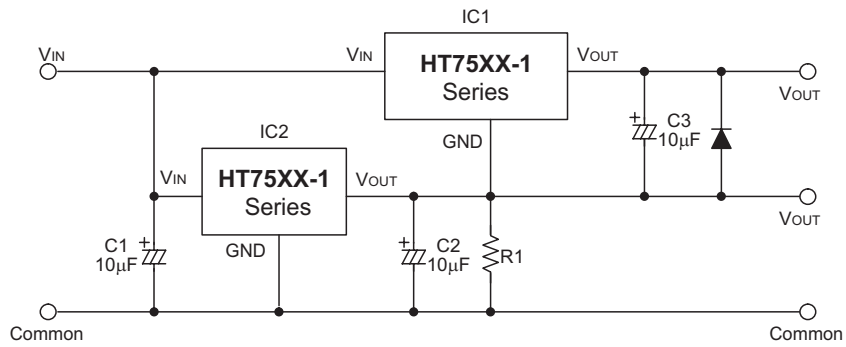
$$V_{OUT} = V_{xx} + V_{D1}$$

Constant Current Regulator



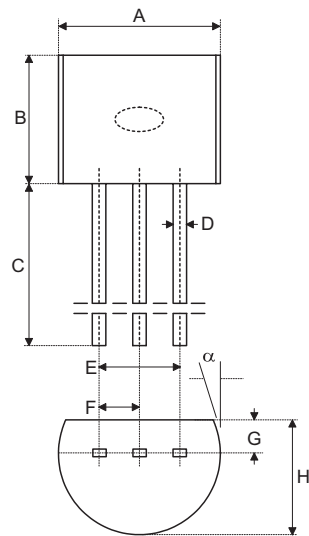
$$I_{OUT} = \frac{V_{XX}}{R_A} + I_{SS}$$

Dual Supply



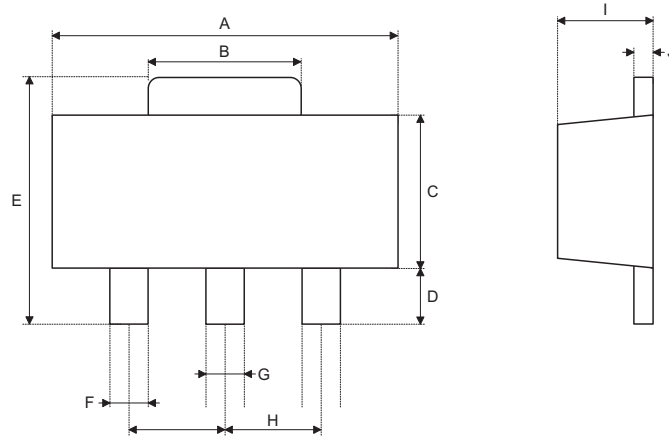
**Package Information**

**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   |
| $\alpha$ | 4°                | —    | 6°   |

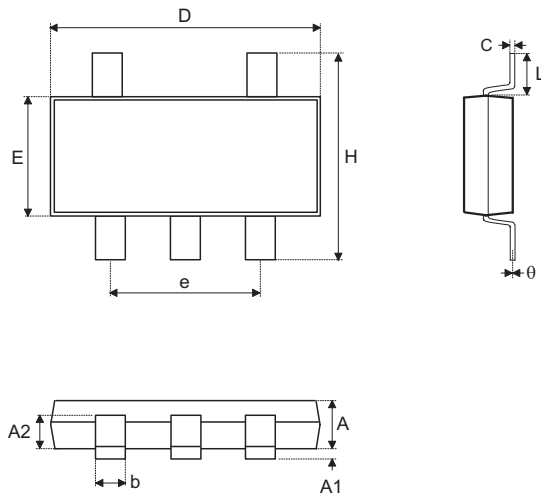
3-pin SOT-89 Outline Dimensions



| 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   |



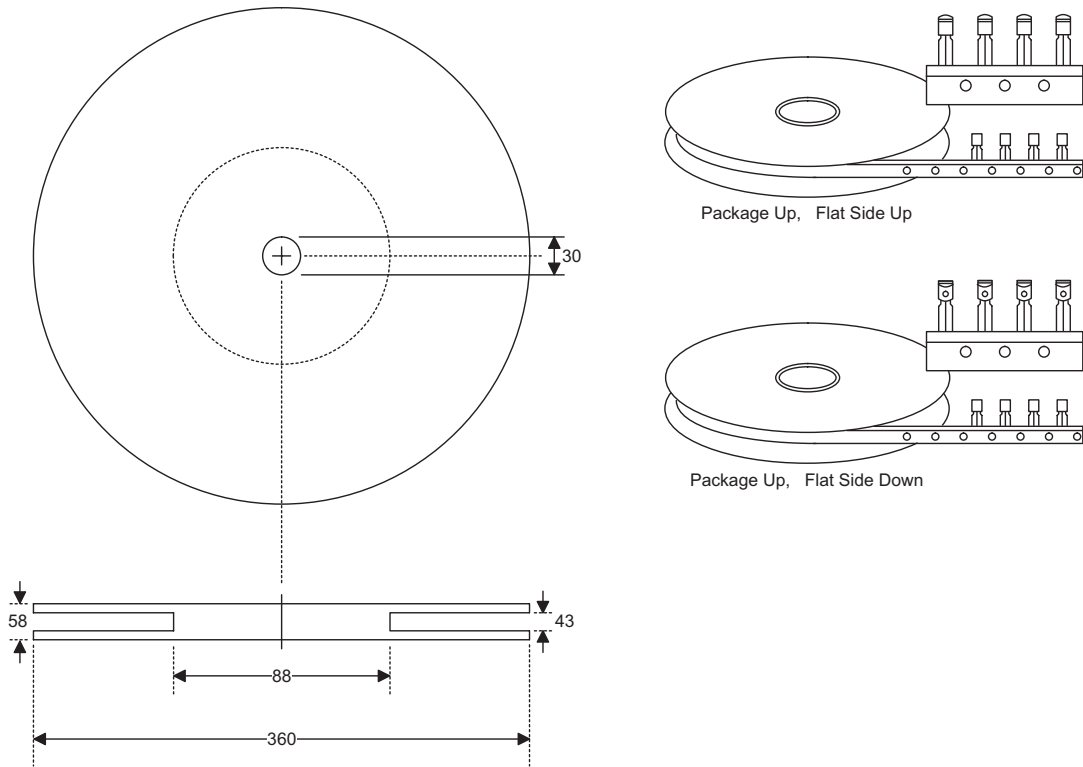
5-pin SOT-25 Outline Dimensions



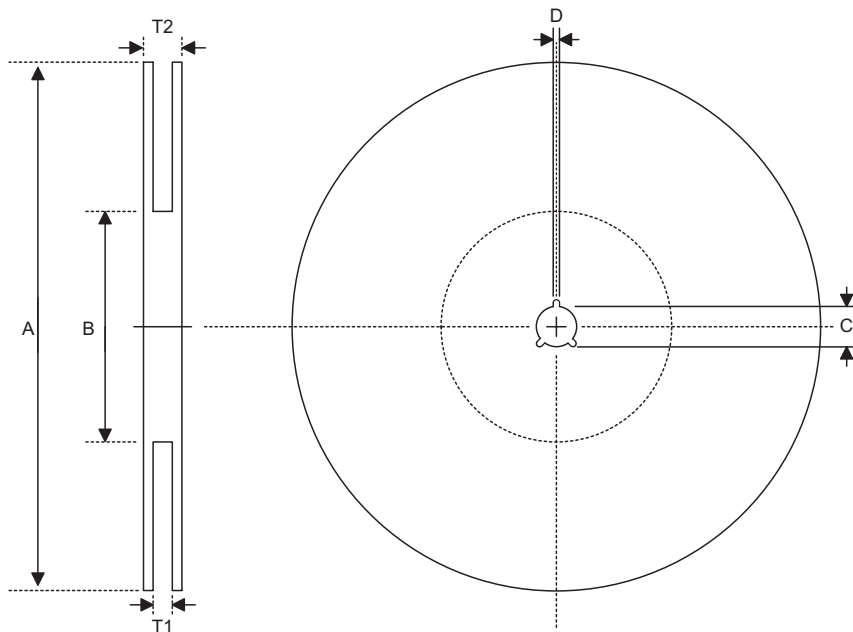
| Symbol   | Dimensions in mm |      |      |
|----------|------------------|------|------|
|          | Min.             | Nom. | Max. |
| A        | 1.00             | —    | 1.30 |
| A1       | —                | —    | 0.10 |
| A2       | 0.70             | —    | 0.90 |
| b        | 0.35             | —    | 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             | —    | —    |
| $\theta$ | 1°               | —    | 9°   |

**Product Tape and Reel Specifications**

TO-92 Reel Dimensions (Unit: mm)



SOT-89 & SOT-25 Reel Dimensions



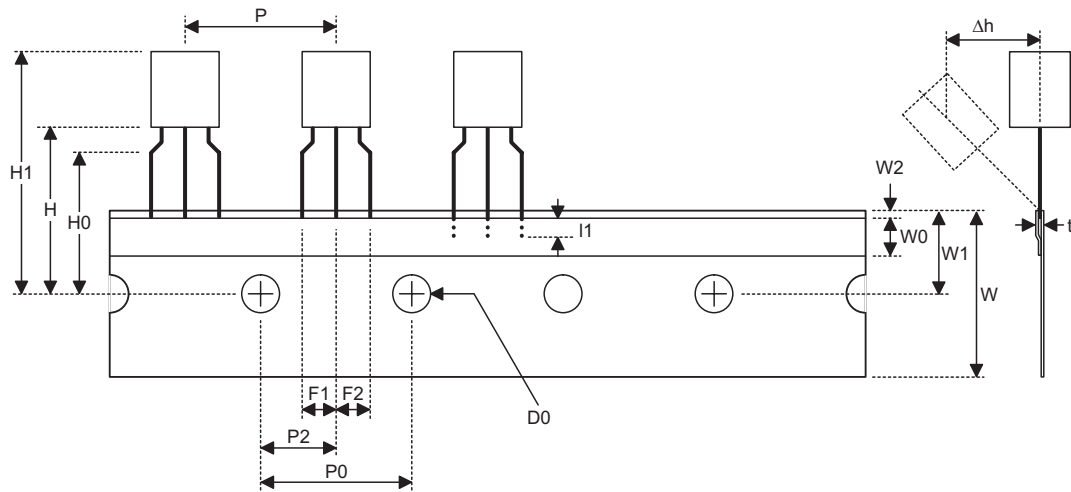
SOT-89

| 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<br>-0.0  |
| T2     | Reel Thickness        | 11.4+1.5         |

TO-92 Carrier Tape Dimensions

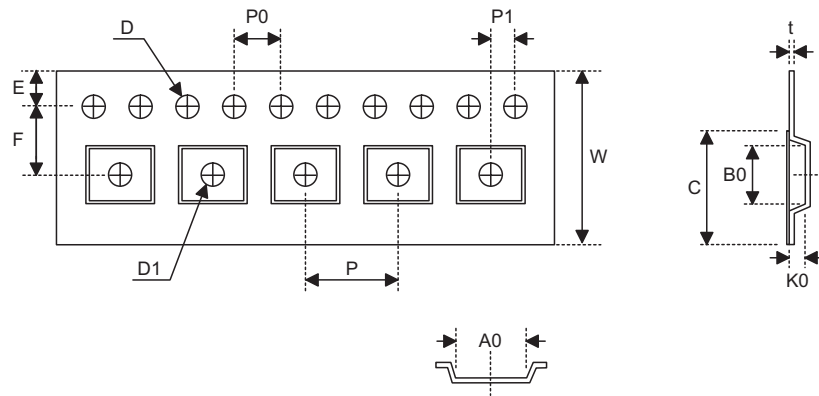


TO-92

| 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<br>-0.1  |
| F <sub>2</sub> | Lead Spread                                 | 2.5+0.4<br>-0.1  |
| Δh             | Component Alignment                         | 0±0.1            |
| W              | Carrier Tape Width                          | 18.0+1.0<br>-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 & SOT-25 Carrier Tape Dimensions



SOT-89

| Symbol | Description                              | Dimensions in mm |
|--------|------------------------------------------|------------------|
| W      | Carrier Tape Width                       | 12.0+0.3<br>-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          |
| 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                         | 5.3              |