10-Ampere N-P-N Darlington Power Transistors

Complementary to the D45E Series

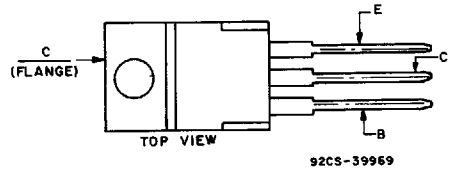
40, 60, and 80 Volts, 50 Watts
Gain of 2000 at 5 A

Features:
- *Operates from IC without predriver*

Applications:
- *Solenoid Driver*
- *Lamp Driver*
- *Relay Substitute*
- *Switching Regulator*
- *Inverter/Converter*

The D44E-series n-p-n Darlington power transitors are designed for general purpose switching of multi-ampere loads directly from low-level logic circuitry. The monolithic base-to-emitter resistors have been deleted from the structure to enhance the gain characteristics. These devices feature minimum gains of 1000.

TERMINAL DESIGNATIONS



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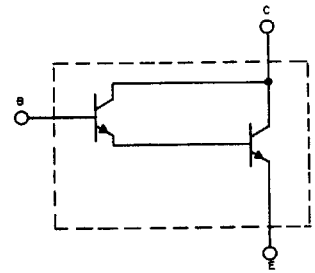

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Schematic diagram for all types.

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

RATING	SYMBOL	D44E1	D44E2	D44E3	UNITS
Collector-Emitter Voltage	V_{CEO}	40	60	80	Volts
Collector-Emitter Voltage	V_{CES}	40	60	80	Volts
Emitter Base Voltage	V_{EBO}	7	7	7	Volts
Collector Current — Continuous Peak(1)	I_C I_{CM}	10 20	10 20	10 20	A
Base Current — Continuous	I_B	1	1	1	A
Total Power Dissipation @ T_A = 25°C @ T_C = 25°C	P_D	1.67 50	1.67 50	1.67 50	Watts
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-55 to +150	-55 to +150	-55 to +150	°C

THERMAL CHARACTERISTICS

Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	75	75	75	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.5	2.5	2.5	°C/W
Maximum Lead Temperature for Soldering Purposes: ⅛" from Case for 5 Seconds	T_L	260	260	260	°C

(1) Pulse Test: Pulse Width = 300ms. Duty Cycle ≤ 2%.

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

T-35-29

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS[1]						
Collector-Emitter Voltage (I_C = 100mA)	D44E1	V_{CEO}	40	—	—	Volts
	D44E2		60	—	—	
	D44E3		80	—	—	
Collector Cut-off Current (V_{CE} = Rated V_{CES})		I_{CES}	—	—	10	μA
Emitter Cutoff Current (V_{EB} = 7V)		I_{EBO}	—	—	1.0	μA
SECOND BREAKDOWN						
Second Breakdown with Base Forward Biased		FBSOA	SEE FIGURE 6			
ON CHARACTERISTICS[1]						
DC Current Gain (I_C = 5A, V_{CE} = 5V)		h_{FE}	1,000	—	—	—
Collector-Emitter Saturation Voltage (I_C = 5.0A, I_B = 10mA)		$V_{CE(sat)}$	—	—	1.5	V
(I_C = 10.0A, I_B = 20mA)			—	—	2.0	V
Base-Emitter Saturation Voltage (I_C = 5.0A, I_B = 10mA)		$V_{BE(sat)}$	—	—	2.5	Volts
DYNAMIC CHARACTERISTICS						
Collector Capacitance (V_{CB} = -10V, f = 1MHz)		C_{CBO}	—	—	130	pF
SWITCHING CHARACTERISTICS						
Resistive Load						
Delay Time + Rise Time	I_C = 10A, I_{B1} = I_{B2} = 20mA	$t_d + t_r$	—	0.6	—	μS
Storage Time	V_{CC} = 40V, t_p = 25 μsec	t_s	—	2.0	—	
Fall Time		t_f	—	0.5	—	

(1) Pulse Test: PW ≤ 300ms Duty Cycle ≤ 2%.

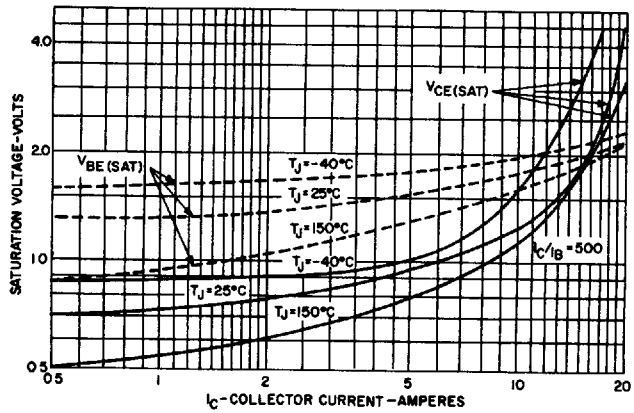

FIG. 1 TYPICAL SATURATION VOLTAGE CHARACTERISTICS

POWER TRANSISTORS

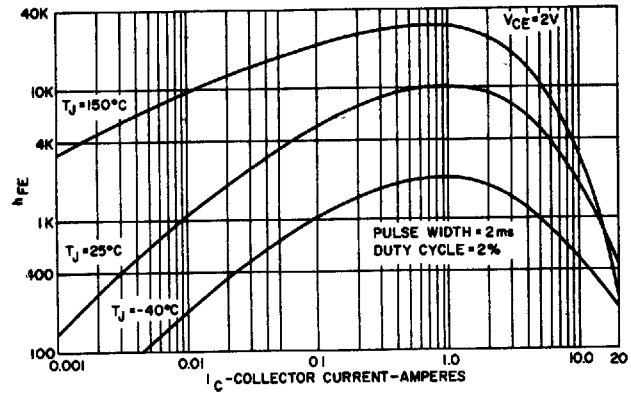

FIG. 2 TYPICAL GAIN CHARACTERISTIC

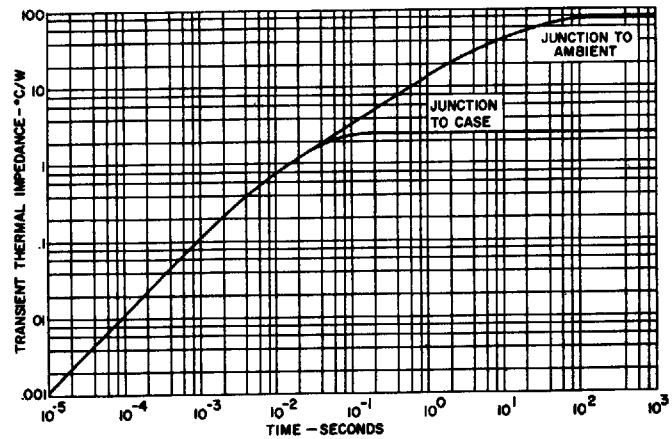

FIG. 3 TRANSIENT THERMAL IMPEDANCE

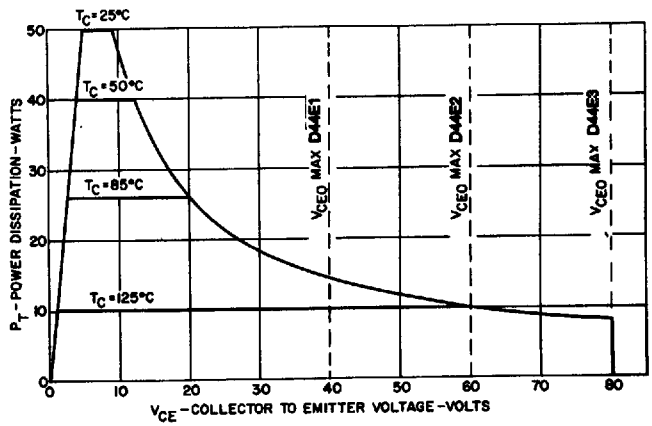

FIG. 4 MAXIMUM PERMISSIBLE DC POWER DISSIPATION

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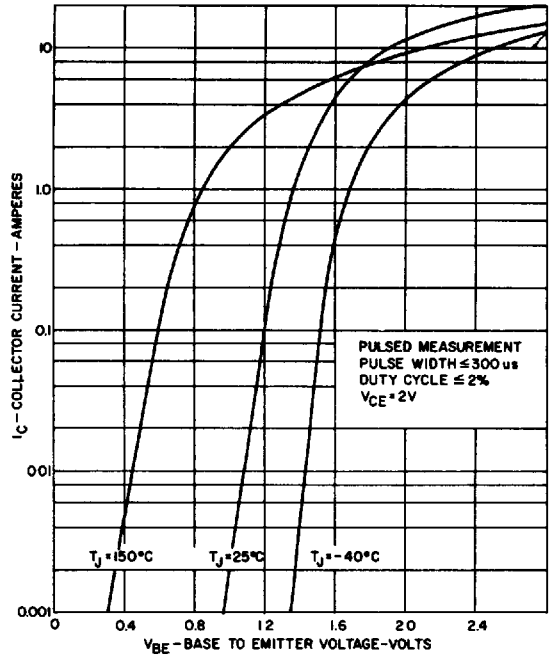

FIG. 5 TYPICAL TRANSCONDUCTANCE CHARACTERISTICS

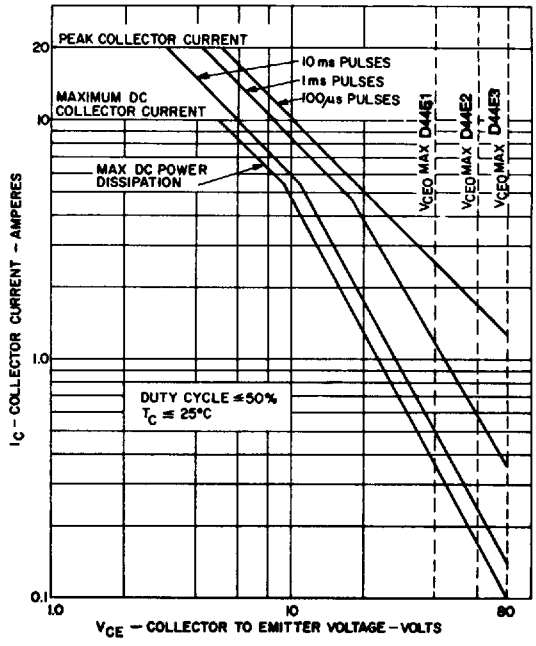

FIG. 6 SAFE REGION OF OPERATION