

# 2N3055, MJ2955

Preferred Device

## 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
- Pb–Free Package is Available

### 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 $25^\circ\text{C}$	$P_D$	115 0.657	W 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	$^\circ\text{C/W}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

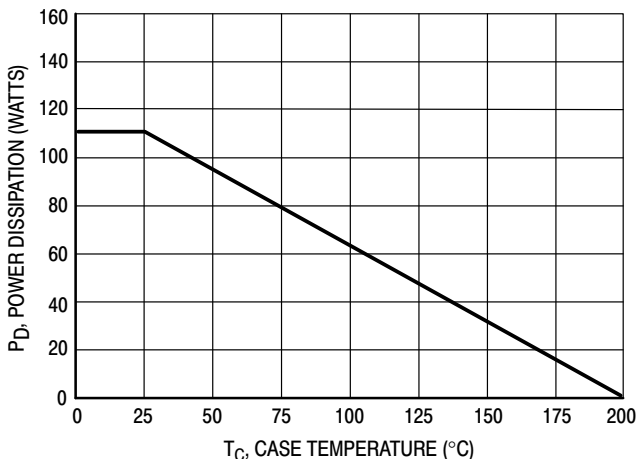


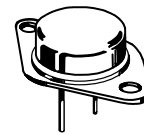
Figure 1. Power Derating



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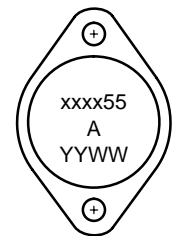
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**15 A**  
**POWER TRANSISTORS**  
**COMPLEMENTARY SILICON**  
**60 V**  
**115 W**



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

### MARKING DIAGRAM



xxxx55 = Device Code  
xxxx = 2N3055 or MJ2955  
A = Assembly Location  
YY = Year  
WW = Work Week  
x = 1, 2, or 3

### ORDERING INFORMATION

Device	Package	Shipping†
2N3055	TO-204AA	100 Units / Tray
2N3055G	TO-204AA (Pb-Free)	1 Units / Tubes
2N3055H	TO-204AA	100 Units / Tray
MJ2955	TO-204AA	100 Units / Tray

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

Preferred devices are 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
<b>*OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage (Note 1) ( $I_C = 200\text{ mA}$ , $I_B = 0$ )	$V_{CEO(sus)}$	60	–	Vdc
Collector–Emitter Sustaining Voltage (Note 1) ( $I_C = 200\text{ mA}$ , $R_{BE} = 100\ \Omega$ )	$V_{CER(sus)}$	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 (Note 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  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

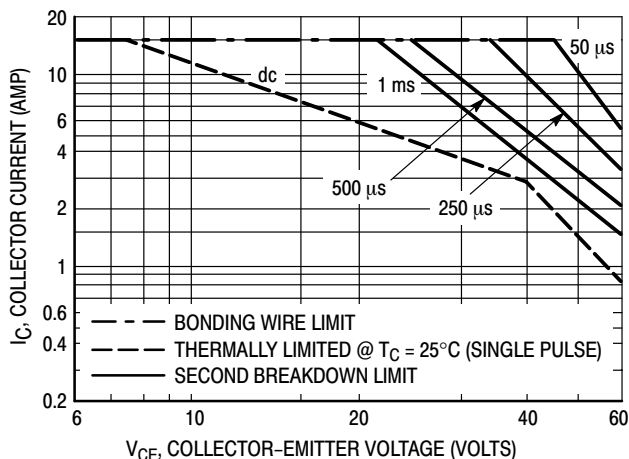


Figure 2. Active Region Safe Operating Area

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.

## 2N3055, MJ2955

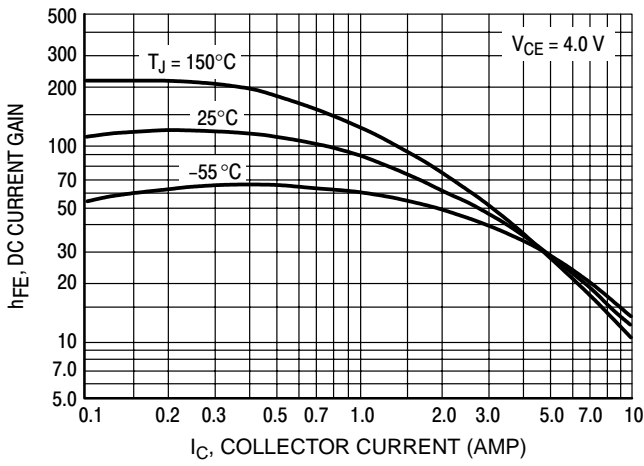


Figure 3. DC Current Gain, 2N3055 (NPN)

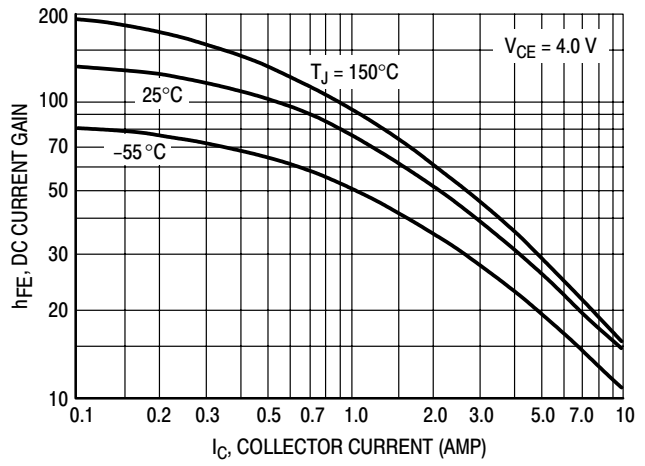


Figure 4. DC Current Gain, MJ2955 (PNP)

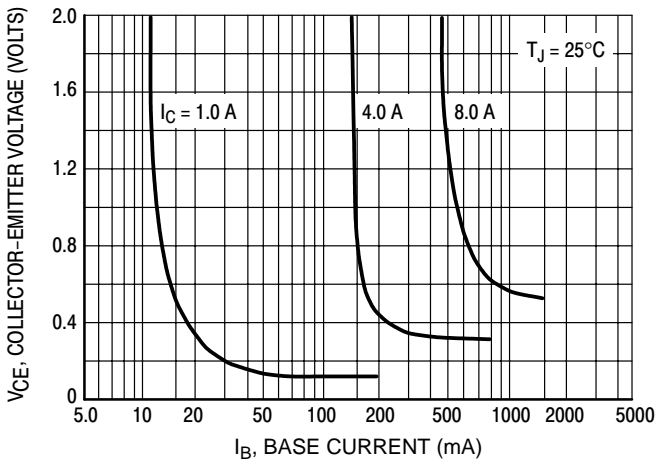


Figure 5. Collector Saturation Region, 2N3055 (NPN)

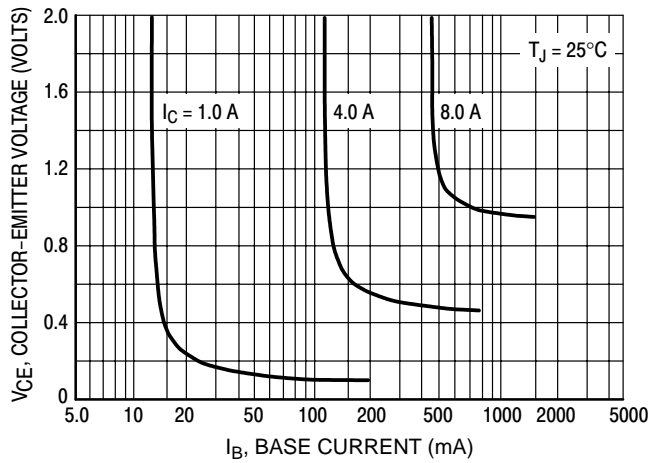


Figure 6. Collector Saturation Region, MJ2955 (PNP)

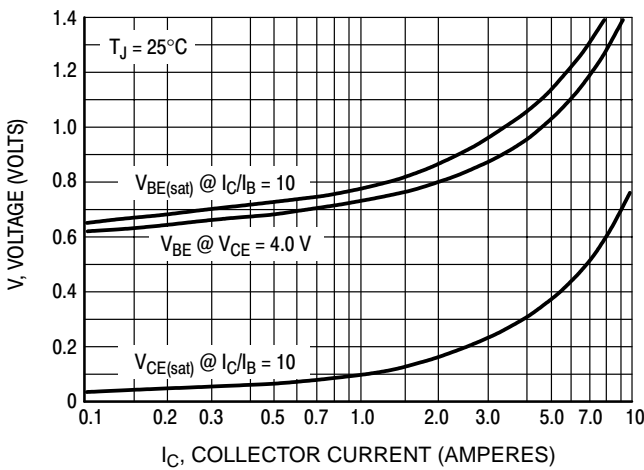


Figure 7. "On" Voltages, 2N3055 (NPN)

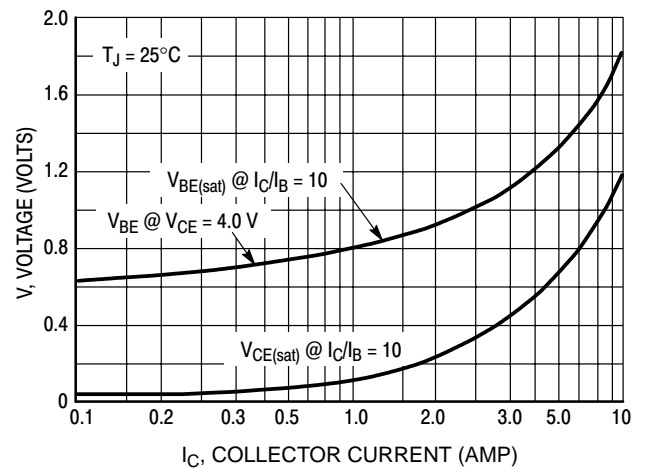
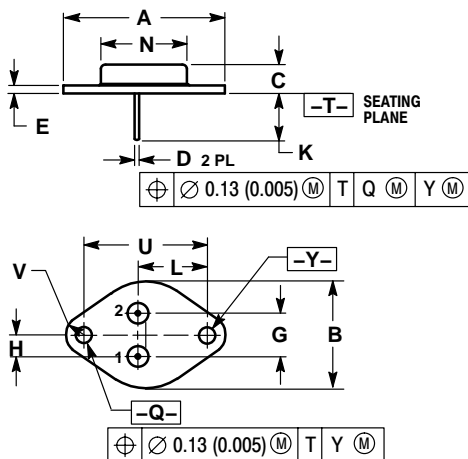


Figure 8. "On" Voltages, MJ2955 (PNP)

# 2N3055, MJ2955


## PACKAGE DIMENSIONS

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



- 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

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