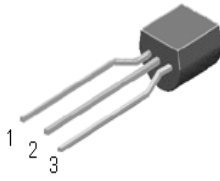


## High Voltage NPN Transistor



### TO-92

#### Pin Definition

1. Emitter
2. Collector
3. Base



### TO-251

#### Pin Definition

1. Base
2. Collector
3. Emitter

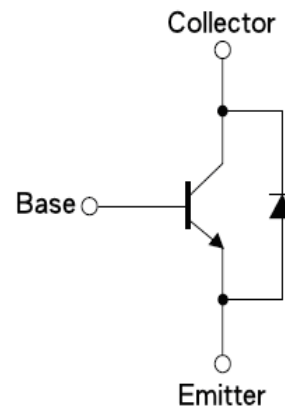
## Features

- High Voltage
- High Switch Speed
- $BV_{CEO} : 450V$
- $BV_{CBO} : 850V$
- $I_C : 1.5A$
- $V_{CE(SAT)} : 0.5V @ I_C / I_B = 0.5A / 0.1A$
- Silicon Triple Diffused Type

## Application

- Electronic Ballasts
- Adapter
- Charger
- Lighting

## INTERNAL SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS ( $T_c = 25^\circ C$ )

| Parameter  | Symbol | Max Rating | Unit |
|--|--------|------------|------|
| Collector-Base Voltage                           | VCBO   | 850        | V    |
| Collector-Emitter Voltage                        | VCEO   | 450        | V    |
| Emitter-Base Voltage                             | VEBO   | 9          | V    |
| Collector Current(DC)                            | IC     | 1.5        | A    |
| Collector Current(Pulse)                         | ICP    | 3          | A    |
| Total Power Dissipation(TO92)                    | Ptot   | 1.96       | W    |
| Total Power Dissipation(TO251)                   |        | 30         |      |
| Junction Temperature                             | TJ     | 150        | °C   |
| Operating Junction and Storage Temperature Range | TSTG   | -55 ~ +150 | °C   |

**ELECTRICAL CHARACTERISTICS ( T<sub>c</sub> = 25°C )**

| Parameter                            | Symbol    | Test Condition       | Min | Typ | Max | Unit |
|--------------------------------------|-----------|----------------------|-----|-----|-----|------|
| Collector-Base Voltage               | BVCBO     | IC = 0.5mA, IB=0     | 850 | —   | —   | V    |
| Collector-Emitter Breakdown Voltage  | BVCEO     | IC = 5mA, IE=0       | 450 | —   | —   | V    |
| Emitter- Base Breakdown Voltage      | BVEBO     | IE = 0.5mA, IC=0     | 9   | —   | —   | V    |
| Collector Cutoff Current             | ICBO      | VCB = 800V, IE=0     | —   | —   | 10  | μA   |
| Emitter Cutoff Current               | IEBO      | VEB = 9V, IC=0       | —   | —   | 0.5 | μA   |
| DC Current Gain                      | hFE1      | VCE = 5V, IC=1mA     | 10  | —   | —   |      |
|                                      | hFE2      | VCE = 5V, IC=300mA   | 20  | —   | 40  |      |
|                                      | hFE3      | VCE = 5V, IC=1A      | 5   | —   | —   |      |
| Collector-Emitter Saturation Voltage | VCE(SAT1) | IC/IB = 0.5A / 0.1A  | —   | —   | 0.8 | V    |
|                                      | VCE(SAT2) | IC/IB = 1.5A / 0.5A  | —   | —   | 2.5 |      |
| Base-Emitter Saturation Voltage      | VBE(SAT1) | IC/IB = 0.5A / 0.1A  | —   | —   | 1.5 | V    |
|                                      | VBE(SAT2) | IC/IB = 1.0A / 0.25A | —   | —   | 3.0 |      |

**Dynamic**

|                    |                 |                   |   |    |   |     |
|--------------------|-----------------|-------------------|---|----|---|-----|
| Frequency          | f <sub>r</sub>  | VCE=10V, IC=0.1A  | 4 | —  | — | MHz |
| Output Capacitance | C <sub>ob</sub> | VCB=10V, f=01.MHz | — | 21 | — | pF  |

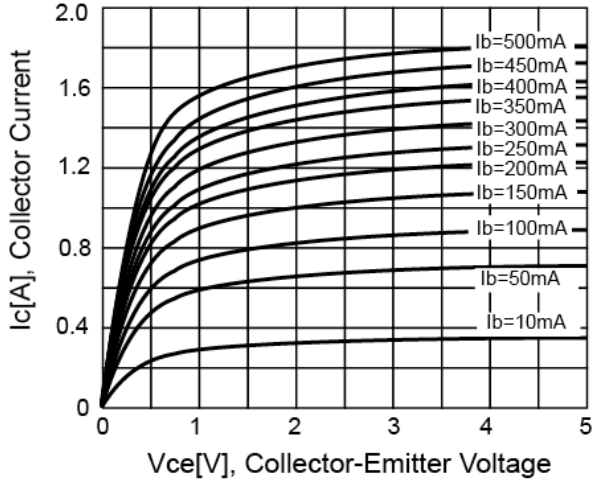
**Resistive Load Switching Time (Ratings)**

|              |                  |  |   |      |     |    |
|--------------|------------------|--|---|------|-----|----|
| Delay Time   | t <sub>d</sub>   | V <sub>cc</sub> =125V, IC=1A,<br>IB1=IB2=0.2A,<br>tp=25uS<br>Duty Cycle ≤ 1% | — | 0.05 | 0.2 | uS |
| Rise Time    | t <sub>r</sub>   |  | — | 1.1  | —   | uS |
| Storage Time | t <sub>STG</sub> |  | — | 2    | 4   | uS |
| Fall Time    | t <sub>f</sub>   |  | — | 0.4  | 0.7 | uS |

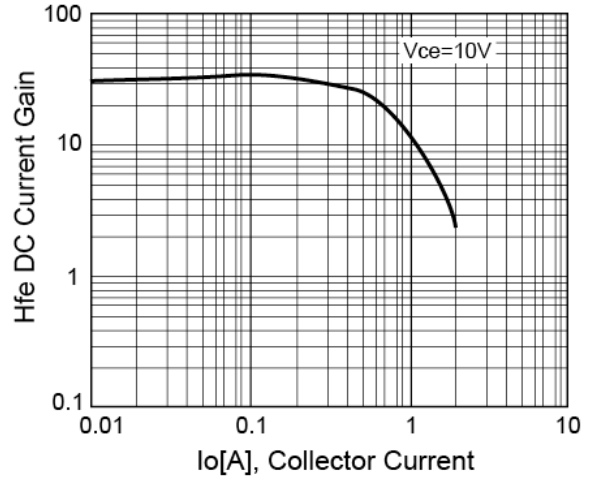
\*Note:pulse test: pulse width ≤ 300uS, duty cycle ≤ 2%

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

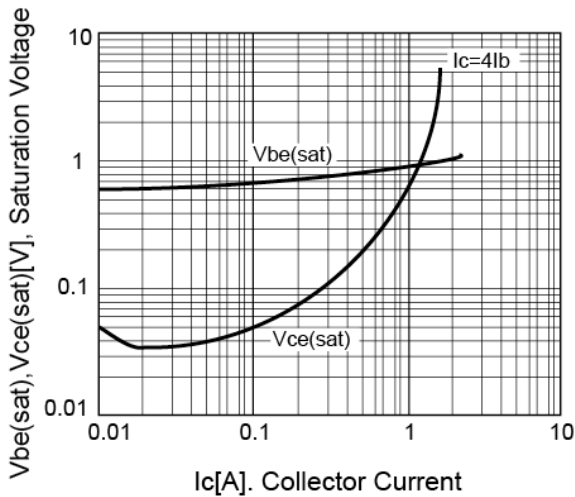
**Figure 1. Static Characteristics**



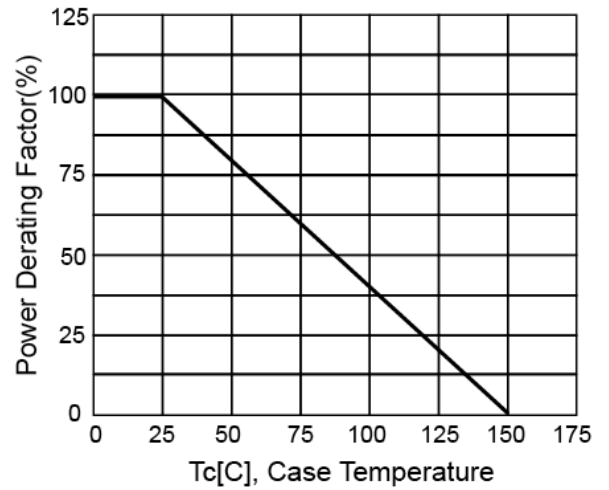
**Figure 2. DC Current Gain**



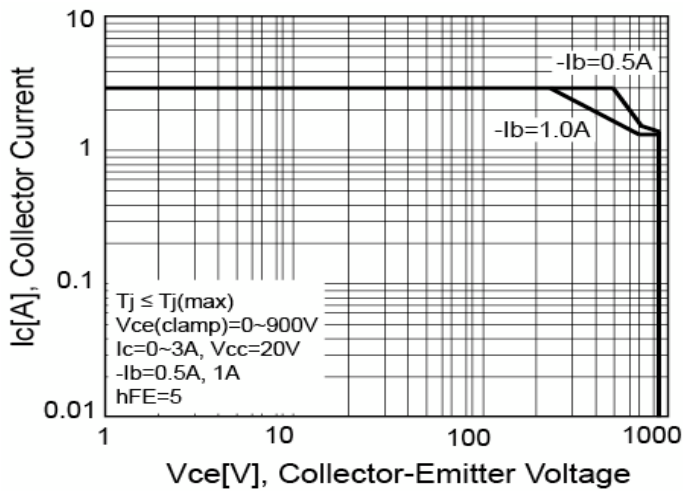
**Figure 3.  $V_{CE(SAT)}$  V.S.  $V_{BE(SAT)}$**



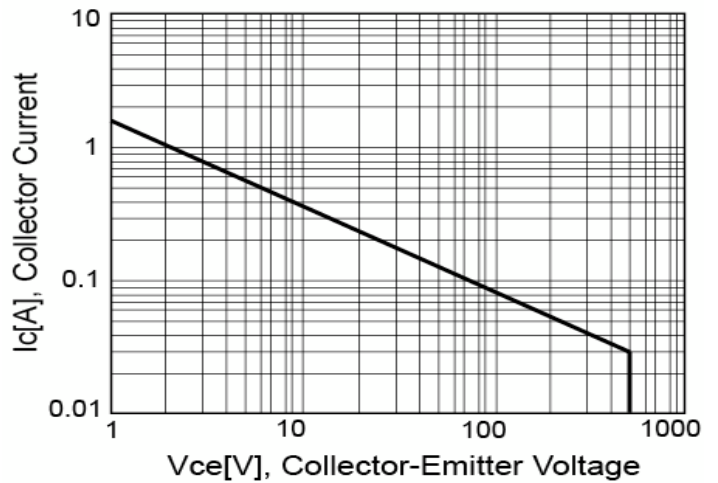
**Figure 4. Power Derating**



**Figure 5. Reverse Bias SOA**



**Figure 6. Safety Operating Area**



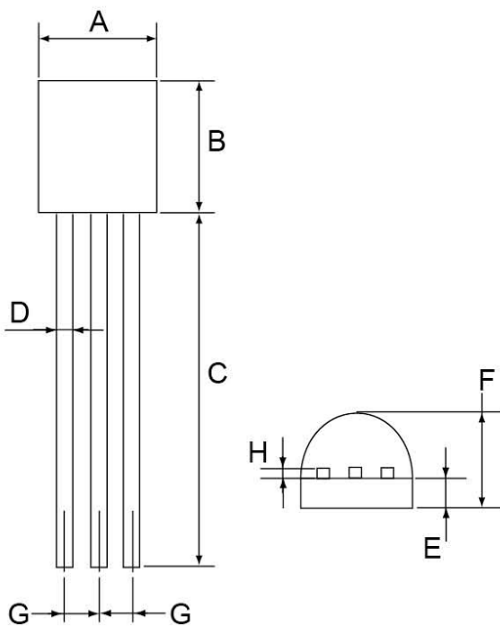
### Ordering Information

| Type NO | Marking | Package Code |
|---------|---------|--------------|
| WTBV39L | BV39L   | TO-92        |

### Marking and Pin Define

|             |  |                    |   |
|-------------|--|--------------------|---|
| First Line  | WTC  | Company Name       |   |
| Second Line | BV39L  | Product Code       |   |
| Third Line  | <u>B</u> <u>K</u> <u>0</u> <u>T</u> <u>L</u> | 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)     | 0~9, A~Z  |
|             |  | 4th (Product Code) | M - MOS, T - Transistor, L - Linear   |
|             |  | 5th (Package Code) | I - TO251, D - TO252, L - TO92, M - TO126, X - TO220, F - TO220F, Y - SOT89, S - SOP8 |
|             |  | 6th (Spec Code)    | (Reserve)   |

### TO-92 Package Dimension



| DIM | TO-92 DIMENSION |      |        |       |
|-----|-----------------|------|--------|-------|
|     | MILLIMETERS     |      | INCHES |       |
|     | MIN             | MAX  | MIN    | MAX   |
| A   | 4.0             | 4.7  | 0.157  | 0.185 |
| B   | 4.3             | 4.8  | 0.169  | 0.189 |
| C   | 12.8            | 13.8 | 0.522  | 0.56  |
| D   | 0.4             | 0.5  | 0.015  | 0.020 |
| E   | 1.05            | 1.28 | 0.41   | 0.5   |
| F   | 3.05            | 3.7  | 0.12   | 0.146 |
| G   | 1.27            | 1.31 | 0.05   | 0.051 |
| H   | 0.29            | 0.43 | 0.011  | 0.017 |

### Ordering Information

| Type NO | Marking | Package Code |
|---------|---------|--------------|
| WTI39   | 39I     | TO-251S      |

### Marking and Pin Define

|             |           |                    |  |
|-------------|-----------|--------------------|--|
| First Line  | WTC       | Company Name       |  |
| Second Line | 39I       | Product Code       |  |
| Third Line  | A J 0 T M | 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)     | 0~9 , A~Z  |
|             |           | 4th (Product Code) | M - MOS , T - Transistor, L - Linear   |
|             |           | 5th (Package Code) | I - TO251, D - TO252 , L - TO92, M - TO126, X - TO220, F - TO220F, Y - SOT89, S - SOP8 |
|             |           | 6th (Spec Code)    | (Reserve)  |

