HIGH SPEED
NPN POWER DARLINGTON TRANSISTORS

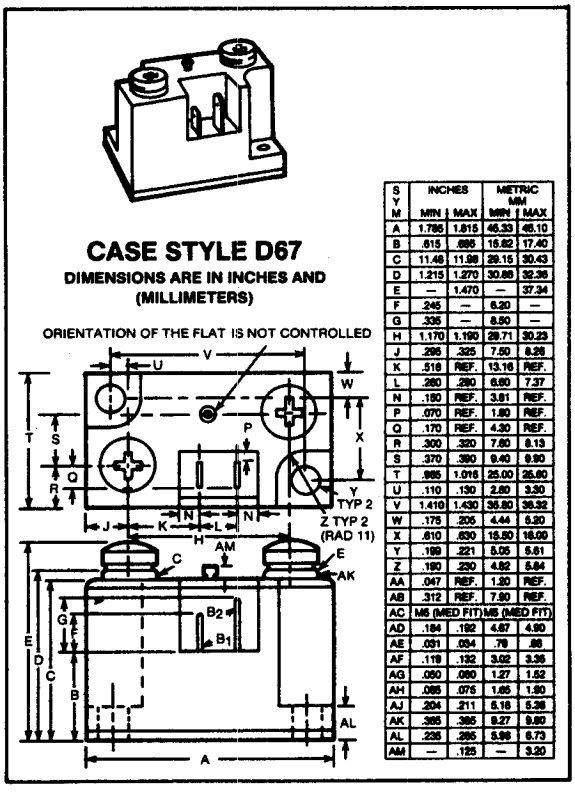
D67DE5,6,7

500-700 VOLTS
100 AMP, 312.5 WATTS

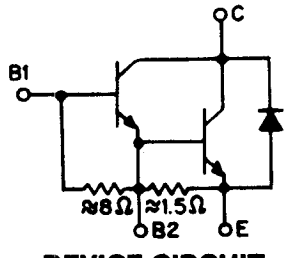
The General Electric D67DE is a high current power darlington. It features collector isolation from the heat sink, an internal construction designed for stress-free operation at temperature extremes, hefty screw terminals for emitter and collector connection and quick electrical terminals for B1 and B2. The device is designed to meet UL creep, strike and isolation voltage. Major applications are for motor controls, switching power supplies and UPS systems.

Features:

- High Voltage: 400-500 $V_{CEO(sus)}$; 500-700 V_{CEV}
- High Current: 150 Amperes, I_C (Peak)
- High Gain: h_{FE} 50 Minimum @ 100 Amperes I_C (h_{FE} 200 typical)
- Both Base 1 and Base 2 connections are available
- UL recognized industrial package



SYM	INCHES MIN	INCHES MAX	METRIC MM MIN	METRIC MM MAX
A	1.786	1.815	45.33	46.10
B	.815	.685	16.62	17.40
C	11.48	11.98	29.15	30.43
D	1.215	1.270	30.86	32.36
E	—	1.470	—	37.34
F	.245	—	6.20	—
G	.335	—	8.50	—
H	1.170	1.190	29.71	30.23
J	.295	.325	7.50	8.26
K	.518	REF.	13.16	REF.
L	.280	.290	6.60	7.37
N	.150	REF.	3.81	REF.
P	.070	REF.	1.80	REF.
Q	.170	REF.	4.30	REF.
R	.300	.320	7.60	8.13
S	.370	.380	9.40	9.90
T	.985	1.016	25.00	25.60
U	.110	.130	2.80	3.30
V	1.418	1.430	36.80	36.32
W	.175	.205	4.44	5.20
X	.610	.650	15.50	16.00
Y	.199	.221	5.05	5.61
Z	.190	.220	4.82	5.84
AA	.047	REF.	1.20	REF.
AB	.312	REF.	7.90	REF.
AC	M5 (MED FIT)	M5 (MED FIT)		
AD	.184	.192	4.67	4.90
AE	.031	.034	.79	.86
AF	.119	.132	3.02	3.35
AG	.050	.060	1.27	1.52
AH	.065	.075	1.65	1.90
AJ	.204	.211	5.18	5.36
AK	.365	.365	9.27	9.60
AL	.235	.265	5.96	6.73
AM	—	.125	—	3.20



DEVICE CIRCUIT

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

RATING	SYMBOL	D67DE5	D67DE6	D67DE7	UNITS
Collector-Base Voltage	V_{CBO}	500	600	700	Volts
Collector-Emitter Voltage	V_{CEO}	400	450	500	Volts
Emitter Base Voltage	V_{EBO}	8	8	8	Volts
Collector Current — Continuous Peak (Repetitive) Peak (Non-Repetitive)	I_C I_{CM} I_{CSM}	100 150 250	100 150 250	100 150 250	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	312.5	312.5	312.5	Watts
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-40 to +150	-40 to +150	-40 to +150	°C
Isolation Voltage	V_{ISOL}	2500	2500	2500	$V_{(rms)}$

thermal characteristics

Thermal Resistance, Junction to Case	$R_{\theta JC}$	4	4	4	°C/W

See page 845 for mounting and handling considerations.

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

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
off characteristics						
Collector-Emitter Sustaining Voltage (I_C = 1A) (V_{clamp} = V_{CEO}, R_{BE} = 10Ω)	D67DE5 D67DE6 D67DE7	$V_{CEO(sus)}$	400 450 500	— — —	— — —	Volts
Collector Cutoff Current (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5V)	T_J = 25°C T_J = 150°C	I_{CEV}	— —	— —	1.0 2.5	mA
Emitter Cutoff Current (V_{EB} = 3.5V, I_C = 0)		I_{EBO}	—	—	500	mA
second breakdown						
Second Breakdown with Base Forward Biased		FBSOA	SEE FIGURE 16			
on characteristics						
DC Current Gain (I_C = 150A, V_{CE} = 5V) (I_C = 100A, V_{CE} = 5V) (I_C = 40A, V_{CE} = 5V)		h_{FE}	 25 50 100	 90 200 275	 — — —	—
Collector-Emitter Saturation Voltage (I_C = 150A, I_B = 10A) (I_C = 100A, I_B = 8A) (I_C = 40A, I_B = 4A)		$V_{CE(sat)}$	 — — —	 1.9 1.4 1.0	 3.0 2.0 1.5	V
Base-Emitter Saturation Voltage (I_C = 150A, I_B = 10A) (I_C = 100A, I_B = 8A)		$V_{BE(sat)}$	 — —	 2.75 2.3	 3.5 3.0	V
switching characteristics						
Resistive Load						
Delay Time	V_{CC} = 250V	t_d	—	.105	0.5	μs
Rise Time	I_C = 100A	t_r	—	.45	1.0	
Storage Time	I_{B1} = 5A, I_{B2} = 10A	t_s	—	3.2	5.0	
Fall Time		t_f	—	1.1	3.0	
emitter-collector diode characteristics						
Forward Voltage	(I_F = 100A) (T_J = 25°C) (T_J = 150°C)	 V_F V_F	 — —	 1.9 1.75	 3.25 3.00	 Volts Volts
Reverse Recovery Time (I_F = 100A, $di/_{dt}$ = 25A/μsec, R_{B1E} = .25Ω)	(T_J = 25°C)	T_{rr}	—	4.5	10.0	μsec
Forward Turn-On Time (I_F = 100A, $di/_{dt}$ = 100A/μsec)	(T_J = 25°C)	T_{ON}	—	1.7	2.5	μsec
Thermal Resistance		$R_{\theta JC}$	—	—	0.4	°C/Watt

TYPICAL CHARACTERISTICS

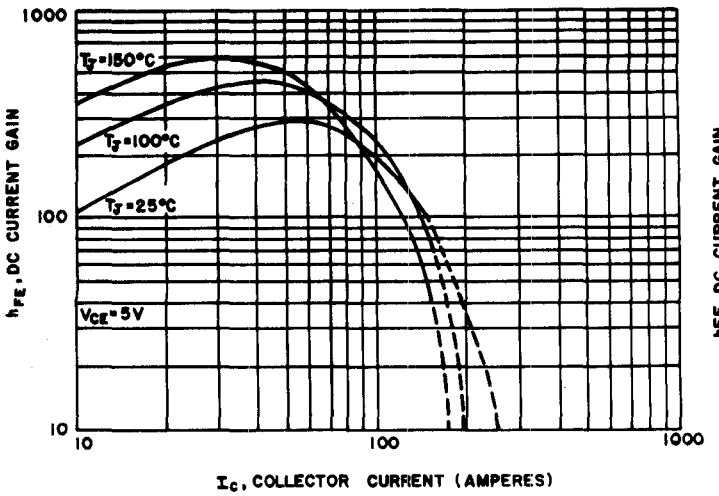


FIGURE 1: DC CURRENT GAIN (V_{CE}=5V)

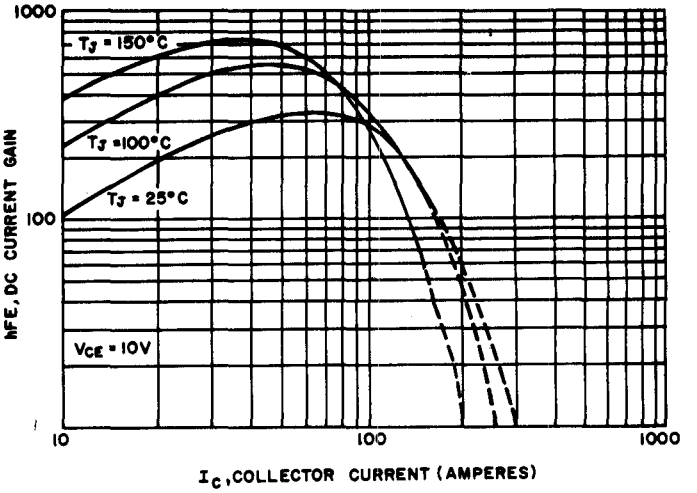


FIGURE 2: DC CURRENT GAIN (V_{CE}=10V)

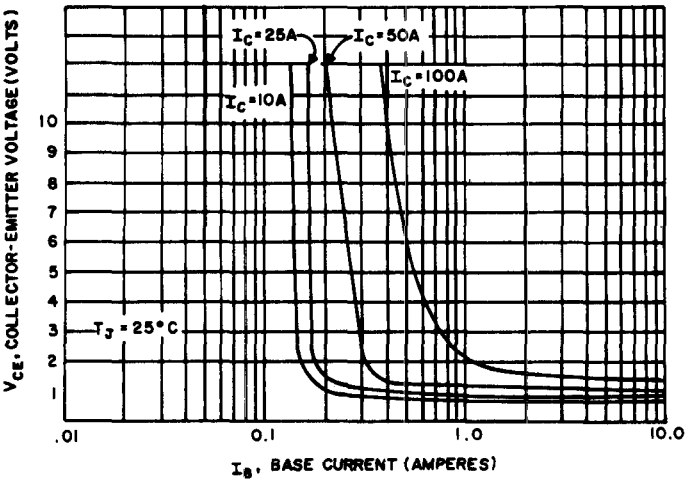


FIGURE 3: COLLECTOR SATURATION REGION

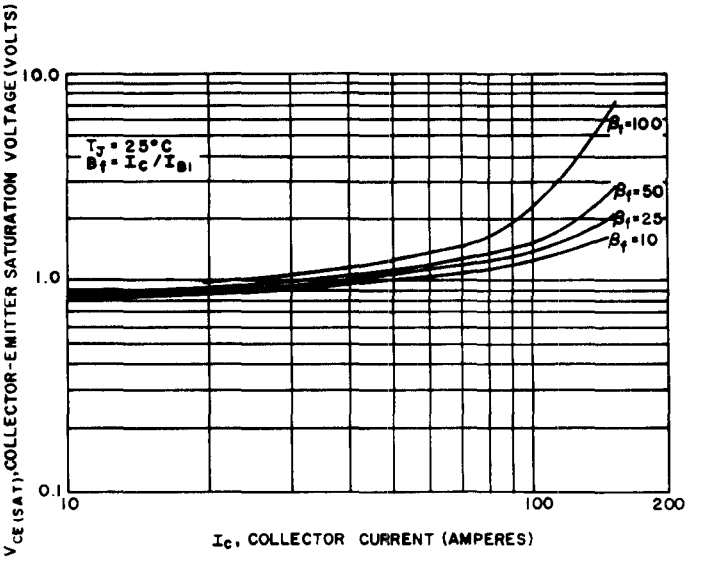


FIGURE 4: $V_{CE(SAT)}$ VS I_C, T_J=25°C

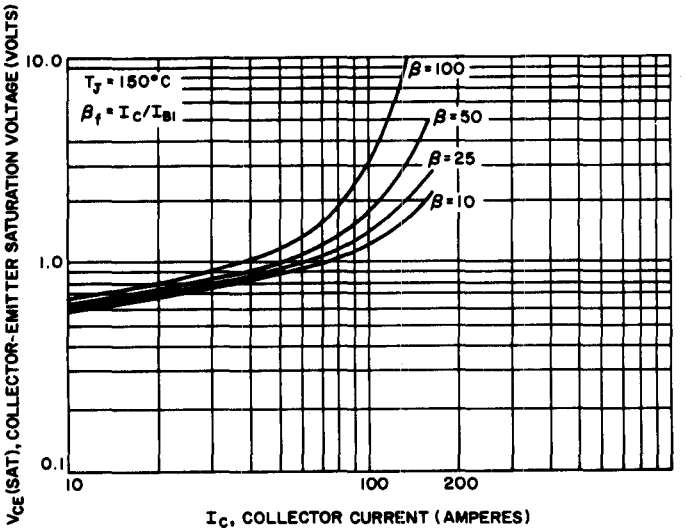


FIGURE 5: $V_{CE(SAT)}$ VS I_C, T_J=150°C

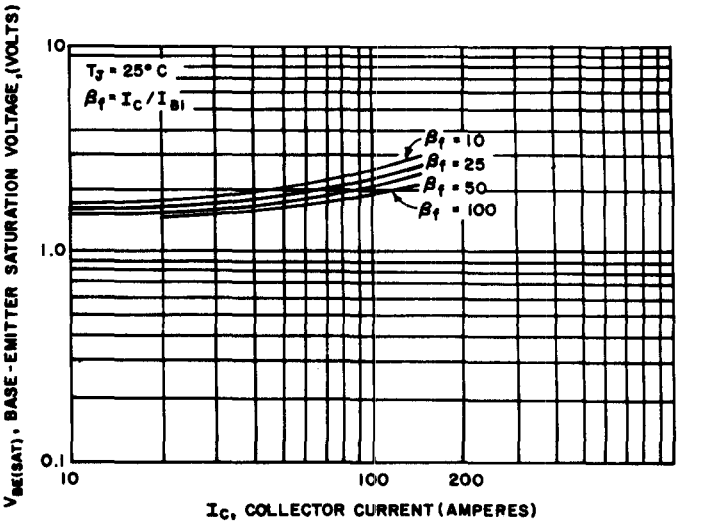


FIGURE 6: $V_{BE(SAT)}$ VS I_C, T_J=25°C

TYPICAL CHARACTERISTICS

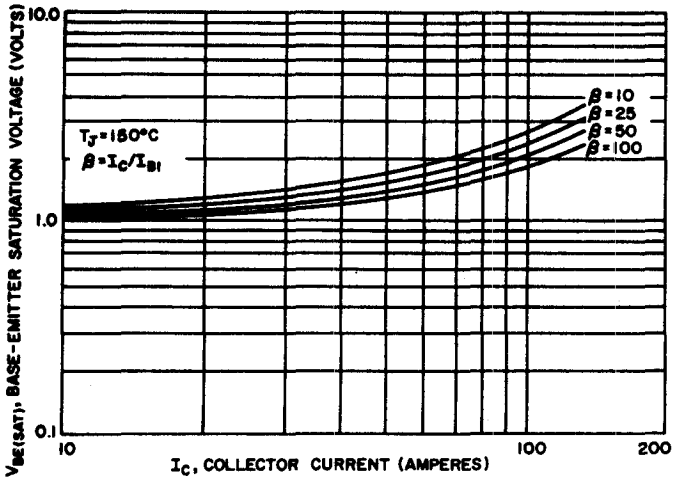


FIGURE 7: $V_{BE(SAT)}$ VS I_C, T_J=150°C

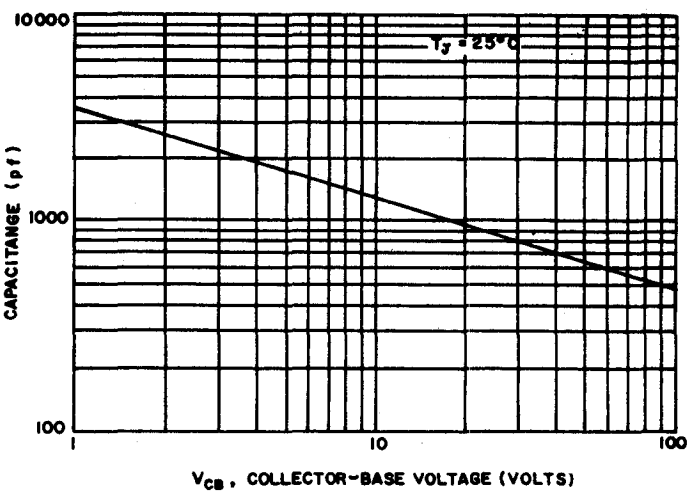


FIGURE 8: CAPACITANCE (C_{CBO})

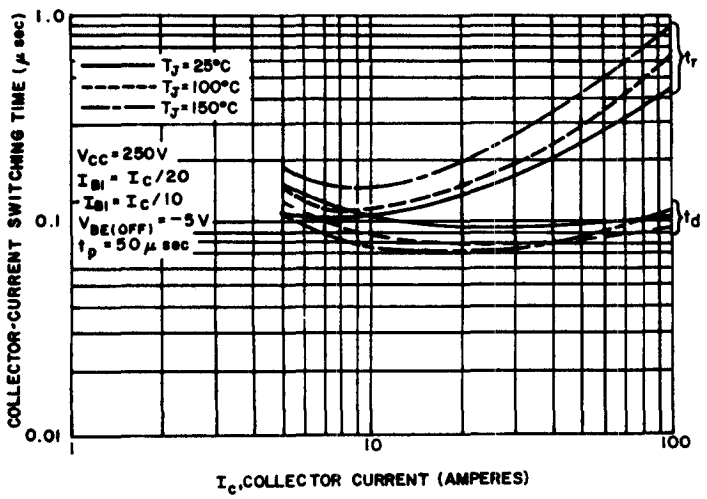


FIGURE 9: TURN-ON TIME (RESISTIVE LOAD)

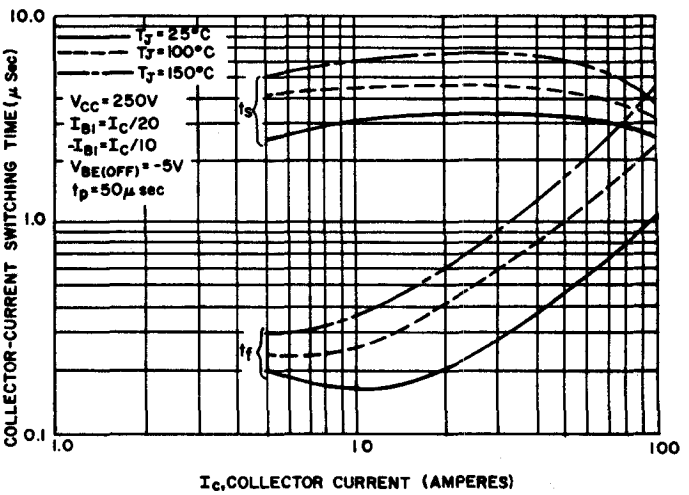


FIGURE 10: TURN-OFF TIME (RESISTIVE LOAD)

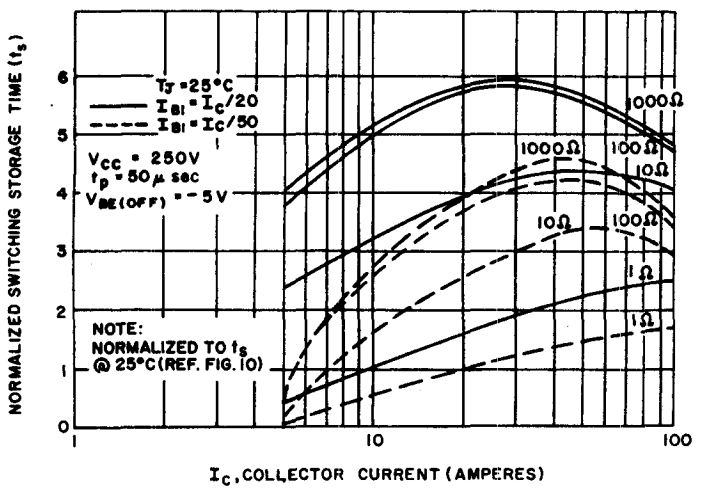


FIGURE 11: NORMALIZED RESISTIVE SWITCHING STORAGE TIME (R_{BE} VARIATIONS) VS COLLECTOR CURRENT

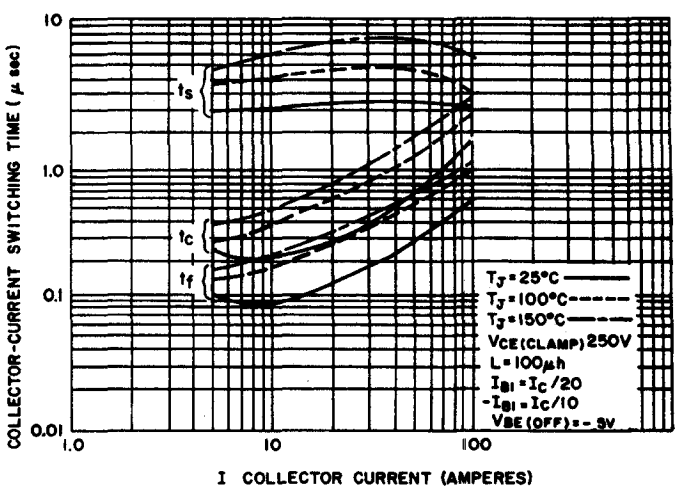


FIGURE 12: CLAMPED INDUCTIVE TURN-OFF TIME

TYPICAL CHARACTERISTICS

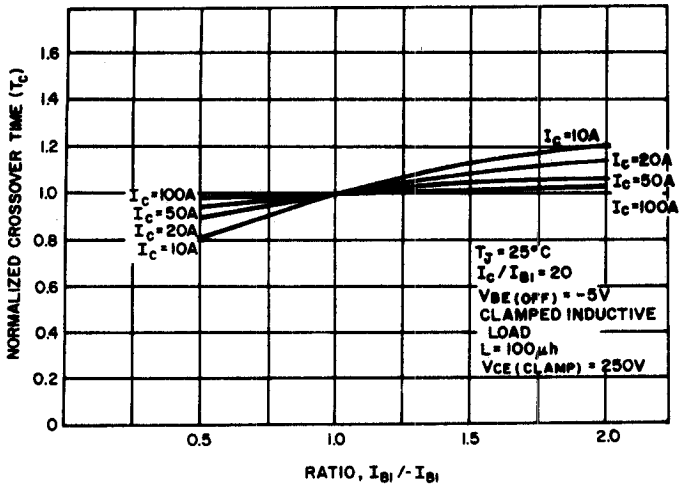


FIGURE 13: CROSSOVER TIME VARIATION WITH $-I_{B1}$

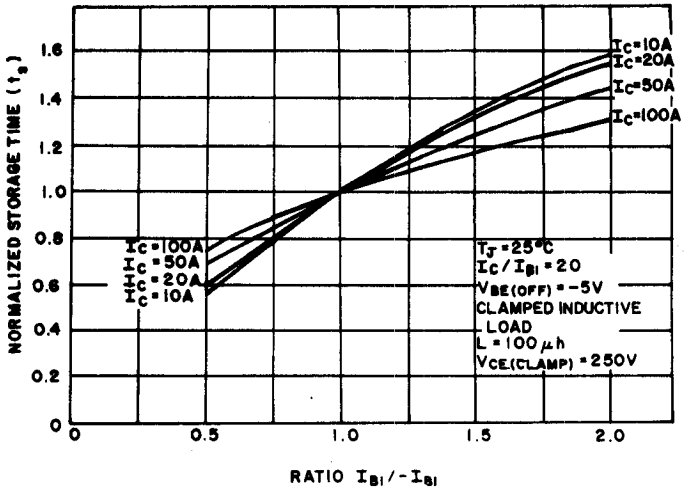


FIGURE 14: STORAGE TIME VARIATION WITH $-I_{B1}$

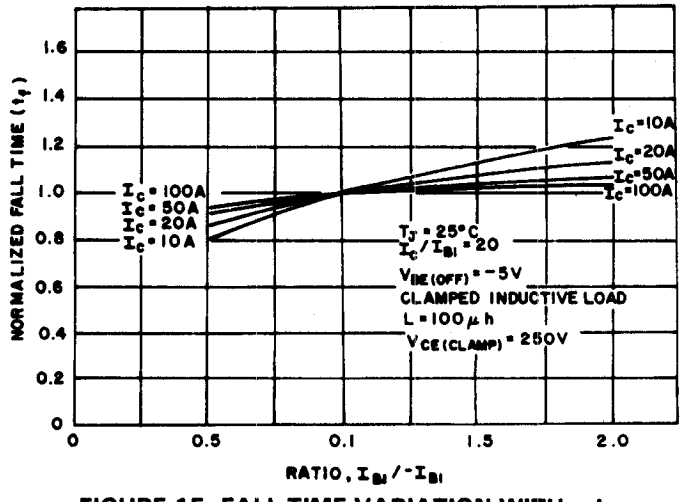


FIGURE 15: FALL TIME VARIATION WITH $-I_{B1}$

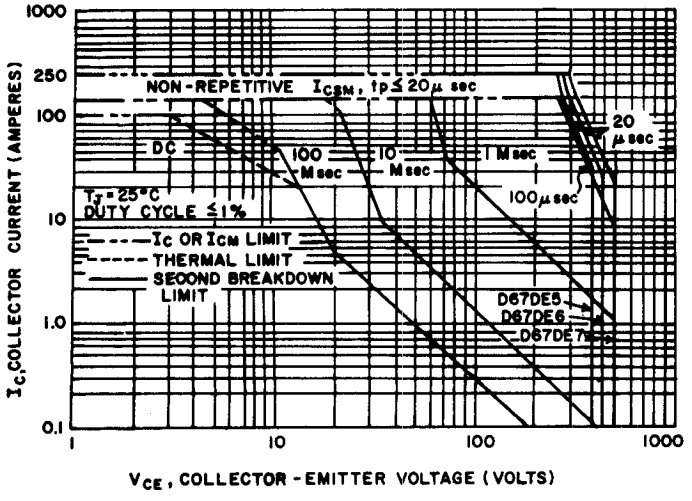


FIGURE 16: FORWARD BIAS SAFE OPERATING AREA

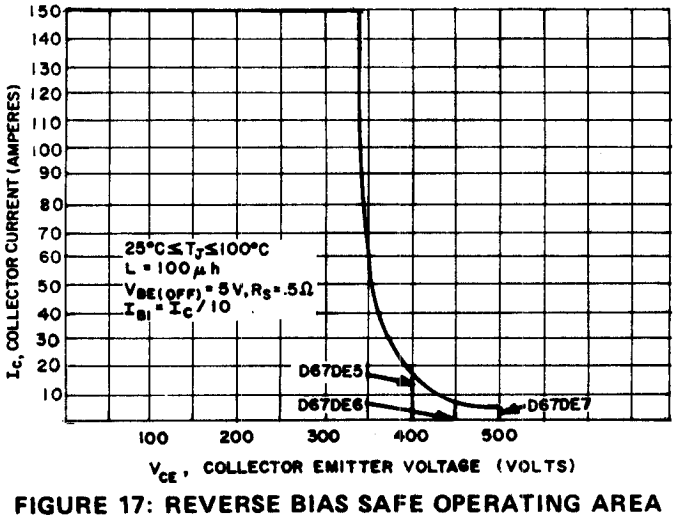


FIGURE 17: REVERSE BIAS SAFE OPERATING AREA (CLAMPED)

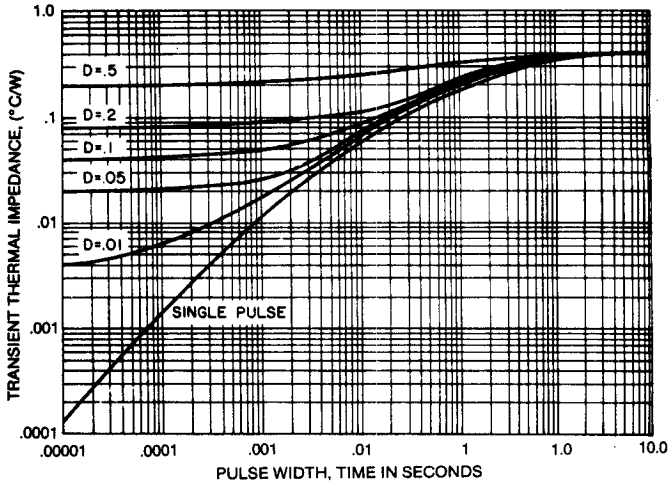


FIGURE 18: TRANSIENT THERMAL RESPONSE

TYPICAL CHARACTERISTICS

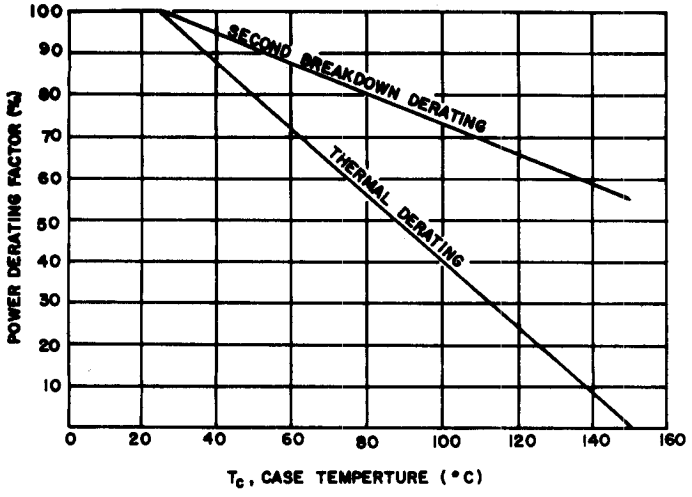


FIGURE 19: POWER DERATING

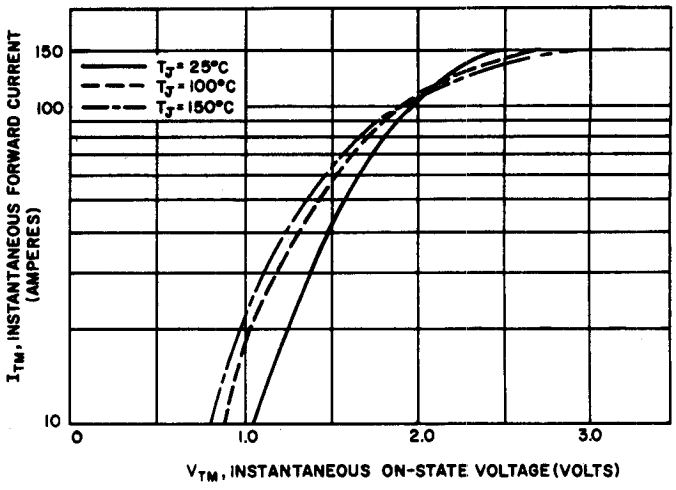


FIGURE 20: DIODE FORWARD CHARACTERISTICS

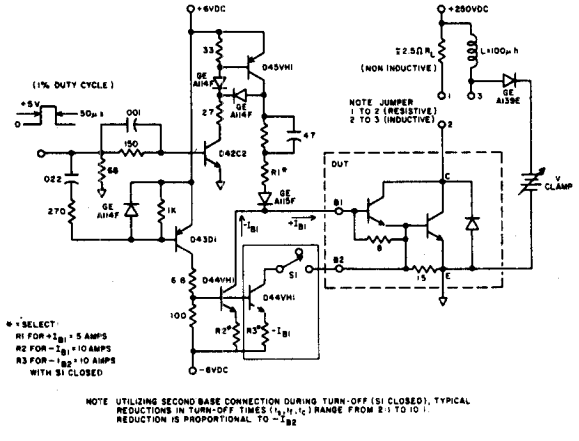


FIGURE 21: SWITCHING TIME TEST CIRCUITS FOR:
- **RESISTIVE & INDUCTIVE SWITCHING**
- **USING BASE 1 ONLY**
- **USING BASE 1 AND BASE 2**