



HIGH SPEED NPN POWER DARLINGTON TRANSISTORS

D67FP5,6,7

500-700 VOLTS
100 AMP, 312.5 WATTS

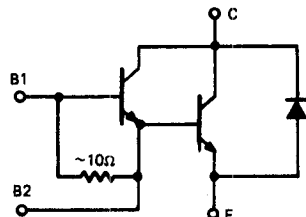
The D67FP is a high voltage NPN high current power darlington especially designed for use in PWM applications where fast and efficient switching is required. This device utilizes GE's latest advances in bipolar technology and features the D67 Package offering: collector isolation from heat sink, left screw terminals for the emitter and collector and quick-connect terminals for Base 1 and Base 2.

The D67FP also features a discrete fast recovery antiparallel high power diode which eliminates the need for an external flyback diode in motor control and other inverter applications such as power supplies and UPS systems.

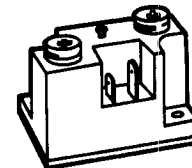
Features:

- Fast switching — $t_f(\text{TYP})$ 0.6 μs
- High blocking voltage — V_{CEV} 500 to 700 Volts
- High current — $I_C(\text{Peak})$ 150 Amps
- High gain — $h_{FE}(\text{MIN})$ 50 @ 100 Amps
- Discrete high power fast recovery diode
- Both Base 1 and Base 2 connections are available
- UL recognized industrial package

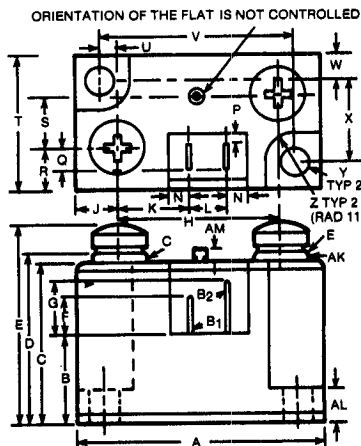
DEVICE
CIRCUIT



*NOTE: The collector-emitter diode is a discrete fast-recovery high power diode.



CASE STYLE D67
DIMENSIONS ARE IN INCHES AND
(MILLIMETERS)



S	V	MIN	MAX	MIN	MAX
A	1.785	1.915	45.33	48.10	
B	.615	.685	15.62	17.40	
C	11.48	11.98	29.15	30.43	
D	1.215	1.270	30.86	32.38	
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	8.25	
K	.618	.685	15.62	17.40	
L	.280	.290	6.60	7.37	
N	.180	REF.	3.81	REF.	
P	.070	REF.	1.80	REF.	
Q	.170	REF.	4.30	REF.	
R	.300	.350	7.62	8.93	
S	.370	.390	9.40	9.90	
T	.385	1.015	25.00	25.80	
U	.110	.130	2.80	3.30	
V	1.410	1.430	35.80	36.32	
W	.175	.205	4.44	5.20	
X	.610	.630	15.50	16.00	
Y	.190	.221	5.08	5.61	
Z	.190	.230	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	.081	.084	.78	.86	
AF	.118	.132	3.02	3.35	
AG	.080	.080	1.27	1.52	
AH	.088	.075	1.85	1.90	
AJ	.204	.211	5.18	5.35	
AK	.385	.385	9.27	9.80	
AL	.235	.265	5.96	6.73	
AM	—	.125	—	3.20	

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

RATING	SYMBOL	D67FP5	D67FP6	D67FP7	UNITS
Collector-Emitter Voltage	V_{CEV}	500	600	700	Volts
Collector-Emitter Voltage	V_{CER}	400	450	500	Volts
Emitter Base Voltage	V_{EBO}	7	7	7	Volts
Collector Current — Continuous	I_C	100	100	100	A
Peak (Repetitive)	I_{CM}	150	150	150	
Peak (Non-Repetitive)	I_{CSM}	250	250	250	
Base Current — Continuous	I_B	10	10	10	A
Peak (Non-Repetitive)	I_{BM}	20	20	20	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	312.5	312.5	312.5	Watts
Derate above 25°C		2.5	2.5	2.5	W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-40 to +150	-40 to +150	-40 to +150	$^\circ\text{C}$
Isolation Voltage	V_{ISOL}	2500	2500	2500	$V_{(rms)}$

thermal characteristics

Thermal Resistance, (transistor)	$R_{\theta JC}$	.40	.40	.40	$^\circ\text{C/W}$
(diode)		1.5	1.5	1.5	

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 ($I_C = 1.0\text{A}$, $R_{BE} = 10\Omega$)	D67FP5 D67FP6 D67FP7	$V_{CEO(sus)}$	400 450 500	— — —	— — —	Volts
Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CEV}$, $V_{BE(off)} = 1.5\text{V}$)	$T_J = 25^\circ\text{C}$ $T_J = 150^\circ\text{C}$	I_{CEV}	— —	— —	1.0 2.5	mA
Emitter Cutoff Current ($V_{EB} = 5\text{V}$, $I_C = 0$)		I_{EBO}	—	—	10	mA

second breakdown

Second Breakdown with Base Forward Biased	FBSOA	SEE FIGURE 5
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on characteristics

DC Current Gain ($I_C = 150\text{A}$, $V_{CE} = 5\text{V}$) ($I_C = 100\text{A}$, $V_{CE} = 5\text{V}$) ($I_C = 40\text{A}$, $V_{CE} = 5\text{V}$)	h_{FE}	25 50 100	150 300 350	— — —	—
Collector-Emitter Saturation Voltage ($I_C = 150\text{A}$, $I_B = 10\text{A}$) ($I_C = 100\text{A}$, $I_B = 8\text{A}$) ($I_C = 40\text{A}$, $I_B = 4\text{A}$)	$V_{CE(sat)}$	— — —	1.9 1.3 0.8	3.0 2.0 1.5	V
Base-Emitter Saturation Voltage ($I_C = 150\text{A}$, $I_B = 10\text{A}$) ($I_C = 100\text{A}$, $I_B = 8\text{A}$)	$V_{BE(sat)}$	— —	2.75 2.3	3.5 3.0	V

switching characteristics

Resistive Load					
Delay Time	$V_{CE} = 250\text{V}$	t_d	—	0.1	0.5
Rise Time	$I_C = 100\text{A}$	t_r	—	0.45	1.0
Storage Time	$I_{B1} = 5\text{A}$, $-I_{B2} = 10\text{A}$	t_s	—	3.2	5.0
Fall Time	$t_p = 50\mu\text{sec}$	t_f	—	1.0	3.0

e-c diode characteristics

Forward Voltage @ $T_J = 25^\circ\text{C}$ @ $T_J = 150^\circ\text{C}$	($I_F = 100\text{A}$)	V_P V_P	— —	1.3 1.3	2.0 2.5	Volts Volts
Reverse Recovery Time ($I_F = 100\text{A}$, $di/dt = 100\text{A}/\mu\text{sec}$, $V_{BE(off)} = 1.5\text{V}$)		T_{rr}	—	0.5	1.0	μsec

TYPICAL CHARACTERISTICS

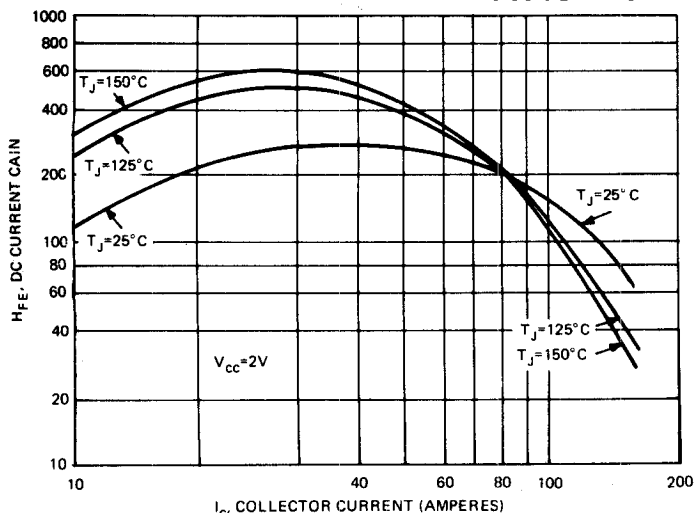


FIGURE 1. DC CURRENT GAIN ($V_{CE} = 2\text{V}$), TYPICAL

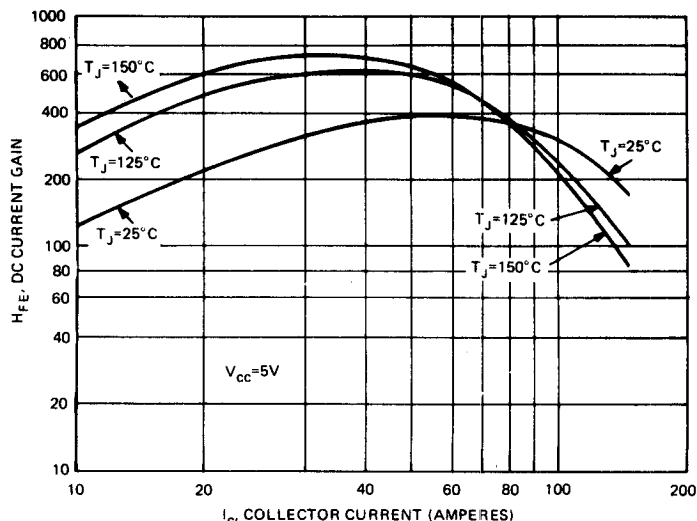


FIGURE 2. DC CURRENT GAIN ($V_{CE} = 5\text{V}$), TYPICAL

TYPICAL CHARACTERISTICS

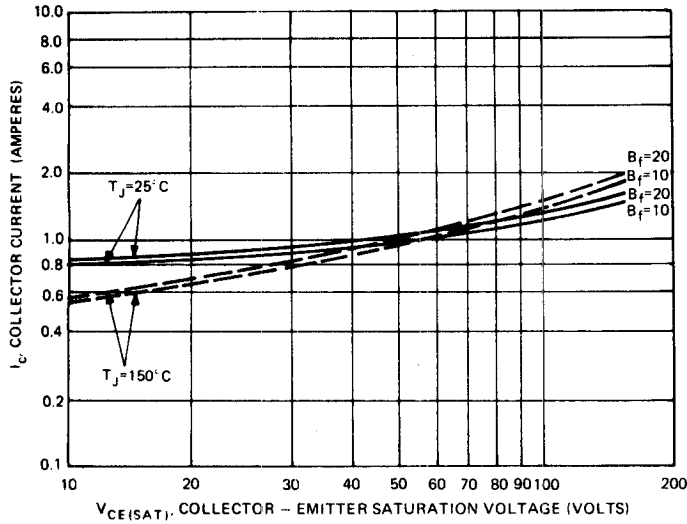


FIGURE 3. $V_{CE(SAT)}$ vs. I_C , TYPICAL

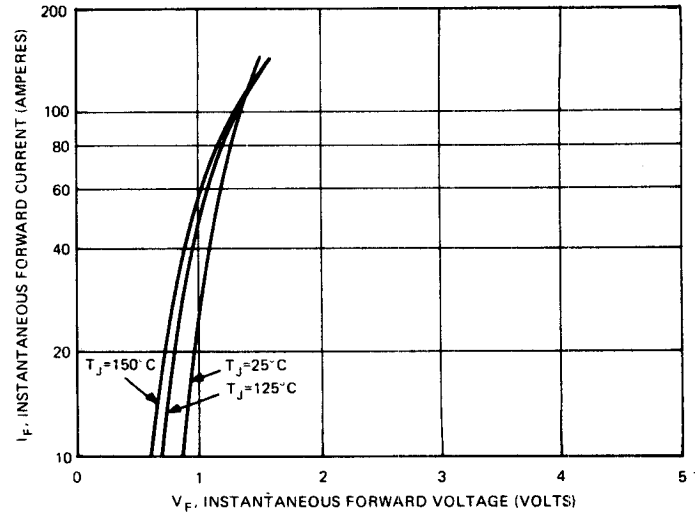


FIGURE 4. DIODE FORWARD CHARACTERISTICS

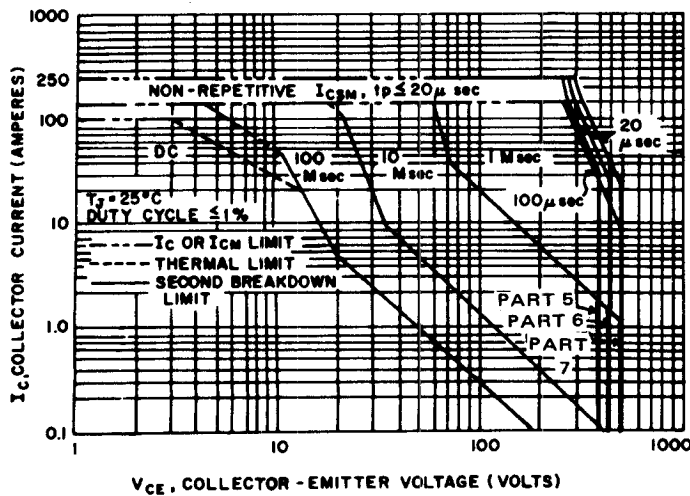


FIGURE 5. FORWARD BIAS SAFE OPERATING AREA

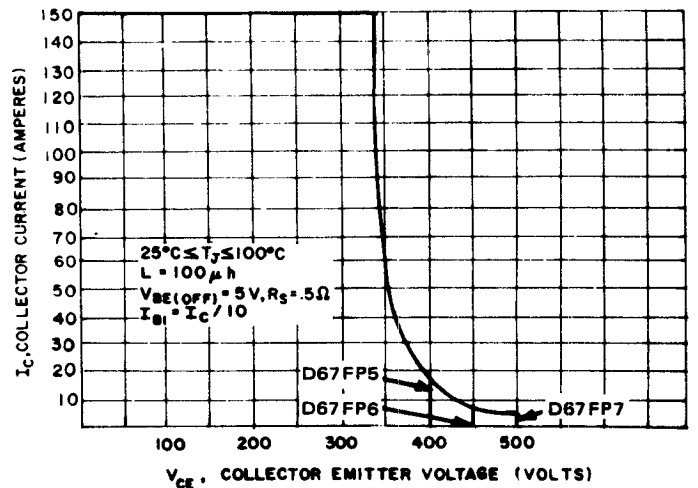
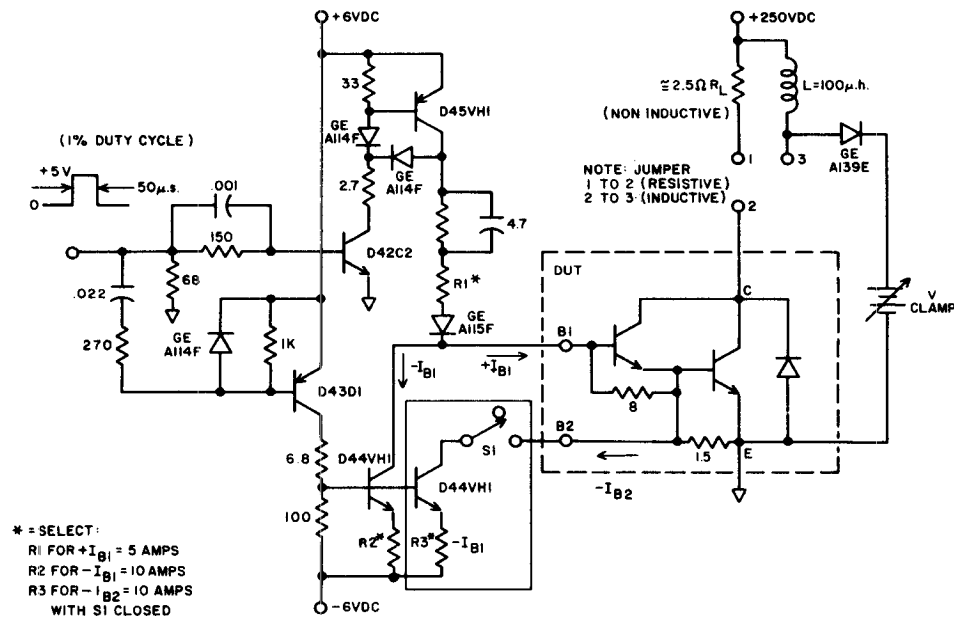


FIGURE 6. REVERSE BIAS SAFE OPERATING AREA (CLAMPED)



NOTE: UTILIZING SECOND BASE CONNECTION DURING TURN-OFF (S1 CLOSED), TYPICAL REDUCTIONS IN TURN-OFF TIMES (t_{tr} , t_f , t_c) RANGE FROM 2:1 TO 10:1. REDUCTION IS PROPORTIONAL TO $-I_{B2}$.

FIGURE 7. SWITCHING TIME TEST CIRCUIT