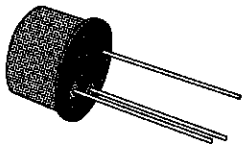
SGS-THOMSON MICROELECTRONICS

# 2N3019
# 2N3020

## HIGH CURRENT, HIGH FREQUENCY AMPLIFIERS

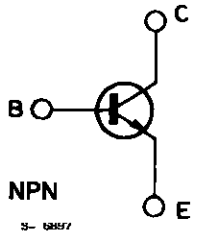
### DESCRIPTION

The 2N3019 and 2N3020 are silicon planar epitaxial NPN transistors in Jedec TO-39 metal case, designed for high-current, high-frequency amplifier applications. They feature high gain and low saturation voltages.



**TO-39**

**INTERNAL SCHEMATIC DIAGRAM**




### ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-base Voltage ($I_E$ = 0) | 140 | V |
| $V_{CEO}$ | Collector-emitter Voltage ($I_B$ = 0) | 80 | V |
| $V_{EBO}$ | Emitter-base Voltage ($I_C$ = 0) | 7 | V |
| $I_C$ | Collector Current | 1 | mA |
| $P_{tot}$ | Total Power Dissipation at $T_{amb} \leq 25$ °C<br>at $T_{case} \leq 25$ °C | 0.8<br>5 | W<br>W |
| $T_{stg}$, $T_j$ | Storage and Junction Temperature | – 65 to 200 | °C |

## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{th\ j\text{-}case}$ | Thermal Resistance Junction-case | Max | 35 | °C/W |
| $R_{th\ j\text{-}amb}$ | Thermal Resistance Junction-ambient | Max | 219 | °C/W |

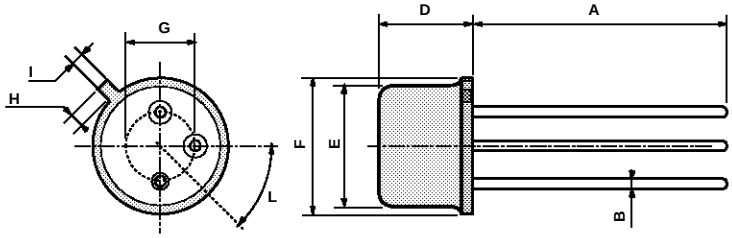
## ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25 °C unless otherwise specified)

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_{CBO}$ | Collector Cutoff Current ($I_E$ = 0) | $V_{CB}$ = 90 V<br>$V_{CB}$ = 90 V | <br>$T_{amb}$ = 150 °C | | | 10<br>10 | nA<br>µA |
| $I_{EBO}$ | Emitter Cutoff Current ($I_C$ = 0) | $V_{EB}$ = 5 V | | | | 10 | nA |
| $V_{(BR)CBO}$ | Collector-base Breakdown Voltage ($I_E$ = 0) | $I_C$ = 100 µA | | 140 | | | V |
| $V_{(BR)CEO}$* | Collector-emitter Breakdown Voltage ($I_B$ = 0) | $I_C$ = 10 mA | | 80 | | | V |
| $V_{(BR)EBO}$ | Emitter-base Breakdown Voltage ($I_C$ = 0) | $I_E$ = 100 µA | | 7 | | | V |
| $V_{CE(sat)}$* | Collector-emitter Saturation Voltage | $I_C$ = 150 mA<br>$I_C$ = 500 mA | $I_B$ = 15 mA<br>$I_B$ = 50 mA | | | 0.2<br>0.5 | V<br>V |
| $V_{BE(sat)}$* | Base-emitter Saturation Voltage | $I_C$ = 150 mA | $I_B$ = 15 mA | | | 1.1 | V |
| $h_{FE}$* | DC Current Gain | $I_C$ = 0.1 mA | $V_{CE}$ = 10 V | | | | |
| | | | For **2N3019** | 50 | | | |
| | | | For **2N3020** | 30 | | 100 | |
| | | $I_C$ = 10 mA | $V_{CE}$ = 10 V | | | | |
| | | | For **2N3019** | 90 | | | |
| | | | For **2N3020** | 40 | | 120 | |
| | | $I_C$ = 150 mA | $V_{CE}$ = 10 V | | | | |
| | | | For **2N3019** | 100 | | 300 | |
| | | | For **2N3020** | 40 | | 120 | |
| | | $I_C$ = 500 mA | $V_{CE}$ = 10 V | | | | |
| | | | For **2N3019** | 50 | | | |
| | | | For **2N3020** | 30 | | 100 | |
| | | $I_C$ = 1 A | $V_{CE}$ = 10 V | 15 | | | |
| | | $I_C$ = 150 mA<br>$T_{amb}$ = – 55 °C | $V_{CE}$ = 10 V | | | | |
| | | | For **2N3019** | 40 | | | |
| $h_{fe}$ | Small Signal Current Gain | $I_C$ = 1 mA<br>f = 1 kHz | $V_{CE}$ = 5 V | | | | |
| | | | For **2N3019** | 80 | | 400 | |
| | | | For **2N3020** | 30 | | 200 | |
| $f_T$ | Transition Frequency | $I_C$ = 50 mA<br>f = 20 MHz | $V_{CE}$ = 10 V | | | | |
| | | | For **2N3019** | 100 | | | MHz |
| | | | For **2N3020** | 80 | | | MHz |
| $C_{EBO}$ | Emitter-base Capacitance | $I_C$ = 0<br>f = 1 MHz | $V_{EB}$ = 0.5 V | | | 60 | pF |
| $C_{CBO}$ | Collector-base Capacitance | $I_E$ = 0<br>f = 1 MHz | $V_{CB}$ = 10 V | | | 12 | pF |
| NF | Noise Figure for (**2N3019**) only | $I_C$ = 100 µA<br>f = 1 kHz | $V_{CE}$ = 10 V<br>$R_g$ = 1 KΩ | | | 4 | dB |
| $r_{bb'}C_{b'c}$ | Feedback Time Constant | $I_C$ = 10 mA<br>f = 4 MHz | $V_{CE}$ = 10 V | | | 400 | ps |

* 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 | $45^{o}$ (typ.) | | | | | |

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