

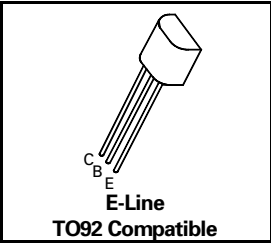
# NPN SILICON PLANAR MEDIUM POWER DARLINGTON TRANSISTORS

**ZTX602**  
**ZTX603**

**ISSUE 1 – MARCH 94**

## FEATURES

- \* 80 Volt  $V_{CE0}$
- \* 1 Amp continuous current
- \* Gain of 2K at  $I_C=1$  Amp
- \*  $P_{tot} = 1$  Watt



## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                                                            | SYMBOL         | ZTX602      | ZTX603 | UNIT                      |
|--------------------------------------------------------------------------------------|----------------|-------------|--------|---------------------------|
| Collector-Base Voltage                                                               | $V_{CBO}$      | 80          | 100    | V                         |
| Collector-Emitter Voltage                                                            | $V_{CEO}$      | 60          | 80     | 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/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range                                              | $T_j; T_{stg}$ | -55 to +200 |        | $^\circ\text{C}$          |

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

| PARAMETER                            | SYMBOL        | ZTX602 |            | ZTX603 |            | UNIT                                                             | CONDITIONS.                                                                                                                                    |
|--------------------------------------|---------------|--------|------------|--------|------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      |               | MIN.   | MAX.       | MIN.   | MAX.       |                                                                  |                                                                                                                                                |
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | 80     |            | 100    |            | V                                                                | $I_C=100\mu\text{A}$                                                                                                                           |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | 60     |            | 80     |            | 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            | $I_{CBO}$     |        | 0.01<br>10 |        | 0.01<br>10 | $\mu\text{A}$<br>$\mu\text{A}$<br>$\mu\text{A}$<br>$\mu\text{A}$ | $V_{CB}=60\text{V}$<br>$V_{CB}=80\text{V}$<br>$V_{CB}=60\text{V}, T_{amb}=100^\circ\text{C}$<br>$V_{CB}=80\text{V}, T_{amb}=100^\circ\text{C}$ |
| Emitter Cut-Off Current              | $I_{EBO}$     |        | 0.1        |        | 0.1        | $\mu\text{A}$                                                    | $V_{EB}=8\text{V}$                                                                                                                             |
| Collector-Emitter Cut-Off Current    | $I_{CES}$     |        | 10         |        | 10         | $\mu\text{A}$<br>$\mu\text{A}$                                   | $V_{CES}=60\text{V}$<br>$V_{CES}=80\text{V}$                                                                                                   |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |        | 1.0<br>1.0 |        | 1.0<br>1.0 | V<br>V                                                           | $I_C=400\text{mA}$ ,<br>$I_B=0.4\text{mA}^*$<br>$I_C=1\text{A}, I_B=1\text{mA}^*$                                                              |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ |        | 1.8        |        | 1.8        | V                                                                | $I_C=1\text{A}, I_B=1\text{mA}^*$                                                                                                              |
| Base-Emitter Turn-On Voltage         | $V_{BE(on)}$  |        | 1.7        |        | 1.7        | V                                                                | $I_C=1\text{A}, V_{CE}=5\text{V}^*$                                                                                                            |

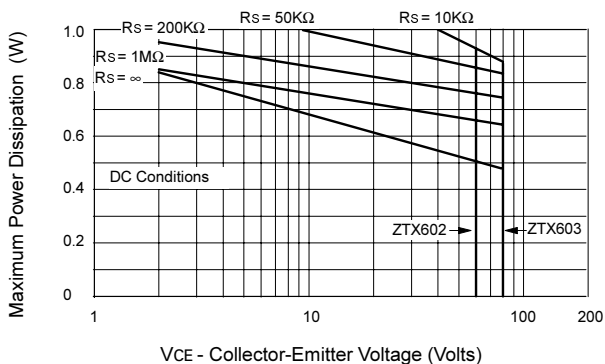
# ZTX602

# ZTX603

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

| PARAMETER                             | SYMBOL    | ZTX602                 |      | ZTX603                 |      | 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 |               | $I_C=50\text{mA}$ , $V_{CE}=5\text{V}$<br>$I_C=500\text{mA}$ , $V_{CE}=5\text{V}^*$<br>$I_C=1\text{A}$ , $V_{CE}=5\text{V}^*$<br>$I_C=2\text{A}$ , $V_{CE}=5\text{V}^*$ |
| Transition Frequency                  | $f_T$     | 150                    |      | 150                    |      | MHz           | $I_C=100\text{mA}$ , $V_{CE}=10\text{V}$<br>$f=20\text{MHz}$                                                                                                            |
| Input Capacitance                     | $C_{ibo}$ | 90 Typical             |      |                        |      | pF            | $V_{EB}=500\text{mV}$ , $f=1\text{MHz}$                                                                                                                                 |
| Output Capacitance                    | $C_{obo}$ | 15 Typical             |      |                        |      | pF            | $V_{CB}=10\text{V}$ , $f=1\text{MHz}$                                                                                                                                   |
| Switching Times                       | $t_{on}$  | 0.5 Typical            |      |                        |      | $\mu\text{s}$ | $I_C=500\text{mA}$ , $V_{CE}=10\text{V}$<br>$I_{B1}=I_{B2}=0.5\text{mA}$                                                                                                |
|                                       | $t_{off}$ | 1.1 Typical            |      |                        |      | $\mu\text{s}$ |                                                                                                                                                                         |

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



**Voltage Derating Graph**

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

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

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

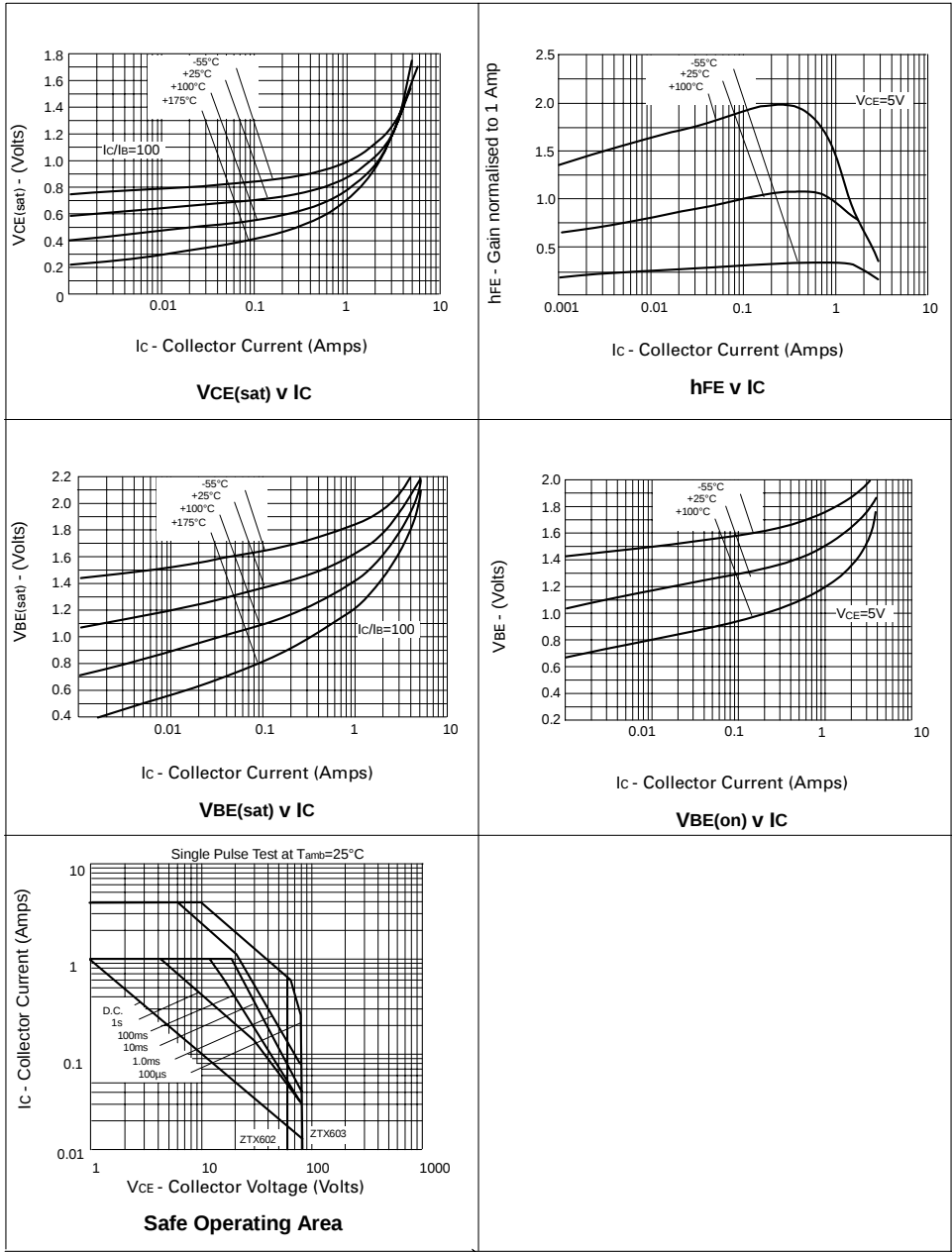
Power(max) = Maximum power dissipation figure, obtained from the above graph for a given  $V_{CE}$  and source resistance ( $R_S$ )

Power(actual) = Actual power dissipation in users circuit

ZTX602

ZTX603

TYPICAL CHARACTERISTICS



10

1

0.1

0.01

$I_C$  - Collector Current (Amps)

1

10

100

1000

$V_{CE}$  - Collector Voltage (Volts)

Single Pulse Test at  $T_{amb}=25^{\circ}C$

D.C.

1s

100ms

10ms

1.0ms

100µs

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Safe Operating Area