


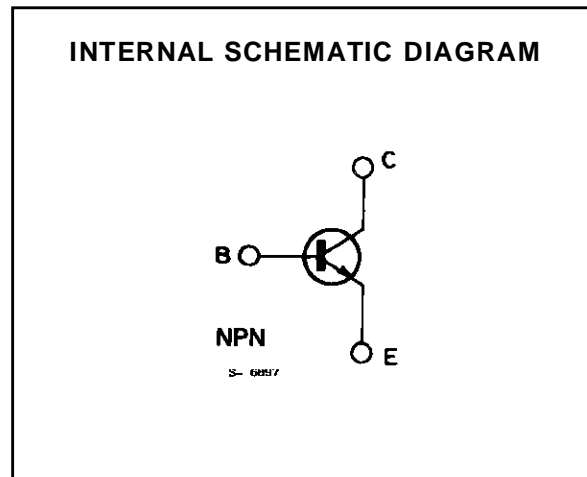
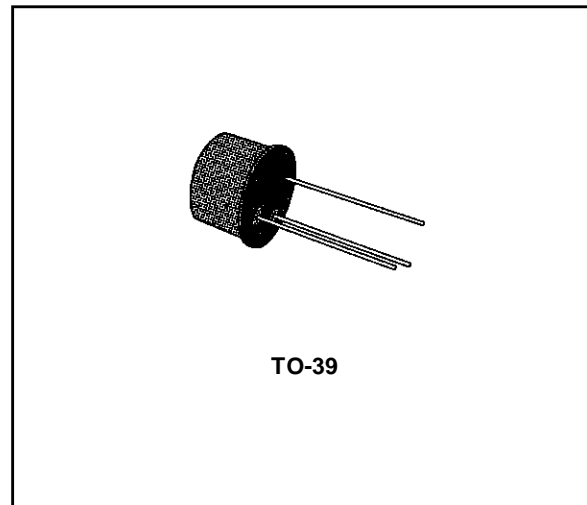
SWITCHES AND UNIVERSAL AMPLIFIERS

DESCRIPTION

The 2N1613 and 2N1711 are silicon planar epitaxial NPN transistors in Jedec TO-39 metal case. They are designed for use in high-performance amplifier, oscillator and switching circuits.

The 2N1711 is also used to advantage in amplifiers where low noise is an important factor.

 Products approved to CECC 50002-104 available on request.



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|----------------|---|-------------|------------------|
| V_{CBO} | Collector-base Voltage ($I_E = 0$) | 75 | V |
| V_{CER} | Collector-emitter Voltage ($R_{BE} \leq 10 \Omega$) | 50 | V |
| V_{EBO} | Emitter-base Voltage ($I_C = 0$) | 7 | V |
| I_C | Collector Current | 500 | mA |
| P_{tot} | Total Power Dissipation at $T_{amb} \leq 25 \text{ }^\circ\text{C}$ | 0.8 | W |
| | at $T_{case} \leq 25 \text{ }^\circ\text{C}$ | 3 | W |
| | at $T_{case} \leq 100 \text{ }^\circ\text{C}$ | 1.7 | W |
| T_{stg}, T_j | Storage and Junction Temperature | - 65 to 200 | $^\circ\text{C}$ |

2N1613-2N1711

THERMAL DATA

| | | | | |
|------------------|-------------------------------------|-----|-----|------|
| $R_{th\ j-case}$ | Thermal Resistance Junction-case | Max | 58 | °C/W |
| $R_{th\ j-amb}$ | Thermal Resistance Junction-ambient | Max | 219 | °C/W |

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ °C}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit | |
|-------------------|---|--|----------|-----------|---------|------------|----|
| I_{CBO} | Collector Cutoff Current ($I_E = 0$) | $V_{CB} = 60\text{ V}$ | | | 10 | nA | |
| | | $V_{CB} = 60\text{ V}$ $T_{amb} = 150\text{ °C}$ | | | 10 | μA | |
| I_{EBO} | Emitter Cutoff Current ($I_C = 0$) | $V_{EB} = 5\text{ V}$ for 2N1613 for 2N1711 | | | 10 5 | nA nA | |
| $V_{(BR)\ CBO}$ | Collector-base Breakdown Voltage | $I_C = 0.1\text{ mA}$ | 75 | | | V | |
| $V_{(BR)\ CER}^*$ | Collector-emitter Breakdown Voltage ($R_{BE} \leq 10\ \Omega$) | $I_C = 10\text{ mA}$ | 50 | | | V | |
| $V_{(BR)\ EBO}$ | Emitter-base Breakdown Voltage ($I_C = 0$) | $I_E = 0.1\text{ mA}$ | 7 | | | V | |
| $V_{CE(sat)}^*$ | Collector-emitter Saturation Voltage | $I_C = 150\text{ mA}$ $I_B = 15\text{ mA}$ | | 0.5 | 1.5 | V | |
| $V_{BE(sat)}^*$ | Base-emitter Saturation Voltage | $I_C = 150\text{ mA}$ $I_B = 15\text{ mA}$ | | 0.95 | 1.3 | V | |
| h_{FE}^* | DC Current Gain | for 2N1613 | | | | | |
| | | $I_C = 0.01\text{ mA}$ $V_{CE} = 10\text{ V}$ | | 35 | | | |
| | | $I_C = 0.1\text{ mA}$ $V_{CE} = 10\text{ V}$ | 20 | 50 | | | |
| | | $I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ | 35 | 80 | | | |
| | | $I_C = 150\text{ mA}$ $V_{CE} = 10\text{ V}$ | 40 | 80 | 120 | | |
| | | $I_C = 500\text{ mA}$ $V_{CE} = 10\text{ V}$ | 20 | 55 | | | |
| | | $I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ | | | | | |
| | | $T_{amb} = -55\text{ °C}$ | 20 | 35 | | | |
| h_{FE}^* | DC Current Gain | for 2N1711 | | | | | |
| | | $I_C = 0.01\text{ mA}$ $V_{CE} = 10\text{ V}$ | 20 | 60 | | | |
| | | $I_C = 0.1\text{ mA}$ $V_{CE} = 10\text{ V}$ | 35 | 80 | | | |
| | | $I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ | | 130 | | | |
| | | $I_C = 150\text{ mA}$ $V_{CE} = 10\text{ V}$ | | 130 | 300 | | |
| | | $I_C = 500\text{ mA}$ $V_{CE} = 10\text{ V}$ | | 75 | | | |
| | | $I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ | | | | | |
| | | $T_{amb} = 55\text{ °C}$ | | 65 | | | |
| h_{fe} | Small Signal Current Gain | for 2N1613 | | | | | |
| | | $I_C = 1\text{ mA}$ $V_{CE} = 10\text{ V}$ $f = 1\text{ kHz}$ | 30 | 70 | 150 | | |
| | | for 2N1711 | | | | | |
| | | $I_C = 1\text{ mA}$ $V_{CE} = 10\text{ V}$ $f = 1\text{ kHz}$ | 70 | 135 | 300 | | |
| f_t | Transition Frequency | $I_C = 50\text{ mA}$ $V_{CE} = 10\text{ V}$ | | | | | |
| | | $f = 20\text{ MHz}$ for 2N1613 for 2N1711 | 60 70 | 80 100 | | MHz MHz | |
| C_{EBO} | Emitter-base Capacitance | $I_C = 0$ $V_{EB} = 0.5\text{ V}$ $f = 1\text{ MHz}$ | | | 50 | 80 | pF |
| C_{CBO} | Collector-base Capacitance | $I_E = 0$ $V_{CB} = 10\text{ V}$ $f = 1\text{ MHz}$ | | | 18 | 25 | pF |

* Pulsed : pulse duration = 300 μs, duty cycle = 1 %.

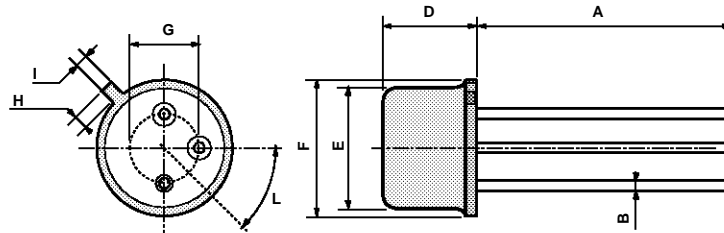
ELECTRICAL CHARACTERISTICS (continued)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------|-----------------------|--|------|--|---------|--------------------------------|
| NF | Noise Figure | $I_C = 0.3 \text{ mA}$ $R_g = 510 \Omega$ | | | | |
| | | $V_{CE} = 10 \text{ V}$ $f = 1 \text{ kHz}$ for 2N1613 for 2N1711 | | 6 3.5 | 12 8 | dB dB |
| h_{ie} | Input Impedance | $I_C = 1 \text{ mA}$ $f = 1 \text{ kHz}$ | | | | |
| | | $V_{CE} = 5 \text{ V}$ for 2N1613 for 2N1711 | | 2.2 4.4 | | k Ω k Ω |
| h_{re} | Reverse Voltage Ratio | $I_C = 1 \text{ mA}$ $f = 1 \text{ kHz}$ | | | | |
| | | $V_{CE} = 5 \text{ V}$ for 2N1613 for 2N1711 | | 3.6×10^{-4} 7.3×10^{-4} | | |
| h_{oe} | Output Admittance | $I_C = 1 \text{ mA}$ $f = 1 \text{ kHz}$ | | | | |
| | | $V_{CE} = 5 \text{ V}$ for 2N1613 for 2N1711 | | 12.5 23.8 | | μS μS |

* Pulsed : pulse duration = 300 μs , duty cycle = 1 %.

TO39 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------------|------|------|-------|------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 12.7 | | | 0.500 | | |
| B | | | 0.49 | | | 0.019 |
| D | | | 6.6 | | | 0.260 |
| E | | | 8.5 | | | 0.334 |
| F | | | 9.4 | | | 0.370 |
| G | 5.08 | | | 0.200 | | |
| H | | | 1.2 | | | 0.047 |
| I | | | 0.9 | | | 0.035 |
| L | 45° (typ.) | | | | | |



P008B

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands -
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A