

## HIGH-POWER PNP SILICON TRANSISTORS

... designed for use in industrial power amplifiers and switching circuit applications.

### FEATURES:

- \* High DC Current Gain  
 $h_{FE}=20-80 @ I_C=10A$   
 $=12 \text{ (Min)} @ I_C=25A$
- \* Low Collector-Emitter Saturation Voltage  
 $V_{CE(SAT)} = 1.0V \text{ (Max.)} @ I_C = 10 A, I_B = 1.0A$
- \* Complement to 2N6338 thru 2N6340

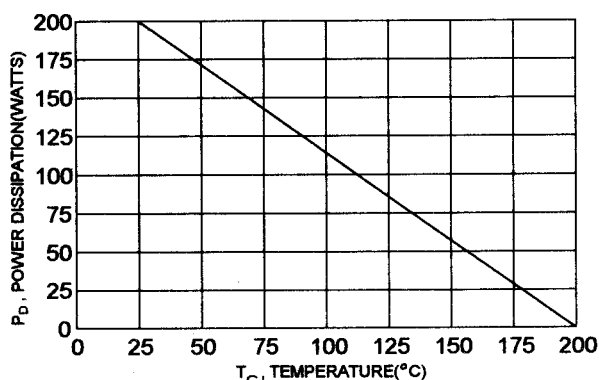
### MAXIMUM RATINGS

| Characteristic                                                          | Symbol         | 2N6436      | 2N6437 | 2N6438 | Unit               |
|-------------------------------------------------------------------------|----------------|-------------|--------|--------|--------------------|
| Collector-Emitter Voltage                                               | $V_{CEO}$      | 80          | 100    | 120    | V                  |
| Collector-Base Voltage                                                  | $V_{CBO}$      | 100         | 120    | 140    | V                  |
| Emitter-Base Voltage                                                    | $V_{EBO}$      | 6.0         |        |        | V                  |
| Collector Current-Continuous<br>-Peak                                   | $I_C$          | 25<br>50    |        |        | A                  |
| Base Current                                                            | $I_B$          | 10          |        |        | A                  |
| Total Power Dissipation @ $T_C=25^\circ C$<br>Derate above $25^\circ C$ | $P_D$          | 200<br>1.14 |        |        | W<br>W/ $^\circ C$ |
| Operating and Storage Junction<br>Temperature Range                     | $T_J, T_{STG}$ | -65 to +200 |        |        | $^\circ C$         |

### THERMAL CHARACTERISTICS

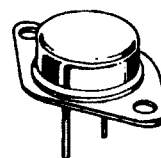
| Characteristic                      | Symbol          | Max   | Unit         |
|-------------------------------------|-----------------|-------|--------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 0.875 | $^\circ C/W$ |

FIGURE -1 POWER DERATING

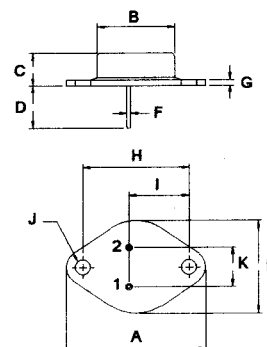


**PNP**  
**2N6436**  
**2N6437**  
**2N6438**

**25 AMPERE**  
**POWER TRANSISTOR**  
**PNP SILICON**  
**80-120 VOLTS**  
**200 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 |

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

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

**OFF CHARACTERISTICS**

|                                                                                                                                                                                      |                |                  |                |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------|----------------|---------------|
| Collector -Emitter Sustaining Voltage (1)<br>( $I_C = 50\text{ mA}$ , $I_B = 0$ )<br>2N6436<br>2N6437<br>2N6438                                                                      | $V_{CEO(sus)}$ | 80<br>100<br>120 |                | V             |
| Collector Cutoff Current<br>( $V_{CE} = 40\text{ V}$ , $I_B = 0$ )<br>( $V_{CE} = 50\text{ V}$ , $I_B = 0$ )<br>( $V_{CE} = 60\text{ V}$ , $I_B = 0$ )<br>2N6436<br>2N6437<br>2N6438 | $I_{CEO}$      |                  | 50<br>50<br>50 | $\mu\text{A}$ |
| Collector Cutoff Current<br>( $V_{CB} = \text{Rated } V_{CB}$ , $I_E = 0$ )                                                                                                          | $I_{CBO}$      |                  | 10             | $\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 6.0\text{ V}$ , $I_C = 0$ )                                                                                                                    | $I_{EBO}$      |                  | 100            | $\mu\text{A}$ |

**ON CHARACTERISTICS (1)**

|                                                                                                                                                                                 |               |                |            |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|------------|---|
| DC Current Gain<br>( $I_C = 0.5\text{ A}$ , $V_{CE} = 2.0\text{ V}$ )<br>( $I_C = 10\text{ A}$ , $V_{CE} = 2.0\text{ V}$ )<br>( $I_C = 25\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ) | $h_{FE}$      | 30<br>20<br>12 | 80         |   |
| Collector-Emitter Saturation Voltage<br>( $I_C = 10\text{ A}$ , $I_B = 1.0\text{ A}$ )<br>( $I_C = 25\text{ A}$ , $I_B = 2.5\text{ A}$ )                                        | $V_{CE(sat)}$ |                | 1.0<br>1.8 | V |
| Base-Emitter Saturation Voltage<br>( $I_C = 10\text{ A}$ , $I_B = 1.0\text{ A}$ )<br>( $I_C = 25\text{ A}$ , $I_B = 2.5\text{ A}$ )                                             | $V_{BE(sat)}$ |                | 1.8<br>2.5 | V |

**DYNAMIC CHARACTERISTICS**

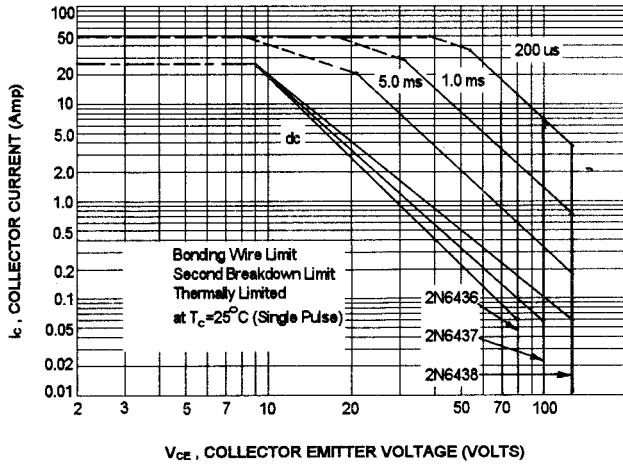
|                                                                                                               |          |    |     |     |
|---------------------------------------------------------------------------------------------------------------|----------|----|-----|-----|
| Current-Gain Bandwidth Product (2)<br>( $I_C = 1.0\text{ A}$ , $V_{CE} = 10\text{ V}$ , $f = 10\text{ MHz}$ ) | $f_T$    | 40 |     | MHz |
| Output Capacitance<br>( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 0.1\text{ MHz}$ )                           | $C_{ob}$ |    | 700 | pF  |

**SWITCHING CHARACTERISTICS**

|              |                                                                                                                     |       |  |     |               |
|--------------|---------------------------------------------------------------------------------------------------------------------|-------|--|-----|---------------|
| Rise Time    | $V_{CC} = 80\text{ V}$ , $I_C = 10\text{ A}$<br>$I_{B1} = -I_{B2} = 1.0\text{ A}$ ,<br>$V_{BE(off)} = 6.0\text{ V}$ | $t_r$ |  | 0.3 | $\mu\text{s}$ |
| Storage Time |                                                                                                                     | $t_s$ |  | 2.0 | $\mu\text{s}$ |
| Fall Time    |                                                                                                                     | $t_f$ |  | 0.4 | $\mu\text{s}$ |

(1) Pulse Test: Pulse width =  $300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ (2)  $f_T = |h_{fe}| \cdot f_{test}$

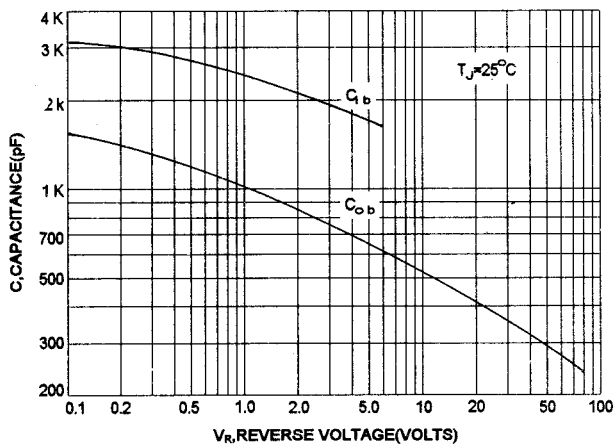
### ACTIVE-REGION SAFE OPERATING AREA (SOA)



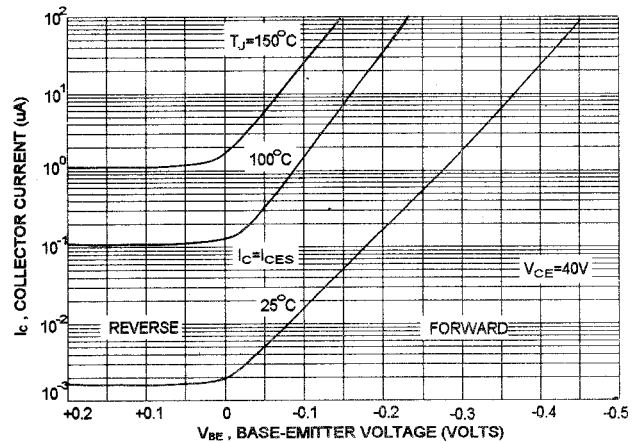
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater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

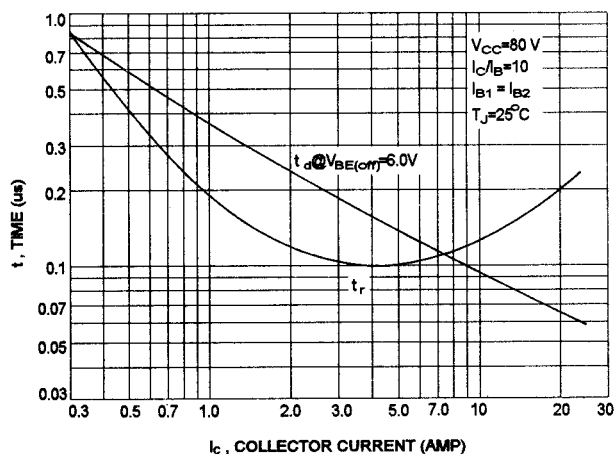
### CAPACITANCES



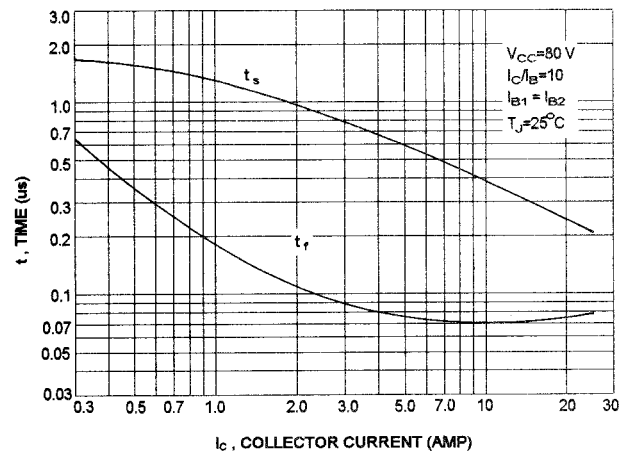
### COLLECTOR CUT-OFF REGION



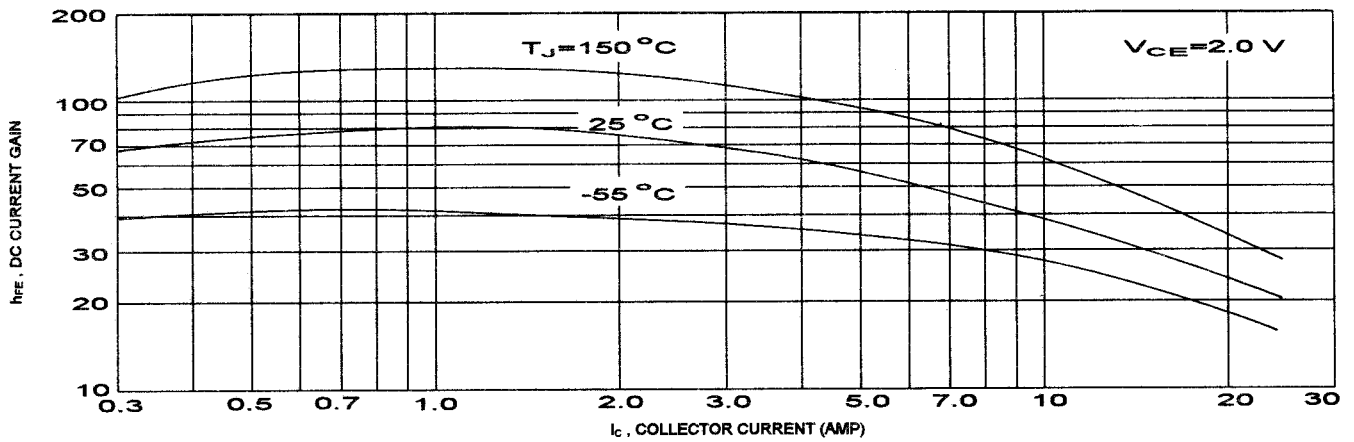
### TURN-ON TIME



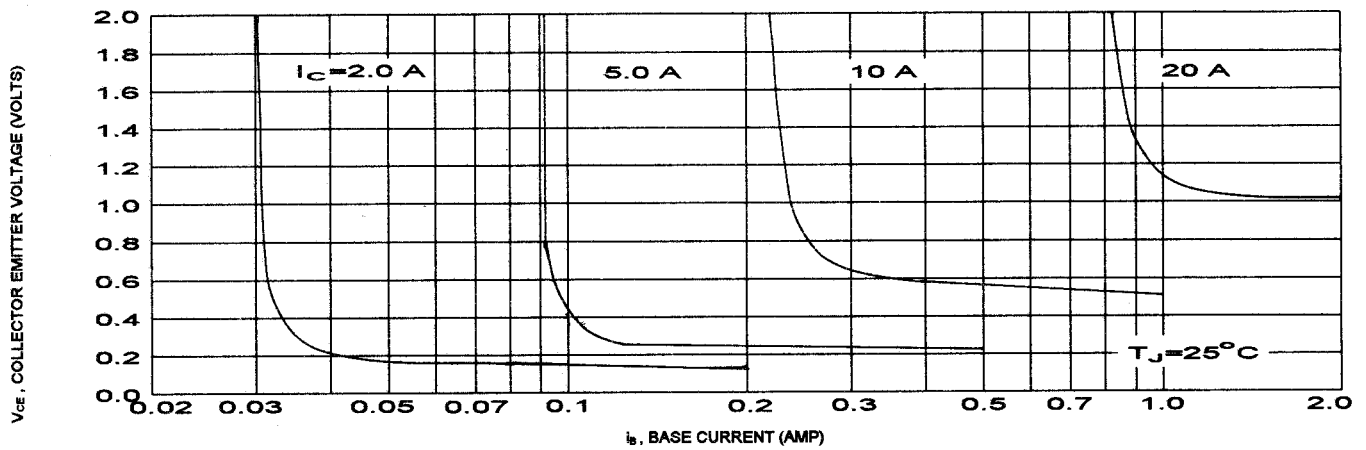
### TURN-OFF TIME



## DC CURRENT GAIN



## COLLECTOR SATURATION REGION



## "ON" VOLTAGES

