# 2N5109

Silicon NPN Transistor

*Data Sheet*

## Description

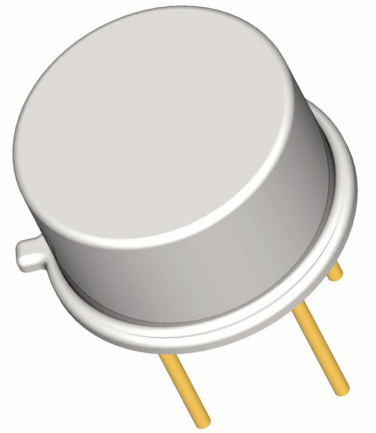
Semicoa Semiconductors offers:

- Screening and processing per MIL-PRF-19500 Appendix E
- JAN level (2N5109J)
- JANTX level (2N5109JX)
- JANTXV level (2N5109JV)
- JANS level (2N5109JS)
- QCI to the applicable level
- 100% die visual inspection per MIL-STD-750 method 2072 for JANTXV and JANS
- Radiation testing (total dose) upon request

Please contact Semicoa for special configurations
www.***SEMICOA***.com or (714) 979-1900

## Applications

- General purpose
- VHF-UHF amplifier transistor
- NPN silicon transistor



## Features

- Hermetically sealed TO-39 metal can
- Also available in chip configuration
- Chip geometry 1009
- Reference document: MIL-PRF-19500/453

## Benefits

- Qualification Levels: JAN, JANTX, JANTXV and JANS
- Radiation testing available

| Absolute Maximum Ratings | | $T_C$ = 25°C unless otherwise specified | |
|---|---|---|---|
| **Parameter** | **Symbol** | **Rating** | **Unit** |
| Collector-Emitter Voltage | $V_{CEO}$ | 20 | Volts |
| Collector-Base Voltage | $V_{CBO}$ | 40 | Volts |
| Emitter-Base Voltage | $V_{EBO}$ | 3 | Volts |
| Collector Current, Continuous | $I_C$ | 400 | mA |
| Power Dissipation, $T_A$ = 25°C<br>Derate linearly above 25°C | $P_T$ | 1<br>5.71 | W<br>mW/°C |
| Power Dissipation, $T_C$ = 25°C<br>Derate linearly above 25°C | $P_T$ | 2.9<br>16.6 | W<br>mW/°C |
| Thermal Resistance | $R_{\theta JA}$ | 175 | °C/W |
| Operating Junction Temperature | $T_J$ | -65 to +200 | °C |
| Storage Temperature | $T_{STG}$ | -65 to +200 | °C |

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## ELECTRICAL CHARACTERISTICS

characteristics specified at $T_A$ = 25°C

### Off Characteristics

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C$ = 100 µA | 40 | | | Volts |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$ = 5 mA | 20 | | | Volts |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CER}$ | $I_C$ = 5 mA, $R_{BE}$ = 10 Ω | 40 | | | Volts |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E$ = 100 µA | 3 | | | Volts |
| Collector-Emitter Cutoff Current | $I_{CEO1}$<br>$I_{CEO2}$ | $V_{CE}$ = 15 Volts<br>$V_{CE}$ = 15 Volts, $T_A$ = 175°C | | | 20<br>5 | µA<br>mA |

### On Characteristics

Pulse Test: Pulse Width = 300 µs, Duty Cycle ≤ 2.0%

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| DC Current Gain | $h_{FE1}$<br>$h_{FE2}$ | $I_C$ = 50 mA, $V_{CE}$ = 15 Volts<br>$I_C$ = 50 mA, $V_{CE}$ = 5 Volts<br>$T_A$ = -55°C | 40<br>15 | | 150 | |
| Collector-Emitter Saturation Voltage | $V_{CEsat}$ | $I_C$ = 100 mA, $I_B$ = 10 mA | | | 0.5 | Volts |

### Dynamic Characteristics

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Magnitude – Common Emitter, Short Circuit Forward Current Transfer Ratio | $\|h_{FE1}\|$<br>$\|h_{FE2}\|$<br>$\|h_{FE3}\|$ | $V_{CE}$ = 15 Volts, f = 200 MHz,<br>$I_C$ = 25 mA<br>$I_C$ = 50 mA<br>$I_C$ = 100 mA | <br>5<br>6<br>5 | | <br>10.0<br>11.0<br>10.5 | |
| Open Circuit Output Capacitance | $C_{OBO}$ | $V_{CB}$ = 5 Volts, $I_E$ = 0 mA,<br>100 kHZ < f < 1 MHz | | | 3.5 | pF |
| Power Gain (narrow band) current | $G_{PE}$ | $V_{CC}$ = 15 Volts, $I_C$ = 50 mA,<br>f = 200 MHz, $P_{in}$ = -10 dB | 11 | | | dB |
| Cross Modulation | cm | $V_{CC}$ = 15 Volts, $I_C$ = 50 mA,<br>54 dB output | | | -57 | dB |
| Noise Figure | NF | $V_{CC}$ = 15 Volts, $I_C$ = 10 mA,<br>f = 200 MHz, $P_{in}$ = -10 dB | | | 3.5 | dB |
| Voltage Gain (wideband) | G | $V_{CC}$ = 15 Volts, $I_C$ = 50 mA,<br>50 MHz < f < 216 MHz,<br>$P_{in}$ = -10dB | 11 | | | dB |

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