

# 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<br>-1                    | nA<br>$\mu A$        | $V_{CB} = -30V$<br>$V_{CB} = -30V, T_{amb} = 100^{\circ}C$  |
| Collector Cut-Off Current            | $I_{CER}$<br>$R \leq 1K\Omega$ |      |                            | -50<br>-1                    | nA<br>$\mu A$        | $V_{CB} = -30V$<br>$V_{CB} = -30V, T_{amb} = 100^{\circ}C$  |
| Emitter Cut-Off Current              | $I_{EBO}$                      |      |                            | -10                          | nA                   | $V_{EB} = -6V$  |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$                  |      | -45<br>-90<br>-180<br>-230 | -100<br>-150<br>-250<br>-310 | mV<br>mV<br>mV<br>mV | $I_C = -0.5A, I_B = -10mA^*$<br>$I_C = -2A, I_B = -200mA^*$<br>$I_C = -4A, I_B = -400mA^*$<br>$I_C = -5A, I_B = -300mA^*$ |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$                  |      | -960                       | -1100                        | mV                   | $I_C = -5A, I_B = -300mA^*$   |

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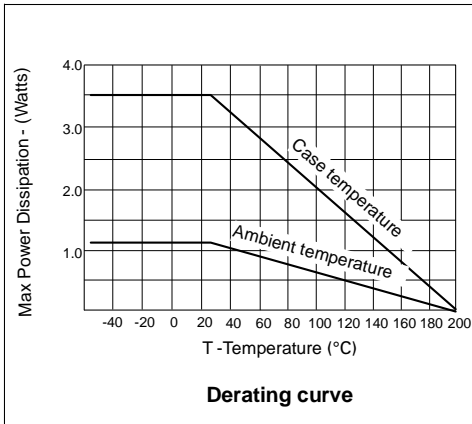
## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ )

| 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<br>100<br>75<br>60<br>15 | 200<br>200<br>160<br>130<br>40 | 300   |          | $I_C = -10\text{mA}$ , $V_{CE} = -1\text{V}$<br>$I_C = -1\text{A}$ , $V_{CE} = -1\text{V}^*$<br>$I_C = -5\text{A}$ , $V_{CE} = -1\text{V}^*$<br>$I_C = -10\text{A}$ , $V_{CE} = -1\text{V}^*$<br>$I_C = -20\text{A}$ , $V_{CE} = -1\text{V}^*$ |
| Transition Frequency                  | $f_T$                 |                              | 80                             |       | MHz      | $I_C = -100\text{mA}$ , $V_{CE} = -10\text{V}$<br>$f = 50\text{MHz}$   |
| Output Capacitance                    | $C_{obo}$             |                              | 163                            |       | pF       | $V_{CE} = -10\text{V}$ , $f = 1\text{MHz}$   |
| Switching Times                       | $t_{on}$<br>$t_{off}$ |                              | 120<br>126                     |       | ns<br>ns | $I_C = -4\text{A}$ , $I_{B1} = -400\text{mA}$<br>$I_{B2} = 400\text{mA}$ , $V_{CC} = -10\text{V}$  |

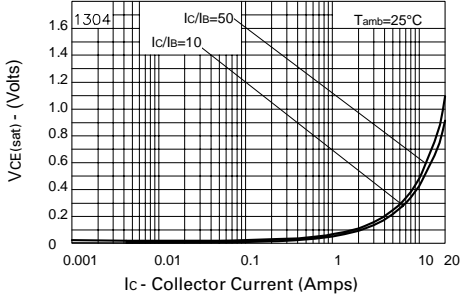
\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

## THERMAL CHARACTERISTICS

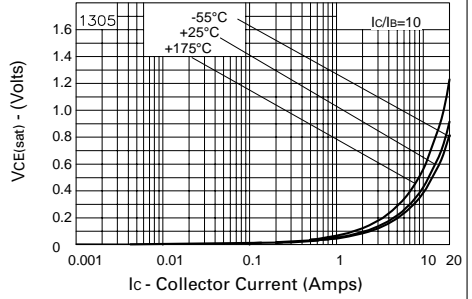
| PARAMETER   | SYMBOL                              | MAX.      | UNIT   |
|---|-------------------------------------|-----------|--|
| Thermal Resistance: Junction to Ambient<br>Junction to Case | $R_{th(j-amb)}$<br>$R_{th(j-case)}$ | 150<br>50 | $^{\circ}\text{C/W}$<br>$^{\circ}\text{C/W}$ |



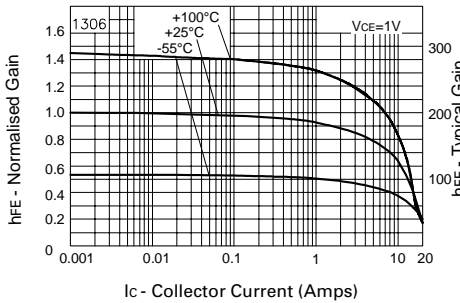
## TYPICAL CHARACTERISTICS



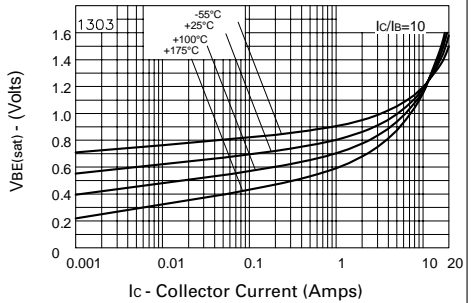
VCE(sat) v IC



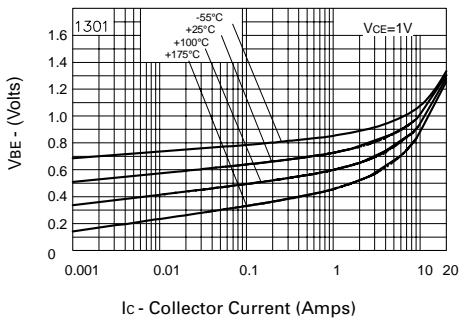
VCE(sat) v IC



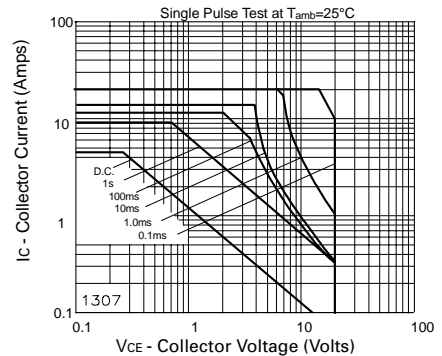
hFE v IC



VBE(sat) v IC



VBE(on) v IC



Safe Operating Area