

# PNP SILICON PLANAR MEDIUM POWER HIGH CURRENT TRANSISTOR

## ZTX949

ISSUE 3 – 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                     | $V_{CBO}$      | -50         | V           |
| Collector-Emitter Voltage                  | $V_{CEO}$      | -30         | 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     | $V_{(BR)CBO}$                  | -50  | -80                        |                             | V                    | $I_C = -100\mu A$  |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CER}$                  | -50  | -80                        |                             | V                    | $I_C = -1\mu A, R_B \leq 1K\Omega$   |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$                  | -30  | -45                        |                             | 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>$\mu A$        | $V_{CB} = -40V$<br>$V_{CB} = -40V, T_{amb} = 100^{\circ}C$   |
| Collector Cut-Off Current            | $I_{CER}$<br>$R \leq 1K\Omega$ |      |                            | -50<br>-1                   | nA<br>$\mu A$        | $V_{CB} = -40V$<br>$V_{CB} = -40V, T_{amb} = 100^{\circ}C$   |
| Emitter Cut-Off Current              | $I_{EBO}$                      |      |                            | -10                         | nA                   | $V_{EB} = -6V$   |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$                  |      | -40<br>-80<br>-100<br>-240 | -60<br>-100<br>-160<br>-320 | mV<br>mV<br>mV<br>mV | $I_C = -0.5A, I_B = -20mA^*$<br>$I_C = -1A, I_B = -20mA^*$<br>$I_C = -2A, I_B = -200mA^*$<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 | 200<br>200<br>140<br>35 | 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>$I_C = -20\text{A}$ , $V_{CE} = -1\text{V}^*$ |
| Transition Frequency                  | $f_T$                 |                  | 100                     |       | MHz      | $I_C = -100\text{mA}$ , $V_{CE} = -10\text{V}$<br>$f = 50\text{MHz}$  |
| Output Capacitance                    | $C_{obo}$             |                  | 122                     |       | pF       | $V_{CB} = -10\text{V}$ , $f = 1\text{MHz}$  |
| Switching Times                       | $t_{on}$<br>$t_{off}$ |                  | 120<br>130              |       | 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  $\leq 2\%$

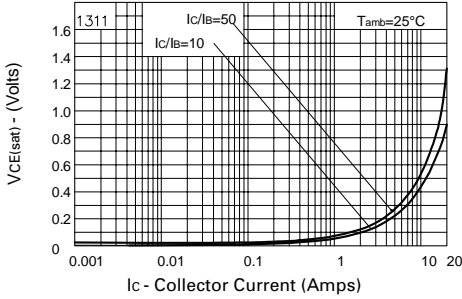
## THERMAL CHARACTERISTICS

| 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>$^{\circ}\text{C/W}$ |

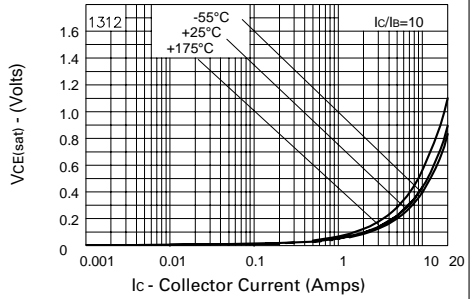


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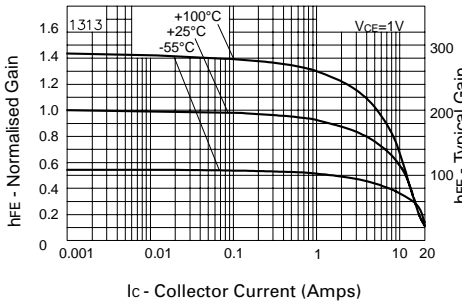
## TYPICAL CHARACTERISTICS



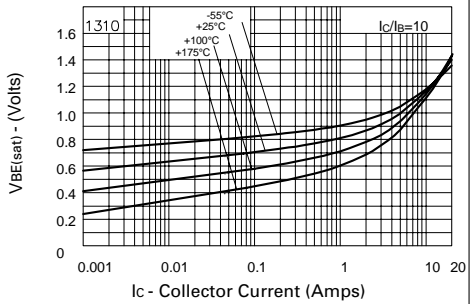
**$V_{CE(sat)}$  v  $I_C$**



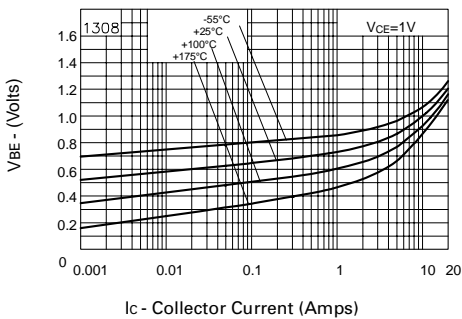
**$V_{CE(sat)}$  v  $I_C$**



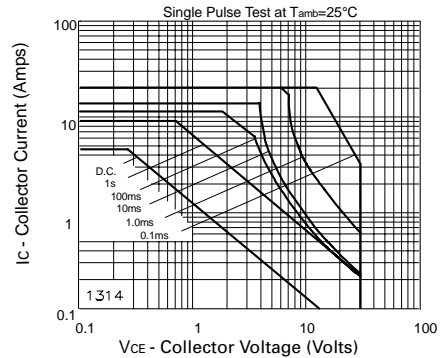
**$h_{FE}$  v  $I_C$**



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



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



**Safe Operating Area**

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