
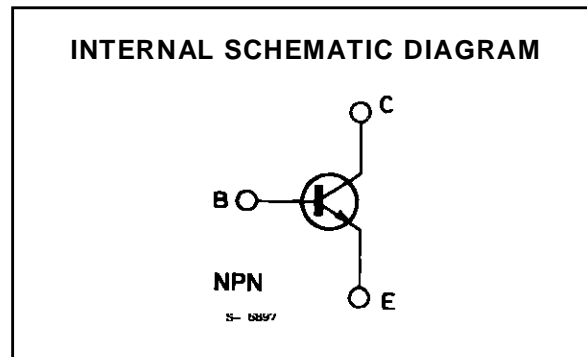
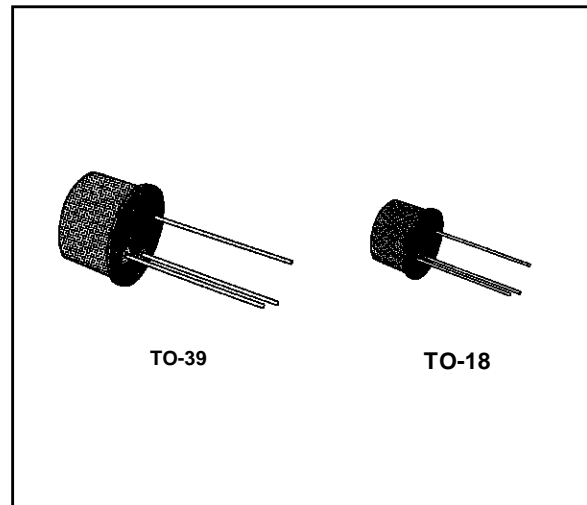


**HIGH-SPEED SWITCHES**

**DESCRIPTION**

The 2N2218, 2N2219, 2N2221 and 2N2222 are silicon planar epitaxial NPN transistors in Jedec TO-39 (for 2N2218 and 2N2219) and in Jedec TO-18 (for 2N2221 and 2N2222) metal cases. They are designed for high-speed switching applications at collector currents up to 500 mA, and feature useful current gain over a wide range of collector current, low leakage currents and low saturation voltages.

 2N2218/2N2219 approved to CECC 50002-100, 2N2221/2N2222 approved to CECC 50002-101 available on request.



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-base Voltage ( $I_E = 0$ )	60	V
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )	30	V
$V_{EBO}$	Emitter-base Voltage ( $I_C = 0$ )	5	V
$I_C$	Collector Current	0.8	A
$P_{tot}$	Total Power Dissipation at $T_{amb} \leq 25\text{ }^\circ\text{C}$ for <b>2N2218</b> and <b>2N2219</b> for <b>2N2221</b> and <b>2N2222</b> at $T_{case} \leq 25\text{ }^\circ\text{C}$ for <b>2N2218</b> and <b>2N2219</b> for <b>2N2221</b> and <b>2N2222</b>	0.8	W
		0.5	W
		3	W
		1.8	W
$T_{stg}$	Storage Temperature	- 65 to 200	$^\circ\text{C}$
$T_j$	Junction Temperature	175	$^\circ\text{C}$

## 2N2218-2N2219-2N2221-2N2222

### THERMAL DATA

			2N2218 2N2219	2N2221 2N2222
R <sub>th j-case</sub>	Thermal Resistance Junction-case	Max	50 °C/W	83.3 °C/W
R <sub>th j-amb</sub>	Thermal Resistance Junction-ambient	Max	187.5 °C/W	300 °C/W

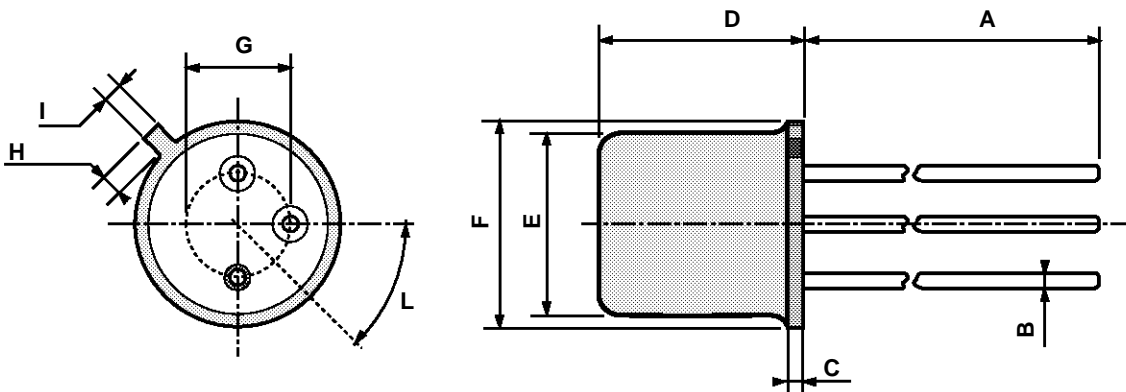
### ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CBO</sub>	Collector Cutoff Current (I <sub>E</sub> = 0)	V <sub>CB</sub> = 50 V V <sub>CB</sub> = 50 V    T <sub>amb</sub> = 150 °C			10 10	nA μA
I <sub>EBO</sub>	Emitter Cutoff Current (I <sub>C</sub> = 0)	V <sub>EB</sub> = 3 V			10	nA
V <sub>(BR) CBO</sub>	Collector-base Breakdown Voltage (I <sub>E</sub> = 0)	I <sub>C</sub> = 10 μA	60			V
V <sub>(BR) CEO</sub> *	Collector-emitter Breakdown Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 10 mA	30			V
V <sub>(BR) EBO</sub>	Emitter-base Breakdown Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 μA	5			V
V <sub>CE (sat)</sub> *	Collector-emitter Saturation Voltage	I <sub>C</sub> = 150 mA    I <sub>B</sub> = 15 mA I <sub>C</sub> = 500 mA    I <sub>B</sub> = 50 mA			0.4 1.6	V V
V <sub>BE (sat)</sub> *	Base-emitter Saturation Voltage	I <sub>C</sub> = 150 mA    I <sub>B</sub> = 15 mA I <sub>C</sub> = 500 mA    I <sub>B</sub> = 50 mA			1.3 2.6	V V
h <sub>FE</sub> *	DC Current Gain	for <b>2N2218</b> and <b>2N2221</b> I <sub>C</sub> = 0.1 mA    V <sub>CE</sub> = 10 V I <sub>C</sub> = 1 mA       V <sub>CE</sub> = 10 V I <sub>C</sub> = 10 mA      V <sub>CE</sub> = 10 V I <sub>C</sub> = 150 mA     V <sub>CE</sub> = 10 V I <sub>C</sub> = 500 mA     V <sub>CE</sub> = 10 V I <sub>C</sub> = 150 mA     V <sub>CE</sub> = 1 V for <b>2N2219</b> and <b>2N2222</b> I <sub>C</sub> = 0.1 mA    V <sub>CE</sub> = 10 V I <sub>C</sub> = 1 mA       V <sub>CE</sub> = 10 V I <sub>C</sub> = 10 mA      V <sub>CE</sub> = 10 V I <sub>C</sub> = 150 mA     V <sub>CE</sub> = 10 V I <sub>C</sub> = 500 mA     V <sub>CE</sub> = 10 V I <sub>C</sub> = 150 mA     V <sub>CE</sub> = 1 V	20 25 35 40 20 20		120	
f <sub>T</sub>	Transition Frequency	I <sub>C</sub> = 20 mA    V <sub>CE</sub> = 20 V f = 100 MHz	250			MHz
C <sub>CBO</sub>	Collector-base Capacitance	I <sub>E</sub> = 0 f = 100 kHz    V <sub>CB</sub> = 10 V			8	pF
R <sub>e(hie)</sub>	Real Part of Input Impedance	I <sub>C</sub> = 20 mA    V <sub>CE</sub> = 20 V f = 300 MHz			60	Ω

\* Pulsed : pulse duration = 300 μs, duty cycle = 1 %.

TO-18 MECHANICAL DATA

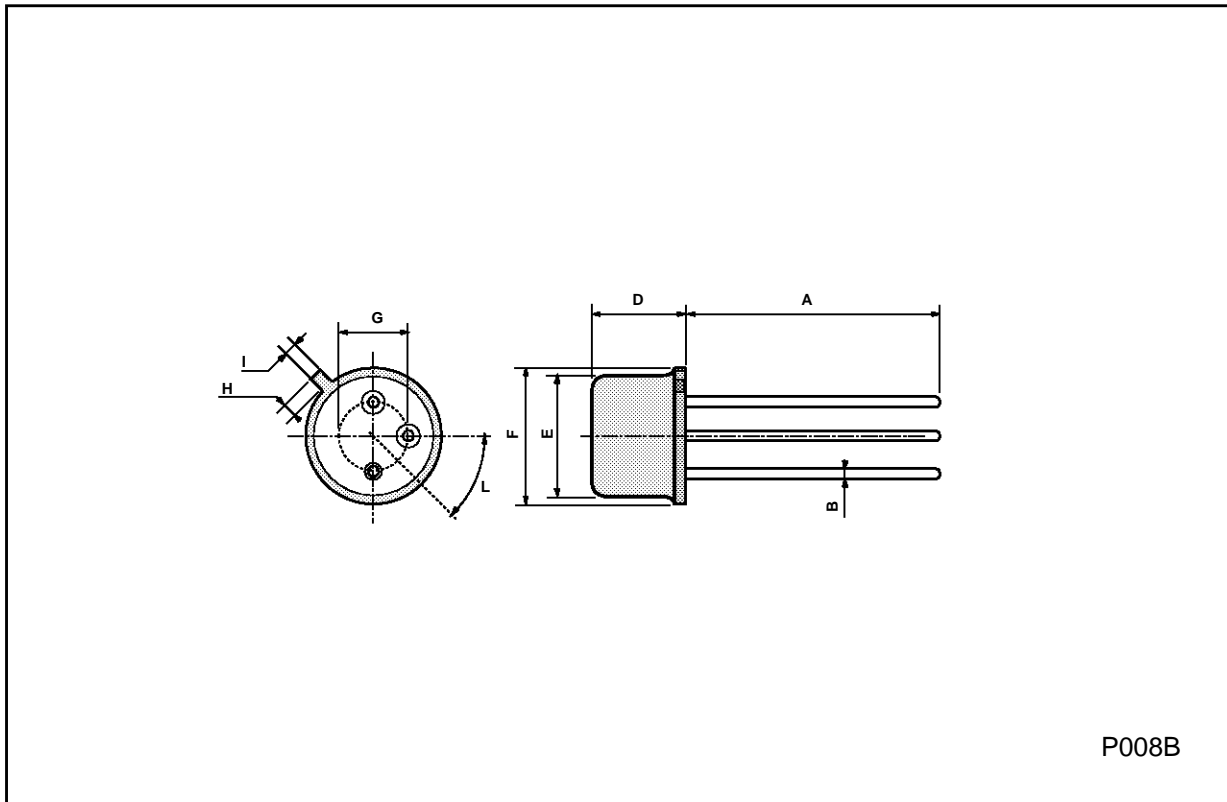
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45°			45°		



0016043

**TO39 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	12.7			0.500		
B			0.49			0.019
D			6.6			0.260
E			8.5			0.334
F			9.4			0.370
G	5.08			0.200		
H			1.2			0.047
I			0.9			0.035
L	45° (typ.)					



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