

**TO-39 NPN SILICON PLANAR TRANSISTOR**
**General Transistor**
**ABSOLUTE MAXIMUM RATINGS**

DESCRIPTION	SYMBOL	VALUE	UNIT
Collector Emitter Voltage	$V_{CEO}$	80	V
Collector Base Voltage	$V_{CBO}$	140	V
Emitter Base Voltage	$V_{EBO}$	7.0	V
Collector Current Continuous	$I_C$	1.0	A
Power Dissipation at $T_a=25^\circ\text{C}$	$P_D$	0.8	W
Derate Above $25^\circ\text{C}$		4.6	mW/ $^\circ\text{C}$
Power Dissipation at $T_c=25^\circ\text{C}$	$P_D$	5.0	W
Derate Above $25^\circ\text{C}$		28.6	mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_j, T_{stg}$	- 65 to +200	$^\circ\text{C}$

**THERMAL RESISTANCE**

Junction to Case	$R_{th(j-c)}$	16.5	$^\circ\text{C/W}$
Junction to Ambient in free air	$R_{th(j-a)}$	89.5	$^\circ\text{C/W}$

**ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$  unless specified otherwise )**

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Collector Emitter Voltage	$V_{CEO}$	$I_C=1\text{mA}, I_B=0$	80			V
Collector Base Voltage	$V_{CBO}$	$I_C=100\mu\text{A}, I_E=0$	140			V
Emitter Base Voltage	$V_{EBO}$	$I_E=100\mu\text{A}, I_C=0$	7.0			V
Collector Cut Off Current	$I_{CBO}$	$V_{CB}=90\text{V}, I_E=0$			10	nA
		$V_{CB}=90\text{V}, I_E=0, T_a=150^\circ\text{C}$			10	$\mu\text{A}$
Emitter Cut Off Current	$I_{EBO}$	$V_{EB}=5\text{V}, I_C=0$			10	nA
			<b>2N3019</b>		<b>2N3020</b>	
DC Current Gain	$*h_{FE}$	$I_C=0.1\text{mA}, V_{CE}=10\text{V}$	>50		30 - 100	
		$I_C=10\text{mA}, V_{CE}=10\text{V}$	>90		40 - 120	
		$I_C=150\text{mA}, V_{CE}=10\text{V}$	100 - 300		40 - 120	
		$I_C=150\text{mA}, V_{CE}=10\text{V}, T_c=-55^\circ\text{C}$	>40		-	
		$I_C=500\text{mA}, V_{CE}=10\text{V}$	>50		30 - 100	
		$I_C=1\text{A}, V_{CE}=10\text{V}$	>15		>15	
			<b>MIN</b>	<b>TYP</b>	<b>MAX</b>	<b>UNIT</b>
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

\*Pulse Test: Pulse Width  $\leq 300\text{ms}$ , Duty Cycle  $\leq 1\%$

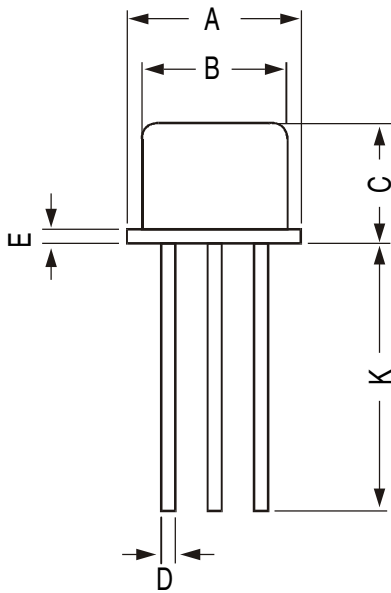
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ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$  unless specified otherwise)

SMALL SIGNAL CHARACTERISTICS

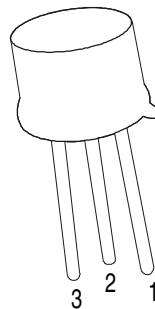
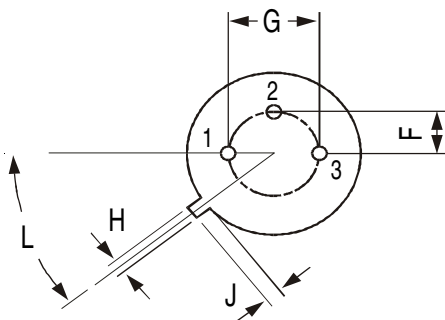
DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$			12	pF
Input Capacitance	$C_{ib}$	$V_{EB}=0.5\text{V}, I_C=0, f=1\text{MHz}$			60	pF
Small Signal Current Gain	$h_{fe}$	$I_C=1\text{mA}, V_{CE}=5\text{V}, f=1\text{KHz}$				
			<b>2N3019</b>	80		400
		<b>2N3020</b>	30		200	
Collector Rise Time Constant	$r_b'C_C$	$I_E=10\text{mA}, V_{CB}=10\text{V}, f=79.8\text{MHz}$			400	ps
Noise Figure	NF	$I_C=100\mu\text{A}, V_{CE}=10\text{V}, R_S=1\text{K}\Omega, f=1.0\text{KHz}$			4.0	dB
		<b>2N3019</b>				

TO-39 Metal Can Package



DIM	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 DEG	48 DEG

All dimensions are in mm



PIN CONFIGURATION

1. EMITTER
2. BASE
3. COLLECTOR

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