

2N3010 (SILICON)



NPN silicon low-power transistor primarily designed for high-speed, saturated switching applications.

CASE 22
(TO-18)

Collector connected to case

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage*	V_{CEO}^*	6.0	Vdc
Collector-Emitter Voltage	V_{CES}	11	Vdc
Collector-Base Voltage	V_{CB}	15	Vdc
Emitter-Base Voltage	V_{EB}	4.0	Vdc
Collector Current – Continuous	I_C	50	mAdc
Total Device Dissipation @ $T_A = 25^\circ C$ Derate above $25^\circ C$	P_D	0.30 1.71	Watt mW/ $^\circ C$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ C$

* Applicable from 0.01 mAdc to 10 mAdc (Pulsed).

FIGURE 1 — TURN-ON AND TURN-OFF
TIME TEST CIRCUIT

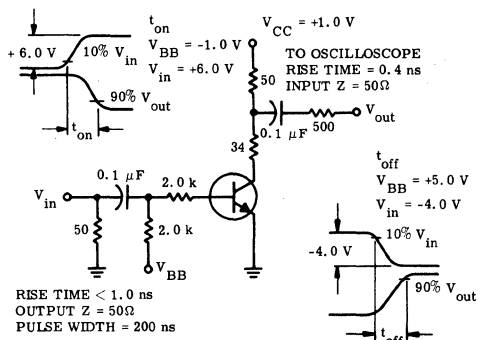
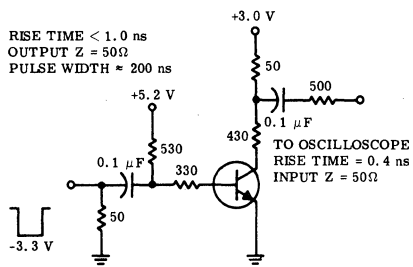


FIGURE 2 — CHARGE-STORAGE TIME
TEST CIRCUIT



2N3010 (continued)

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage ⁽¹⁾ ($I_C = 10\text{ mAdc}$, $I_B = 0$)	$BV_{CEO(sus)}^*$	6.0	-	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 10\text{ }\mu\text{Adc}$, $V_{BE} = 0$)	BV_{CES}	11	-	Vdc
Collector-Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{Adc}$, $I_E = 0$)	BV_{CBO}	15	-	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{Adc}$, $I_C = 0$)	BV_{EBO}	4.0	-	Vdc
Collector Cutoff Current ($V_{CE} = 11\text{ Vdc}$, $V_{BE} = 0$) ($V_{CE} = 5.0\text{ Vdc}$, $V_{BE} = 0$) ($V_{CE} = 5.0\text{ Vdc}$, $V_{BE} = 0$, $T_A = +85^\circ\text{C}$)	I_{CES}	- - -	10 0.1 5.0	μAdc
Base Cutoff Current ($V_{CE} = 11\text{ Vdc}$, $V_{EB(off)} = 0$)	I_{BL}	-	10	μAdc

ON CHARACTERISTICS ⁽¹⁾

DC Current Gain ($I_C = 1.0\text{ mAdc}$, $V_{CE} = 0.4\text{ Vdc}$) ($I_C = 10\text{ mAdc}$, $V_{CE} = 0.4\text{ Vdc}$) ($I_C = 30\text{ mAdc}$, $V_{CE} = 0.4\text{ Vdc}$)	h_{FE}	15 25 15	- 125 -	-
Collector-Emitter Saturation Voltage ($I_C = 1.0\text{ mAdc}$, $I_B = 0.1\text{ mAdc}$) ($I_C = 10\text{ mAdc}$, $I_B = 1.0\text{ mAdc}$) ($I_C = 30\text{ mAdc}$, $I_B = 3.0\text{ mAdc}$) ($I_C = 10\text{ mAdc}$, $I_B = 1.0\text{ mAdc}$, $T_A = 85^\circ\text{C}$)	$V_{CE(sat)}$	- - - -	0.25 0.25 0.38 0.4	Vdc
Base-Emitter Saturation Voltage ($I_C = 1.0\text{ mAdc}$, $I_B = 0.1\text{ mAdc}$) ($I_C = 10\text{ mAdc}$, $I_B = 1.0\text{ mAdc}$) ($I_C = 30\text{ mAdc}$, $I_B = 3.0\text{ mAdc}$)	$V_{BE(sat)}$	0.68 0.75 -	0.85 0.95 1.3	Vdc

DYNAMIC CHARACTERISTICS

Current-Gain-Bandwidth Product ($I_C = 10\text{ mAdc}$, $V_{CE} = 4.0\text{ Vdc}$, $f = 100\text{ MHz}$)	f_T	600	-	MHz
Output Capacitance ($V_{CB} = 5.0\text{ Vdc}$, $I_E = 0$, $f = 140\text{ kHz}$)	C_{ob}	-	3.0	pF
Input Capacitance ($V_{BE} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 140\text{ kHz}$)	C_{ib}	-	2.0	pF
Turn-On Time (Figure 1) ($V_{CC} = 1.0\text{ Vdc}$, $V_{BE(off)} = 1.0\text{ Vdc}$, $I_C = 10\text{ mAdc}$, $I_{B1} \approx 2.0\text{ mAdc}$)	t_{on}	-	12	ns
Turn-Off Time (Figure 1) ($V_{CC} = 1.0\text{ Vdc}$, $I_C \approx 10\text{ mAdc}$, $I_{B1} \approx I_{B2} \approx 1.0\text{ mAdc}$)	t_{off}	-	12	ns
Charge Storage Time (Figure 2) ($I_C = I_{B1} \approx I_{B2} = 5.0\text{ mAdc}$)	t_s	-	6.0	ns

⁽¹⁾ Pulse Test: Pulse Length = 300 μs ; Duty Cycle $\leq 2.0\%$.