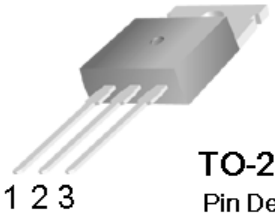
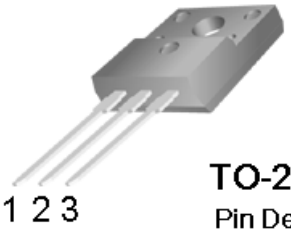
# High Voltage NPN Power Transistor




**TO-220**
Pin Definition
1. Base
2. Collector
3. Emitter




**TO-220F**
Pin Definition
1. Base
2. Collector
3. Emitter

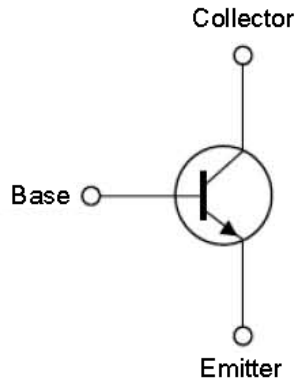
## Features

- High Voltage
- High Switch Speed
- $BV_{CEO}$ : 400V
- $BV_{CBO}$ : 700V
- $I_C$ : 4A
- $V_{CE(SAT)}$ : 1.3V @ $I_C$ / $I_B$ = 2.5A / 0.6A

## Application

- Electronic Ballasts
- Adapter
- Lighting

INTERNAL SCHMATIC DIAGRAM




## ABSOLUTE MAXIMUM RATINGS ( Ta = 25℃ )

| Parameter | Symbol | Max rating | Unit |
|---|---|---|---|
| Collector-Base Voltage | VCBO | 700 | V |
| Collector-Emitter Voltage | VCEO | 400 | V |
| Emitter-Base Voltage | VEBO | 9 | V |
| Collector Current (DC) | $I_C$ | 4 | A |
| Collector Current (Pulse) | | 8 | |
| Base Current (DC) | $I_B$ | 2 | A |
| Base Current (Pulse) | | 4 | |
| Total Power Dissipation (TO-220) | $P_{Btot}$ | 75 | W |
| Total Power Dissipation (TO-220F) | | 30 | |
| Junction Temperature | $T_J$ | +150 | ℃ |
| Operating Junction and Storage Temperature Range | $T_{STG}$ | -55 ~ +150 | ℃ |

Note: Single Pulse. Pw=300uS, Duty≦ 2%

## ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-Base Voltage | BVCBO | IC = 1mA, IB=0 | 700 | – | – | V |
| Collector-Emitter Breakdown Voltage | BVCEO | IC = 10mA, IE=0 | 400 | – | – | V |
| Emitter- Base Breakdown Voltage | BVEBO | IE = 0.1mA, IC=0 | 9 | – | – | V |
| Collector Cutoff Current | ICEO | VCE = 400V, IE=0 | – | – | 250 | uA |
| Collector Cutoff Current | ICBO | VCB = 700V, IE=0 | – | – | 1 | mA |
| Emitter Cutoff Current | IEBO | VEB = 9V, IC=0 | – | – | 1 | mA |
| DC Current Gain | hFE1 | VCE = 5V, IC=10mA | 15 | – | 32 | V |
| | hFE2 | VCE = 5V, IC=2.5A | 8 | – | 28 | |
| Collector-Emitter Saturation Voltage | VCE(SAT1) | IC = 0.8A, IB =0.1A | – | – | 1.1 | V |
| | VCE(SAT2) | IC = 2.5A, IB =0.6A | – | – | 1.3 | |
| Base-Emitter Saturation Voltage | VBE(SAT1) | IC = 1A, IB =0.2A | – | – | 1.2 | V |
| | VBE(SAT2) | IC = 2.5A, IB =0.5A | – | – | 1.3 | |
| Turn On Time | $t_{on}$ | Vcc = 125V, Ic = 2A, IB1=1B2=0.4A, tp=25uS Duty Cycle ≦ 1% | – | 0.2 | 0.5 | uS |
| Storage Time | $t_{STG}$ | | – | 2.2 | 3 | uS |
| Fall Time | $t_f$ | | – | 0.2 | 0.5 | uS |

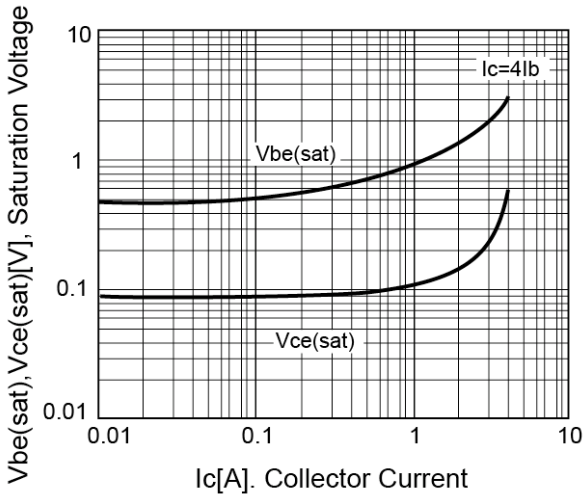
## Dynamic

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Frequency | $f_T$ | VCE = 10V, IC=0.5A | 4 | – | – | MHz |
| Output Capacitance | Cob | VCB = 10V, f=0.1MHz | – | 65 | – | pF |

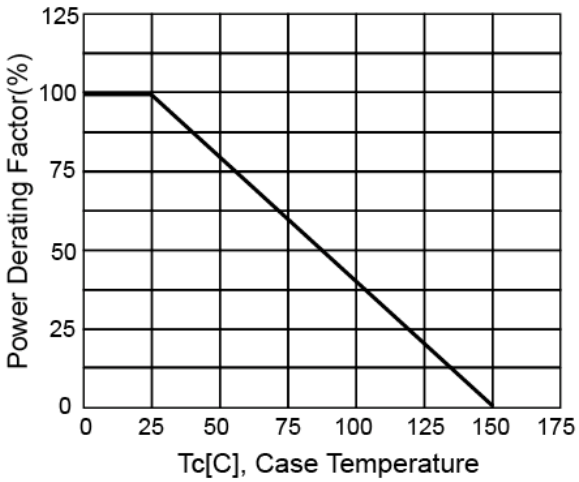
Note: Pulse test: pulse width ≦ 300uS, duty cycle ≦ 2%

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

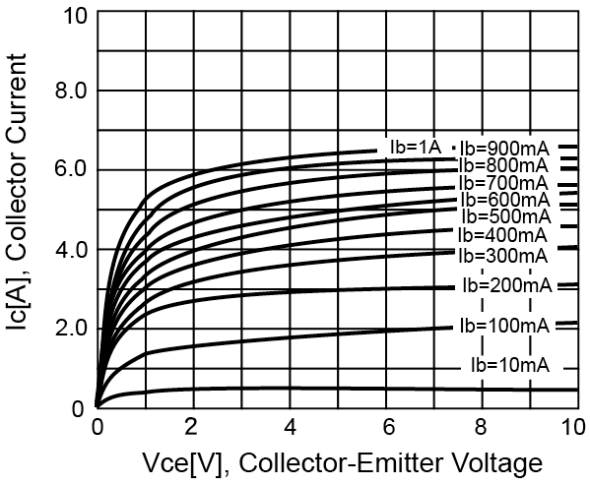
**$V_{CE(SAT)}$ v.s. $V_{BE(SAT}$**



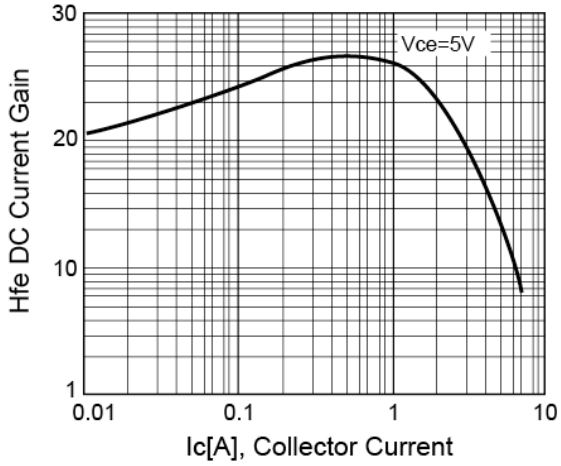

**Power Derating**




**Static Characteristics**




**DC Current Gain**




**Reverse Bias SOA**

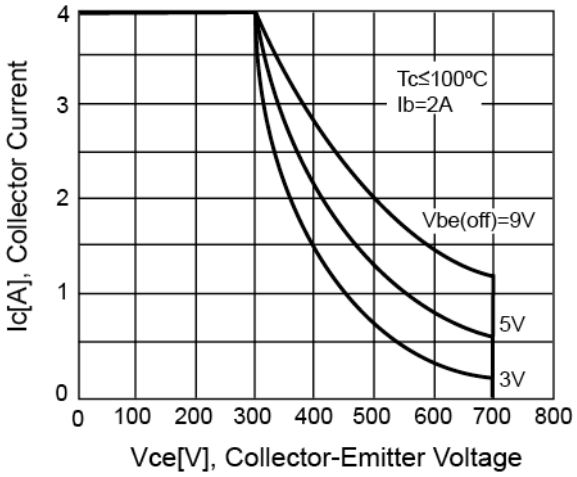
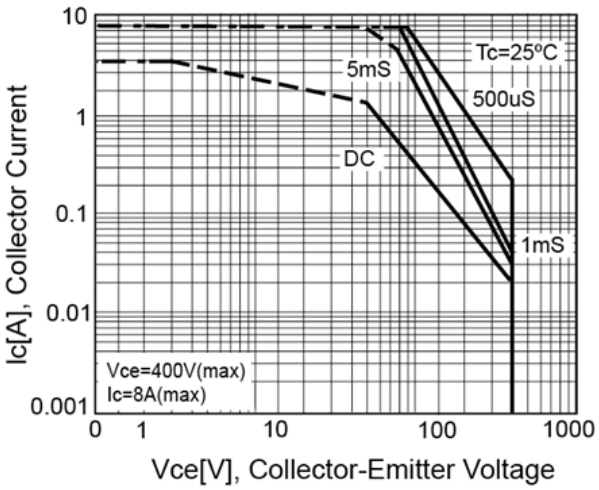


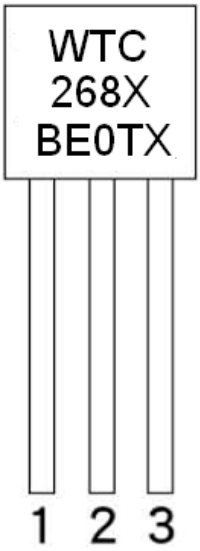

**Figure 6. Safety Operating Area**



## Ordering Information

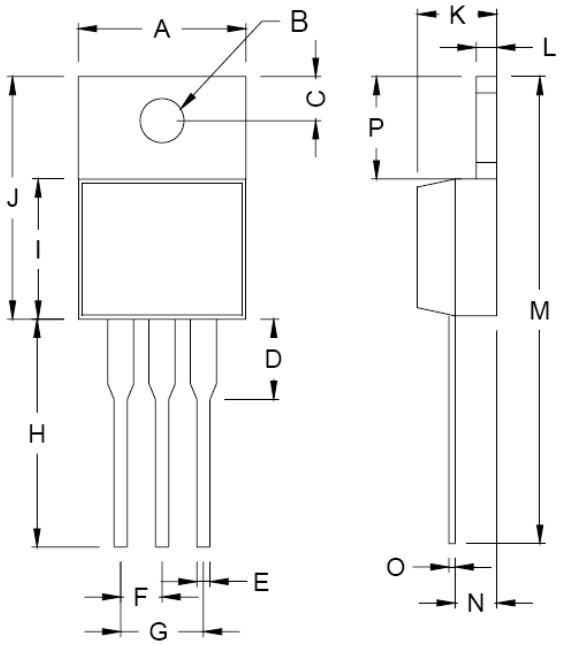
| Type NO | Marking | Package Code |
|---|---|---|
| WTX268 | 268X | TO-220 |

## Marking and Pin Define




| | | | |
|---|---|---|---|
| First Line | WTC | Company Name | |
| Second Line | 268X | Product Code | |
| Third Line | B E 0 T X | 1st (Year Code) | A-2010 B-2011 C-2012 ... |
| | | 2nd (Month Code) | A-Jan, B-Feb, C-Mar, D-Apr, E-May, F-Jun, G-Jul, H-Aug, I-Sep, J-Oct, K-Nov, L-Dec |
| | | 3rd (Lot Code) | 0~1 , A~9 |
| | | 4th (Product Code) | M - MOS , T - Transistor |
| | | 5th (Package Code) | I - TO251, D - TO252 , L - TO92, M - TO126, X - TO220, F - TO220F |
| | | 6th (Spec Code) | (Reserve) |

## TO-220 Package Dimension

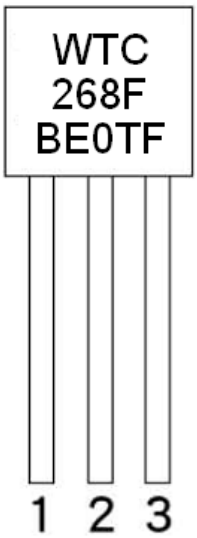



| TO-220 DIMENSION | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 10.000 | 10.500 | 0.394 | 0.413 |
| B | 3.740 | 3.910 | 0.147 | 0.154 |
| C | 2.440 | 2.940 | 0.096 | 0.116 |
| D | - | 6.350 | - | 0.250 |
| E | 0.75 | 0.85 | 0.029 | 0.033 |
| F | 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 |
| J | 14.224 | 16.510 | 0.560 | 0.650 |
| K | 3.556 | 4.826 | 0.140 | 0.190 |
| L | 1.285 | 1.315 | 0.050 | 0.051 |
| 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 |

## Ordering Information

| Type NO | Marking | Package Code |
|---|---|---|
| WTF268 | 268F | TO-220F |

## Marking and Pin Define

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| | | 3rd (Lot Code) | 0~1 , A~9 |
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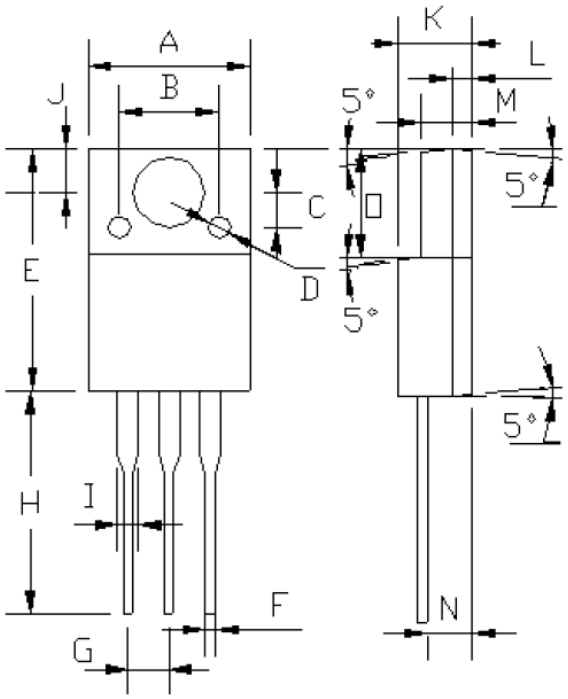
## TO-220F Package Dimension




| 220F DIMENSION | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 9.96 | 10.36 | 0.392 | 0.407 |
| B | 6.20 (typ.) | | 0.244 (typ.) | |
| C | 2.20 (typ.) | | 0.087 (typ.) | |
| D | 1.40 (typ.) | | 0.055 (typ.) | |
| E | 15.07 | 16.07 | 0.593 | 0.632 |
| F | 0.80 (typ.) | | 0.031 (typ.) | |
| G | 2.44 | 2.64 | 0.096 | 0.104 |
| H | 13.08 | 13.48 | 0.514 | 0.530 |
| I | 1.47 (max.) | | 0.057 (max.) | |
| J | 3.20 | 3.40 | 0.125 | 0.133 |
| K | 4.60 | 4.80 | 0.181 | 0.188 |
| L | 1.15 (typ.) | | 0.045 (typ.) | |
| M | 2.44 | 2.64 | 0.096 | 0.104 |
| N | 2.60 | 2.80 | 0.102 | 0.110 |
| O | 6.55 | 6.65 | 0.258 | 0.262 |