

## NPN HIGH POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/408

### Devices

2N3715

2N3716

### Qualified Level

JAN  
JANTX  
JANTXV

### MAXIMUM RATINGS

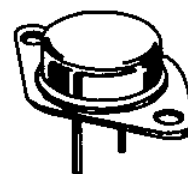
| Ratings                                                                                  | Symbol         | 2N3715      | 2N3716 | Units              |
|------------------------------------------------------------------------------------------|----------------|-------------|--------|--------------------|
| Collector-Emitter Voltage                                                                | $V_{CEO}$      | 60          | 80     | Vdc                |
| Collector-Base Voltage                                                                   | $V_{CBO}$      | 80          | 100    | Vdc                |
| Emitter-Base Voltage                                                                     | $V_{EBO}$      | 7.0         |        | Vdc                |
| Base Current                                                                             | $I_B$          | 4.0         |        | Adc                |
| Collector Current                                                                        | $I_C$          | 10          |        | Adc                |
| Total Power Dissipation<br>@ $T_A = 25^{\circ}\text{C}$<br>@ $T_C = 100^{\circ}\text{C}$ | $P_T$          | 5.0         |        | W                  |
|                                                                                          |                | 85.7        |        | W                  |
| Operating & Storage Junction Temperature Range                                           | $T_J, T_{stg}$ | -65 to +200 |        | $^{\circ}\text{C}$ |

### THERMAL CHARACTERISTICS

| Characteristics                      | Symbol          | Max. | Unit                 |
|--------------------------------------|-----------------|------|----------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.17 | $^{\circ}\text{C/W}$ |

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

2) Derate linearly 0.857 W/ $^{\circ}\text{C}$  for  $T_C > 100^{\circ}\text{C}$



TO-3\* (TO-204AA)

\*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 Breakdown Current<br>$I_C = 10 \text{ mAdc}$                                                                                 | 2N3715 | $V_{(BR)CEO}$ | 60  | Vdc             |
|                                                                                                                                                | 2N3716 |               | 80  |                 |
| Collector-Base Cutoff Current<br>$V_{CB} = 80 \text{ Vdc}$<br>$V_{CB} = 100 \text{ Vdc}$                                                       | 2N3715 | $I_{CBO}$     | 10  | $\mu\text{Adc}$ |
|                                                                                                                                                | 2N3716 |               | 10  |                 |
| Emitter-Base Breakdown Voltage<br>$V_{EB} = 7.0 \text{ Vdc}$                                                                                   |        | $I_{EBO}$     | 1.0 | mAdc            |
| Collector-Emitter Cutoff Current<br>$V_{BE} = 1.5 \text{ Vdc}, V_{CE} = 60 \text{ Vdc}$<br>$V_{BE} = 1.5 \text{ Vdc}, V_{CE} = 80 \text{ Vdc}$ | 2N3715 | $I_{CEX}$     | 1.0 | mAdc            |
|                                                                                                                                                | 2N3716 |               | 1.0 |                 |

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# 2N3715, 2N3716 JAN SERIES

## ELECTRICAL CHARACTERISTICS (con't)

| Characteristics                  | Symbol    | Min. | Max. | Unit |
|----------------------------------|-----------|------|------|------|
| Collector-Emitter Cutoff Current | $I_{CES}$ |      |      |      |
| $V_{CE} = 60 \text{ Vdc}$ 2N3715 |           |      | 1.0  | mAdc |
| $V_{CE} = 80 \text{ Vdc}$ 2N3716 |           |      | 1.0  |      |

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

|                                                                                                                                                                                                                                                   |               |     |     |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----|-----|-----|
| Forward-Current Transfer Ratio<br>$I_C = 1.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$<br>$I_C = 3.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$<br>$I_C = 5.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$<br>$I_C = 10 \text{ Adc}, V_{CE} = 4.0 \text{ Vdc}$ | $h_{FE}$      | 50  | 150 |     |
|                                                                                                                                                                                                                                                   |               | 30  | 120 |     |
|                                                                                                                                                                                                                                                   |               | 10  |     |     |
|                                                                                                                                                                                                                                                   |               | 5.0 |     |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 5.0 \text{ Adc}, I_B = 0.5 \text{ Adc}$<br>$I_C = 10 \text{ Adc}, I_B = 2.0 \text{ Adc}$                                                                                                           | $V_{CE(sat)}$ |     | 1.0 | Vdc |
|                                                                                                                                                                                                                                                   |               |     | 2.5 |     |
| Base-Emitter Saturation Voltage<br>$I_C = 5.0 \text{ Adc}, I_B = 0.5 \text{ Adc}$<br>$I_C = 10 \text{ Adc}, I_B = 2.0 \text{ Adc}$                                                                                                                | $V_{BE(sat)}$ |     | 1.5 |     |
|                                                                                                                                                                                                                                                   |               |     | 3.0 | Vdc |

## DYNAMIC CHARACTERISTICS

|                                                                                                                                                                                     |            |     |     |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|-----|----|
| Magnitude of Common Emitter Small-Signal Short Circuit<br>Forward Current Transfer Ratio<br>$I_C = 0.5 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 100 \text{ kHz} - 1.0 \text{ MHz}$ | $ h_{fe} $ | 4.0 | 20  |    |
| Forward Current Transfer Ratio<br>$I_C = 0.5 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ kHz}$                                                                             |            | 30  | 300 |    |
| Output Capacitance<br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$                                                                                                       | $C_{obo}$  |     | 500 | pF |

## SAFE OPERATING AREA

|                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| <b>DC Tests</b><br>$T_C = +25^\circ\text{C}$ , 1 Cycle, $t \geq 1.0 \text{ s}$<br><b>Test 1</b><br>$V_{CE} = 15 \text{ Vdc}, I_C = 10 \text{ Adc}$<br><b>Test 2</b><br>$V_{CE} = 40 \text{ Vdc}, I_C = 3.75 \text{ Adc}$<br><b>Test 3</b><br>$V_{CE} = 55 \text{ Vdc}, I_C = 0.9 \text{ Adc}$ 2N3715<br>$V_{CE} = 65 \text{ Vdc}, I_C = 0.9 \text{ Adc}$ 2N3716 |  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|

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

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