

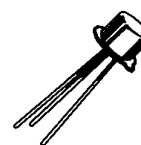
**NPN LOW POWER SILICON TRANSISTOR**
**Qualified per MIL-PRF-19500/253**
**Devices**
**2N930**
**Qualified Level**
**JAN  
JANTX  
JANTXV**
**MAXIMUM RATINGS**

| Ratings                                                                                               | Symbol         | Value       | Units              |
|-------------------------------------------------------------------------------------------------------|----------------|-------------|--------------------|
| Collector-Emitter Voltage                                                                             | $V_{CEO}$      | 45          | Vdc                |
| Collector-Base Voltage                                                                                | $V_{CBO}$      | 60          | Vdc                |
| Emitter-Base Voltage                                                                                  | $V_{EBO}$      | 6.0         | Vdc                |
| Collector Current                                                                                     | $I_C$          | 30          | mAdc               |
| Total Power Dissipation<br>@ $T_A = +25^{\circ}\text{C}^{(1)}$<br>@ $T_C = +25^{\circ}\text{C}^{(2)}$ | $P_T$          | 300<br>600  | mW                 |
| 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 | $R_{\theta JC}$ | 97   | $^{\circ}\text{C/W}$ |

1) Derate linearly 2.0 mW/ $^{\circ}\text{C}$  above  $T_A = +25^{\circ}\text{C}$ 

2) Derate linearly 4.0 mW/ $^{\circ}\text{C}$  above  $T_C = +25^{\circ}\text{C}$ 

**TO- 18\***  
**(TO-206AA)**

\*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 Voltage<br>$I_C = 10 \text{ mAdc}$                          | $V_{(BR)CEO}$ | 45 |           | Vdc                                 |
| Collector-Base Cutoff Current<br>$V_{CB} = 60 \text{ Vdc}$<br>$V_{CB} = 45 \text{ Vdc}$ | $I_{CBO}$     |    | 10<br>10  | $\mu\text{Adc}$<br>$\eta\text{Adc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 6.0 \text{ Vdc}$<br>$V_{EB} = 5.0 \text{ Vdc}$ | $I_{EBO}$     |    | 10<br>5.0 | $\mu\text{Adc}$<br>$\eta\text{Adc}$ |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 45 \text{ Vdc}$                           | $I_{CES}$     |    | 2.0       | $\eta\text{Adc}$                    |
| Collector-Base Cutoff Current<br>$V_{CE} = 5.0 \text{ Vdc}$                             | $I_{CEO}$     |    | 2.0       | $\eta\text{Adc}$                    |

**2N930, JAN SERIES**

**ELECTRICAL CHARACTERISTICS (con't)**

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

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

|                                                                                                                                                                                                           |               |            |            |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|------------|-----|
| Forward-Current Transfer Ratio<br>$I_C = 10 \mu\text{Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$<br>$I_C = 500 \mu\text{Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$<br>$I_C = 10 \text{ mAdc}$ , $V_{CE} = 5.0 \text{ Vdc}$ | $h_{FE}$      | 100<br>150 | 300<br>600 |     |
| Collector-Emitter Saturation Voltage<br>$I_C = 10 \text{ mAdc}$ , $I_B = 0.5 \text{ mAdc}$                                                                                                                | $V_{CE(sat)}$ |            | 1.0        | Vdc |
| Base-Emitter Saturation Voltage<br>$I_C = 10 \text{ mAdc}$ , $I_B = 0.5 \text{ mAdc}$                                                                                                                     | $V_{BE(sat)}$ | 0.6        | 1.0        | Vdc |

**DYNAMIC CHARACTERISTICS**

|                                                                                                                                                                                                 |            |     |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|-------------|-------------|
| Magnitude of Small-Signal Short-Circuit<br>Forward Current Transfer Ratio<br>$I_C = 500 \mu\text{Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $f = 30 \text{ MHz}$                                      | $ h_{fe} $ | 1.5 | 6.0         |             |
| Small-Signal Short-Circuit Forward Current Transfer Ratio<br>$I_C = 1.0 \text{ mAdc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $f = 1.0 \text{ kHz}$                                                      | $h_{fe}$   | 150 | 600         |             |
| Small-Signal Short-Circuit Input Impedance<br>$V_{CB} = 5.0 \text{ Vdc}$ , $I_E = 1.0 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$                                                                     | $h_{ib}$   | 25  | 32          | $\Omega$    |
| Small-Signal Short-Circuit Output Admittance<br>$V_{CB} = 5.0 \text{ Vdc}$ , $I_E = 1.0 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$                                                                   | $h_{ob}$   |     | 1.0         | $\mu\Omega$ |
| Output Capacitance<br>$V_{CB} = 5.0 \text{ Vdc}$ , $I_E = 0$ , $100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$                                                                                    | $C_{obo}$  |     | 8.0         | pF          |
| Noise Figure<br>$V_{CE} = 5 \text{ Vdc}$ ; $I_C = 10 \mu\text{Adc}$ ; $R_g = 10\text{k}\Omega$<br>Test 1: $f = 100 \text{ Hz}$<br>Test 2: $f = 1.0 \text{ kHz}$<br>Test 3: $f = 10 \text{ kHz}$ | NF         |     | 5<br>3<br>3 | dB          |

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