**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | |
| Collector – Emitter Breakdown Voltage (Note 2)<br>($I_C$ = 10 mAdc, $I_B$ = 0) | $V_{(BR)CEO}$ | 80 | – | Vdc |
| Collector – Base Breakdown Voltage<br>($I_C$ = 100 μAdc, $I_E$ = 0) | $V_{(BR)CBO}$ | 80 | – | Vdc |
| Emitter – Base Breakdown Voltage<br>($I_E$ = 10 μAdc, $I_C$ = 0) | $V_{(BR)EBO}$ | 5.0 | – | Vdc |
| Collector Cutoff Current<br>($V_{CE}$ = 60 Vdc, $I_B$ = 0) | $I_{CES}$ | – | 0.1 | μAdc |
| Collector Cutoff Current<br>($V_{CB}$ = 80 Vdc, $I_E$ = 0) | $I_{CBO}$ | – | 0.1 | μAdc |
| Emitter Cutoff Current<br>($V_{EB}$ = 4.0 Vdc, $I_C$ = 0) | $I_{EBO}$ | – | 0.1 | μAdc |
| **ON CHARACTERISTICS** (Note 2) | | | | |
| DC Current Gain<br>($I_C$ = 1.0 mAdc, $V_{CE}$ = 5.0 Vdc)<br>($I_C$ = 10 mAdc, $V_{CE}$ = 5.0 Vdc)<br>($I_C$ = 100 mAdc, $V_{CE}$ = 5.0 Vdc) | $h_{FE}$ | <br>100<br>100<br>75 | <br>300<br>–<br>– | – |
| Collector – Emitter Saturation Voltage<br>($I_C$ = 100 mAdc, $I_B$ = 5.0 mAdc)<br>($I_C$ = 100 mAdc, $I_B$ = 10 mAdc) | $V_{CE(sat)}$ | <br>–<br>– | <br>0.4<br>0.3 | Vdc |
| Base–Emitter On Voltage<br>($I_C$ = 10 mAdc, $V_{CE}$ = 5.0 Vdc) | $V_{BE(on)}$ | 0.6 | 0.8 | Vdc |
| **SMALL–SIGNAL CHARACTERISTICS** | | | | |
| Current – Gain – Bandwidth Product<br>($I_C$ = 10 mAdc, $V_{CE}$ = 5.0 Vdc, f = 100 MHz) | $f_T$ | 150 | – | MHz |
| Output Capacitance<br>($V_{CB}$ = 5.0 Vdc, $I_E$ = 0, f = 1.0 MHz) | $C_{obo}$ | – | 8.0 | pF |
| Input Capacitance<br>($V_{EB}$ = 0.5 Vdc, $I_C$ = 0, f = 1.0 MHz) | $C_{ibo}$ | – | 30 | pF |

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle = 2.0%.

## ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| MPS8099G | TO–92 (Pb–Free) | 5000 Units / Bulk |
| MPS8099RLRAG | TO–92 (Pb–Free) | 2000 / Tape & Reel |
| MPS8099RLRP | TO–92 | 2000 / Ammo Pack |
| MPS8099RLRPG | TO–92 (Pb–Free) | 2000 / Ammo Pack |
| MPS8599RLRAG | TO–92 (Pb–Free) | 2000 / Tape & Reel |
| MPS8599RLRMG | TO–92 (Pb–Free) | 2000 / Ammo Pack |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

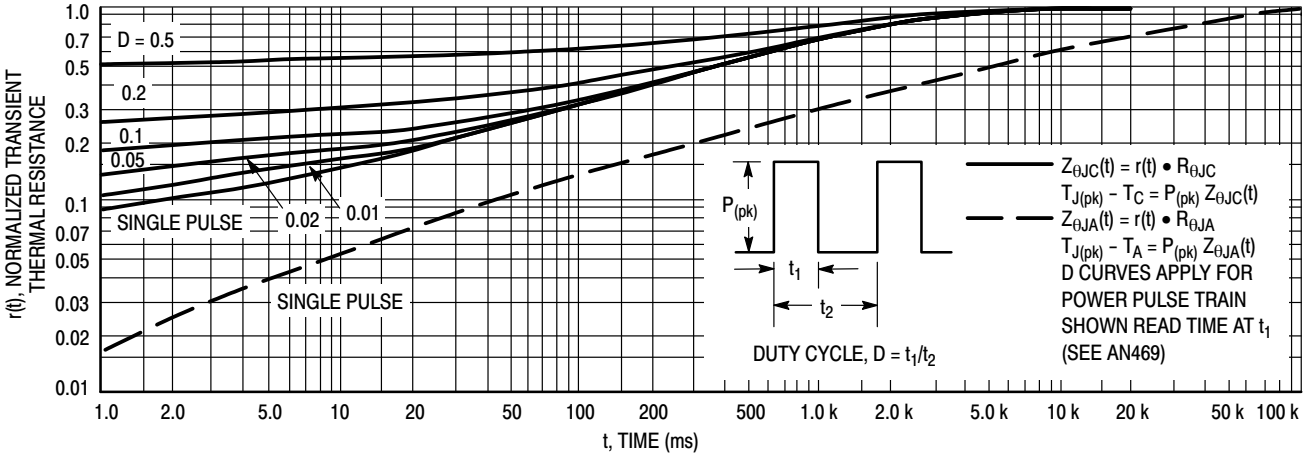
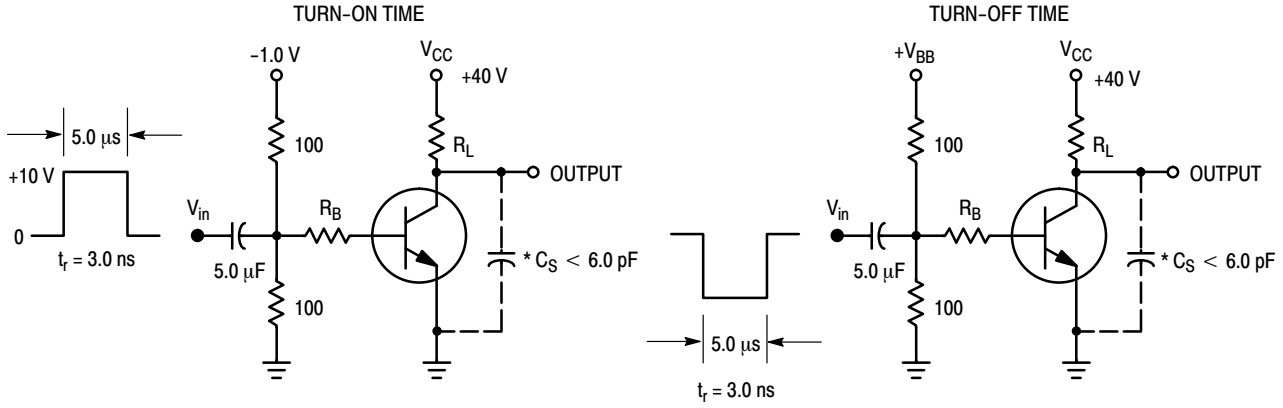



**Figure 1. Thermal Response**




*Total Shunt Capacitance of Test Jig and Connectors For PNP Test Circuits, Reverse All Voltage Polarities

**Figure 2. Switching Time Test Circuits**

**NPN**

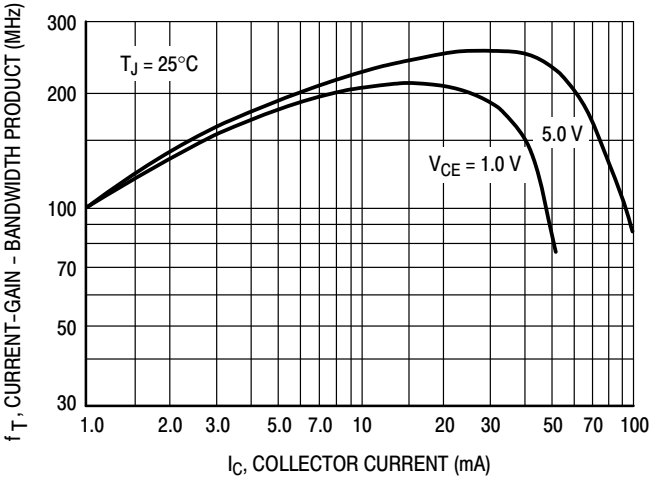



**Figure 3. Current−Gain − Bandwidth Product**

**PNP**

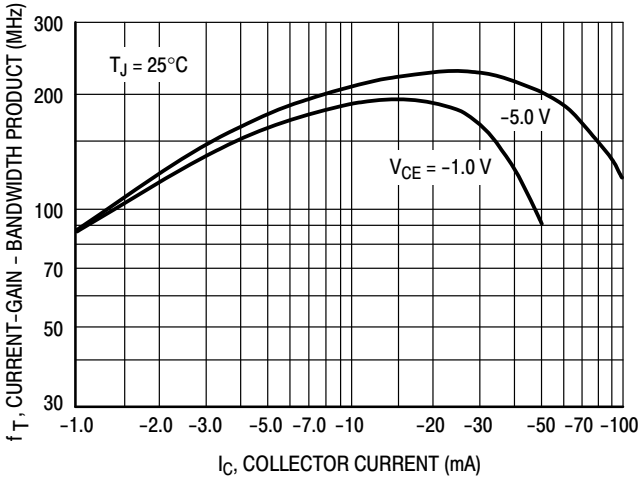



**Figure 4. Current−Gain − Bandwidth Product**

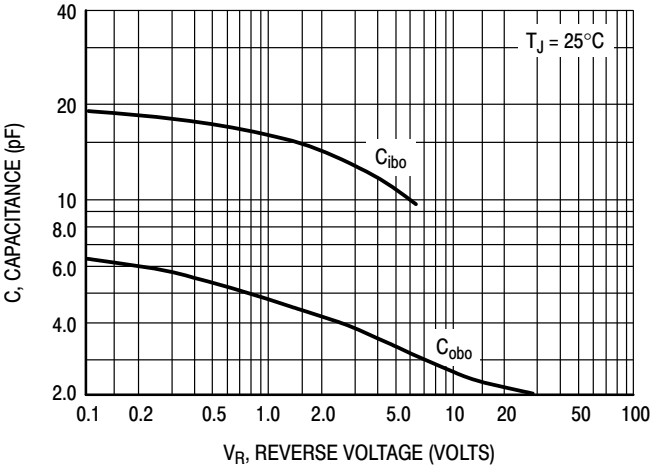



**Figure 5. Capacitance**

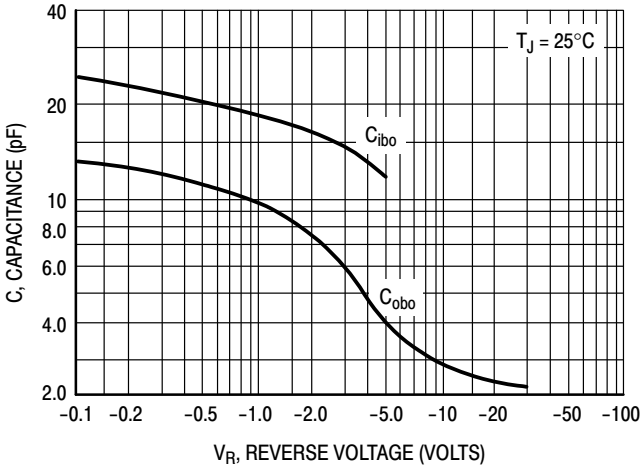



**Figure 6. Capacitance**

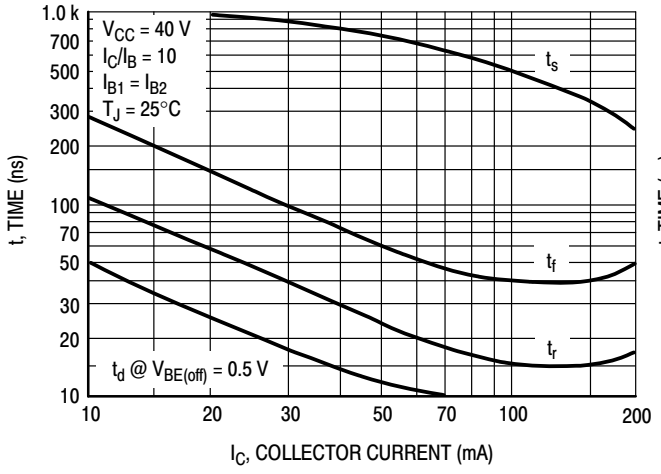



**Figure 7. Switching Times**

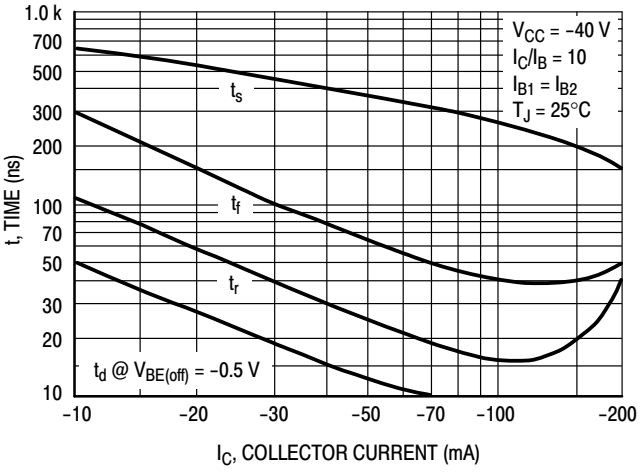



**Figure 8. Switching Times**

**NPN**

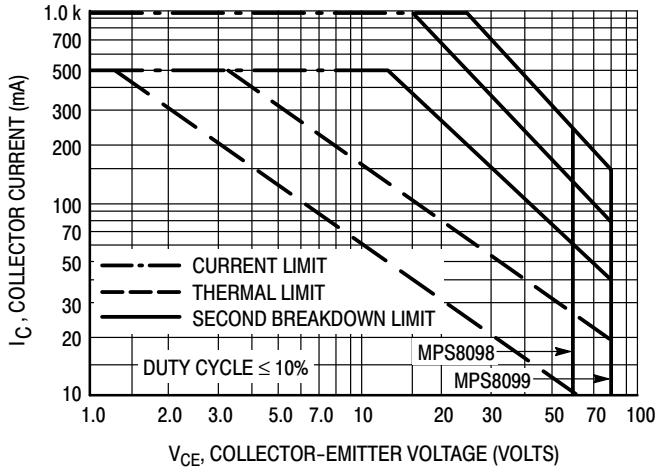



**Figure 9. Active−Region Safe Operating Area**

**PNP**

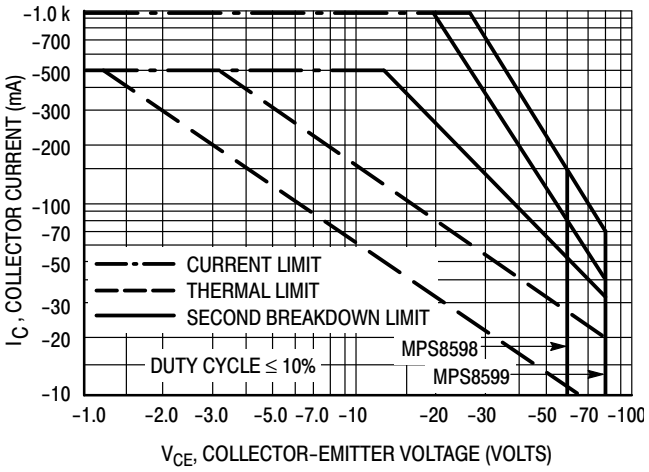



**Figure 10. Active−Region Safe Operating Area**

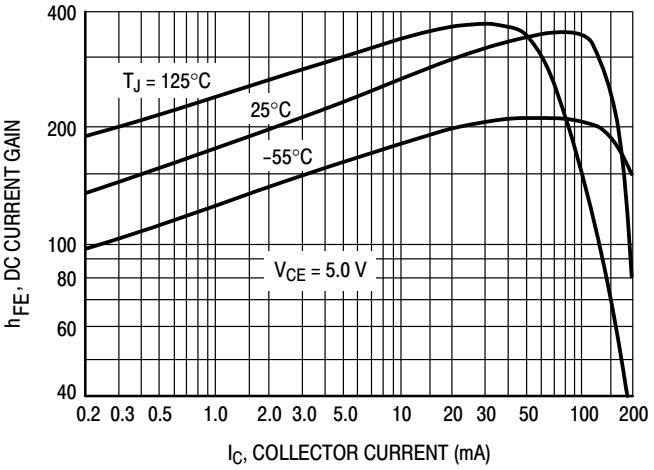



**Figure 11. DC Current Gain**

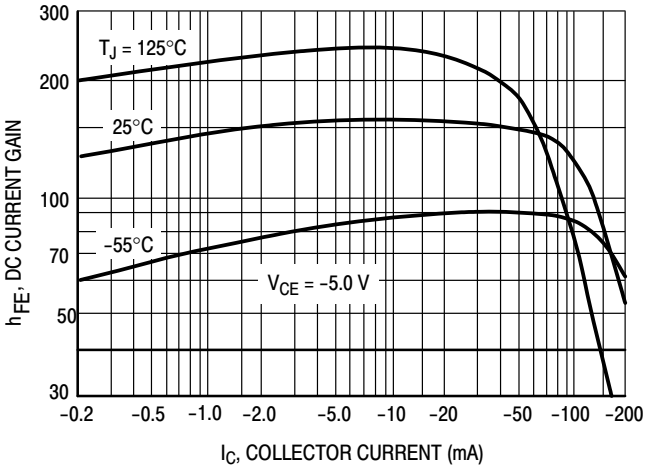



**Figure 12. DC Current Gain**

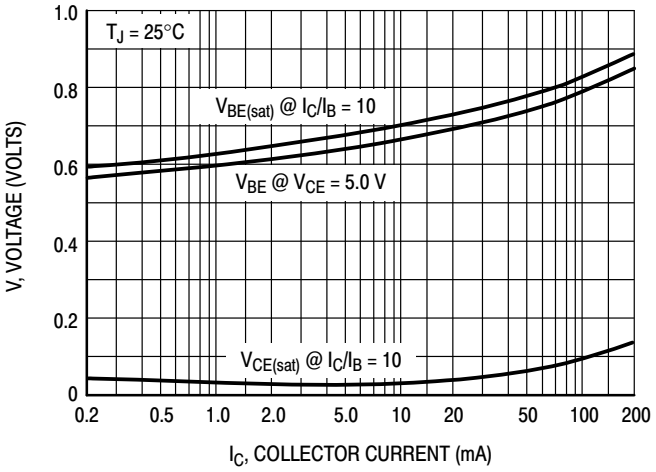



**Figure 13. “ON” Voltages**

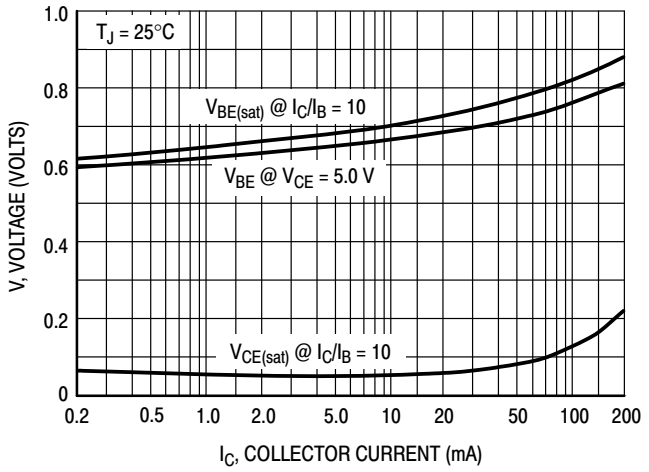



**Figure 14. “ON” Voltages**

**NPN**

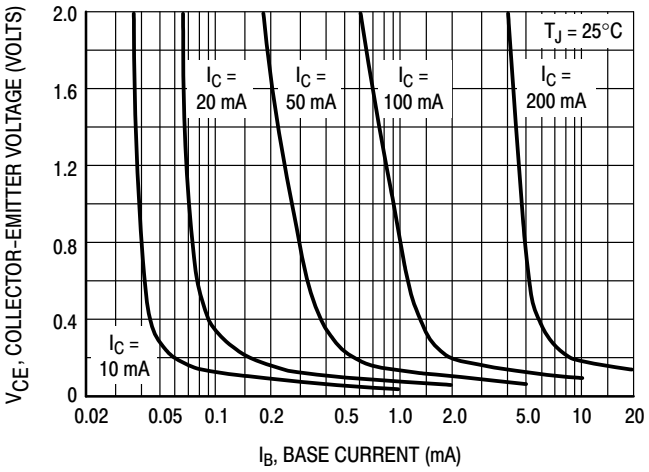



**Figure 15. Collector Saturation Region**

**PNP**

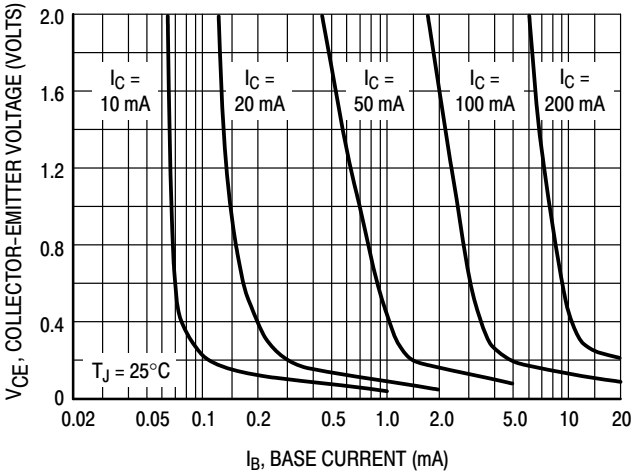



**Figure 16. Collector Saturation Region**

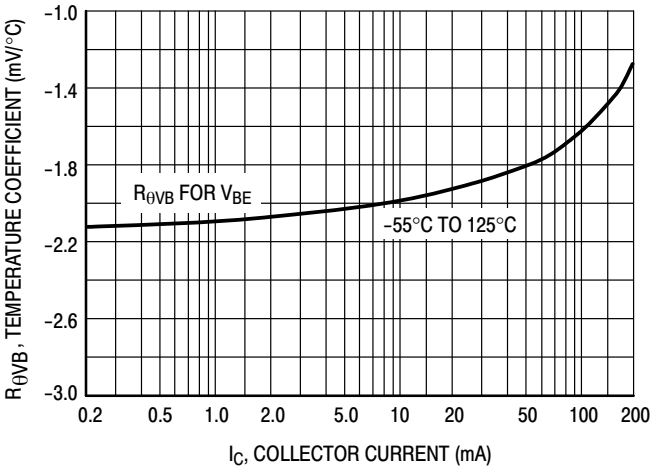



**Figure 17. Base−Emitter Temperature Coefficient**

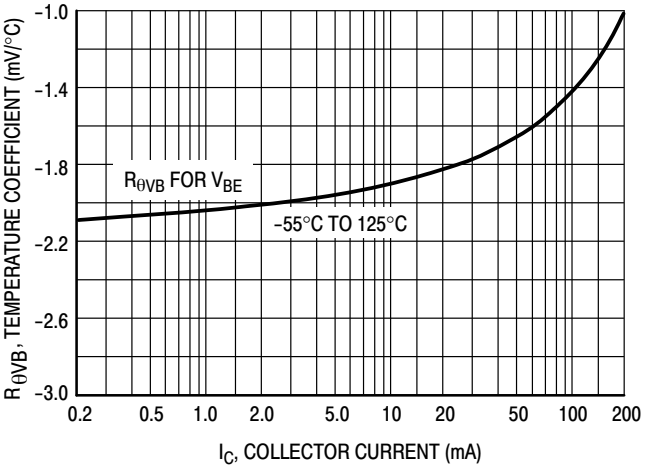
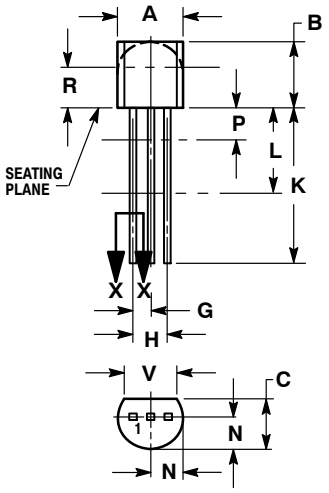


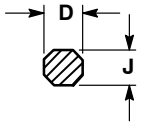

**Figure 18. Base−Emitter Temperature Coefficient**

## PACKAGE DIMENSIONS

**TO–92 (TO–226)**
CASE 29–11
ISSUE AM



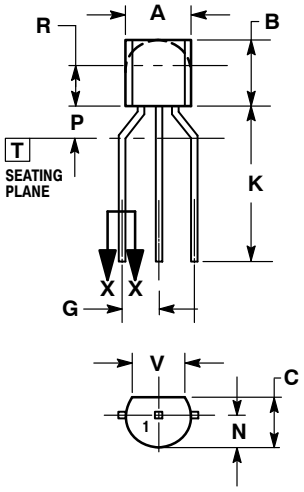

STRAIGHT LEAD
BULK PACK



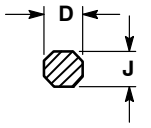

SECTION X–X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.175 | 0.205 | 4.45 | 5.20 |
| B | 0.170 | 0.210 | 4.32 | 5.33 |
| C | 0.125 | 0.165 | 3.18 | 4.19 |
| D | 0.016 | 0.021 | 0.407 | 0.533 |
| G | 0.045 | 0.055 | 1.15 | 1.39 |
| H | 0.095 | 0.105 | 2.42 | 2.66 |
| J | 0.015 | 0.020 | 0.39 | 0.50 |
| K | 0.500 | --- | 12.70 | --- |
| L | 0.250 | --- | 6.35 | --- |
| N | 0.080 | 0.105 | 2.04 | 2.66 |
| P | --- | 0.100 | --- | 2.54 |
| R | 0.115 | --- | 2.93 | --- |
| V | 0.135 | --- | 3.43 | --- |




BENT LEAD
TAPE & REEL
AMMO PACK




SECTION X–X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 4.45 | 5.20 |
| B | 4.32 | 5.33 |
| C | 3.18 | 4.19 |
| D | 0.40 | 0.54 |
| G | 2.40 | 2.80 |
| J | 0.39 | 0.50 |
| K | 12.70 | --- |
| N | 2.04 | 2.66 |
| P | 1.50 | 4.00 |
| R | 2.93 | --- |
| V | 3.43 | --- |

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR



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