

## COMPLEMENTARY SILICON HIGH-POWER TRANSISTORS

General-purpose power amplifier and switching applications

### FEATURES:

- \* Low Collector-Emitter Saturation Voltage -  
 $V_{CE(SAT)} = 1.0V(\text{Max.}) @ I_C = 5.0A$
- \* Excellent DC Current Gain -  
 $hFE = 20 \sim 100 @ I_C = 4.0 A$

### MAXIMUM RATINGS

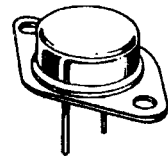
| Characteristic                                                           | Symbol            | 2N5875<br>2N5877 | 2N5876<br>2N5878 | Unit               |
|--------------------------------------------------------------------------|-------------------|------------------|------------------|--------------------|
| Collector-Emitter Voltage                                                | $V_{CEO}$         | 60               | 80               | V                  |
| Collector-Base Voltage                                                   | $V_{CBO}$         | 60               | 80               | V                  |
| Emitter-Base Voltage                                                     | $V_{EBO}$         | 5.0              |                  | V                  |
| Collector Current-Continuous<br>-Peak                                    | $I_C$<br>$I_{CM}$ | 10<br>20         |                  | A                  |
| Base Current                                                             | $I_B$             | 4.0              |                  | A                  |
| Total Power Dissipation@ $T_C = 25^\circ C$<br>Derate above $25^\circ C$ | $P_D$             | 150<br>0.857     |                  | W<br>W/ $^\circ C$ |
| Operating and Storage Junction<br>Temperature Range                      | $T_J, T_{STG}$    | - 65 to +200     |                  | $^\circ C$         |

### THERMAL CHARACTERISTICS

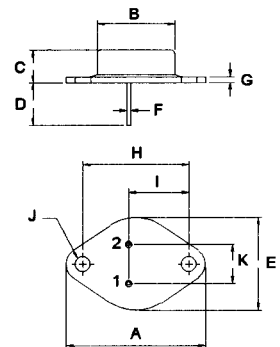
| Characteristic                      | Symbol          | Max  | Unit         |
|-------------------------------------|-----------------|------|--------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 1.17 | $^\circ C/W$ |

|               |               |
|---------------|---------------|
| <b>PNP</b>    | <b>NPN</b>    |
| <b>2N5875</b> | <b>2N5877</b> |
| <b>2N5876</b> | <b>2N5878</b> |

10 AMPERE  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
60 - 80 Volts  
150 Watts



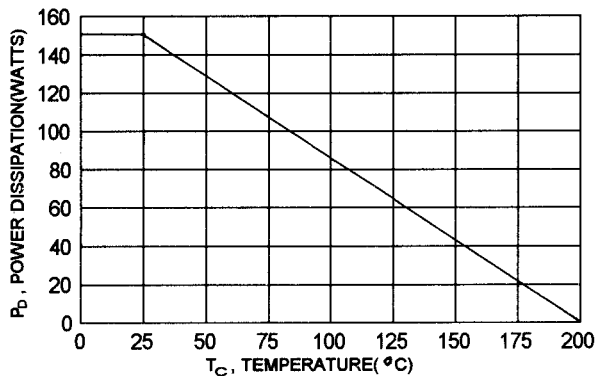
TO-3



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>( $I_c = 200\text{ mA}$ , $I_B = 0$ )                                                                                                                                                                                                                                                  | 2N5875, 2N5877<br>2N5876, 2N5878                                     | $V_{CE(sus)}$ | 60<br>80                 | V  |
| Collector Cutoff Current<br>( $V_{CE} = 30\text{ V}$ , $I_B = 0$ )<br>( $V_{CE} = 40\text{ V}$ , $I_B = 0$ )                                                                                                                                                                                                                         | 2N5875, 2N5877<br>2N5876, 2N5878                                     | $I_{CEO}$     | 1.0<br>1.0               | mA |
| Collector Cutoff Current<br>( $V_{CE} = 60\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ )<br>( $V_{CE} = 80\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ )<br>( $V_{CE} = 60\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ , $T_c = 150^\circ\text{C}$ )<br>( $V_{CE} = 80\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ , $T_c = 150^\circ\text{C}$ ) | 2N5875, 2N5877<br>2N5876, 2N5878<br>2N5875, 2N5877<br>2N5876, 2N5878 | $I_{CEX}$     | 0.5<br>0.5<br>5.0<br>5.0 | mA |
| Collector Cutoff Current<br>( $V_{CB} = 60\text{ V}$ , $I_E = 0$ )<br>( $V_{CB} = 80\text{ V}$ , $I_E = 0$ )                                                                                                                                                                                                                         | 2N5875, 2N5877<br>2N5876, 2N5878                                     | $I_{CBO}$     | 0.5<br>0.5               | mA |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )                                                                                                                                                                                                                                                                    |                                                                      | $I_{EBO}$     | 1.0                      | mA |

**ON CHARACTERISTICS (1)**

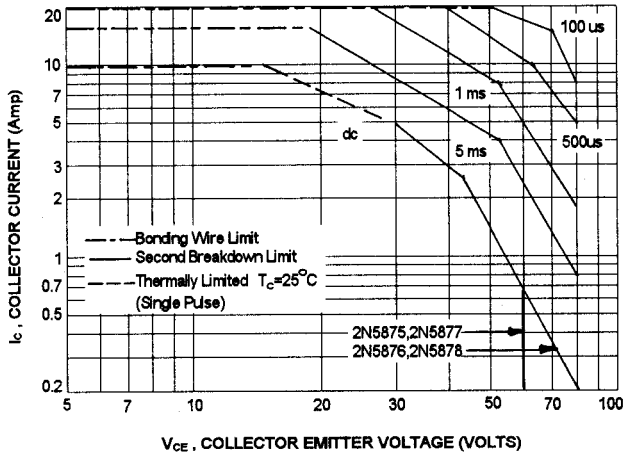
|                                                                                                                                                                                  |               |                 |            |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------|------------|---|
| DC Current Gain<br>( $I_c = 1.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )<br>( $I_c = 4.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )<br>( $I_c = 10\text{ A}$ , $V_{CE} = 4.0\text{ V}$ ) | $h_{FE}$      | 35<br>20<br>4.0 | 100        |   |
| Collector-Emitter saturation Voltage<br>( $I_c = 5.0\text{ A}$ , $I_B = 0.5\text{ A}$ )<br>( $I_c = 10\text{ A}$ , $I_B = 2.5\text{ A}$ )                                        | $V_{CE(sat)}$ |                 | 1.0<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 |
| Base-Emitter Saturation Voltage<br>( $I_c = 10\text{ A}$ , $I_B = 2.5\text{ A}$ )                                                                                                | $V_{BE(sat)}$ |                 | 2.5        | V |

**DYNAMIC CHARACTERISTICS**

|                                                                                                                |          |     |  |     |
|----------------------------------------------------------------------------------------------------------------|----------|-----|--|-----|
| Current-Gain-Bandwidth Product (2)<br>( $I_c = 0.5\text{ A}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ ) | $f_T$    | 4.0 |  | MHz |
| Small-Signal Current Gain<br>( $I_c = 1.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , $f = 1.0\text{ KHz}$ )         | $h_{fe}$ | 20  |  |     |

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

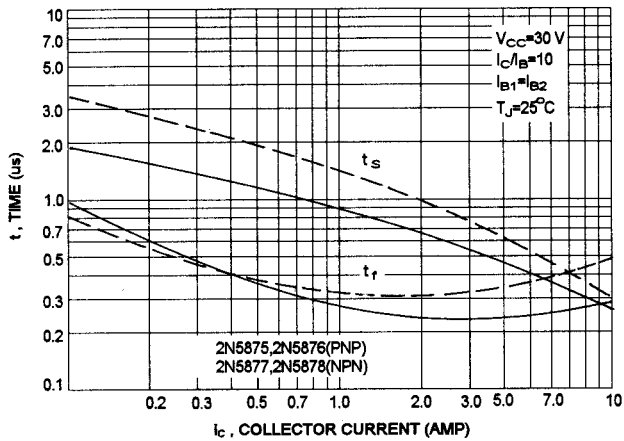
### ACTIVE-REGION SAFE OPERATING AREA (SOA)



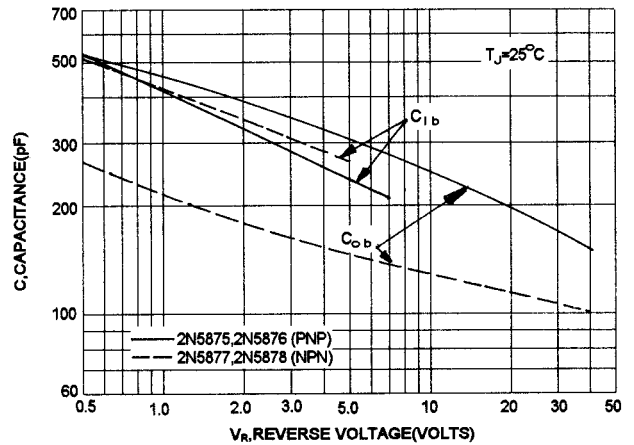
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater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

### TURN-OFF TIME



### CAPACITANCES



### TURN-ON TIME

