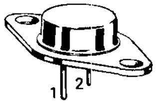
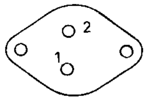
## ALPHANUMERIC INDEX — CROSS-REFERENCE (Continued)

| Industry Part Number | Motorola Direct Replacement | Motorola Similar Replacement | Page Number |
|---|---|---|---|
| 2N6283 | 2N6283 | | 3-172 |
| 2N6283JAN | 2N6283JAN | | 3-172 |
| 2N6283JTX | 2N6283JTX | | 3-172 |
| 2N6283JTXV | 2N6283JTXV | | 3-172 |
| 2N6284 | 2N6284 | | 3-172 |
| 2N6284JAN | 2N6284JAN | | 3-172 |
| 2N6284JTX | 2N6284JTX | | 3-172 |
| 2N6284JTXV | 2N6284JTXV | | 3-172 |
| 2N6285 | 2N6285 | | 3-172 |
| 2N6286 | 2N6286 | | 3-172 |
| 2N6286JAN | 2N6286JAN | | 3-172 |
| 2N6286JTX | 2N6286JTX | | 3-172 |
| 2N6286JTXV | 2N6286JTXV | | 3-172 |
| 2N6287 | 2N6287 | | 3-172 |
| 2N6287JAN | 2N6287JAN | | 3-172 |
| 2N6287JTX | 2N6287JTX | | 3-172 |
| 2N6287JTXV | 2N6287JTXV | | 3-172 |
| 2N6288 | 2N6288 | | 3-151 |
| 2N6289 | | 2N6288 | 3-151 |
| 2N6290 | 2N6292 | | 3-151 |
| 2N6291 | 2N6292 | | 3-151 |
| 2N6292 | 2N6292 | | 3-151 |
| 2N6293 | | 2N6292 | 3-151 |
| 2N6294 | 2N6294 | | 3-177 |
| 2N6295 | 2N6295 | | 3-177 |
| 2N6296 | 2N6296 | | 3-177 |
| 2N6297 | 2N6297 | | 3-177 |
| 2N6298 | 2N6298 | | 3-147 |
| 2N6298JAN | 2N6298JAN | | 3-147 |
| 2N6298JTX | 2N6298JTX | | 3-147 |
| 2N6298JTXV | 2N6298JTXV | | 3-147 |
| 2N6299 | 2N6299 | | 3-147 |
| 2N6299JAN | 2N6299JAN | | 3-147 |
| 2N6299JTX | 2N6299JTX | | 3-147 |
| 2N6299JTXV | 2N6299JTXV | | 3-147 |
| 2N6300 | 2N6300 | | 3-147 |
| 2N6300JAN | 2N6300JAN | | 3-147 |
| 2N6300JTX | 2N6300JTX | | 3-147 |
| 2N6300JTXV | 2N6300JTXV | | 3-147 |
| 2N6301 | 2N6301 | | 3-147 |
| 2N6301JAN | 2N6301JAN | | 3-147 |
| 2N6301JTX | 2N6301JTX | | 3-147 |
| 2N6301JTXV | 2N6301JTXV | | 3-147 |
| 2N6302 | | 2N5630 | 3-105 |
| 2N6303 | 2N6303 | | 3-32 |
| 2N6306 | 2N6306 | | 3-181 |
| 2N6306JAN | 2N6306JAN | | 3-181 |
| 2N6306JTX | 2N6306JTX | | 3-181 |
| 2N6307 | 2N6307 | | 3-181 |
| 2N6308 | 2N6308 | | 3-181 |
| 2N6308JAN | 2N6308JAN | | 3-181 |
| 2N6308JTX | 2N6308JTX | | 3-181 |
| 2N6312 | 2N6318 | | 3-185 |
| 2N6313 | | 2N6318 | 3-185 |
| 2N6314 | | 2N6318 | 3-185 |
| 2N6315 | | 2N5428 | 3-101 |
| 2N6316 | | 2N5428 | 3-101 |
| 2N6317 | 2N6317 | | 3-185 |
| 2N6318 | 2N6318 | | 3-185 |
| 2N6322 | | MJ10015 | 3-606 |
| 2N6323 | | MJ10015 | 3-606 |
| 2N6324 | | MJ10015 | 3-606 |
| 2N6325 | | MJ10015 | 3-606 |
| 2N6326 | 2N6328 | | — |
| 2N6327 | 2N6328 | | — |
| 2N6328 | 2N6328 | | — |
| 2N6329 | | 2N5884 | 3-127 |
| 2N6330 | | 2N5884 | 3-127 |
| 2N6331 | | 2N5884 | 3-127 |
| 2N6338 | 2N6338 | | 3-188 |
| 2N6338JAN | 2N6338JAN | | 3-188 |
| 2N6338JTX | 2N6338JTX | | 3-188 |
| 2N6338JTXV | 2N6338JTXV | | 3-188 |
| 2N6339 | 2N6339 | | 3-188 |
| 2N6340 | 2N6340 | | 3-188 |
| 2N6341 | 2N6341 | | 3-188 |
| 2N6341JAN | 2N6341JAN | | 3-188 |
| 2N6341JTX | 2N6341JTX | | 3-188 |
| 2N6341JTXV | 2N6341JTXV | | 3-188 |
| 2N6354 | | 2N6339 | 3-188 |
| 2N6355 | | 2N6057 | 3-143 |
| 2N6356 | | 2N6057 | 3-143 |
| 2N6357 | | 2N6058 | 3-143 |
| 2N6358 | | 2N6058 | 3-143 |
| 2N6359 | | 2N5885 | 3-127 |
| 2N6371 | | 2N3055 | 3-6 |
| 2N6372 | | 2N5428 | 3-101 |
| 2N6373 | | 2N5428 | 3-101 |
| 2N6374 | | 2N5428 | 3-101 |
| 2N6377 | 2N6377 | | 3-191 |
| 2N6378 | 2N6378 | | 3-191 |
| 2N6378JAN | 2N6378JAN | | 3-191 |
| 2N6378JTX | 2N6378JTX | | 3-191 |
| 2N6378JTXV | 2N6378JTXV | | 3-191 |
| 2N6379 | 2N6379 | | 3-191 |
| 2N6379JAN | 2N6379JAN | | 3-191 |
| 2N6379JTX | 2N6379JTX | | 3-191 |
| 2N6379JTXV | 2N6379JTXV | | 3-191 |
| 2N6380 | | 2N6377 | 3-191 |
| 2N6381 | | 2N6378 | 3-191 |
| 2N6382 | | 2N6379 | 3-191 |
| 2N6383 | 2N6383 | | 3-195 |
| 2N6383JAN | 2N6383JAN | | 3-195 |
| 2N6383JTX | 2N6383JTX | | 3-195 |
| 2N6383JTXV | 2N6383JTXV | | 3-195 |
| 2N6384 | 2N6384 | | 3-195 |
| 2N6384JAN | 2N6384JAN | | 3-195 |
| 2N6384JTX | 2N6384JTX | | 3-195 |
| 2N6384JTXV | 2N6384JTXV | | 3-195 |
| 2N6385 | 2N6385 | | 3-195 |
| 2N6385JAN | 2N6385JAN | | 3-195 |
| 2N6385JTX | 2N6385JTX | | 3-195 |
| 2N6385JTXV | 2N6385JTXV | | 3-191 |
| 2N6386 | 2N6386 | | 3-199 |
| 2N6387 | 2N6387 | | 3-199 |
| 2N6388 | 2N6388 | | 3-199 |
| 2N6406 | | MJE171 | 3-862 |
| 2N6407 | | MJE172 | 3-862 |
| 2N6408 | | MJE181 | 3-862 |
| 2N6409 | | MJE182 | 3-862 |

*Consult Motorola if a direct replacement is necessary.

## TABLE 3 — METAL TO-213 (Formerly TO-66)




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

### CASE 80-02 (TO-213AA)

| $I_C$Cont Amps Max | $V_{CEO(sus)}$ Volts Min | Device Type | | $h_{FE}$ Min/Max | @ $I_C$ Amp | Resistive Switching | | | $f_T$ MHz Min | $P_D$ (Case) Watts @ 25°C |
|---|---|---|---|---|---|---|---|---|---|---|
| | | NPN | PNP | | | $t_s$ μs Max | $t_f$ μs Max | @ $I_C$ Amp | | |
| 1 | 80 | 2N4912 | | 20/100 | 0.5 | 0.6 typ | 0.3 typ | 0.5 | 3 | 25 |
| | 175 | 2N3583 | 2N6420 | 40/200 | 0.5 | 2 typ | 0.23 typ | 0.5 | 10 | 35 |
| | 225 | 2N3738 | | 40/200 | 0.1 | 3 typ | 0.3 typ | 0.1 | 10 | 20 |
| | 300 | 2N3739 | | 40/200 | 0.1 | 3 typ | 0.3 typ | 0.1 | 10 | 20 |
| 2 | 225 | | 2N6211 | 10/100 | 1 | 2.5 | 0.6 | 1 | 20 | 35 |
| | 250 | 2N3584 | 2N6421 | 25/100 | 1 | 4 | 3 | 1 | 10 | 35 |
| | 300 | | 2N6212 | 10/100 | 1 | 2.5 | 0.6 | 1 | 20 | 35 |
| | | 2N3585 | 2N6422 | 25/100 | 1 | 4 | 3 | 1 | 10 | 35 |
| | | 2N4240 | | 30/150 | 0.75 | 6 | 3 | 0.75 | 15 | 35 |
| | 350 | | 2N6213 | 10/100 | 1 | 2.5 | 0.6 | 1 | 20 | 35 |
| 3 | 140 | 2N3441 | | 25/100 | 0.5 | | | | 0.2 | 25 |
| 4 | 60 | | 2N3740 | 30/100 | 0.25 | 1.3 typ | 0.27 typ | 0.25 | 4 | 25 |
| | | 2N3054,A | | 25/100 | 0.5 | 1 typ | 0.3 typ | 0.5 | 3 | 75 |
| | | 2N3766 | | 40/160 | 0.5 | 0.9 typ | 0.09 typ | 0.5 | 10 | 20 |
| | | 2N6294## | 2N6296## | 750/18k | 2 | 0.9 typ | 0.7 typ | 2 | 4# | 50 |
| | 80 | | 2N3741 | 30/100 | 0.25 | 1.3 typ | 0.27 typ | 0.25 | 4 | 25 |
| | | 2N3767 | | 40/160 | 0.5 | 0.9 typ | 0.09 typ | 0.5 | 10 | 20 |
| | | 2N6295## | 2N6297## | 750/18k | 2 | 0.9 typ | 0.7 typ | 2 | 4 | 50 |
| 5 | 80 | 2N4233A | | 25/100 | 1.5 | 0.5 typ | 0.2 typ | 1.5 | 4 | 75 |
| 7 | 60 | | 2N6317 | 20/100 | 2.5 | 1 | 0.8 | 2.5 | 4 | 90 |
| | 80 | 2N5428 | | 60/240 | 2 | 2 | 0.2 | 2 | 30 | 40 |
| | | | 2N6318 | 20/100 | 2.5 | 1 | 0.8 | 2.5 | 4 | 90 |
| | 100 | 2N5429 | | 30/120 | 2 | 2 | 0.2 | 2 | 30 | 40 |
| | | 2N5430 | | 60/240 | 2 | 2 | 0.2 | 2 | 30 | 40 |
| 8 | 60 | 2N6300## | 2N6298## | 750/18k | 4 | 1.5 typ | 1.5 typ | 4 | 4# | 75 |
| | 80 | 2N6301## | 2N6299## | 750/18k | 4 | 1.5 typ | 1.5 typ | 4 | 4# | 75 |

# $|h_{fe}|$ @ 1 MHz, ## Darlington

JAN, JTX, JTXV Available

2

## TABLE 12 — POWER DARLINGTONS (continued)

| $I_C$ Cont Amps Max | $V_{CEO(sus)}$ Volts Min | Device Type NPN | Device Type PNP | $h_{FE}$ Min/Max | @ $I_C$ Amp | Resistive Switching $t_s$ µs Max | Resistive Switching $t_f$ µs Max | Resistive Switching @ $I_C$ Amp | $\|h_{fe}\|$ @ 1 MHz Min | $P_D$ (Case) Watts @ 25°C | Case JEDEC/MOT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 40 | MJE3300 | MJE3310 | 1k min | 1 | | | | 20 | 15 | TO-225AA/77R |
| | | 2N6037 | 2N6034 | 750/1k | 2 | 1.7 typ | 1.2 typ | 2 | 25 | 40 | TO-225AA/77 |
| | 45 | BD675 | BD676 | 750 min | 1.5 | | | | | 40 | TO-225AA/77 |
| | | BD675A | BD676A | 750 min | 2 | | | | | 40 | TO-225AA/77 |
| | | | BD776 | 750 min | 2 | | | | 20 | 15 | TO-225AA/77 |
| | 60 | BD677 | BD678 | 750 min | 1.5 | | | | | 15 | TO-225AA/77 |
| | | BD677A | BD678A | 750 min | 2 | | | | | 40 | TO-225AA/77 |
| | | BD777 | BD778 | 750 min | 2 | | | | 20 | 40 | TO-225AA/77 |
| | | MJE3301 | | 1k min | 1 | | | | 20 | 15 | TO-225AA/77R |
| | | MJE800 | MJE700 | 750 min | 1.5 | | | | 1 | 40 | TO-225AA/77 |
| | | MJE800T | MJE700T | 750 min | 1.5 | | | | 1 | 40 | TO-220/221A |
| | | MJE801 | MJE701 | 750 min | 2 | | | | 1 | 40 | TO-225AA/77 |
| | | 2N6038 | 2N6035 | 750/18k | 2 | 1.7 typ | 1.2 typ | 2 | 25 | 40 | TO-225AA/77 |
| | | 2N6294 | 2N6296 | 750/18k | 2 | 0.9 typ | 0.7 typ | 2 | 4 | 50 | TO-213AA/80 |
| | 80 | BD679 | BD680 | 750 min | 1.5 | | | | | 40 | TO-225AA/77 |
| | | BD679A | BD680A | 750 min | 2 | | | | | 40 | TO-225AA/77 |
| | | BD779 | BD780 | 750 min | 2 | | | | 20 | 15 | TO-225AA/77 |
| | | MJD6039 | MJD6036 | 1k/12k | 2 | 1.7 typ | 1.2 typ | 2 | 25 | 20 | TO-252/369A-04 |
| | | MJE802 | MJE702 | 750 min | 1.5 | | | | | 40 | TO-225AA/77 |
| | | MJE803 | MJE703 | 750 min | 2 | | | | | 40 | TO-225AA/77 |
| | | 2N6039 | 2N6036 | 750/18k | 2 | 1.7 typ | 1.2 typ | 2 | 25 | 40 | TO-225AA/77 |
| | | 2N6295 | 2N6297 | 750/18k | 2 | 0.9 typ | 0.7 typ | 2 | 4 | 50 | TO-213AA/80 |
| | 100 | BD681 | BD682 | 750 min | 1.5 | | | | | 40 | TO-225AA/77 |
| 5 | 60 | MJE1100 | MJE1090 | 750 min | 3A | | | | 1 | 70 | TO-225AB/90 |
| | | MJE1101 | MJE1091 | 750 min | 4A | | | | 1 | 70 | TO-225AB/90 |
| | | TIP120 | TIP125 | 1k min | 3 | 1.5 typ | 1.5 typ | 3 | 4 | 65 | TO-220/221A |
| | 80 | MJE1102 | MJE1092 | 750 min | 3A | | | | 1 | 70 | TO-225AB/90 |
| | | MJE1103 | MJE1102 | 750 min | 4A | | | | 1 | 70 | TO-225AB/90 |
| | | TIP121 | TIP126 | 1k min | 3 | 1.5 typ | 1.5 typ | 3 | 4 | 65 | TO-220/221A |
| | 100 | MJF122 | MJF127 | 2k min | 3 | 1.5 typ | 1.5 typ | 3 | 4 | 28 | —/221C-02 |
| | | TIP122 | TIP127 | 1k min | 3 | 1.5 typ | 1.5 typ | 3 | 4 | 65 | TO-220/221A |
| 7 | 300 | MJ3041 | | 250 min | 2.5 | | | | | 100 | TO-204/1 |
| | 350 | MJ3042 | | 250 min | 2.5 | | | | | 100 | TO-204/1 |
| | 375 | BU522 | | 250 min | 2.5 | | | | 7.5 | 75 | TO-220/221A |
| | 425 | BU522A | | 250 min | 2.5 | | | | 7.5 | 75 | TO-220/221A |
| | 450 | BU522B | | 250 min | 2.5 | | | | 7.5 | 75 | TO-220/221A |
| 8 | 40 | 2N6386 | | 1k/20k | 3 | | | | 20 | 65 | TO-220/221A |
| | 45 | BDX53 | BDX54 | 750 min | 3 | | | | 4 | 60 | TO-220/221A |
| | | BD895 | BD896 | 750 min | 3 | | | | 1 | 70 | TO-220/221A |
| | | BD895A | BD896A | 750 min | 4 | | | | 1 | 70 | TO-220/221A |
| | 60 | BDX53A | BDX54A | 750 min | 3 | | | | 4 | 60 | TO-220/221A |
| | | BD897 | BD898 | 750 min | 3 | | | | 1 | 70 | TO-220/221A |
| | | BD897A | BD898A | 750 min | 4 | | | | 1 | 70 | TO-220/221A |
| | | MJ1000 | MJ900 | 1k min | 3 | | | | | 90 | TO-204/1 |
| | | TIP100 | TIP105 | 1k/20k | 3 | 1.5 typ | 1.5 typ | 3 | 4 | 80 | TO-220/221A |
| | | 2N6043 | 2N6040 | 1k/10k | 4 | 1.5 typ | 1.5 typ | 3 | 4 | 75 | TO-220/221A |
| | | 2N6300 | 2N6298 | 750k/18k | 4 | 1.5 typ | 1.5 typ | 4 | 4 | 75 | TO-213AA/80 |
| | | 2N6055 | 2N6053 | 750k/18k | 4 | 1.5 typ | 1.5 typ | 4 | 4 | 100 | TO-204/1 |
| | | MJE6043 | MJE6040 | 1k/20k | 4 | 1.5 typ | 1.5 typ | 4 | 2 | 75 | TO-225AB/90 |
| | 80 | BDX53B | BDX54B | 750 min | 3 | | | | 4 | 60 | TO-220/221A |
| | | BD899 | BD900 | 750 min | 3 | | | | 1 | 70 | TO-220/221A |
| | | BD899A | BD900A | 750 min | 4 | | | | 1 | 70 | TO-220/221A |

(continued)

MOTOROLA
# SEMICONDUCTOR
TECHNICAL DATA

## 2N6053, 2N6054
## 2N6298, 2N6299 PNP
## 2N6055, 2N6056
## 2N6300, 2N6301 NPN

### DARLINGTON COMPLEMENTARY SILICON POWER TRANSISTORS

. . . designed for general-purpose amplifier and low frequency switching applications.

- High DC Current Gain — $h_{FE}$ = 3000 (Typ) @ $I_C$ = 4.0 Adc
- Collector-Emitter Sustaining Voltage — @ 100 mA
  $V_{CEO(sus)}$ = 60 Vdc (Min) — 2N6053, 2N6055, 2N6298, 2N6300
  = 80 Vdc (Min) — 2N6054, 2N6056, 2N6299, 2N6301
- Low Collector-Emitter Saturation Voltage —
  $V_{CE(sat)}$ = 2.0 Vdc (Max) @ $I_C$ = 4.0 Adc
  = 3.0 Vdc (Max) @ $I_C$ = 8.0 Adc
- Monolithic Construction with Built-In Base-Emitter Shunt Resistors

### DARLINGTON 8 AMPERE

### COMPLEMENTARY SILICON POWER TRANSISTORS

60-80 VOLTS
75,100 WATTS

### *MAXIMUM RATINGS

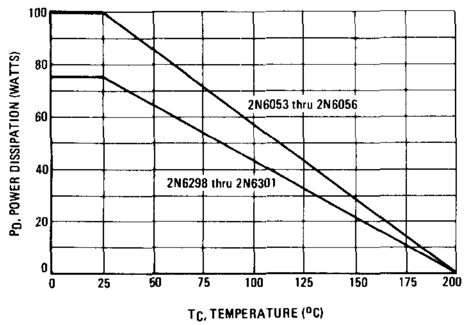
| Rating | Symbol | 2N6053 2N6055 2N6298 2N6300 | 2N6054 2N6056 2N6299 2N6301 | Unit |
|---|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 60 | 80 | Vdc |
| Collector-Base Voltage | $V_{CB}$ | 60 | 80 | Vdc |
| Emitter-Base Voltage | $V_{EB}$ | 5.0 | | Vdc |
| Collector Current — Continuous / Peak | $I_C$ | 8.0 / 16 | | Adc |
| Base Current | $I_B$ | 120 | | mAdc |
| | | 2N6053 2N6054 2N6055 2N6056 | 2N6298 2N6299 2N6300 2N6301 | |
| Total Device Dissipation @ $T_C$ = 25°C / Derate above 25°C | $P_D$ | 100 / 0.571 | 75 / 0.428 | Watts / W/°C |
| Operating and Storage Junction Temperature Range | $T_J, T_{stg}$ | -65 to +200 | | °C |

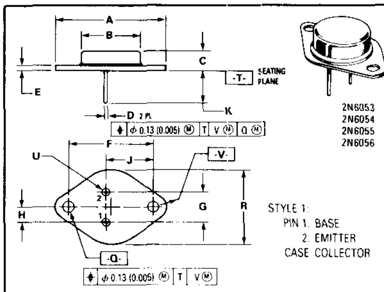
### THERMAL CHARACTERISTICS

| Characteristic | Symbol | 2N6053 2N6054 2N6055 2N6056 | 2N6298 2N6299 2N6300 2N6301 | Unit |
|---|---|---|---|---|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 1.75 | 2.33 | °C/W |

*Indicates JEDEC Registered Data.

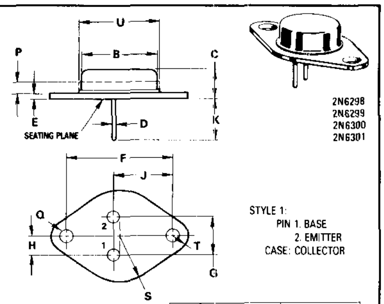
FIGURE 1 — POWER DERATING




| 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 | 11.13 | 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)**




| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| B | 11.94 | 12.70 | 0.470 | 0.500 |
| C | 6.35 | 8.64 | 0.250 | 0.340 |
| D | 0.71 | 0.86 | 0.028 | 0.034 |
| E | 1.27 | 1.91 | 0.050 | 0.075 |
| F | 24.33 | 24.43 | 0.958 | 0.962 |
| G | 4.83 | 5.33 | 0.190 | 0.210 |
| H | 2.41 | 2.67 | 0.095 | 0.105 |
| J | 14.48 | 14.99 | 0.570 | 0.590 |
| K | 9.14 | — | 0.360 | — |
| P | — | 1.27 | — | 0.050 |
| Q | 3.61 | 3.86 | 0.142 | 0.152 |
| S | — | 8.89 | — | 0.350 |
| T | — | 3.68 | — | 0.145 |
| U | — | 15.75 | — | 0.620 |

All JEDEC Dimensions and Notes Apply.

**CASE 80-02**
**TO-213AA**
**(TO-66)**

3

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

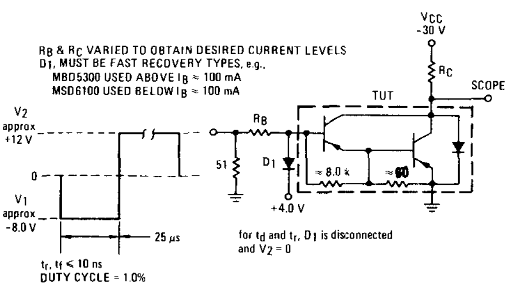
| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector-Emitter Sustaining Voltage (1) | | $V_{CEO(sus)}$ | | | Vdc |
| ($I_C$ = 100 mAdc, $I_B$ = 0) | 2N6053, 2N6055, 2N6298, 2N6300 | | 60 | – | |
| | 2N6054, 2N6056, 2N6299, 2N6301 | | 80 | – | |
| Collector Cutoff Current | | $I_{CEO}$ | | | mAdc |
| ($V_{CE}$ = 30 Vdc, $I_B$ = 0) | 2N6053, 2N6055, 2N6298, 2N6300 | | – | 0.5 | |
| ($V_{CE}$ = 40 Vdc, $I_B$ = 0) | 2N6054, 2N6056, 2N6299, 2N6301 | | – | 0.5 | |
| Collector Cutoff Current | | $I_{CEX}$ | | | mAdc |
| ($V_{CE}$ = Rated $V_{CB}$, $V_{BE(off)}$ = 1.5 Vdc) | | | – | 0.5 | |
| ($V_{CE}$ = Rated $V_{CB}$, $V_{BE(off)}$ = 1.5 Vdc, $T_C$ = 150°C) | | | – | 5.0 | |
| Emitter Cutoff Current ($V_{BE}$ = 5.0 Vdc, $I_C$ = 0) | | $I_{EBO}$ | – | 2.0 | mAdc |
| **ON CHARACTERISTICS (1)** | | | | | |
| DC Current Gain | | $h_{FE}$ | | | – |
| ($I_C$ = 4.0 Adc, $V_{CE}$ = 3.0 Vdc) | | | 750 | 18000 | |
| ($I_C$ = 8.0 Adc, $V_{CE}$ = 3.0 Vdc) | | | 100 | – | |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | | | Vdc |
| ($I_C$ = 4.0 Adc, $I_B$ = 16 mAdc) | | | – | 2.0 | |
| ($I_C$ = 8.0 Adc, $I_B$ = 80 mAdc) | | | – | 3.0 | |
| Base-Emitter Saturation Voltage ($I_C$ = 8.0 Adc, $I_B$ = 80 mAdc) | | $V_{BE(sat)}$ | – | 4.0 | Vdc |
| Base-Emitter On Voltage ($I_C$ = 4.0 Adc, $V_{CE}$ = 3.0 Vdc) | | $V_{BE(on)}$ | – | 2.8 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Magnitude of Common Emitter Small-Signal Short Circuit Current Transfer Ratio ($I_C$ = 3.0 Adc, $V_{CE}$ = 3.0 Vdc, f = 1.0 MHz) | | $\|h_{fe}\|$ | 4.0 | – | – |
| Output Capacitance | | $C_{ob}$ | | | pF |
| ($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 0.1 MHz) | 2N6053, 2N6054, 2N6298, 2N6299 | | – | 300 | |
| | 2N6055, 2N6056, 2N6300, 2N6301 | | – | 200 | |
| Small-Signal Current Gain ($I_C$ = 3.0 Adc, $V_{CE}$ = 3.0 Vdc, f = 1.0 kHz) | | $h_{fe}$ | 300 | – | – |

*Indicates JEDEC Registered Data.

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0 %.



FIGURE 2 – SWITCHING TIMES TEST CIRCUIT




For NPN test circuit reverse diode, polarities and input pulses.

FIGURE 3 – SWITCHING TIMES

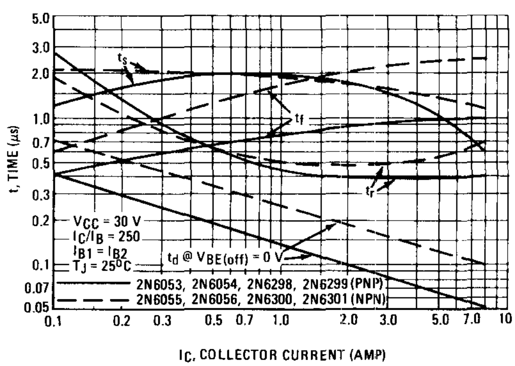
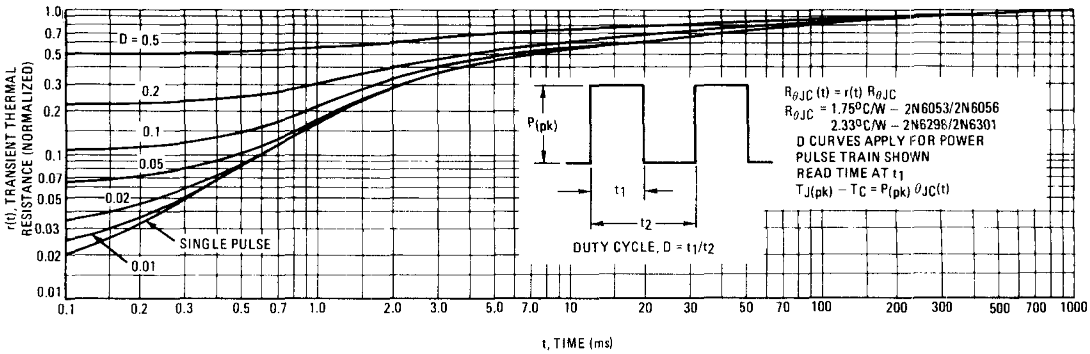


**FIGURE 4 – THERMAL RESPONSE**




## ACTIVE-REGION SAFE OPERATING AREA

**FIGURE 5 – 2N6053 thru 2N6056**

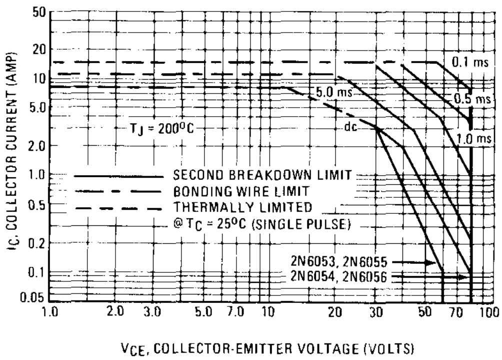
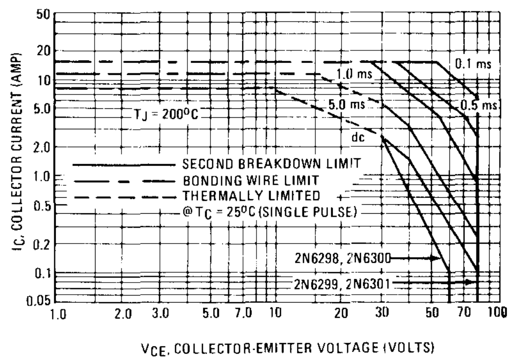



**FIGURE 6 – 2N6298 thru 2N6301**




There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C$ - $V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figures 5 and 6 is based on $T_{J(pk)} = 200°C$; $T_C$ is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 200°C$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

**FIGURE 7 – SMALL-SIGNAL CURRENT GAIN**

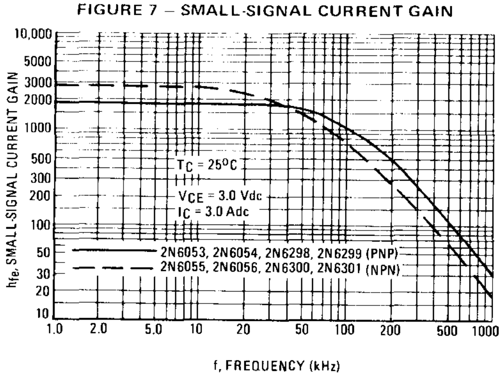
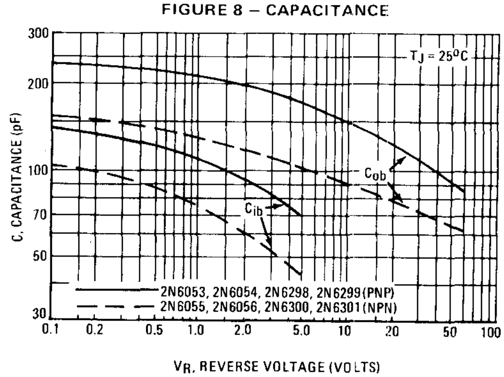



**FIGURE 8 – CAPACITANCE**




3

**PNP** — 2N6053, 2N6054, 2N6298, 2N6299

**NPN** — 2N6055, 2N6056, 2N6300, 2N6301

FIGURE 9 – DC CURRENT GAIN

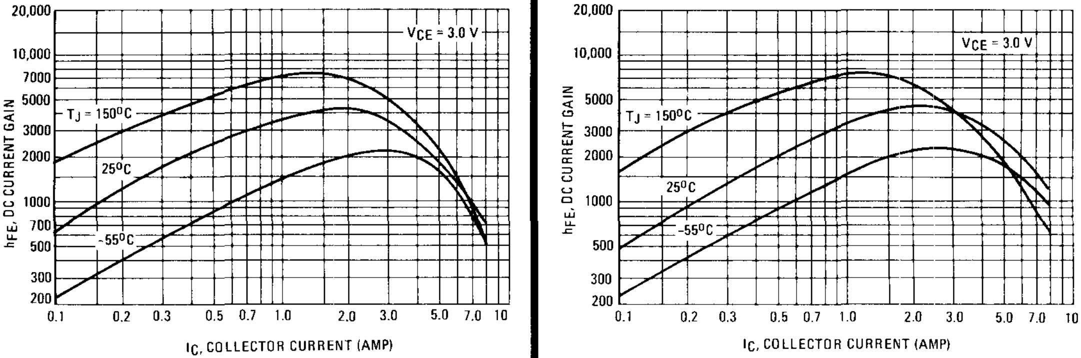



FIGURE 10 – COLLECTOR SATURATION REGION

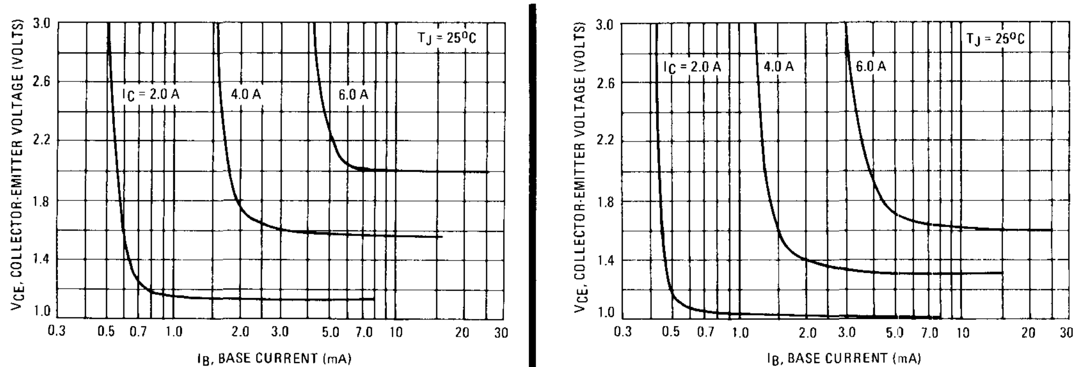
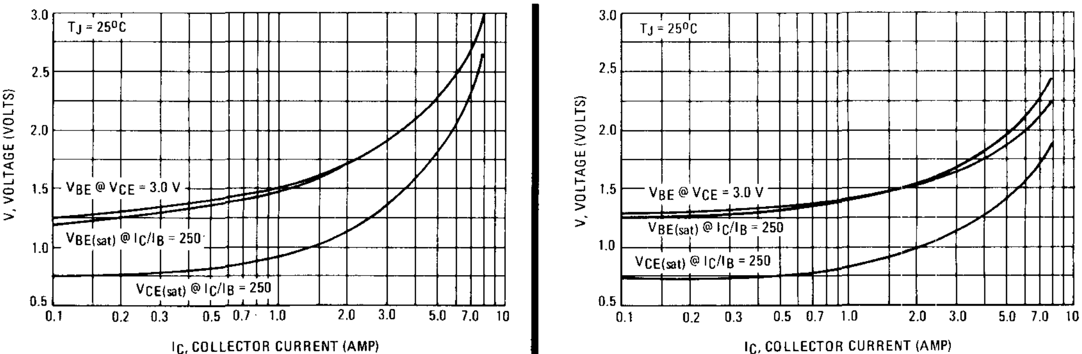



FIGURE 11 – "ON" VOLTAGES



**2N6298 thru 2N6301**
**See Page 3-147**
**2N6303 — See Page 3-32**

MOTOROLA
# SEMICONDUCTOR
TECHNICAL DATA

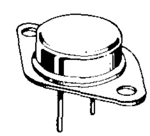
# 2N6306
# 2N6307, 2N6308

## HIGH VOLTAGE NPN SILICON POWER TRANSISTORS

*. . . designed for high voltage inverters, switching regulators and line-operated amplifier applications. Especially well suited for switching power supply applications in associated consumer products.*

- High Collector-Base Voltage —
  $V_{CB}$ = 500 Vdc — 2N6306
  = 600 Vdc — 2N6307
  = 700 Vdc — 2N6308
- Excellent DC Current Gain @ $I_C$ = 3.0 Adc
  $h_{FE}$ = 15 - 75 — 2N6306, 2N6307
  = 12 - 60 — 2N6308
- Low Collector-Emitter Saturation Voltage @ $I_C$ = 3.0 Adc
  $V_{CE(sat)}$ = 0.8 Vdc (Max) — 2N6306
  = 1.0 Vdc (Max) — 2N6307
  = 1.5 Vdc (Max) — 2N6308
- Current Gain Bandwidth Product —
  $f_T$ = 5.0 MHz (Min) @ $I_C$ = 0.3 Adc

**8 AMPERE**
**POWER TRANSISTORS**
**NPN SILICON**
**250-300-350 VOLTS**
**125 WATTS**



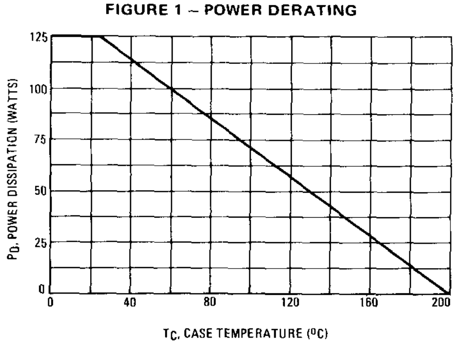
### *MAXIMUM RATINGS

| Rating | Symbol | 2N6306 | 2N6307 | 2N6308 | Unit |
|---|---|---|---|---|---|
| Collector-Base Voltage | $V_{CB}$ | 500 | 600 | 700 | Vdc |
| Collector-Emitter Voltage | $V_{CEO}$ | 250 | 300 | 350 | Vdc |
| Emitter-Base Voltage | $V_{EB}$ | ← 8.0 → | | | Vdc |
| *Collector Current — Continuous*<br>Peak | $I_C$ | ← 8.0 →<br>16 | | | Adc |
| Base Current | $I_B$ | ← 4.0 → | | | Adc |
| *Total Device Dissipation @ $T_C$ = 25°C*<br>Derate above 25°C | $P_D$ | ← 125 →<br>0.714 | | | *Watts*<br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J, T_{stg}$ | ← −65 to +200 → | | | °C |

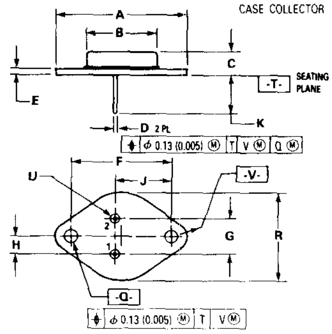
| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case | $\theta_{JC}$ | 1.4 | °C/W |

*Indicates JEDEC Registered Data.

**FIGURE 1 — POWER DERATING**




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




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.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | 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)**

3