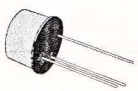
SGS-THOMSON
MICROELECTRONICS

# 2N930

## LOW-LEVEL, LOW-NOISE AMPLIFIERS

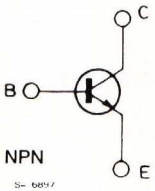
### DESCRIPTION

The 2N930 is a silicon planar epitaxial NPN transistor in Jedec TO-18 metal case, designed for use in high performance, low-level, low-noise amplifier applications.



TO-18

### INTERNAL SCHEMATIC DIAGRAM




### ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-base Voltage ($I_E$ = 0) | 45 | V |
| $V_{CEO}$ | Collector–emitter Voltage ($I_B$ = 0) | 45 | V |
| $V_{EBO}$ | Emitter–base Voltage ($I_C$ = 0) | 5 | V |
| $I_C$ | Collector Current | 30 | mA |
| $P_{tot}$ | Total Power Dissipation at $T_{amb}$ = 25 °C<br>at $T_{case}$ = 25 °C | 0.3<br>0.6 | W<br>W |
| $T_{stg}$, $T_j$ | Storage and Junction Temperature | – 55 to 200 | °C |

## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{th\ j\text{-}case}$ | Thermal Resistance Junction-case | Max | 292 | °C/W |
| $R_{th\ j\text{-}amb}$ | Thermal Resistance Junction-ambient | Max | 583 | °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) | $V_{CB}$ = 45 V | | | 10 | nA |
| $I_{CES}$ | Collector Cutoff Current ($V_{BE}$ = 0) | $V_{CE}$ = 45 V<br>$V_{CE}$ = 45 V $T_{amb}$ = 150 °C | | | 10<br>10 | nA<br>µA |
| $I_{CEO}$ | Collector Cutoff Current ($I_B$ = 0) | $V_{CE}$ = 5 V | | | 2 | nA |
| $I_{EBO}$ | Emitter Cutoff Current ($I_C$ = 0) | $V_{EB}$ = 5 V | | | 10 | nA |
| $V_{(BR)CEO}$* | Collector–emitter Breakdown Voltage ($I_B$ = 0) | $I_C$ = 10 mA | 45 | | | V |
| $V_{(BR)EBO}$ | Emitter–base Breakdown Voltage ($I_C$ = 0) | $I_E$ = 10 nA | 5 | | | V |
| $V_{CE(sat)}$* | Collector–emitter Sustaining Voltage | $I_C$ = 10 mA $I_B$ = 0.5 mA | | | 1 | V |
| $V_{BE}$* | Base–emitter Voltage | $I_C$ = 10 mA $I_B$ = 0.5 mA | 0.6 | | 1 | V |
| $h_{FE}$* | DC Current Gain | $I_C$ = 10 µA $V_{CE}$ = 5 V<br>$I_C$ = 0.5 mA $V_{CE}$ = 5 V<br>$I_C$ = 10 mA $V_{CE}$ = 5 V<br>$I_C$ = 10 µA $V_{CE}$ = 5 V<br>$T_{amb}$ = – 55 °C | 100<br>150<br><br><br>20 | | 300<br><br>600<br><br> | –<br>–<br>–<br><br>– |
| $h_{fe}$ | Small Signal Current Gain | $I_C$ = 1 mA $V_{CE}$ = 5 V<br>f = 1 kHz | <br>150 | | <br>600 | <br>– |
| $f_T$ | Transition Frequency | $I_C$ = 0.5 mA $V_{CE}$ = 5 V<br>f = 30 MHz | <br>30 | | | <br>MHz |
| $C_{CBO}$ | Collector–base Capacitance | $I_E$ = 0 $V_{CB}$ = 5 V<br>f = 1 MHz | | | <br>8 | <br>pF |
| NF | Noise Figure | $I_C$ = 10 µA $V_{CE}$ = 5 V<br>f = 1 kHz $R_g$ = 10 kΩ | | | <br>3 | <br>dB |

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