

## NPN 2N3019 – 2N3020

### SILICON PLANAR EPITAXIAL TRANSISTORS

The 2N3019 and 2N3020 are NPN transistors mounted in TO-39 metal case .  
They are intended for high-current, high-frequency amplifier applications.  
They feature high gain and low saturation voltages.  
Compliance to RoHS

#### ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings		Value	Unit
$V_{CEO}$	Collector-Emitter Voltage	2N3019	80	V
		2N3020		
$V_{CBO}$	Collector-Base Voltage	2N3019	140	V
		2N3020		
$V_{EBO}$	Emitter-Base Voltage	2N3019	7	V
		2N3020		
$I_C$	Collector Current	2N3019	1	A
		2N3020		
$P_D$	Total Power Dissipation	@ $T_{amb} = 25^\circ$	0.8	Watts
		2N3019		
$P_D$	Total Power Dissipation	@ $T_{case} = 25^\circ$	5	
		2N3019		
$T_J$	Junction Temperature	2N3019	200	$^\circ\text{C}$
		2N3020		
$T_{Stg}$	Storage Temperature range	2N3019	-65 to +200	$^\circ\text{C}$
		2N3020		

#### THERMAL CHARACTERISTICS

Symbol	Ratings		Value	Unit
$R_{thJ-a}$	Thermal Resistance, Junction to ambient in free air	2N3019	35	$^\circ\text{C/W}$
		2N3020		
$R_{thJ-c}$	Thermal Resistance, Junction to case	2N3019	219	$^\circ\text{C/W}$
		2N3020		

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### ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

Symbol	Ratings	Test Condition(s)	Min	Typ	Max	Unit	
$I_{CBO}$	Collector Cutoff Current	$V_{CB}=950\text{ V}$ $I_E=0$	2N3019 2N3020	-	-	10	nA
		$V_{CB}=90\text{ V}$ , $I_E=0$ $T_J=150^\circ\text{C}$	2N3019 2N3020	-	-	10	$\mu\text{A}$
$I_{EBO}$	Emitter Cutoff Current	$V_{EB}=5\text{ V}$ $I_C=0$	2N3019 2N3020	-	-	10	nA
$V_{CEO}$	Collector Emitter Breakdown Voltage	$I_C=10\text{ mA}$ $I_B=0$	2N3019 2N3020	80	-	-	V
$V_{CBO}$	Collector Base Breakdown Voltage	$I_C=100\text{ }\mu\text{A}$ $I_E=0$	2N3019 2N3020	140	-	-	V
$V_{EBO}$	Emitter Base Breakdown Voltage	$I_E=100\text{ }\mu\text{A}$ $I_C=0$	2N3019 2N3020	7	-	-	V
$h_{FE}$	DC Current Gain (*)	$I_C=0.1\text{ mA}$ $V_{CE}=10\text{ V}$	2N3019 2N3020	50 30	-	- 100	-
		$I_C=10\text{ mA}$ $V_{CE}=10\text{ V}$	2N3019 2N3020	90 40	-	- 120	
		$I_C=150\text{ mA}$ $V_{CE}=10\text{ V}$	2N3019 2N3020	100 40	-	- 120	
		$I_C=500\text{ mA}$ $V_{CE}=10\text{ V}$	2N3019 2N3020	50 30	-	- 100	
		$I_C=1\text{ A}$ $V_{CE}=10\text{ V}$	2N3019 2N3020	15	-	-	
		$I_C=150\text{ mA}$ $V_{CE}=10\text{ V}$ $T_{amb} = -55^\circ\text{C}$	2N3019	40	-	-	
		$V_{CE(SAT)}$	Collector-Emitter saturation Voltage (*)	$I_C=150\text{ mA}$ $I_B=15\text{ mA}$	2N3019 2N3020	-	
		$I_C=500\text{ mA}$ $I_B=50\text{ mA}$	2N3019 2N3020	-	-	0.5	
$V_{BE(SAT)}$	Base-Emitter saturation Voltage (*)	$I_C=150\text{ mA}$ $I_B=15\text{ mA}$	2N3019	-	-	1.1	

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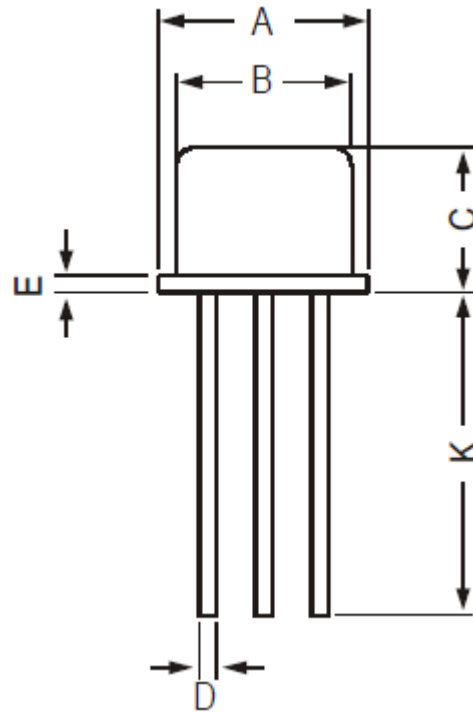
Symbol	Ratings	Test Condition(s)	Min	Typ	Max	Unit	
$f_T$	Transition frequency	$I_C = 50 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $f = 20 \text{ MHz}$	2N3019	100	-	-	MHz
			2N3020	80	-	-	
$h_{fe}$	Small Signal Current Gain	$I_C = 1 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $f = 1 \text{ kHz}$	2N3019	80	-	400	-
			2N3020	30	-	200	
<b>NF</b>	Noise Figure	$I_C = 100 \mu\text{A}$ $V_{CE} = 10 \text{ V}$ $f = 1 \text{ kHz}$ $R_g = 1 \text{ k}\Omega$	2N3019	-	-	4	dB
$C_{CBO}$	Collector-Base capacitance	$I_E = 0$ $V_{CB} = 10 \text{ V}$ $f = 1 \text{ MHz}$	2N3019	-	-	12	pF
			2N3020				
$C_{EBO}$	Emitter-Base capacitance	$I_C = 0$ $V_{EB} = 0.5 \text{ V}$ $f = 1 \text{ MHz}$	2N3019	-	-	60	pF
			2N3020				
$r_{bb'}C_{b'c}$	Feedback Time Constant	$I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $f = 4 \text{ MHz}$	2N3019	-	-	400	ps
			2N3020				

(\*) Pulse conditions :  $t_p < 300 \mu\text{s}$ ,  $\delta = 2\%$

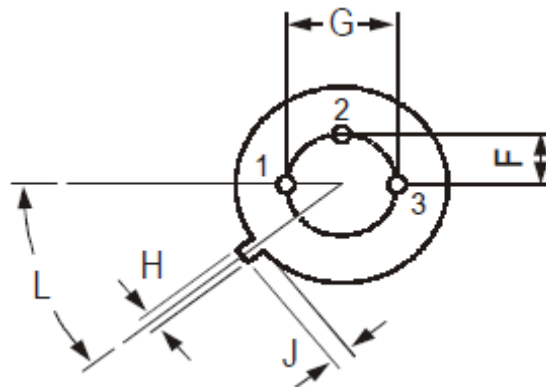
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### MECHANICAL DATA CASE TO-39

DIMENSIONS (mm)		
	min	max
A	8.50	9.39
B	7.74	8.50
C	6.09	6.60
D	0.40	0.53
E	-	0.88
F	2.41	2.66
G	4.82	5.33
H	0.71	0.86
J	0.73	1.02
K	12.70	-
L	42°	48°



Pin 1 :	Emitter
Pin 2 :	Base
Pin 3 :	Collector
Case :	Collector



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