

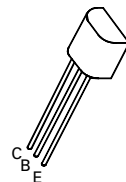
# NPN SILICON PLANAR MEDIUM POWER DARLINGTON TRANSISTORS

## ZTX600 ZTX601

ISSUE 2 – JUNE 94

### FEATURES

- \* 160 Volt  $V_{CEO}$
- \* 1 Amp continuous current
- \* Gain of 5K at  $I_C=1$  Amp
- \*  $P_{tot} = 1$  Watt



**E-Line  
TO92 Compatible**

### ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	ZTX600	ZTX601	UNIT
Collector-Base Voltage	$V_{CBO}$	160	180	V
Collector-Emitter Voltage	$V_{CEO}$	140	160	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 $T_{amb}=25^\circ\text{C}$ derate above $25^\circ\text{C}$	$P_{tot}$	1 5.7		W 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).

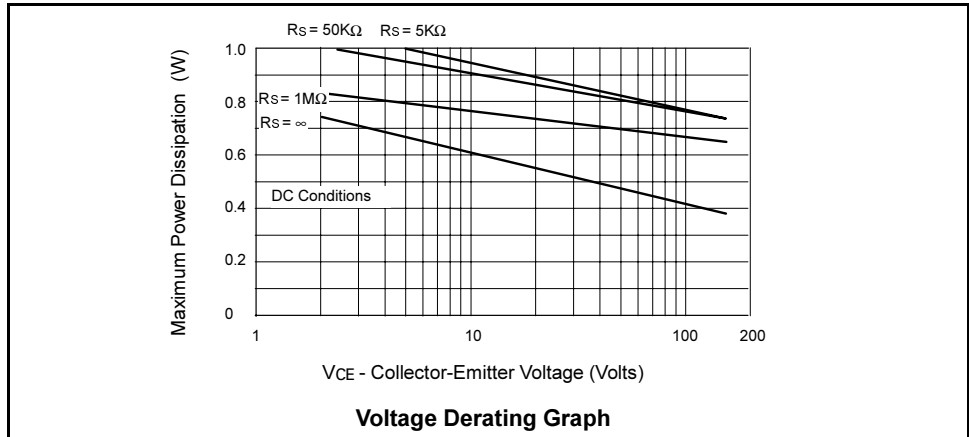
PARAMETER	SYMBOL	ZTX600			ZTX601			UNIT	CONDITIONS.
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	160			180			V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	140			160			V	$I_C=10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	10			10			V	$I_E=100\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$			0.01 10			0.01 10	$\mu\text{A}$ $\mu\text{A}$ $\mu\text{A}$ $\mu\text{A}$	$V_{CB}=140\text{V}$ $V_{CB}=160\text{V}$ $V_{CB}=140\text{V}, T_a=100^\circ\text{C}$ $V_{CB}=160\text{V}, T_a=100^\circ\text{C}$
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	$\mu\text{A}$ $\mu\text{A}$	$V_{CES}=140\text{V}$ $V_{CES}=160\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		0.75 0.85	1.1 1.2		0.75 0.85	1.1 1.2	V V	$I_C=0.5\text{A}, I_B=5\text{mA}^*$ $I_C=1\text{A}, I_B=10\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		1.7	1.9		1.7	1.9	V	$I_C=1\text{A}, I_B=10\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		1.5	1.7		1.5	1.7	V	$I_C=1\text{A}, V_{CE}=5\text{V}^*$

# ZTX600 ZTX601

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

PARAMETER	SYMBOL	ZTX600			ZTX601			UNIT	CONDITIONS.
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
Static Forward Current Transfer Ratio	$h_{FE}$	1K 2K 1K		100K	1K 2K 1K		100K		$I_C=50mA, V_{CE}=10V^*$ $I_C=0.5A, V_{CE}=10V^*$ $I_C=1A, V_{CE}=10V^*$
	Group A	1K 2K 1K	2K 5K 3K	20K	1K 2K 1K	2K 5K 3K	20K		$I_C=50mA, V_{CE}=10V^*$ $I_C=0.5A, V_{CE}=10V^*$ $I_C=1A, V_{CE}=10V^*$
	Group B	5K 10K 5K	10K 20K 10K	100K	5K 10K 5K	10K 20K 10K	100K		$I_C=50mA, V_{CE}=10V^*$ $I_C=0.5A, V_{CE}=10V^*$ $I_C=1A, V_{CE}=10V^*$
Transition Frequency	$f_T$	150	250		150	250		MHz	$I_C=100mA, V_{CE}=10V, f=20MHz$
Input Capacitance	$C_{ibo}$		60	90		60	90	pF	$V_{EB}=0.5V, f=1MHz$
Output Capacitance	$C_{obo}$		10	15		10	15	pF	$V_{CE}=10V, f=1MHz$
Switching Times	$t_{on}$		0.75			0.75		$\mu s$	$I_C=0.5A, V_{CE}=10V$ $I_{B1}=I_{B2}=0.5mA$
	$t_{off}$		2.2			2.2		$\mu s$	

\*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

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

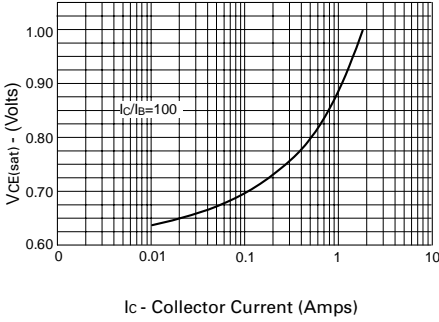
$T_{amb(max)}$  = Maximum operating ambient temperature

Power(max) = Maximum power dissipation figure, obtained from the above graph for a given V<sub>CE</sub> and source resistance (R<sub>s</sub>)

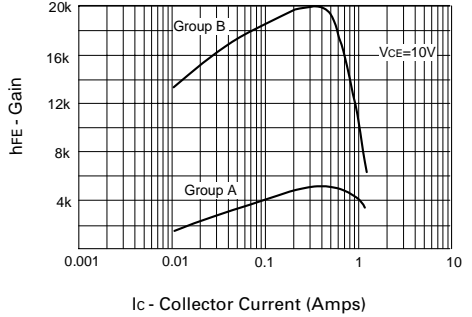
Power(actual) = Actual power dissipation in users circuit

# ZTX600 ZTX601

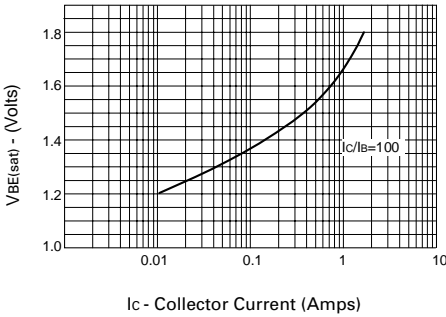
## TYPICAL CHARACTERISTICS



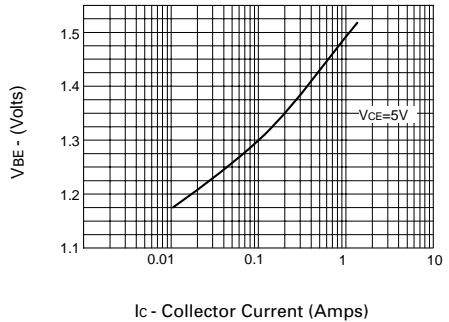
**$V_{CE(sat)}$  v  $I_C$**



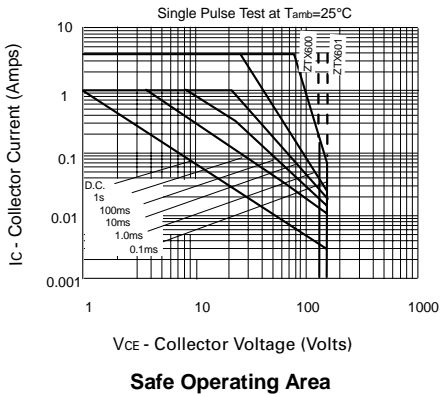
**$h_{FE}$  v  $I_C$**



**$V_{BE(sat)}$  v  $I_C$**



**$V_{BE(on)}$  v  $I_C$**



**Safe Operating Area**