File Number 15.85

GE6060, GE6061, GE6062

T-33-29

20-Ampere N-P-N Darlington Power Transistors

Features:

- *High-voltage operation: 350, 400, 450 volts*
- *Gain of 40 at 10A*

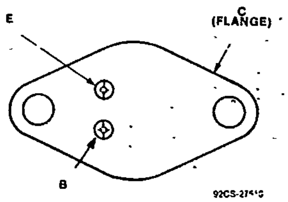
Applications:

- *Series/shunt regulators*
- *Automotive ignition*
- *Power switching*
- *Solenoid driver*

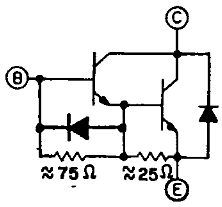
The GE6060, GE6061, and GE6062 silicon n-p-n Darlington power transistors are designed for use in high-speed switching applications, such as: off-line power supplies, AC and DC motor control, UPS systems, ultrasonic equipment, and other high-frequency power conversion equipment.

These devices are supplied in the JEDEC TO-204AA steel hermetic package.

TERMINAL DESIGNATION



JEDEC TO-204AA



DEVICE CIRCUIT

MAXIMUM RATINGS (T_A = 25°C) (unless otherwise specified)

RATING	SYMBOL	GE6060	GE6061	GE6062	UNITS
Collector-Base Voltage	V_{CBO}	400	450	500	Volts
Collector-Emitter Voltage	V_{CEO}	350	400	450	Volts
Emitter Base Voltage	V_{EBO}	5	5	5	Volts
Collector Current — Continuous Peak (Repetitive) Peak (Non-Repetitive)	I_C I_{CM} I_{CSM}	20 25 42.5	20 25 42.5	20 25 42.5	A
Base Current — Continuous Peak (Non-Repetitive)	I_B I_{BM}	4 6	4 6	4 6	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	1	1	°C/W
Maximum Lead Temperature for Soldering Purposes: ⅛" from Case for 5 Seconds	T_L	300	300	300	°C

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ELECTRICAL CHARACTERISTICS (T_C = 25°C) (unless otherwise specified)

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS(1)						
Collector-Emitter Sustaining Voltage (I_C = 0.5mA) (V_{clamp} = V_{CEO} Rated)	GE6060 GE6061 GE6062	$V_{CEO(sus)}$	350 400 450	— — —	— — —	Volts
Collector-Base Voltage (I_C = 0.25mA)	GE6060 GE6061 GE6062	V_{CBO}	400 450 500	— — —	— — —	Volts
Collector Cutoff Current (V_{CB} = V_{CBO} Rated)		I_{CBO}	—	—	0.25	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 14			
Clamped Inductive SOA with Base Reversed Biased		RBSOA	SEE FIGURE 17			
ON CHARACTERISTICS(1)						
DC Current Gain (I_C = 10A, V_{CE} = 5V) (I_C = 15A, V_{CE} = 5V) (I_C = 20A, V_{CE} = 5V)		h_{FE}	40 30 10	160 115 65	— — —	—
Collector-Emitter Saturation Voltage (I_C = 10A, I_B = 1A) (I_C = 10A, I_B = 2A) (I_C = 20A, I_B = 2A)		$V_{CE(sat)}$	— — —	1.2 1.15 1.6	1.5 1.4 2	V
Base-Emitter Voltage (I_C = 5A, I_B = 0.5A) (I_C = 20A, I_B = 2A)		$V_{BE(sat)}$	— —	1.95 2.3	2.5 3.5	V
SWITCHING CHARACTERISTICS						
Resistive Load						
Rise Time	V_{CC} = 300V, t_p = 50 µs I_C = 15A, I_{B1} = 1.5A, I_{B2} = -2.25A	t_r	—	0.3	0.4	µs
Storage Time		t_s	—	2.3	2.5	
Fall Time		t_f	—	0.5	1	
Inductive Load, Clamped						
Storage Time	V_{CC} = 300V, L = 100 µH I_C = 15A, I_{B1} = 1.5A, I_{B2} = -2.25A	t_s	—	2.6	—	µs
Crossover Time		t_c	—	0.5	—	
Fall Time		t_f	—	0.12	—	
EMITTER-COLLECTOR DIODE CHARACTERISTICS						
Forward Voltage I_F = 10A I_F = 25A		V_F	— —	1.9 2.8	— —	Volts

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TYPICAL CHARACTERISTICS

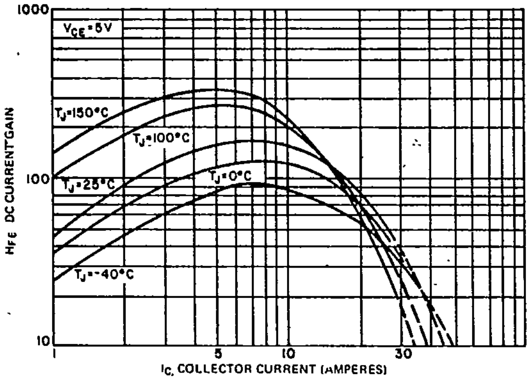

FIGURE 1. DC CURRENT GAIN (V_{CE} = 2V)

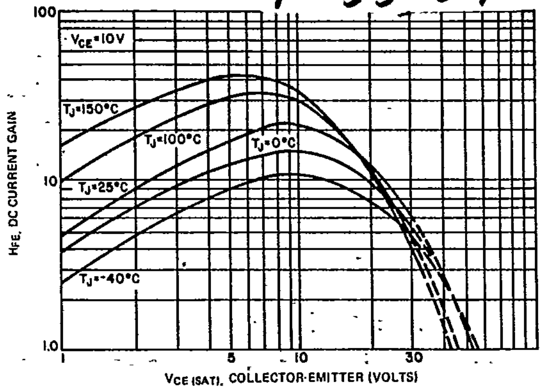

FIGURE 2. DC CURRENT GAIN (V_{CE} = 10V)

2

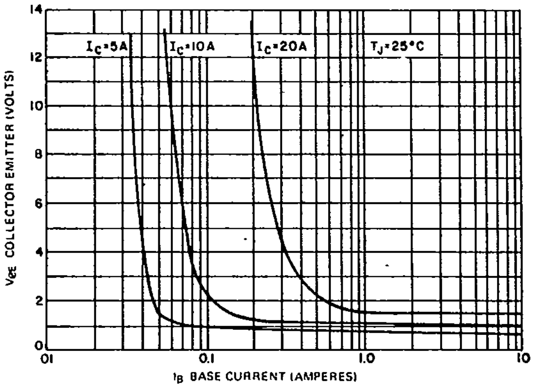

FIGURE 3. COLLECTOR SATURATION REGION

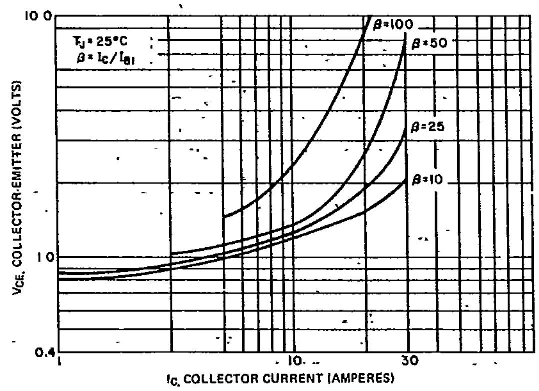

FIGURE 4. $V_{CE(SAT)}$ VS. I_C, T_J = 25°C

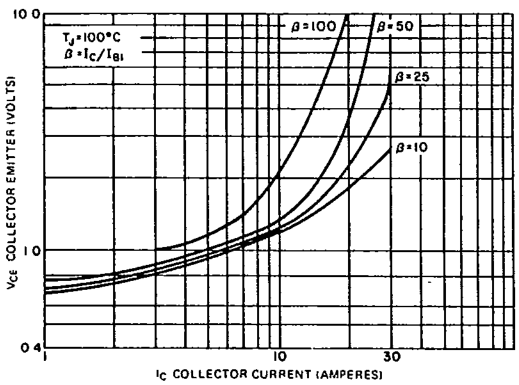

FIGURE 5. $V_{CE(SAT)}$ VS. I_C, T_J = 100°C

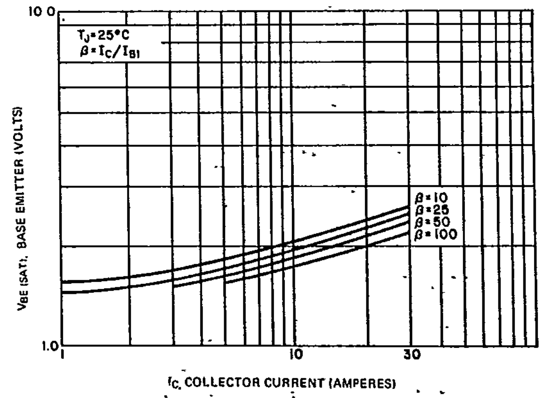

FIGURE 6. $V_{BE(SAT)}$ VS. I_C, T_J = 25°C

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TYPICAL CHARACTERISTICS

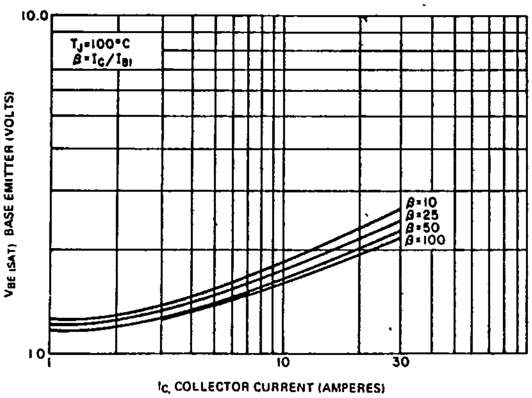

FIGURE 7. $V_{BE(SAT)}$ VS. I_C, T_J = 100°C

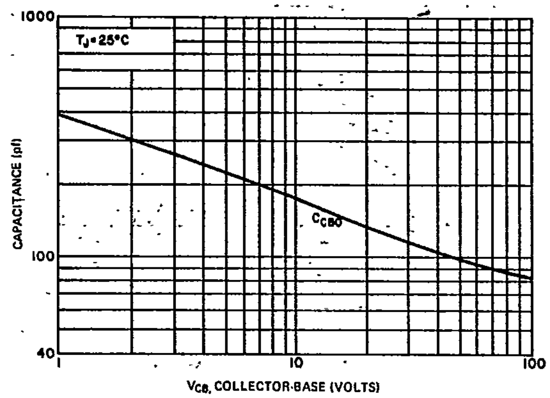

FIGURE 8. CAPACITANCE (C_{CBO})

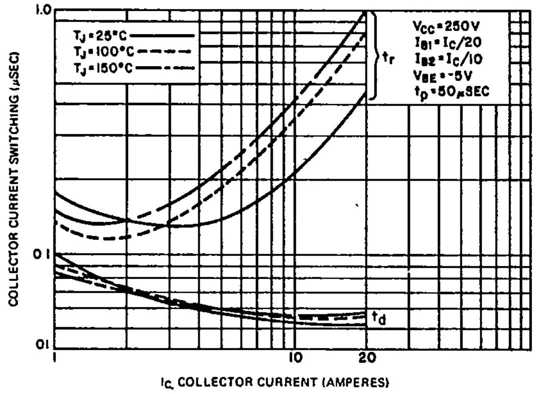

FIGURE 9. TURN-ON TIME (RESISTIVE)

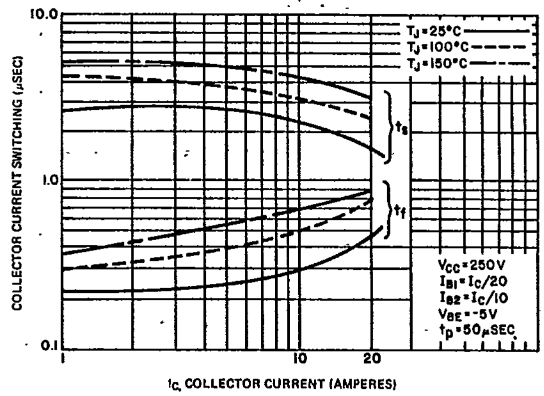

FIGURE 10. TURN-OFF TIME (RESISTIVE)

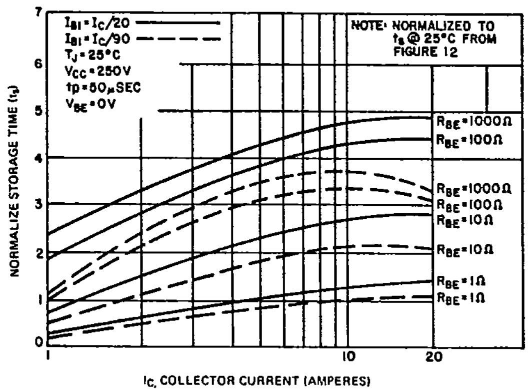

FIGURE 11. NORMALIZED RESISTIVE SWITCHING STORAGE TIME (R_{BE} VARIATIONS) VS. COLLECTOR CURRENT

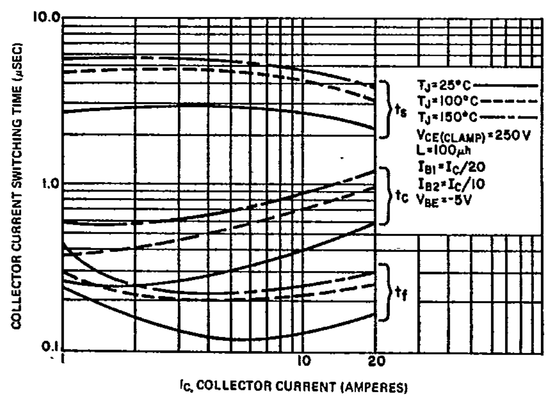

FIGURE 12. CLAMPED INDUCTIVE TURN-OFF TIME

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TYPICAL CHARACTERISTICS

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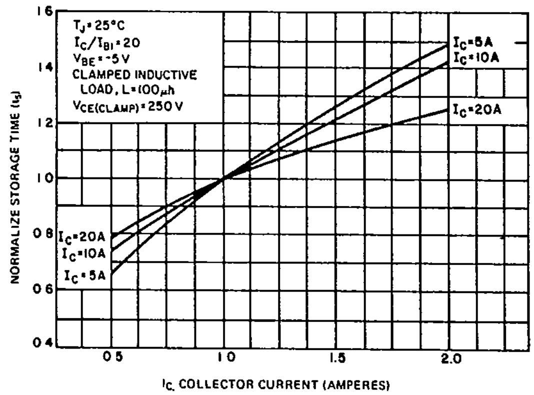

FIGURE 13. STORAGE TIME VARIATION WITH I_{B2}

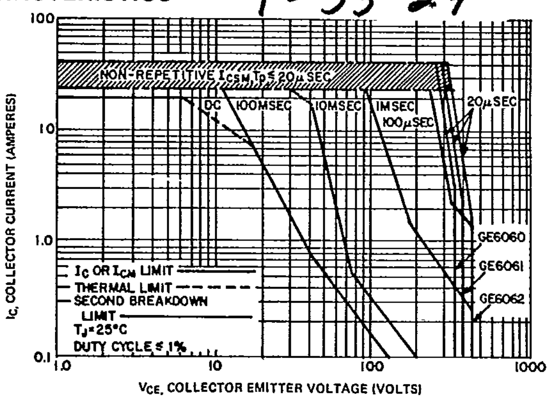

FIGURE 14. FORWARD BIAS SAFE OPERATING AREA

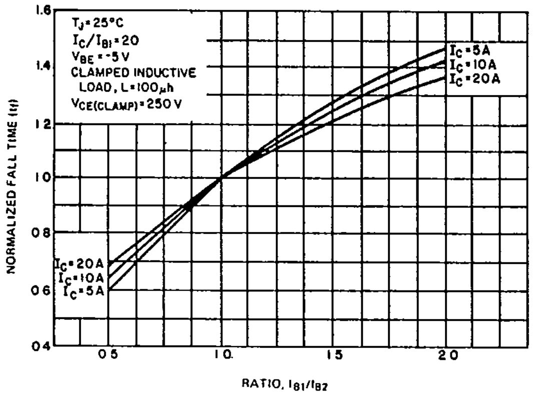

FIGURE 15. FALL TIME VARIATION WITH I_{B2}

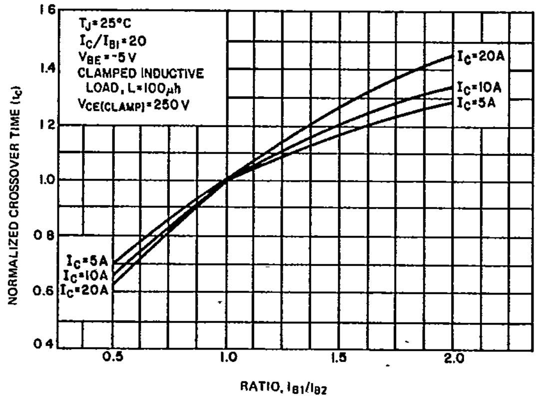

FIGURE 16. CROSS-OVER TIME VARIATION WITH I_{B2}

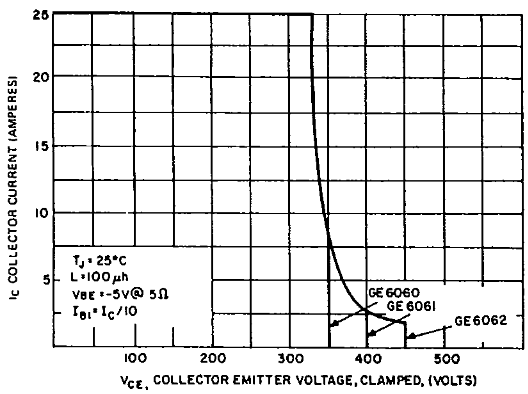

FIGURE 17. REVERSE BIAS SAFE OPERATING AREA

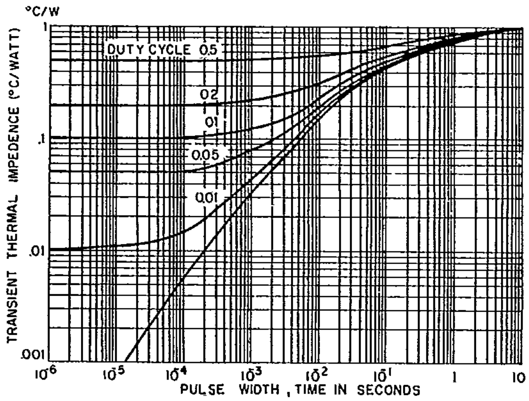

FIGURE 18. TRANSIENT THERMAL RESPONSE

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TYPICAL CHARACTERISTICS

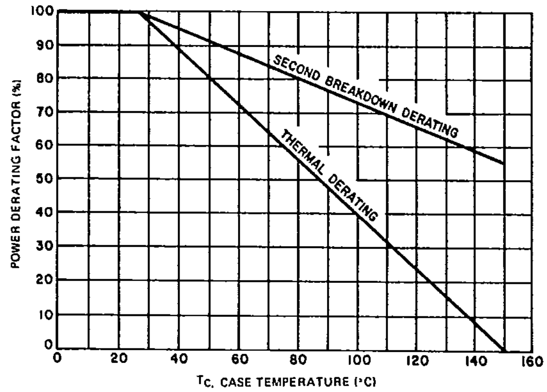

FIGURE 19. POWER DERATING

DIODE CHARACTERISTICS

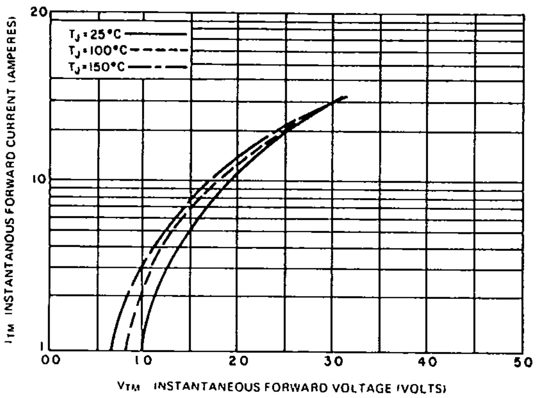

FIGURE 20. FORWARD CHARACTERISTICS

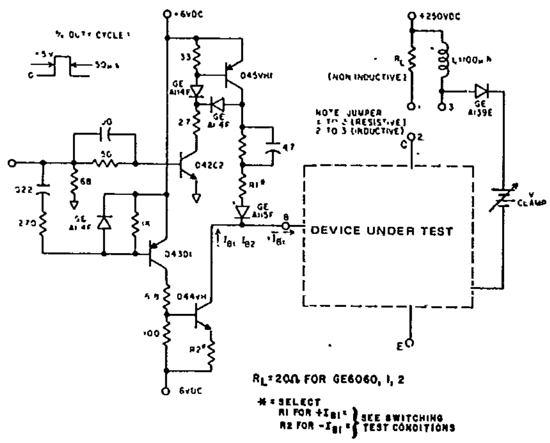

FIGURE 21. SWITCHING TIME TEST CIRCUIT