

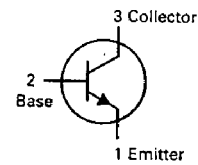
# **MAXIMUM RATINGS**

| Rating                                                                                 | Symbol         | 2N718A<br>2N956 | 2N1711       | Unit                          |
|----------------------------------------------------------------------------------------|----------------|-----------------|--------------|-------------------------------|
| Collector-Emitter Voltage                                                              | $V_{CE}$       | 50              |              | Vdc                           |
| Collector-Base Voltage                                                                 | $V_{CB}$       | 75              |              | Vdc                           |
| Emitter-Base Voltage                                                                   | $V_{EB}$       | 7.0             |              | Vdc                           |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 500<br>2.86     | 800<br>4.57  | mW<br>mW/ $^\circ\text{C}$    |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.8<br>10.3     | 3.0<br>17.15 | Watts<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                    | $T_J, T_{stg}$ | -65 to +200     |              | $^\circ\text{C}$              |

# **THERMAL CHARACTERISTICS**

| Characteristic                          | Symbol          | 2N718A<br>2N956 | 2N1711 | Unit               |
|-----------------------------------------|-----------------|-----------------|--------|--------------------|
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 350             | 58     | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case    | $R_{\theta JC}$ | 97              | 219    | $^\circ\text{C/W}$ |

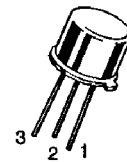
# **2N718A 2N956** CASE 22-03, STYLE 1 TO-18 (TO-206AA)



# **2N1711** CASE 79-04, STYLE 1 TO-39 (TO-205AD)

# **GENERAL PURPOSE TRANSISTORS**

**NPN SILICON**



Refer to 2N3019 for graphs.

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

| Characteristic                                                                                                                                 | Symbol        | Min    | Typ        | Max            | Unit            |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|------------|----------------|-----------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                     |               |        |            |                |                 |
| Collector-Emitter Breakdown Voltage<br>( $I_C = 100 \text{ mAdc}$ , pulsed; $R_{BE} \leq 10 \text{ ohms}$ )(1)                                 | $V_{CE(sus)}$ | 50     | —          | —              | Vdc             |
| Collector-Base Breakdown Voltage<br>( $I_C = 100 \text{ } \mu\text{Adc}$ , $I_E = 0$ )                                                         | $V_{(BR)CBO}$ | 75     | —          | —              | Vdc             |
| Emitter-Base Breakdown Voltage<br>( $I_E = 100 \text{ } \mu\text{Adc}$ , $I_C = 0$ )                                                           | $V_{(BR)EBO}$ | 7.0    | —          | —              | Vdc             |
| Collector Cutoff Current<br>( $V_{CB} = 60 \text{ Vdc}$ , $I_E = 0$ )<br>( $V_{CB} = 60 \text{ Vdc}$ , $I_E = 0$ , $T_A = 150^\circ\text{C}$ ) | $I_{CBO}$     | —<br>— | 0.001<br>— | 0.01<br>10     | $\mu\text{Adc}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0 \text{ Vdc}$ , $I_C = 0$ )                                                                           | $I_{EBO}$     | —<br>— | —<br>—     | 0.010<br>0.005 | $\mu\text{Adc}$ |

# **ON CHARACTERISTICS**

|                                                                                                   |                          |               |           |        |            |     |
|---------------------------------------------------------------------------------------------------|--------------------------|---------------|-----------|--------|------------|-----|
| DC Current Gain<br>( $I_C = 0.01 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ )                      | 2N956, 2N1711            | $h_{FE}$      | 20        | —      | —          | —   |
| ( $I_C = 0.1 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ )                                          | 2N718A,<br>2N956, 2N1711 |               | 20<br>35  | —<br>— | —<br>—     |     |
| ( $I_C = 10 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ )                                           | 2N718A,<br>2N956, 2N1711 |               | 35<br>75  | —<br>— | —<br>—     |     |
| ( $I_C = 10 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ , $T_A = -55^\circ\text{C}$ )               | 2N718A,<br>2N956, 2N1711 |               | 20<br>35  | —<br>— | —<br>—     |     |
| ( $I_C = 150 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ )(1)                                       | 2N718A,<br>2N956, 2N1711 |               | 40<br>100 | —<br>— | 120<br>300 |     |
| ( $I_C = 500 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ )(1)                                       | 2N718A,<br>2N956, 2N1711 |               | 20<br>40  | —<br>— | —<br>—     |     |
| Collector-Emitter Saturation Voltage(1)<br>( $I_C = 150 \text{ mAdc}$ , $I_B = 15 \text{ mAdc}$ ) |                          | $V_{CE(sat)}$ | —         | 0.24   | 1.5        | Vdc |
| Base-Emitter Saturation Voltage(1)<br>( $I_C = 150 \text{ mAdc}$ , $I_B = 15 \text{ mAdc}$ )      |                          | $V_{BE(sat)}$ | —         | 1.0    | 1.3        | Vdc |

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

## 2N718A, 2N956, 2N1711

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

| Characteristic                                                                                                                                                                                   | Symbol    | Min          | Typ        | Max        | Unit             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------------|------------|------------|------------------|
| <b>SMALL-SIGNAL CHARACTERISTICS</b>                                                                                                                                                              |           |              |            |            |                  |
| Current-Gain — Bandwidth Product<br>( $I_C = 50\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )                                                                                  | $f_T$     | 60<br>70     | 300<br>300 | —          | MHz              |
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1\text{ MHz}$ )                                                                                                              | $C_{obo}$ | —            | 4.0        | 25         | pF               |
| Input Capacitance<br>( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1\text{ MHz}$ )                                                                                                              | $C_{ibo}$ | —            | 20         | 80         | pF               |
| Input Impedance<br>( $I_C = 1.0\text{ mAdc}$ , $V_{CB} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )<br>( $I_C = 5.0\text{ mAdc}$ , $V_{CB} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )               | $h_{ib}$  | 24<br>4.0    | —<br>—     | 34<br>8.0  | ohms             |
| Voltage Feedback Ratio<br>( $I_C = 1.0\text{ mAdc}$ , $V_{CB} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )<br><br>( $I_C = 5.0\text{ mAdc}$ , $V_{CB} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )    | $h_{rb}$  | —<br>—       | —<br>—     | 3.0<br>5.0 | $\times 10^{-4}$ |
| Small-Signal Current Gain<br>( $I_C = 1.0\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )<br><br>( $I_C = 5.0\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ ) | $h_{fe}$  | 30<br>50     | —<br>—     | 100<br>200 | —                |
| Output Admittance<br>( $I_C = 1.0\text{ mAdc}$ , $V_{CB} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )<br>( $I_C = 5.0\text{ mAdc}$ , $V_{CB} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )             | $h_{ob}$  | 0.05<br>0.05 | —<br>—     | 0.5<br>0.5 | $\mu\text{mhos}$ |
| Noise Figure<br>( $I_C = 300\text{ }\mu\text{A}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )                                                                                             | NF        | —<br>—       | —<br>—     | 12<br>8.0  | dB               |