

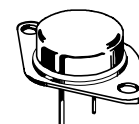
**2N3442**

## High-Power Industrial Transistors

NPN silicon power transistor designed for applications in industrial and commercial equipment including high fidelity audio amplifiers, series and shunt regulators and power switches.

- Collector–Emitter Sustaining Voltage —  
 $V_{CEO(sus)} = 140 \text{ Vdc (Min)}$
- Excellent Second Breakdown Capability

**10 AMPERE  
POWER TRANSISTOR  
NPN SILICON  
140 VOLTS  
117 WATTS**



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

### \*MAXIMUM RATINGS

| Rating  | Symbol         | Value       | Unit                         |
|---|----------------|-------------|------------------------------|
| Collector–Emitter Voltage   | $V_{CEO}$      | 140         | Vdc                          |
| Collector–Base Voltage  | $V_{CB}$       | 160         | Vdc                          |
| Emitter–Base Voltage  | $V_{EB}$       | 7.0         | Vdc                          |
| Collector Current — Continuous<br>Peak  | $I_C$          | 10<br>15**  | Adc                          |
| Base Current — Continuous<br>Peak   | $I_B$          | 7.0<br>—    | Adc                          |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 117<br>0.67 | Watts<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                   | $T_J, T_{stg}$ | –65 to +200 | $^\circ\text{C}$             |

### THERMAL CHARACTERISTICS

| Characteristic                       | Symbol          | Max | Unit               |
|--------------------------------------|-----------------|-----|--------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 1.5 | $^\circ\text{C/W}$ |

\* Indicates JEDEC Registered Data.

\*\* This data guaranteed in addition to JEDEC registered data.

REV 7

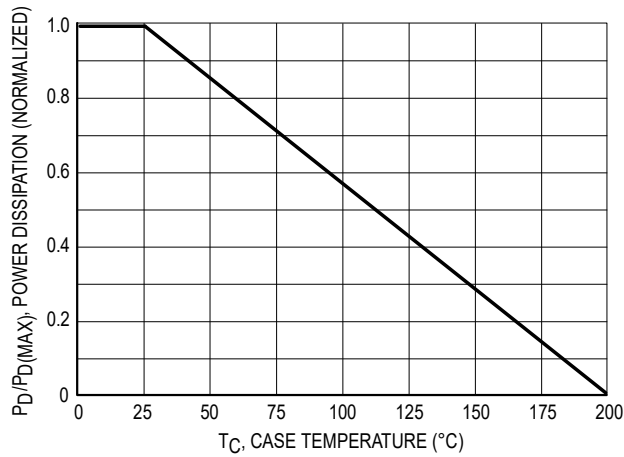
**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

| Characteristic   | Symbol         | Min       | Max       | Unit |
|--|----------------|-----------|-----------|------|
| <b>OFF CHARACTERISTICS</b>   |                |           |           |      |
| Collector–Emitter Sustaining Voltage<br>( $I_C = 200\text{ mAdc}$ , $I_B = 0$ )  | $V_{CE0(sus)}$ | 140       | —         | Vdc  |
| Collector Cutoff Current<br>( $V_{CE} = 140\text{ Vdc}$ , $I_B = 0$ )  | $I_{CEO}$      | —         | 200       | mAdc |
| Collector Cutoff Current<br>( $V_{CE} = 140\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ )<br>( $V_{CE} = 140\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ ) | $I_{CEX}$      | —         | 5.0<br>30 | mAdc |
| Emitter Cutoff Current<br>( $V_{BE} = 7.0\text{ Vdc}$ , $I_C = 0$ )  | $I_{EBO}$      | —         | 5.0       | mAdc |
| <b>ON CHARACTERISTICS (1)</b>  |                |           |           |      |
| DC Current Gain<br>( $I_C = 3.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )<br>( $I_C = 10\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )   | $h_{FE}$       | 20<br>7.5 | 70<br>—   | —    |
| Collector–Emitter Saturation Voltage<br>( $I_C = 10\text{ Adc}$ , $I_B = 2.0\text{ Adc}$ )   | $V_{CE(sat)}$  | —         | 5.0       | Vdc  |
| Base–Emitter On Voltage<br>( $I_C = 10\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )   | $V_{BE(on)}$   | —         | 5.7       | Vdc  |
| <b>DYNAMIC CHARACTERISTICS</b>   |                |           |           |      |
| Current–Gain — Bandwidth Product (2)<br>( $I_C = 2.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f_{test} = 40\text{ kHz}$ )  | $f_T$          | 80        | —         | kHz  |
| Small–Signal Current Gain<br>( $I_C = 2.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )   | $h_{fe}$       | 12        | 72        | —    |

\* Indicates JEDEC Registered Data.

NOTES:

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



**Figure 1. Power Derating**

ACTIVE REGION SAFE OPERATING AREA INFORMATION

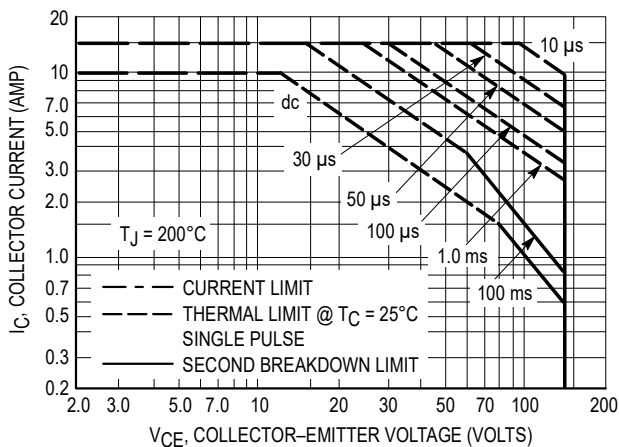


Figure 2. 2N3442

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  $T_{J(pk)} = 200^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

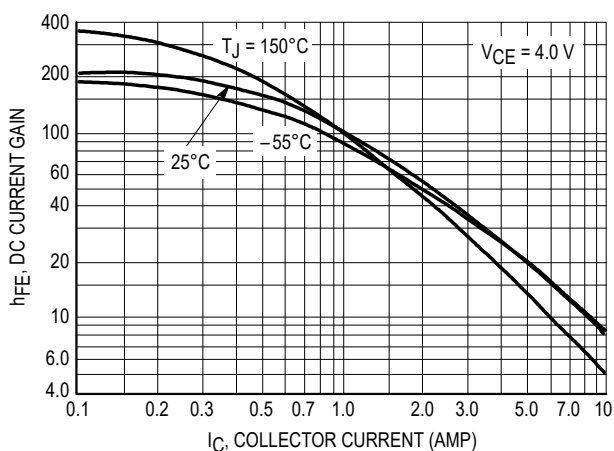


Figure 3. DC Current Gain

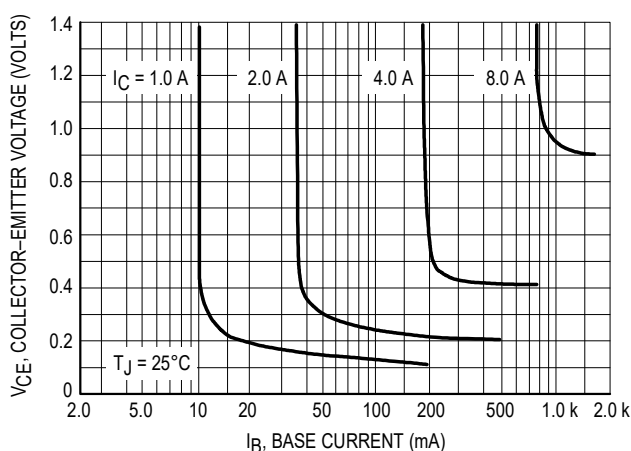
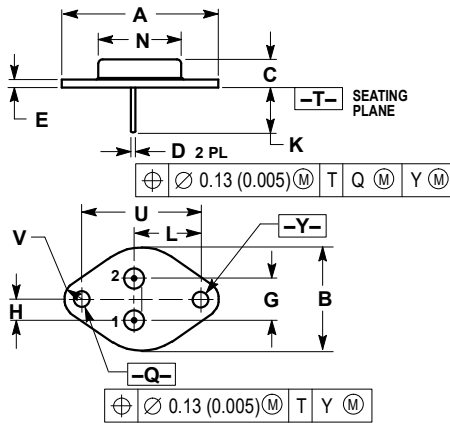


Figure 4. Collector-Saturation Region

PACKAGE DIMENSIONS



- 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  |

STYLE 1:  
 PIN 1: BASE  
 2: EMITTER  
 CASE: COLLECTOR

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

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