



**THE DATASHEET OF  
ZTX1053ASTOA**



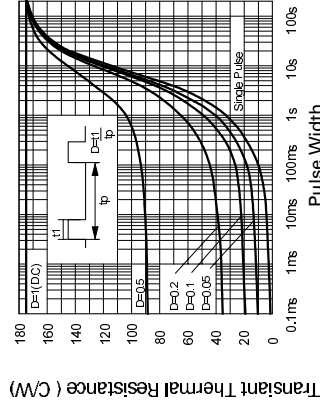
# ZTX1053A

## NPN SILICON PLANAR ME HIGH GAIN TRANSISTOR

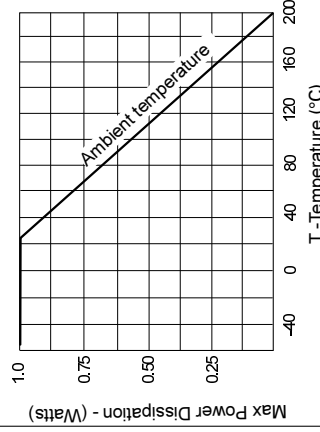
ISSUE 3-JANUARY 1995

### FEATURES

- \*  $V_{CE0}=75V$
  - \* 3 Amp Continuous Current
  - \* 10 Amp Pulse Current
  - \* Very Low Saturation Voltage
- APPLICATIONS
- \* Automotive Switching Circuits
  - \* DC-DC Convertors



**Transient Thermal Resistance**



**Derating curve**

### ABSOLUTE MAXIMUM RATINGS

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

### SPICE PARAMETERS

\*ZETEX ZTX1053A Spice model Last revision 19/01/95

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*
.MODEL ZTX1053A NPN IS=2.1E-12 NF=1.0 BF=600 IKF=2.2 VAF=100
+   |SE=0.9E-13 NE=1.25 NR=0.99 BR=150 IKR=2.5 VAR=15
+   |SC=5.0E-10 NC=1.76 RB=0.1 RE=0.028 RC=0.016
+   |CJC=75.1E-12 CJE=520E-12 MJC=0.415 MJE=0.367
+   |VJC=0.512 VJE=0.766 TF=550E-12 TR=22E-9
*

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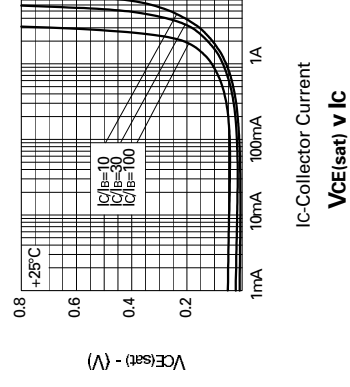
# ZTX1053A

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

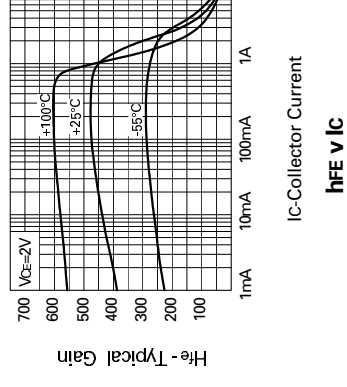
| PARAMETER                             | SYMBOL        | MIN.              | TYP.              | MAX.             | UNIT | CONDITIONS.                                                                                                                                                             |
|---------------------------------------|---------------|-------------------|-------------------|------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage      | $V_{(BR)CBO}$ | 150               | 245               |                  | V    | $I_C=100\mu\text{A}$                                                                                                                                                    |
| Collector-Emitter Breakdown Voltage   | $V_{CES}$     | 150               | 245               |                  | V    | $I_C=100\mu\text{A}$                                                                                                                                                    |
| Collector-Emitter Breakdown Voltage   | $V_{CEO}$     | 75                | 100               |                  | V    | $I_C=10\text{mA}$                                                                                                                                                       |
| Collector-Emitter Breakdown Voltage   | $V_{CEV}$     | 150               | 245               |                  | V    | $I_C=100\mu\text{A}$ , $V_{EB}=1\text{V}$                                                                                                                               |
| Emitter-Base Breakdown Voltage        | $V_{(BR)EBO}$ | 5                 | 8.8               |                  | V    | $I_E=100\mu\text{A}$                                                                                                                                                    |
| Collector Cut-Off Current             | $I_{CBO}$     |                   | 0.3               | 10               | nA   | $V_{CB}=120\text{V}$                                                                                                                                                    |
| Emitter Cut-Off Current               | $I_{EBO}$     |                   | 0.3               | 10               | nA   | $V_{EB}=4\text{V}$                                                                                                                                                      |
| Collector Emitter Cut-Off Current     | $I_{CES}$     |                   | 0.3               | 10               | nA   | $V_{CES}=120\text{V}$                                                                                                                                                   |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$ |                   | 17<br>120<br>180  | 25<br>150<br>250 | mV   | $I_C=0.2\text{A}$ , $I_B=20\text{mA}^*$<br>$I_C=1\text{A}$ , $I_B=10\text{mA}^*$<br>$I_C=3\text{A}$ , $I_B=100\text{mA}^*$                                              |
| Base-Emitter Saturation Voltage       | $V_{BE(sat)}$ |                   | 900               | 1000             | mV   | $I_C=3\text{A}$ , $I_B=100\text{mA}^*$                                                                                                                                  |
| Base-Emitter Turn-On Voltage          | $V_{BE(on)}$  |                   | 825               | 950              | mV   | $I_C=3\text{A}$ , $V_{CE}=2\text{V}^*$                                                                                                                                  |
| Static Forward Current Transfer Ratio | hFE           | 260<br>300<br>100 | 420<br>450<br>150 | 1200             |      | $I_C=10\text{mA}$ , $V_{CE}=2\text{V}^*$<br>$I_C=1\text{A}$ , $V_{CE}=2\text{V}^*$<br>$I_C=3\text{A}$ , $V_{CE}=2\text{V}^*$<br>$I_C=10\text{A}$ , $V_{CE}=2\text{V}^*$ |
| Transition Frequency                  | $f_T$         |                   | 140               |                  | MHz  | $I_C=50\text{mA}$ , $V_{CE}=10\text{V}$<br>$f=100\text{MHz}$                                                                                                            |
| Output Capacitance                    | $C_{obo}$     |                   | 21                | 30               | pF   | $V_{CB}=10\text{V}$ , $f=1\text{MHz}$                                                                                                                                   |
| Switching Times                       | $t_{on}$      |                   | 90                |                  | ns   | $I_C=2\text{A}$ , $I_B=20\text{mA}$ , $V_{CC}=50\text{V}$                                                                                                               |
|                                       | $t_{off}$     |                   | 750               |                  | ns   | $I_C=2\text{A}$ , $I_B=\pm 20\text{mA}$ , $V_{CC}=50\text{V}$                                                                                                           |

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

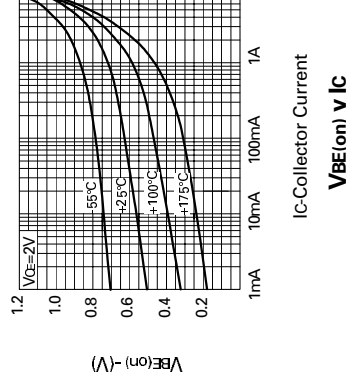
## TYPICAL



IC-Collector Current  
 **$V_{CE(sat)}$  v  $I_C$**



IC-Collector Current  
**hFE v  $I_C$**



IC-Collector Current  
 **$V_{BE(on)}$  v  $I_C$**

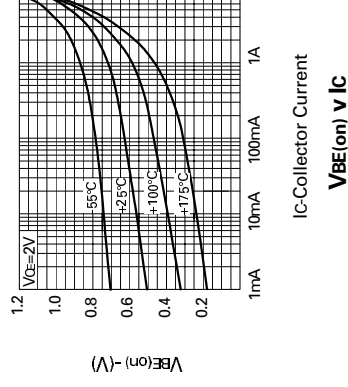
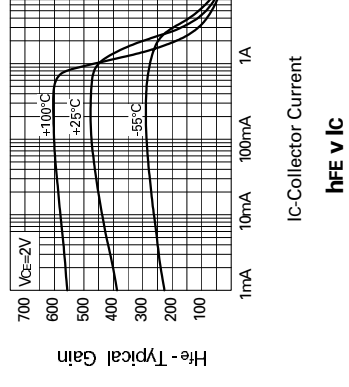
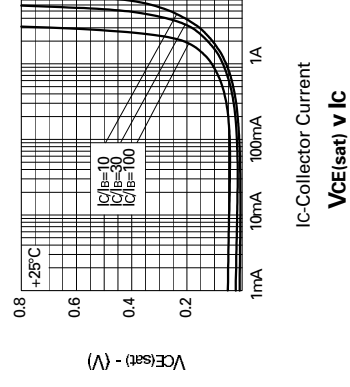
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| Collector-Base Breakdown Voltage      | $V_{(BR)CBO}$ | 150               | 245               |                  | V    | $I_C=100\mu\text{A}$                                                                                                                                                    |
| Collector-Emitter Breakdown Voltage   | $V_{CES}$     | 150               | 245               |                  | V    | $I_C=100\mu\text{A}$                                                                                                                                                    |
| Collector-Emitter Breakdown Voltage   | $V_{CEO}$     | 75                | 100               |                  | V    | $I_C=10\text{mA}$                                                                                                                                                       |
| Collector-Emitter Breakdown Voltage   | $V_{CEV}$     | 150               | 245               |                  | V    | $I_C=100\mu\text{A}$ , $V_{EB}=1\text{V}$                                                                                                                               |
| Emitter-Base Breakdown Voltage        | $V_{(BR)EBO}$ | 5                 | 8.8               |                  | V    | $I_E=100\mu\text{A}$                                                                                                                                                    |
| Collector Cut-Off Current             | $I_{CBO}$     |                   | 0.3               | 10               | nA   | $V_{CB}=120\text{V}$                                                                                                                                                    |
| Emitter Cut-Off Current               | $I_{EBO}$     |                   | 0.3               | 10               | nA   | $V_{EB}=4\text{V}$                                                                                                                                                      |
| Collector Emitter Cut-Off Current     | $I_{CES}$     |                   | 0.3               | 10               | nA   | $V_{CES}=120\text{V}$                                                                                                                                                   |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$ |                   | 17<br>120<br>180  | 25<br>150<br>250 | mV   | $I_C=0.2\text{A}$ , $I_B=20\text{mA}^*$<br>$I_C=1\text{A}$ , $I_B=10\text{mA}^*$<br>$I_C=3\text{A}$ , $I_B=100\text{mA}^*$                                              |
| Base-Emitter Saturation Voltage       | $V_{BE(sat)}$ |                   | 900               | 1000             | mV   | $I_C=3\text{A}$ , $I_B=100\text{mA}^*$                                                                                                                                  |
| Base-Emitter Turn-On Voltage          | $V_{BE(on)}$  |                   | 825               | 950              | mV   | $I_C=3\text{A}$ , $V_{CE}=2\text{V}^*$                                                                                                                                  |
| Static Forward Current Transfer Ratio | hFE           | 260<br>300<br>100 | 420<br>450<br>150 | 1200             |      | $I_C=10\text{mA}$ , $V_{CE}=2\text{V}^*$<br>$I_C=1\text{A}$ , $V_{CE}=2\text{V}^*$<br>$I_C=3\text{A}$ , $V_{CE}=2\text{V}^*$<br>$I_C=10\text{A}$ , $V_{CE}=2\text{V}^*$ |
| Transition Frequency                  | $f_T$         |                   | 140               |                  | MHz  | $I_C=50\text{mA}$ , $V_{CE}=10\text{V}$<br>$f=100\text{MHz}$                                                                                                            |
| Output Capacitance                    | $C_{obo}$     |                   | 21                | 30               | pF   | $V_{CB}=10\text{V}$ , $f=1\text{MHz}$                                                                                                                                   |
| Switching Times                       | $t_{on}$      |                   | 90                |                  | ns   | $I_C=2\text{A}$ , $I_B=20\text{mA}$ , $V_{CC}=50\text{V}$                                                                                                               |
|                                       | $t_{off}$     |                   | 750               |                  | ns   | $I_C=2\text{A}$ , $I_B=\pm 20\text{mA}$ , $V_{CC}=50\text{V}$                                                                                                           |

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

## TYPICAL



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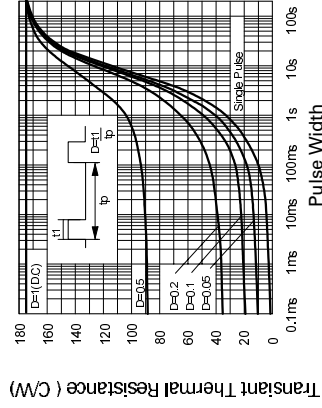
ISSUE 3-JANUARY 1995

### FEATURES

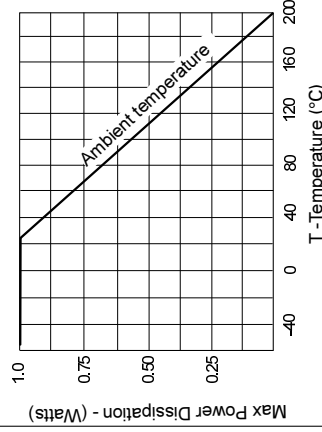
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  - \* 3 Amp Continuous Current
  - \* 10 Amp Pulse Current
  - \* Very Low Saturation Voltage
- APPLICATIONS
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### ABSOLUTE MAXIMUM RATINGS

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



**Transient Thermal Resistance**



**Derating curve**

### SPICE PARAMETERS

\* ZETEX ZTX1053A Spice model Last revision 19/01/95

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```

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