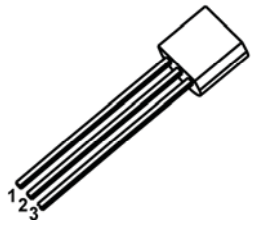
# FS13001

TRANSISTOR (NPN)

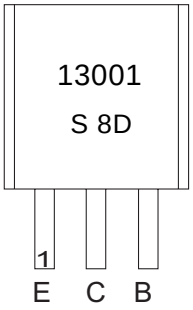
**TO – 92**




## FEATURE

- power switching applications

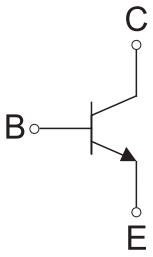
## MARKING




13001=Device code

S 8D=Code

## Equivalent Circuit



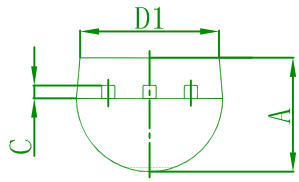

## MAXIMUM RATINGS ($T_a$=25℃ unless otherwise noted)

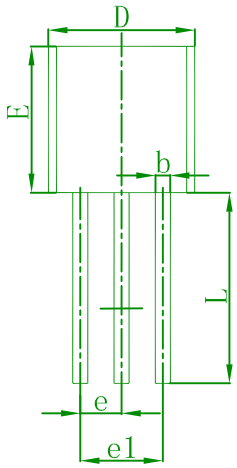
| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector -Base Voltage | 600 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | 420 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 7 | V |
| $I_C$ | Collector Current -Continuous | 0.2 | A |
| $P_C$ | Collector Power Dissipation | 0.75 | W |
| $T_J$ | Junction Temperature | 150 | ℃ |
| $T_{stg}$ | Storage Temperature | -55 ~150 | ℃ |

## ELECTRICAL CHARACTERISTICS $T_a$=25℃ unless otherwise specified

| Parameter | Symbol | Test conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Collector-base breakdown voltage** | $V_{(BR)CBO}$ | $I_C$= 100μA , $I_E$=0 | 600 | | | V |
| **Collector-emitter breakdown voltage** | $V_{(BR)CEO}$ | $I_C$= 1mA , $I_B$=0 | 400 | | | V |
| **Emitter-base breakdown voltage** | $V_{(BR)EBO}$ | $I_E$= 100μA, $I_C$=0 | 7 | | | V |
| **Collector cut-off current** | $I_{CBO}$ | $V_{CB}$= 600V , $I_E$=0 | | | 100 | μA |
| **Collector cut-off current** | $I_{CEO}$ | $V_{CE}$= 400V, $I_B$=0 | | | 200 | μA |
| **Emitter cut-off current** | $I_{EBO}$ | $V_{EB}$=7V, $I_C$=0 | | | 100 | μA |
| **DC current gain** | $h_{FE(1)}$ | $V_{CE}$= 20V, $I_C$= 20mA | 14 | | 30 | |
| | $h_{FE(2)}$ | $V_{CE}$= 10V, $I_C$= 0.25 mA | 5 | | | |
| **Collector-emitter saturation voltage** | $V_{CE(sat)}$ | $I_C$= 50mA, $I_B$= 10 mA | | | 0.5 | V |
| **Base-emitter saturation voltage** | $V_{BE(sat)}$ | $I_C$= 50 mA, $I_B$= 10mA | | | 1.2 | V |
| **Transition frequency** | $f_T$ | $V_{CE}$= 20V, $I_C$=20mA<br>f = 1MHz | 8 | | | MHz |
| **Fall time** | $t_f$ | $I_C$=50mA, $I_{B1}$=-$I_{B2}$=5mA,<br>$V_{CC}$=45V | | | 0.3 | μs |
| **Storage time** | $t_S$ | | | | 1.5 | μs |

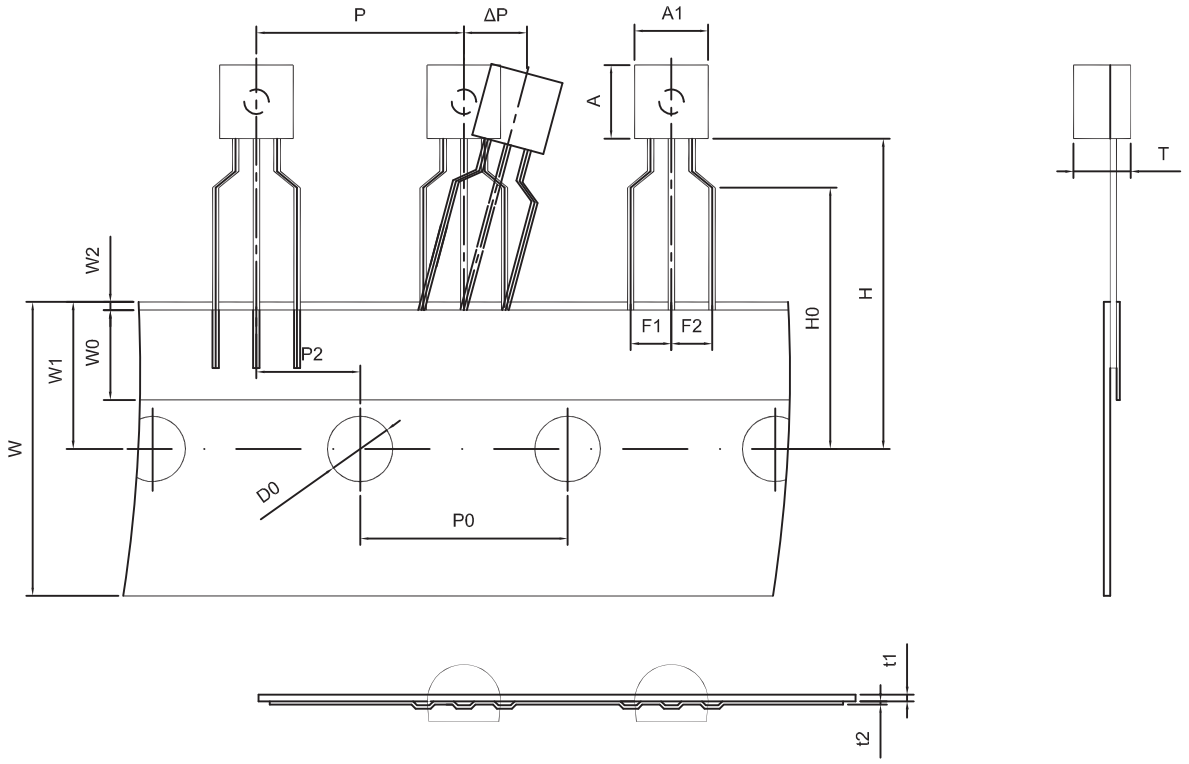
## TO-92 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | |
|---|---|---|
| | Min | Max |
| A | 3.100 | 3.800 |
| b | 0.340 | 0.550 |
| c | 0.300 | 0.510 |
| D | 4.100 | 4.900 |
| D1 | 3.700 | 4.800 |
| E | 4.300 | 4.800 |
| e | 1.270 TYP | |
| e1 | 2.440 | 2.640 |
| L | 13.100 | 14.500 |

## TO-92 Tape




| Dimiensions are in millimeter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| A1 | A | T | P | P0 | P2 | F1 | F2 | W |
| 4.5 | 4.5 | 3.5 | 12.7 | 12.7 | 6.35 | 2.5 | 2.5 | 18.0 |
| W0 | W1 | W2 | H | H0 | D0 | t1 | t2 | ΔP |
| 6.0 | 9.0 | 1.0 MAX. | 19.0 | 16.0 | 4.0 | 0.4 | 0.2 | 0 |