VERY HIGH SPEED
NPN POWER TRANSISTORS
COMPLEMENTARY TO THE D45VH SERIES

D44VH Series

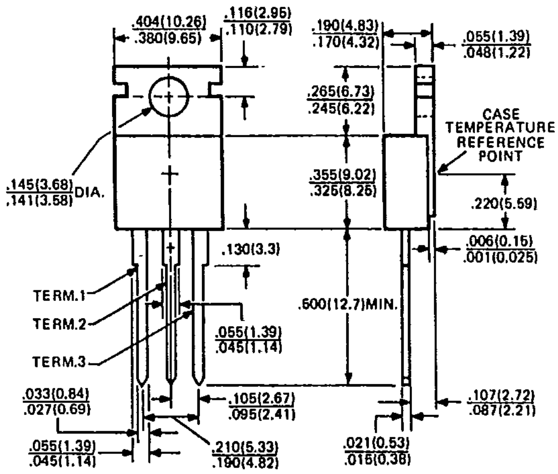
30-80 VOLTS
15 AMP, 83 WATTS

The D44VH is an NPN power transistor especially designed for use in switching circuits such as switching regulators, high-frequency inverters/converters and other applications where very fast switching and low-saturation voltages are necessary. This device complements the D45VH PNP power transistor and is characterized with performance information which relates directly to switching.

Features:

- Fast Switching $t_s \leq 700$ ns resistive
  $t_f \leq 200$ ns
- Low $V_{CE(sat)} \leq 0.4V$ @ $I_C = 8A$

CASE STYLE TO-220AB
DIMENSIONS ARE IN INCHES AND (MILLIMETERS)



TYPE	TERM. 1	TERM. 2	TERM. 3	TAB
TO-220-AB	BASE	COLLECTOR	EMITTER	COLLECTOR

maximum ratings (T_A = 25° C) (unless otherwise specified)

RATING	SYMBOL	D44VH1	D44VH4	D44VH7	D44VH10	UNIT
Collector-Emitter Voltage	$V_{CEO(sus)}$	30	45	60	80	V
Collector-Emitter Voltage	V_{CEX}	40	55	70	90	V
Collector-Emitter Voltage	V_{CEV}	50	65	80	100	V
Emitter Base Voltage	V_{EB}		7			V
Collector Current — Continuous — Peak (1)	I_C I_{CM}		15 20			A
Base Current — Continuous — Peak (1)	I_B I_{BM}		5 10			A
Total Power Dissipation @ T_C = 25°C @ T_C = 100°C Derate above 25°C	P_D		83 33 .67			Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{STG}		-55 to +150			°C

thermal characteristics

CHARACTERISTICS	SYMBOL	MAX	UNIT
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.5	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	74	°C/W
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	T_L	235	°C

(1) Pulse measurement condition PW $\leq$ 6.0 ms, See Figure 14.

electrical characteristics ($T_C = 25°C$) (unless otherwise specified)

CHARACTERISTICS	SYMBOL	MIN	MAX	UNIT

off characteristics(1)

CHARACTERISTICS	SYMBOL	MIN	MAX	UNIT
Collector-Emitter Sustaining Voltage(1) (I_C = 100mA, I_B = 0)	$V_{CEO(sus)}$			V
D44VH1		30	—	
D44VH4		45	—	
D44VH7		60	—	
D44VH10		80	—	
Collector-Emitter Voltage(2) (I_C = 1A, V_{CLAMP} = Rated V_{CEX}, T_C = 100°C)	V_{CEX}			V
D44VH1		40	—	
D44VH4		55	—	
D44VH7		65	—	
D44VH10		90	—	
Collector Cutoff Current	I_{CEV}			μA
(V_{CEV} = Rated Value, $V_{BE(off)}$ = 4.0V)		—	10	
(V_{CEV} = Rated Value, $V_{BE(off)}$ = 4.0V, T_C = 100°C)		—	100	
Collector Cutoff Current (V_{CE} = Rated V_{CEV}, R_{BE} = 50 Ω, T_C = 100°C)	I_{CER}	—	100	μA
Emitter Cutoff Current (V_{EB} = 7V, I_C = 0)	I_{EBO}	—	10	μA

second breakdown

CHARACTERISTICS	SYMBOL	
Second Breakdown with Base Forward Biased	F_{BSOA}	SEE FIGURE 7
Second Breakdown with Base Reverse Biased	R_{BSOA}	SEE FIGURE 8

on characteristics(1)

CHARACTERISTICS	SYMBOL	MIN	MAX	UNIT
DC Current Gain	h_{FE}			—
(I_C = 2 A, V_{CE} = 1V)		35	—	
(I_C = 4 A, V_{CE} = 1V)		20	—	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			V
(I_C = 8A, I_B = 0.4A)		—	0.4	
(I_C = 8A, I_B = 0.4A, T_C = 100°C)		—	0.5	
(I_C = 15A, I_B = 3.0A, T_C = 100°C)		—	0.8	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			V
(I_C = 8A, I_B = 0.4A)		—	1.2	
(I_C = 8A, I_B = 0.4A, T_C = 100°C)		—	1.1	

dynamic characteristics

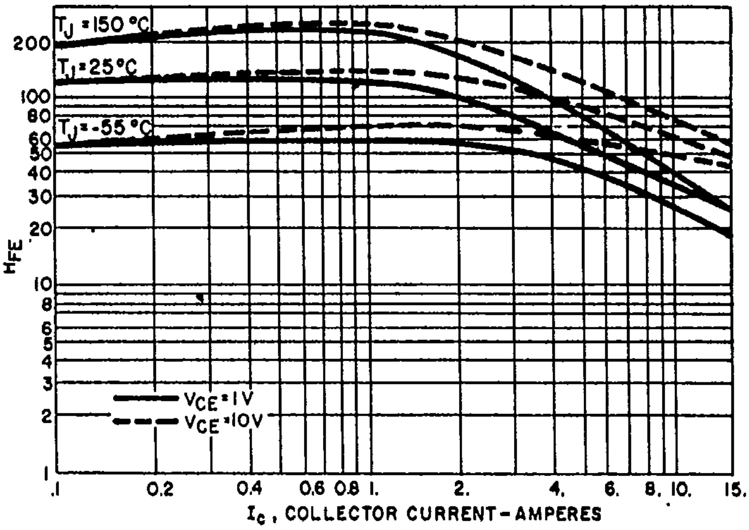
CHARACTERISTICS	SYMBOL	Typical	UNIT
Current-Gain — Bandwidth Product (I_C = 0.1A, V_{CE} = 10V, f_{test} = 1 MHz)	f_T	50	MHz
Output Capacitance (V_{CB} = 10V, I_E = 0, f_{test} = 1 MHz)	C_{OB}	120	pF

switching characteristics

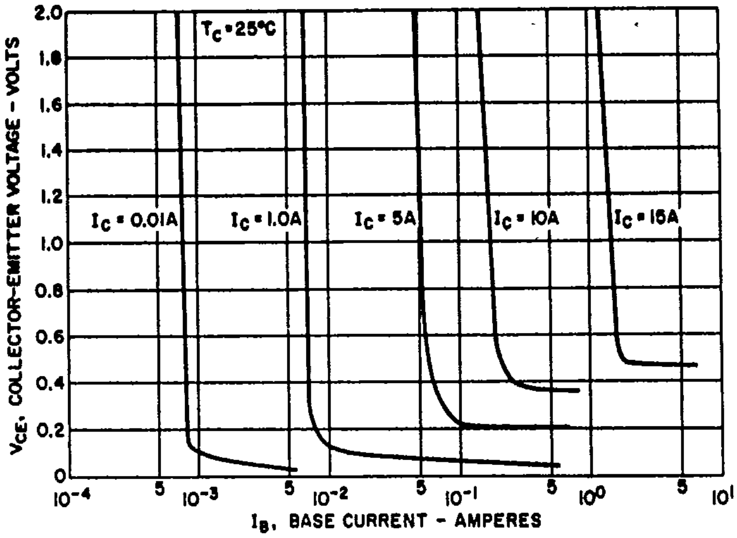
			Maximum		
Resistive Load (See Figure 16 for Test Circuit)		T_C	25°C	100°C	
Delay Time	V_{CC} = 20V, I_C = 8A	t_d	50	—	nsec
Rise Time	$I_{B1} = I_{B2}$ = 0.8A	t_r	250	—	nsec
Storage Time	t_p = 25 μsec	t_s	700	—	nsec
Fall Time		t_f	200	—	nsec
Inductive Load, Clamped (See Figure 15 for Test Circuit)					
Storage Time	V_{CC} = 20V, I_C = 8A	t_s	800	—	nsec
Fall Time	V_{CLAMP} = Rated V_{CEX}	t_f	180	400	nsec
	I_{B1} = 0.8A, $V_{BE(off)}$ = −5V		Typical		
Storage Time	L = 200 μh	t_s	280	370	nsec
Fall Time		t_f	130	150	nsec

(1) Pulse Duration = 300 μsec, Duty Factor ≤ 2%.
(2) See Figure 15 for Test Circuit.

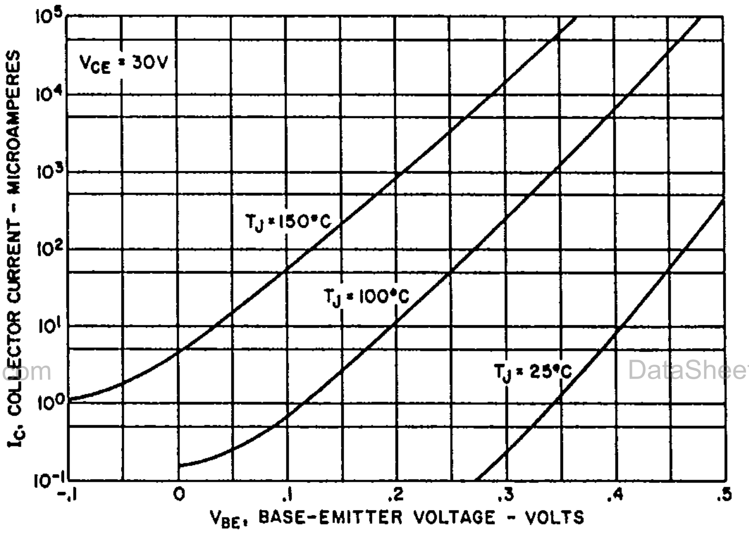
SAFE OPERATING AREA



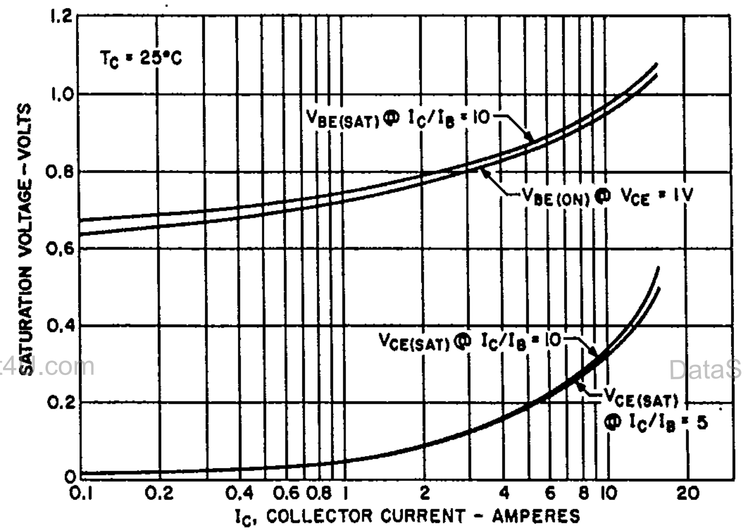
1. DC CURRENT GAIN



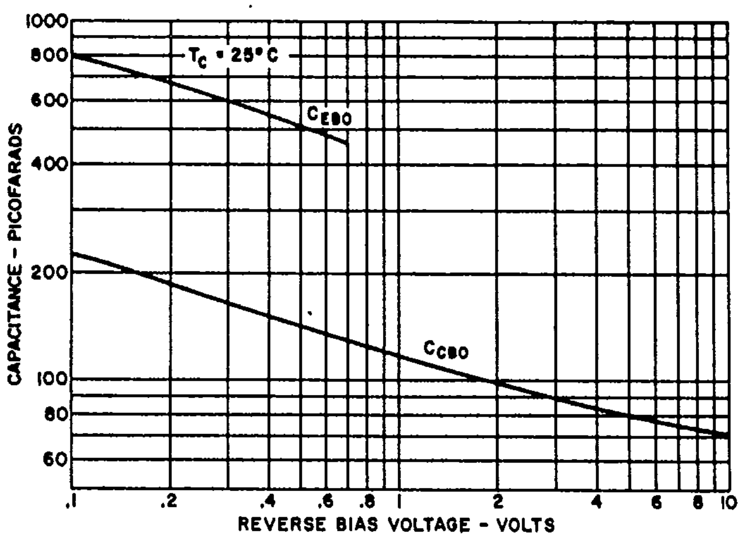
2. COLLECTOR SATURATION REGION



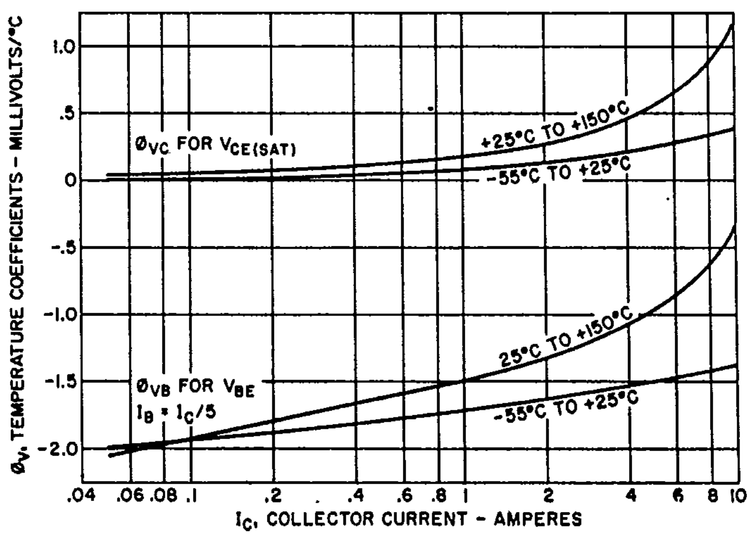
3. COLLECTOR CUTOFF REGION



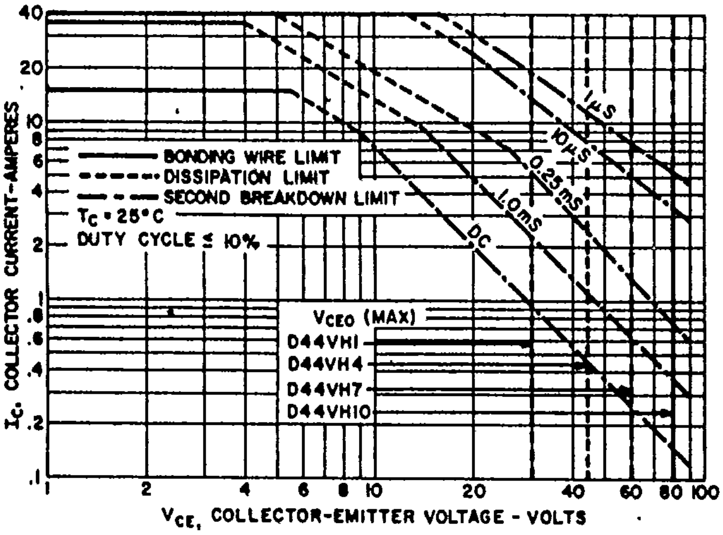
4. SATURATION VOLTAGE



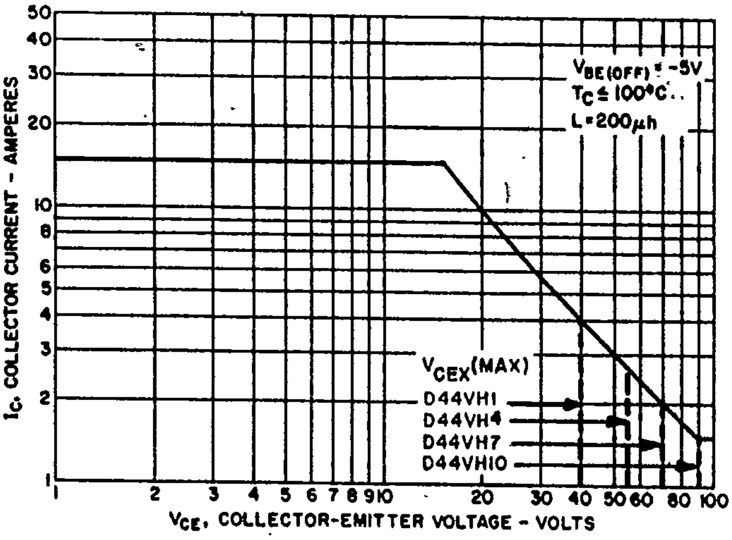
5. CAPACITANCE



6. SATURATION VOLTAGE TEMPERATURE COEFFICIENTS

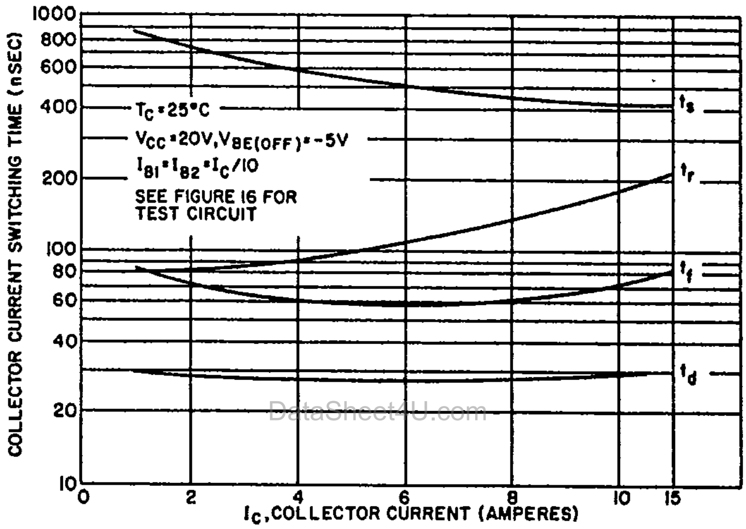


7. FORWARD BIAS SOA

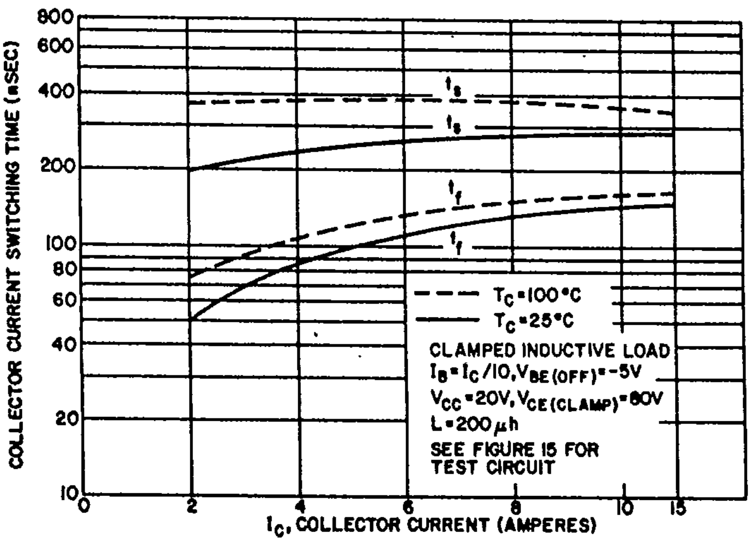


8. REVERSE BIAS SOA

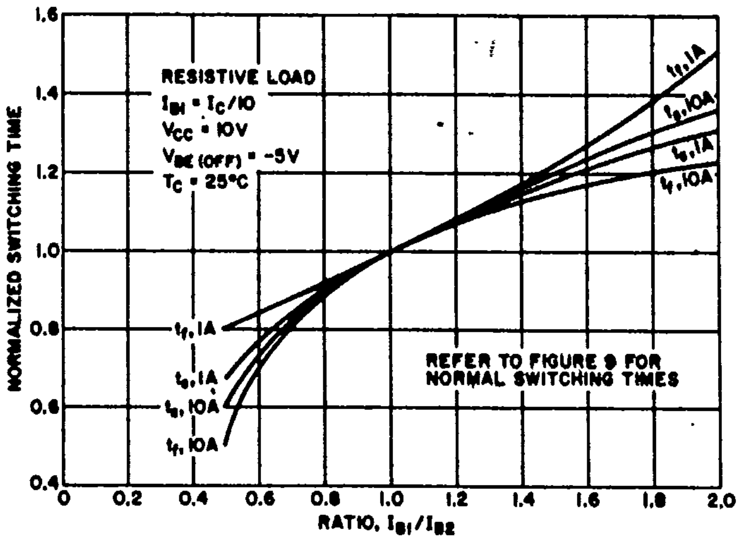
TYPICAL SWITCHING CHARACTERISTICS



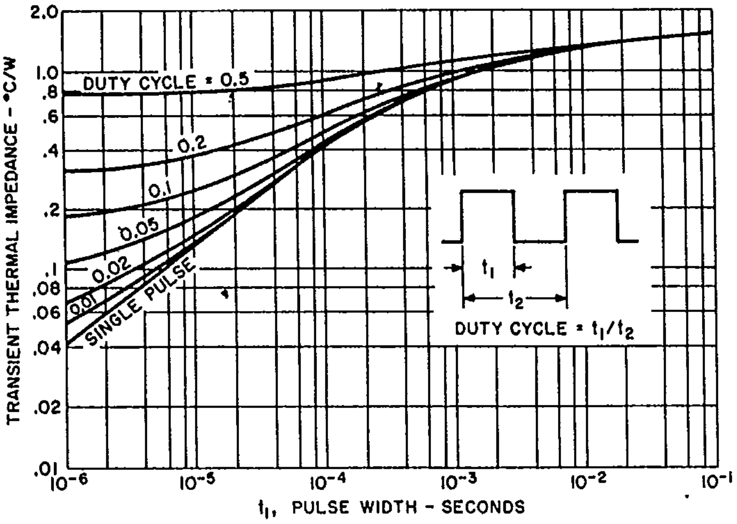
9. RESISTIVE SWITCHING TIME



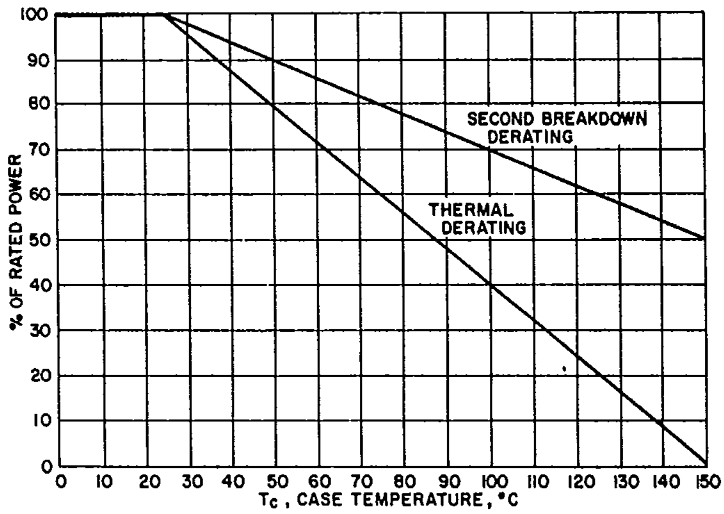
10. CLAMPED INDUCTIVE SWITCHING TIME



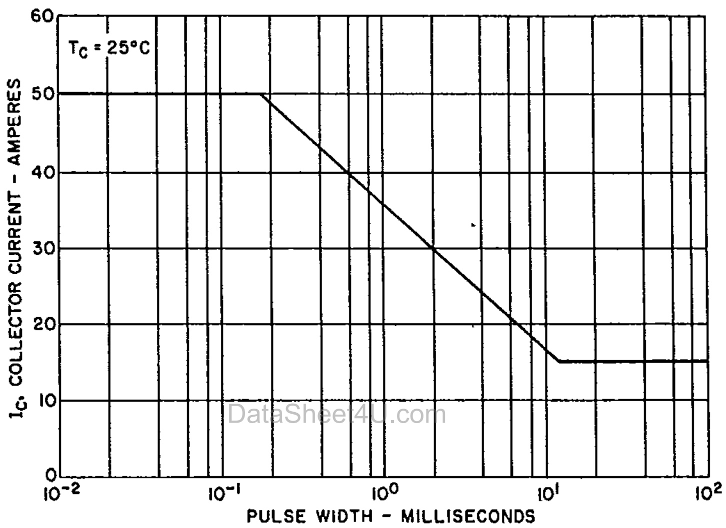
11. SWITCHING TIME VARIATION WITH I_{B2}



12. TRANSIENT THERMAL RESPONSE

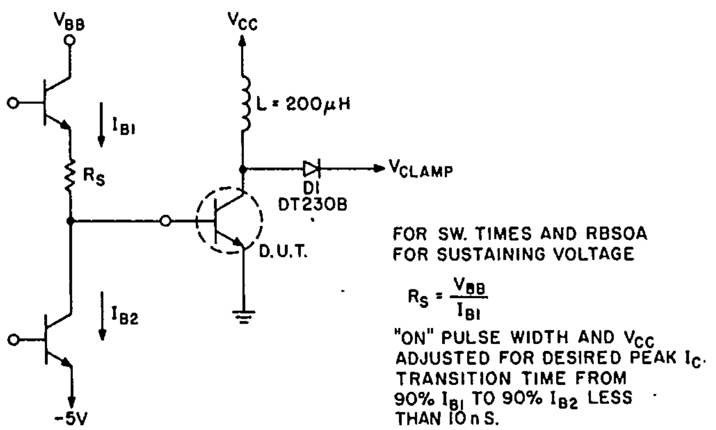


13. POWER DERATING FACTOR

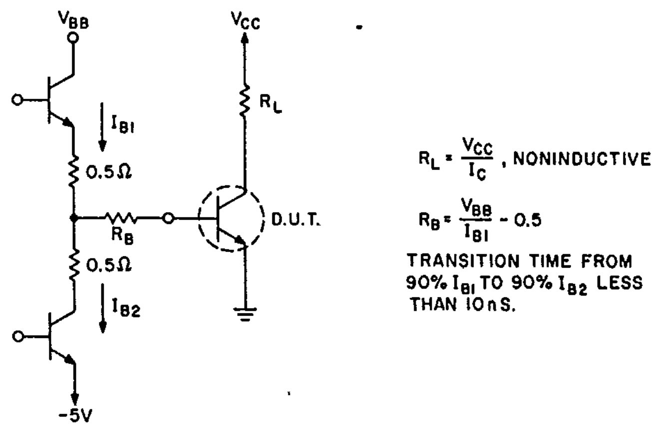


14. MAXIMUM SINGLE PULSE COLLECTOR CURRENT

TEST CIRCUITS



15. INDUCTIVE SWITCHING AND V_{CEX}



16. RESISTIVE SWITCHING