

# NPN SILICON PLANAR MEDIUM POWER HIGH CURRENT TRANSISTOR

ISSUE 2 – AUGUST 94

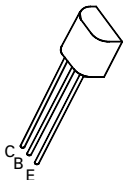
## ZTX851

### FEATURES

- \* 60 Volt  $V_{CEO}$
- \* 5 Amps continuous current
- \* Up to 20 Amps peak current
- \* Very low saturation voltage
- \*  $P_{tot}=1.2$  Watts

### APPLICATIONS

- \* Emergency lighting circuits



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

### ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                  | SYMBOL         | VALUE       | UNIT        |
|--------------------------------------------|----------------|-------------|-------------|
| Collector-Base Voltage                     | $V_{CBO}$      | 150         | V           |
| Collector-Emitter Voltage                  | $V_{CEO}$      | 60          | V           |
| Emitter-Base Voltage                       | $V_{EBO}$      | 6           | V           |
| Peak Pulse Current                         | $I_{CM}$       | 20          | A           |
| Continuous Collector Current               | $I_C$          | 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     | $V_{(BR)CBO}$                  | 150  | 220                    |                         | V                    | $I_C=100\mu A$                                                                                 |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CER}$                  | 150  | 220                    |                         | V                    | $I_C=1\mu A, R_B \leq 1K\Omega$                                                                |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$                  | 60   | 85                     |                         | 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>$\mu A$        | $V_{CB}=120V$<br>$V_{CB}=120V, T_{amb}=100^{\circ}C$                                           |
| Collector Cut-Off Current            | $I_{CER}$<br>$R \leq 1K\Omega$ |      |                        | 50<br>1                 | nA<br>$\mu A$        | $V_{CB}=120V$<br>$V_{CB}=120V, T_{amb}=100^{\circ}C$                                           |
| Emitter Cut-Off Current              | $I_{EBO}$                      |      |                        | 10                      | nA                   | $V_{EB}=6V$                                                                                    |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$                  |      | 10<br>50<br>100<br>200 | 50<br>100<br>150<br>250 | mV<br>mV<br>mV<br>mV | $I_C=0.1A, I_B=5mA^*$<br>$I_C=1A, I_B=50mA^*$<br>$I_C=2A, I_B=50mA^*$<br>$I_C=5A, I_B=200mA^*$ |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$                  |      | 920                    | 1050                    | mV                   | $I_C=4A, I_B=200mA^*$                                                                          |

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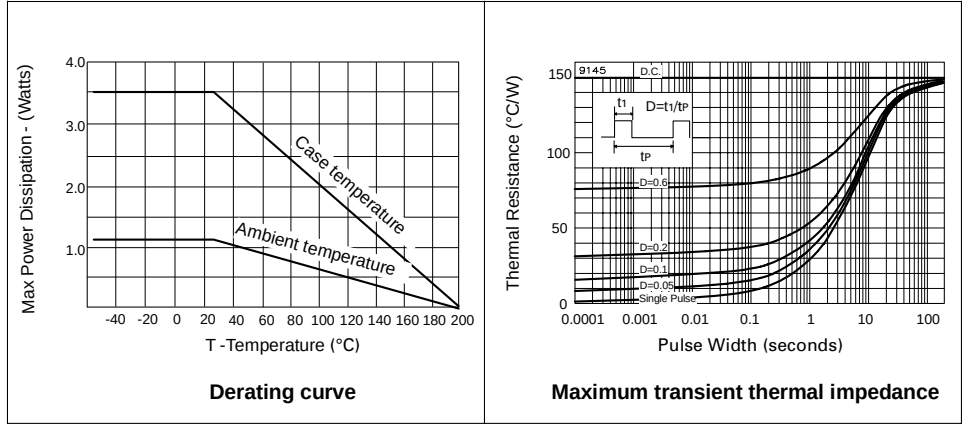
## ELECTRICAL CHARACTERISTICS (at T<sub>amb</sub> = 25°C)

| PARAMETER                             | SYMBOL                              | MIN.                   | TYP.                    | MAX. | UNIT     | CONDITIONS.                                                                                                                                                                    |
|---------------------------------------|-------------------------------------|------------------------|-------------------------|------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Base-Emitter Turn-On Voltage          | V <sub>BE(on)</sub>                 |                        | 840                     | 950  | mV       | I <sub>C</sub> =4A, V <sub>CE</sub> =1V*                                                                                                                                       |
| Static Forward Current Transfer Ratio | h <sub>FE</sub>                     | 100<br>100<br>75<br>25 | 200<br>200<br>120<br>50 | 300  |          | I <sub>C</sub> =10mA, V <sub>CE</sub> =1V<br>I <sub>C</sub> =2A, V <sub>CE</sub> =1V*<br>I <sub>C</sub> =5A, V <sub>CE</sub> =1V*<br>I <sub>C</sub> =10A, V <sub>CE</sub> =1V* |
| Transition Frequency                  | f <sub>T</sub>                      |                        | 130                     |      | MHz      | I <sub>C</sub> =100mA, V <sub>CE</sub> =10V<br>f=50MHz                                                                                                                         |
| Output Capacitance                    | C <sub>obo</sub>                    |                        | 45                      |      | pF       | V <sub>CB</sub> =10V, f=1MHz                                                                                                                                                   |
| Switching Times                       | t <sub>on</sub><br>t <sub>off</sub> |                        | 45<br>1100              |      | ns<br>ns | I <sub>C</sub> =1A, I <sub>BI</sub> =100mA<br>I <sub>B2</sub> =100mA, V <sub>CC</sub> =10V                                                                                     |

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

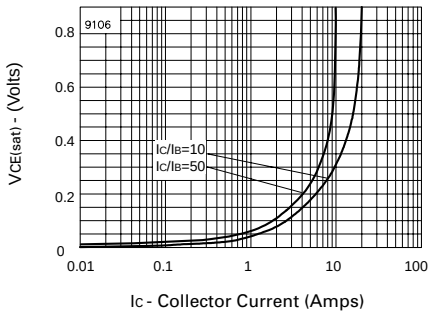
## THERMAL CHARACTERISTICS

| 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 |

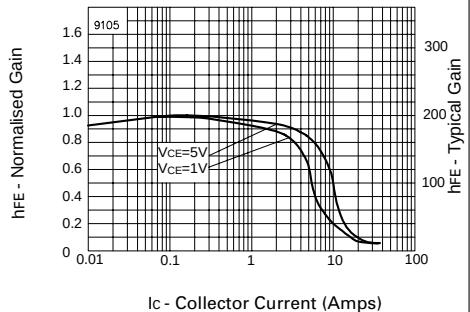


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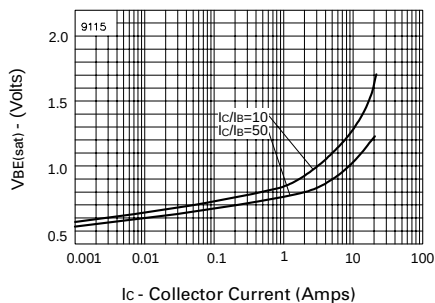
## TYPICAL CHARACTERISTICS



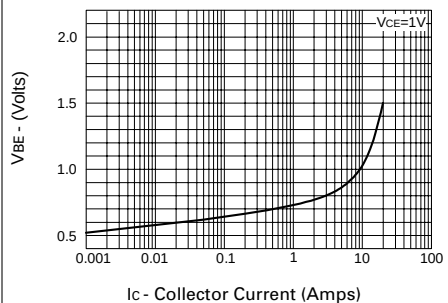
**$V_{CE(sat)}$  v  $I_C$**



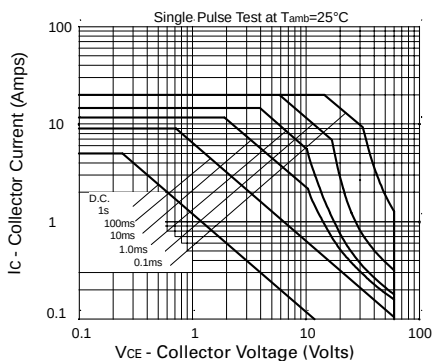
**$h_{FE}$  v  $I_C$**



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



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



**Safe Operating Area**