

2N4104

NPN SILICON TRANSISTOR



TO-18 CASE



[www.centrasemi.com](http://www.centrasemi.com)

DESCRIPTION:

The CENTRAL SEMICONDUCTOR 2N4104 type is an NPN silicon transistor designed for Low-Noise amplifier applications.

MARKING: FULL PART NUMBER

MAXIMUM RATINGS: ( $T_A=25^{\circ}\text{C}$ )

Collector-Base Voltage  
Collector-Emitter Voltage  
Emitter-Base Voltage  
Continuous Collector Current  
Power Dissipation  
Operating and Storage Junction Temperature

SYMBOL

$V_{CBO}$

$V_{CEO}$

$V_{EBO}$

$I_C$

$P_D$

$T_J, T_{stg}$

60

60

7.5

50

300

-65 to +200

UNITS

V

V

V

mA

mW

$^{\circ}\text{C}$

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

| SYMBOL        | TEST CONDITIONS                                        | MIN | MAX                | UNITS         |
|---------------|--------------------------------------------------------|-----|--------------------|---------------|
| $I_{CBO}$     | $V_{CB}=45\text{V}, I_E=0$                             |     | 10                 | nA            |
| $I_{CBO}$     | $V_{CB}=45\text{V}, I_E=0, T_A=150^{\circ}\text{C}$    |     | 10                 | $\mu\text{A}$ |
| $I_{EBO}$     | $V_{EB}=5.0\text{V}, I_C=0$                            |     | 10                 | nA            |
| $BV_{CBO}$    | $I_C=10\mu\text{A}, I_E=0$                             | 60  |                    | V             |
| $BV_{CEO}$    | $I_C=10\text{mA}, I_B=0$                               | 60  |                    | V             |
| $BV_{EBO}$    | $I_E=10\mu\text{A}, I_C=0$                             | 7.5 |                    | V             |
| $V_{CE(SAT)}$ | $I_C=1.0\text{mA}, I_B=100\mu\text{A}$                 |     | 0.3                | V             |
| $V_{BE(ON)}$  | $V_{CE}=5.0\text{V}, I_C=100\mu\text{A}$               |     | 0.7                | V             |
| $h_{FE}$      | $V_{CE}=5.0\text{V}, I_C=1.0\mu\text{A}$               | 150 |                    |               |
| $h_{FE}$      | $V_{CE}=5.0\text{V}, I_C=10\mu\text{A}$                | 400 | 800                |               |
| $h_{FE}$      | $V_{CE}=5.0\text{V}, I_C=100\mu\text{A}$               | 450 |                    |               |
| $h_{FE}$      | $V_{CE}=5.0\text{V}, I_C=1.0\text{mA}$                 | 500 |                    |               |
| $h_{ie}$      | $V_{CE}=5.0\text{V}, I_C=1.0\text{mA}, f=1\text{kHz}$  | 12  | 42                 | k $\Omega$    |
| $h_{fe}$      | $V_{CE}=5.0\text{V}, I_C=1.0\text{mA}, f=1\text{kHz}$  | 500 | 1400               |               |
| $h_{re}$      | $V_{CE}=5.0\text{V}, I_C=1.0\text{mA}, f=1\text{kHz}$  |     | $8 \times 10^{-4}$ |               |
| $h_{oe}$      | $V_{CE}=5.0\text{V}, I_C=1.0\text{mA}, f=1\text{kHz}$  | 8.0 | 60                 | umhos         |
| $f_T$         | $V_{CE}=5.0\text{V}, I_C=0.5\text{mA}, f=30\text{MHz}$ | 90  | 540                | MHz           |
| $C_{ob}$      | $V_{CB}=5.0\text{V}, I_E=0, f=1.0\text{MHz}$           |     | 4.5                | pF            |
| $C_{ib}$      | $V_{EB}=0.5\text{V}, I_C=0, f=1.0\text{MHz}$           |     | 6.0                | pF            |

2N4104

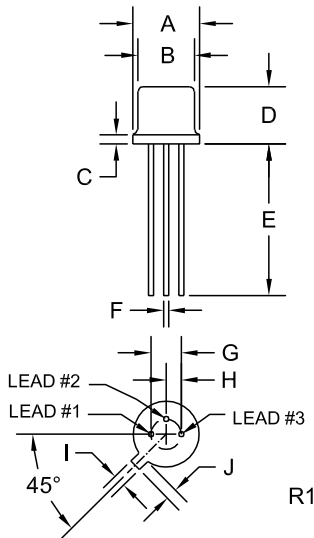
NPN SILICON TRANSISTOR



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

| SYMBOL | TEST CONDITIONS                                                                           | MIN | MAX | UNITS |
|--------|-------------------------------------------------------------------------------------------|-----|-----|-------|
| NF     | $V_{CE}=5.0\text{V}$ , $I_C=30\mu\text{A}$ , $f=10\text{Hz}$ ,<br>$R_G=10\text{k}\Omega$  |     | 15  | dB    |
| NF     | $V_{CE}=5.0\text{V}$ , $I_C=30\mu\text{A}$ , $f=100\text{Hz}$ ,<br>$R_G=10\text{k}\Omega$ |     | 4.0 | dB    |
| NF     | $V_{CE}=5.0\text{V}$ , $I_C=5\mu\text{A}$ , $f=1\text{kHz}$ ,<br>$R_G=50\text{k}\Omega$   |     | 1.0 | dB    |
| NF     | $V_{CE}=5.0\text{V}$ , $I_C=5\mu\text{A}$ , $f=10\text{kHz}$ ,<br>$R_G=50\text{k}\Omega$  |     | 1.0 | dB    |

**TO-18 CASE - MECHANICAL OUTLINE**



| DIMENSIONS |        |       |             |      |
|------------|--------|-------|-------------|------|
| SYMBOL     | INCHES |       | MILLIMETERS |      |
|            | MIN    | MAX   | MIN         | MAX  |
| A (DIA)    | 0.209  | 0.230 | 5.31        | 5.84 |
| B (DIA)    | 0.178  | 0.195 | 4.52        | 4.95 |
| C          | -      | 0.030 | -           | 0.76 |
| D          | 0.170  | 0.210 | 4.32        | 5.33 |
| E          | 0.500  | -     | 12.70       | -    |
| F (DIA)    | 0.016  | 0.019 | 0.41        | 0.48 |
| G (DIA)    | 0.100  |       | 2.54        |      |
| H          | 0.050  |       | 1.27        |      |
| I          | 0.036  | 0.046 | 0.91        | 1.17 |
| J          | 0.028  | 0.048 | 0.71        | 1.22 |

TO-18 (REV: R1)

**LEAD CODE:**

- 1) Emitter
- 2) Base
- 3) Collector

**MARKING:**

**FULL PART NUMBER**

## OUTSTANDING SUPPORT AND SUPERIOR SERVICES



---

### PRODUCT SUPPORT

Central's operations team provides the highest level of support to insure product is delivered on-time.

- Supply management (Customer portals)
- Inventory bonding
- Consolidated shipping options
- Custom bar coding for shipments
- Custom product packing

---

### DESIGNER SUPPORT/SERVICES

Central's applications engineering team is ready to discuss your design challenges. Just ask.

- Free quick ship samples (2<sup>nd</sup> day air)
- Online technical data and parametric search
- SPICE models
- Custom electrical curves
- Environmental regulation compliance
- Customer specific screening
- Up-screening capabilities
- Special wafer diffusions
- PbSn plating options
- Package details
- Application notes
- Application and design sample kits
- Custom product and package development

---

### REQUESTING PRODUCT PLATING

1. If requesting Tin/Lead plated devices, add the suffix "TIN/LEAD" to the part number when ordering (example: 2N2222A TIN/LEAD).
2. If requesting Lead (Pb) Free plated devices, add the suffix "PBFREE" to the part number when ordering (example: 2N2222A PBFREE).

---

### CONTACT US

#### Corporate Headquarters & Customer Support Team

Central Semiconductor Corp.  
145 Adams Avenue  
Hauppauge, NY 11788 USA  
Main Tel: (631) 435-1110  
Main Fax: (631) 435-1824  
Support Team Fax: (631) 435-3388  
[www.centrasemi.com](http://www.centrasemi.com)

**Worldwide Field Representatives:**  
[www.centrasemi.com/wwreps](http://www.centrasemi.com/wwreps)

**Worldwide Distributors:**  
[www.centrasemi.com/wwdistributors](http://www.centrasemi.com/wwdistributors)

---

For the latest version of Central Semiconductor's **LIMITATIONS AND DAMAGES DISCLAIMER**, which is part of Central's Standard Terms and Conditions of sale, visit: [www.centrasemi.com/terms](http://www.centrasemi.com/terms)