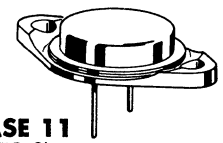
2N3445 thru 2N3448 (SILICON)



CASE 11
(TO-3)
Collector connected to case

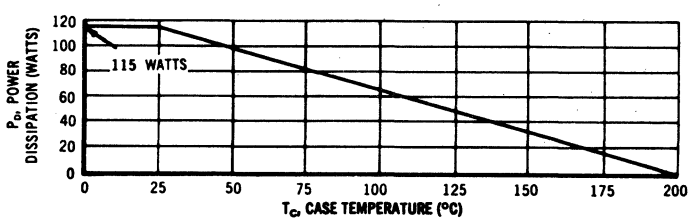
NPN silicon power transistors for switching and amplifier applications requiring fast response, wide band and good Beta linearity.

MAXIMUM RATINGS

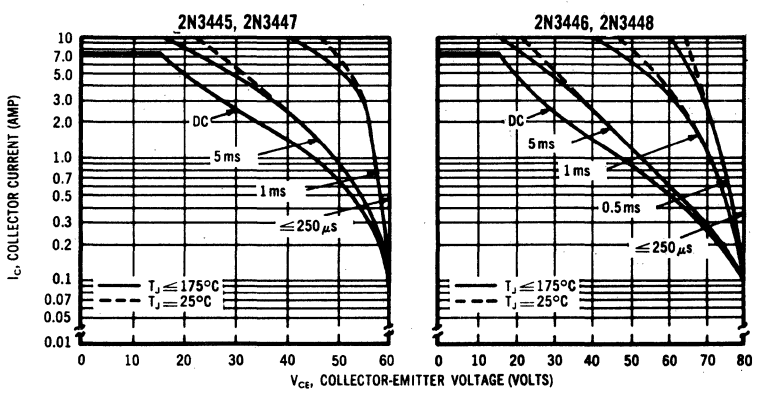
Rating	Symbol	2N3445 2N3447	2N3446 2N3448	Unit
Collector-Base Voltage	V_{CB}	80	100	Volts
Collector-Emitter Voltage	V_{CEO}	60	80	Volts
Emitter-Base Voltage	V_{EB}	6.0	10	Volts
Collector Current	I_C	7.5		Amp
Base Current	I_B	4.0		Amp
Power Dissipation	P_D	115		Watts
Junction Operating Temperature Range	T_J	-65 to +200		°C

POWER-TEMPERATURE DERATING CURVE

These transistors are also subject to safe area curves. Both limits are applicable and must be observed.



SAFE OPERATING AREAS

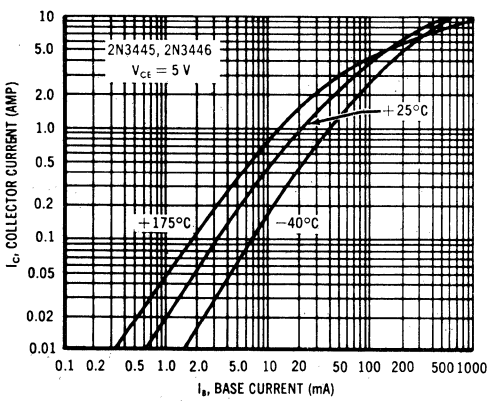


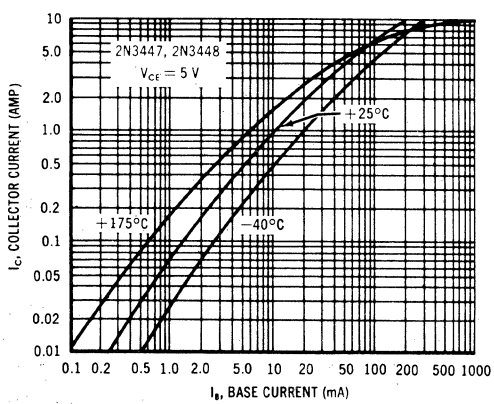
The Safe Operating Area Curves indicate $I_C - V_{CE}$ limits below which the device will not go into secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a collector-emitter short. (Duty cycle of the excursions make no significant change in these safe areas.) To insure operation below the maximum T_J, the power-temperature derating curve must be observed for both steady state and pulse power conditions.

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

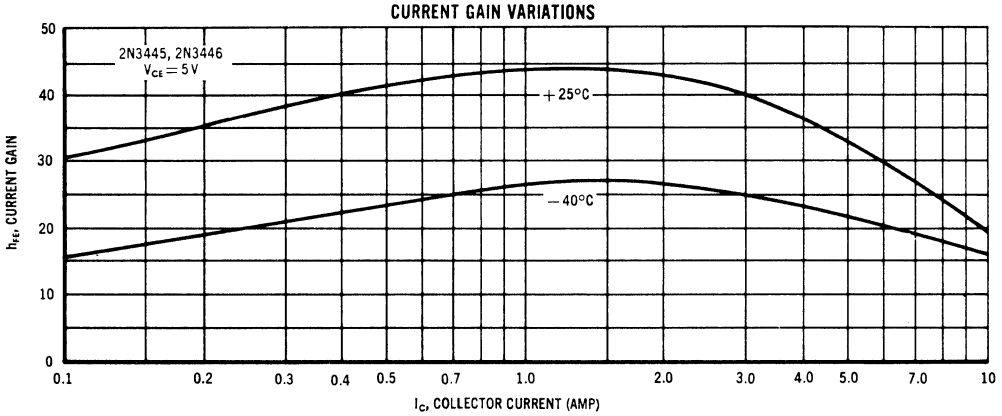
Characteristic		Symbol	Min	Typ	Max	Unit
Emitter-Base Cutoff Current		I_{EBO}				mAdc
(V_{EB} = 6 Vdc)	2N3445, 2N3447		—	—	0.25	
(V_{EB} = 10 Vdc)	2N3446, 2N3448		—	—	0.25	
Collector-Emitter Cutoff Current		I_{CEX}				mAdc
(V_{CE} = 60 Vdc, V_{BE} = -1 Vdc)	2N3445, 2N3447		—	—	0.1	
(V_{CE} = 60 Vdc, V_{BE} = -1 Vdc, T_C = 150°C)	2N3445, 2N3447		—	—	1.0	
(V_{CE} = 80 Vdc, V_{BE} = -1 Vdc)	2N3446, 2N3448		—	—	0.1	
(V_{CE} = 80 Vdc, V_{BE} = -1 Vdc, T_C = 150°C)	2N3446, 2N3448		—	—	1.0	
Collector-Emitter Cutoff Current		I_{CEO}				mAdc
(V_{CE} = 40 Vdc, I_B = 0)	2N3445, 2N3447		—	—	1.0	
(V_{CE} = 60 Vdc, I_B = 0)	2N3446, 2N3448		—	—	1.0	
Collector-Base Breakdown Voltage		BV_{CBO}				Vdc
(I_C = 1 mAdc, I_E = 0)	2N3445, 2N3447		80	—	—	
	2N3446, 2N3448		100	—	—	
Collector-Emitter Sustaining Voltage		$V_{CEO(sus)}$				Vdc
(I_C = 100 mAdc, I_B = 0)	2N3445, 2N3447		60	—	—	
	2N3446, 2N3448		80	—	—	
DC Current Gain		h_{FE}				—
(I_C = 0.5 Adc, V_{CE} = 5 Vdc)	2N3445, 2N3446		20	45	—	
	2N3447, 2N3448		40	85	—	
(I_C = 3 Adc, V_{CE} = 5 Vdc)	2N3445, 2N3446		20	40	60	
(I_C = 5 Adc, V_{CE} = 5 Vdc)	2N3447, 2N3448		40	75	120	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$				Vdc
(I_C = 3 Adc, I_B = 0.3 Adc)	2N3445, 2N3446		—	0.6	1.5	
(I_C = 5 Adc, I_B = 0.5 Adc)	2N3447, 2N3448		—	0.8	1.5	
Base-Emitter Saturation Voltage		$V_{BE(sat)}$				Vdc
(I_C = 3 Adc, I_B = 0.3 Adc)	2N3445, 2N3446		—	1.0	1.5	
(I_C = 5 Adc, I_B = 0.5 Adc)	2N3447, 2N3448		—	1.0	1.5	
Base-Emitter Voltage		V_{BE}				Vdc
(I_C = 3 Adc, V_{CE} = 5 Vdc)	2N3445, 2N3446		—	1.0	1.5	
(I_C = 5 Adc, V_{CE} = 5 Vdc)	2N3447, 2N3448		—	1.0	1.4	
Small Signal Current Gain		h_{fe}				—
(V_{CE} = 10 Vdc, I_C = 0.5 Adc, f = 1 kHz)	2N3445, 2N3446		20	—	100	
	2N3447, 2N3448		40	—	200	
(V_{CE} = 10 Vdc, I_C = 0.5 Adc, f = 10 MHz)			1.0	1.6	—	
Common Base Output Capacitance		C_{ob}				pF
(V_{CB} = 10 Vdc, f = 0.1 MHz)			—	260	400	
Switching Times						μs
(V_{CC} ≈ 25 Vdc, R_L = 5 ohms, I_C = 5 A, I_{B1} = I_{B2} = 0.5 A)						
Delay Time plus Rise Time		$t_d + t_r$	—	0.15	0.35	
Storage Time		t_s	—	0.9	2.0	
Fall Time		t_f	—	0.15	0.35	

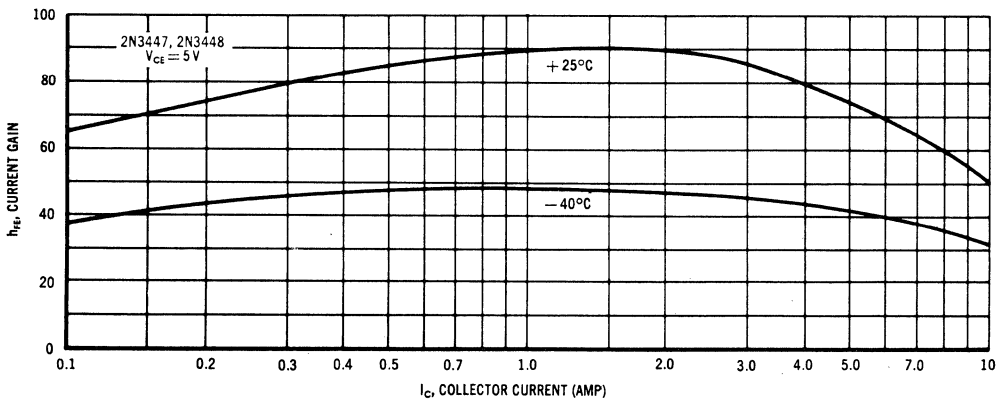
COLLECTOR CURRENT versus BASE CURRENT



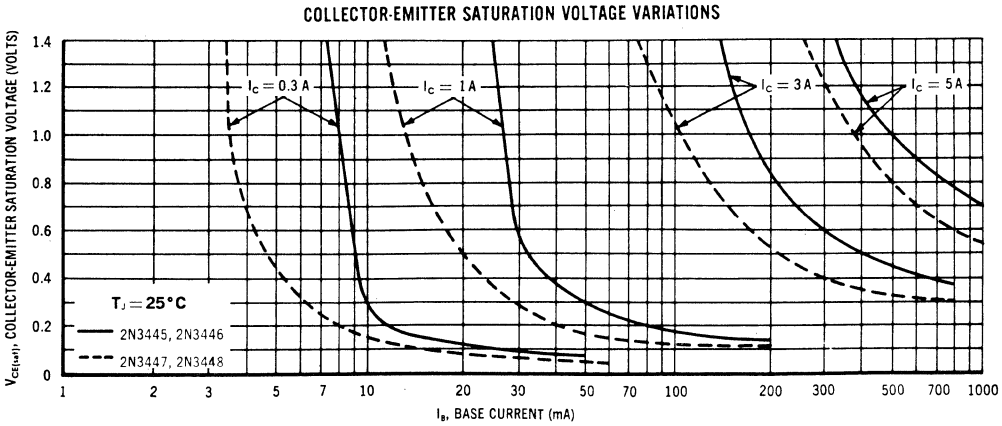


CURRENT GAIN VARIATIONS

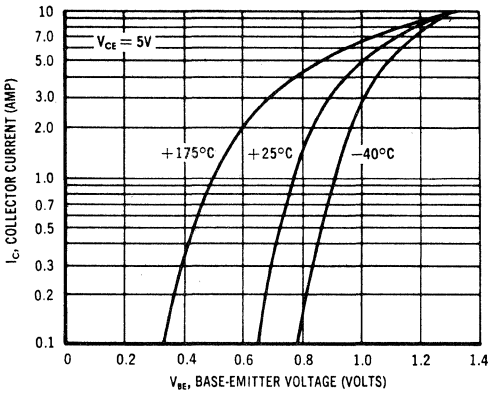




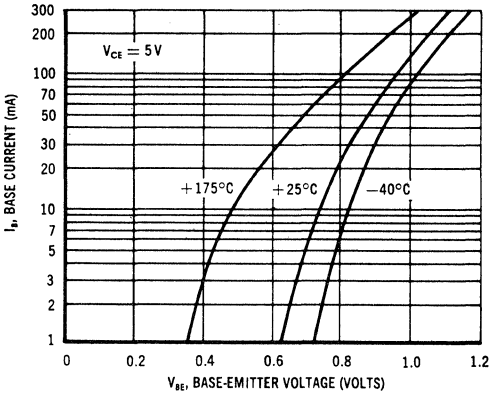
COLLECTOR-EMITTER SATURATION VOLTAGE VARIATIONS



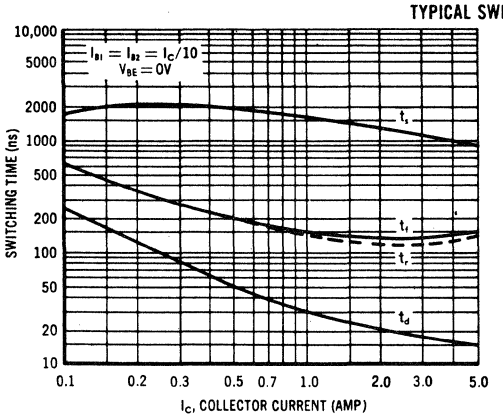
COLLECTOR CURRENT-VOLTAGE VARIATIONS



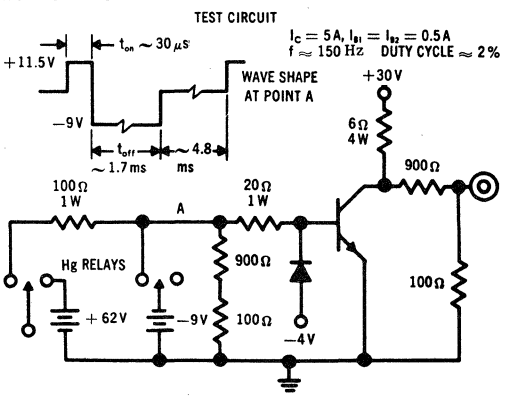
BASE CURRENT-VOLTAGE VARIATIONS



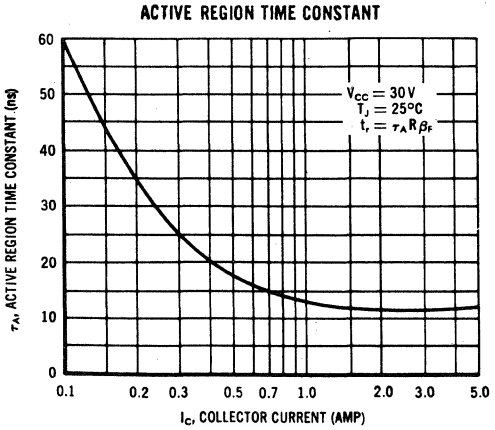
TYPICAL SWITCHING TIMES



TEST CIRCUIT



ACTIVE REGION TIME CONSTANT



RISE TIME FACTOR