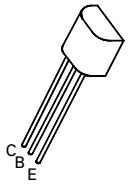
# NPN SILICON PLANAR MEDIUM POWER DARLINGTON TRANSISTORS

# ZTX604 ZTX605

**ISSUE 1 – MARCH 94**

FEATURES

* 120 Volt $V_{CEO}$
* 1 Amp continuous current
* Gain of 2K at $I_C$=1 Amp
* $P_{tot}$= 1 Watt




**E-Line**
**TO92 Compatible**

## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER | SYMBOL | ZTX604 | ZTX605 | 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°C<br>derate above 25°C | $P_{tot}$ | 1<br>5.7 | | W<br>mW/ °C |
| Operating and Storage Temperature Range | $T_j$:$T_{stg}$ | -55 to +200 | | °C |

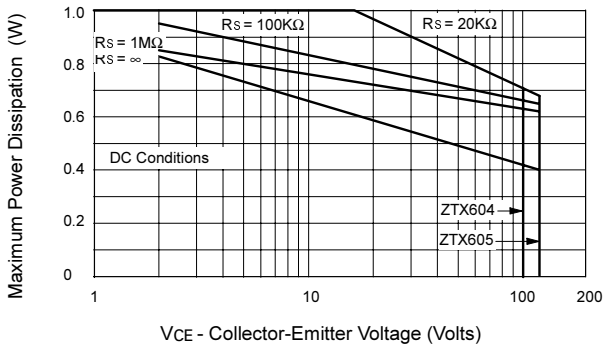
## ELECTRICAL CHARACTERISTICS (at $T_{amb}$ = 25°C unless otherwise stated).

| PARAMETER | SYMBOL | ZTX604 | | ZTX605 | | UNIT | CONDITIONS. |
|---|---|---|---|---|---|---|---|
| | | MIN. | MAX. | MIN. | MAX. | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 120 | | 140 | | V | $I_C$=100μA |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 100 | | 120 | | V | $I_C$=10mA* |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | 10 | | 10 | | V | $I_E$=100μA |
| Collector Cut-Off Current | $I_{CBO}$ | | 0.01<br><br>10 | | <br>0.01<br><br>10 | μA<br>μA<br>μA<br>μA | $V_{CB}$=100V<br>$V_{CB}$=120V<br>$V_{CB}$=100V,$T_{amb}$=100°C<br>$V_{CB}$=120V,$T_{amb}$=100°C |
| Emitter Cut-Off Current | $I_{EBO}$ | | 0.1 | | 0.1 | μA | $V_{EB}$=8V |
| Colllector-Emitter Cut-Off Current | $I_{CES}$ | | 10 | | <br>10 | μA | $V_{CES}$=100V<br>$V_{CES}$=120V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | | 1.0<br>1.5 | | 1.0<br>1.5 | V<br>V | $I_C$=250mA, $I_B$=0.25mA*<br>$I_C$=1A, $I_B$=1mA* |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | | 1.8 | | 1.8 | V | $I_C$=1A, $I_B$=1mA* |
| Base-Emitter Turn-On Voltage | $V_{BE(on)}$ | | 1.7 | | 1.7 | V | IC=1A, $V_{CE}$=5V* |

## ELECTRICAL CHARACTERISTICS (at $T_{amb}$ = 25°C unless otherwise stated).

| PARAMETER | SYMBOL | ZTX604 | | ZTX605 | | UNIT | CONDITIONS. |
|---|---|---|---|---|---|---|---|
| | | MIN. | MAX. | MIN. | MAX. | | |
| Static Forward Current Transfer Ratio | $h_{FE}$ | 2K<br>5K<br>2K<br>0.5K | 100K | 2K<br>5K<br>2K<br>0.5K | 100K | | $I_C$=50mA, $V_{CE}$=5V<br>$I_C$=500mA, $V_{CE}$=5V*<br>$I_C$=1A, $V_{CE}$=5V*<br>$I_C$=2A, $V_{CE}$=5V* |
| Transition Frequency | $f_T$ | 150 | | 150 | | MHz | $I_C$=100mA, $V_{CE}$=10V<br>f=20MHz |
| Input Capacitance | $C_{ibo}$ | 90 Typical | | | | pF | $V_{EB}$=500mV, f=1MHz |
| Output Capacitance | $C_{obo}$ | 15 Typical | | | | pF | $V_{CB}$=10V, f=1MHz |
| Switching Times | $t_{on}$ | 0.5 Typical | | | | µs | $I_C$=500mA, $V_{CE}$=10V<br>$I_{B1}$=$I_{B2}$=0.5mA |
| | $t_{off}$ | 1.6 Typical | | | | µs | |

*Measured under pulsed conditions. Pulse width=300µs. Duty cycle ≤2%




**Voltage Derating Graph**

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

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

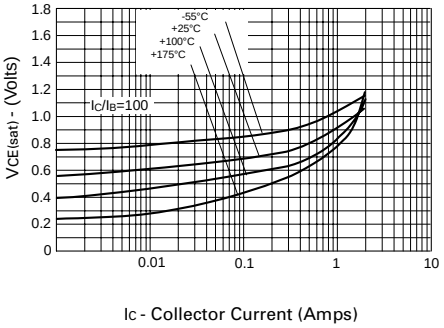
$T_{amb(max)}$= Maximum operating ambient temperature

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

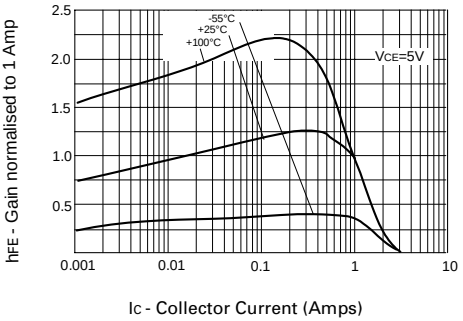
Power(actual)= Actual power dissipation in users circuit

# ZTX604
# ZTX605

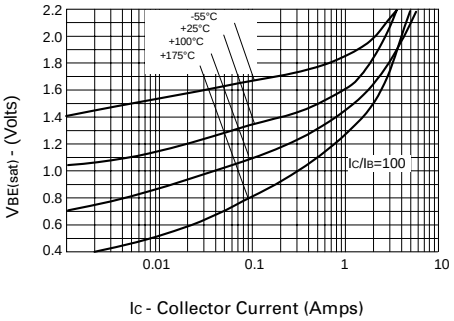
## TYPICAL CHARACTERISTICS



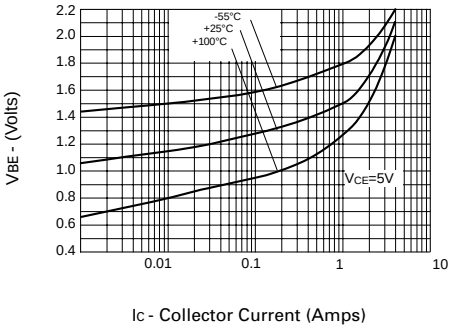

**VCE(sat) v IC**



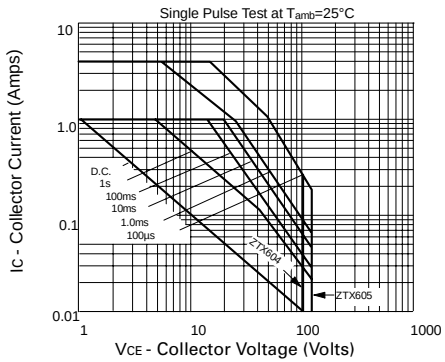

**hFE v IC**




**VBE(sat) v IC**




**VBE(on) v IC**




**Safe Operating Area**