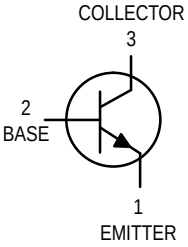
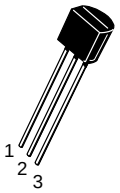
# High Voltage Transistor
## NPN Silicon

**MPSA44**

**Motorola Preferred Device**




**CASE 29–04, STYLE 1**
**TO–92 (TO–226AA)**

**MAXIMUM RATINGS**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector–Emitter Voltage | $V_{CEO}$ | 400 | Vdc |
| Collector–Base Voltage | $V_{CBO}$ | 500 | Vdc |
| Emitter–Base Voltage | $V_{EBO}$ | 6.0 | Vdc |
| Collector Current — Continuous | $I_C$ | 300 | mAdc |
| Total Device Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 625<br>5.0 | mW<br>mW/°C |
| Total Device Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 1.5<br>12 | Watts<br>mW/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | –55 to +150 | °C |



**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 200 | °C/W |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 83.3 | °C/W |

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

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | |
| Collector–Emitter Breakdown Voltage(1)<br>($I_C$ = 1.0 mAdc, $I_B$ = 0) | $V_{(BR)CEO}$ | 400 | — | Vdc |
| Collector–Emitter Breakdown Voltage<br>($I_C$ = 100 μAdc, $V_{BE}$ = 0) | $V_{(BR)CES}$ | 500 | — | Vdc |
| Collector–Base Breakdown Voltage<br>($I_C$ = 100 μAdc, $I_E$ = 0) | $V_{(BR)CBO}$ | 500 | — | Vdc |
| Emitter–Base Breakdown Voltage<br>($I_E$ = 10 μAdc, $I_C$ = 0) | $V_{(BR)EBO}$ | 6.0 | — | Vdc |
| Collector Cutoff Current<br>($V_{CB}$ = 400 Vdc, $I_E$ = 0) | $I_{CBO}$ | — | 0.1 | μAdc |
| Collector Cutoff Current<br>($V_{CE}$ = 400 Vdc, $V_{BE}$ = 0) | $I_{CES}$ | — | 500 | nAdc |
| Emitter Cutoff Current<br>($V_{EB}$ = 4.0 Vdc, $I_C$ = 0) | $I_{EBO}$ | — | 0.1 | μAdc |

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

**Preferred** devices are Motorola recommended choices for future use and best overall value.

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

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **ON CHARACTERISTICS(1)** | | | | |
| DC Current Gain(1) | $h_{FE}$ | | | — |
| ($I_C$ = 1.0 mAdc, $V_{CE}$ = 10 Vdc) | | 40 | — | |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 10 Vdc) | | 50 | 200 | |
| ($I_C$ = 50 mAdc, $V_{CE}$ = 10 Vdc) | | 45 | — | |
| ($I_C$ = 100 mAdc, $V_{CE}$ = 10 Vdc) | | 40 | — | |
| Collector–Emitter Saturation Voltage(1) | $V_{CE(sat)}$ | | | Vdc |
| ($I_C$ = 1.0 mAdc, $I_B$ = 0.1 mAdc) | | — | 0.4 | |
| ($I_C$ = 10 mAdc, $I_B$ = 1.0 mAdc) | | — | 0.5 | |
| ($I_C$ = 50 mAdc, $I_B$ = 5.0 mAdc) | | — | 0.75 | |
| Base–Emitter Saturation Voltage ($I_C$ = 10 mAdc, $I_B$ = 1.0 mAdc) | $V_{BE(sat)}$ | — | 0.75 | Vdc |
| **SMALL–SIGNAL CHARACTERISTICS** | | | | |
| Output Capacitance ($V_{CB}$ = 20 Vdc, $I_E$ = 0, f = 1.0 MHz) | $C_{obo}$ | — | 7.0 | pF |
| Input Capacitance ($V_{EB}$ = 0.5 Vdc, $I_C$ = 0, f = 1.0 MHz) | $C_{ibo}$ | — | 130 | pF |
| Small–Signal Current Gain ($I_C$ = 10 mAdc, $V_{CE}$ = 10 Vdc, f = 20 MHz) | $h_{fe}$ | 1.0 | — | — |

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

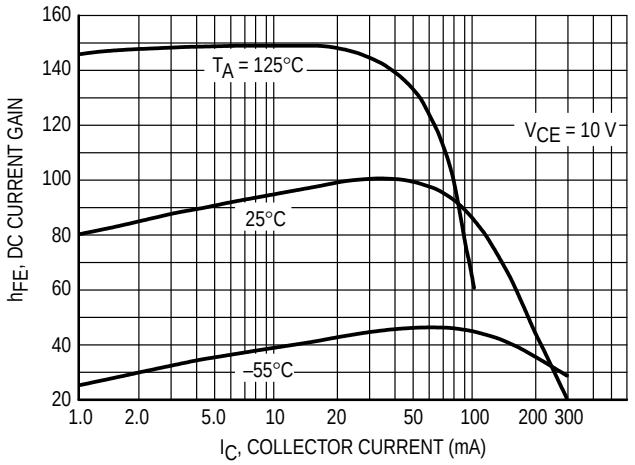



**Figure 1. DC Current Gain**

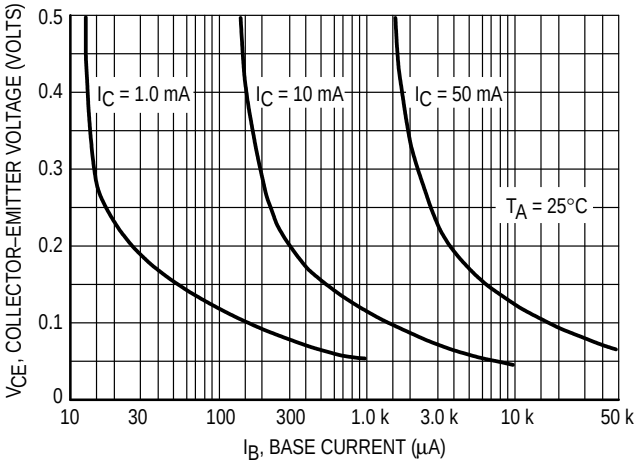



**Figure 2. Collector Saturation Region**

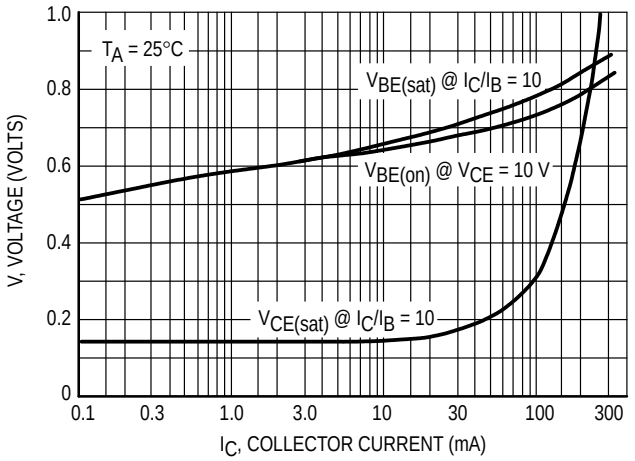



**Figure 3. “On” Voltages**

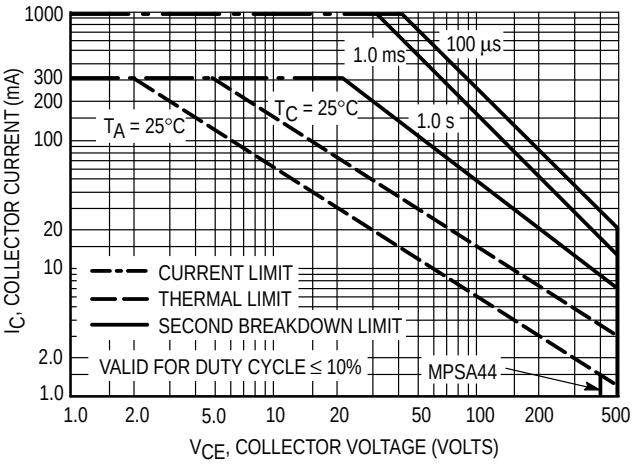



**Figure 4. Active Region — Safe Operating Area**

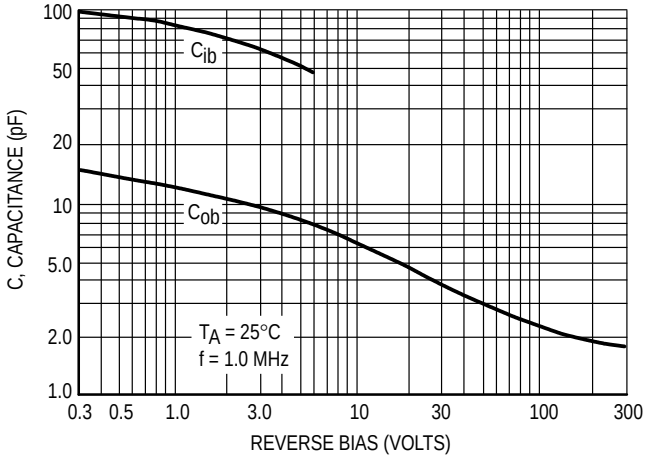



**Figure 5. Capacitance**

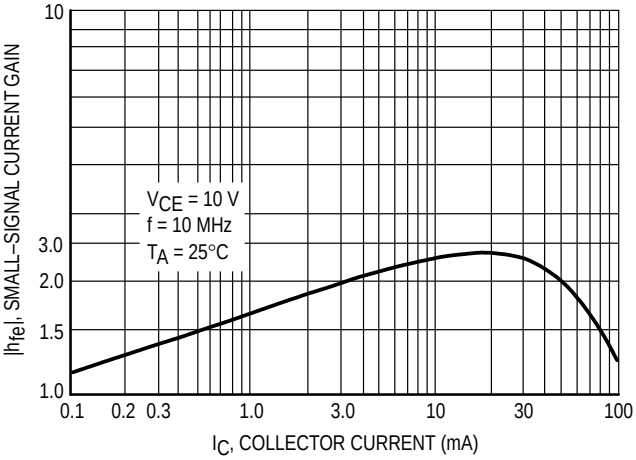



**Figure 6. High Frequency Current Gain**

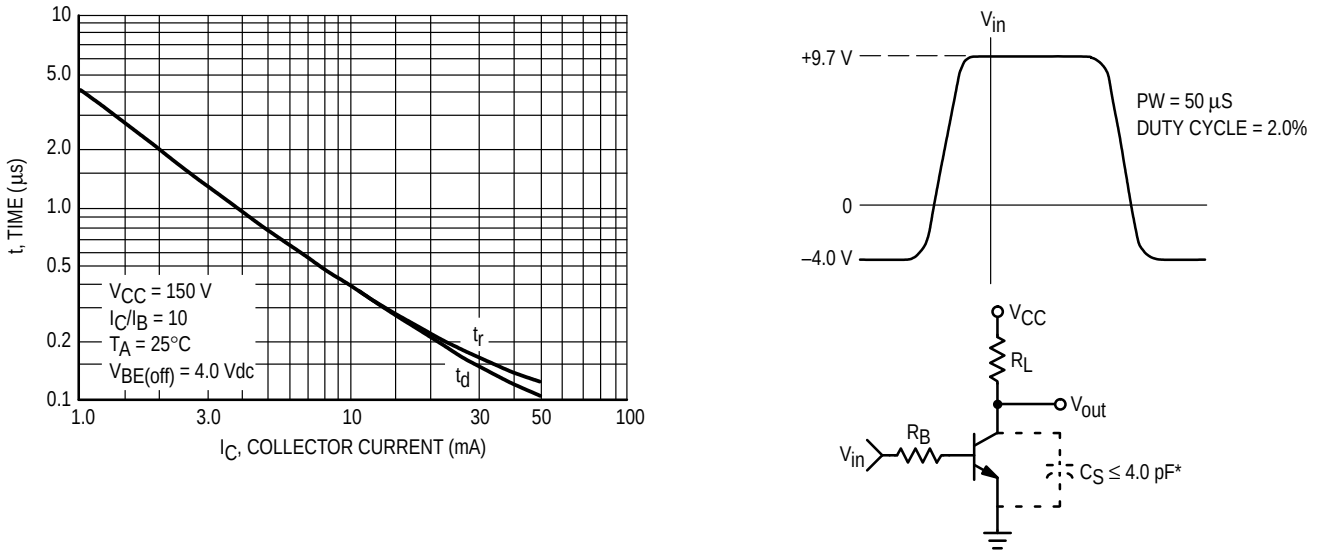



**Figure 7. Turn–On Switching Times and Test Circuit**

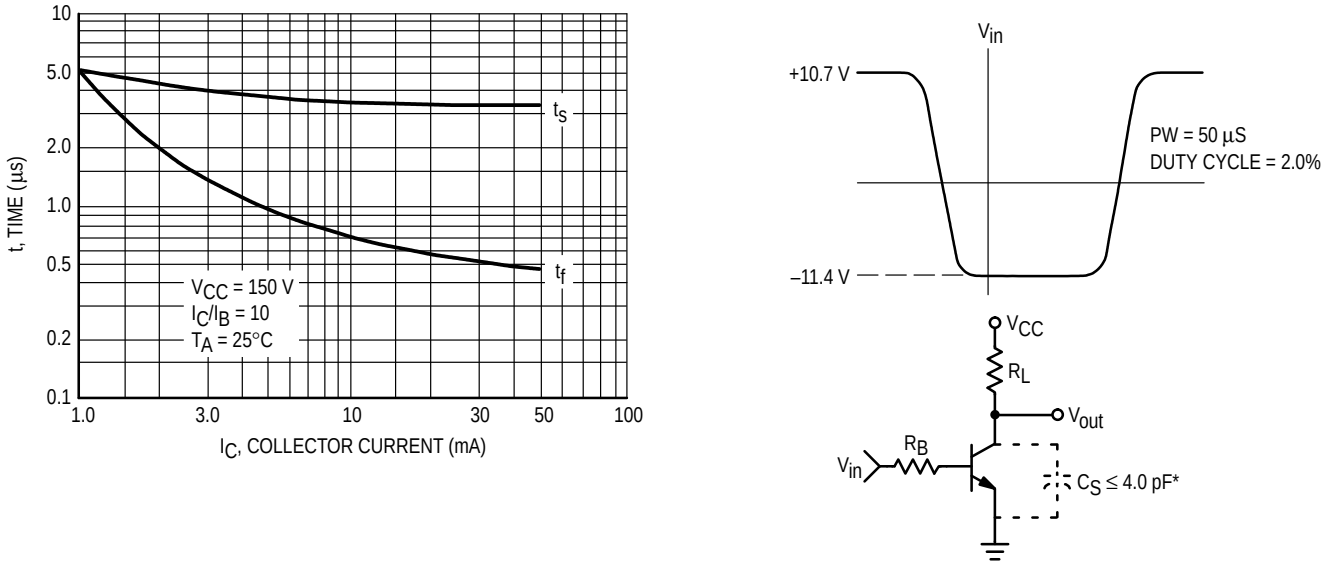
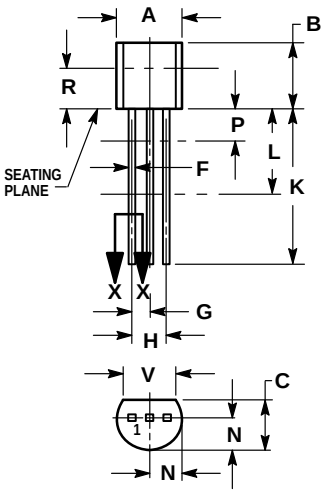
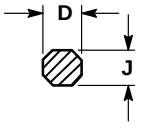



**Figure 8. Turn–Off Switching Times and Test Circuit**

* Total Shunt Capacitance or Test Jig and Connectors.

## PACKAGE DIMENSIONS




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. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. 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 | 0.022 | 0.41 | 0.55 |
| F | 0.016 | 0.019 | 0.41 | 0.48 |
| 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 | — |

**CASE 029–04**
**(TO–226AA)**
**ISSUE AD**

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

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