

## PNP HIGH POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/433

### Devices

2N4399

2N5745

### Qualified Level

JANTX  
JANTXV

### MAXIMUM RATINGS

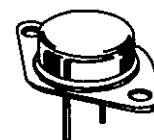
| Ratings                                        | Symbol                                                                                        | 2N4399      | 2N5745 | Unit               |
|------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------|--------|--------------------|
| Collector-Emitter Voltage                      | $V_{CEO}$                                                                                     | 60          | 80     | Vdc                |
| Collector-Base Voltage                         | $V_{CBO}$                                                                                     | 60          | 80     | Vdc                |
| Emitter-Base Voltage                           | $V_{EBO}$                                                                                     | 5.0         |        | Vdc                |
| Base Current                                   | $I_B$                                                                                         | 7.5         |        | Adc                |
| Collector Current                              | $I_C$                                                                                         | 30          | 20     | Adc                |
| Total Power Dissipation                        | @ $T_A = +25^{\circ}\text{C}$ <sup>(1)</sup><br>@ $T_C = +100^{\circ}\text{C}$ <sup>(2)</sup> | 5.0         |        | W                  |
|                                                |                                                                                               | 115         |        | 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 | $R_{\theta JC}$ | 0.875 | $^{\circ}\text{C/W}$ |
| Junction-to-Ambient                  | $R_{\theta JA}$ | 35    |                      |

1) Derate linearly @ 28.57 mW/ $^{\circ}\text{C}$  for  $T_A > +25^{\circ}\text{C}$

2) Derate linearly @ 1.15 W/ $^{\circ}\text{C}$  for  $T_C > +100^{\circ}\text{C}$



TO-3\*  
(TO-204AA)

\*See appendix A for package outline

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

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

### OFF CHARACTERISTICS

|                                                                                                                                                |                  |               |            |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|------------|-----------------|
| Collector-Emitter Breakdown Voltage<br>$I_C = 200 \text{ mAdc}$                                                                                | 2N4399<br>2N5745 | $V_{(BR)CEO}$ | 60<br>80   | Vdc             |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 60 \text{ Vdc}$<br>$V_{CE} = 80 \text{ Vdc}$                                                     | 2N4399<br>2N5745 | $I_{CEO}$     | 100<br>100 | $\mu\text{Adc}$ |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 60 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$<br>$V_{CE} = 80 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ | 2N4399<br>2N5745 | $I_{CEX}$     | 5.0<br>5.0 | $\mu\text{Adc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 5.0 \text{ Vdc}$                                                                                      |                  | $I_{EBO}$     | 5.0        | $\mu\text{Adc}$ |

**ELECTRICAL CHARACTERISTICS (con't)**

| Characteristics                                                                                                                                                                                                                                                                                                                                               | Symbol               | Min.                         | Max.                | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------|---------------------|------|
| <b>ON CHARACTERISTICS</b> <sup>(3)</sup>                                                                                                                                                                                                                                                                                                                      |                      |                              |                     |      |
| Forward-Current Transfer Ratio<br>I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 2.0 Vdc<br>I <sub>C</sub> = 15 Adc, V <sub>CE</sub> = 2.0 Vdc      2N4399<br>I <sub>C</sub> = 10 Adc, V <sub>CE</sub> = 2.0 Vdc      2N5745<br>I <sub>C</sub> = 30 Adc, V <sub>CE</sub> = 5.0 Vdc      2N4399<br>I <sub>C</sub> = 20 Adc, V <sub>CE</sub> = 5.0 Vdc      2N5745 | h <sub>FE</sub>      | 40<br>15<br>15<br>5.0<br>5.0 | 425<br>60<br>60     |      |
| Collector-Emitter Saturation Voltage<br>I <sub>C</sub> = 5.0 Adc, I <sub>B</sub> = 0.5 Adc<br>I <sub>C</sub> = 10 Adc, I <sub>B</sub> = 1.0 Adc      2N4399<br>I <sub>C</sub> = 10 Adc, I <sub>B</sub> = 1.0 Adc      2N5745                                                                                                                                  | V <sub>CE(sat)</sub> |                              | 0.55<br>0.75<br>1.0 | Vdc  |
| Base-Emitter Saturation Voltage<br>I <sub>C</sub> = 10 Adc, I <sub>B</sub> = 1.0 Adc<br>I <sub>C</sub> = 15 Adc, I <sub>B</sub> = 1.5 Adc      2N4399<br>I <sub>C</sub> = 15 Adc, I <sub>B</sub> = 1.5 Adc      2N5745                                                                                                                                        | V <sub>BE(sat)</sub> |                              | 1.7<br>1.8<br>2.0   | Vdc  |

**DYNAMIC CHARACTERISTICS**

|                                                                                                                                                          |                  |     |      |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----|------|----|
| Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio<br>I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 10 Vdc, f = 1.0 MHz | h <sub>fe</sub>  | 4.0 | 40   |    |
| Small-Signal Short-Circuit Forward Current Transfer Ratio<br>I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 10 Vdc, f = 1.0 MHz                             | h <sub>fe</sub>  | 40  | 425  |    |
| Output Capacitance<br>V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, 100 kHz ≤ f ≤ 1.0 MHz                                                                | C <sub>obo</sub> |     | 1000 | pF |

**SAFE OPERATING AREA**

|                                                                                                                                                     |  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| <b>DC Tests</b><br>T <sub>C</sub> = +25°C, 1 Cycle, t = 1.0 s                                                                                       |  |  |  |  |
| <b>Test 1</b><br>V <sub>CE</sub> = 6.67 Vdc, I <sub>C</sub> = 30 Adc      2N4399<br>V <sub>CE</sub> = 10 Vdc, I <sub>C</sub> = 20 Adc      2N5745   |  |  |  |  |
| <b>Test 2</b><br>V <sub>CE</sub> = 20 Vdc, I <sub>C</sub> = 10 Adc      All Types                                                                   |  |  |  |  |
| <b>Test 3</b><br>V <sub>CE</sub> = 40 Vdc, I <sub>C</sub> = 3.0 Adc      All Types                                                                  |  |  |  |  |
| <b>Test 4</b><br>V <sub>CE</sub> = 50 Vdc, I <sub>C</sub> = 600 mAdc      2N4399<br>V <sub>CE</sub> = 60 Vdc, I <sub>C</sub> = 600 mAdc      2N5745 |  |  |  |  |

(3) Pulse Test: Pulse Width = 300μs, Duty Cycle ≤ 2.0%.