

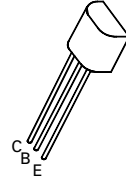
# NPN SILICON PLANAR MEDIUM POWER HIGH CURRENT TRANSISTOR

ISSUE 1 – APRIL 94

## FEATURES

- \* 300 Volt  $V_{CEO}$
- \* 3 Amps continuous current
- \* Up to 5 Amps peak current
- \* Very low saturation voltage
- \*  $P_{tot} = 1.2$  Watt

# ZTX857



**E-Line**  
**TO92 Compatible**

## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                  | SYMBOL         | VALUE       | UNIT        |
|--------------------------------------------|----------------|-------------|-------------|
| Collector-Base Voltage                     | $V_{CBO}$      | 330         | V           |
| Collector-Emitter Voltage                  | $V_{CEO}$      | 300         | V           |
| Emitter-Base Voltage                       | $V_{EBO}$      | 6           | V           |
| Peak Pulse Current                         | $I_{CM}$       | 5           | A           |
| Continuous Collector Current               | $I_C$          | 3           | 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     | $V_{(BR)CBO}$                  | 330  | 475                    |                          | V                    | $I_C = 100\mu A$                                                                                                              |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CER}$                  | 330  | 475                    |                          | V                    | $I_C = 1\mu A$ , $R_B \leq 1K\Omega$                                                                                          |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$                  | 300  | 350                    |                          | 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>$\mu A$        | $V_{CB} = 300V$<br>$V_{CB} = 300V$ , $T_{amb} = 100^{\circ}C$                                                                 |
| Collector Cut-Off Current            | $I_{CER}$<br>$R \leq 1K\Omega$ |      |                        | 50<br>1                  | nA<br>$\mu A$        | $V_{CB} = 300V$<br>$V_{CB} = 300V$ , $T_{amb} = 100^{\circ}C$                                                                 |
| Emitter Cut-Off Current              | $I_{EBO}$                      |      |                        | 10                       | nA                   | $V_{EB} = 6V$                                                                                                                 |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$                  |      | 50<br>80<br>140<br>170 | 100<br>140<br>200<br>250 | mV<br>mV<br>mV<br>mV | $I_C = 0.5A$ , $I_B = 50mA^*$<br>$I_C = 1A$ , $I_B = 100mA^*$<br>$I_C = 2A$ , $I_B = 200mA^*$<br>$I_C = 3A$ , $I_B = 600mA^*$ |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$                  |      | 870                    | 1000                     | mV                   | $I_C = 2A$ , $I_B = 200mA^*$                                                                                                  |

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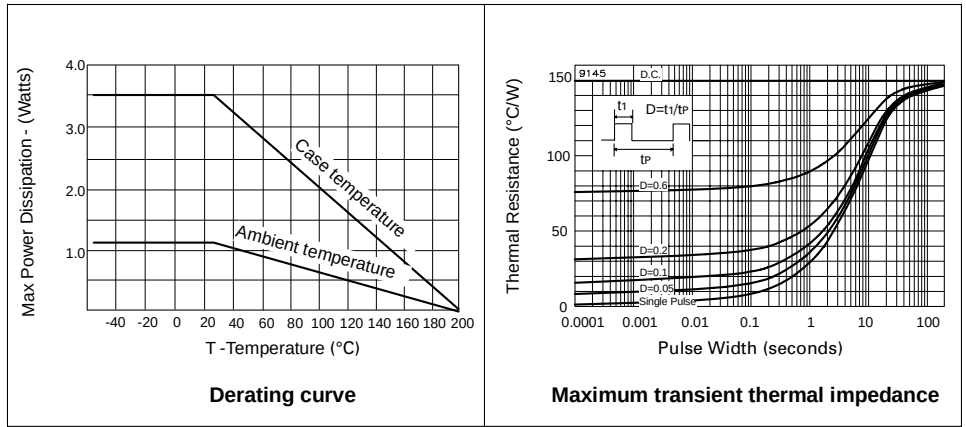
## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ )

| PARAMETER                             | SYMBOL                | MIN.             | TYP.             | MAX.             | UNIT     | CONDITIONS.                                                                                                                                                                |
|---------------------------------------|-----------------------|------------------|------------------|------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Base-Emitter Turn-On Voltage          | $V_{BE(on)}$          |                  | 810              | 950              | mV       | $I_C=2\text{A}$ , $V_{CE}=5\text{V}^*$                                                                                                                                     |
| Static Forward Current Transfer Ratio | $h_{FE}$              | 100<br>100<br>15 | 200<br>200<br>25 | 300<br>300<br>15 |          | $I_C=10\text{mA}$ , $V_{CE}=5\text{V}$<br>$I_C=500\text{mA}$ , $V_{CE}=10\text{V}^*$<br>$I_C=2\text{A}$ , $V_{CE}=10\text{V}^*$<br>$I_C=3\text{A}$ , $V_{CE}=10\text{V}^*$ |
| Transition Frequency                  | $f_T$                 |                  | 80               |                  | MHz      | $I_C=100\text{mA}$ , $V_{CE}=10\text{V}$<br>$f=100\text{MHz}$                                                                                                              |
| Output Capacitance                    | $C_{obo}$             |                  | 11               |                  | pF       | $V_{CB}=20\text{V}$ , $f=1\text{MHz}$                                                                                                                                      |
| Switching Times                       | $t_{on}$<br>$t_{off}$ |                  | 100<br>5300      |                  | ns<br>ns | $I_C=250\text{mA}$ , $I_{B1}=25\text{mA}$<br>$I_{B2}=25\text{mA}$ , $V_{CC}=50\text{V}$                                                                                    |

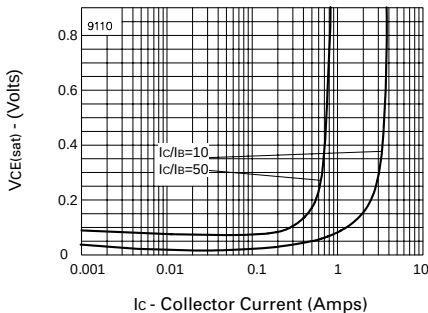
\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

## THERMAL CHARACTERISTICS

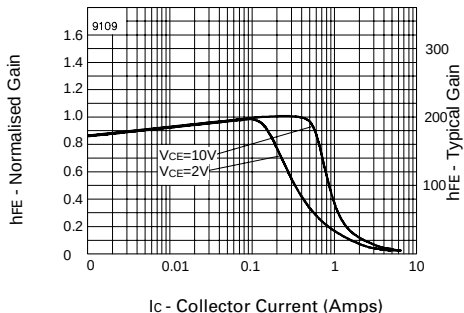
| PARAMETER                               | SYMBOL           | MAX. | UNIT                 |
|-----------------------------------------|------------------|------|----------------------|
| Thermal Resistance: Junction to Ambient | $R_{th(j-amb)}$  | 150  | $^{\circ}\text{C/W}$ |
| Junction to Case   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



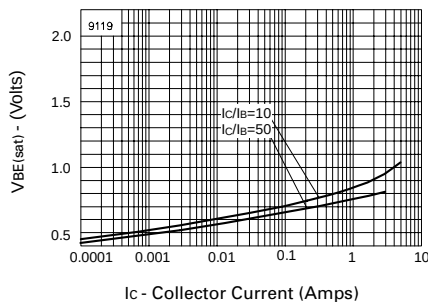
TYPICAL CHARACTERISTICS



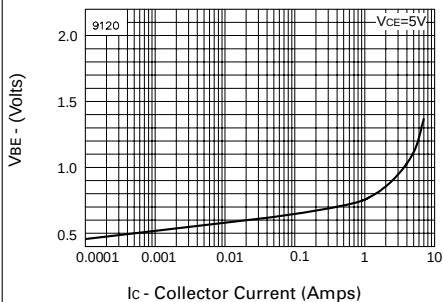
$V_{CE(sat)}$  v  $I_C$



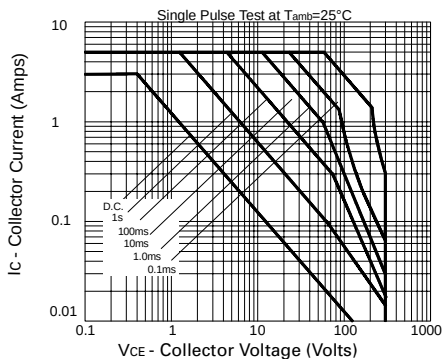
hFE v  $I_C$



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



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



Safe Operating Area