

ZTX1051A

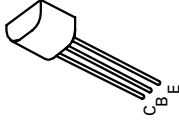
NPN SILICON PLANAR MEDIUM POWER HIGH GAIN TRANSISTOR

ISSUE 3 – FEBRUARY 95

ZTX1051A

FEATURES

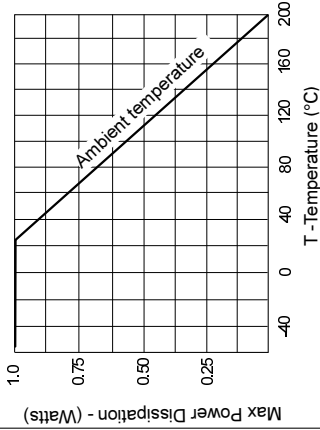
- * $B_{CEV}=150V$
 - * Very Low Saturation Voltage
 - * High Gain
 - * Inherently Low Noise
- ### APPLICATIONS
- * Emergency Lighting
 - * Low Noise Audio



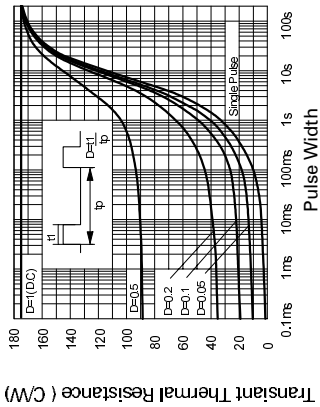
E-Line
TO92 Compatible

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CBO}	150	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	5	V
Peak Pulse Current	I_{CM}	10	A
Continuous Collector Current	I_C	4	A
Base Current	I_B	500	mA
Power Dissipation at $T_{amb}=25^{\circ}C$	P_{tot}	1	W
Operating and Storage Temperature Range	T_j, T_{stg}	-55 to +200	$^{\circ}C$



Derating curve



Transient Thermal Resistance

SPICE PARAMETERS

*ZETEX ZTX1051A Spice model Last revision 16/12/94

- ```

.MODEL ZTX1051A NPN IS=1.35E-12 NF=1.0 BF=600 IKF=5.0 VAF=120
+ ISE=0.6E-13 NE=1.25 NR=1.0 BR=150 IKR=3 VAR=15
+ ISC=1.0E-10 NC=1.7 RB=0.1 RE=0.023 RC=0.010
+ CJC=90.36E-12 CJE=547.5E-12 MJC=0.385 MJE=0.357
+ VJC=0.5 VJE=0.741 TF=600E-12 TR=8E-9

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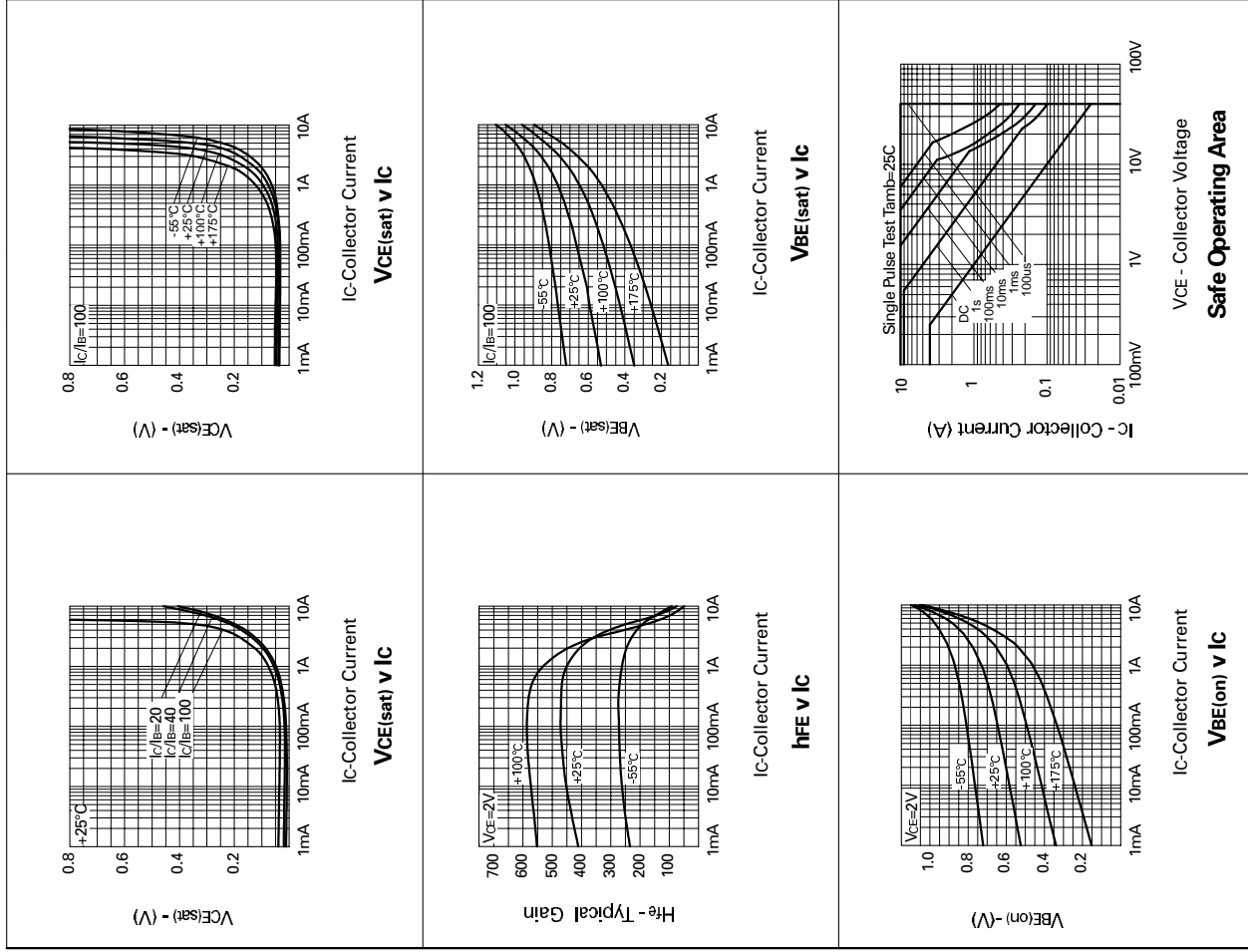
ZTX1051A

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

| PARAMETER                             | SYMBOL               | MIN.                    | TYP.                    | MAX.             | UNIT | CONDITIONS.                                                                                                                                                                     |
|---------------------------------------|----------------------|-------------------------|-------------------------|------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage      | V(BR)CBO             | 150                     | 190                     |                  | V    | I <sub>C</sub> =100μA                                                                                                                                                           |
| Collector-Emitter Breakdown Voltage   | V <sub>CES</sub>     | 150                     | 190                     |                  | V    | I <sub>C</sub> =100μA                                                                                                                                                           |
| Collector-Emitter Breakdown Voltage   | V <sub>CEO</sub>     | 40                      | 60                      |                  | V    | I <sub>C</sub> =10mA                                                                                                                                                            |
| Collector-Emitter Breakdown Voltage   | V <sub>CEV</sub>     | 150                     | 190                     |                  | V    | I <sub>C</sub> =100μA, V <sub>EB</sub> =1V                                                                                                                                      |
| Emitter-Base Breakdown Voltage        | V(BR)EBO             | 5                       | 8.8                     |                  | V    | I <sub>E</sub> =100μA                                                                                                                                                           |
| Collector Cut-Off Current             | I <sub>CBO</sub>     |                         | 0.3                     | 10               | nA   | V <sub>CB</sub> =120V                                                                                                                                                           |
| Emitter Cut-Off Current               | I <sub>EBO</sub>     |                         | 0.3                     | 10               | nA   | V <sub>EB</sub> =4V                                                                                                                                                             |
| Collector Emitter Cut-Off Current     | I <sub>CES</sub>     |                         | 0.3                     | 10               | nA   | V <sub>CE</sub> =120V                                                                                                                                                           |
| Collector-Emitter Saturation Voltage  | V <sub>CE(sat)</sub> |                         | 17<br>75<br>165         | 25<br>110<br>210 | mV   | I <sub>C</sub> =0.2A, I <sub>B</sub> =10mA*<br>I <sub>C</sub> =1A, I <sub>B</sub> =10mA*<br>I <sub>C</sub> =4A, I <sub>B</sub> =100mA*                                          |
| Base-Emitter Saturation Voltage       | V <sub>BE(sat)</sub> |                         | 920                     | 1000             | mV   | I <sub>C</sub> =4A, I <sub>B</sub> =100mA*                                                                                                                                      |
| Base-Emitter Turn-On Voltage          | V <sub>BE(on)</sub>  |                         | 825                     | 950              | mV   | I <sub>C</sub> =4A, V <sub>CE</sub> =2V*                                                                                                                                        |
| Static Forward Current Transfer Ratio | h <sub>FE</sub>      | 290<br>300<br>190<br>45 | 440<br>450<br>310<br>70 | 1200             |      | I <sub>C</sub> =10mA, V <sub>CE</sub> =2V*<br>I <sub>C</sub> =1A, V <sub>CE</sub> =2V*<br>I <sub>C</sub> =4A, V <sub>CE</sub> =2V*<br>I <sub>C</sub> =10A, V <sub>CE</sub> =2V* |
| Transition Frequency                  | f <sub>T</sub>       |                         | 155                     |                  | MHz  | I <sub>C</sub> =50mA, V <sub>CE</sub> =10V<br>f=100MHz                                                                                                                          |
| Output Capacitance                    | C <sub>obo</sub>     |                         | 27                      | 40               | pF   | V <sub>CB</sub> =10V, f=1MHz                                                                                                                                                    |
| Switching Times                       | t <sub>on</sub>      |                         | 100                     |                  | ns   | I <sub>C</sub> =4A, I <sub>B</sub> =40mA, V <sub>CC</sub> =10V                                                                                                                  |
|                                       | t <sub>off</sub>     |                         | 300                     |                  | ns   | I <sub>C</sub> =4A, I <sub>B</sub> =40mA, V <sub>CC</sub> =10V                                                                                                                  |

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

**TYPICAL CHARACTERISTICS**



VCE - Collector Voltage  
Safe Operating Area

IC - Collector Current  
VBE(on) v IC

IC - Collector Current  
VBE(sat) v IC

IC - Collector Current  
VBE(sat) v IC

IC - Collector Current  
hFE v IC

IC - Collector Current  
VBE(on) v IC

IC - Collector Current  
VBE(sat) v IC

IC - Collector Current  
VBE(sat) v IC

IC - Collector Current  
VBE(sat) v IC

ZTX1051A

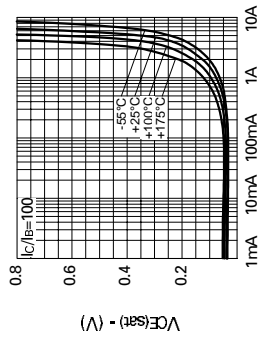
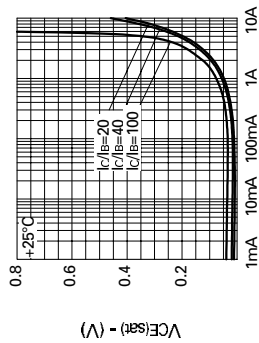
ZTX1051A

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

| PARAMETER                             | SYMBOL               | MIN. | TYP. | MAX. | UNIT | CONDITIONS.                                                    |
|---------------------------------------|----------------------|------|------|------|------|----------------------------------------------------------------|
| Collector-Base Breakdown Voltage      | V(BR)CBO             | 150  | 190  |      | V    | I <sub>C</sub> =100μA                                          |
| Collector-Emitter Breakdown Voltage   | V <sub>CES</sub>     | 150  | 190  |      | V    | I <sub>C</sub> =100μA                                          |
| Collector-Emitter Breakdown Voltage   | V <sub>CEO</sub>     | 40   | 60   |      | V    | I <sub>C</sub> =10mA                                           |
| Collector-Emitter Breakdown Voltage   | V <sub>CEV</sub>     | 150  | 190  |      | V    | I <sub>C</sub> =100μA, V <sub>EB</sub> =1V                     |
| Emitter-Base Breakdown Voltage        | V(BR)EBO             | 5    | 8.8  |      | V    | I <sub>E</sub> =100μA                                          |
| Collector Cut-Off Current             | I <sub>CBO</sub>     |      | 0.3  | 10   | nA   | V <sub>CB</sub> =120V                                          |
| Emitter Cut-Off Current               | I <sub>EBO</sub>     |      | 0.3  | 10   | nA   | V <sub>EB</sub> =4V                                            |
| Collector Emitter Cut-Off Current     | I <sub>CES</sub>     |      | 0.3  | 10   | nA   | V <sub>CE</sub> =120V                                          |
| Collector-Emitter Saturation Voltage  | V <sub>CE(sat)</sub> | 17   | 75   | 25   | mV   | I <sub>C</sub> =0.2A, I <sub>B</sub> =10mA*                    |
|                                       |                      |      | 165  | 110  | mV   | I <sub>C</sub> =1A, I <sub>B</sub> =10mA*                      |
|                                       |                      |      |      | 210  | mV   | I <sub>C</sub> =4A, I <sub>B</sub> =100mA*                     |
| Base-Emitter Saturation Voltage       | V <sub>BE(sat)</sub> |      | 920  | 1000 | mV   | I <sub>C</sub> =4A, I <sub>B</sub> =100mA*                     |
| Base-Emitter Turn-On Voltage          | V <sub>BE(on)</sub>  |      | 825  | 950  | mV   | I <sub>C</sub> =4A, V <sub>CE</sub> =2V*                       |
| Static Forward Current Transfer Ratio | h <sub>FE</sub>      | 290  | 440  | 1200 |      | I <sub>C</sub> =10mA, V <sub>CE</sub> =2V*                     |
|                                       |                      | 300  | 450  |      |      | I <sub>C</sub> =1A, V <sub>CE</sub> =2V*                       |
|                                       |                      | 190  | 310  |      |      | I <sub>C</sub> =4A, V <sub>CE</sub> =2V*                       |
|                                       |                      | 45   | 70   |      |      | I <sub>C</sub> =10A, V <sub>CE</sub> =2V*                      |
| Transition Frequency                  | f <sub>T</sub>       |      | 155  |      | MHz  | I <sub>C</sub> =50mA, V <sub>CE</sub> =10V<br>f=100MHz         |
| Output Capacitance                    | C <sub>obo</sub>     |      | 27   | 40   | pF   | V <sub>CB</sub> =10V, f=1MHz                                   |
| Switching Times                       | t <sub>on</sub>      |      | 100  |      | ns   | I <sub>C</sub> =4A, I <sub>B</sub> =40mA, V <sub>CC</sub> =10V |
|                                       | t <sub>off</sub>     |      | 300  |      | ns   | I <sub>C</sub> =4A, I <sub>B</sub> =40mA, V <sub>CC</sub> =10V |

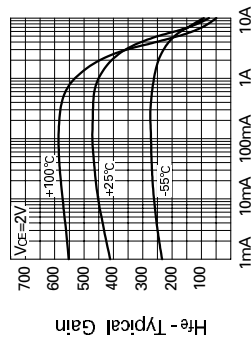
\*Measured under pulsed conditions. Pulse width=300μs. Duty cycle ≤ 2%

**TYPICAL CHARACTERISTICS**



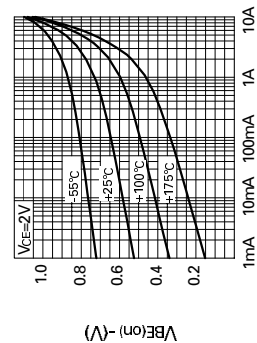
I<sub>C</sub>-Collector Current  
**V<sub>CE(sat)</sub> v I<sub>C</sub>**

I<sub>C</sub>-Collector Current  
**V<sub>CE(sat)</sub> v I<sub>C</sub>**

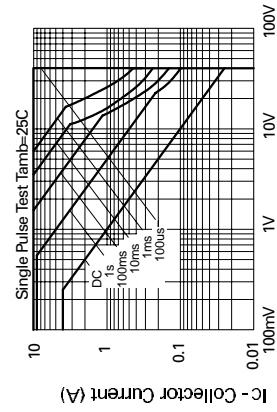


**h<sub>FE</sub> v I<sub>C</sub>**

**V<sub>BE(sat)</sub> v I<sub>C</sub>**



I<sub>C</sub>-Collector Current  
**V<sub>BE(on)</sub> v I<sub>C</sub>**



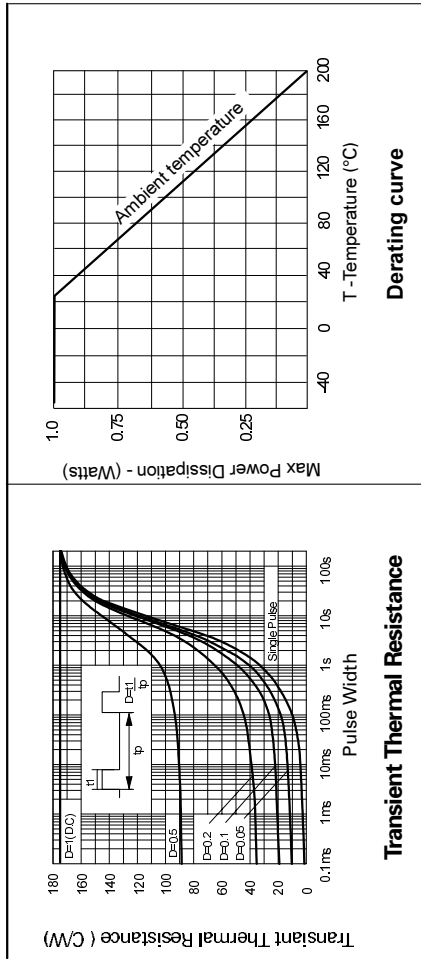
I<sub>C</sub>-Collector Current  
**Safe Operating Area**

ZTX1051A

NPN SILICON PLANAR MEDIUM POWER  
HIGH GAIN TRANSISTOR

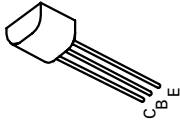
ISSUE 3 – FEBRUARY 95

ZTX1051A



FEATURES

- \*  $B_{CEV}=150V$
  - \* Very Low Saturation Voltage
  - \* High Gain
  - \* Inherently Low Noise
- APPLICATIONS
- \* Emergency Lighting
  - \* Low Noise Audio



E-Line  
TO92 Compatible

ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                  | SYMBOL         | VALUE       | UNIT        |
|--------------------------------------------|----------------|-------------|-------------|
| Collector-Base Voltage                     | $V_{CBO}$      | 150         | V           |
| Collector-Emitter Voltage                  | $V_{CEO}$      | 40          | V           |
| Emitter-Base Voltage                       | $V_{EBO}$      | 5           | V           |
| Peak Pulse Current                         | $I_{CM}$       | 10          | A           |
| Continuous Collector Current               | $I_C$          | 4           | A           |
| Base Current                               | $I_B$          | 500         | mA          |
| Power Dissipation at $T_{amb}=25^{\circ}C$ | $P_{tot}$      | 1           | W           |
| Operating and Storage Temperature Range    | $T_j, T_{stg}$ | -55 to +200 | $^{\circ}C$ |

SPICE PARAMETERS

- \* ZETEX ZTX1051A Spice model Last revision 16/12/94
- \* .MODEL ZTX1051A NPN IS=1.35E-12 NF=1.0 BF=600 IKF=5.0 VAF=120
- + ISE=0.6E-13 NE=1.25 NR=1.0 BR=150 IKR=3 VAR=15
- + ISC=1.0E-10 NC=1.7 RB=0.1 RE=0.023 RC=0.010
- + CJC=90.36E-12 CJE=547.5E-12 MJC=0.385 MJE=0.357
- + VJC=0.5 VJE=0.741 TF=600E-12 TR=8E-9

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