HIGH SPEED
NPN POWER DARLINGTON TRANSISTORS

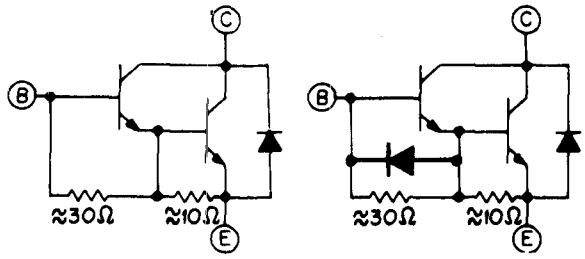
D64DV5,6,7
D64EV5,6,7

400-500 VOLTS
50 AMP, 180 WATTS

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

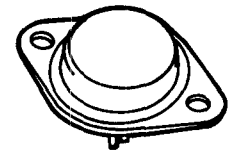
Features:

- High Speed: $t_s < 5.0$ μsec., $t_f < 3.0$ μsec.
- High Voltage: 400-500 V_{CEO}
- High Gain: h_{FE} 50 Minimum @ 50 Amperes, I_C
- High Current: 75 Amperes, I_C (Peak)



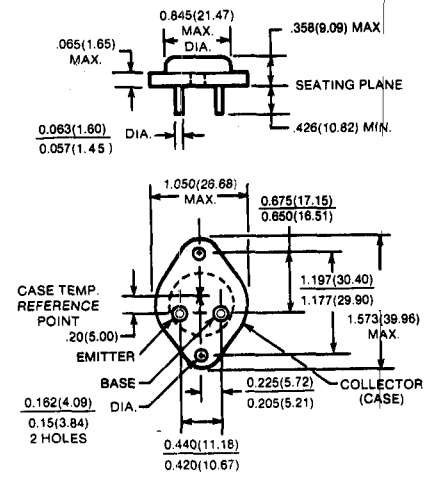
D64DV D64EV

DEVICE CIRCUIT



CASE STYLE TO-204AE (TO-3)

DIMENSIONS ARE IN INCHES AND (MILLIMETERS)



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

RATING	SYMBOL	D64DV5/EV5	D64DV6/EV6	D64DV7/EV7	UNITS
Collector-Emitter Voltage	V_{CEO}	400	450	500	Volts
Collector-Base Voltage	V_{CBO}	500	600	700	Volts
Emitter Base Voltage D64DV D64EV	V_{EBO}	8 5	8 5	8 5	Volts
Collector Current — Continuous Peak (Repetitive) Peak (Non-Repetitive)	I_C I_{CM} I_{CSM}	50 75 125	50 75 125	50 75 125	A
Base Current — Continuous Peak (Non-Repetitive)	I_B I_{BM}	10 20	10 20	10 20	A
Total Power Dissipation @ T_C = 25°C	P_D	180	180	180	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	$R_{\theta JC}$	0.7	0.7	0.7	°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	D64DV5/EV5	$V_{CEO(sus)}$	400	—	—	Volts
(I_C = .5A)	D64DV6/EV6		450	—	—	
(V_{clamp} = V_{CEO} Rated)	D64DV6/EV7		500	—	—	
Collector Cutoff Current	T_J = 25°C	I_{CEV}	—	—	1.0	mA
(V_{CE} = Rated Value, V_{BE} = -1.5V)	T_J = 150°C		—	—	2.5	
Emitter Cutoff Current		I_{EBO}				
(V_{EB} = 4.5V, I_C = 0)	D64DV		—	—	350	mA
(V_{EB} = 1.5V, I_C = 0)	D64EV		—	—	350	
second breakdown						
Second Breakdown with Base Forward Biased		FBSOA	SEE FIGURE 23			
on characteristics						
DC Current Gain		h_{FE}				
(I_C = 75A, V_{CE} = 5V)			25	60	—	—
(I_C = 50A, V_{CE} = 5V)			50	135	—	
(I_C = 20A, V_{CE} = 5V)			100	250	—	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$				
(I_C = 75A, I_B = 5A)			—	2.2	3.0	V
(I_C = 50A, I_B = 4A)			—	1.7	2.0	
(I_C = 20A, I_B = 2A)			—	1.15	1.5	
Base-Emitter Saturation Voltage		$V_{BE(sat)}$				
(I_C = 75A, I_B = 5A)			—	2.8	3.5	V
(I_C = 50A, I_B = 4A)			—	2.45	3.0	
(I_C = 20A, I_B = 2A)			—	1.95	2.5	

switching characteristics

Resistive Load				TYP. DV	TYP. EV	MAX. DV	MAX. EV	
Delay Time	V_{CC} = 250V	t_d	—	0.09	.09	.5	.5	μs
Rise Time	I_C = 50A	t_r	—	.5	.5	1	1	
Storage Time	I_{B1} = 2.5A, I_{B2} = 5A	t_s	—	2.55	2	5	3	
Fall Time	t_p = 50 μsec	t_f	—	1.4	.64	3	1	

emitter-collector diode characteristics

Power Dissipation	(I_{B1} = 0)	P_D	—	—	125	Watts
Forward Voltage	(I_F = 25A)	V_F	—	1.95	3.20	Volts
	(I_P = 50A)	V_F	—	2.60	3.80	Volts
	(I_F = 50A, T_J = 150°C)	V_F	—	2.30	3.50	Volts
Reverse Recovery Time (I_F = 50A, $di/_{dt}$ = 25A/μsec, R_{B1E} = .25Ω)		T_{rr}	—	3.85	10.0	μsec
Forward Turn-On Time (I_F = 100A, $di/_{dt}$ = 100A/μsec)		T_{ON}	—	0.75	1.5	μsec
Single Cycle Surge Current (60Hz)		I_{FSM}	—	—	150	Amps
Thermal Resistance		$R_{\theta JC}$	—	—	1.0	°C/Watt

TYPICAL CHARACTERISTICS

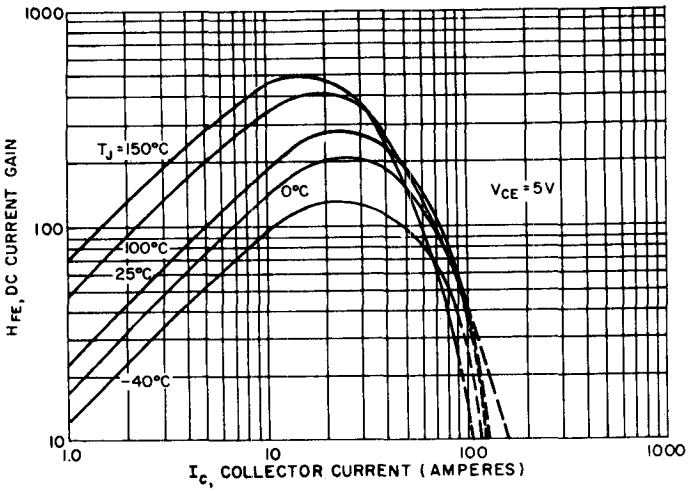


FIGURE 1. DC CURRENT GAIN (V_{CE} = 5V)

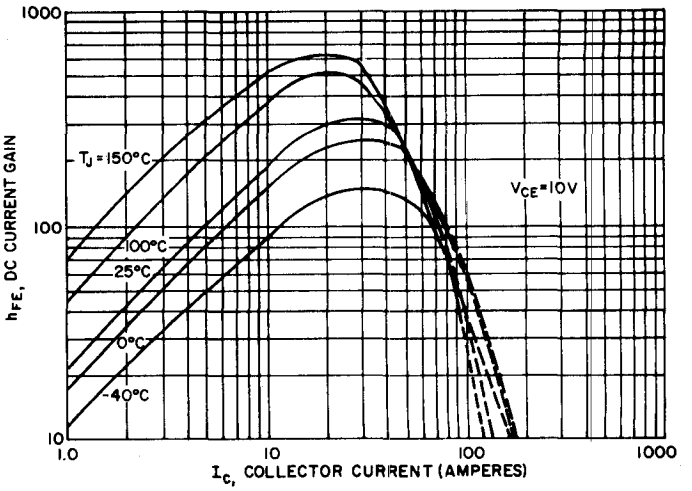


FIGURE 2. DC CURRENT GAIN (V_{CE} = 10V)

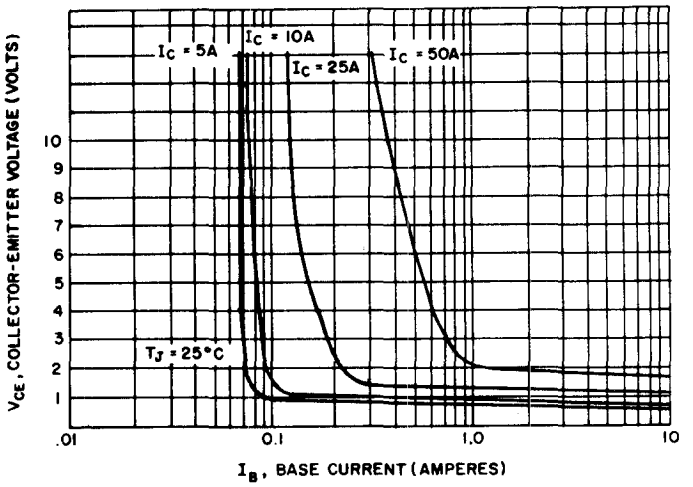


FIGURE 3. COLLECTOR SATURATION REGION

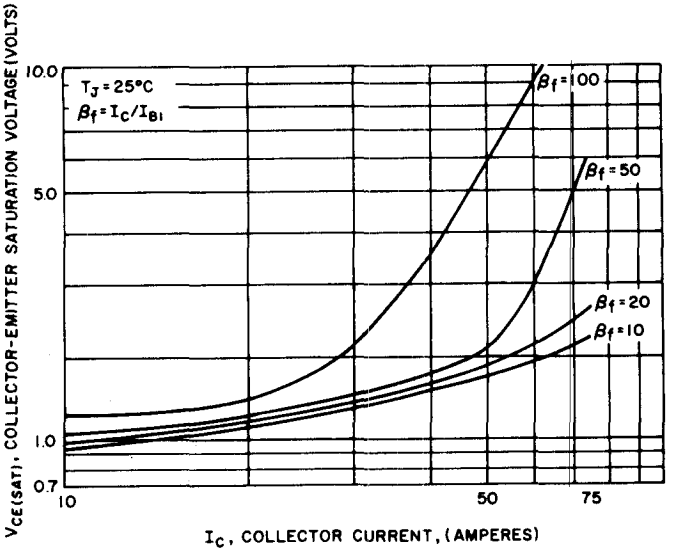


FIGURE 4. $V_{CE\ (SAT)}$ VS I_C, T_J = 25°C

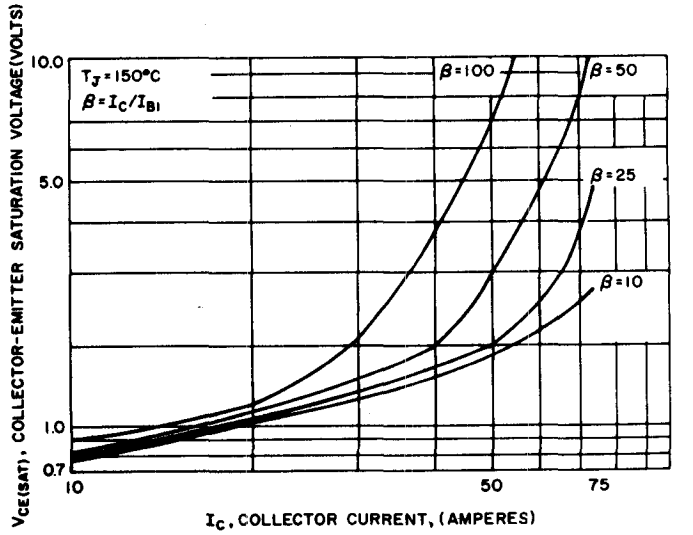


FIGURE 5. $V_{CE\ (SAT)}$ VS I_C, T_J = 150°C

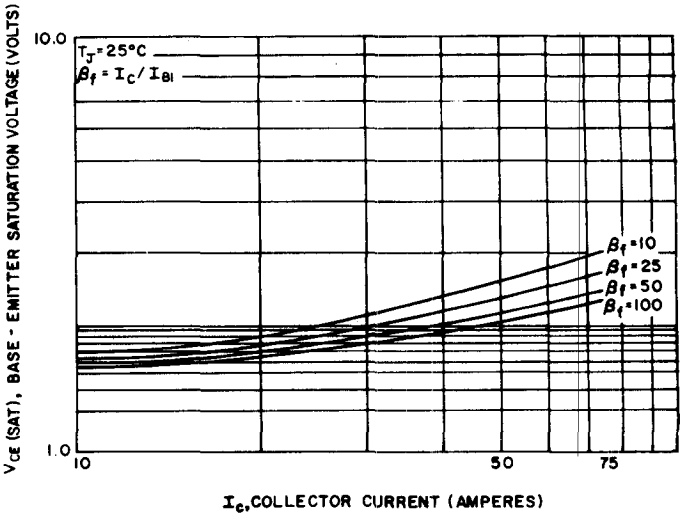


FIGURE 6. $V_{BE\ (SAT)}$ VS I_C, T_J = 25°C

TYPICAL CHARACTERISTICS

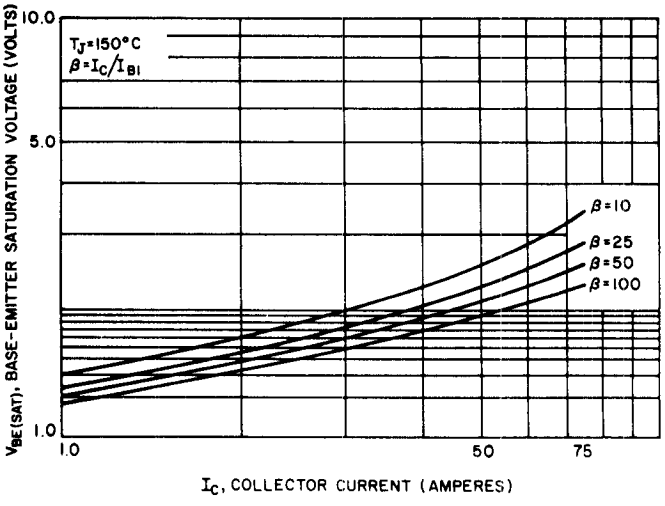


FIGURE 7. $V_{BE\ (SAT)}$ VS I_C, T_J = 150°C

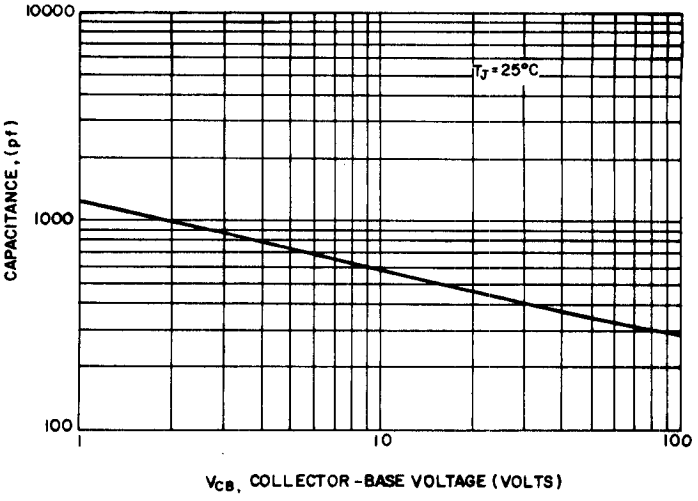


FIGURE 8. CAPACITANCE (C_{CBO})

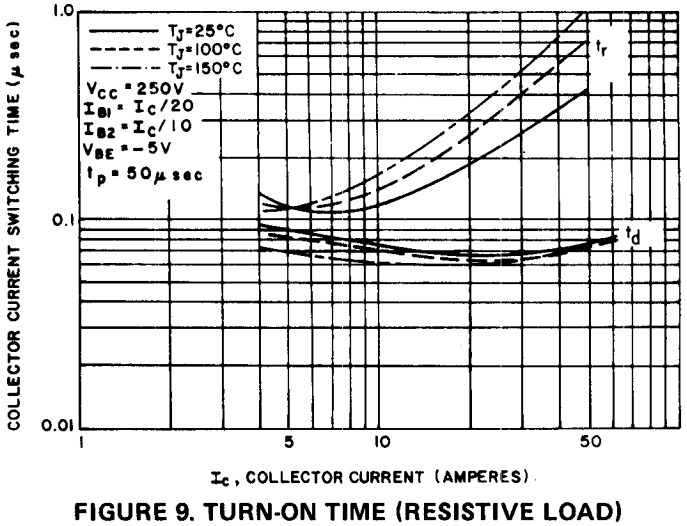


FIGURE 9. TURN-ON TIME (RESISTIVE LOAD) (D64DV ONLY)

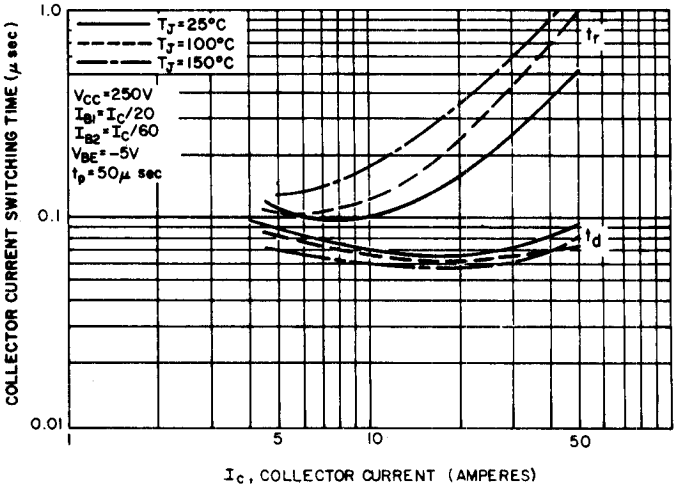


FIGURE 10. TURN-ON TIME (RESISTIVE LOAD) (D64EV ONLY)

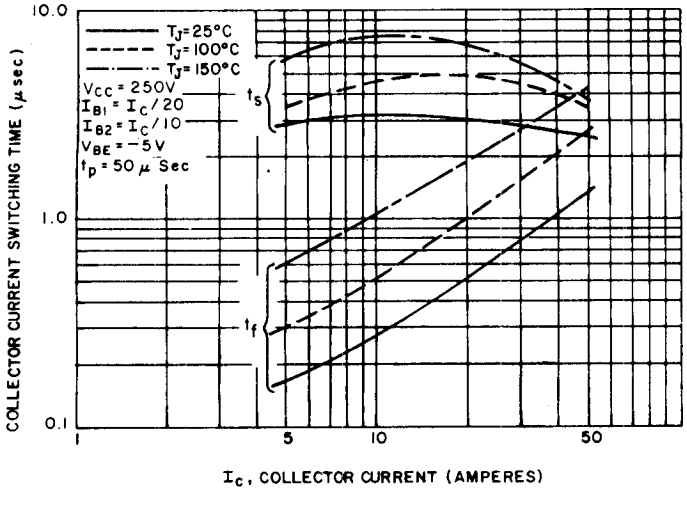


FIGURE 11. TURN-OFF TIME (RESISTIVE LOAD) (D64DV ONLY)

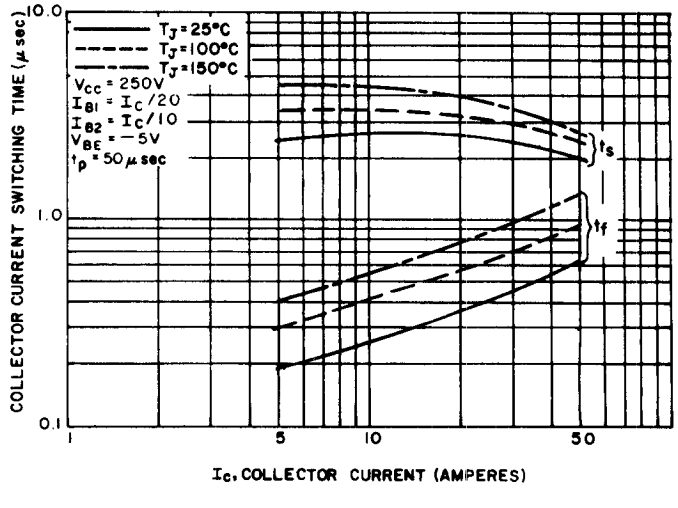


FIGURE 12. TURN-OFF TIME (RESISTIVE LOAD) (D64EV ONLY)

TYPICAL CHARACTERISTICS

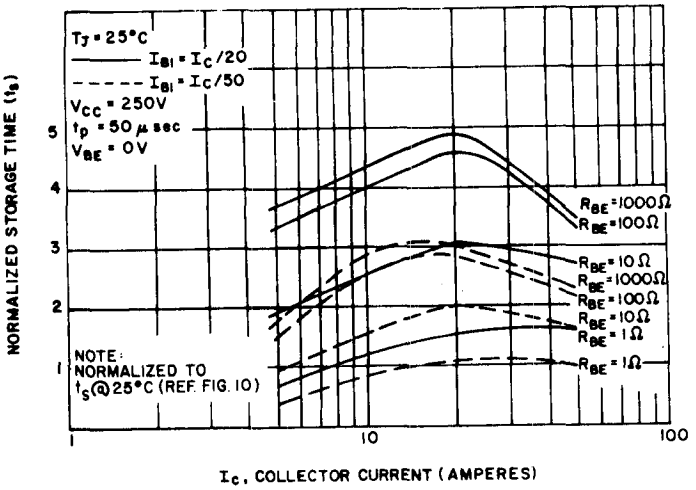


FIGURE 13. NORMALIZED RESISTIVE SWITCHING STORAGE TIME (R_{BE} VARATIONS) VS COLLECTOR CURRENT (D64DV ONLY)

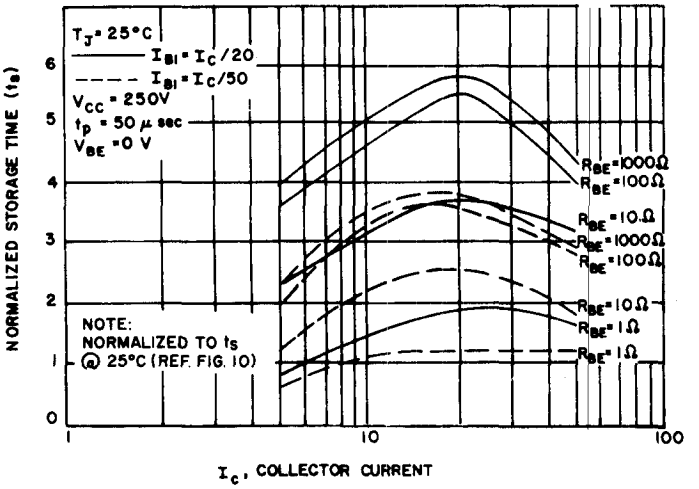


FIGURE 14. NORMALIZED RESISTIVE SWITCHING STORAGE TIME (R_{BE} VARATIONS) VS COLLECTOR CURRENT (D64EV ONLY)

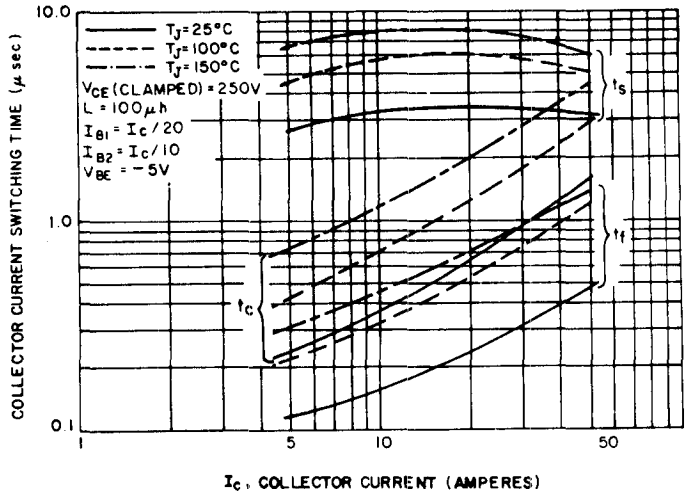


FIGURE 15. CLAMPING INDUCTIVE TURN-OFF TIME (D64DV ONLY)

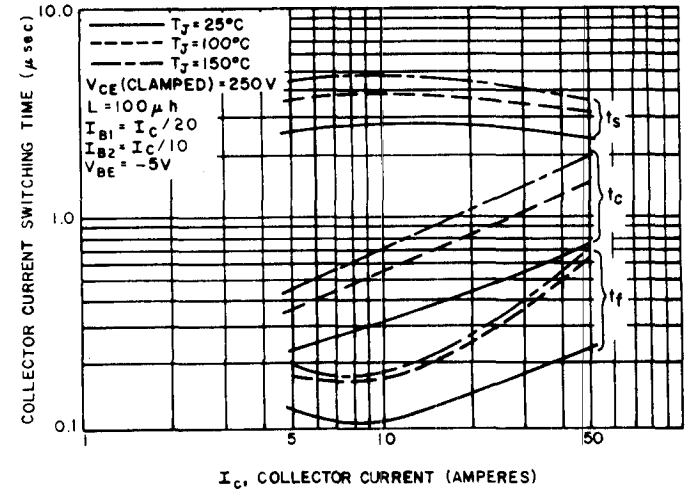


FIGURE 16. CLAMPING INDUCTIVE TURN-OFF TIME (D64EV ONLY)

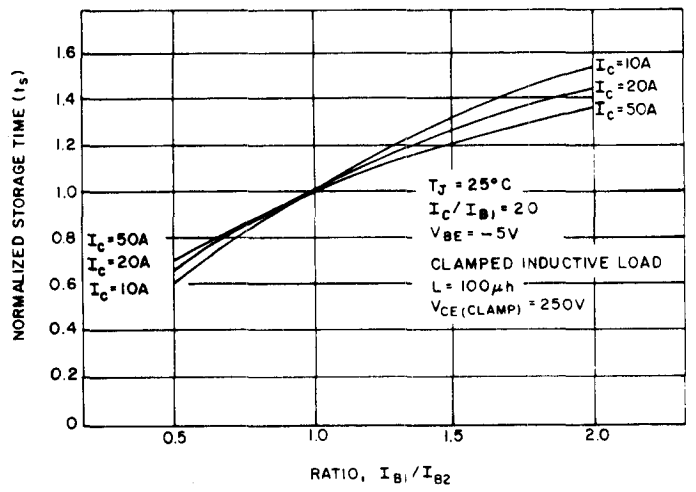


FIGURE 17. STORAGE TIME VARIATION WITH I_{B2} (D64DV ONLY)

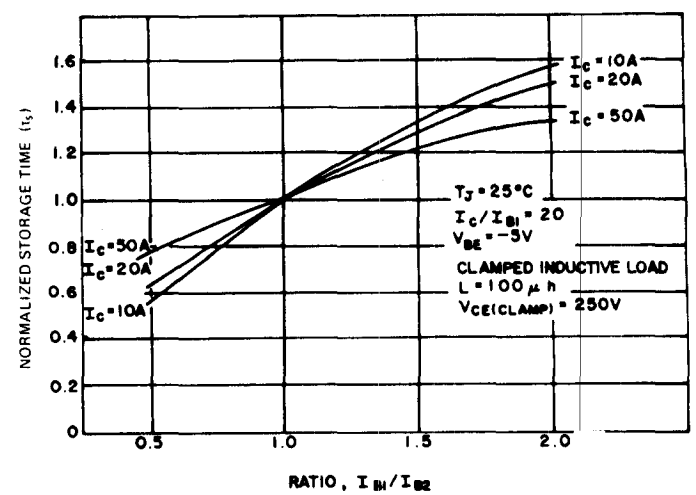


FIGURE 18. STORAGE TIME VARIATION WITH I_{B2} (D64EV ONLY)

TYPICAL CHARACTERISTICS

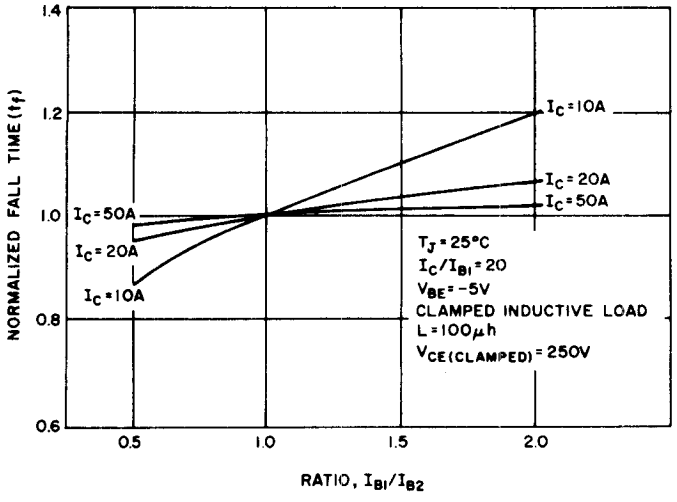


FIGURE 19. FALL TIME VARIATION WITH I_{B2} (D64DV ONLY)

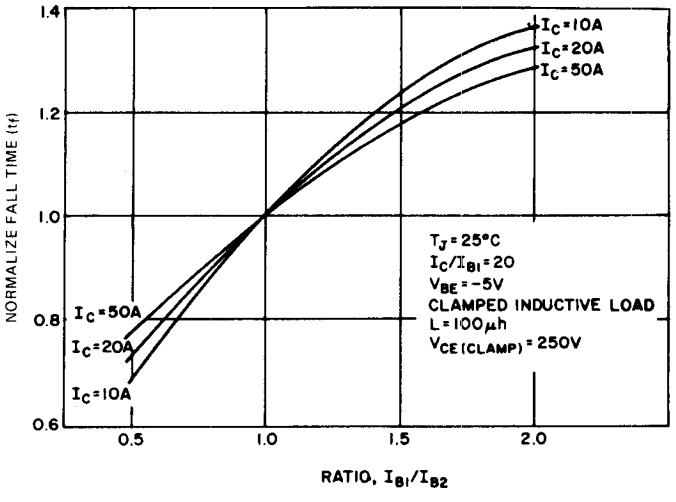


FIGURE 20. FALL TIME VARIATION WITH I_{B2} (D64EV ONLY)

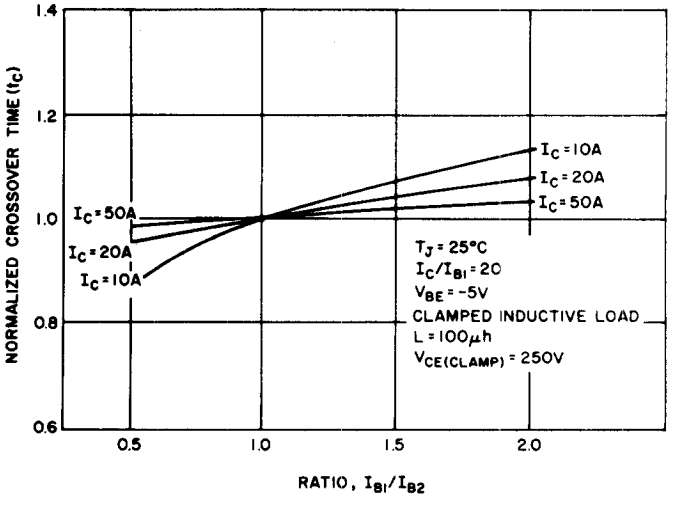


FIGURE 21. CROSSOVER TIME VARIATION WITH I_{B2} (D64DV ONLY)

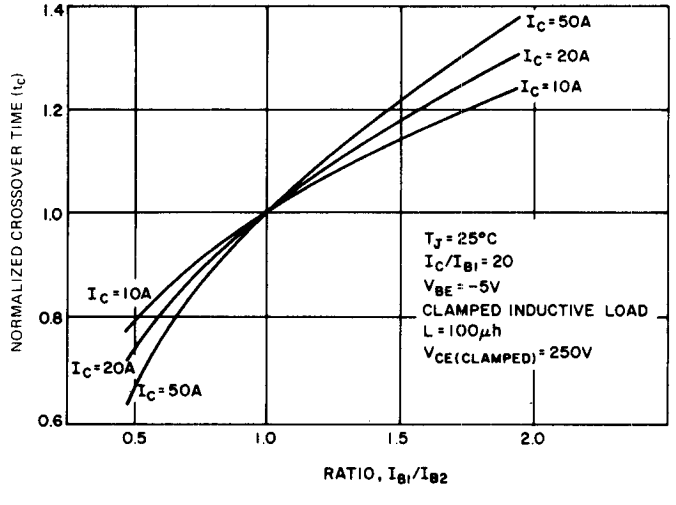


FIGURE 22. CROSSOVER TIME VARIATION WITH I_{B2} (D64EV ONLY)

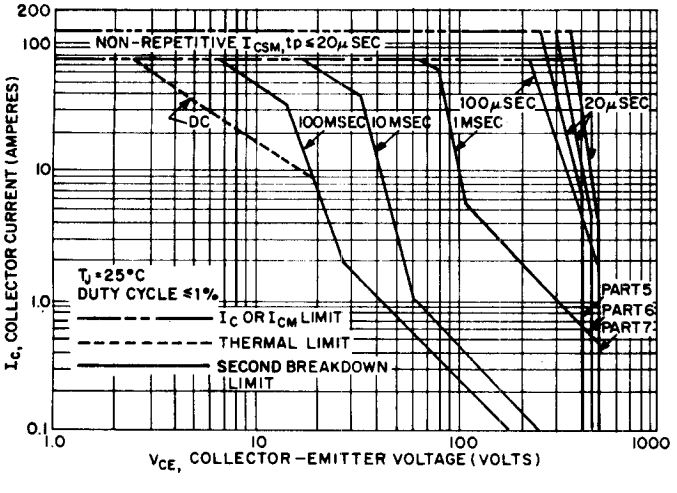


FIGURE 23. FORWARD BIAS SAFE OPERATING AREA

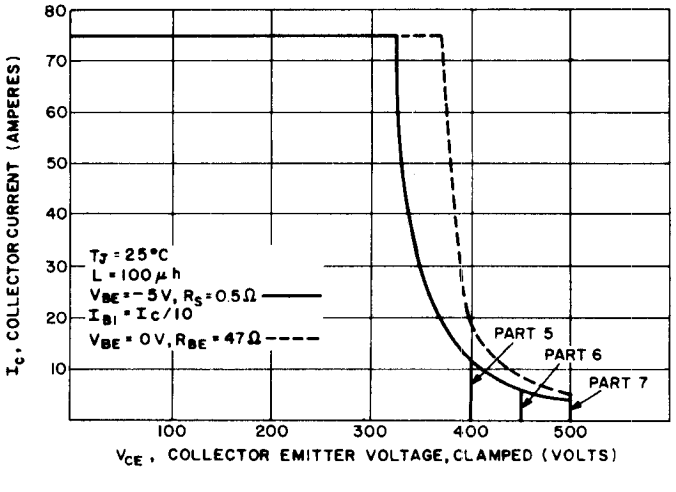


FIGURE 24. REVERSE BIAS SAFE OPERATING AREA (CLAMPED)

TYPICAL CHARACTERISTICS

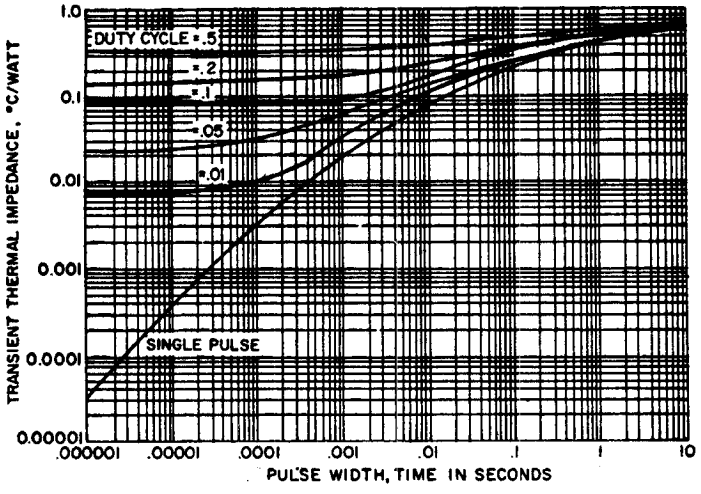


FIGURE 25. TRANSIENT THERMAL RESPONSE

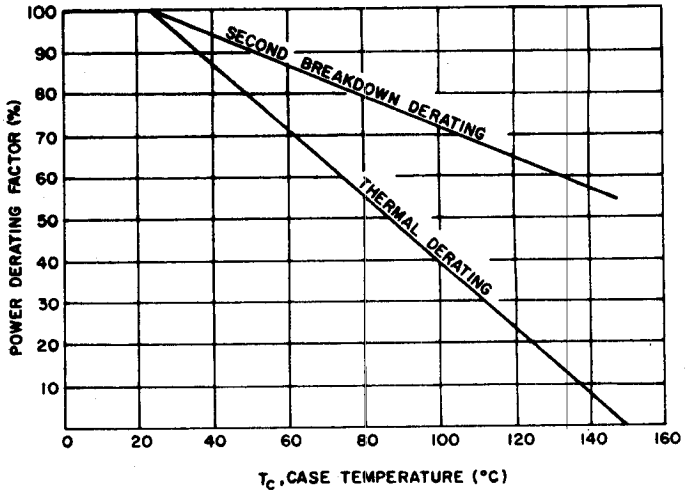


FIGURE 26. POWER DERATING

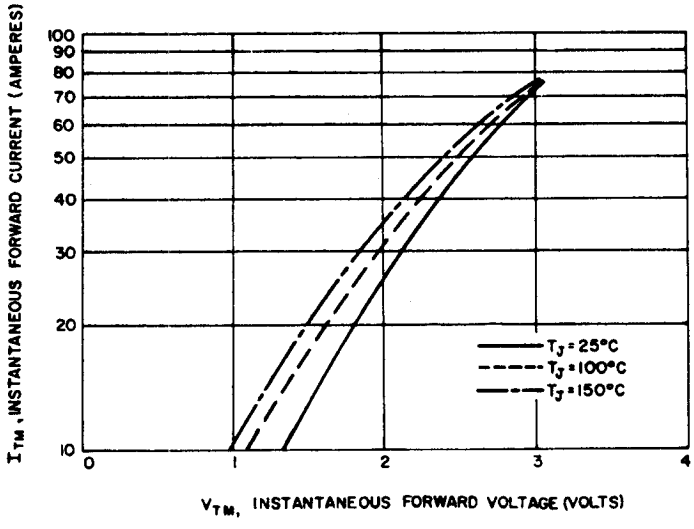


FIGURE 27. FORWARD CHARACTERISTICS

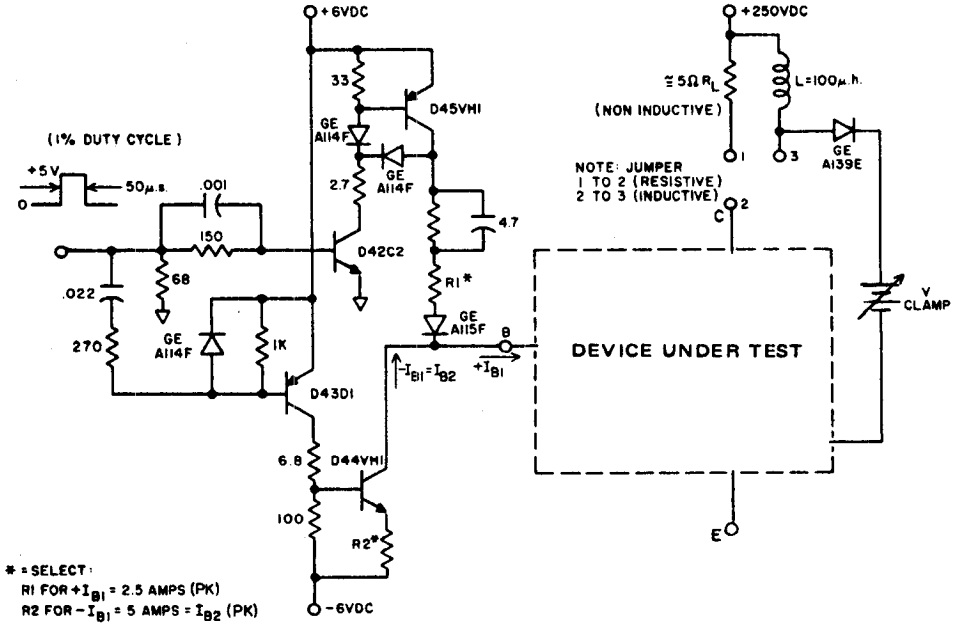


FIGURE 28. SWITCHING TIME TEST CIRCUIT