

## NPN HIGH POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/370

### Devices

2N3442

### Qualified Level

JAN  
JANTX  
JANTXV

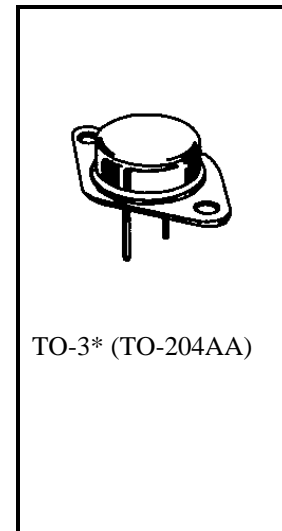
### MAXIMUM RATINGS

| Ratings  | Symbol         | Value                                       | Units              |   |
|--|----------------|---|--------------------|---|
| Collector-Emitter Voltage                      | $V_{CEO}$      | 140   | Vdc                |   |
| Collector-Base Voltage                         | $V_{CBO}$      | 160   | Vdc                |   |
| Collector-Emitter Voltage                      | $V_{CER}$      | 150   | Vdc                |   |
| Emitter-Base Voltage                           | $V_{EBO}$      | 7.0   | Vdc                |   |
| Base Current                                   | $I_B$          | 7.0   | Adc                |   |
| Collector Current                              | $I_C$          | 10  | Adc                |   |
| Total Power Dissipation                        | $P_T$          | @ $T_A = 25^{\circ}\text{C}$ <sup>(1)</sup> | 6.0                | W |
|  |                | @ $T_C = 25^{\circ}\text{C}$ <sup>(2)</sup> | 117                | W |
| Operating & Storage Junction Temperature Range | $T_J, T_{stg}$ | -55 to +200                                 | $^{\circ}\text{C}$ |   |

### THERMAL CHARACTERISTICS

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

- Derate linearly 34.2 mW/ $^{\circ}\text{C}$  for  $T_A > 25^{\circ}\text{C}$
- Derate linearly 668 mW/ $^{\circ}\text{C}$  for  $T_C > 25^{\circ}\text{C}$



\*See Appendix A for Package Outline

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

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

### OFF CHARACTERISTICS

|  |               |     |     |      |
|--|---------------|-----|-----|------|
| Collector-Emitter Voltage<br>$I_C = 3.0 \text{ Adc}$                                     | $V_{(BR)CEO}$ | 140 |     | Vdc  |
| Collector-Emitter Breakdown Voltage<br>$I_C = 1.5 \text{ Adc}, R_{BE} = 100 \Omega$      | $V_{(BR)CER}$ | 150 |     | Vdc  |
| Collector-Emitter Breakdown Voltage<br>$I_C = 1.5 \text{ Adc}, V_{EB} = 1.5 \text{ Vdc}$ | $V_{(BR)CEX}$ | 160 |     | Vdc  |
| Collector-Base Cutoff Current<br>$V_{CB} = 140 \text{ Vdc}, V_{EB} = 1.5 \text{ Vdc}$    | $I_{CEX}$     |     | 1.0 | mAdc |
| Emitter-Base Cutoff Current<br>$V_{EB} = 7.0 \text{ Vdc}$                                | $I_{EBO}$     |     | 1.0 | mAdc |

**ELECTRICAL CHARACTERISTICS (con't)**

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

**ON CHARACTERISTICS** <sup>(3)</sup>

|   |               |    |     |     |
|---|---------------|----|-----|-----|
| Forward-Current Transfer Ratio<br>$I_C = 3.0 \text{ Adc}, V_{CE} = 4.0 \text{ Vdc}$     | $h_{FE}$      | 20 | 70  |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 3.0 \text{ Adc}, I_B = 300 \text{ mAdc}$ | $V_{CE(sat)}$ |    | 1.0 | Vdc |
| Base-Emitter Voltage<br>$I_C = 3.0 \text{ Adc}, V_{CE} = 4.0 \text{ Vdc}$               | $V_{BE}$      |    | 1.7 | Vdc |

**DYNAMIC CHARACTERISTICS**

|   |            |     |  |  |
|---|------------|-----|--|--|
| Small-Signal Short-Circuit Forward Current Transfer Ratio<br>$I_C = 3.0 \text{ Adc}, V_{CE} = 4.0 \text{ Vdc}, f = 100 \text{ kHz}$ | $ h_{fe} $ | 1.0 |  |  |
|---|------------|-----|--|--|

**SAFE OPERATING AREA**

|   |
|---|
| <p><b>DC Tests</b><br/> <math>T_C = +25^{\circ}\text{C}</math>, 1 Cycle, <math>t = 1.0 \text{ s}</math></p> <p><b>Test 1</b><br/> <math>V_{CE} = 11.7 \text{ Vdc}, I_C = 10 \text{ Adc}</math></p> <p><b>Test 2</b><br/> <math>V_{CE} = 78 \text{ Vdc}, I_C = 1.5 \text{ Adc}</math></p> <p><b>Test 3</b><br/> <math>V_{CE} = 140 \text{ Vdc}, I_C = 0.5 \text{ Adc}</math></p> |
|---|

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