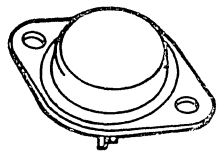
HIGH SPEED
NPN POWER DARLINGTON TRANSISTORS

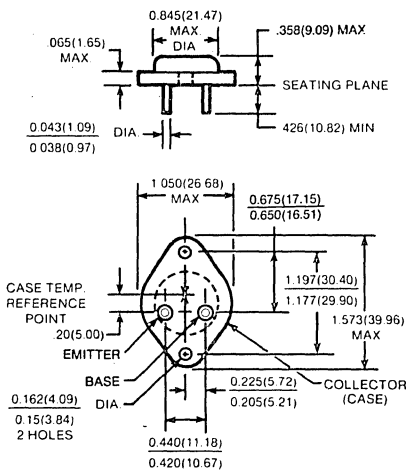
GE6251,2,3

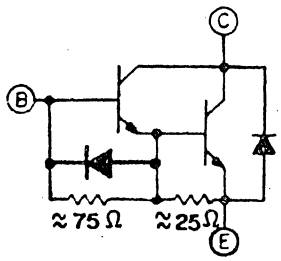
450-550 VOLTS
10 AMP, 125 WATTS

These devices are designed for use in high speed switching applications, such as off-line switching power supplies, AC & DC motor control, UPS systems, ultrasonic equipment and other high frequency power conversion equipment.



CASE STYLE TO-204AA (TO-3)
DIMENSIONS ARE IN INCHES AND (MILLIMETERS)





DEVICE CIRCUIT

maximum ratings (T_C = 25° C) (unless otherwise noted)

RATING	SYMBOL	GE6251	GE6252	GE6253	UNITS
Collector-Base Voltage	V_{CBO}	450	500	550	Volts
Collector-Emitter Voltage	V_{CEO}	400	450	500	Volts
Emitter Base Voltage	V_{EBO}	5	5	5	Volts
Collector Current — Continuous Peak (Repetitive) Peak (Non-Repetitive)	I_C I_{CM} I_{CSM}	10 15 25	10 15 25	10 15 25	A
Base Current — Continuous Peak (Non-Repetitive)	I_B I_{BM}	3 5	3 5	3 5	A
Total Power Dissipation @ T_C = 25° C	P_D	125	125	125	Watts
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150	-65 to +150	-65 to +150	°C

thermal characteristics

Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	1.0	1.0	°C/W
Maximum Lead Temperature for Soldering Purposes: ⅛" from Case for 5 Seconds	T_L	300	300	300	°C

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

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
off characteristics						
Collector-Emitter Sustaining Voltage (I_C = .5A) (V_{clamp} = V_{CEO} Rated)	GE6251 GE6252 GE6253	$V_{CEO(sus)}$	400 450 500	— — —	— — —	Volts
Collector-Base Voltage (I_C = 1.0mA)	GE6251 GE6252 GE6253	V_{CBO}	450 500 550	— — —	— — —	Volts
Collector Cutoff Current (V_{CB} = V_{CBO} Rated)		I_{CBO}	—	—	1	mA
Emitter Cutoff Current (V_{EB} = 1.5V, I_C = 0)		I_{EBO}	—	—	200	mA
second breakdown						
Second Breakdown with Base Forward Biased		FBSOA	SEE FIGURE 16			
Clamped Inductive SOA with Base Reversed Biased		RBSOA	SEE FIGURE 19			
on characteristics						
DC Current Gain (I_C = 3A, V_{CE} = 5V) (I_C = 5A, V_{CE} = 5V) (I_C = 10A, V_{CE} = 5V)		h_{FE}	60 50 30	125 170 160	— — —	—
Collector-Emitter Saturation Voltage (I_C = 5A, I_B = .5A) (I_C = 10A, I_B = 2A)		$V_{CE(sat)}$	— —	1.0 1.15	1.5 2.0	V
Base-Emitter Voltage (I_C = 5A, I_B = .5A)		$V_{BE(sat)}$	—	1.75	2.5	V
switching characteristics						
Resistive Load						
Rise Time	V_{CC} = 300V, t_p = 50 μsec	t_r	—	0.2	.25	μs
Storage Time	I_C = 10A, I_{B1} = 1A, I_{B2} = 2A	t_s	—	2.1	2.5	
Fall Time		t_f	—	.2	1.0	
Inductive Load, Clamped						
Storage Time	V_{CC} = 300V, L = 100 μH	t_s	—	2.35	—	μs
Crossover Time	I_C = 10A, I_{B1} = 1A, I_{B2} = 2A	t_c	—	.28	—	
Fall Time		t_f	—	.09	—	
emitter-collector diode characteristics						
Forward Voltage I_F = 10A		V_F	—	1.9	—	Volts

TYPICAL CHARACTERISTICS

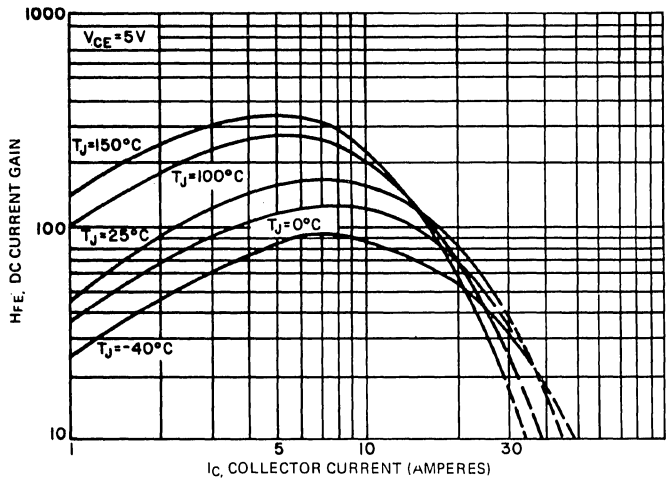


FIGURE 1. DC CURRENT GAIN (V_{CE} = 2V)

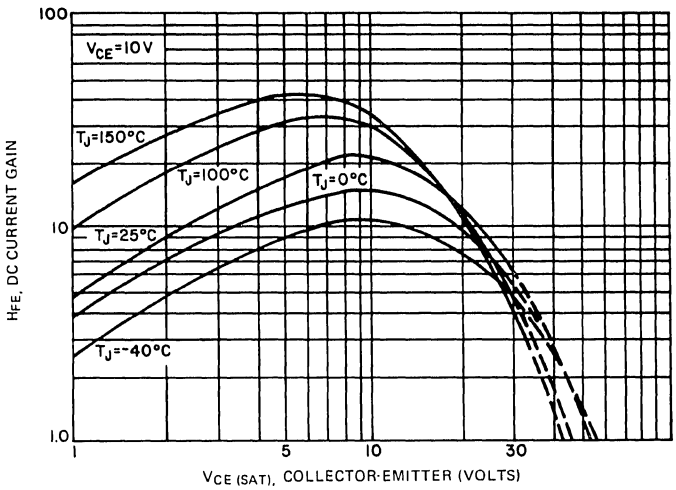


FIGURE 2. DC CURRENT GAIN (V_{CE} = 10V)

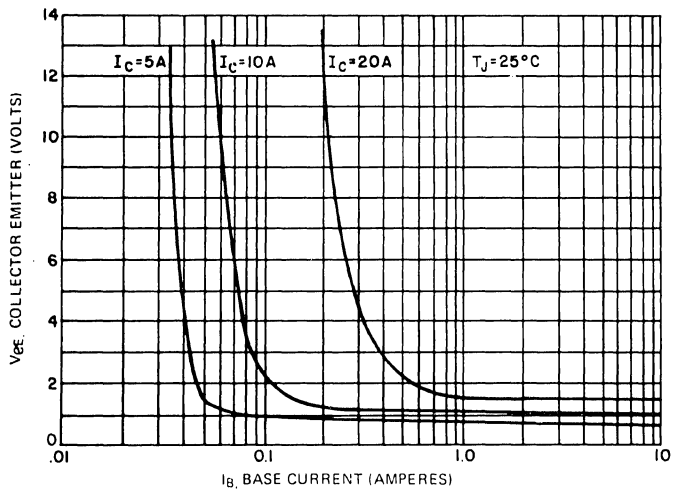


FIGURE 3. COLLECTOR SATURATION REGION

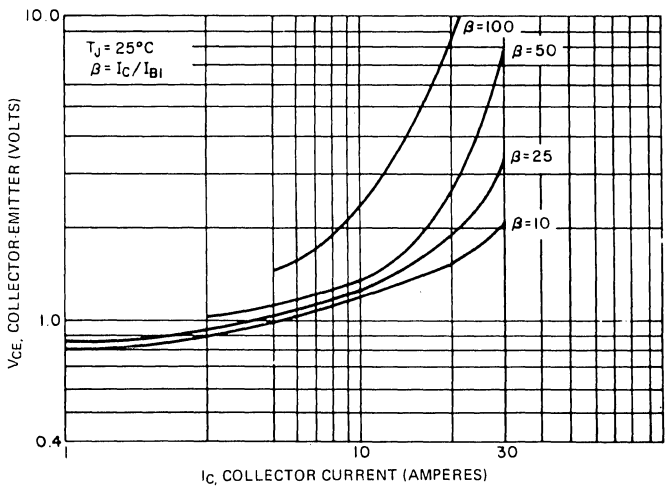


FIGURE 4. $V_{CE(SAT)}$ VS. I_C, T_J = 25°C

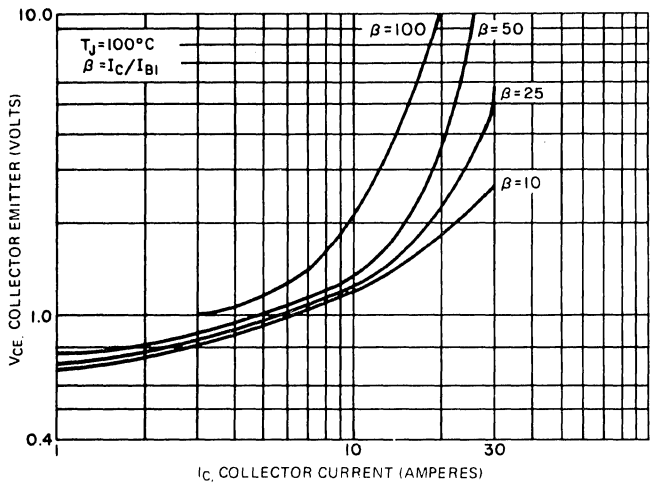


FIGURE 5. $V_{CE(SAT)}$ VS. I_C, T_J = 100°C

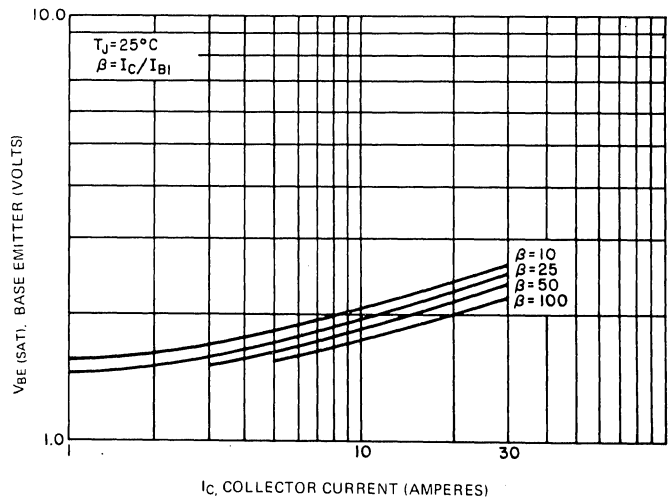


FIGURE 6. $V_{BE(SAT)}$ VS. I_C, T_J = 25°C

TYPICAL CHARACTERISTICS

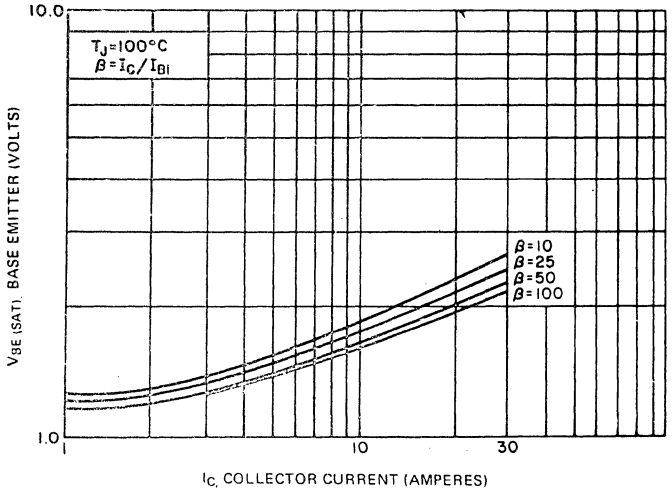


FIGURE 7. $V_{BE(SAT)}$ VS. I_C, T_J = 100°C

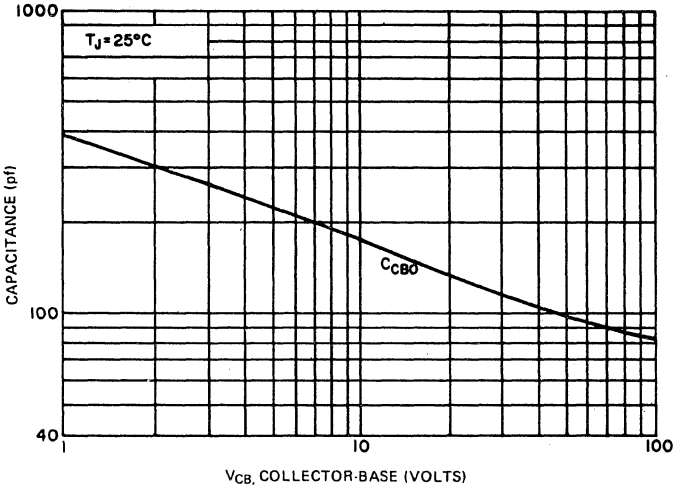


FIGURE 8. CAPACITANCE (C_{CBO})

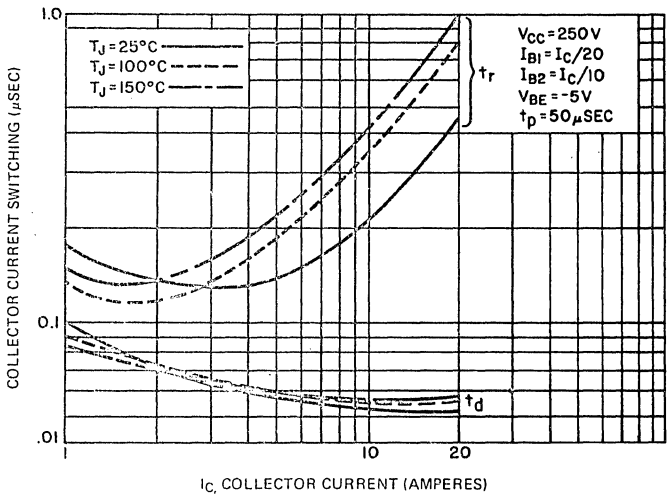


FIGURE 9. TURN-ON TIME (RESISTIVE)

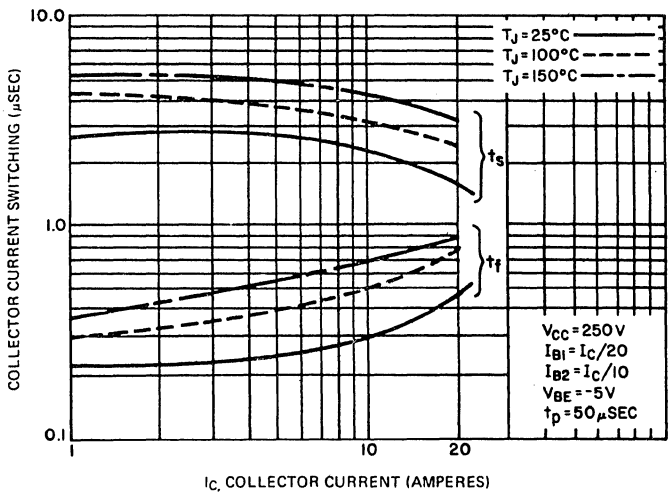


FIGURE 10. TURN-OFF TIME (RESISTIVE)

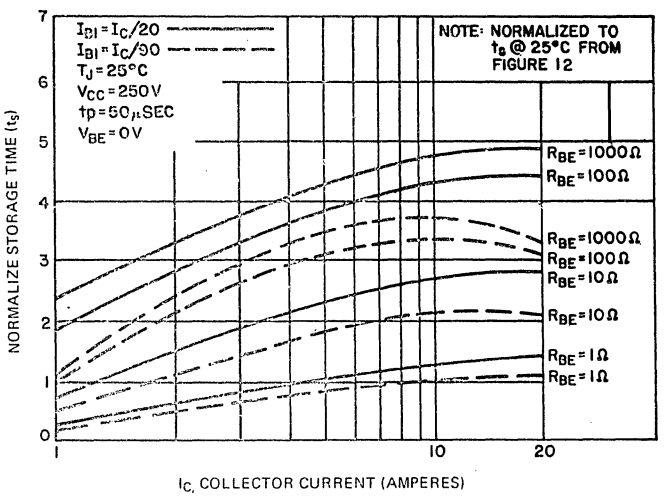


FIGURE 11. NORMALIZED RESISTIVE SWITCHING STORAGE TIME (R_{BE} VARIATIONS) VS. COLLECTOR CURRENT

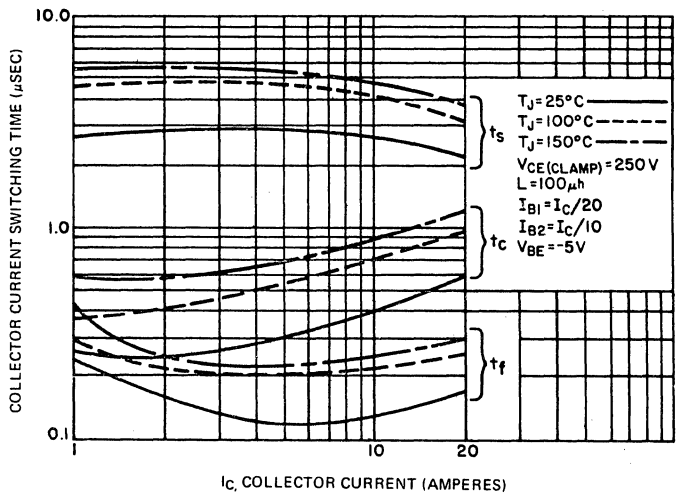


FIGURE 12. CLAMPED INDUCTIVE TURN-OFF TIME

TYPICAL CHARACTERISTICS

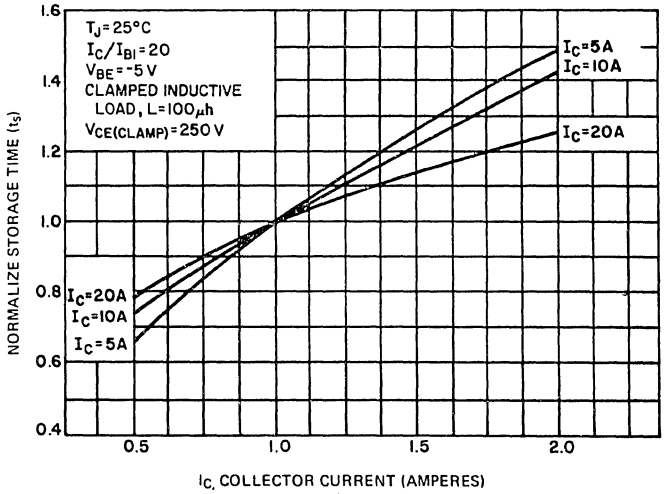


FIGURE 13. STORAGE TIME VARIATION WITH I_{B2}

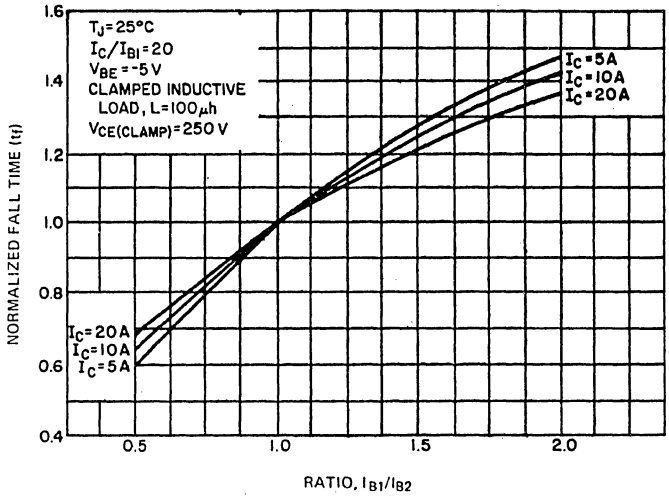


FIGURE 14. FALL TIME VARIATION WITH I_{B2}

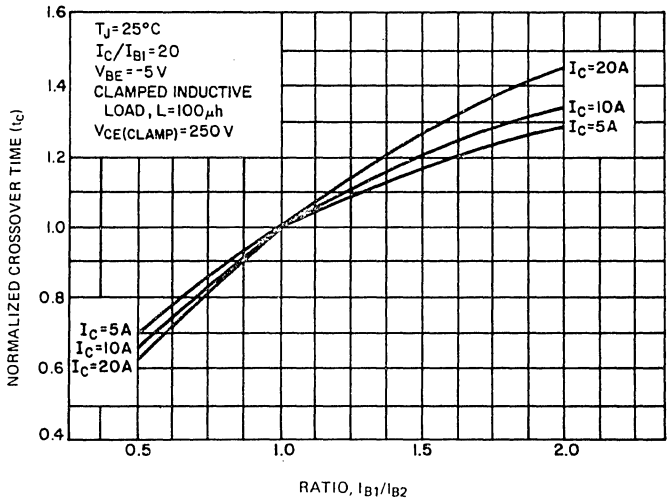


FIGURE 15. CROSS-OVER TIME VARIATION WITH I_{B2}

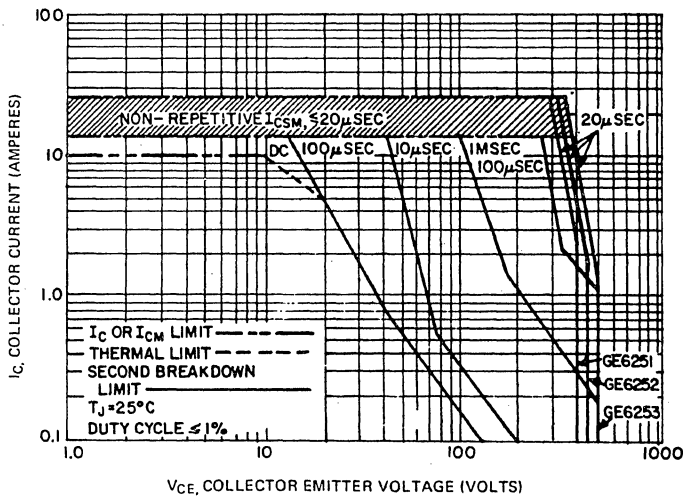


FIGURE 16. FORWARD BIAS SAFE OPERATING AREA

DIODE CHARACTERISTICS

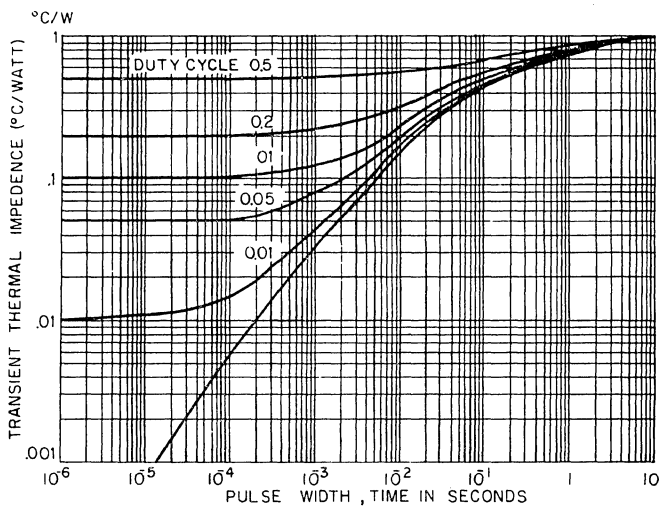


FIGURE 17. TRANSIENT THERMAL RESPONSE

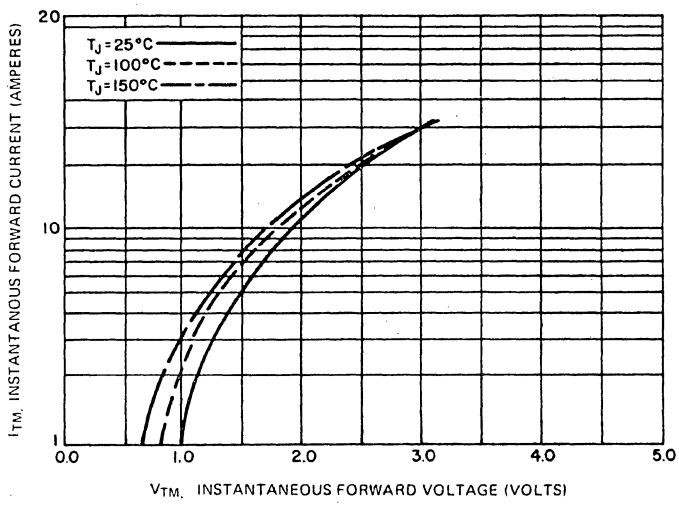


FIGURE 18. FORWARD CHARACTERISTICS

TYPICAL CHARACTERISTICS

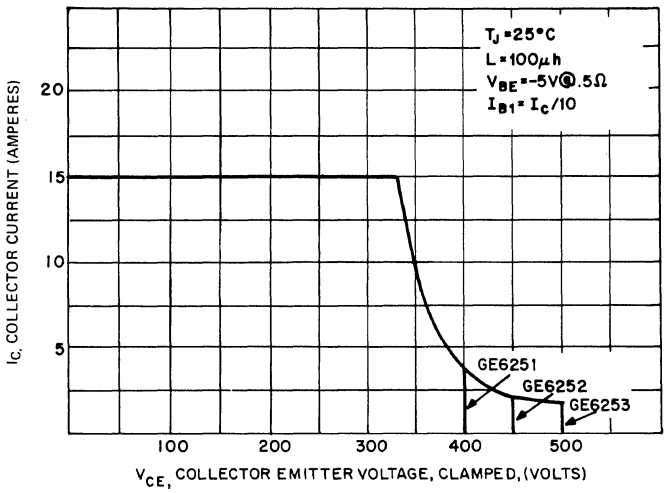


FIGURE 19. REVERSE BIAS SAFE OPERATING AREA

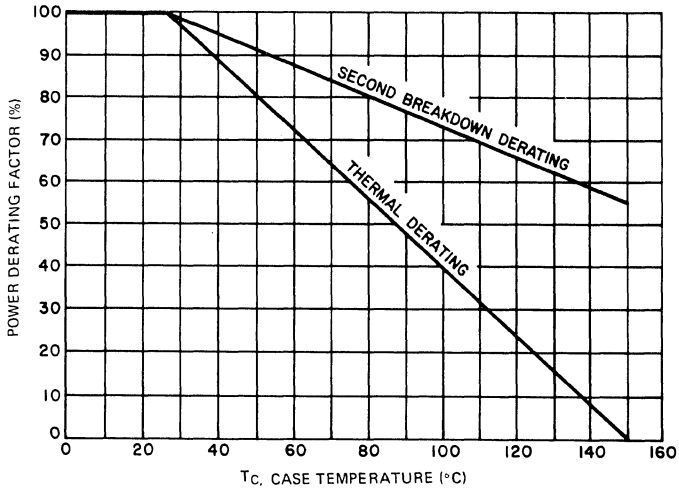


FIGURE 20. POWER DERATING

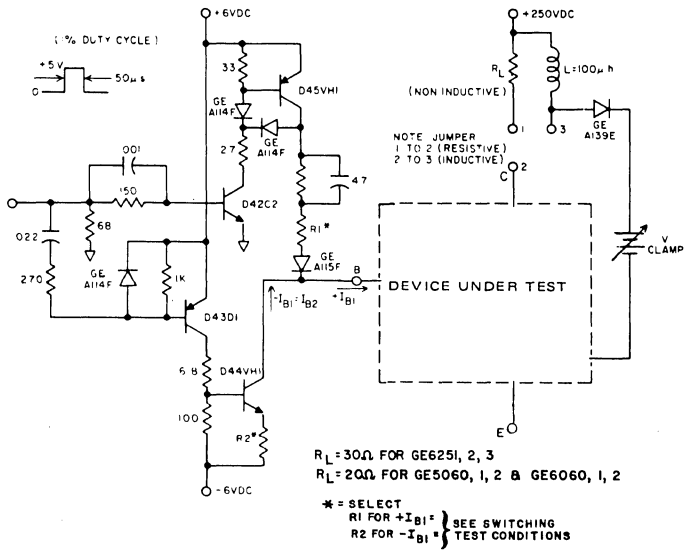


FIGURE 21. SWITCHING TIME TEST CIRCUIT