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2N4033 Silicon PNP Transistor Small Signal General Purpose Amplifier TO-39 Type Package

Description:

The 2N4033 is a silicon transistor in a TO-39 type package designed primarily for amplifier and switching applications. This device features high breakdown voltages, low leakage currents, low capacity, and a beta useful over an extremely wide current range.

Absolute Maximum Ratings: (Note 1)

Collector-Emitter Voltage (Note 2), V_{CE0}	80V
Collector-Base Voltage, V_{CBO}	80V
Emitter-Base Voltage, V_{EBO}	5V
Collector Current, I_C	1A
Power Dissipation ($T_A = +25^\circ\text{C}$, Note 3), P_D	800 mW
Derate above 25°C	4.56mw/ $^\circ\text{C}$
Power Dissipation ($T_C = +25^\circ\text{C}$, Note 3), P_D	4W
Derate above 25°C	22.8mw/ $^\circ\text{C}$
Operating Temperature, T_J	+200 $^\circ\text{C}$
Storage Temperature Range, T_{stg}	-65 $^\circ\text{C}$ to +200 $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient, R_{thJA}	219 $^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case, R_{thJC}	43.7 $^\circ\text{C}/\text{W}$

Note 1. These ratings are limiting values above which the serviceability of any device may be impaired.

Note 2. Rating refers to a high current point where Collector-Emitter voltage is lowest.

Note 3. These are steady state limits and give a maximum junction temperature of +200 $^\circ\text{C}$.

Electrical Characteristics: ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Base Breakdown Voltage	BV_{CBO}	$I_C = 10\mu\text{A}, I_E = 0$	80	-	-	V
Emitter Base Breakdown Voltage	BV_{EBO}	$I_E = 10\mu\text{A}, I_C = 0$	5	-	-	V
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 5\text{V}, I_C = 0$	-	-	10	μA
Collector Cutoff Current	I_{CBO}	$V_{CB} = 60\text{V}, I_E = 0$	-	-	50	nA
		$V_{CB} = 60\text{V}, T_A = 150^\circ\text{C}$	-	-	50	μA
DC Current Gain	h_{FE}	$I_C = 100\mu\text{A}, V_{CE} = 5\text{V}$	75	-	-	
		$I_C = 100\mu\text{A}, V_{CE} = 5\text{V}$, Note 4	100	-	300	
		$I_C = 500\text{mA}, V_{CE} = 5\text{V}$, Note 4	70	-	-	
		$I_C = 1\text{A}, V_{CE} = 5\text{V}$, Note 4	25	-	-	
		$I_C = 100\text{mA}, V_{CE} = 5\text{V}$, $T_A = -55^\circ\text{C}$, Note 4	40	-	-	

Note 4. Pulse Test; Pulse Width $\leq 300\mu\text{s}$, Duty Cycle = 1%

Electrical Characteristics (Cont'd): ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector Emitter Sustaining Voltage	V_{CEO}	$I_C = 10\text{mA}$ (pulsed), $I_B = 0$, Note 4	80	-	-	V
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150\text{mA}$, $I_B = 15\text{mA}$, Note 4	-	-	-0.15	V
		$I_C = 500\text{mA}$, $I_B = 50\text{mA}$, Note 4	-	-	-0.5	V
		$I_C = 1\text{A}$, $I_B = 100\text{mA}$, Note 4	-	-	-1.0	V
Base Emitter ON Voltage	$V_{BE(ON)}$	$I_C = 500\text{mA}$, $V_{BE} = -0.5\text{V}$, Note 4	-	-	-1.1	V
Base Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 150\text{mA}$, $I_B = 15\text{mA}$, Note 4	-	-	-0.9	V
Collector to Base Capacitance	C_{cb}	$V_{CB} = -10\text{V}$, $I_E = 0$, $f = 1\text{MHz}$	-	-	20	pF
Input Capacitance	C_{ib}	$V_{BE} = -0.5\text{V}$, $I_C = 0$, $f = 1\text{MHz}$	-	-	110	pF
Magnitude of Common Emitter Small Signal Current Gain	$ h_{fe} $	$I_C = 50\text{mA}$, $V_{CE} = -10\text{V}$, $f = 100\text{MHz}$	1.5	-	5.0	
Storage Time	t_s	$I_C \approx 500\text{mA}$, $I_{B1} \approx I_{B2} \approx 50\text{mA}$	-	-	350	ns
Fall Time	t_f		-	-	50	ns
Turn On Time	t_{on}	$I_C \approx 500\text{mA}$, $I_{B1} \approx 50\text{mA}$	-	-	100	ns

Note 4. Pulse Test; Pulse Width $\leq 300\mu\text{s}$, Duty Cycle = 1%

Note 1. Pulse Test; Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

