2N3209 (SILICON)

PNP SILICON ANNULAR TRANSISTOR

. . . designed for medium-speed saturated switching applications.

- Low Collector-Emitter Saturation Voltage –
  $V_{CE(sat)}$ = 0.15 Vdc (Max) @ I_C = 10 mAdc
- Low Output Capacitance –
  C_{ob} = 5.0 pF (Max) @ V_{CB} = 5.0 Vdc
- DC Current Gain Specified – 10 mAdc to 100 mAdc

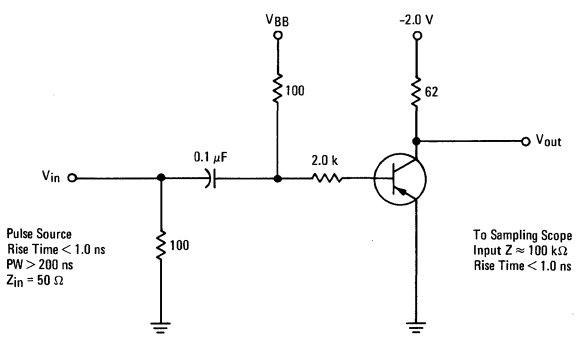
PNP SILICON TRANSISTOR

*MAXIMUM RATINGS

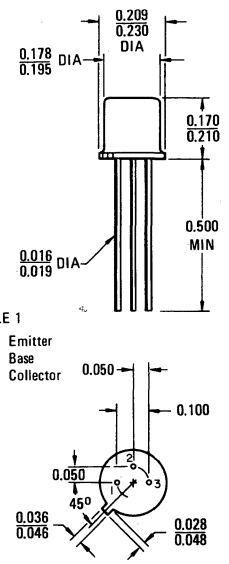
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	20	Vdc
Collector-Base Voltage	V_{CB}	20	Vdc
Emitter-Base Voltage	V_{EB}	4.0	Vdc
Collector Current	I_C	200	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	360 2.06	mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.2 6.85	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J,T_{stg}	-65 to +200	°C

*Indicates JEDEC Registered Data.

FIGURE 1 – SWITCHING TIME TEST CIRCUIT



Notes:
(1) Collector Current ≈ 30 mA
(2) Turn On and Turn Off Base Currents ≈ 1.5 mA
(3) t_{on} – V_{BB} = +3.0 V, V_{in} = -7.0 V
(4) t_{off} – V_{BB} = -4.0 V, V_{in} = +6.0 V



To convert to millimeters multiply by 25.4.
All JEDEC TO-18 dimensions and notes apply.

Collector Connected to Case
CASE 22(1)
TO-18

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage(1) (I_C = 10 mAdc, I_B = 0)	$V_{CEO(sus)}$	20	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 10 μAdc, V_{BE} = 0)	BV_{CES}	20	–	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	BV_{CBO}	20	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	BV_{EBO}	4.0	–	Vdc
Collector Cutoff Current	I_{CES}			
(V_{CE} = 10 Vdc, V_{BE} = 0)		–	0.080	μAdc
(V_{CE} = 10 Vdc, V_{BE} = 0, T_A = 125°C)		–	10	μAdc
Base Current (V_{CE} = 10 Vdc, V_{BE} = 0)	I_B	–	80	nAdc
ON CHARACTERISTICS				
DC Current Gain(1)	h_{FE}			–
(I_C = 10 mAdc, V_{CE} = 0.3 Vdc)		25	–	
(I_C = 30 mAdc, V_{CE} = 0.5 Vdc)		30	120	
(I_C = 30 mAdc, V_{CE} = 0.5 Vdc, T_A = -55°C)		12	–	
(I_C = 100 mAdc, V_{CE} = 1.0 Vdc)		15	–	
Collector-Emitter Saturation Voltage(1)	$V_{CE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)		–	0.15	
(I_C = 30 mAdc, I_B = 3.0 mAdc)		–	0.2	
(I_C = 100 mAdc, I_B = 10 mAdc)		–	0.6	
Base-Emitter Saturation Voltage(1)	$V_{BE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)		0.78	0.98	
(I_C = 30 mAdc, I_B = 3.0 mAdc)		0.85	1.2	
(I_C = 100 mAdc, I_B = 10 mAdc)		–	1.7	
DYNAMIC CHARACTERISTICS				
Current-Gain–Bandwidth Product(2) (I_C = 30 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	f_T	400	–	MHz
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 140 kHz)	C_{ob}	–	5.0	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 140 kHz)	C_{ib}	–	6.0	pF
SWITCHING CHARACTERISTICS (Figure 1)				
Turn-On Time ($I_C \approx 30$ mAdc, $I_{B1} \approx 1.5$ mAdc)	t_{on}	–	60	ns
Turn-Off Time ($I_C \approx 30$ mAdc, $I_{B1} = I_{B2} \approx 1.5$ mAdc)	t_{off}	–	90	ns

*Indicates JEDEC Registered Data.

(1)Pulse Test: Pulse Width = 300 μs, Duty Cycle = 1.0%.

(2)f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.