

# PNP SILICON PLANAR MEDIUM POWER DARLINGTON TRANSISTORS

## ZTX704 ZTX705

ISSUE 3 – MAY 94

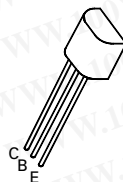
### FEATURES

- \* 120 Volt  $V_{CEO}$
- \* 1 Amp continuous current
- \* Gain of 3K at  $I_C=1$  Amp
- \*  $P_{tot}=1$  Watt

### APPLICATIONS

- \* Lamp, solenoid and relay drivers

勝特力材料 886-3-5753170  
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E-Line  
TO92 Compatible

### ABSOLUTE MAXIMUM RATINGS.

| PARAMETER  | SYMBOL         | ZTX704 | ZTX705      | UNIT       |
|--|----------------|--------|-------------|------------|
| Collector-Base Voltage   | $V_{CBO}$      | -120   | -140        | V          |
| Collector-Emitter Voltage  | $V_{CEO}$      | -100   | -120        | V          |
| Emitter-Base Voltage   | $V_{EBO}$      |        | -10         | V          |
| Peak Pulse Current   | $I_{CM}$       |        | -4          | A          |
| Continuous Collector Current   | $I_C$          |        | -1          | A          |
| Power Dissipation at $T_{amb} = 25^\circ\text{C}$<br>derate above $25^\circ\text{C}$ | $P_{tot}$      |        | 1<br>5.7    | W<br>mW/°C |
| Operating and Storage Temperature Range  | $T_j; T_{stg}$ |        | -55 to +200 | °C         |

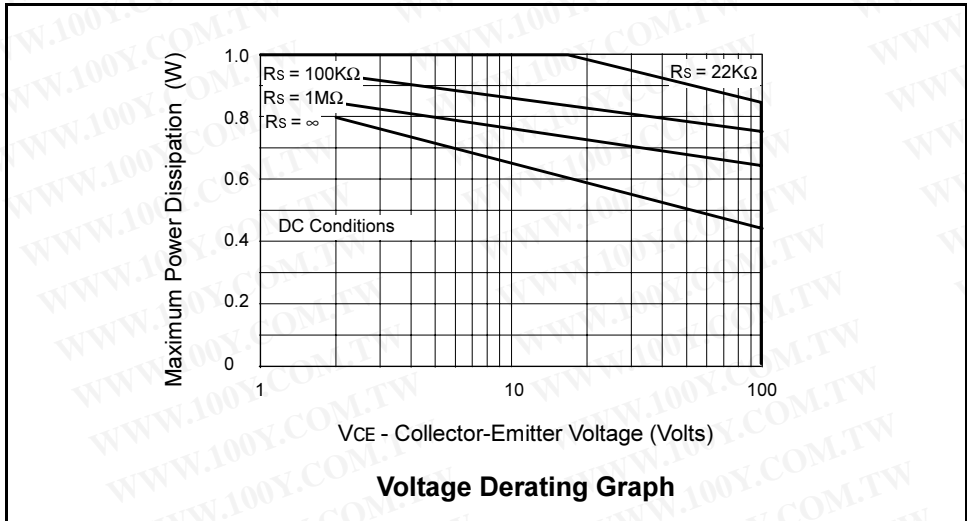
### ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^\circ\text{C}$ unless otherwise stated).

| PARAMETER                            | SYMBOL         | ZTX704 |              | ZTX705 |              | UNIT                           | CONDITIONS.  |
|--------------------------------------|----------------|--------|--------------|--------|--------------|--------------------------------|--|
|                                      |                | MIN.   | MAX.         | MIN.   | MAX.         |                                |  |
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$  | -120   |              | -140   |              | V                              | $I_C=-100\mu\text{A}$  |
| Collector-Emitter Breakdown Voltage  | $V_{CEO(SUS)}$ | -100   |              | -120   |              | V                              | $I_C=-10\text{mA}^*$   |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$  | -10    |              | -10    |              | V                              | $I_E=-100\mu\text{A}$  |
| Collector Cut-Off Current            | $I_{CBO}$      |        | -0.1<br>-10  |        | -0.1<br>-10  | $\mu\text{A}$<br>$\mu\text{A}$ | $V_{CB}=-100\text{V}$<br>$V_{CB}=-120\text{V}$<br>$V_{CB}=-100\text{V}, T_{amb}=100^\circ\text{C}$<br>$V_{CB}=-120\text{V}, T_{amb}=100^\circ\text{C}$ |
| Collector Cut-Off Current            | $I_{CES}$      |        | -10          |        | -10          | $\mu\text{A}$                  | $V_{CES}=-80\text{V}$  |
| Emitter Cut-Off Current              | $I_{EBO}$      |        | -0.1         |        | -0.1         | $\mu\text{A}$                  | $V_{EB}=-8\text{V}$  |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$  |        | -1.3<br>-2.5 |        | -1.3<br>-2.5 | V<br>V                         | $I_C=-1\text{A}, I_B=-1\text{mA}^*$<br>$I_C=-2\text{A}, I_B=-2\text{mA}^*$   |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$  |        | -1.8         |        | -1.8         | V                              | $I_C=-1\text{A}, I_B=-10\text{mA}^*$   |
| Base-Emitter Turn-On Voltage         | $V_{BE(on)}$   |        | -1.7         |        | -1.7         | V                              | $I_C=-1\text{A}, V_{CE}=-5\text{V}^*$  |

**ELECTRICAL CHARACTERISTICS (at  $T_{amb} = 25^{\circ}C$ ).**

| PARAMETER                             | SYMBOL    | ZTX704               |      | ZTX705               |      | UNIT    | CONDITIONS.   |
|---------------------------------------|-----------|----------------------|------|----------------------|------|---------|---|
|                                       |           | MIN.                 | MAX. | MIN.                 | MAX. |         |   |
| Static Forward Current Transfer Ratio | $h_{FE}$  | 3K<br>3K<br>3K<br>2K | 30K  | 3K<br>3K<br>3K<br>2K | 30K  |         | $I_C = -10mA, V_{CE} = -5V^*$<br>$I_C = -100mA, V_{CE} = -5V^*$<br>$I_C = -1A, V_{CE} = -5V^*$<br>$I_C = -2A, V_{CE} = -5V^*$ |
| Transition Frequency                  | $f_T$     | 160 Typical          |      | 160 Typical          |      | MHz     | $I_C = -100mA, V_{CE} = -10V$<br>$f = 20MHz$  |
| Input Capacitance                     | $C_{ibo}$ | 90 Typical           |      | 90 Typical           |      | pF      | $V_{EB} = -0.5V, f = 1MHz$  |
| Output Capacitance                    | $C_{obo}$ | 15 Typical           |      | 15 Typical           |      | pF      | $V_{CE} = -10V, f = 1MHz$   |
| Switching Times                       | $t_{on}$  | 0.6 Typical          |      | 0.6 Typical          |      | $\mu s$ | $I_C = -0.5A, V_{CE} = -10V$<br>$I_{B1} = I_{B2} = -0.5mA$  |
|                                       | $t_{off}$ | 0.8 Typical          |      | 0.8 Typical          |      | $\mu s$ |   |

\*Measured under pulsed conditions. Pulse width=300 $\mu s$ . Duty cycle  $\leq 2\%$



The maximum permissible operational temperature can be obtained from this graph using the following equation

$$T_{amb(max)} = \frac{Power(max) - Power(act)}{0.0057} + 25^{\circ}C$$

$T_{amb(max)}$  = Maximum operating ambient temperature

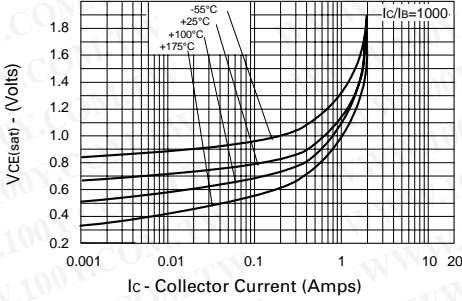
Power(max) = Maximum power dissipation figure, obtained from the above graph for a given  $V_{CE}$  and source resistance ( $R_S$ )

Power(actual) = Actual power dissipation in users circuit

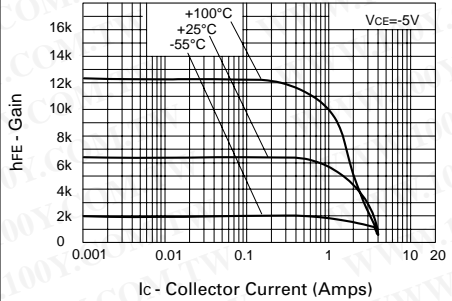
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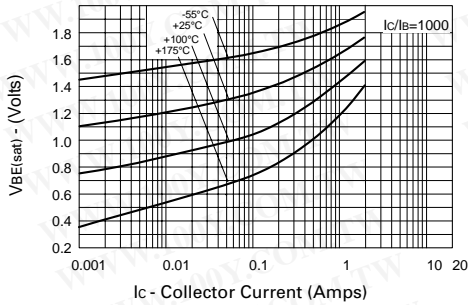
**TYPICAL CHARACTERISTICS**



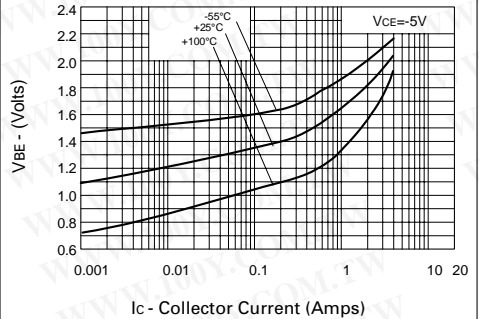
**VCE(sat) v IC**



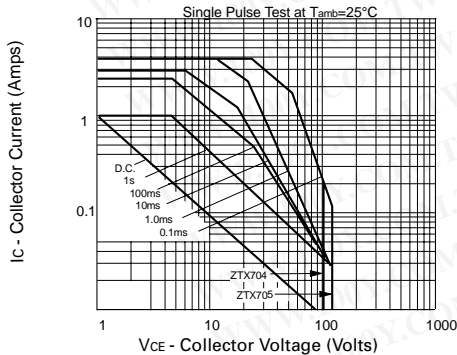
**hFE v IC**



**VBE(sat) v IC**



**VBE(on) v IC**



**Safe Operating Area**