

Complementary Silicon Power Transistors

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

- DC Current Gain — $h_{FE} = 20-70 @ I_C = 4 \text{ Adc}$
- Collector-Emitter Saturation Voltage —
 $V_{CE(sat)} = 1.1 \text{ Vdc (Max) @ } I_C = 4 \text{ Adc}$
- Excellent Safe Operating Area

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|----------------|--------------|------------------------------|
| Collector-Emitter Voltage | V_{CEO} | 60 | Vdc |
| Collector-Emitter Voltage | V_{CER} | 70 | Vdc |
| Collector-Base Voltage | V_{CB} | 100 | Vdc |
| Emitter-Base Voltage | V_{EB} | 7 | Vdc |
| Collector Current — Continuous | I_C | 15 | Adc |
| Base Current | I_B | 7 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 115 0.657 | Watts W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +200 | $^\circ\text{C}$ |

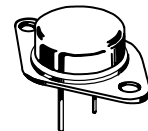
THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|-----------------|------|--------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 1.52 | $^\circ\text{C/W}$ |

NPN
2N3055 *
PNP
MJ2955 *

*Motorola Preferred Device

15 AMPERE
POWER TRANSISTORS
COMPLEMENTARY
SILICON
60 VOLTS
115 WATTS



CASE 1-07
TO-204AA
(TO-3)

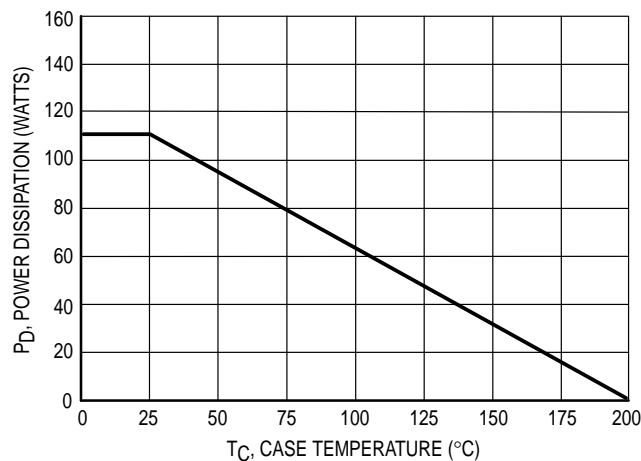


Figure 1. Power Derating

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

2N3055 MJ2955

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|--|----------------|-----|------------|------|
| *OFF CHARACTERISTICS | | | | |
| Collector–Emitter Sustaining Voltage (1) ($I_C = 200\text{ mAdc}$, $I_B = 0$) | $V_{CEO(sus)}$ | 60 | — | Vdc |
| Collector–Emitter Sustaining Voltage (1) ($I_C = 200\text{ mAdc}$, $R_{BE} = 100\text{ Ohms}$) | $V_{CER(sus)}$ | 70 | — | Vdc |
| Collector Cutoff Current ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$) | I_{CEO} | — | 0.7 | mAcd |
| Collector Cutoff Current ($V_{CE} = 100\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 100\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$) | I_{CEX} | — | 1.0 5.0 | mAcd |
| Emitter Cutoff Current ($V_{BE} = 7.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | — | 5.0 | mAcd |

*ON CHARACTERISTICS (1)

| | | | | |
|--|---------------|-----------|------------|-----|
| DC Current Gain ($I_C = 4.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 10\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) | h_{FE} | 20 5.0 | 70 — | — |
| Collector–Emitter Saturation Voltage ($I_C = 4.0\text{ Adc}$, $I_B = 400\text{ mAcd}$) ($I_C = 10\text{ Adc}$, $I_B = 3.3\text{ Adc}$) | $V_{CE(sat)}$ | — | 1.1 3.0 | Vdc |
| Base–Emitter On Voltage ($I_C = 4.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) | $V_{BE(on)}$ | — | 1.5 | Vdc |

SECOND BREAKDOWN

| | | | | |
|---|-----------|------|---|-----|
| Second Breakdown Collector Current with Base Forward Biased ($V_{CE} = 40\text{ Vdc}$, $t = 1.0\text{ s}$, Nonrepetitive) | $I_{s/b}$ | 2.87 | — | Adc |
|---|-----------|------|---|-----|

DYNAMIC CHARACTERISTICS

| | | | | |
|--|-----------|-----|-----|-----|
| Current Gain — Bandwidth Product ($I_C = 0.5\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ MHz}$) | f_T | 2.5 | — | MHz |
| *Small–Signal Current Gain ($I_C = 1.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$, $f = 1.0\text{ kHz}$) | h_{fe} | 15 | 120 | — |
| *Small–Signal Current Gain Cutoff Frequency ($V_{CE} = 4.0\text{ Vdc}$, $I_C = 1.0\text{ Adc}$, $f = 1.0\text{ kHz}$) | f_{hfe} | 10 | — | kHz |

* Indicates Within JEDEC Registration. (2N3055)

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

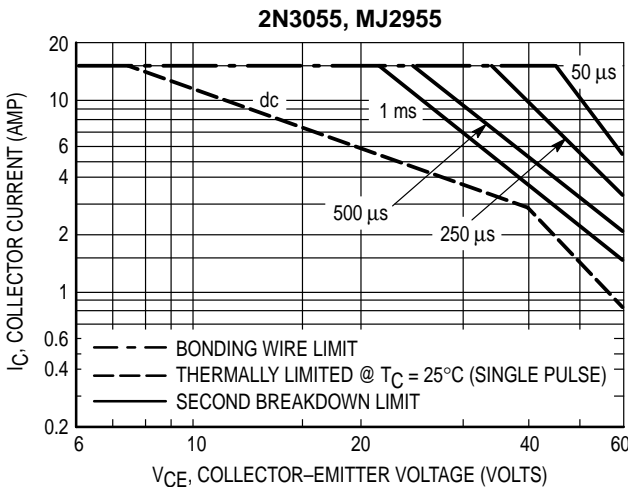


Figure 2. Active Region Safe Operating Area

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 Figure 2 is based on $T_C = 25^\circ\text{C}$; $T_{J(pk)}$ is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% but must be derated for temperature according to Figure 1.

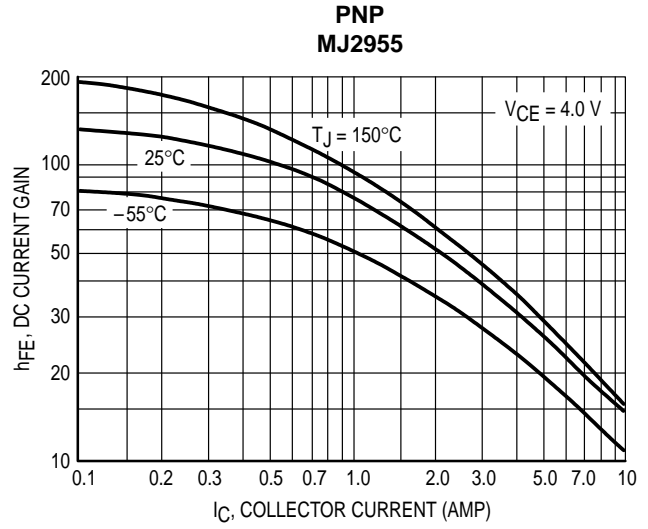
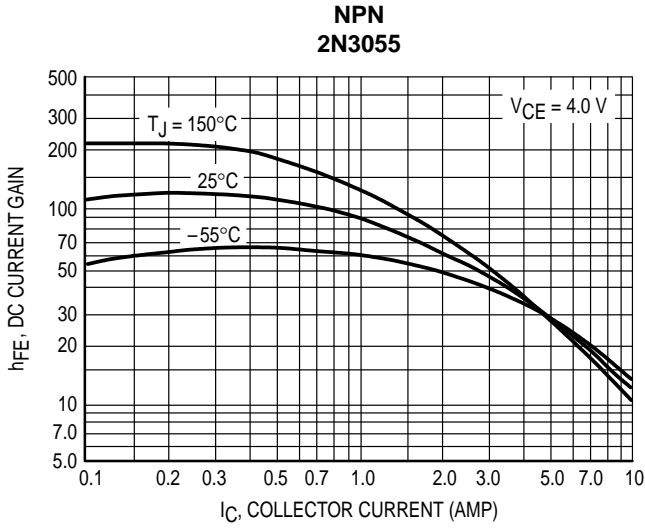


Figure 3. DC Current Gain

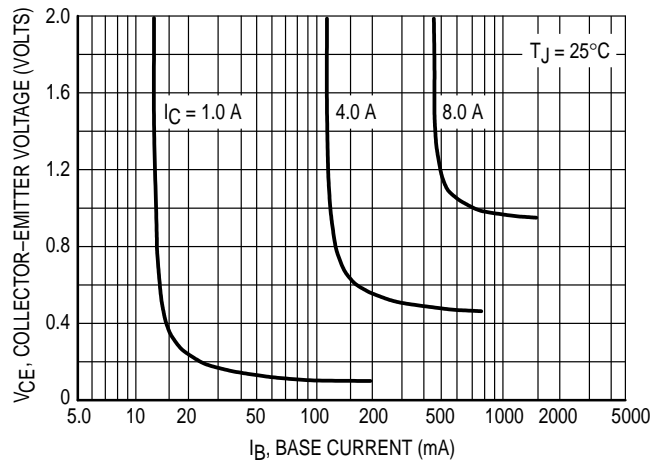
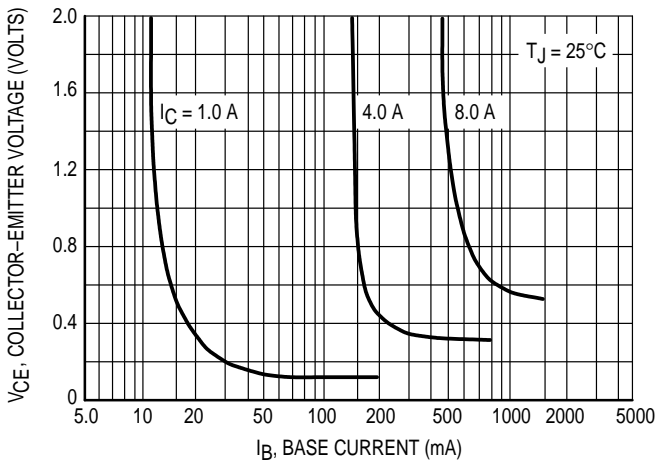


Figure 4. Collector Saturation Region

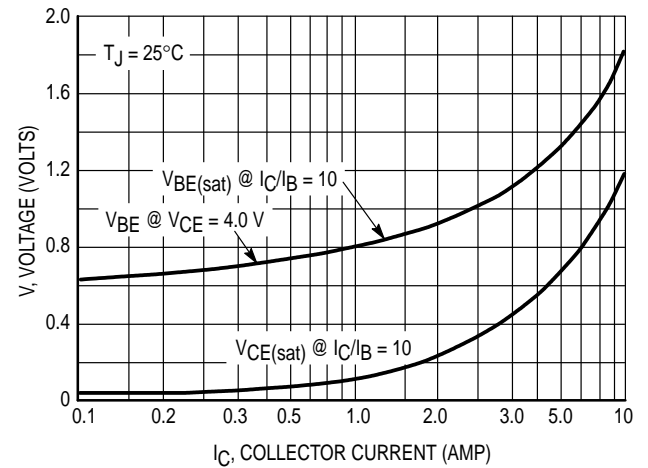
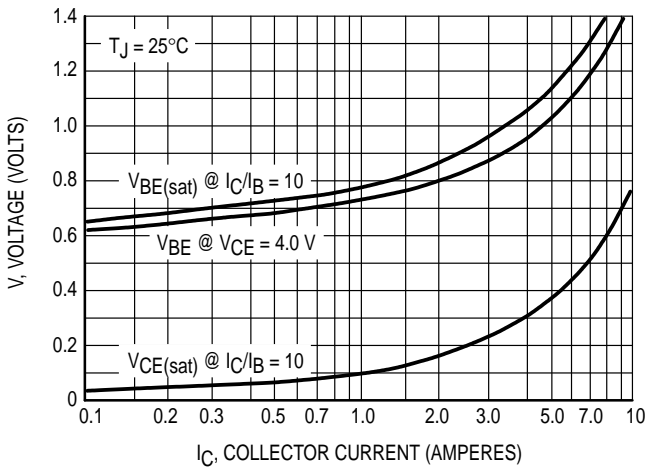
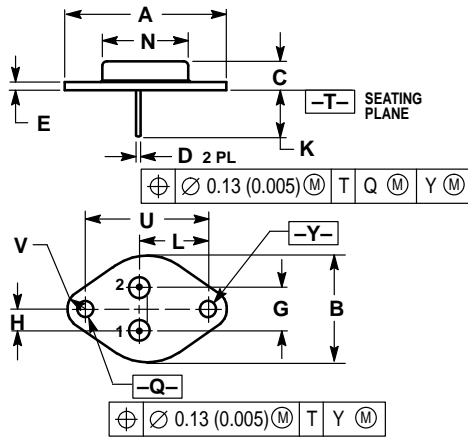


Figure 5. "On" Voltages

PACKAGE DIMENSIONS



- 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 | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.550 REF | | 39.37 REF | |
| B | — | 1.050 | — | 26.67 |
| C | 0.250 | 0.335 | 6.35 | 8.51 |
| D | 0.038 | 0.043 | 0.97 | 1.09 |
| E | 0.055 | 0.070 | 1.40 | 1.77 |
| G | 0.430 BSC | | 10.92 BSC | |
| H | 0.215 BSC | | 5.46 BSC | |
| K | 0.440 | 0.480 | 11.18 | 12.19 |
| L | 0.665 BSC | | 16.89 BSC | |
| N | — | 0.830 | — | 21.08 |
| Q | 0.151 | 0.165 | 3.84 | 4.19 |
| U | 1.187 BSC | | 30.15 BSC | |
| V | 0.131 | 0.188 | 3.33 | 4.77 |

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

CASE 1-07
TO-204AA (TO-3)
ISSUE Z

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How to reach us:
USA / EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

MFAX: RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609
INTERNET: <http://Design-NET.com>

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

