



HIGH POWER NPN POWER DARLINGTON TRANSISTORS

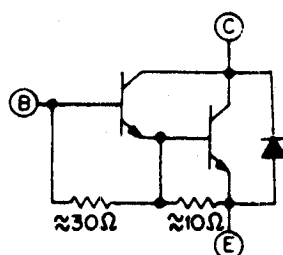
**D66DV5,6,7
D66EV5,6,7**

**500-700 VOLTS
50 AMP, 125 WATTS**

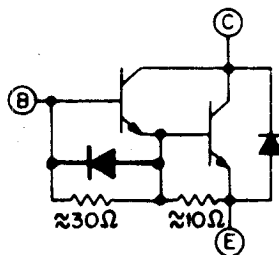
The General Electric D66DV and EV are high current power Darlington transistors. They feature collector isolation from the heat sink, and internal construction designed for stress-free operation at temperature extremes and quick connect electrical terminals. They are designed to meet UL creep, strike 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: 75 Amperes, I_C (Peak)
- High Gain: h_{FE} 50 Minimum @ 50 Amperes, I_C ($h_{FE} = 135$, typical)

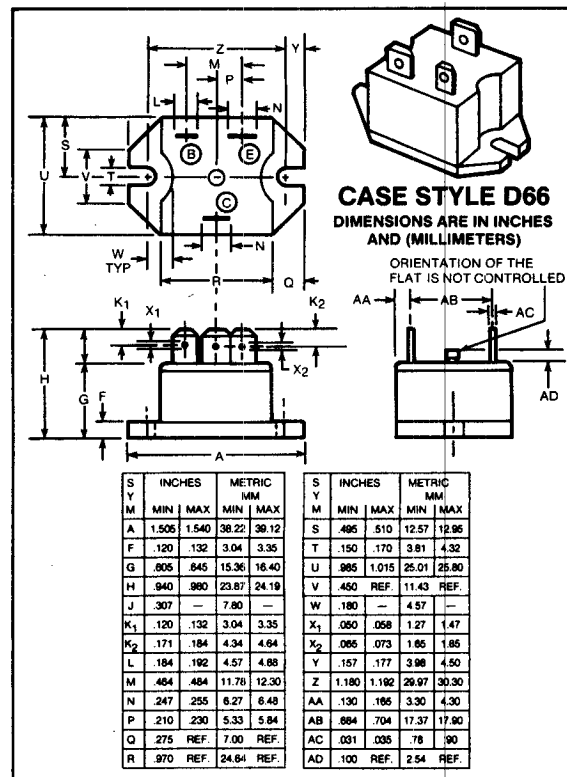


D66DV



D66EV

DEVICE CIRCUIT



maximum ratings ($T_C = 25^\circ C$) (unless otherwise noted)

RATING	SYMBOL	D66DV5/EV5	D66DV6/EV6	D66DV7/EV7	UNITS
Collector-Emitter Voltage	V_{CEV}	500	600	700	Volts
Collector-Emitter Voltage	V_{CEO}	400	450	500	Volts
Emitter Base Voltage	V_{EBO}	8	8	8	Volts
		5	5	5	
Collector Current — Continuous	I_C	50	50	50	A
Peak (Repetitive)	I_{CM}	75	75	75	
Peak (Non-Repetitive)	I_{CSM}	125	125	125	
Base Current — Continuous	I_B	10	10	10	A
Peak (Non-Repetitive)	I_{BM}	20	20	20	
Total Power Dissipation @ $T_C = 25^\circ C$	P_D	125	125	125	Watts
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-40 to +150	-40 to +150	-40 to +150	$^\circ C$
Isolation Voltage	V_{ISOL}	2500	2500	2500	$V_{(rms)}$

thermal characteristics

Thermal Resistance, Junction to Case	$R_{\theta JC}$	4	4	4	$^\circ C/W$
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See page 845 for mounting and handling considerations.

electrical characteristics ($T_C = 25^\circ\text{C}$) (unless otherwise specified)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
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off characteristics

Collector-Emitter Sustaining Voltage ($I_C = 1\text{A}$) ($V_{\text{clamp}} = V_{\text{CEO Rated}}$)	D66DV5/EV5 D66DV6/EV6 D66DV7/EV7	$V_{\text{CEO(sus)}}$	400 450 500	— — —	— — —	Volts
Collector Cutoff Current ($V_{\text{CE}} = \text{Rated Value}$, $V_{\text{BE}} = -1.5\text{V}$)	$T_J = 25^\circ\text{C}$ $T_J = 150^\circ\text{C}$	I_{CEV}	— —	— —	10 2.5	mA
Emitter Cutoff Current ($V_{\text{EB}} = 4.5\text{V}$, $I_C = 0$) ($V_{\text{EB}} = 1.5\text{V}$, $I_C = 0$)	D66DV D66EV	I_{EBO}	— —	— —	350 350	mA

second breakdown

Second Breakdown with Base Forward Biased	FBSOA	SEE FIGURE 23
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on characteristics

DC Current Gain ($I_C = 75\text{A}$, $V_{\text{CE}} = 5\text{V}$) ($I_C = 50\text{A}$, $V_{\text{CE}} = 5\text{V}$) ($I_C = 20\text{A}$, $V_{\text{CE}} = 5\text{V}$)	h_{FE}	25 50 100	60 135 250	— — —	—
Collector-Emitter Saturation Voltage ($I_C = 75\text{A}$, $I_B = 5\text{A}$) ($I_C = 50\text{A}$, $I_B = 4\text{A}$) ($I_C = 20\text{A}$, $I_B = 2\text{A}$)	$V_{\text{CE(sat)}}$	— — —	2.2 1.7 1.15	3.0 2.0 1.5	V
Base-Emitter Saturation Voltage ($I_C = 75\text{A}$, $I_B = 5\text{A}$) ($I_C = 50\text{A}$, $I_B = 4\text{A}$) ($I_C = 20\text{A}$, $I_B = 2\text{A}$)	$V_{\text{BE(sat)}}$	— — —	2.8 2.45 1.95	3.5 3.0 2.5	V

switching characteristics

switching characteristics				TYP.		MAX.		μs
Resistive Load				DV	EV	DV	EV	
Delay Time	$V_{\text{CC}} = 250\text{V}$	t_{d}	—	.09	.09	.5	.5	
Rise Time	$I_{\text{C}} = 50\text{A}$	t_{r}	—	.5	.5	1	1	
Storage Time	$I_{\text{B}1} = 2.5\text{A}, I_{\text{B}2} = 5\text{A}$	t_{s}	—	2.55	2	5	3	
Fall Time	$t_{\text{b}} = 50 \mu\text{sec}$	t_{f}	—	1.4	.64	3	1	

emitter-collector diode characteristics

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

TYPICAL CHARACTERISTICS

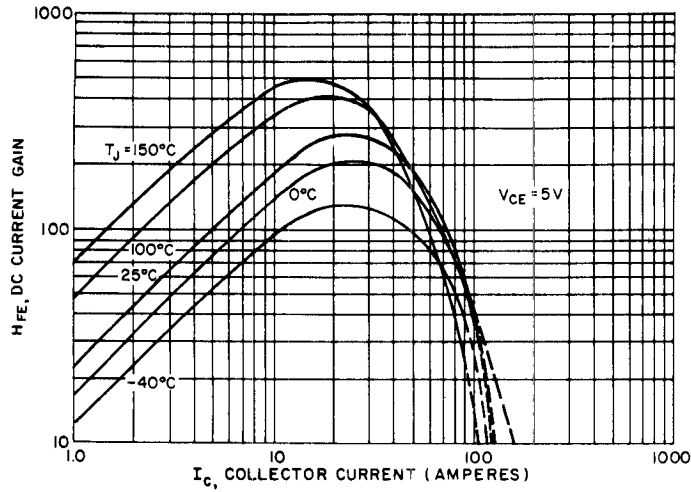


FIGURE 1. DC CURRENT GAIN ($V_{CE} = 5V$)

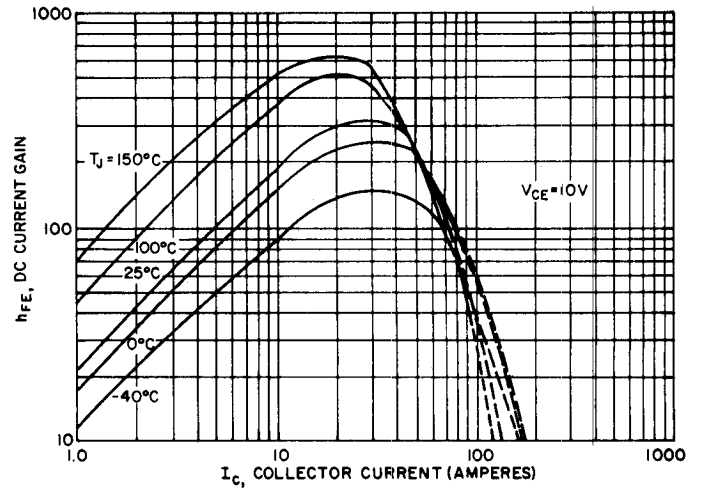


FIGURE 2. DC CURRENT GAIN ($V_{CE} = 10V$)

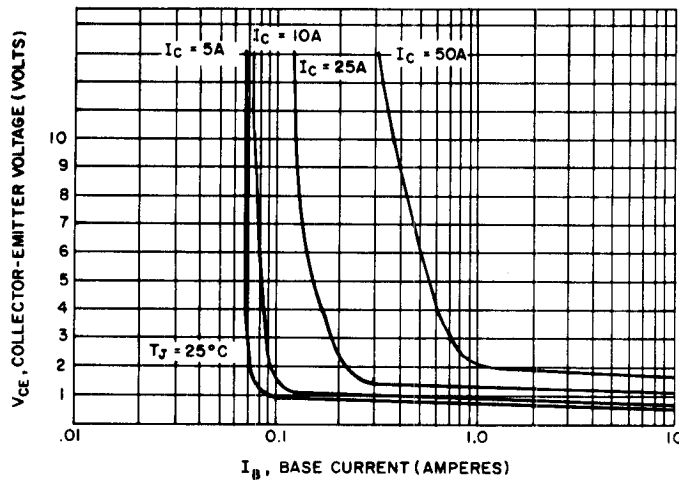


FIGURE 3. COLLECTOR SATURATION REGION

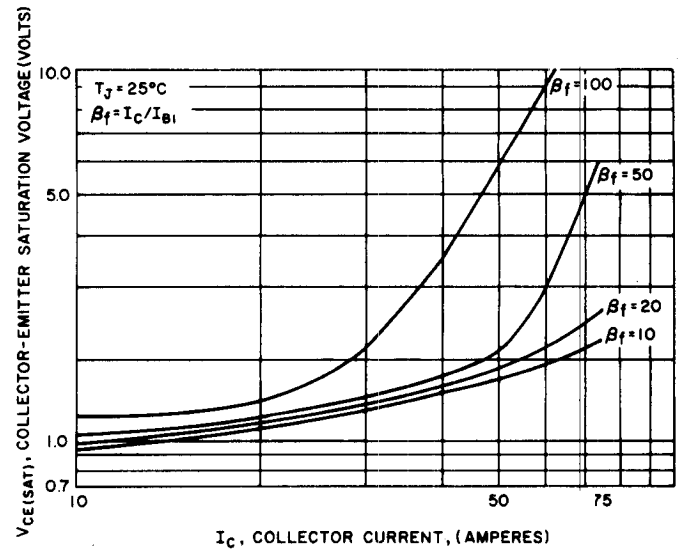


FIGURE 4. $V_{CE} (SAT)$ VS I_C , $T_J = 25^\circ C$

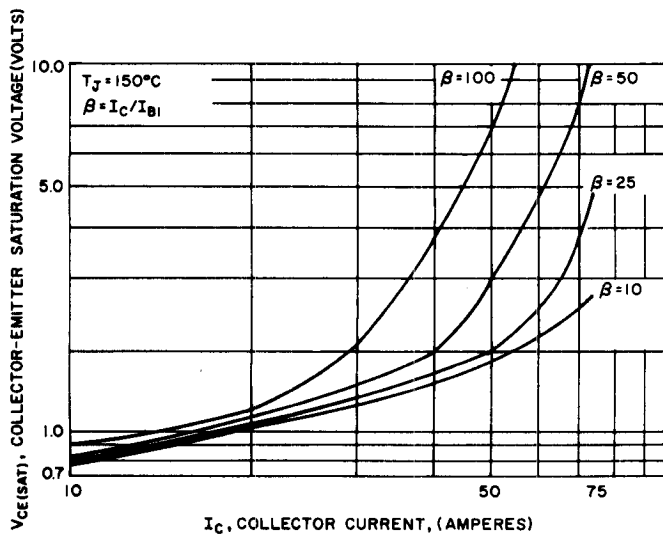


FIGURE 5. $V_{CE} (SAT)$ VS I_C , $T_J = 150^\circ C$

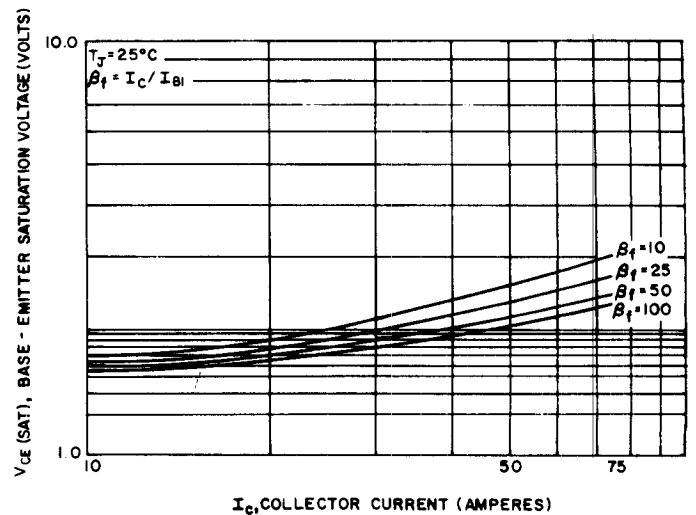


FIGURE 6. $V_{BE} (SAT)$ VS I_C , $T_J = 25^\circ C$

TYPICAL CHARACTERISTICS

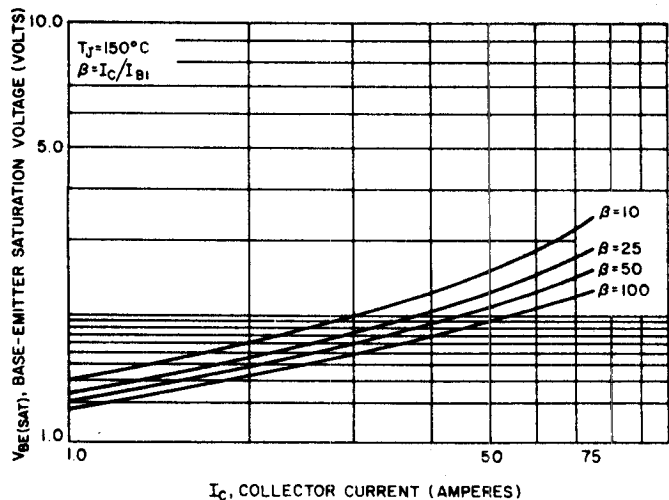


FIGURE 7. $V_{BE} (SAT)$ VS I_C , $T_J = 150^\circ C$

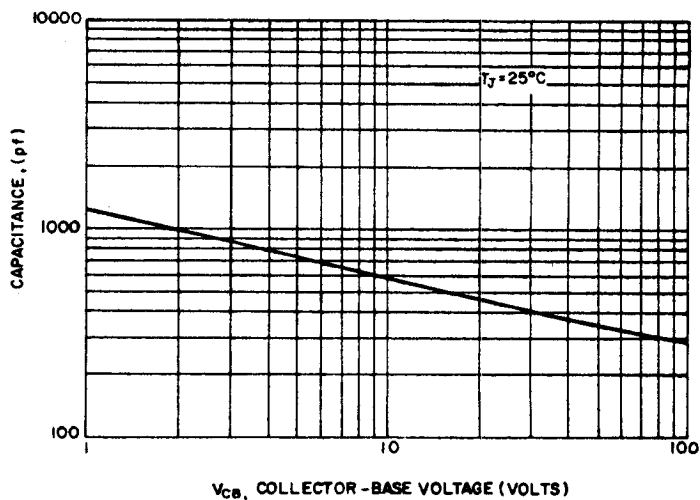


FIGURE 8. CAPACITANCE (C_{CB0})

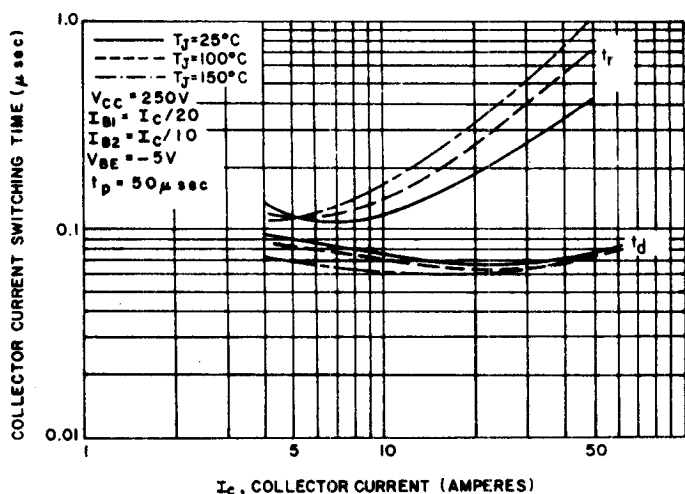


FIGURE 9. TURN-ON TIME (RESISTIVE LOAD)
(D66DV ONLY)

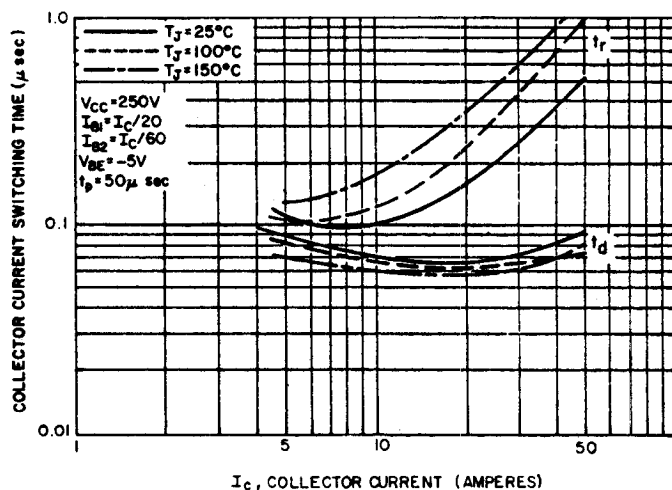


FIGURE 10. TURN-ON TIME (RESISTIVE LOAD)
(D66EV ONLY)

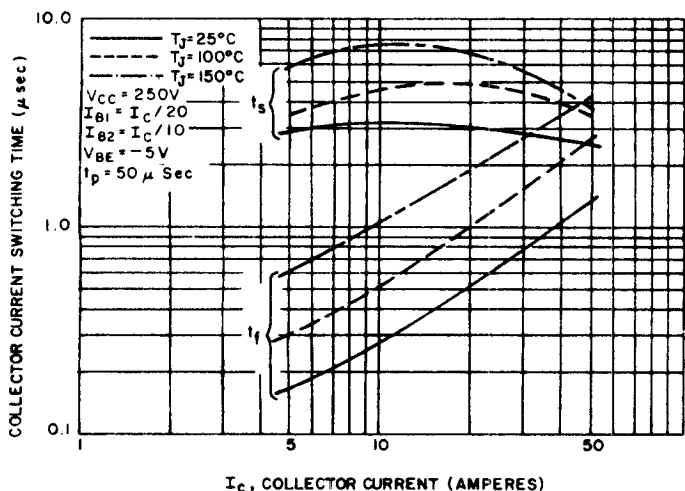


FIGURE 11. TURN-ON TIME (RESISTIVE LOAD)
(D66DV ONLY)

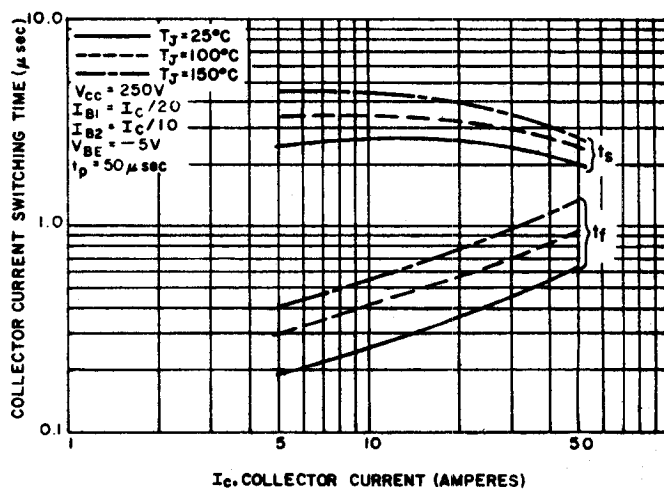


FIGURE 12. TURN-ON TIME (RESISTIVE LOAD)
(D66EV ONLY)

TYPICAL CHARACTERISTICS

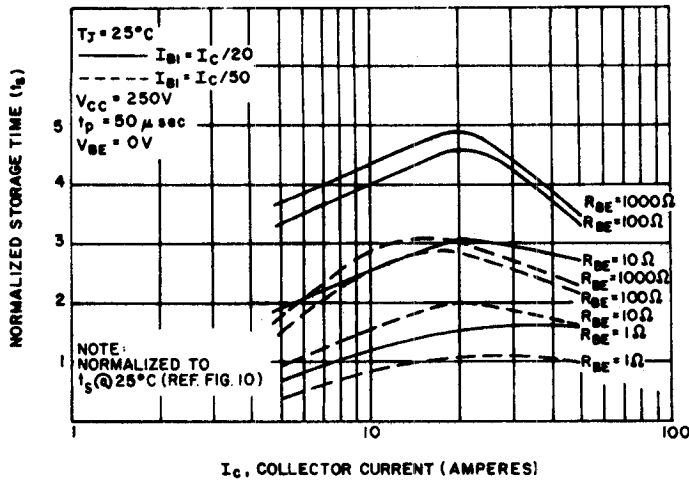


FIGURE 13. NORMALIZED RESISTIVE SWITCHING STORAGE TIME (R_{BE} VARIATIONS) VS COLLECTOR CURRENT (D66DV ONLY)

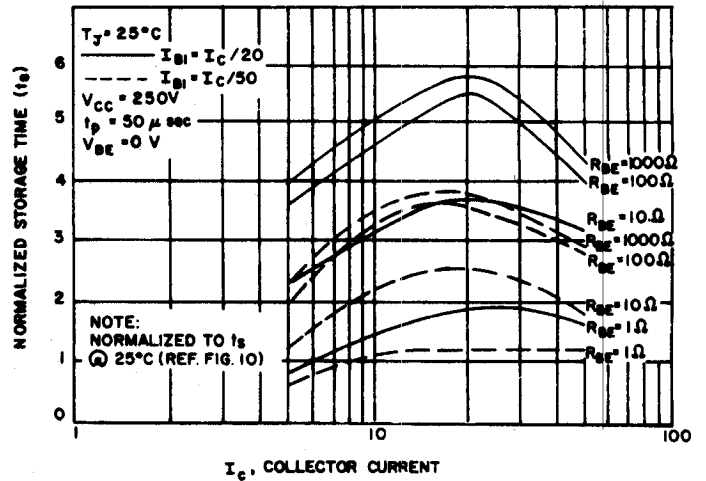


FIGURE 14. NORMALIZED RESISTIVE SWITCHING STORAGE TIME (R_{BE} VARIATIONS) VS COLLECTOR CURRENT (D66EV ONLY)

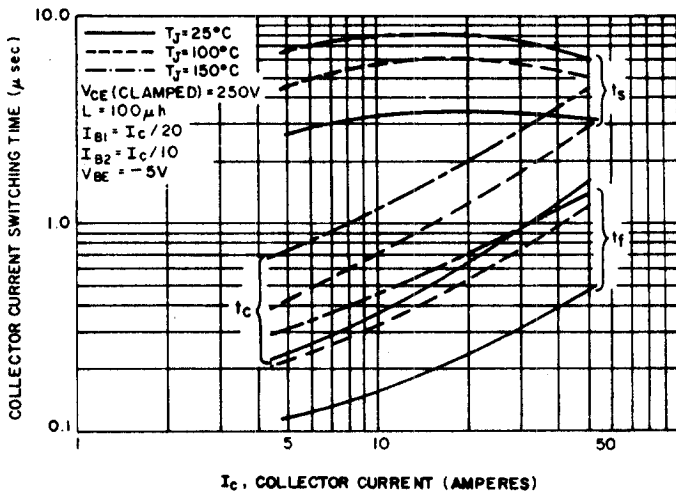


FIGURE 15. CLAMPING INDUCTIVE TURN-OFF TIME (D66DV ONLY)

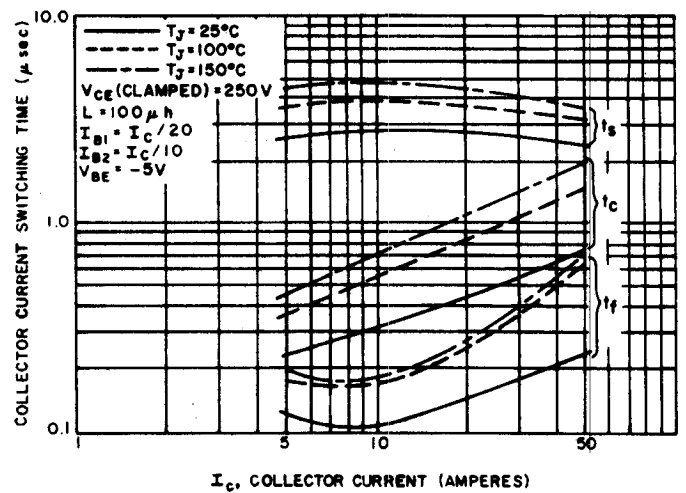


FIGURE 16. CLAMPING INDUCTIVE TURN-OFF TIME (D66EV ONLY)

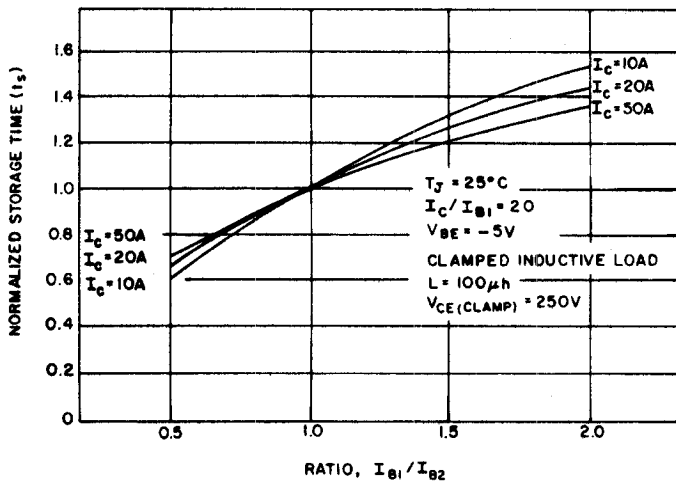


FIGURE 17. STORAGE TIME VARIATION WITH I_{B2} (D66DV ONLY)

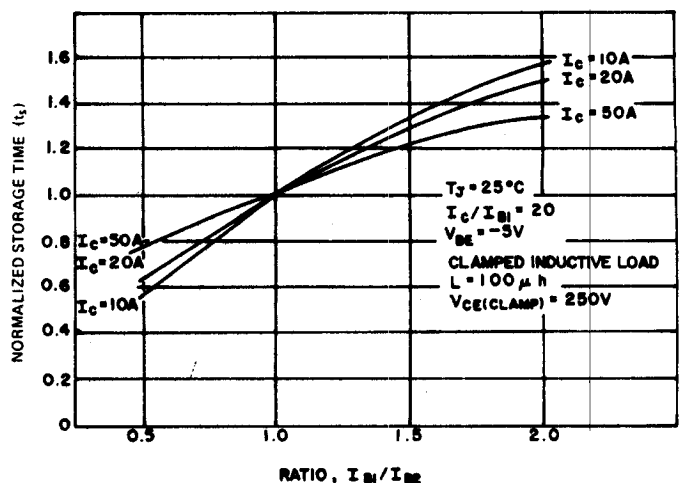


FIGURE 18. STORAGE TIME VARIATION WITH I_{B2} (D66EV ONLY)

Graph showing Normalized Fall Time (t_f) versus Ratio, I_{B1}/I_{B2} for a 2N3055A transistor. The curves are plotted for $I_C = 10A$, $20A$, and $50A$. The graph includes the following parameters:

- $T_J = 25^\circ C$
- $I_C/I_{B1} = 20$
- $V_{BE} = -5V$
- CLAMPED INDUCTIVE LOAD
- $L = 100\mu h$
- $V_{CE(CLAMPED)} = 250V$

Graph showing Normalized Fall Time (t_f) versus Ratio, I_{B1}/I_{B2} for a 2N2907A transistor. The curves are plotted for collector currents $I_C = 10A$, $20A$, and $50A$.

Operating conditions:

- $T_J = 25^\circ C$
- $I_C/I_{B1} = 20$
- $V_{BE} = -5V$
- CLAMPED INDUCTIVE LOAD
- $L = 100 \mu h$
- $V_{CE(CLAMP)} = 250V$

The graph plots Normalized Crossover Time (t_c) on the y-axis (ranging from 0.6 to 1.4) against the Ratio, I_{B1}/I_{B2} on the x-axis (ranging from 0.5 to 2.0). Three curves are shown for different collector currents: $I_C = 10A$, $I_C = 20A$, and $I_C = 50A$. All curves intersect at a ratio of 1.0 and a normalized time of 1.0. For ratios greater than 1.0, the crossover time increases, with higher collector currents showing a more significant increase. For ratios less than 1.0, the crossover time decreases, with higher collector currents showing a more significant decrease.

Operating conditions specified in the graph:

- $T_J = 25^\circ C$
- $I_C/I_{B1} = 20$
- $V_{BE} = -5V$
- CLAMPED INDUCTIVE LOAD
- $L = 100\mu h$
- $V_{CE(CLAMP)} = 250V$

Graph showing Normalized Crossover Time (t_c) versus Ratio, I_{B1}/I_{B2} for a 2N3055A transistor. The curves are plotted for $I_C = 10A$, $I_C = 20A$, and $I_C = 50A$. The graph includes the following operating conditions:

- $T_J = 25^\circ C$
- $I_C/I_{B1} = 20$
- $V_{BE} = -5V$
- CLAMPED INDUCTIVE LOAD
- $L = 100\mu h$
- $V_{CE}(CLAMPED) = 250V$

Graph showing the relationship between Collector Current (I_C) in Amperes (Y-axis, logarithmic scale from 0.1 to 125) and Collector-Emitter Voltage (V_{CE}) in Volts (X-axis, logarithmic scale from 1.0 to 1000). The graph is for a 2N3638 PNP transistor at $T_J = 25^\circ\text{C}$ and Duty Cycle $\leq 1\%$.

Key curves and limits shown:

- DC (Continuous Duty)
- 100 MSec.
- 10 MSec.
- 1 MSec.
- 100 μ Sec.
- 20 μ Sec.
- NON-REPETITIVE $I_{CSM}, 1p \leq 20\mu$ Sec.
- I_C OR I_{CM} LIMIT
- THERMAL LIMIT
- SECOND BREAKDOWN LIMIT
- PART 5
- PART 6
- PART 7

$T_J = 25^\circ\text{C}$
 $L = 100\ \mu\text{h}$
 $V_{BE} = -5\text{V}, R_S = 0.5\ \Omega$ ———
 $I_{B1} = I_C/10$
 $V_{BE} = 0\text{V}, R_{BE} = 47\ \Omega$ - - -

PART 5
 PART 6
 PART 7

I_C , COLLECTOR CURRENT (AMPERES)

V_{CE} , COLLECTOR-EMITTER VOLTAGE, CLAMPED (VOLTS)

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TYPICAL CHARACTERISTICS

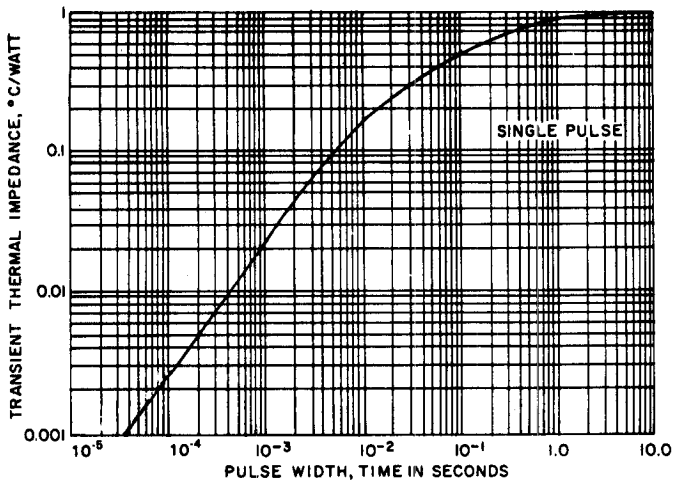


FIGURE 25. TRANSIENT THERMAL RESPONSE

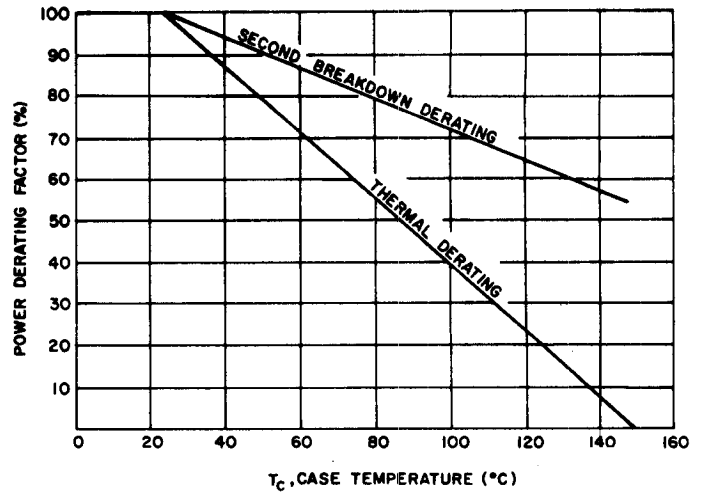


FIGURE 26. POWER DERATING

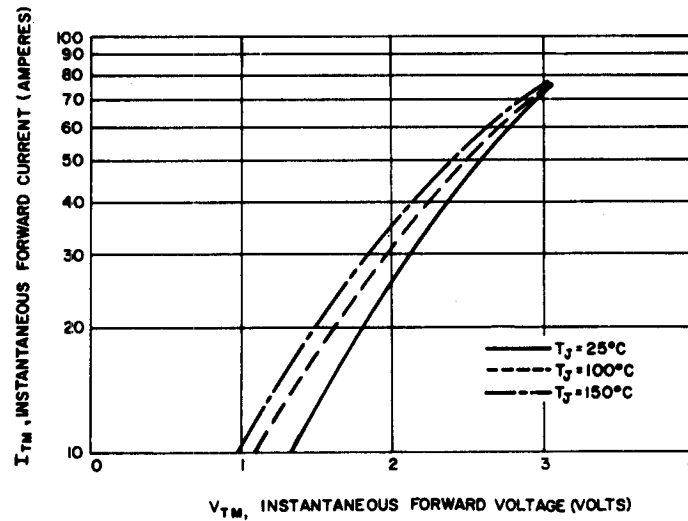


FIGURE 27. DIODE FORWARD CHARACTERISTICS

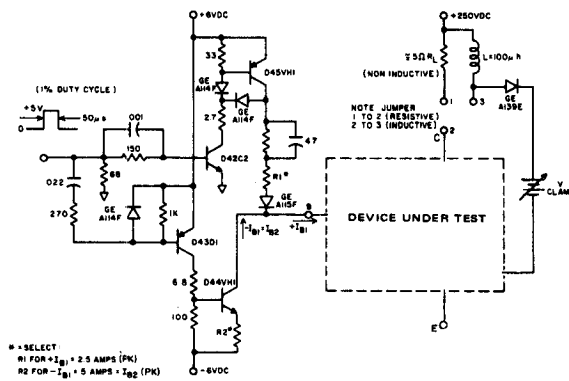


FIGURE 28. SWITCHING TIME TEST CIRCUIT