MOTOROLA
**SEMICONDUCTOR**
TECHNICAL DATA

# 2N3789, thru 2N3792

## SILICON PNP POWER TRANSISTORS

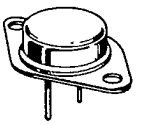
. . . designed for medium-speed switching and amplifier applications. These devices feature:

- Total Switching Time @ 3 A ≈ 1 μs (typ)
- Two Gain Ranges:
  $h_{FE}$ (min) = 15 and 30 @ 3 A (2N3789, 2N3790)
  25 and 50 @ 1 A (2N3791, 2N3792)
- Low $V_{CE(sat)}$ = 0.5 V (typ) @ $I_C$ = 4.0 A, $I_B$ = 0.4 A
- Excellent Safe Area Limits
- Complementary NPN types available — 2N3713 thru 2N3716

**10 AMPERE**

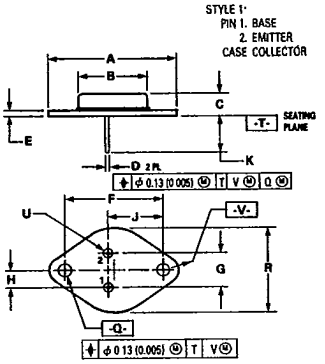
**POWER TRANSISTORS**
**PNP SILICON**

**60-80 VOLTS**
**150 WATTS**



### MAXIMUM RATINGS

| Characteristic | Symbol | 2N3789 2N3791 | 2N3790 2N3792 | Unit |
|---|---|---|---|---|
| Collector-Base Voltage | $V_{CB}$ | 60 | 80 | Volts |
| Collector-Emitter Voltage | $V_{CEO}$ | 60 | 80 | Volts |
| Emitter-Base Voltage | $V_{EB}$ | 7.0 | 7.0 | Volts |
| Collector Current (Continuous) | $I_C$ | 10 | 10 | Amps |
| Base Current (Continuous) | $I_B$ | 4.0 | 4.0 | Amps |
| Power Dissipation | $P_D$ | 150 | 150 | Watts |
| Thermal Resitance | $\theta_{JC}$ | 1.17 | 1.17 | °C/W |
| Junction Operating and Storage Temperature Range | $T_J$, $T_{stg}$ | -65 to +200 | | °C |

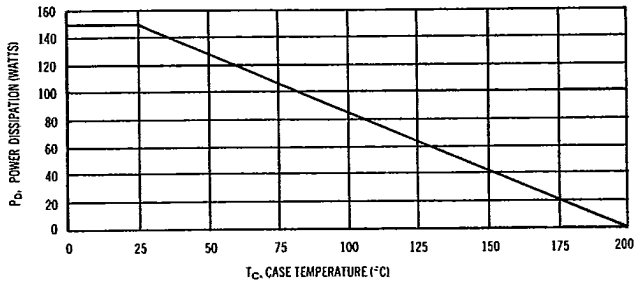



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | — | 39.37 | — | 1.550 |
| B | — | 21.08 | — | 0.830 |
| C | 6.35 | 8.25 | 0.250 | 0.325 |
| D | 0.97 | 1.09 | 0.038 | 0.043 |
| E | 1.40 | 1.77 | 0.055 | 0.070 |
| F | 30.15 BSC | | 1.187 BSC | |
| G | 10.92 BSC | | 0.430 BSC | |
| H | 5.46 BSC | | 0.215 BSC | |
| J | 16.89 BSC | | 0.665 BSC | |
| K | 11.18 | 12.19 | 0.440 | 0.480 |
| Q | 3.84 | 4.19 | 0.151 | 0.165 |
| R | — | 26.67 | — | 1.050 |
| U | 4.83 | 5.33 | 0.190 | 0.210 |
| V | 3.84 | 4.19 | 0.151 | 0.165 |

**CASE 1-06**
**TO-204AA**
**(TO-3)**

**FIGURE 1 — POWER-TEMPERATURE DERATING CURVE**




Safe Area Limits are indicated by Figures 15, 16. Both limits are applicable and must be observed.

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## ELECTRICAL CHARACTERISTICS (Tc = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| Collector-Emitter Sustaining Voltage* ($I_C$ = 200 mAdc, $I_B$ = 0) | 2N3789, 2N3791 | $V_{CEO(sus)}$* | 60 | – | Vdc |
| | 2N3790, 2N3792 | | 80 | – | |
| Collector-Emmiter Cutoff Current | | $I_{CEX}$ | | | mAdc |
| ($V_{CE}$ = 60 Vdc, $V_{BE}$ = -1.5 Vdc) | 2N3789, 2N3791 | | – | 1 | |
| ($V_{CE}$ = 80 Vdc, $V_{BE}$ = -1.5 Vdc) | 2N3790, 2N3792 | | – | 1 | |
| ($V_{CE}$ = 60 Vdc, $V_{BE}$ = -1.5 Vdc, $T_C$ = 150°C) | 2N3789, 2N3791 | | – | 5 | |
| ($V_{CE}$ = 80 Vdc, $V_{BE}$ = -1.5 Vdc, $T_C$ = 150°C) | 2N3790, 2N3792 | | – | 5 | |
| Emitter-Base Cutoff Current ($V_{EB}$ = 7 Vdc) | All Types | $I_{EBO}$ | – | 5 | mAdc |
| DC Current Gain* | | $h_{FE}$* | | | – |
| ($I_C$ = 1 Adc, $V_{CE}$ = 2 Vdc) | 2N3789, 2N3790 | | 25 | 90 | |
| | 2N3791, 2N3792 | | 50 | 180 | |
| ($I_C$ = 3 Adc, $V_{CE}$ = 2 Vdc) | 2N3789, 2N3790 | | 15 | – | |
| | 2N3791, 2N3792 | | 30 | – | |
| Collector-Emitter Saturation Voltage* | | $V_{CE(sat)}$* | | | Vdc |
| ($I_C$ = 4 Adc, $I_B$ = 0.4 Adc) | 2N3789, 2N3790 | | – | 1.0 | |
| ($I_C$ = 5 Adc, $I_B$ = 0.5 Adc) | 2N3791, 2N3792 | | – | 1.0 | |
| Base-Emitter On Voltage* | | $V_{BE(on)}$* | | | Vdc |
| ($I_C$ = 5 A, $V_{CE}$ = 2 Vdc) | 2N3789, 2N3790 | | – | 2.0 | |
| | 2N3791, 2N3792 | | – | 1.8 | |
| ($I_C$ = 10 Adc, $V_{CE}$ = 4 Vdc) | All Types | | – | 4.0 | |
| Current Gain – Bandwidth Product ($V_{CE}$ = 10 Vdc, $I_C$ = 0.5 Adc, f = 1 MHz) | All Types | $f_T$ | 4 | – | MHz |

*Sweep Test: 1/2 sine wave cycle @ 60 cps.

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FIGURE 2 – TYPICAL SWITCHING TIMES AND TEST CIRCUIT

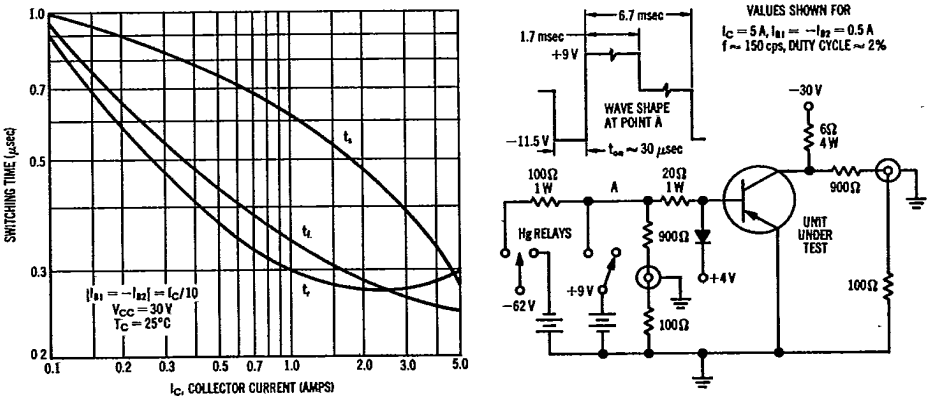


FIGURE 3 – CURRENT GAIN VARIATIONS

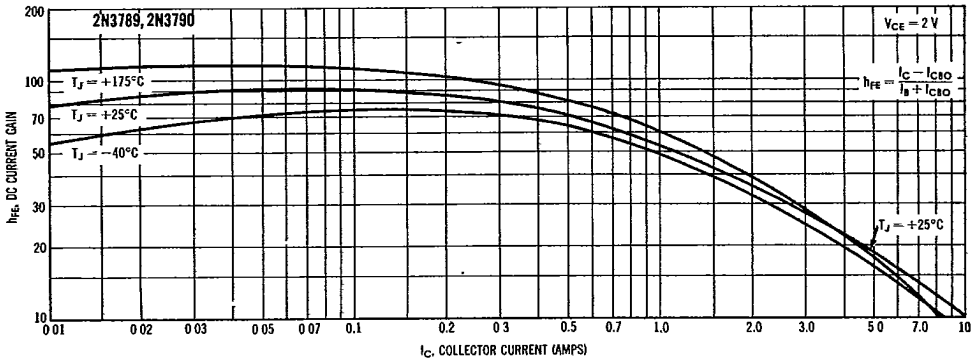



FIGURE 4 – CURRENT GAIN VARIATIONS

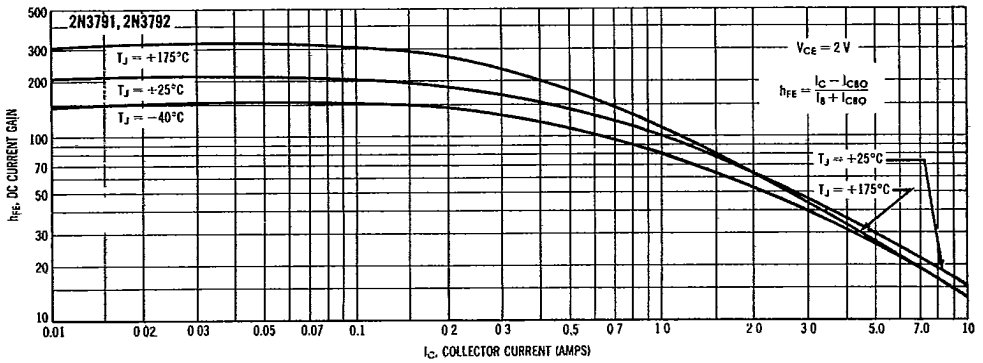



FIGURE 5 – SATURATION VOLTAGES

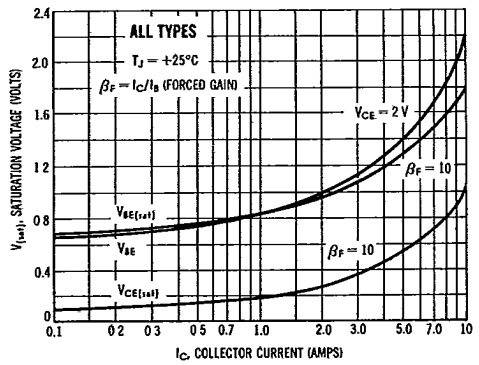
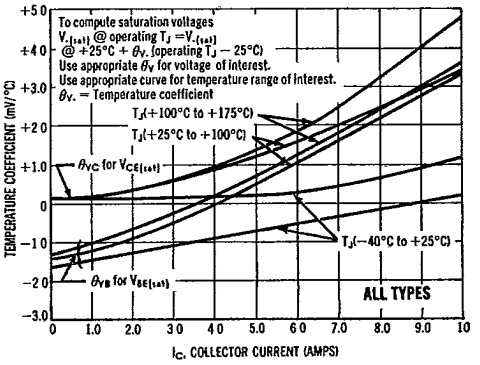



FIGURE 6 – TEMPERATURE COEFFICIENTS



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## SAFE OPERATING AREAS

FIGURE 7 – 2N3789, 2N3791

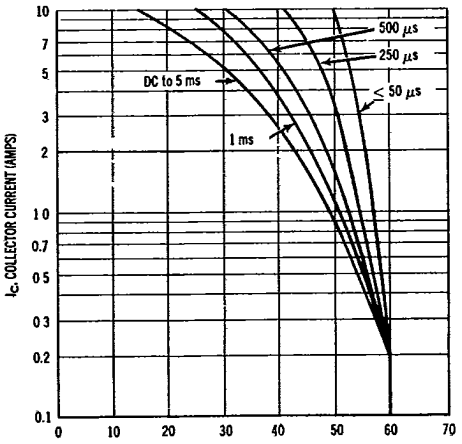
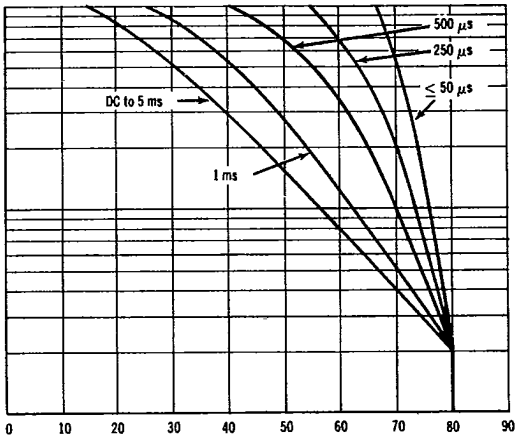



FIGURE 8 – 2N3790, 2N3792




$V_{CE}$, COLLECTOR EMITTER VOLTAGE (VOLTS)

The Safe Operating Area Curves indicate $I_C - V_{CE}$ limits below which the device will not go into secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a collector-emitter short. (Duty cycle of the excursions make no significant change in these safe areas.) To insure operation below the maximum $T_J$, the power-temperature derating curve must be observed for both steady state and pulse power conditions.

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FIGURE 9 – CUT-OFF REGION TRANSCONDUCTANCE

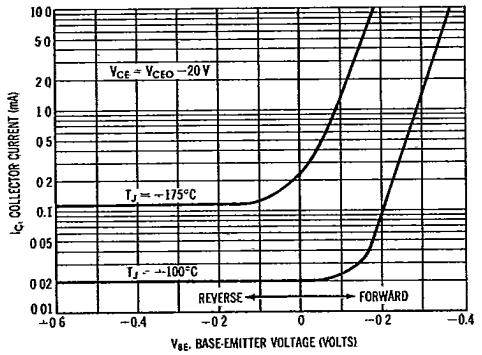


FIGURE 10 – COLLECTOR CUT-OFF CURRENT versus BASE-EMITTER RESISTANCE