



TS13005

High Voltage NPN Transistor

TO-220

ITO-220

TO-252



Pin assignment:

1. Base
2. Collector
3. Emitter

$BV_{CEO} = 400V$

$BV_{CBO} = 700V$

$I_C = 4A$

$V_{CE(SAT)} = 1V @ I_C / I_B = 4A / 1A$

Features

- ✧ High voltage.
- ✧ High speed switching

Structure

- ✧ Silicon triple diffused type.
- ✧ NPN silicon transistor

Ordering Information

| Part No. | Packing | Package |
|-----------|---------|---------|
| TS13005CZ | Tube | TO-220 |
| TS13005CI | | ITO-220 |
| TS13005CP | T&R | TO-252 |

Absolute Maximum Rating (Ta = 25 °C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|-----------|--------------|------|
| Collector-Base Voltage | V_{CBO} | 700V | V |
| Collector-Emitter Voltage | V_{CEO} | 400V | V |
| Emitter-Base Voltage | V_{EBO} | 9 | V |
| Collector Current | DC | I_C | 4 |
| | Pulse | | 8 |
| Collector Power Dissipation | TO-220 | P_D | 2 |
| | ITO-220 | | 1.5 |
| | TO-252 | | 1.3 |
| Operating Junction Temperature | T_J | +150 | °C |
| Operating Junction and Storage Temperature Range | T_{STG} | - 65 to +150 | °C |

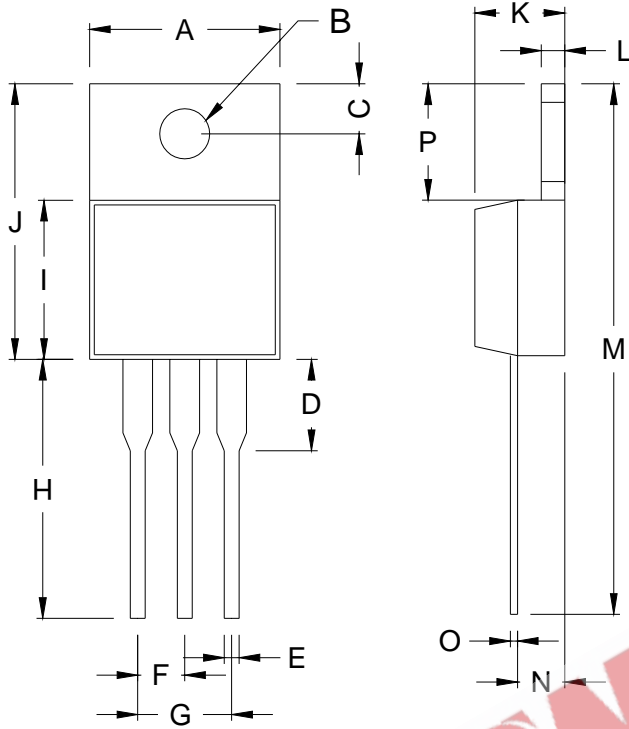
Note: 1. Single pulse, $P_w = 300\mu S$, Duty $\leq 2\%$

Electrical Characteristics (Ta = 25 °C unless otherwise noted)

| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------------|-----------------------------------|----------------|-----|-----|-----|------|
| Static | | | | | | |
| Collector-Base Voltage | $I_C = 10mA, I_B = 0$ | BV_{CBO} | 700 | | | V |
| Collector-Emitter Breakdown Voltage | $I_C = 10mA, I_E = 0$ | BV_{CEO} | 400 | | | V |
| Emitter-Base Breakdown Voltage | $I_E = 1mA, I_C = 0$ | BV_{EBO} | 9 | | | V |
| Collector Cutoff Current | $V_{CB} = 700V, I_E = 0$ | I_{CBO} | | | 10 | mA |
| Emitter Cutoff Current | $V_{EB} = 9V, I_C = 0$ | I_{EBO} | | | 1 | mA |
| Collector-Emitter Saturation Voltage | $I_C / I_B = 4A / 1A$ | $V_{CE(SAT)1}$ | | | 1 | V |
| | $I_C / I_B = 1A / 0.2A$ | $V_{CE(SAT)2}$ | | | 0.5 | |
| DC Current Gain | $V_{CE} = 5V, I_C = 2A$ | h_{FE} | 8 | | 40 | |
| Frequency | $V_{CE} = 10V, I_C = 0.5A$ | f_T | 4 | | | MHz |
| Output Capacitance | $V_{CB} = 10V, f = 0.1MHz$ | C_{ob} | | 65 | | pF |
| Turn On Time | $V_{CC} = 125V, I_C = 2A,$ | t_{ON} | | 0.8 | | uS |
| Storage Time | $I_{B1} = 0.4A, I_{B2} = - 0.4A,$ | t_{STG} | | | 4 | uS |
| Fall Time | $R_L = 62.5ohm$ | t_f | | | 0.9 | uS |

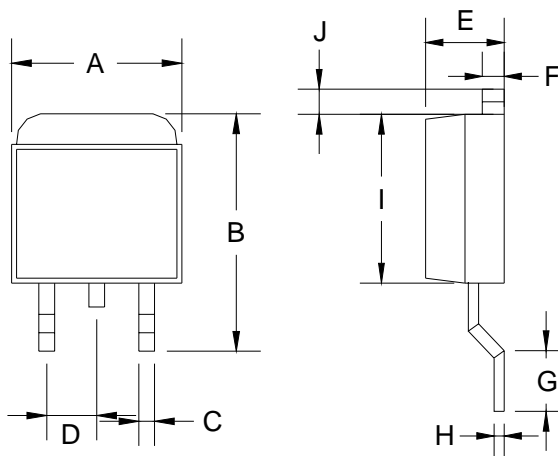
Note : pulse test: pulse width $\leq 300\mu S$, duty cycle $\leq 2\%$

TO-220 Mechanical Drawing



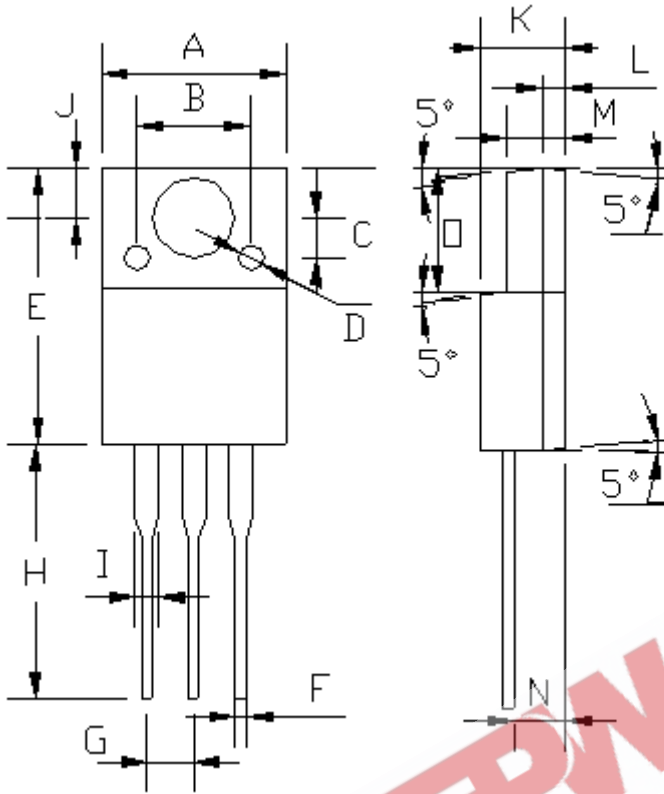
| TO-220 DIMENSION | | | | |
|------------------|-------------|--------|--------|-------|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 10.000 | 10.500 | 0.394 | 0.413 |
| B | 3.240 | 4.440 | 0.128 | 0.175 |
| C | 2.440 | 2.940 | 0.096 | 0.116 |
| D | - | 6.350 | - | 0.250 |
| E | 0.381 | 1.106 | 0.015 | 0.040 |
| F | 2.345 | 2.715 | 0.092 | 0.058 |
| G | 4.690 | 5.430 | 0.092 | 0.107 |
| H | 12.700 | 14.732 | 0.500 | 0.581 |
| I | 8.382 | 9.017 | 0.330 | 0.355 |
| J | 14.224 | 16.510 | 0.560 | 0.650 |
| K | 3.556 | 4.826 | 0.140 | 0.190 |
| L | 0.508 | 1.397 | 0.020 | 0.055 |
| M | 27.700 | 29.620 | 1.060 | 1.230 |
| N | 2.032 | 2.921 | 0.080 | 0.115 |
| O | 0.255 | 0.610 | 0.010 | 0.024 |
| P | 5.842 | 6.858 | 0.230 | 0.270 |

TO-252 Mechanical Drawing



| TO-252 DIMENSION | | | | |
|------------------|-------------|--------|--------|-------|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 6.570 | 6.840 | 0.259 | 0.269 |
| B | 9.250 | 10.400 | 0.364 | 0.409 |
| C | 0.550 | 0.700 | 0.022 | 0.028 |
| D | 2.560 | 2.670 | 0.101 | 0.105 |
| E | 2.300 | 2.390 | 0.090 | 0.094 |
| F | 0.490 | 0.570 | 0.019 | 0.022 |
| G | 1.460 | 1.580 | 0.057 | 0.062 |
| H | 0.520 | 0.570 | 0.020 | 0.022 |
| I | 5.340 | 5.550 | 0.210 | 0.219 |
| J | 1.460 | 1.640 | 0.057 | 0.065 |

ITO-220 Mechanical Drawing



| ITO-220 DIMENSION | | | | |
|-------------------|---------------|-------|----------------|-------|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 10.04 | 10.07 | 0.395 | 0.396 |
| B | 6.20 (typ.) | | 0.244 (typ.) | |
| C | 2.20 (typ.) | | 0.087 (typ.) | |
| D | ∅ 1.40 (typ.) | | ∅ 0.055 (typ.) | |
| E | 15.0 | 15.20 | 0.591 | 0.598 |
| F | 0.52 | 0.54 | 0.020 | 0.021 |
| G | 2.35 | 2.73 | 0.093 | 0.107 |
| H | 13.50 | 13.55 | 0.531 | 0.533 |
| I | 1.11 | 1.49 | 0.044 | 0.058 |
| J | 2.60 | 2.80 | 0.102 | 0.110 |
| K | 4.49 | 4.50 | 0.176 | 0.177 |
| L | 1.15 (typ.) | | 0.045 (typ.) | |
| M | 3.03 | 3.05 | 0.119 | 0.120 |
| N | 2.60 | 2.80 | 0.102 | 0.110 |
| O | 6.55 | 6.65 | 0.258 | 0.262 |