

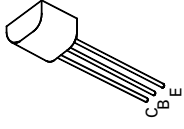
ZTX604 ZTX605

NPN SILICON PLANAR MEDIUM POWER DARLINGTON TRANSISTORS

ISSUE 1 – MARCH 94

FEATURES

- * 120 Volt V_{CE0}
- * 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	10	V
Peak Pulse Current	I_{CM}	4	4	A
Continuous Collector Current	I_C	1	1	A
Power Dissipation at $T_{amb}=25^\circ\text{C}$ derate above 25°C	P_{tot}	1	5.7	W
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).

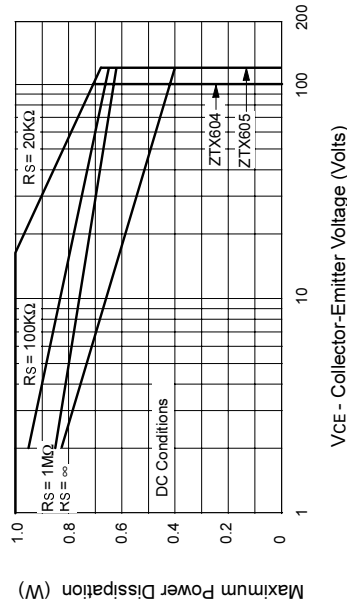
PARAMETER	SYMBOL	ZTX604		ZTX605		UNIT	CONDITIONS.
		MIN.	MAX.	MIN.	MAX.		
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	120	140			V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	100	120			V	$I_C=10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	10	10			V	$I_E=100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}		0.01		0.01	μA	$V_{CB}=100\text{V}$ $V_{CE}=120\text{V}$
Emitter Cut-Off Current	I_{EBO}		0.1		0.1	μA	$V_{EB}=8\text{V}$
Collector-Emitter Cut-Off Current	I_{CES}		10		10	μA	$V_{CES}=100\text{V}$ $V_{CES}=120\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	1.0	1.5	1.0	1.5	V	$I_C=250\text{mA}, I_B=0.25\text{mA}^*$ $I_C=1\text{A}, I_B=1\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	1.8	1.8	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	1.7	1.7	V	$I_C=1\text{A}, V_{CE}=5\text{V}^*$

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

PARAMETER	SYMBOL	ZTX604		ZTX605		UNIT	CONDITIONS.
		MIN.	MAX.	MIN.	MAX.		
Static Forward Current Transfer Ratio	h_{FE}	2K 5K 2K 0.5K	100K	2K 5K 2K 0.5K	100K		$I_C=50\text{mA}, V_{CE}=5\text{V}$ $I_C=500\text{mA}, V_{CE}=5\text{V}^*$ $I_C=1\text{A}, V_{CE}=5\text{V}^*$ $I_C=2\text{A}, V_{CE}=5\text{V}^*$
Transition Frequency	f_T	150		150		MHz	$I_C=100\text{mA}, V_{CE}=10\text{V}$ $f=20\text{MHz}$
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				μs	$I_C=500\text{mA}, V_{CE}=10\text{V}$ $I_B=I_{B2}=0.5\text{mA}$
	t_{off}	1.6 Typical				μs	

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



Maximum Power Dissipation (W)

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

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

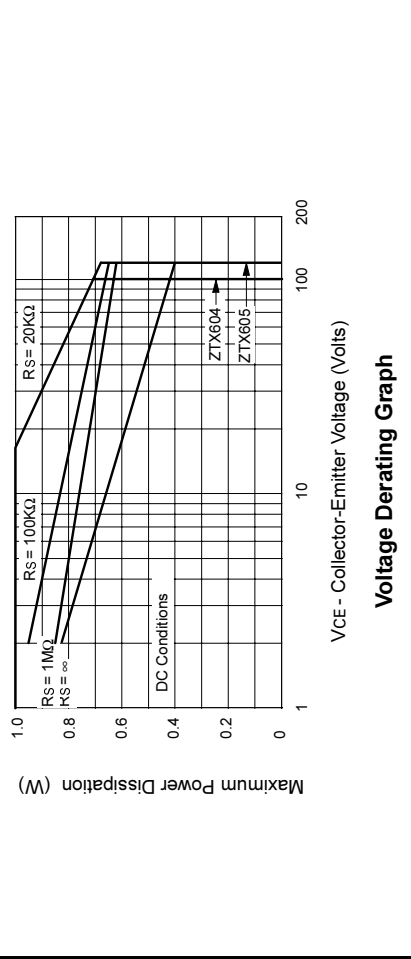
$T_{amb(max)}$ = Maximum operating ambient temperature
 Power(max) = Maximum power dissipation figure, obtained from the above graph for a given V_{CE} and source resistance (R_S)
 Power(actual) = Actual power dissipation in users circuit

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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	100K	2K	100K		I _C =50mA, V _{CE} =5V
		5K	100K	5K	100K		I _C =500mA, V _{CE} =5V*
		2K	100K	2K	100K		I _C =1A, V _{CE} =5V*
		0.5K	100K	0.5K	100K		I _C =2A, V _{CE} =5V*
Transition Frequency	f _T	150		150		MHz	I _C =100mA, V _{CE} =10V 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 I _{B1} =I _{B2} =0.5mA
	t _{off}	1.6 Typical				μs	

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



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

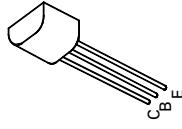
T_{amb(max)} = Maximum operating ambient temperature
 Power(max) = Maximum power dissipation figure, obtained from the above graph for a given V_{CE} and source resistance (R_S)
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ABSOLUTE MAXIMUM RATINGS.

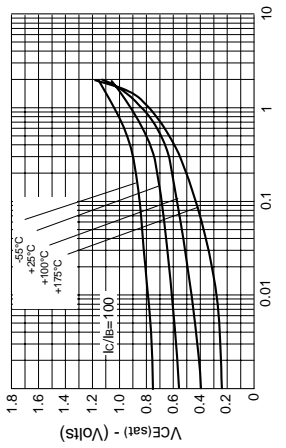
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ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

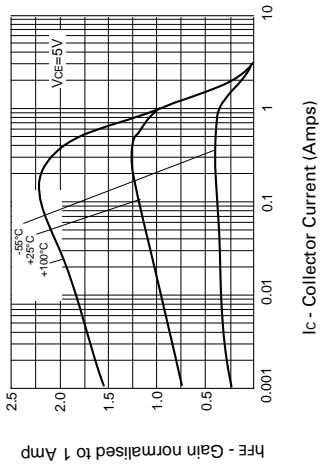
PARAMETER	SYMBOL	ZTX604		ZTX605		UNIT	CONDITIONS.
		MIN.	MAX.	MIN.	MAX.		
Collector-Base Breakdown Voltage	V _{(BR)CBO}	120	140			V	I _C =100μA
Collector-Emitter Breakdown Voltage	V _{(BR)CEO}	100	120			V	I _C =10mA*
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	10	10			V	I _E =100μA
Collector Cut-Off Current	I _{CBO}		0.01		0.01	μA	V _{CB} =100V V _{CE} =120V
Emitter Cut-Off Current	I _{EBO}		0.1		0.1	μA	V _{CB} =100V, T _{amb} =100°C V _{CE} =120V, T _{amb} =100°C
			0.1		0.1	μA	V _{EB} =8V
Collector-Emitter Cut-Off Current	I _{CES}		10		10	μA	V _{CE} ≤100V V _{CE} ≤120V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	1.0	1.5	1.0	1.5	V	I _C =250mA, I _B =0.25mA*
		1.5	1.8	1.5	1.8	V	I _C =1A, I _B =1mA*
Base-Emitter Saturation Voltage	V _{BE(sat)}	1.8	1.8	1.8	1.8	V	I _C =1A, I _B =1mA*
		1.7	1.7	1.7	1.7	V	I _C =1A, V _{CE} =5V*

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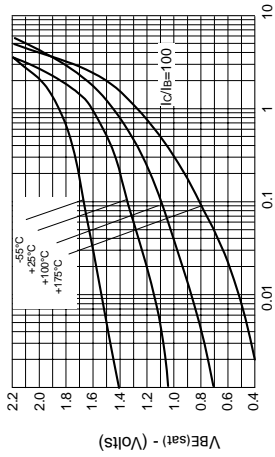
TYPICAL CHARACTERISTICS



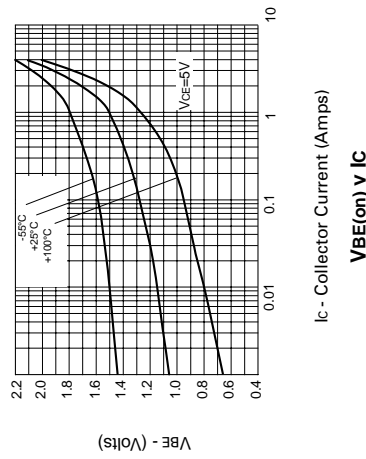
IC - Collector Current (Amps)
VCE(sat) v IC



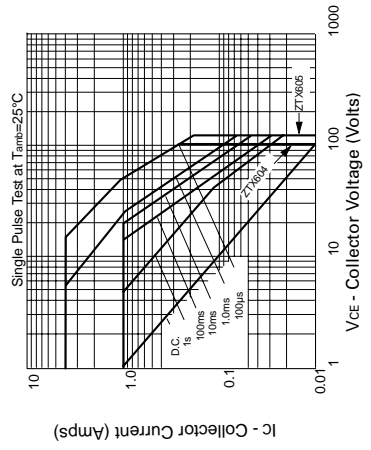
IC - Collector Current (Amps)
hFE v IC



IC - Collector Current (Amps)
VBE(sat) v IC



IC - Collector Current (Amps)
VBE(on) v IC



Safe Operating Area