

ZTX688B

NPN SILICON PLANAR MEDIUM POWER HIGH GAIN TRANSISTOR

ISSUE 2 – MAY 94

ZTX688B

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Transition Frequency	f_T	150			MHz	$I_C=50\text{mA}$, $V_{CE}=5\text{V}$ $f=50\text{MHz}$
Input Capacitance	C_{ibo}		200		pF	$V_{EB}=0.5\text{V}$, $f=1\text{MHz}$
Output Capacitance	C_{obo}		40		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$
Switching Times	t_{on}		40		ns	$I_C=500\text{mA}$, $I_B=50\text{mA}$ $V_{CE}=10\text{V}$
	t_{off}		500		ns	

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

THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	MAX.	UNIT
Thermal Resistance: Junction to Ambient ₁	$R_{th(j-amb)1}$	175	$^{\circ}\text{C/W}$
Junction to Ambient ₂	$R_{th(j-amb)2}$	116	$^{\circ}\text{C/W}$
Junction to Case	$R_{th(j-case)}$	70	$^{\circ}\text{C/W}$

† Device mounted on P.C.B. with copper equal to 1 sq. Inch minimum.

FEATURES

- * 12 Volt V_{CEO}
- * Gain of 400 at $I_C=3$ Amps
- * Very low saturation voltage

APPLICATIONS

- * Darlington replacement
- * Flash gun converters
- * Battery powered circuits
- * Motor drivers

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	12	V
Collector-Emitter Voltage	V_{CEO}	12	V
Emitter-Base Voltage	V_{EBO}	5	V
Peak Pulse Current	I_{CM}	10	A
Continuous Collector Current	I_C	3	A
Practical Power Dissipation*	P_{totp}	1.5	W
Power Dissipation at $T_{amb}=25^{\circ}\text{C}$ derate above 25°C	P_{tot}	1	W
Operating and Storage Temperature Range	T_j, T_{sg}	-55 to +200	$^{\circ}\text{C}$

*The power which can be dissipated assuming the device is mounted in a typical manner on a P.C.B. with copper equal to 1 inch square minimum

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	12			V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	12			V	$I_C=10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			V	$I_E=100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}			0.1	μA	$V_{CB}=10\text{V}$
Emitter Cut-Off Current	I_{EBO}			0.1	μA	$V_{EB}=4\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		0.04		V	$I_C=0.1\text{A}$, $I_B=1\text{mA}$
			0.06		V	$I_C=0.1\text{A}$, $I_B=0.5\text{mA}^*$
			0.18		V	$I_C=1\text{A}$, $I_B=50\text{mA}^*$
			0.35		V	$I_C=3\text{A}$, $I_B=20\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			1.1	V	$I_C=3\text{A}$, $I_B=20\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$			1	V	$I_C=3\text{A}$, $V_{CE}=2\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	500				$I_C=0.1\text{A}$, $V_{CE}=2\text{V}^*$
		400				$I_C=3\text{A}$, $V_{CE}=2\text{V}^*$
		100				$I_C=10\text{A}$, $V_{CE}=2\text{V}^*$

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

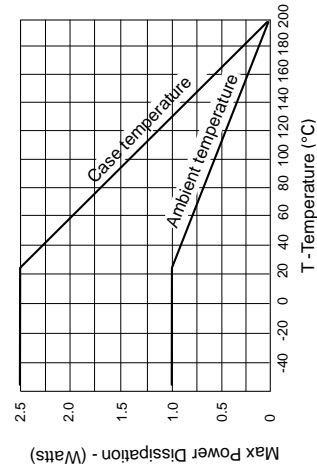
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Output Capacitance	C_{obo}		40		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$
Switching Times	t_{on}		40		ns	$I_C=500\text{mA}$, $I_B=50\text{mA}$ $V_{CE}=10\text{V}$
	t_{off}		500		ns	

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

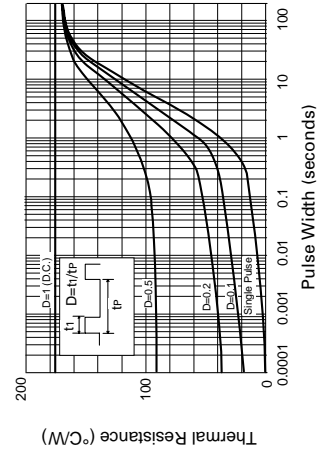
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Derating curve



Maximum transient thermal impedance

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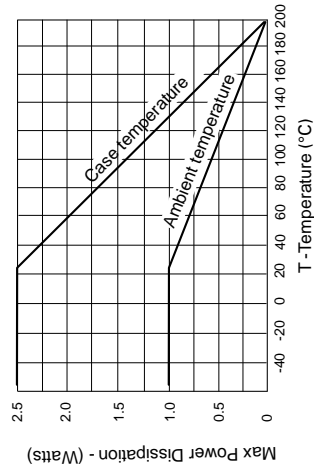
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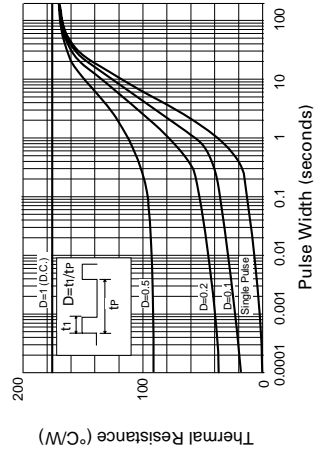
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Derating curve



Maximum transient thermal impedance

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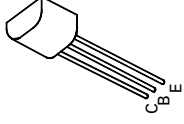
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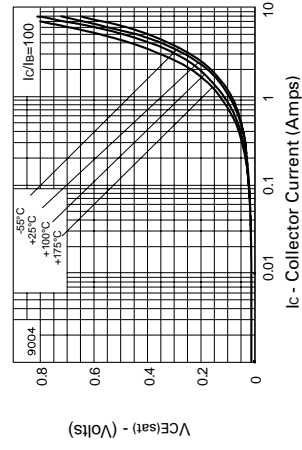
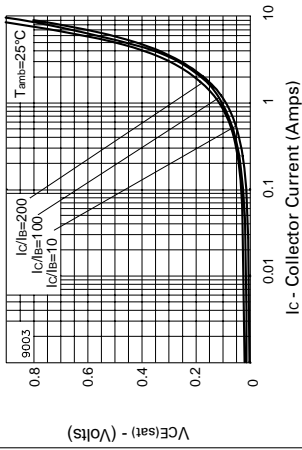
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Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		0.04		V	$I_C=0.1\text{A}$, $I_B=1\text{mA}$
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			0.35		V	$I_C=3\text{A}$, $I_B=20\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			1.1	V	$I_C=3\text{A}$, $I_B=20\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$			1	V	$I_C=3\text{A}$, $V_{CE}=2\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	500				$I_C=0.1\text{A}$, $V_{CE}=2\text{V}^*$
		400				$I_C=3\text{A}$, $V_{CE}=2\text{V}^*$
		100				$I_C=10\text{A}$, $V_{CE}=2\text{V}^*$



E-Line
TO92 Compatible

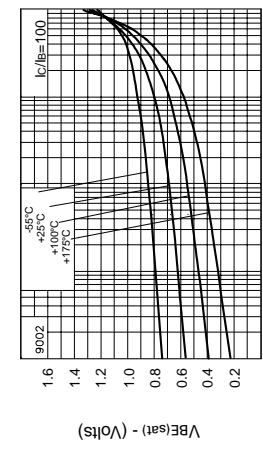
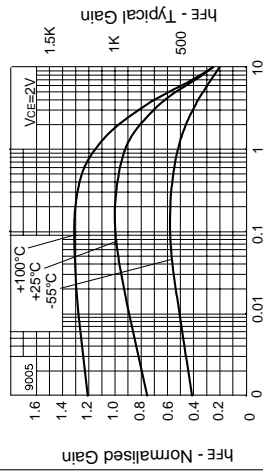
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TYPICAL CHARACTERISTICS



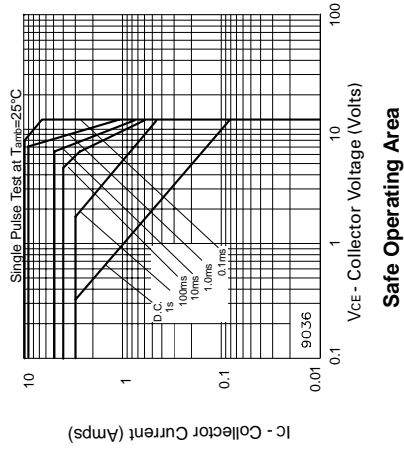
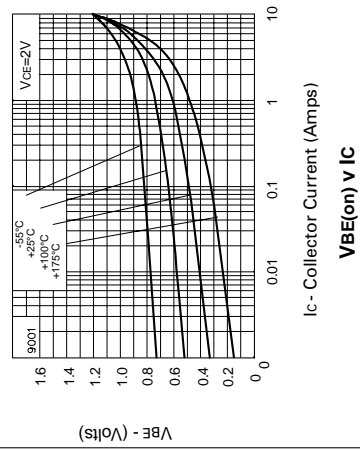
VCE(sat) v IC

VCE(sat) v IC



hFE v IC

VBE(sat) v IC



VBE(on) v IC

Safe Operating Area