

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	$^\circ\text{C}$

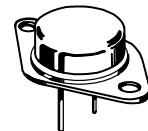
THERMAL CHARACTERISTICS

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)

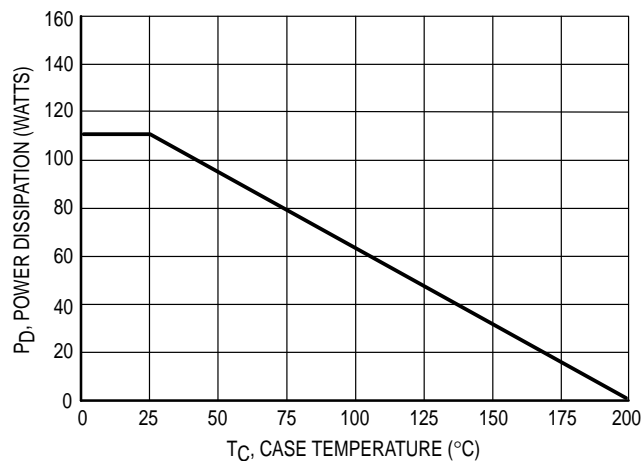


Figure 1. Power Derating

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) ($I_C = 200\text{ mA}$, $I_B = 0$)	$V_{CEO(sus)}$	60	—	Vdc
Collector–Emitter Sustaining Voltage (1) ($I_C = 200\text{ mA}$, $R_{BE} = 100\text{ Ohms}$)	$V_{CER(sus)}$	70	—	Vdc
Collector Cutoff Current ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$)	I_{CEO}	—	0.7	mA
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	mA
Emitter Cutoff Current ($V_{BE} = 7.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	5.0	mA

*ON CHARACTERISTICS (1)

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

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

* Indicates Within JEDEC Registration. (2N3055)

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

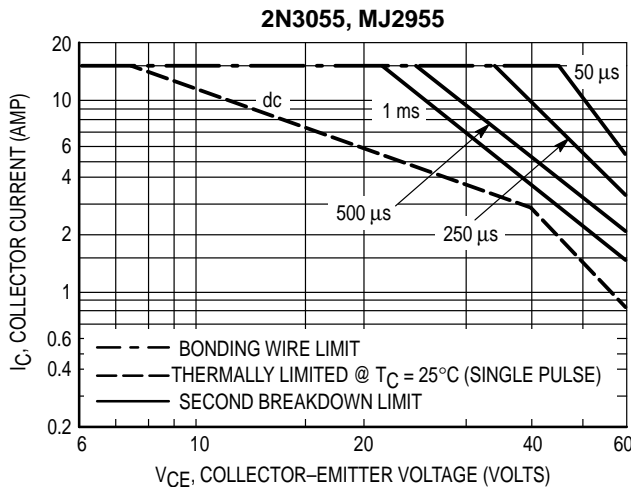


Figure 2. Active Region Safe Operating Area

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.

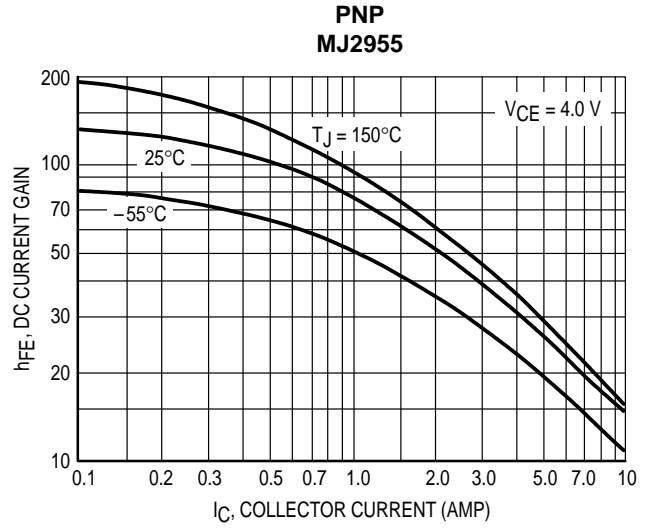
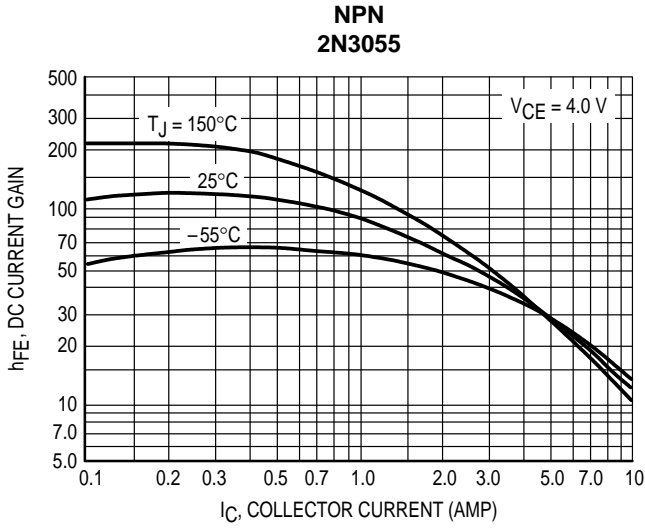


Figure 3. DC Current Gain

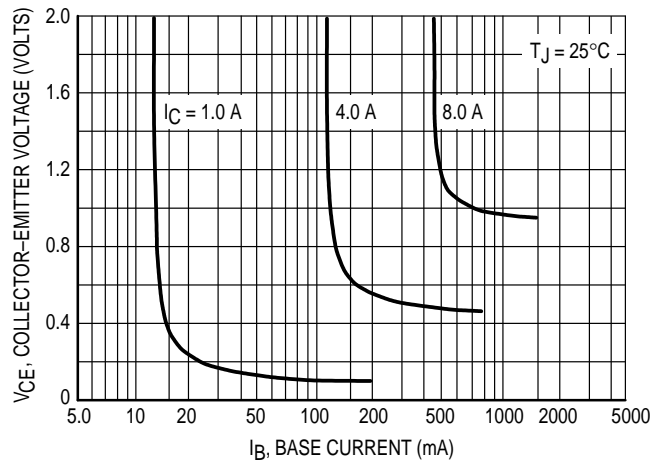
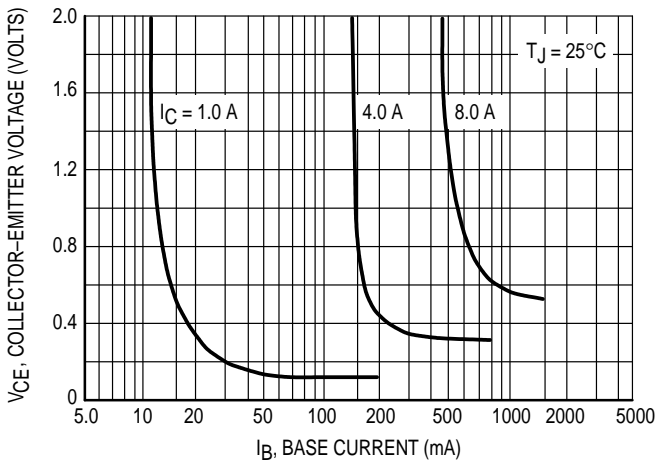


Figure 4. Collector Saturation Region

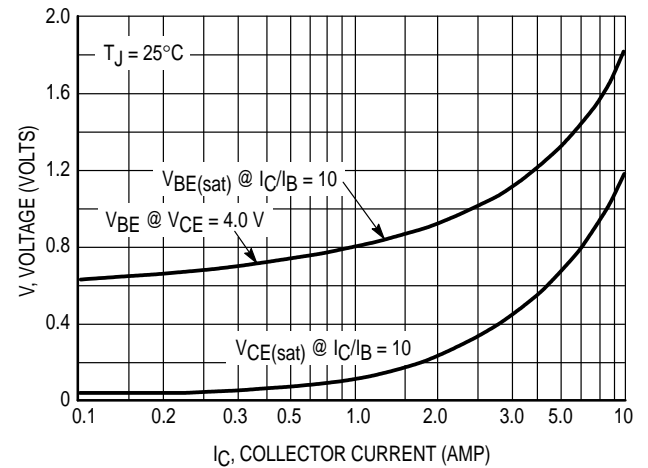
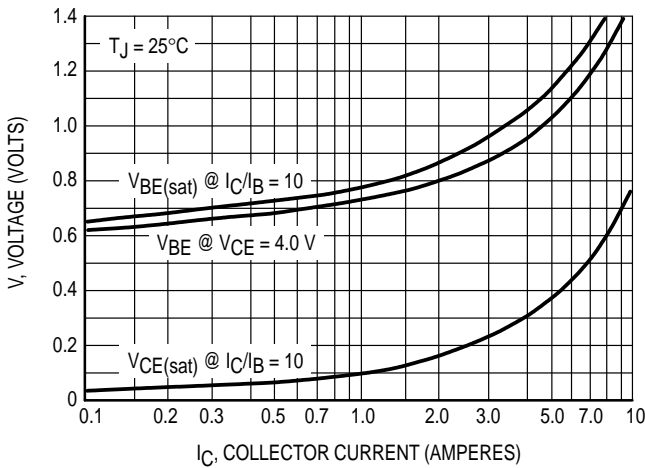
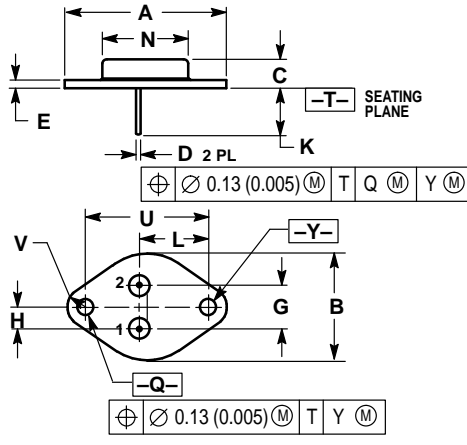


Figure 5. "On" Voltages

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:
 PIN 1: BASE
 2: EMITTER
 CASE: COLLECTOR

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

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