

# PNP SILICON PLANAR MEDIUM POWER HIGH CURRENT TRANSISTOR

## ZTX948

ISSUE 2 – JUNE 94

### FEATURES

- \* 4.5 Amps continuous current
- \* Up to 20 Amps peak current
- \* Very low saturation voltage
- \* Excellent gain up to 20 Amps
- \* Very low leakage
- \* Exceptional gain linearity down to 10mA
- \* Spice model available



**E-Line  
TO92 Compatible**

### ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	$V_{CBO}$	-40	V
Collector-Emitter Voltage	$V_{CEO}$	-20	V
Emitter-Base Voltage	$V_{EBO}$	-6	V
Peak Pulse Current	$I_{CM}$	-20	A
Continuous Collector Current	$I_C$	-4.5	A
Practical Power Dissipation*	$P_{totp}$	1.58	W
Power Dissipation at $T_{amb}=25^{\circ}C$	$P_{tot}$	1.2	W
Operating and Storage Temperature Range	$T_j; T_{stg}$	-55 to +200	$^{\circ}C$

\*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 $T_{amb} = 25^{\circ}C$ unless otherwise stated)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40	-55		V	$I_C = -100\mu A$
Collector-Emitter Breakdown Voltage	$V_{(BR)CER}$	-40	-55		V	$I_C = -1\mu A, R_B \leq 1K\Omega$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-20	-30		V	$I_C = -10mA^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-6	-8		V	$I_E = -100\mu A$
Collector Cut-Off Current	$I_{CBO}$			-50 -1	nA $\mu A$	$V_{CB} = -30V$ $V_{CB} = -30V, T_{amb} = 100^{\circ}C$
Collector Cut-Off Current	$I_{CER}$ $R \leq 1K\Omega$			-50 -1	nA $\mu A$	$V_{CB} = -30V$ $V_{CB} = -30V, T_{amb} = 100^{\circ}C$
Emitter Cut-Off Current	$I_{EBO}$			-10	nA	$V_{EB} = -6V$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		-45 -90 -180 -230	-100 -150 -250 -310	mV mV mV mV	$I_C = -0.5A, I_B = -10mA^*$ $I_C = -2A, I_B = -200mA^*$ $I_C = -4A, I_B = -400mA^*$ $I_C = -5A, I_B = -300mA^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		-960	-1100	mV	$I_C = -5A, I_B = -300mA^*$

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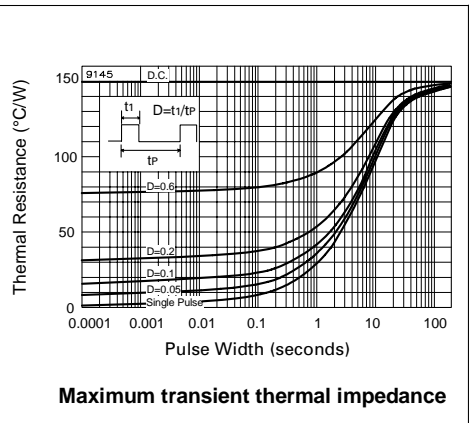
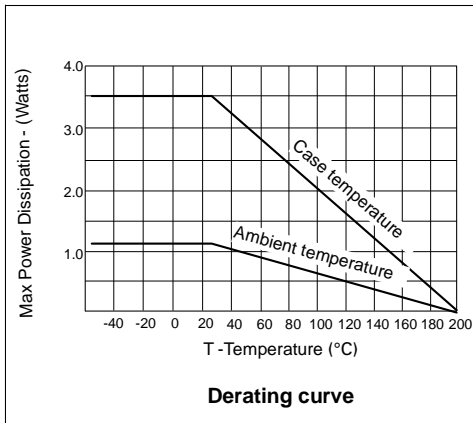
## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ )

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		-860	-1000	mV	$I_C = -5\text{A}$ , $V_{CE} = -1\text{V}^*$
Static Forward Current Transfer Ratio	$h_{FE}$	100 100 75 60 15	200 200 160 130 40	300		$I_C = -10\text{mA}$ , $V_{CE} = -1\text{V}$ $I_C = -1\text{A}$ , $V_{CE} = -1\text{V}^*$ $I_C = -5\text{A}$ , $V_{CE} = -1\text{V}^*$ $I_C = -10\text{A}$ , $V_{CE} = -1\text{V}^*$ $I_C = -20\text{A}$ , $V_{CE} = -1\text{V}^*$
Transition Frequency	$f_T$		80		MHz	$I_C = -100\text{mA}$ , $V_{CE} = -10\text{V}$ $f = 50\text{MHz}$
Output Capacitance	$C_{obo}$		163		pF	$V_{CE} = -10\text{V}$ , $f = 1\text{MHz}$
Switching Times	$t_{on}$ $t_{off}$		120 126		ns ns	$I_C = -4\text{A}$ , $I_{B1} = -400\text{mA}$ $I_{B2} = 400\text{mA}$ , $V_{CC} = -10\text{V}$

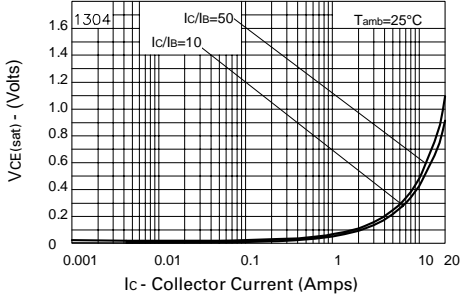
\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

## THERMAL CHARACTERISTICS

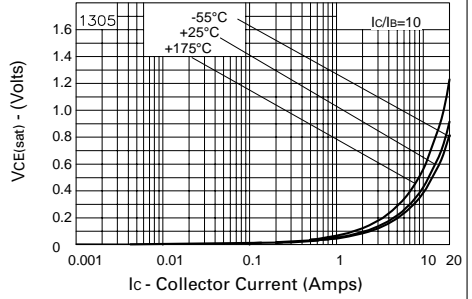
PARAMETER	SYMBOL	MAX.	UNIT
Thermal Resistance: Junction to Ambient	$R_{th(j-amb)}$	150	$^{\circ}\text{C/W}$
Junction to Case	$R_{th(j-case)}$	50	$^{\circ}\text{C/W}$



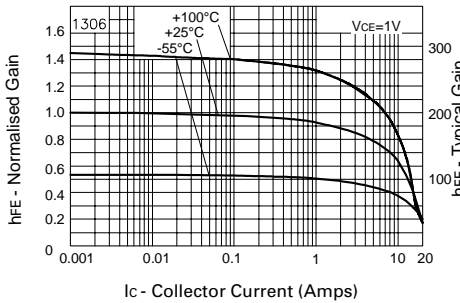
## TYPICAL CHARACTERISTICS



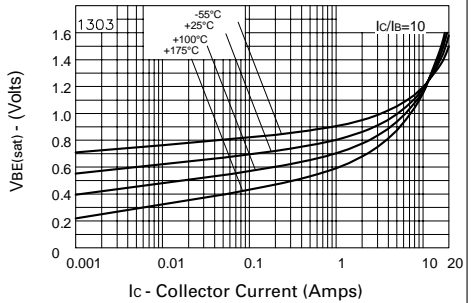
**VCE(sat) v IC**



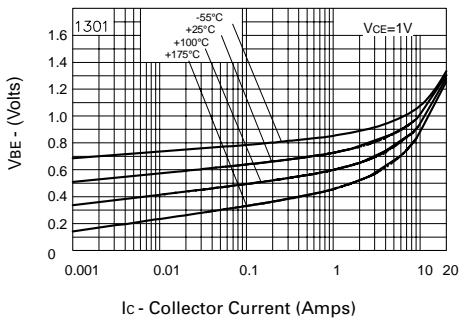
**VCE(sat) v IC**



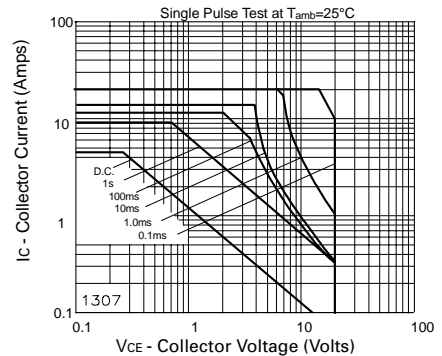
**hFE v IC**



**VBE(sat) v IC**



**VBE(on) v IC**



**Safe Operating Area**