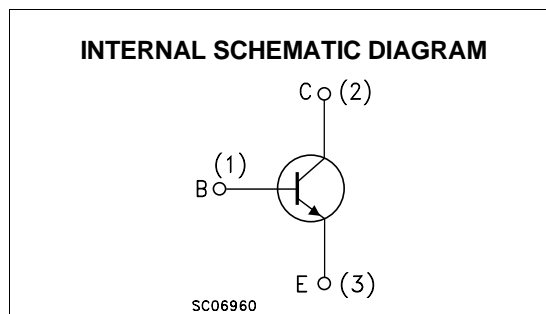
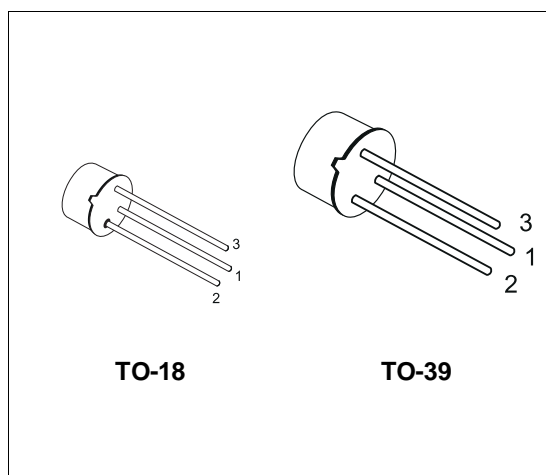


## HIGH SPEED SWITCHES

PRELIMINARY DATA

### DESCRIPTION

The 2N2219A and 2N2222A are silicon Planar Epitaxial NPN transistors in Jedec TO-39 (for 2N2219A) and in Jedec TO-18 (for 2N2222A) metal case. They are designed for high speed switching application at collector current up to 500mA, and feature useful current gain over a wide range of collector current, low leakage currents and low saturation voltage.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage ( $I_E = 0$ )	75	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	40	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	6	V
$I_C$	Collector Current	0.6	A
$I_{CM}$	Collector Peak Current ( $t_p < 5$ ms)	0.8	A
$P_{tot}$	Total Dissipation at $T_{amb} \leq 25$ °C for <b>2N2219A</b> for <b>2N2222A</b> at $T_C \leq 25$ °C for <b>2N2219A</b> for <b>2N2222A</b>	0.8	W
		0.5	W
		3	W
		1.8	W
$T_{stg}$	Storage Temperature	-65 to 175	°C
$T_j$	Max. Operating Junction Temperature	175	°C

## 2N2219A / 2N2222A

### THERMAL DATA

		TO-39	TO-18	
$R_{thj-case}$	Thermal Resistance Junction-Case	Max	50	83.3
$R_{thj-amb}$	Thermal Resistance Junction-Ambient	Max	187.5	300
				$^{\circ}\text{C}/\text{W}$
				$^{\circ}\text{C}/\text{W}$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector Cut-off Current ( $I_E = 0$ )	$V_{CB} = 60\text{ V}$ $V_{CB} = 60\text{ V}$ $T_j = 150^{\circ}\text{C}$			10 10	nA $\mu\text{A}$
$I_{CEX}$	Collector Cut-off Current ( $V_{BE} = -3\text{V}$ )	$V_{CE} = 60\text{ V}$			10	nA
$I_{BEX}$	Base Cut-off Current ( $V_{BE} = -3\text{V}$ )	$V_{CE} = 60\text{ V}$			20	nA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 3\text{ V}$			10	nA
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage ( $I_E = 0$ )	$I_C = 10\ \mu\text{A}$	75			V
$V_{(BR)CEO}^*$	Collector-Emitter Breakdown Voltage ( $I_B = 0$ )	$I_C = 10\text{ mA}$	40			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ( $I_C = 0$ )	$I_E = 10\ \mu\text{A}$	6			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 150\text{ mA}$ $I_B = 15\text{ mA}$ $I_C = 500\text{ mA}$ $I_B = 50\text{ mA}$			0.3 1	V V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 150\text{ mA}$ $I_B = 15\text{ mA}$ $I_C = 500\text{ mA}$ $I_B = 50\text{ mA}$	0.6		1.2 2	V V
$h_{FE}^*$	DC Current Gain	$I_C = 0.1\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 1\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}$ $V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ $T_{amb} = -55^{\circ}\text{C}$	35 50 75 100 40 50 35		300	
$h_{fe}^*$	Small Signal Current Gain	$I_C = 1\text{ mA}$ $V_{CE} = 10\text{ V}$ $f = 1\text{KHZ}$ $I_C = 10\text{ mA}$ $V_{CE} = 10\text{ V}$ $f = 1\text{KHZ}$	50 75		300 375	
$f_T$	Transition Frequency	$I_C = 20\text{ mA}$ $V_{CE} = 20\text{ V}$ $f = 100\text{ MHz}$		300		MHz
$C_{EBO}$	Emitter-Base Capacitance	$I_C = 0$ $V_{EB} = 0.5\text{ V}$ $f = 100\text{KHZ}$			25	pF
$C_{CBO}$	Collector-Base Capacitance	$I_E = 0$ $V_{CB} = 10\text{ V}$ $f = 100\text{ KHZ}$			8	pF
$R_{e(hie)}$	Real Part of Input Impedance	$I_C = 20\text{ mA}$ $V_{CE} = 20\text{ V}$ $f = 300\text{MHz}$			60	$\Omega$

\* Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1\%$

**ELECTRICAL CHARACTERISTICS** (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
NF	Noise Figure	$I_C = 0.1 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $f = 1 \text{ KHz}$ $R_g = 1 \text{ K}\Omega$		4		dB
$h_{ie}$	Input Impedance	$I_C = 1 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$	2 0.25		8 1.25	$\text{k}\Omega$ $\text{k}\Omega$
$h_{re}$	Reverse Voltage Ratio	$I_C = 1 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$			8 4	$10^{-4}$ $10^{-4}$
$h_{oe}$	Output Admittance	$I_C = 1 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$	5 25		35 200	$\mu\text{S}$ $\mu\text{S}$
$t_d^{**}$	Delay Time	$V_{CC} = 30 \text{ V}$ $I_C = 150 \text{ mA}$ $I_{B1} = 15 \text{ mA}$ $V_{BB} = -0.5 \text{ V}$			10	ns
$t_r^{**}$	Rise Time	$V_{CC} = 30 \text{ V}$ $I_C = 150 \text{ mA}$ $I_{B1} = 15 \text{ mA}$ $V_{BB} = -0.5 \text{ V}$			25	ns
$t_s^{**}$	Storage Time	$V_{CC} = 30 \text{ V}$ $I_C = 150 \text{ mA}$ $I_{B1} = -I_{B2} = 15 \text{ mA}$			225	ns
$t_f^{**}$	Fall Time	$V_{CC} = 30 \text{ V}$ $I_C = 150 \text{ mA}$ $I_{B1} = -I_{B2} = 15 \text{ mA}$			60	ns
$r_{bb'}$ $C_{b'c}$	Feedback Time Constant	$I_C = 20 \text{ mA}$ $V_{CE} = 20 \text{ V}$ $f = 31.8 \text{ MHz}$			150	ps

\* Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1\%$ 

\*\* See test circuit

## 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°		

