2N3303 (SILICON)

CASE 94

Collector connected to case

NPN silicon annular transistor designed for high-speed, high-current switching and driving applications.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	12	Vdc
Collector-Base Voltage	V_{CB}	25	Vdc
Emitter-Base Voltage	V_{EB}	4.0	Vdc
Collector Current-Continuous	I_C	1.0	Adc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	0.6 3.43	Watt mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	3.0 17.2	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Voltage* (I_C = 30 mAdc, I_B = 0)	BV_{CEO}*	12	-	Vdc
Collector-Base Breakdown Voltage (I_C = 0.5 mAdc, I_E = 0)	BV_{CBO}	25	-	Vdc
Emitter-Base Breakdown Voltage (I_E = 0.1 mAdc, I_C = 0)	BV_{EBO}	4.0	-	Vdc
Collector Cutoff Current (V_{CE} = 15 Vdc, V_{BE} = 0)	I_{CES}	-	100	μAdc
Base Current (V_{CE} = 15 Vdc, V_{BE} = 0)	I_B	-	100	μAdc

*Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2%

ELECTRICAL CHARACTERISTICS (continued)

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
DC Current Gain	h_{FE}			
(I_C = 10 mAdc, V_{CE} = 0.5 Vdc)		20	-	
(I_C = 100 mAdc, V_{CE} = 0.5 Vdc) (1)		30	-	
(I_C = 300 mAdc, V_{CE} = 0.5 Vdc) (1)		30	120	
(I_C = 300 mAdc, V_{CE} = 0.5 Vdc, T_A = -55°C) (1)		10	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1 mAdc)		-	0.25	
(I_C = 100 mAdc, I_B = 10 mAdc) (1)		-	0.23	
(I_C = 300 mAdc, I_B = 30 mAdc) (1)		-	0.33	
(I_C = 300 mAdc, I_B = 30 mAdc, T_A = 125°C) (1)		-	0.50	
(I_C = 1 Adc, I_B = 100 mAdc) (1)		-	0.70	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1 mAdc)		-	0.78	
(I_C = 100 mAdc, I_B = 10 mAdc) (1)		-	1.10	
(I_C = 300 mAdc, I_B = 30 mAdc) (1)		-	1.30	
(I_C = 1 Adc, I_B = 100 mAdc) (1)		-	2.1	
DYNAMIC CHARACTERISTICS				
Current-Gain – Bandwidth Product (I_C = 100 mAdc, V_{CE} = 5 Vdc, f = 100 MHz)	f_T	450	-	MHz
Output Capacitance (V_{CB} = 5 Vdc, I_E = 0, f = 140 kHz)	C_{ob}	-	15	pF
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 140 kHz)	C_{ib}	-	25	pF
Turn-On Time (Figure 1) ($V_{EB(off)} \approx$ 4 Vdc, $I_C \approx$ 1 Adc, $I_{B1} \approx$ 100 mAdc)	t_{on}	-	15	ns
Turn-Off Time (Figure 1) ($I_C \approx$ 1 Adc, $I_{B1} \approx I_{B2} \approx$ 100 mAdc)	t_{off}	-	25	ns
Storage Time (Figure 2) ($I_C \approx$ 100 mAdc, $I_{B1} \approx I_{B2} \approx$ 100 mAdc)	t_s	-	15	ns

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle $\leq$ 2%

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

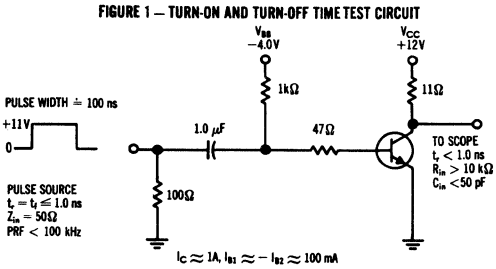

FIGURE 2 – STORAGE TIME TEST CIRCUIT