

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

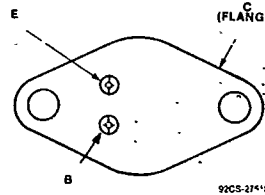
Applications:

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

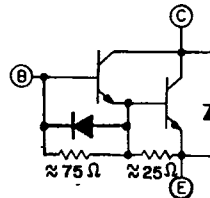
The GE6060, GE6061, and GE6062 silicon n-p-n Darlington power transistors are designed for use in high-speed switching applications, such as: off-line power supplies, AC and DC motor control, UPS systems, ultrasonic equipment, and other high-frequency power conversion equipment.

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	I _C	20	20	20	A
Peak (Repetitive)	I _{CM}	25	25	25	
Peak (Non-Repetitive)	I _{CSM}	42.5	42.5	42.5	
Base Current — Continuous	I _B	4	4	4	A
Peak (Non-Repetitive)	I _{BM}	6	6	6	
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 _{θJC}	1	1	1	°C/W
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	T _L	300	300	300	°C

T-33-29

GE6060, GE6061, GE6062

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ C$) (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	$V_{CC} = 300V, t_p = 50 \mu s$ $I_C = 15A, I_{B1} = 1.5A, I_{B2} = -2.25A$	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	$V_{CC} = 300V, L = 100 \mu H$ $I_C = 15A, I_{B1} = 1.5A, I_{B2} = -2.25A$	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
---	-------	--------	------------	--------	--------	-------

GE6060, GE6061, GE6062

T-33-29

TYPICAL CHARACTERISTICS

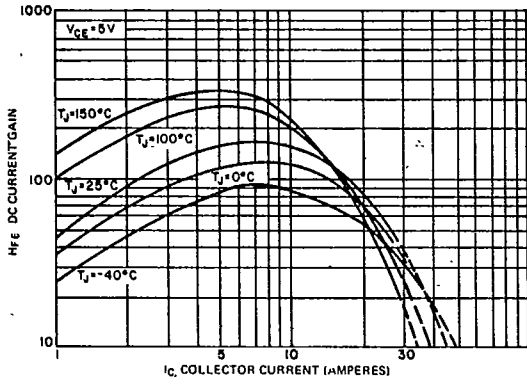


FIGURE 1. DC CURRENT GAIN ($V_{CE} = 2V$)

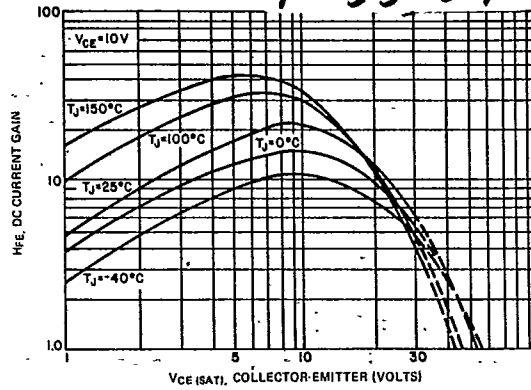


FIGURE 2. DC CURRENT GAIN ($V_{CE} = 10V$)

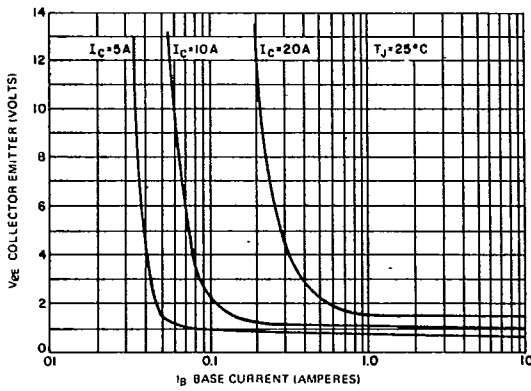


FIGURE 3. COLLECTOR SATURATION REGION

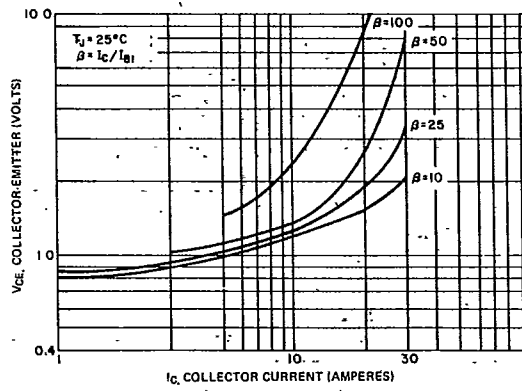


FIGURE 4. $V_{CE(SAT)}$ VS. I_C , $T_J = 25^\circ C$

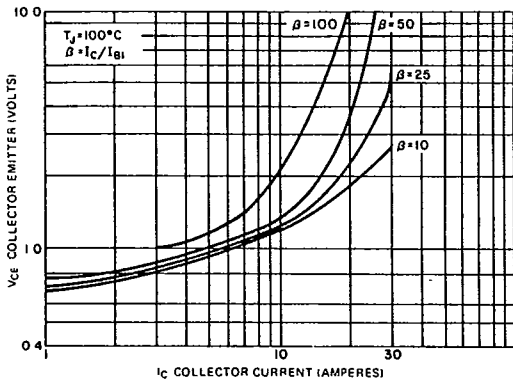


FIGURE 5. $V_{CE(SAT)}$ VS. I_C , $T_J = 100^\circ C$

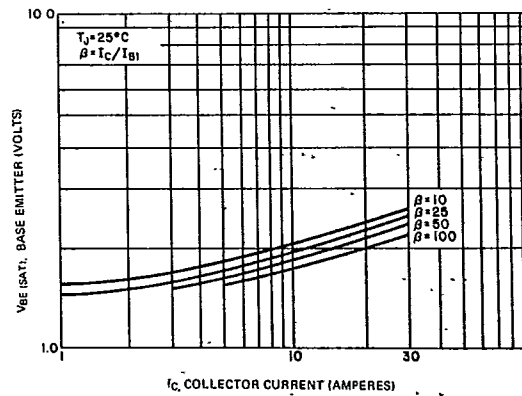


FIGURE 6. $V_{BE(SAT)}$ VS. I_C , $T_J = 25^\circ C$

GE6060, GE6061, GE6062

TYPICAL CHARACTERISTICS

T-33-29

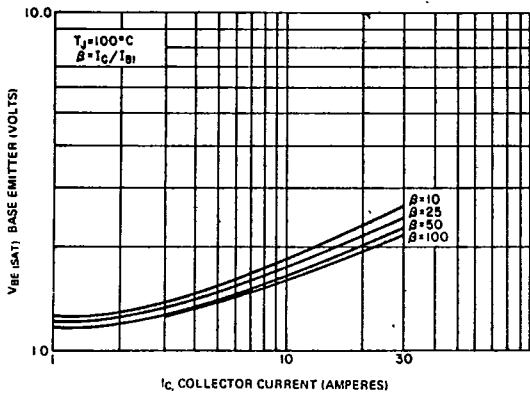


FIGURE 7. $V_{BE(SAT)}$ VS. I_C , $T_J = 100^\circ\text{C}$

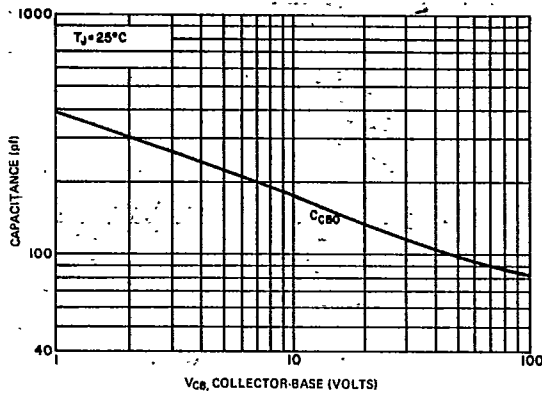


FIGURE 8. CAPACITANCE (C_{CB0})

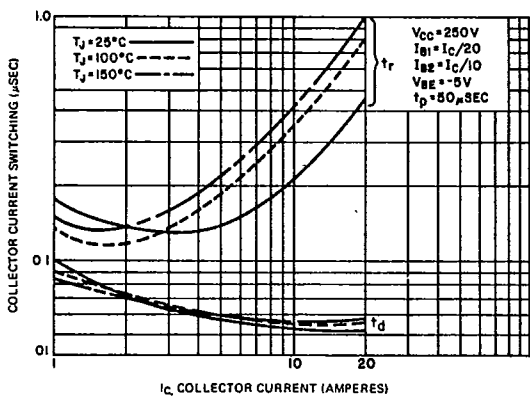


FIGURE 9. TURN-ON TIME (RESISTIVE)

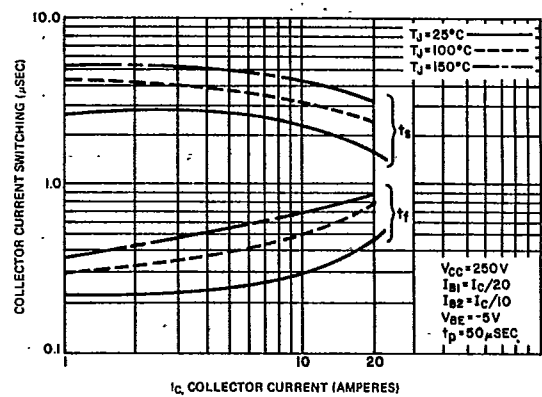


FIGURE 10. TURN-OFF TIME (RESISTIVE)

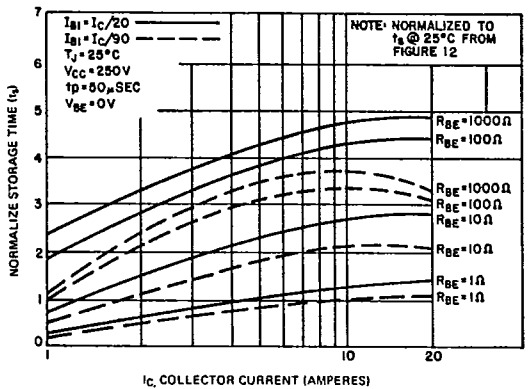


FIGURE 11. NORMALIZED RESISTIVE SWITCHING STORAGE TIME (R_{BE} VARIATIONS) VS. COLLECTOR CURRENT

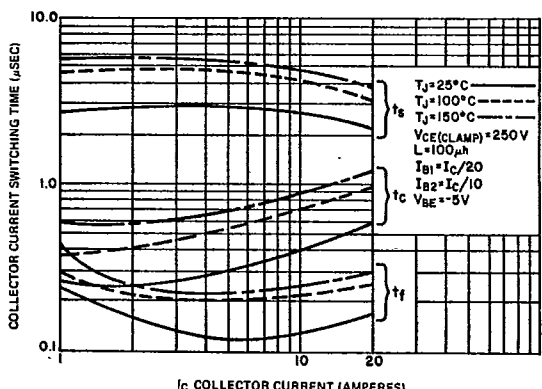


FIGURE 12. CLAMPED INDUCTIVE TURN-OFF TIME

GE6060, GE6061, GE6062

T-33-29

TYPICAL CHARACTERISTICS

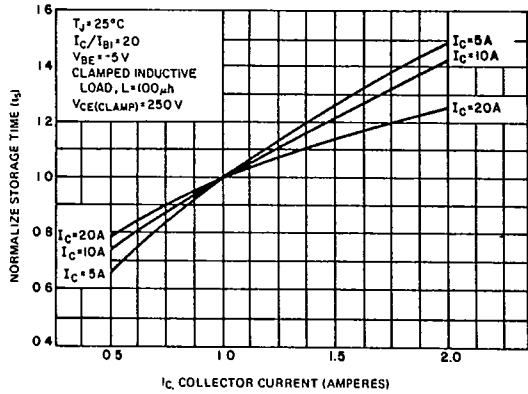


FIGURE 13. STORAGE TIME VARIATION WITH I_{B2}

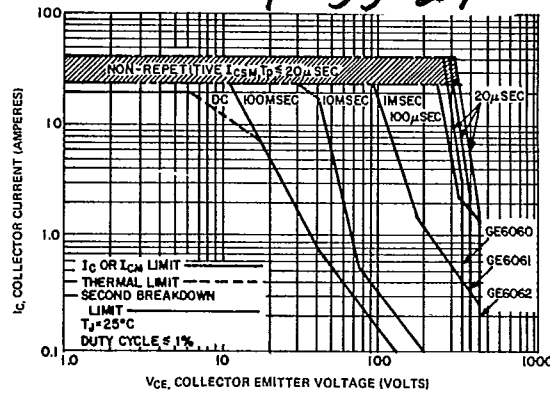


FIGURE 14. FORWARD BIAS SAFE OPERATING AREA

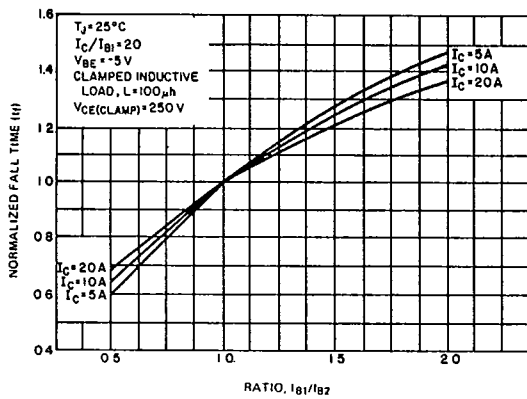


FIGURE 15. FALL TIME VARIATION WITH I_{B2}

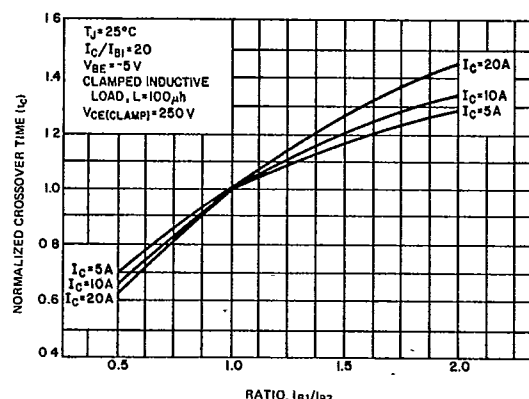


FIGURE 16. CROSS-OVER TIME VARIATION WITH I_{B2}

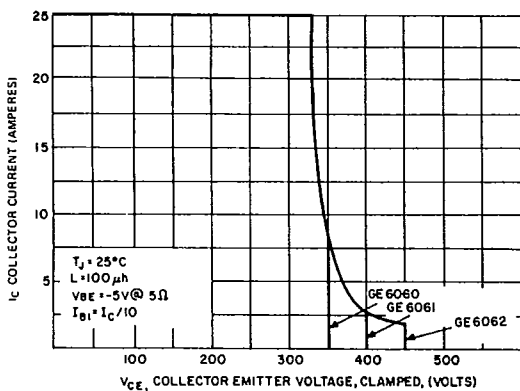


FIGURE 17. REVERSE BIAS SAFE OPERATING AREA

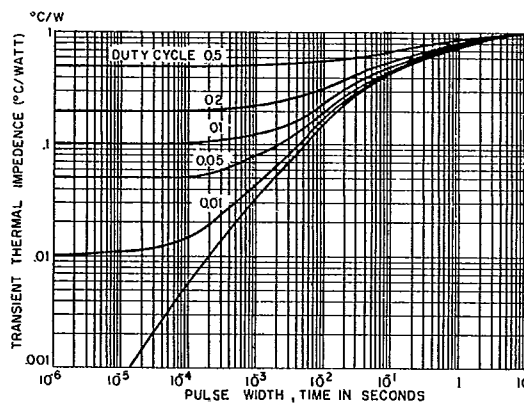


FIGURE 18. TRANSIENT THERMAL RESPONSE



GE6060, GE6061, GE6062

T-33-29

TYPICAL CHARACTERISTICS

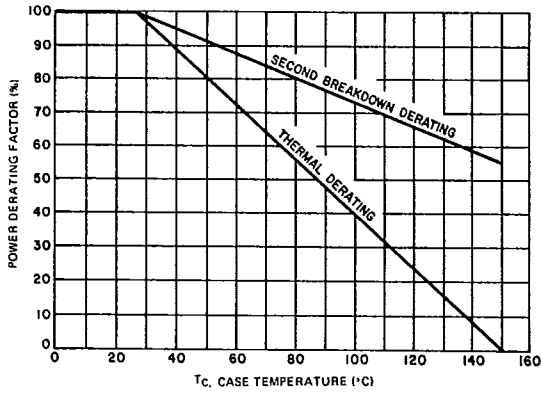


FIGURE 19. POWER DERATING

DIODE CHARACTERISTICS

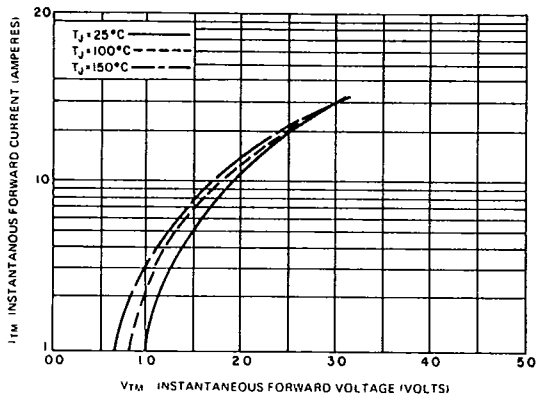


FIGURE 20. FORWARD CHARACTERISTICS

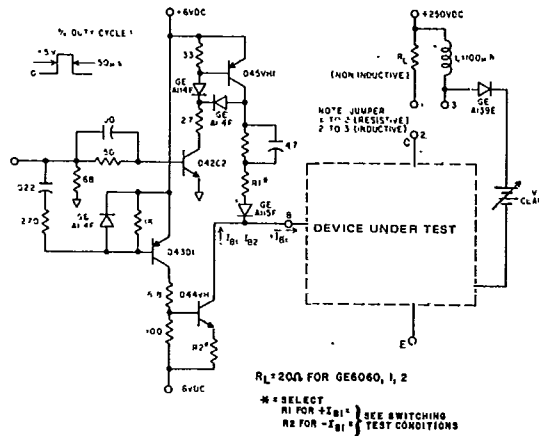


FIGURE 21. SWITCHING TIME TEST CIRCUIT