

## COMPLEMENTARY SILICON POWER TRANSISTORS

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

### FEATURES:

- \* Power Dissipation -  $P_D = 115W @ T_C = 25^\circ C$
- \* DC Current Gain  $h_{FE} = 20 \sim 70 @ I_C = 4.0 A$
- \*  $V_{CE(sat)} = 1.1 V (Max.) @ I_C = 4.0 A, I_B = 400 mA$

### MAXIMUM RATINGS

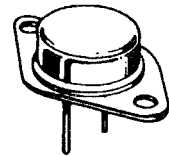
| Characteristic  | Symbol         | Rating       | Unit               |
|---|----------------|--------------|--------------------|
| Collector-Emitter Voltage   | $V_{CEO}$      | 60           | V                  |
| Collector-Emitter Voltage   | $V_{CER}$      | 70           | V                  |
| Collector-Base Voltage  | $V_{CBO}$      | 100          | V                  |
| Emitter-Base Voltage  | $V_{EBO}$      | 7.0          | V                  |
| Collector Current-Continuous  | $I_C$          | 15           | A                  |
| Base Current  | $I_B$          | 7.0          | A                  |
| Total Power Dissipation @ $T_C = 25^\circ C$<br>Derate above $25^\circ C$ | $P_D$          | 115<br>0.657 | W<br>W/ $^\circ C$ |
| Operating and Storage Junction<br>Temperature Range                       | $T_J, T_{STG}$ | - 65 to +200 | $^\circ C$         |

### THERMAL CHARACTERISTICS

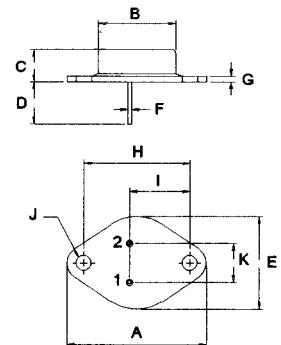
| Characteristic                      | Symbol          | Max  | Unit         |
|-------------------------------------|-----------------|------|--------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 1.52 | $^\circ C/W$ |

**NPN**      **PNP**  
**2N3055**   **MJ2955**

**15 AMPERE**  
**COMPLEMENTARY SILICON**  
**POWER TRANSISTORS**  
**60 VOLTS**  
**115 WATTS**



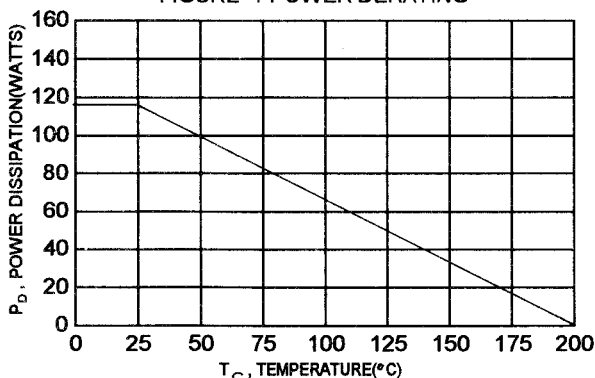
**TO-3**



PIN 1.BASE  
2.EMITTER  
COLLECTOR(CASE)

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 38.75       | 39.96 |
| B   | 19.28       | 22.23 |
| C   | 7.96        | 9.28  |
| D   | 11.18       | 12.19 |
| E   | 25.20       | 26.67 |
| F   | 0.92        | 1.09  |
| G   | 1.38        | 1.62  |
| H   | 29.90       | 30.40 |
| I   | 16.64       | 17.30 |
| J   | 3.88        | 4.36  |
| K   | 10.67       | 11.18 |

FIGURE -1 POWER DERATING



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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

**OFF CHARACTERISTICS**

|  |                |    |            |    |
|--|----------------|----|------------|----|
| Collector - Emitter Sustaining Voltage (1)<br>( $I_C = 200\text{ mA}$ , $I_B = 0$ )  | $V_{CEO(SUS)}$ | 60 |            | V  |
| Collector-Emitter Sustaining Voltage (1)<br>( $I_C = 200\text{ mA}$ , $R_{BE} = 100\text{ Ohms}$ )   | $V_{CER(SUS)}$ | 70 |            | V  |
| Collector Cutoff Current<br>( $V_{CE} = 30\text{ V}$ , $I_B = 0$ )   | $I_{CEO}$      |    | 0.7        | mA |
| Collector Cutoff Current<br>( $V_{CE} = 100\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ )<br>( $V_{CE} = 100\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ , $T_C = 150^\circ\text{C}$ ) | $I_{CEX}$      |    | 1.0<br>5.0 | mA |
| Emitter Cutoff Current<br>( $V_{EB} = 7.0\text{ V}$ , $I_C = 0$ )  | $I_{EBO}$      |    | 5.0        | mA |

**ON CHARACTERISTICS (1)**

|   |               |           |            |   |
|---|---------------|-----------|------------|---|
| DC Current Gain<br>( $I_C = 4.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )<br>( $I_C = 10\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )                  | hFE           | 20<br>5.0 | 70         |   |
| Collector - Emitter Saturation Voltage<br>( $I_C = 4.0\text{ A}$ , $I_B = 0.4\text{ A}$ )<br>( $I_C = 10\text{ A}$ , $I_B = 3.3\text{ A}$ ) | $V_{CE(sat)}$ |           | 1.1<br>3.0 | V |
| Base - Emitter On Voltage<br>( $I_C = 4.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )   | $V_{BE(on)}$  |           | 1.5        | V |

**DYNAMIC CHARACTERISTICS**

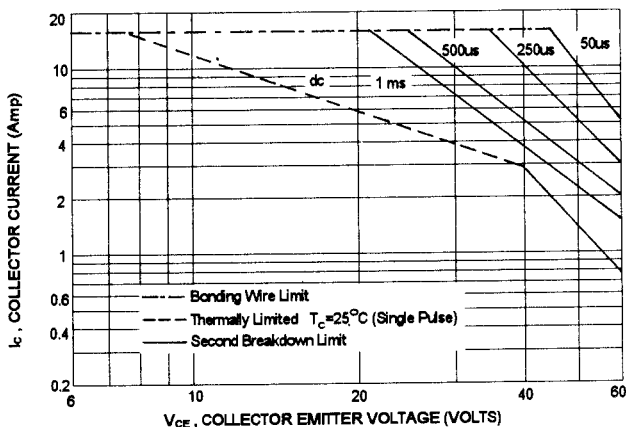
|   |          |     |     |     |
|---|----------|-----|-----|-----|
| Current Gain - Bandwidth Product (2)<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ ) | $f_T$    | 2.5 |     | MHz |
| Small-Signal Current Gain<br>( $I_C = 1.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , $f = 1\text{ KHz}$ )              | $h_{fe}$ | 15  | 120 |     |

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

(2)  $f_T = |h_{re}| \cdot f_{test}$

2N3055,MJ2955

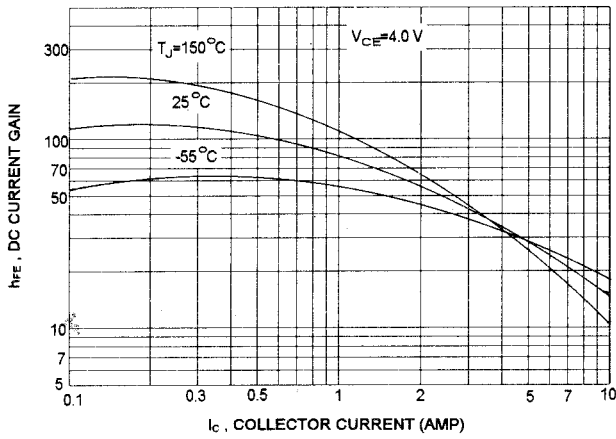
**ACTIVE REGION SAFE OPERATING AREA(SOA)**



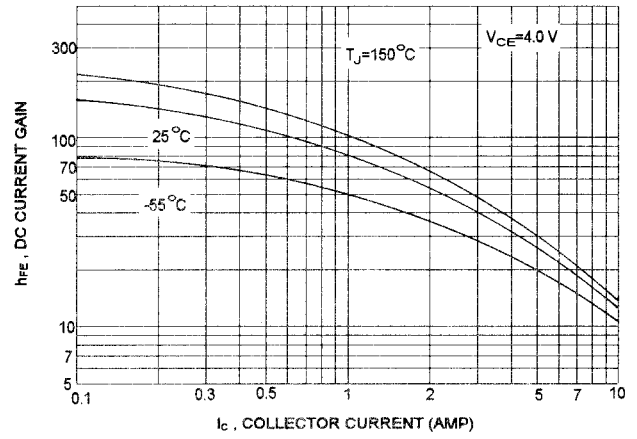
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater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

The data of SOA curve is base on  $T_{J(PK)}=200^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(PK)} \leq 200^\circ\text{C}$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

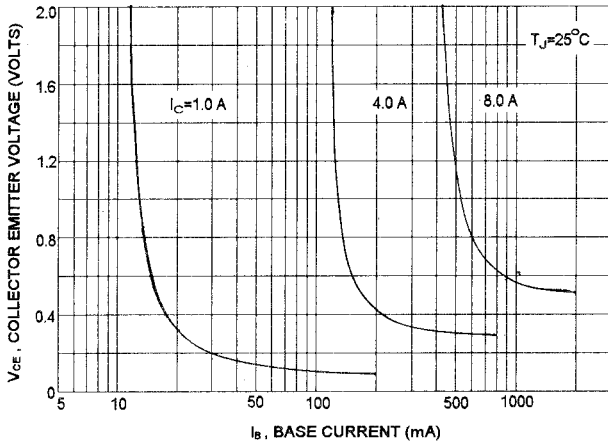
NPN 2N3055  
DC CURRENT GAIN



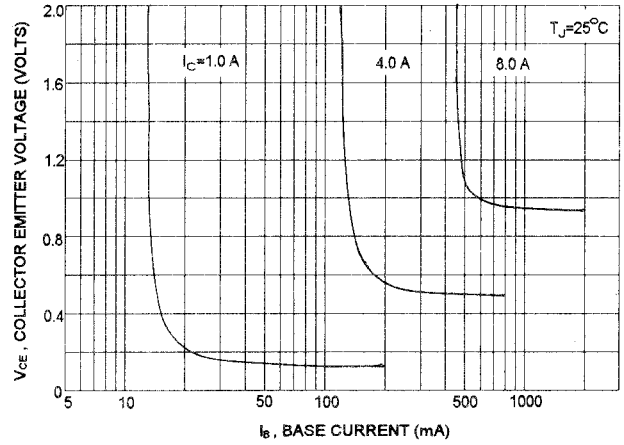
PNP MJ2955  
DC CURRENT GAIN



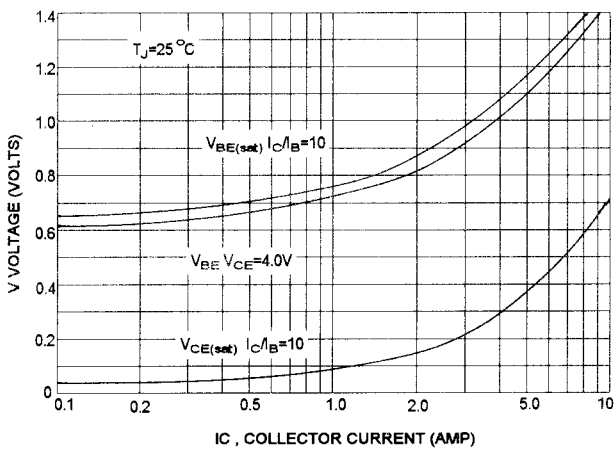
COLLECTOR SATURATION REGION



COLLECTOR SATURATION REGION



"ON" VOLTAGES



"ON" VOLTAGES

