

## PNP SILICON POWER TRANSISTORS

2SA940 transistor is designed for use in general purpose power amplifier, vertical output application

### FEATURES:

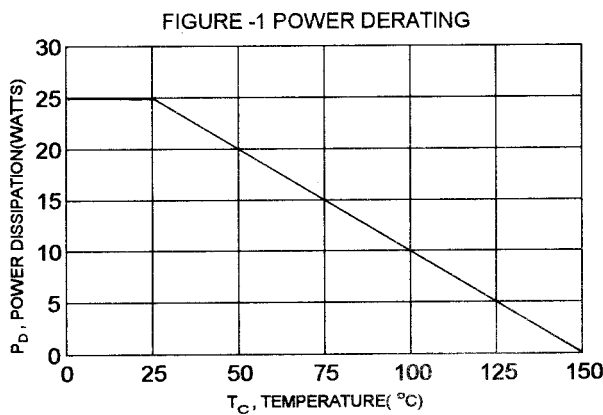
- \* Collector-Emitter Voltage  
 $V_{CEO} = 150V(\text{Min})$
- \* DC Current Gain  
 $hFE = 40-140 @ I_C = 500mA$
- \* Complementary NPN 2SC2073

### MAXIMUM RATINGS

| Characteristic  | Symbol            | 2SA940      | Unit               |
|---|-------------------|-------------|--------------------|
| Collector-Emitter Voltage   | $V_{CEO}$         | 150         | V                  |
| Collector-Base Voltage  | $V_{CBO}$         | 150         | V                  |
| Emitter-Base Voltage  | $V_{EBO}$         | 5.0         | V                  |
| Collector Current - Continuous<br>- Peak                                  | $I_C$<br>$I_{CM}$ | 1.5<br>3.0  | A                  |
| Base Current  | $I_B$             | 0.5         | A                  |
| Total Power Dissipation @ $T_C = 25^\circ C$<br>Derate above $25^\circ C$ | $P_D$             | 25<br>0.2   | W<br>W/ $^\circ C$ |
| Operating and Storage Junction<br>Temperature Range                       | $T_J, T_{STG}$    | -55 to +150 | $^\circ C$         |

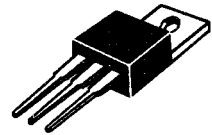
### THERMAL CHARACTERISTICS

| Characteristic                      | Symbol          | Max | Unit         |
|-------------------------------------|-----------------|-----|--------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 5.0 | $^\circ C/W$ |

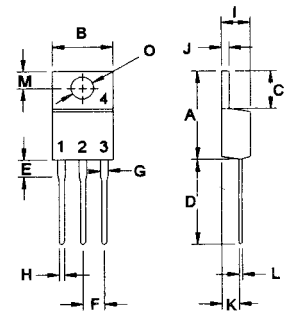


**PNP  
2SA940**

**1.5 AMPERE  
POWER  
TRANSISTORS  
150 VOLTS  
25 WATTS**



**TO-220**



PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 14.68       | 15.31 |
| B   | 9.78        | 10.42 |
| C   | 5.01        | 6.52  |
| D   | 13.06       | 14.62 |
| E   | 3.57        | 4.07  |
| F   | 2.42        | 3.66  |
| G   | 1.12        | 1.36  |
| H   | 0.72        | 0.96  |
| I   | 4.22        | 4.98  |
| J   | 1.14        | 1.38  |
| K   | 2.20        | 2.97  |
| L   | 0.33        | 0.55  |
| M   | 2.48        | 2.98  |
| O   | 3.70        | 3.90  |

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

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

**OFF CHARACTERISTICS**

|   |           |     |    |               |
|---|-----------|-----|----|---------------|
| Collector-Base Voltage<br>( $I_C = 1.0 \text{ mA}, I_B = 0$ )     | $V_{CBO}$ | 150 |    | V             |
| Collector-Emitter Voltage<br>( $I_C = 5.0 \text{ mA}, I_B = 0$ )  | $V_{CEO}$ | 150 |    | V             |
| Emitter-Base Voltage<br>( $I_B = 1.0 \text{ mA}, I_C = 0$ )       | $V_{EBO}$ | 5.0 |    | V             |
| Collector Cutoff Current<br>( $V_{CB} = 120 \text{ V}, I_E = 0$ ) | $I_{CBO}$ |     | 10 | $\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0 \text{ V}, I_C = 0$ )   | $I_{EBO}$ |     | 10 | $\mu\text{A}$ |

**ON CHARACTERISTICS (1)**

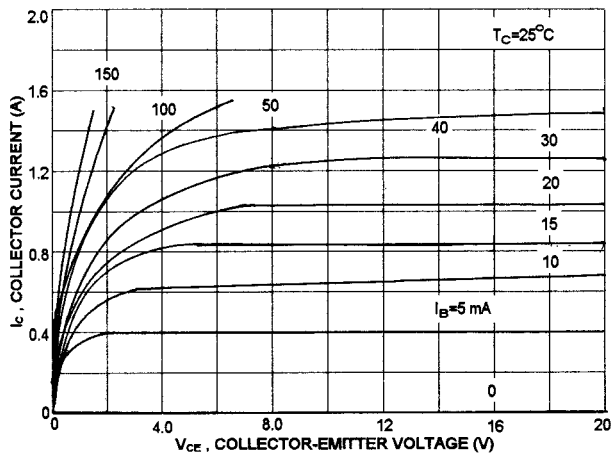
|  |               |      |      |   |
|--|---------------|------|------|---|
| DC Current Gain<br>( $I_C = 0.5 \text{ A}, V_{CE} = 10\text{V}$ )                      | hFE           | 40   | 140  |   |
| Collector-Emitter Saturation Voltage<br>( $I_C = 0.5 \text{ A}, I_B = 50 \text{ mA}$ ) | $V_{CE(sat)}$ |      | 1.5  | V |
| Base-Emitter On Voltage<br>( $I_C = 500 \text{ mA}, V_{CE} = 5.0 \text{ V}$ )          | $V_{BE(on)}$  | 0.65 | 0.85 | V |

**DYNAMIC CHARACTERISTICS**

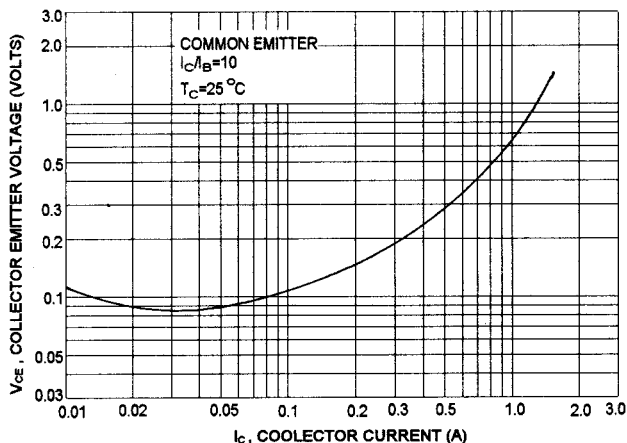
|   |       |     |  |     |
|---|-------|-----|--|-----|
| Current-Gain-Bandwidth Product<br>( $I_C = 0.5 \text{ A}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ MHz}$ ) | $f_T$ | 4.0 |  | MHz |
|---|-------|-----|--|-----|

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

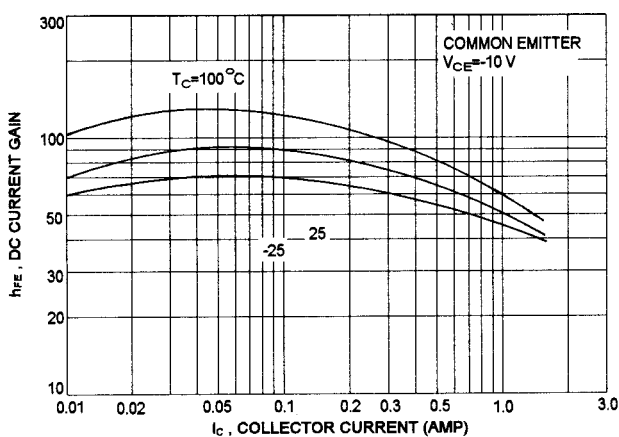
$I_c - V_{ce}$



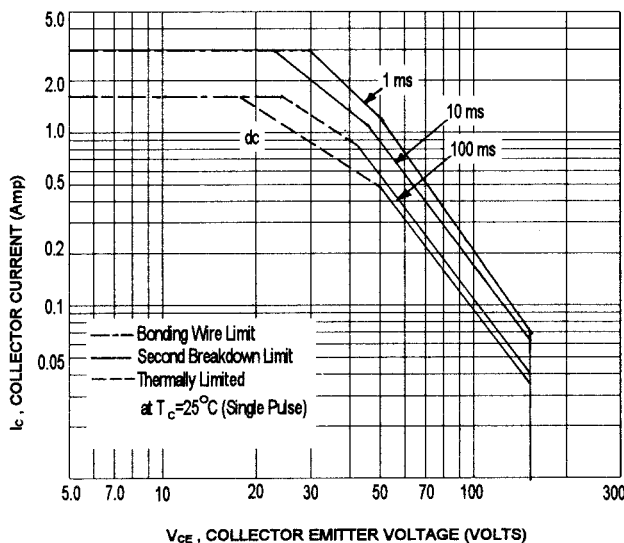
$V_{ce(sat)} - I_c$



DC CURRENT GAIN



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  $T_{j(PK)} = 150^\circ C$ ;  $T_c$  is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{j(PK)} \leq 150^\circ C$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.