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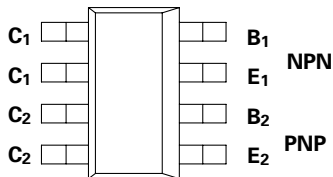
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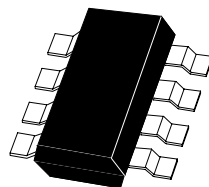
# SM-8 COMPLEMENTARY MEDIUM POWER DARLINGTON TRANSISTORS

ISSUE 2 – February 1997

## ZDT6702



PARTMARKING DETAIL – T6702



SM-8  
(8 LEAD SOT223)

### ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                               | SYMBOL         | NPN         | PNP   | UNIT |
|---|----------------|-------------|-------|------|
| Collector-Base Voltage                  | $V_{CBO}$      | 80          | -80   | V    |
| Collector-Emitter Voltage               | $V_{CEO}$      | 60          | -60   | V    |
| Emitter-Base Voltage                    | $V_{EBO}$      | 10          | -10   | V    |
| Peak Pulse Current                      | $I_{CM}$       | 4           | -4    | A    |
| Continuous Collector Current            | $I_C$          | 1.75        | -1.75 | A    |
| Operating and Storage Temperature Range | $T_j; T_{stg}$ | -55 to +150 |       | °C   |

### THERMAL CHARACTERISTICS

| PARAMETER   | SYMBOL    | VALUE        | UNIT           |
|---|-----------|--------------|----------------|
| Total Power Dissipation at $T_{amb} = 25^\circ\text{C}^*$<br>Any single die "on"<br>Both die "on" equally | $P_{tot}$ | 2.25<br>2.75 | W<br>W         |
| Derate above $25^\circ\text{C}^*$<br>Any single die "on"<br>Both die "on" equally                         |           | 18<br>22     | mW/°C<br>mW/°C |
| Thermal Resistance - Junction to Ambient*<br>Any single die "on"<br>Both die "on" equally                 |           | 55.6<br>45.5 | °C/W<br>°C/W   |

\* The power which can be dissipated assuming the device is mounted in a typical manner on a PCB with copper equal to 2 inches square.

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

| PARAMETER                             | SYMBOL        | MIN.                     | TYP.                   | MAX.         | UNIT                | CONDITIONS.   |
|---------------------------------------|---------------|--------------------------|------------------------|--------------|---------------------|---|
| Collector-Base Breakdown Voltage      | $V_{(BR)CBO}$ | 80                       | 200                    |              | V                   | $I_C=100\mu\text{A}$  |
| Collector-Emitter Breakdown Voltage   | $V_{(BR)CEO}$ | 60                       | 100                    |              | V                   | $I_C=10\text{mA}^*$   |
| Emitter-Base Breakdown Voltage        | $V_{(BR)EBO}$ | 10                       | 15                     |              | V                   | $I_E=100\mu\text{A}$  |
| Collector Cutoff Current              | $I_{CBO}$     |                          | 0.5                    | 10<br>10     | nA<br>$\mu\text{A}$ | $V_{CB}=60\text{V}$<br>$V_{CB}=60\text{V}, T_{amb}=100^{\circ}\text{C}$   |
| Emitter Cutoff Current                | $I_{EBO}$     |                          | 0.1                    | 10           | nA                  | $V_{EB}=8\text{V}$  |
| Collector-Emitter Cutoff Current      | $I_{CES}$     |                          | 50                     | 500          | nA                  | $V_{CE}=60\text{V}$   |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$ |                          | 0.83<br>1.0            | 0.95<br>1.28 | V<br>V              | $I_C=0.5\text{A}, I_B=0.5\text{mA}^*$<br>$I_C=1.75\text{A}, I_B=2\text{mA}^*$   |
| Base-Emitter Saturation Voltage       | $V_{BE(sat)}$ |                          | 1.68                   | 1.85         | V                   | $I_C=1.75\text{A}, I_B=2\text{mA}^*$  |
| Base-Emitter Turn-On Voltage          | $V_{BE(on)}$  |                          | 1.55                   | 1.75         | V                   | $I_C=1.75\text{A}, V_{CE}=5\text{V}^*$  |
| Static Forward Current Transfer Ratio | $h_{FE}$      | 5K<br>5K<br>3.5K<br>0.5K | 13K<br>13K<br>9K<br>2K |              |                     | $I_C=10\text{mA}, V_{CE}=5\text{V}$<br>$I_C=500\text{mA}, V_{CE}=5\text{V}$<br>$I_C=2\text{A}, V_{CE}=5\text{V}$<br>$I_C=4\text{A}, V_{CE}=5\text{V}^*$ |
| Transition Frequency                  | $f_T$         |                          | 140                    |              | MHz                 | $I_C=100\text{mA}, V_{CE}=10\text{V}$<br>$f=100\text{MHz}$  |
| Input Capacitance                     | $C_{ibo}$     |                          | 70                     |              | pF                  | $V_{EB}=500\text{mV}, f=1\text{MHz}$  |
| Output Capacitance                    | $C_{obo}$     |                          | 15                     |              | pF                  | $V_{CB}=10\text{V}, f=1\text{MHz}$  |
| Switching Times                       | $t_{on}$      |                          | 0.5                    |              | $\mu\text{s}$       | $I_C=500\text{mA}, V_{CE}=10\text{V}$<br>$I_{B1}=I_{B2}=0.5\text{mA}$   |
|                                       | $t_{off}$     |                          | 2.1                    |              | $\mu\text{s}$       |   |

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

# ZDT6702

## PNP TRANSISTOR

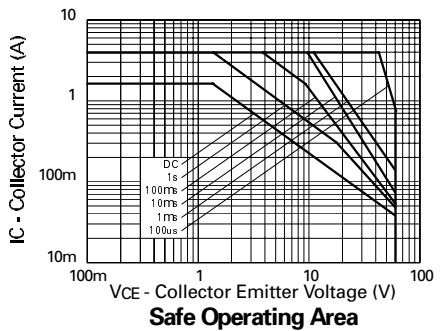
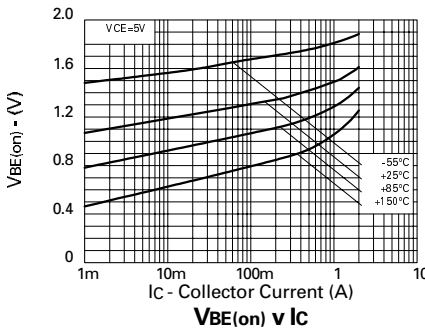
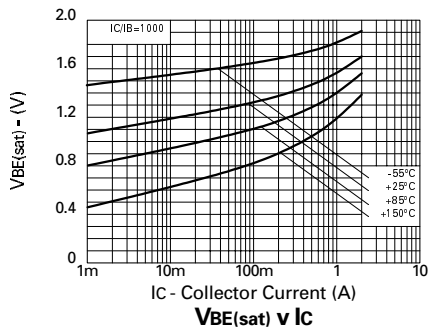
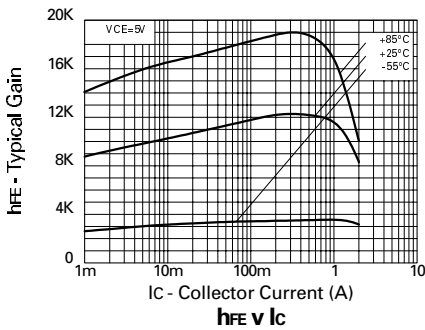
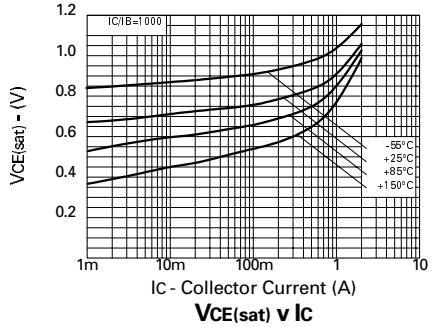
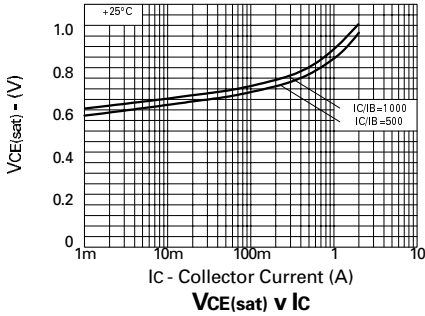
### ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

| PARAMETER                             | SYMBOL         | MIN.                   | TYP.                 | MAX.          | UNIT                | CONDITIONS.   |
|---------------------------------------|----------------|------------------------|----------------------|---------------|---------------------|---|
| Collector-Base Breakdown Voltage      | $V_{(BR)CBO}$  | -80                    | -120                 |               | V                   | $I_C = -100\mu\text{A}$   |
| Collector-Emitter Breakdown Voltage   | $V_{CEO(SUS)}$ | -60                    | -90                  |               | V                   | $I_C = -10\text{mA}^*$  |
| Emitter-Base Breakdown Voltage        | $V_{(BR)EBO}$  | -10                    | -15                  |               | V                   | $I_E = -100\mu\text{A}$   |
| Collector Cutoff Current              | $I_{CBO}$      |                        | -0.5                 | -10<br>-10    | nA<br>$\mu\text{A}$ | $V_{CB} = -60\text{V}$<br>$V_{CB} = -60\text{V}$ , $T_{amb} = 100^{\circ}\text{C}$  |
| Emitter Cutoff Current                | $I_{EBO}$      |                        | -0.1                 | -10           | nA                  | $V_{EB} = -8\text{V}$   |
| Collector-Emitter Cutoff Current      | $I_{CES}$      |                        | -50                  | -500          | nA                  | $V_{CE} = -60\text{V}$  |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$  |                        | -0.86<br>-1.05       | -1.0<br>-1.28 | V<br>V              | $I_C = -0.5\text{A}$ , $I_B = -0.5\text{mA}^*$<br>$I_C = -1.75\text{A}$ , $I_B = -2\text{mA}^*$   |
| Base-Emitter Saturation Voltage       | $V_{BE(sat)}$  |                        | -1.7                 | -1.9          | V                   | $I_C = -1.75\text{A}$ , $I_B = -2\text{mA}^*$   |
| Base-Emitter Turn-On Voltage          | $V_{BE(on)}$   |                        | -1.55                | -1.85         | V                   | $I_C = -1.75\text{A}$ , $V_{CE} = -5\text{V}^*$   |
| Static Forward Current Transfer Ratio | $h_{FE}$       | 2K<br>2K<br>1.5K<br>1K | 8K<br>8K<br>7K<br>4K |               |                     | $I_C = -10\text{mA}$ , $V_{CE} = -5\text{V}^*$<br>$I_C = -500\text{mA}$ , $V_{CE} = -5\text{V}^*$<br>$I_C = -2\text{A}$ , $V_{CE} = -5\text{V}^*$<br>$I_C = -4\text{A}$ , $V_{CE} = -5\text{V}^*$ |
| Transition Frequency                  | $f_T$          |                        | 140                  |               | MHz                 | $I_C = -100\text{mA}$ , $V_{CE} = -10\text{V}$<br>$f = 100\text{MHz}$   |
| Input Capacitance                     | $C_{ibo}$      |                        | 90                   |               | pF                  | $V_{EB} = -0.5\text{V}$ , $f = 1\text{MHz}$   |
| Output Capacitance                    | $C_{obo}$      |                        | 25                   |               | pF                  | $V_{CE} = -10\text{V}$ , $f = 1\text{MHz}$  |
| Switching Times                       | $t_{on}$       |                        | 0.75                 |               | $\mu\text{s}$       | $I_C = -0.5\text{A}$ , $V_{CE} = -10\text{V}$<br>$I_{B1} = I_{B2} = -0.5\text{mA}$  |
|                                       | $t_{off}$      |                        | 1.2                  |               | $\mu\text{s}$       |   |

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

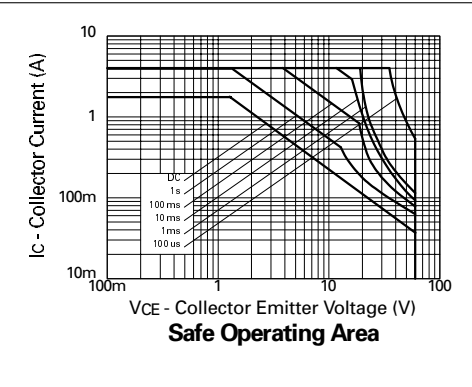
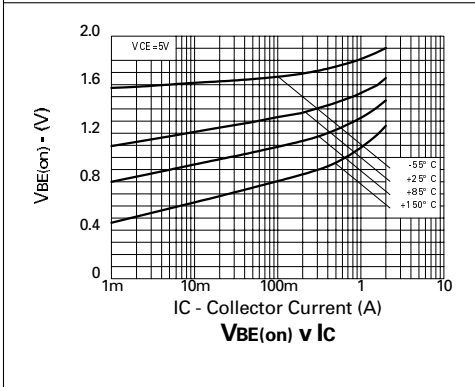
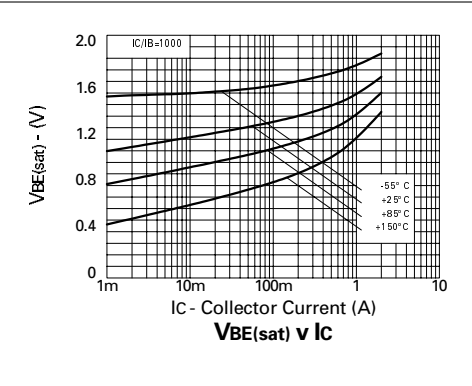
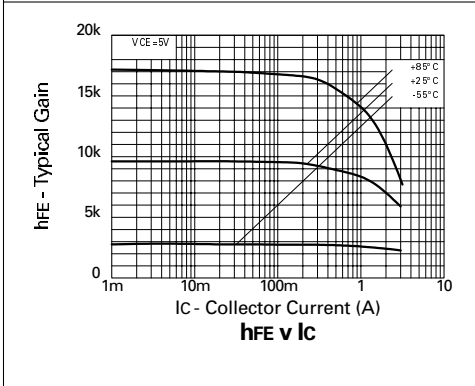
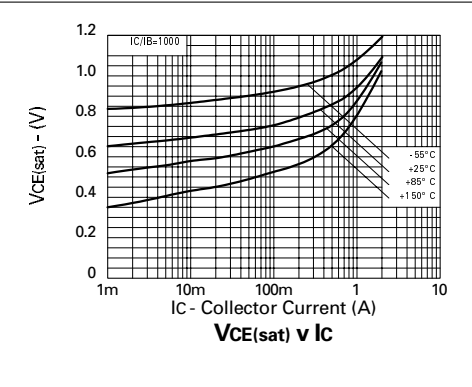
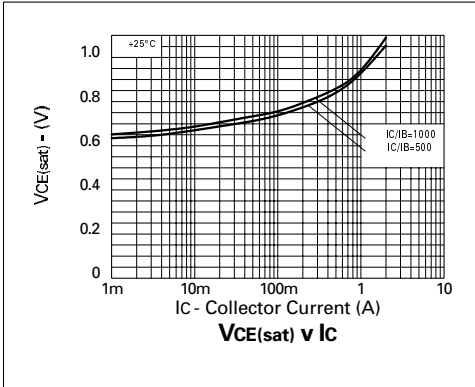
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## TYPICAL CHARACTERISTICS (NPN TRANSISTOR)



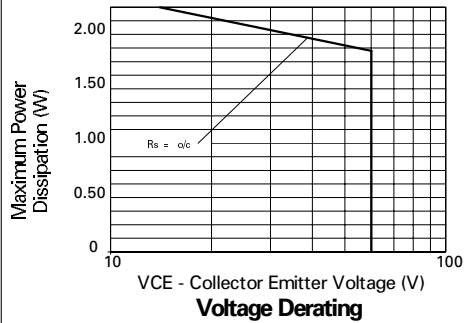
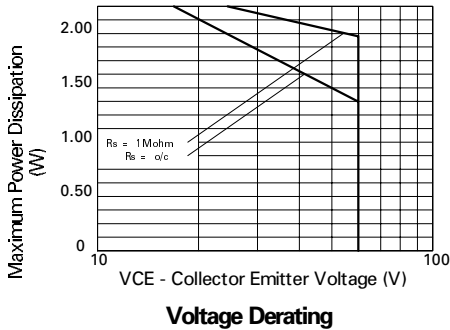
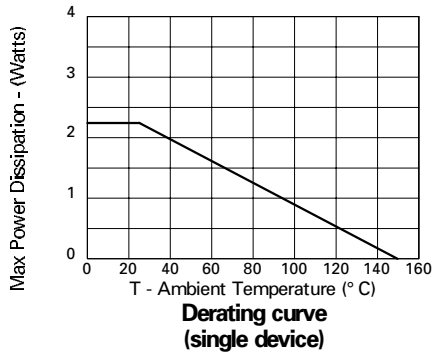
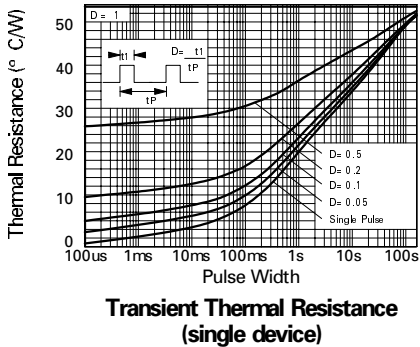
# ZDT6702

## TYPICAL CHARACTERISTICS (PNP TRANSISTOR)

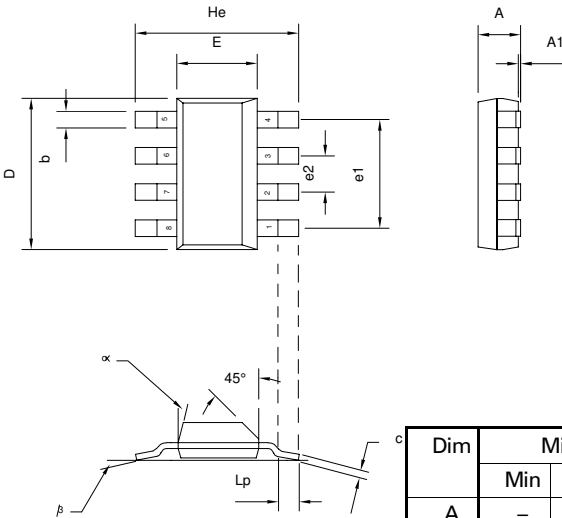


# ZDT6702

## OTHER CHARACTERISTICS



# ZDT6702



| Dim | Millimetres |      |      | Inches |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | Min         | Typ  | Max  | Min    | Typ   | Max   |
| A   | -           | -    | 1.7  | -      | -     | 0.067 |
| A1  | 0.02        | -    | 0.1  | 0.0008 | -     | 0.004 |
| b   | -           | 0.7  | -    | -      | 0.028 | -     |
| c   | 0.24        | -    | 0.32 | 0.009  | -     | 0.013 |
| D   | 6.3         | -    | 6.7  | 0.248  | -     | 0.264 |
| E   | 3.3         | -    | 3.7  | 0.130  | -     | 0.145 |
| e1  | -           | 4.59 | -    | -      | 0.180 | -     |
| e2  | -           | 1.53 | -    | -      | 0.060 | -     |
| He  | 6.7         | -    | 7.3  | 0.264  | -     | 0.287 |
| Lp  | 0.9         | -    | -    | 0.035  | -     | -     |
| α   | -           | -    | 15°  | -      | -     | 15°   |
| β   | -           | 10°  | -    | -      | 10°   | -     |

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