



# THE DATASHEET OF ZTX957



# ZTX957

## PNP SILICON PLANAR ME HIGH CURRENT TRANSIS

ISSUE 3 – JUNE 94

### FEATURES

- \* 1 Amp continuous current
- \* Up to 2 Amps peak current
- \* Very low saturation voltage
- \* Excellent gain characteristics up to 1
- \* Spice model available

### ELECTRICAL CHARACTERISTICS (at T<sub>amb</sub> = 25°C)

| PARAMETER                             | SYMBOL              | MIN. | TYP. | MAX. | UNIT | CONDITIONS.  |
|---------------------------------------|---------------------|------|------|------|------|--|
| Base-Emitter Turn-On Voltage          | V <sub>BE(on)</sub> |      | -710 | -850 | mV   | I <sub>C</sub> =-1A, V <sub>CE</sub> =-10V*                            |
| Static Forward Current Transfer Ratio | h <sub>FE</sub>     | 100  | 200  | 300  |      | I <sub>C</sub> =-10mA, V <sub>CE</sub> =-10V*                          |
|                                       |                     | 100  | 200  |      |      | I <sub>C</sub> =-0.5A, V <sub>CE</sub> =-10V*                          |
|                                       |                     | 90   | 170  |      |      | I <sub>C</sub> =-1A, V <sub>CE</sub> =-10V*                            |
|                                       |                     |      | 10   |      |      | I <sub>C</sub> =-2A, V <sub>CE</sub> =-10V*                            |
| Transition Frequency                  | f <sub>T</sub>      |      | 85   |      | MHz  | I <sub>C</sub> =-100mA, V <sub>CE</sub> =-10V<br>f <sub>s</sub> =50MHz |
| Output Capacitance                    | C <sub>obo</sub>    |      | 23   |      | pF   | V <sub>CE</sub> =-20V, f=1MHz  |
| Switching Times                       | t <sub>on</sub>     |      | 108  |      | ns   | I <sub>C</sub> =-500mA, I <sub>BF</sub> =-50mA                         |
|                                       | t <sub>off</sub>    |      | 2500 |      | ns   | I <sub>B</sub> =-50mA, V <sub>CC</sub> =-100V                          |

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

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                   | SYMBOL | UNIT |
|---|--------|------|
| Collector-Base Voltage                      |        |      |
| Collector-Emitter Voltage                   |        |      |
| Emitter-Base Voltage                        |        |      |
| Peak Pulse Current                          |        |      |
| Continuous Collector Current                |        |      |
| Practical Power Dissipation*                |        |      |
| Power Dissipation at T <sub>amb</sub> =25°C |        |      |
| Operating and Storage Temperature Range     |        |      |

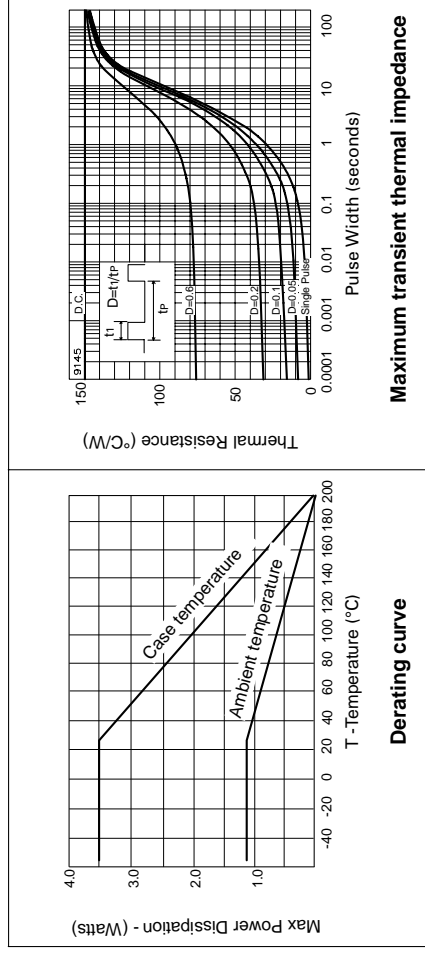
\*The power which can be dissipated as a function of ambient temperature (T<sub>amb</sub>) is shown on P.C.B. with copper equal to 1 inch square.

### ELECTRICAL CHARACTERISTICS

| PARAMETER                            | SYMBOL                      | UNIT |
|--------------------------------------|-----------------------------|------|
| Collector-Base Breakdown Voltage     | V <sub>BR(CBO)</sub>        |      |
| Collector-Emitter Breakdown Voltage  | V <sub>BR(CER)</sub>        |      |
| Collector-Emitter Breakdown Voltage  | V <sub>BR(CEO)</sub>        |      |
| Emitter-Base Breakdown Voltage       | V <sub>BR(EBO)</sub>        |      |
| Collector Cut-Off Current            | I <sub>CBO</sub>            |      |
| Collector Cut-Off Current            | I <sub>CER</sub><br>R ≤ 1KΩ |      |
| Emitter Cut-Off Current              | I <sub>EBO</sub>            |      |
| Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub>        |      |
| Base-Emitter Saturation Voltage      | V <sub>BE(sat)</sub>        |      |

### THERMAL CHARACTERISTICS

| PARAMETER                               | SYMBOL                  | MAX. | UNIT |
|---|-------------------------|------|------|
| Thermal Resistance: Junction to Ambient | R <sub>th(j-amb)</sub>  | 150  | °C/W |
| Junction to Case                        | R <sub>th(j-case)</sub> | 50   | °C/W |



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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          | $V_{BE(on)}$ |      | -710 | -850 | mV   | $I_C = -1A, V_{CE} = -10V^*$             |
| Static Forward Current Transfer Ratio | $h_{FE}$     | 100  | 200  | 300  |      | $I_C = -10mA, V_{CE} = -10V^*$           |
|                                       |              | 100  | 200  |      |      | $I_C = 0.5A, V_{CE} = -10V^*$            |
|                                       |              | 90   | 170  |      |      | $I_C = -1A, V_{CE} = -10V^*$             |
|                                       |              |      | 10   |      |      | $I_C = -2A, V_{CE} = -10V^*$             |
| Transition Frequency                  | $f_T$        |      | 85   |      | MHz  | $I_C = -100mA, V_{CE} = -10V, f = 50MHz$ |
| Output Capacitance                    | $C_{obo}$    |      | 23   |      | pF   | $V_{CB} = -20V, f = 1MHz$                |
| Switching Times                       | $t_{on}$     |      | 108  |      | ns   | $I_C = -500mA, I_B = -50mA$              |
|                                       | $t_{off}$    |      | 2500 |      | ns   | $I_B = -50mA, V_{CC} = -100V$            |

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

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER   | SYMBOL | UNIT |
|---|--------|------|
| Collector-Base Voltage                              |        |      |
| Collector-Emitter Voltage                           |        |      |
| Emitter-Base Voltage                                |        |      |
| Peak Pulse Current                                  |        |      |
| Continuous Collector Current                        |        |      |
| Practical Power Dissipation*                        |        |      |
| Power Dissipation at $T_{amb} = 25^{\circ}\text{C}$ |        |      |
| Operating and Storage Temperature Range             |        |      |

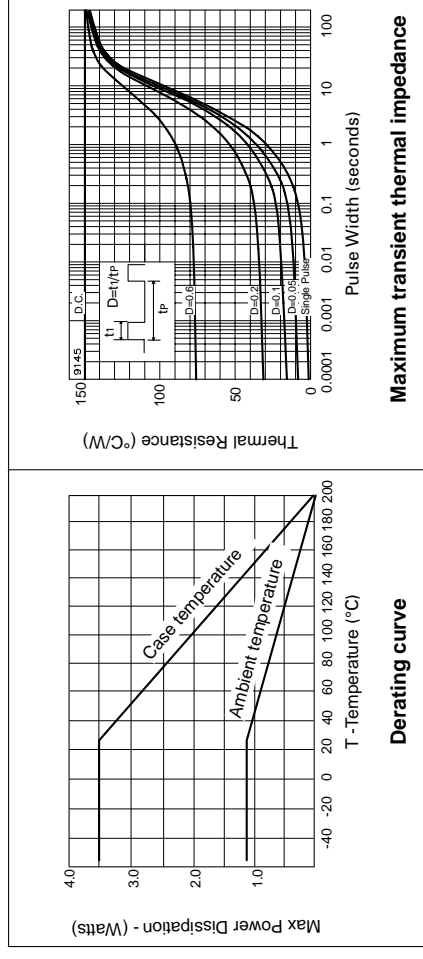
\*The power which can be dissipated as a function of ambient temperature. P.C.B. with copper equal to 1 inch square.

## ELECTRICAL CHARACTERISTICS

| PARAMETER                            | SYMBOL                         | UNIT |
|--------------------------------------|--------------------------------|------|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$                  |      |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CER}$                  |      |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$                  |      |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$                  |      |
| Collector Cut-Off Current            | $I_{CBO}$                      |      |
| Collector Cut-Off Current            | $I_{CER}$<br>$R \leq 1K\Omega$ |      |
| Emitter Cut-Off Current              | $I_{EBO}$                      |      |
| Collector-Emitter Saturation Voltage | $V_{CE(set)}$                  |      |
| Base-Emitter Saturation Voltage      | $V_{BE(set)}$                  |      |

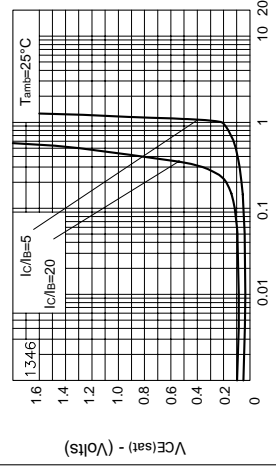
## THERMAL CHARACTERISTICS

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

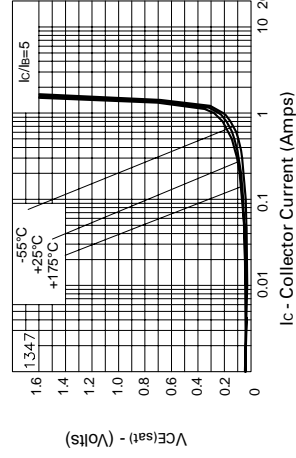


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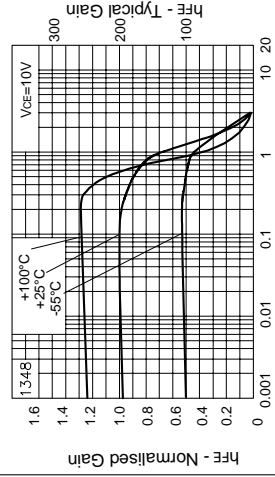
## TYPICAL CHARACTERISTICS



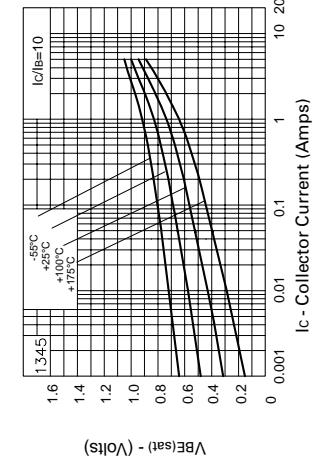
**VCE(sat) v IC**



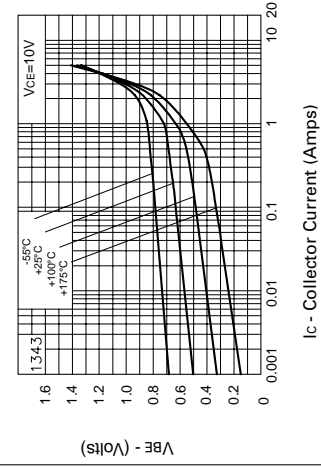
**VCE(sat) v IC**



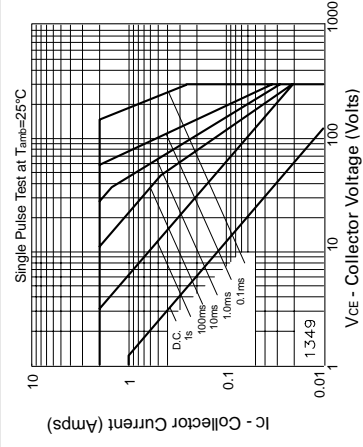
**hFE v IC**



**VBE(sat) v IC**





**VBE(on) v IC**



**Safe Operating Area**

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