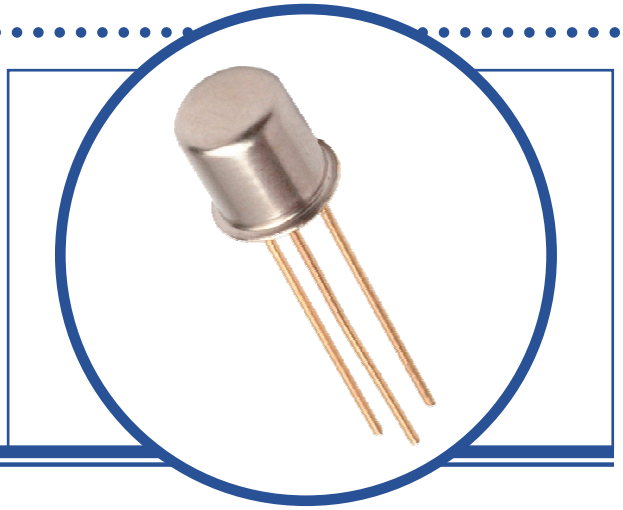
# HIGH SPEED SWITCHING PNP SILICON BIPOLAR TRANSISTOR

TT electronics
Semelab Limited

## 2N4209

- Hermetic TO18 Metal Package
- Silicon Planar Epitaxial PNP Transistor
- High Speed low Saturation Switching
- High-Reliability Screening Options Available



## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25° C unless otherwise stated)

| | | | |
|---|---|---|---|
| $V_{CBO}$ | Collector – Base Voltage | | -15V |
| $V_{CEO}$ | Collector – Emitter Voltage | | -15V |
| $V_{EBO}$ | Emitter – Base Voltage | | -4.5V |
| $I_C$ | Continuous Collector Current | | -50mA |
| $P_D$ | Total Power Dissipation at | $T_A$ = 25° C | 360mW |
| | | Derate Above 25° C | 2.05mW/°C |
| $T_J$ | Junction Temperature Range | | -65 to +200°C |
| $T_{stg}$ | Storage Temperature Range | | -65 to +200°C |

### THERMAL PROPERTIES

| Symbol | Parameter | Max | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient | 250 | °C/W |



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### ELECTRICAL CHARACTERISTICS ($T_A$ = 25° C unless otherwise stated)

| Symbols | Parameters | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| $V_{(BR)CEO}$ (1) | Collector-Emitter Breakdown Voltage | $I_C$ = -3mA | | -15 | | | V |
| $V_{(BR)CES}$ | Collector-Emitter Breakdown Voltage | $I_C$ = -100µA | | -15 | | | V |
| $I_{CES}$ | Collector-Emitter Cut-Off Current | $V_{CE}$ = -10V | | | | -10 | nA |
| | | | $T_A$ = 125° C | | | -5.0 | µA |
| $I_{EBO}$ | Emitter Cut-Off Current | | $V_{EB}$ = -4.5V | | | -10 | µA |
| | | | $V_{EB}$ = -3.5V | | | -10 | nA |
| $I_{CBO}$ | Collector Cut-Off Current | $V_{CB}$ = -15V | $I_E$ = 0 | | | -10 | µA |
| $h_{FE}$ (1) | Forward-current transfer ratio | $I_C$ = -1.0mA | $V_{CE}$ = -0.5V | 35 | | | |
| | | $I_C$ = -10mA | $V_{CE}$ = -0.3V | 50 | | 120 | |
| | | $I_C$ = -10mA | $V_{CE}$ = -1.0V | 55 | | 125 | |
| | | | $T_A$ = -55° C | 25 | | | |
| | | $I_C$ = -50mA | $V_{CE}$ = -1.0V | 40 | | | |
| $V_{CE(sat)}$ (1) | Collector-Emitter Saturation Voltage | $I_C$ = -1.0mA | $I_B$ = -0.1mA | | | -0.15 | V |
| | | $I_C$ = -10mA | $I_B$ = -1.0mA | | | -0.18 | V |
| | | $I_C$ = -50mA | $I_B$ = -5.0mA | | | -0.60 | V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage | $I_C$ = -1.0mA | $I_B$ = -0.1mA | | | -0.80 | V |
| | | $I_C$ = -10mA | $I_B$ = -1.0mA | -0.70 | | -0.95 | V |
| | | $I_C$ = -50mA | $I_B$ = -5.0mA | | | -1.50 | V |

### DYNAMIC CHARACTERISTICS

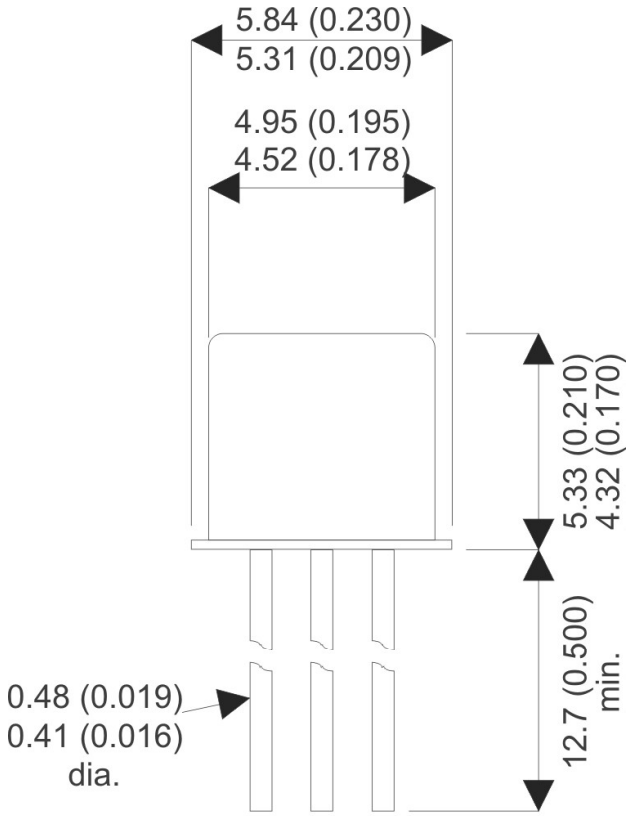
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\lvert h_{fe} \rvert$ | Small signal forward current transfer ratio | $I_C$ = -10mA<br>f = 100MHz | $V_{CE}$ = -10V | 8.5 | | | |
| $C_{obo}$ | Output Capacitance f = 1.0MHz | $V_{CB}$ = -5.0V | $I_E$ = 0 | | | 3.0 | pF |
| $C_{ibo}$ | Input Capacitance f = 1.0MHz | $V_{BE}$ = 0.5V | $I_C$ = 0 | | | 3.5 | pF |
| $t_{on}$ | Turn-On Time | $V_{CC}$ = -3V | $I_C$ = -10mA | | | 15 | ns |
| $t_{off}$ | Turn-Off Time | $I_B$ = 1.0mA | | | | 20 | ns |
| $t_d$ | Turn-On Delay Time | | | | | 10 | ns |
| $t_r$ | Rise Time | | | | | 15 | ns |

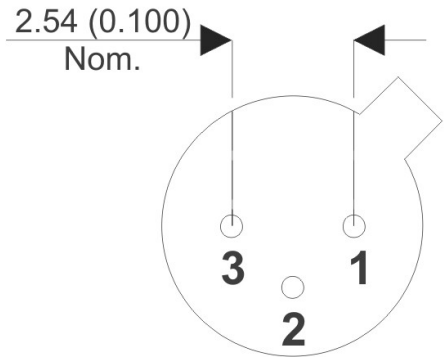
**Notes**

(1) Pulse Width < 380µs, Duty Cycle <2%

## MECHANICAL DATA

Dimensions in mm (Inches)




**TO-18 (TO-206AA)**
**Underside View**

| PIN 1 | PIN 2 | PIN 3 (Case) |
|---|---|---|
| Emitter | Base | Collector |