



## Description:

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.



## Absolute Maximum Ratings:

Collector-Base Voltage, $V_{CBO}$	: 140V
Collector-Emitter Voltage, $V_{CEO}$	: 80V
Emitter-Base Voltage, $V_{EBO}$	: 7V
Continuous Collector Current, $I_C$	: 1A
Total Device Dissipation ( $T_A = +25^\circ\text{C}$ ), PD Derate above $25^\circ\text{C}$	: 800mW : 4.6mW/ $^\circ\text{C}$
Total Device Dissipation ( $T_C = +25^\circ\text{C}$ ), PD Derate above $25^\circ\text{C}$	: 5W : 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 $^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient, $R_{thJA}$	: 89.5 $^\circ\text{C}/\text{W}$
Lead Temperature (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
<b>OFF Characteristics</b>					
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	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 100\mu\text{A}$ , $I_C = 0$	7	-	V
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	$\mu\text{A}$
Emitter Cut-Off Current	$I_{EBO}$	$V_{BE} = 5\text{V}$ , $I_C = 0$	-	0.01	$\mu\text{A}$

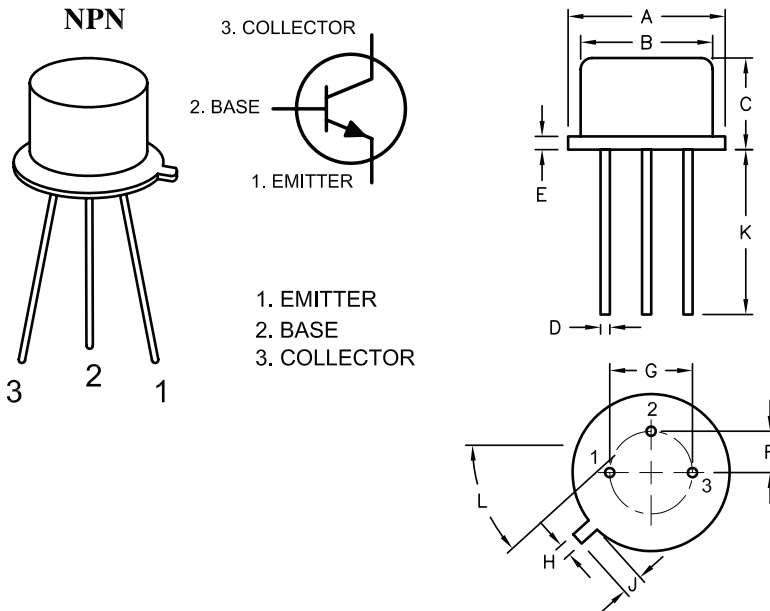
## On Characteristics (Note 1)

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	-
		$V_{CE} = 10\text{V}$ , $I_C = 150\text{mA}$ , $T_A = -55^\circ\text{C}$	40	-	-
		$V_{CE} = 10\text{V}$ , $I_C = 500\text{mA}$	50	-	-
		$V_{CE} = 10\text{V}$ , $I_C = 1\text{A}$	15	-	-
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150\text{mA}$ , $I_B = 15\text{mA}$	-	0.2	V
		$I_C = 500\text{mA}$ , $I_B = 50\text{mA}$	-	0.5	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 150\text{mA}$ , $I_B = 15\text{mA}$	-	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	$rb'Cc$	$V_{CE} = 10V, I_E = 10mA, f = 1MHz$	-	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  $\leq 1\%$



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	8.5	6.6	0.53	0.88	2.66	5.33	0.86	1.02	-	48°

Dimensions : Millimetres

## Part Number Table

Description	Part Number
Transistor Bipolar, Metal, TO-39, NPN	2N3019

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