

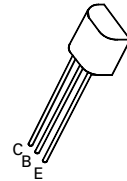
# NPN SILICON PLANAR MEDIUM POWER TRANSISTORS

ISSUE 2 – JULY 94

## FEATURES

- \* 100 Volt  $V_{CE0}$
- \* 2 Amp continuous current
- \* Low saturation voltage
- \*  $P_{tot}$ =1 Watt

# ZTX652 ZTX653



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

## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                                                | SYMBOL         | ZTX652      | ZTX653 | UNIT                 |
|--------------------------------------------------------------------------|----------------|-------------|--------|----------------------|
| Collector-Base Voltage                                                   | $V_{CBO}$      | 100         | 120    | V                    |
| Collector-Emitter Voltage                                                | $V_{CEO}$      | 80          | 100    | V                    |
| Emitter-Base Voltage                                                     | $V_{EBO}$      | 5           |        | V                    |
| Peak Pulse Current                                                       | $I_{CM}$       | 6           |        | A                    |
| Continuous Collector Current                                             | $I_C$          | 2           |        | A                    |
| Power Dissipation at $T_{amb}=25^{\circ}C$<br>derate above $25^{\circ}C$ | $P_{tot}$      | 1<br>5.7    |        | W<br>mW/ $^{\circ}C$ |
| Operating and Storage Temperature Range                                  | $T_j; T_{stg}$ | -55 to +200 |        | $^{\circ}C$          |

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}C$ unless otherwise stated).

| PARAMETER                            | SYMBOL        | ZTX652 |              |            | ZTX653 |              |            | UNIT                                     | CONDITIONS.                                                                                                |
|--------------------------------------|---------------|--------|--------------|------------|--------|--------------|------------|------------------------------------------|------------------------------------------------------------------------------------------------------------|
|                                      |               | MIN.   | TYP.         | MAX.       | MIN.   | TYP.         | MAX.       |                                          |                                                                                                            |
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | 100    |              |            | 120    |              |            | V                                        | $I_C=100\mu A$                                                                                             |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | 80     |              |            | 100    |              |            | V                                        | $I_C=10mA^*$                                                                                               |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | 5      |              |            | 5      |              |            | V                                        | $I_E=100\mu A$                                                                                             |
| Collector Cut-Off Current            | $I_{CBO}$     |        |              | 0.1<br>10  |        |              | 0.1<br>10  | $\mu A$<br>$\mu A$<br>$\mu A$<br>$\mu A$ | $V_{CB}=80V$<br>$V_{CB}=100V$<br>$V_{CB}=80V, T_{amb}=100^{\circ}C$<br>$V_{CB}=100V, T_{amb}=100^{\circ}C$ |
| Emitter Cut-Off Current              | $I_{EBO}$     |        |              | 0.1        |        |              | 0.1        | $\mu A$                                  | $V_{EB}=4V$                                                                                                |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |        | 0.13<br>0.23 | 0.3<br>0.5 |        | 0.13<br>0.23 | 0.3<br>0.5 | V<br>V                                   | $I_C=1A, I_B=100mA^*$<br>$I_C=2A, I_B=200mA^*$                                                             |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ |        | 0.9          | 1.25       |        | 0.9          | 1.25       | V                                        | $I_C=1A, I_B=100mA^*$                                                                                      |
| Base-Emitter Turn-On Voltage         | $V_{BE(on)}$  |        | 0.8          | 1          |        | 0.8          | 1          | V                                        | $I_C=1A, V_{CE}=2V^*$                                                                                      |

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ELECTRICAL CHARACTERISTICS (at T<sub>amb</sub> = 25°C unless otherwise stated).

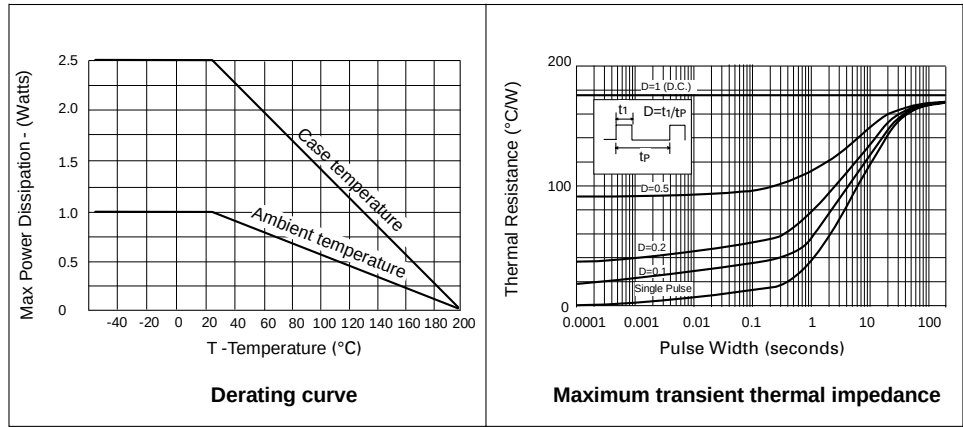
| PARAMETER            | SYMBOL           | ZTX652 |      |      | ZTX653 |      |      | UNIT | CONDITIONS.                                                                           |
|----------------------|------------------|--------|------|------|--------|------|------|------|---------------------------------------------------------------------------------------|
|                      |                  | MIN.   | TYP. | MAX. | MIN.   | TYP. | MAX. |      |                                                                                       |
| Transition Frequency | f <sub>T</sub>   | 140    | 175  |      | 140    | 175  |      | MHz  | I <sub>C</sub> =100mA, V <sub>CE</sub> =5V<br>f=100MHz                                |
| Switching Times      | t <sub>on</sub>  |        | 80   |      |        | 80   |      | ns   | I <sub>C</sub> =500mA, V <sub>CC</sub> =10V<br>I <sub>B1</sub> =I <sub>B2</sub> =50mA |
|                      | t <sub>off</sub> |        | 1200 |      |        | 1200 |      | ns   |                                                                                       |
| Output Capacitance   | C <sub>obo</sub> |        |      | 30   |        |      | 30   | pF   | V <sub>CB</sub> =10V f=1MHz                                                           |

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

THERMAL CHARACTERISTICS

| PARAMETER                                            | SYMBOL                    | MAX. | UNIT |
|------------------------------------------------------|---------------------------|------|------|
| Thermal Resistance: Junction to Ambient <sub>1</sub> | R <sub>th(j-amb)1</sub>   | 175  | °C/W |
| Junction to Ambient <sub>2</sub>                     | R <sub>th(j-amb)2</sub> † | 116  | °C/W |
| Junction to Case                                     | R <sub>th(j-case)</sub>   | 70   | °C/W |

† Device mounted on P.C.B. with copper equal to 1 sq. Inch minimum.



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TYPICAL CHARACTERISTICS

