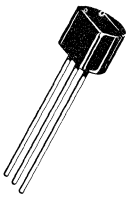
2N5845 (SILICON)
2N5845A

NPN SILICON ANNULAR TRANSISTORS

. . . designed for high-current saturated switching and core driver applications.

- Fast Switching Times @ I_C = 500 mAdc –
  t_{on} = 30 ns (Max) – 2N5845A
  40 ns (Max) – 2N5845
  t_{off} = 50 ns (Max) – 2N5845A
  60 ns (Max) – 2N5845
- High Current Gain – Bandwidth Product –
  f_T = 250 MHz (Min) – 2N5845A
  200 MHz (Min) – 2N5845
- Low Collector-Emitter Saturation Voltage – @ I_C = 500 mAdc –
  $V_{CE(sat)}$ = 0.5 Vdc (Max) – 2N5845A
  0.6 Vdc (Max) – 2N5845

NPN SILICON SWITCHING TRANSISTORS



*MAXIMUM RATINGS

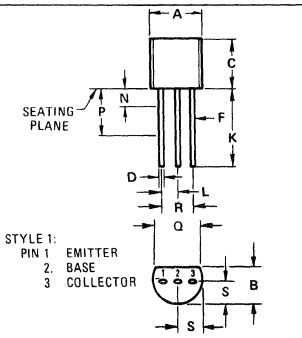
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CB}	50	Vdc
Emitter-Base Voltage	V_{EB}	6.0	Vdc
Collector Current – Continuous	I_C	1.0	Adc
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0	mW mW/°C
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12	Watt mW/°C
Operating and Storage Junction Temperature Range	T_J,T_{stg}	-55 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$(1)	200	°C/W

*Indicates JEDEC Registered Data.

(1) $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board.



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	4.450	5.200	0.175	0.205
B	3.180	4.190	0.125	0.165
C	4.320	5.330	0.170	0.210
D	0.407	0.533	0.016	0.021
F	0.407	0.482	0.016	0.019
K	12.700	–	0.500	–
L	1.150	1.390	0.045	0.055
N	–	1.270	–	0.050
P	6.350	–	0.250	–
Q	3.430	–	0.135	–
R	2.410	2.670	0.095	0.105
S	2.030	2.670	0.080	0.105

CASE 29-02
TO-92

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

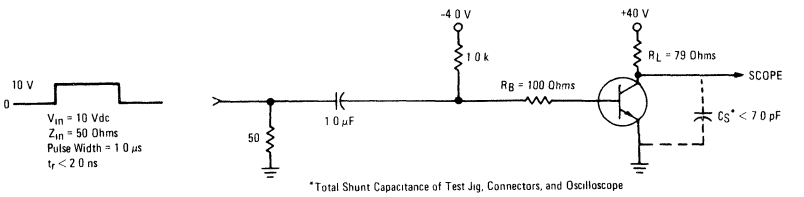
Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ① (I_C = 10 mAdc, I_B = 0)		BV_{CEO}	40	–	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)		BV_{CBO}	50	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		BV_{EBO}	6.0	–	Vdc
Collector Cutoff Current (V_{CB} = 40 Vdc, I_E = 0)		I_{CBO}	–	500	nAdc
Emitter Cutoff Current (V_{BE} = 4.0 Vdc, I_C = 0)		I_{EBO}	–	50	nAdc
ON CHARACTERISTICS					
DC Current Gain ①		h_{FE}			–
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)			50	–	
(I_C = 100 mAdc, V_{CE} = 1.0 Vdc)			50	200	
(I_C = 500 mAdc, V_{CE} = 1.0 Vdc)	2N5845		25	150	
	2N5845A		35	150	
Collector-Emitter Saturation Voltage ①		$V_{CE(sat)}$			Vdc
(I_C = 100 mAdc, I_B = 10 mAdc)			–	0.25	
(I_C = 500 mAdc, I_B = 50 mAdc)	2N5845		–	0.6	
	2N5845A		–	0.5	
Base-Emitter Saturation Voltage		$V_{BE(sat)}$			Vdc
(I_C = 100 mAdc, I_B = 10 mAdc)			–	0.85	
(I_C = 500 mAdc, I_B = 50 mAdc)			0.8	1.1	
DYNAMIC CHARACTERISTICS					
Current-Gain–Bandwidth Product ② (I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	2N5845	f_T	200	–	MHz
	2N5845A		250	–	
Collector-Base Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)		C_{cb}	–	9.0	pF
Emitter-Base Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 100 kHz)		C_{eb}	–	70	pF
SWITCHING CHARACTERISTICS					
Turn-On Time	(V_{CC} = 40 Vdc, I_C = 500 mAdc, I_{B1} = 50 mAdc, $V_{BE(off)}$ = 4.0 Vdc)	2N5845	–	40	ns
		2N5845A	–	30	
Delay Time		2N5845	–	17	ns
		2N5845A	–	15	
Rise Time		2N5845	–	28	ns
		2N5845A	–	25	
Turn-Off Time	(V_{CC} = 40 Vdc, I_C = 500 mAdc, I_{B1} = I_{B2} = 50 mAdc)	2N5845	–	60	ns
		2N5845A	–	50	
Storage Time		2N5845	–	40	ns
		2N5845A	–	38	
Fall Time		2N5845	–	30	ns
		2N5845A	–	27	

*Indicates JEDEC Registered Data.

① Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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

FIGURE 1 – SWITCHING TIMES TEST CIRCUIT



*Total Shunt Capacitance of Test Jig, Connectors, and Oscilloscope

TRANSIENT CHARACTERISTICS

FIGURE 2 – DELAY TIME

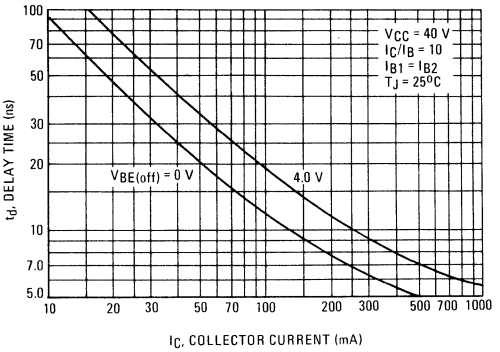


FIGURE 3 – RISE TIME

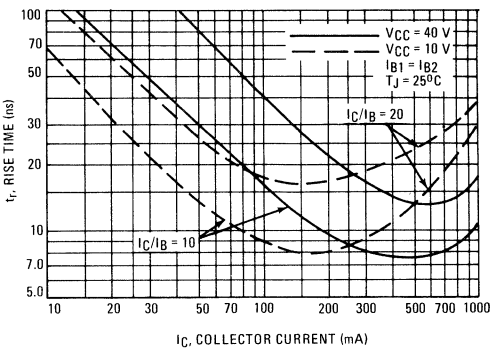


FIGURE 4 – STORAGE TIME

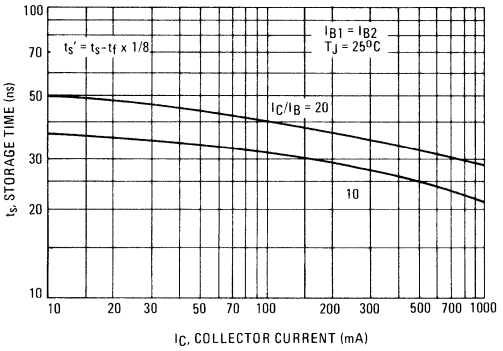


FIGURE 5 – STORAGE TIME CONTOURS

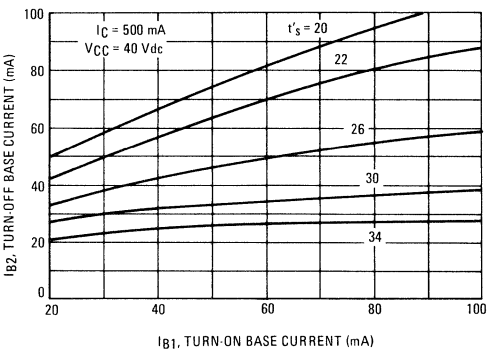


FIGURE 6 – FALL TIME

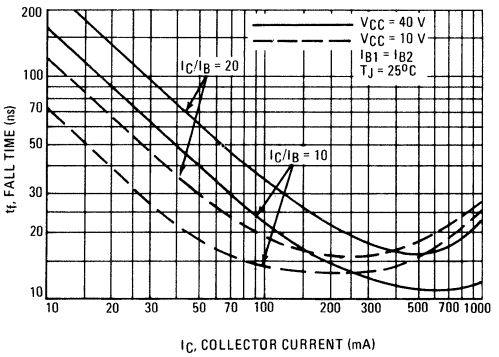
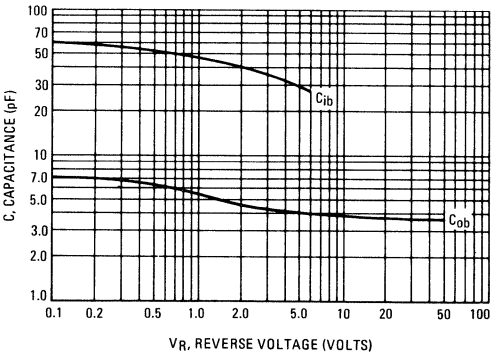


FIGURE 7 – CAPACITANCES



STATIC CHARACTERISTICS

FIGURE 8 – DC CURRENT GAIN

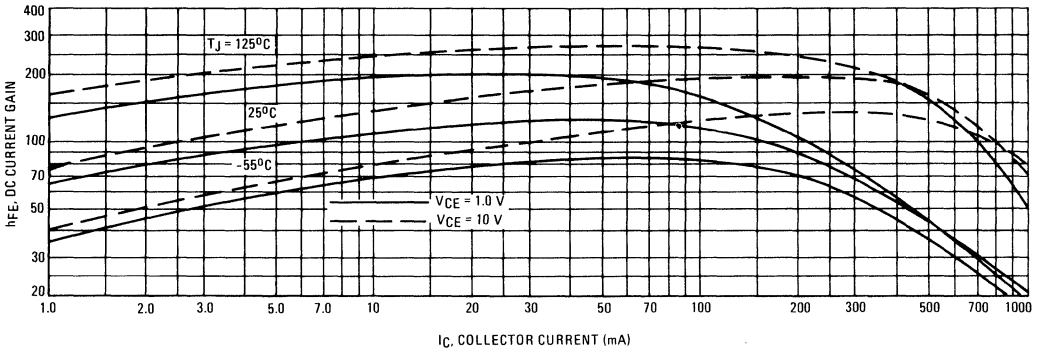


FIGURE 9 – SATURATION REGION

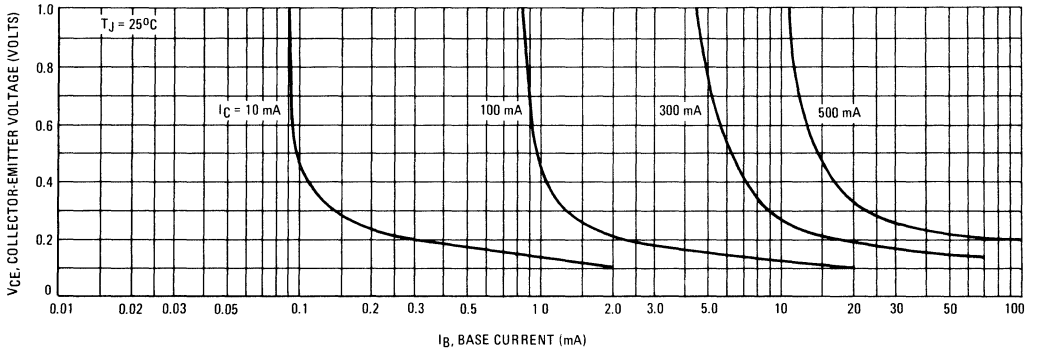


FIGURE 10 – "ON" VOLTAGES

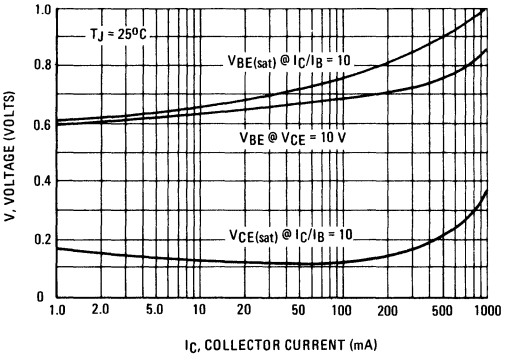


FIGURE 11 – TEMPERATURE COEFFICIENTS