

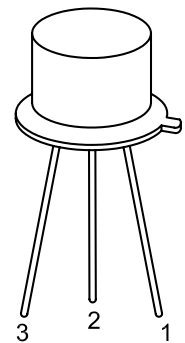
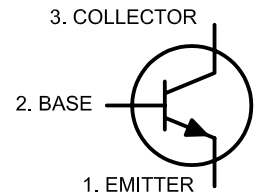


## Description:

This is a Silicon NPN transistor in a TO-39 type case designed primarily for amplifier and switching applications. This device features high breakdown voltage low leakage current, low capacity, and beta useful over an extremely wide current range.

**RoHS  
Compliant**

**NPN**



## Absolute Maximum Ratings:

| Characteristic                                                                            | Symbol     | Rating                                      |
|-------------------------------------------------------------------------------------------|------------|---------------------------------------------|
| Collector-Base Voltage                                                                    | $V_{CB0}$  | 140V                                        |
| Collector-Emitter Voltage                                                                 | $V_{CEO}$  | 80V                                         |
| Emitter - Base Voltage                                                                    | $V_{EBO}$  | 7V                                          |
| Continuous Collector Current                                                              | $I_C$      | 1A                                          |
| Total Device Dissipation ( $T_c = +25^\circ\text{C}$ )<br>Derate above $25^\circ\text{C}$ | $P_D$      | 800mW<br>4.6mW/ $^\circ\text{C}$            |
| Total Device Dissipation ( $T_c = +25^\circ\text{C}$ )<br>Derate above $25^\circ\text{C}$ | $P_D$      | 5W<br>28.6mW/ $^\circ\text{C}$              |
| Operating Junction Temperature Range                                                      | $T_J$      | $-65^\circ\text{C}$ to $+200^\circ\text{C}$ |
| Storage Temperature Range                                                                 | $T_{STG}$  | $-65^\circ\text{C}$ to $+200^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Case                                                      | $R_{thJC}$ | 16.5 $^\circ\text{C/W}$                     |
| Thermal Resistance, Junction-to-Ambient                                                   | $R_{thJA}$ | 89.5 $^\circ\text{C/W}$                     |
| Lead Temperature<br>(During Soldering, 1/16" from case, 60sec max.)                       | $T_L$      | 300 $^\circ\text{C}$                        |

## Electrical Characteristics: ( $T_A = +25^\circ\text{C}$ Unless otherwise specified)

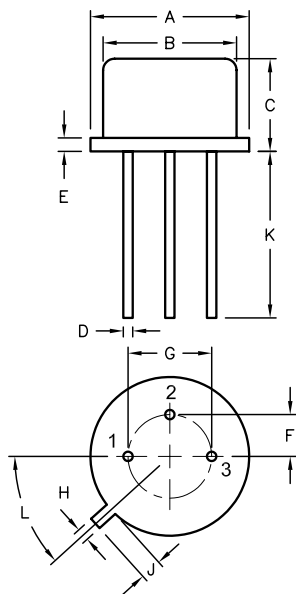
| Parameter                           | Symbol        | Test Conditions                                                | Min. | Max. | Unit.         |
|-------------------------------------|---------------|----------------------------------------------------------------|------|------|---------------|
| OFF Characteristics                 |               |                                                                |      |      |               |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C = 30\text{mA}$ , $I_B = 0$                                | 80   | -    | V             |
| Collector-Base Breakdown Voltage    | $V_{(BR)CBO}$ | $I_C = 100\mu\text{A}$ , $I_E = 0$                             | 140  | -    |               |
| Emitter-Base Breakdown Voltage      | $V_{(BR)EBO}$ | $I_E = 100\mu\text{A}$ , $I_C = 0$                             | 7    | -    |               |
| Collector-Cut-Off Current           | $I_{CBO}$     | $V_{CB} = 90\text{V}$ , $I_E = 0$                              | -    | 0.01 | $\mu\text{A}$ |
|                                     |               | $V_{CB} = 90\text{V}$ , $I_E = 0$ , $T_A = +150^\circ\text{C}$ | -    | 10   |               |
| Emitter Cut-Off Current             | $I_{EBO}$     | $V_{BE} = 5\text{V}$ , $I_C = 0$                               | -    | 0.01 |               |
| On Characteristics (Note 1)         |               |                                                                |      |      |               |
| DC Current Gain                     | $h_{FE}$      | $V_{CE} = 10\text{V}$ , $I_C = 0.1\text{mA}$                   | 50   | -    | -             |
|                                     |               | $V_{CE} = 10\text{V}$ , $I_C = 10\text{mA}$                    | 90   | -    | -             |
|                                     |               | $V_{CE} = 10\text{V}$ , $I_C = 150\text{mA}$                   | 100  | 300  | -             |

| Parameter                            | Symbol        | Test Conditions                                 | Min. | Max. | Unit. |
|--------------------------------------|---------------|-------------------------------------------------|------|------|-------|
| DC Current Gain                      | $h_{FE}$      | $V_{CE} = 10V, I_C = 150mA, T_A = -55^{\circ}C$ | 40   | -    | -     |
|                                      |               | $V_{CE} = 10V, I_C = 500mA$                     | 50   | -    | -     |
|                                      |               | $V_{CE} = 10V, I_C = 1A$                        | 15   | -    | -     |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 150mA, I_B = 15mA$                       | -    | 0.2  | V     |
|                                      |               | $I_C = 150mA, I_B = 50mA$                       | -    | 0.5  | V     |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = 150mA, I_B = 15mA$                       | -    | 1.1  | V     |

## Small-Signal Characteristics

|                                |           |                                                          |     |     |     |
|--------------------------------|-----------|----------------------------------------------------------|-----|-----|-----|
| Current Gain-Bandwidth Product | $f_T$     | $V_{CE} = 10V, I_C = 50mA, f = 20MHz$                    | 100 | 400 | MHz |
| Output Capacitance             | $C_{obo}$ | $V_{CB} = 10V, I_E = 0, f = 1MHz$                        | -   | 12  | pF  |
| Input Capacitance              | $C_{ibo}$ | $V_{BE} = 500mV, I_C = 0, f = 1MHz$                      | -   | 60  | pF  |
| Small-Signal Current Gain      | $h_{fe}$  | $V_{CE} = 5V, I_C = 1mA, f = 1kHz$                       | 80  | 400 | -   |
| Collector-Base Time Constant   | $rb'CC$   | $V_{CE} = 10V, I_E = 10mA, f = 1kHz$                     | -   | 400 | ps  |
| Noise Figure                   | NF        | $V_{CE} = 10V, I_C = 100 \mu A, f = kHz, R_s = 1k\Omega$ | -   | 4   | dB  |

**Note 1.** Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$



1. EMITTER
2. BASE
3. COLLECTOR

| Dimensions | A    | B    | C    | D    | E    | F    | G    | H    | J    | K    | L   |
|------------|------|------|------|------|------|------|------|------|------|------|-----|
| Min.       | 8.5  | 7.74 | 6.09 | 0.4  | -    | 2.41 | 4.82 | 0.71 | 0.73 | 12.7 | 42° |
| Max.       | 9.39 | 8.50 | 6.6  | 0.53 | 0.88 | 2.66 | 5.33 | 0.86 | 1.02 | -    | 48° |

Dimensions : Millimetres

## Part Number Table

| Description                             | Part Number |
|-----------------------------------------|-------------|
| Bipolar Transistor, NPN, 1A, 80V, TO-39 | 2N3019      |

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