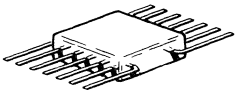
2N5146 (SILICON)

PNP SILICON ANNULAR MULTIPLE TRANSISTORS

. . . designed for use in high current, high speed switching applications.

- Low Collector-Emitter Saturation Voltage –
  $V_{CE(sat)}$ = 1.0 Vdc (Max) @ I_C = 1.0 Adc
- DC Current Gain Specified – 20 (Min) @ I_C = 1.0 Adc
- High Current-Gain–Bandwidth Product –
  f_T = 150 MHz (Min) @ I_C = 50 mAdc
- Fast Turn-On Time
  t_{on} = 40 ns, t_{off} = 110 ns

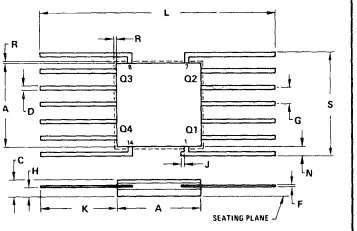
PNP SILICON MULTIPLE TRANSISTORS



*MAXIMUM RATINGS

Rating	Symbol	Value		Unit
Collector-Emitter Voltage	V_{CEO}	40		Vdc
Collector-Base Voltage	V_{CB}	40		Vdc
Emitter-Base Voltage	V_{EB}	5.0		Vdc
Collector Current	I_C	1.5		Adc
Operating and Storage Junction Temperature Range	T_J,T_{stg}	-65 to +200		°C
		One Die	All Die Equal Power	
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	400 2.28	600 3.42	mW mW/°C
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	0.9 5.13	3.6 20.5	Watts mW/°C

*Indicates JEDEC Registered Data.



STYLE 1
PIN 1 COLLECTOR
2 BASE
3 EMITTER
4 NOT CONNECTED
5 EMITTER
6 BASE
7 COLLECTOR
8 COLLECTOR
9 BASE
10 EMITTER
11 NOT CONNECTED
12 EMITTER
13 BASE
14 COLLECTOR

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	6.10	6.99	0.240	0.275
C	0.76	2.03	0.030	0.080
D	0.25	0.48	0.010	0.019
F	0.08	0.15	0.003	0.006
G	1.27 BSC		0.050 BSC	
H	0.13	0.89	0.005	0.035
J	–	0.38	–	0.015
K	6.35	–	0.250	–
L	18.80	–	0.740	–
N	0.25	–	0.010	–
R	–	0.38	–	0.015
S	7.62	8.38	0.300	0.330

CASE 607-04

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (1) (I_C = 10 mAdc, I_B = 0)	BV_{CEO}	40	-	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	BV_{CBO}	40	-	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	BV_{EBO}	5.0	-	Vdc
Collector Cutoff Current (V_{CE} = 30 Vdc, $V_{BE(off)}$ = 2.0 Vdc)	I_{CEV}	-	100	nAdc
Emitter Cutoff Current (V_{BE} = 3.0 Vdc, I_C = 0)	I_{EBO}	-	100	nAdc
Base Cutoff Current (V_{CE} = 30 Vdc, $V_{BE(off)}$ = 2.0 Vdc)	I_{BEV}	-	200	nAdc
ON CHARACTERISTICS				
DC Current Gain (1) (I_C = 1.0 Adc, V_{CE} = 2.0 Vdc)	h_{FE}	20	-	-
Collector-Emitter Saturation Voltage (1) (I_C = 1.0 Adc, I_B = 0.1 Adc)	$V_{CE(sat)}$	-	1.0	Vdc
Base-Emitter Saturation Voltage (1) (I_C = 1.0 Adc, I_B = 0.1 Adc)	$V_{BE(sat)}$	-	1.4	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain–Bandwidth Product (I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	f_T	150	-	MHz
Collector-Base Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)	C_{cb}	-	20	pF
Emitter-Base Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 100 kHz)	C_{eb}	-	80	pF
SWITCHING CHARACTERISTICS (See Figure 1)				
Delay Time	(V_{CC} = 30 Vdc, $V_{BE(off)}$ = 0.5 Vdc, I_C = 1.0 Adc, I_{B1} = 0.1 Adc)	t_d	-	10	ns
Rise Time		t_r	-	30	ns
Storage Time	(V_{CC} = 30 Vdc, I_C = 1.0 Adc, I_{B1} = I_{B2} = 0.1 Adc)	t_s	-	80	ns
Fall Time		t_f	-	30	ns

* Indicates JEDEC Registered Data

(1) **Pulse test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%**

FIGURE 1 – SWITCHING TIME TEST CIRCUIT