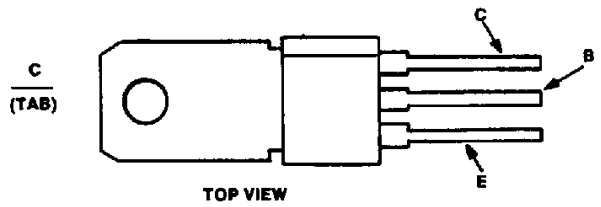
T-33-29

0.5-Ampere N-P-N Darlington Power Transistors

h_{FE} Min. — 10,000
1.33 Watt power dissipation at T_A = 25°

TERMINAL DESIGNATIONS



92CS-43222

Features:

- *Operates from IC without predriver*

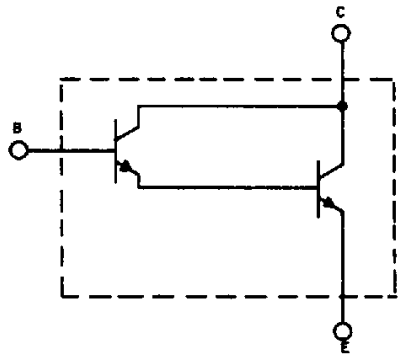
Application:

- *Solenoid Driver*
- *Lamp Driver*
- *Relay Substitute*
- *Switching Regulator*

The D40C-series silicon n-p-n Darlington power transistors are designed for use in general-purpose amplifier and medium-speed switching circuits. The high gain of these devices makes it possible for them to be driven directly from integrated circuits. The monolithic base-to-emitter resistors have been deleted from the structure to enhance the gain characteristics. These devices feature minimum gains of 10,000.

These devices are supplied in the JEDEC TO-202AB plastic package.

JEDEC TO-202AB



92CS-43150

Schematic diagram for all types.

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

RATING	SYMBOL	D40C1	D40C4	D40C7	UNITS
Collector-Emitter Voltage	V_{CEO}	30	40	50	Volts
Collector-Emitter Voltage	V_{CES}	30	40	50	Volts
Emitter Base Voltage	V_{EBO}	13	13	13	Volts
Collector Current — Continuous Peak(1)	I_C I_{CM}	0.5 1.0	0.5 1.0	0.5 1.0	A
Base Current — Continuous	I_B	0.1	0.1	0.1	A
Total Power Dissipation @ T_A = 25°C @ T_C = 25°C	P_D	1.33 6.25	1.33 6.25	1.33 6.25	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	$R_{\theta JC}$	20	20	20	°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)

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS[1]						
Collector-Emitter Voltage (I_C = 10mA)	D40C1	V_{CEO}	30	—	—	Volts
	D40C4		40	—	—	
	D40C7		50	—	—	
Collector Cut-off Current (V_{CE} = Rated V_{CEO})	(T_C = 25°C)	I_{CES}	—	—	0.5	μA
	(T_C = 150°C)	I_{CBO}	—	—	20	
Emitter Cutoff Current (V_{EB} = 13V)		I_{EBO}	—	—	0.1	μA
SECOND BREAKDOWN						
Second Breakdown with Base Forward Biased		FBSOA	SEE FIGURE 2			
ON CHARACTERISTICS[1]						
DC Current Gain (I_C = 200mA, V_{CE} = 5V)		h_{FE}	10K	—	60K	
Collector-Emitter Saturation Voltage (I_C = 500mA, I_B = 0.5mA)		$V_{CE(sat)}$	—	—	1.5	V
Base-Emitter Saturation Voltage (I_C = 500mA, I_B = 0.5mA)		$V_{BE(sat)}$	—	—	2.0	Volts
DYNAMIC CHARACTERISTICS						
Collector Capacitance (V_{CB} = 10V, f = 1MHz)		C_{CBO}	—	—	220	pF
Current Gain - Bandwidth Product (I_C = 20mA, V_{CE} = 5V)		f_T	—	75	—	MHz
SWITCHING CHARACTERISTICS						
Resistive Load						
Delay Time + Rise Time	I_C = 1A, I_{B1} = I_{B2} = 1mA	$t_d + t_r$	—	100	—	ns
Storage Time	V_{CC} = 30V, t_p = 25 μsec	t_s	—	350	—	
Fall Time		t_f	—	800	—	

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

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HARRIS SEMICOND SECTOR

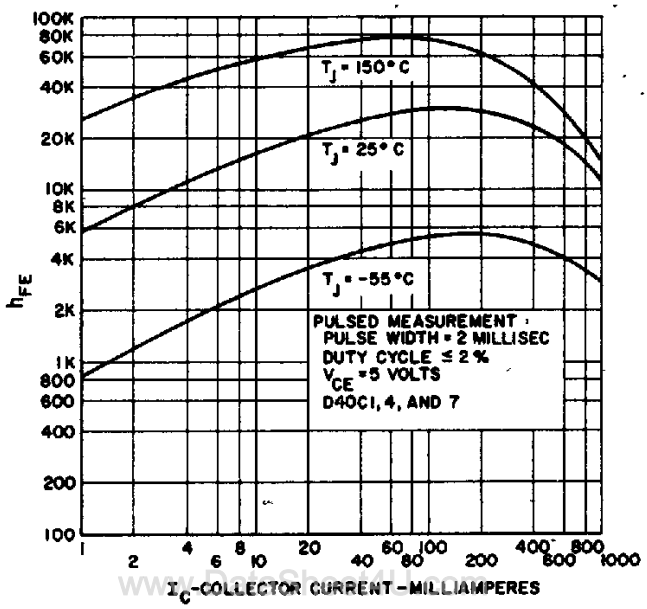

FIG 1. TYPICAL h_{FE} vs. I_C

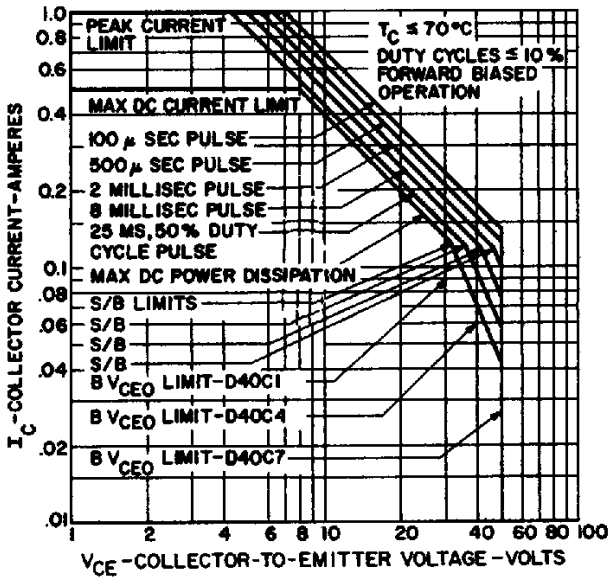

FIG. 2 SAFE REGION OF OPERATION

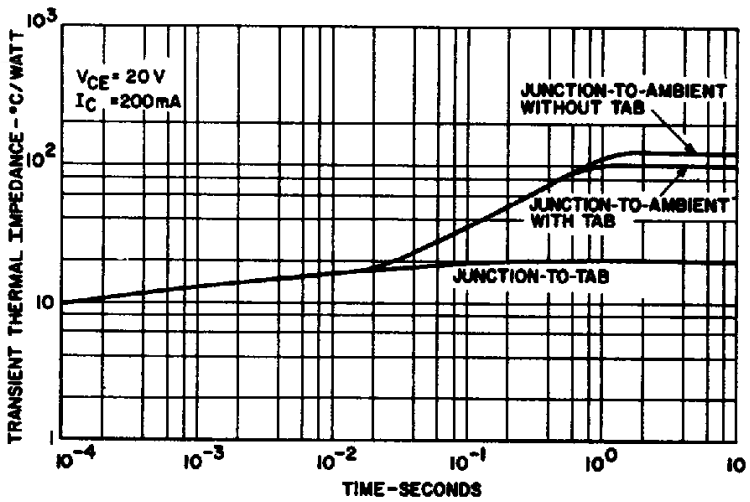

FIG. 3 MAXIMUM TRANSIENT THERMAL IMPEDANCE

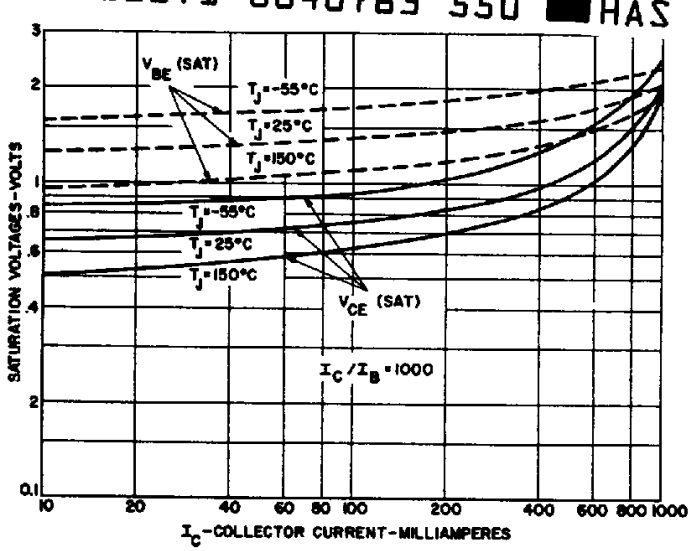

FIG. 4 TYPICAL SATURATION VOLTAGES

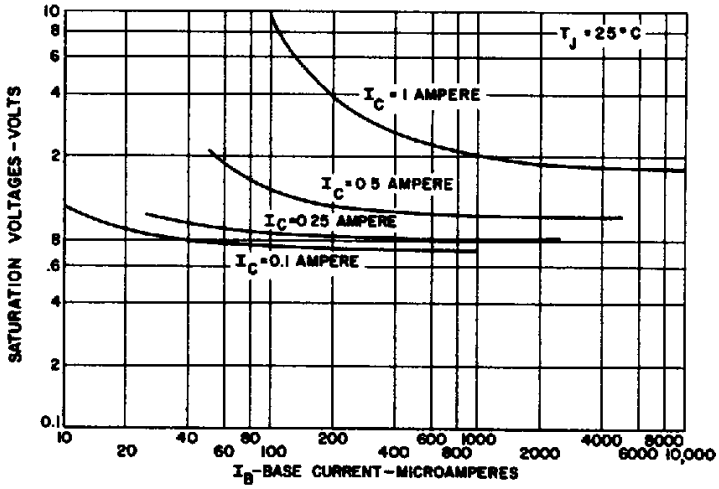

FIG. 5 TYPICAL SATURATION VOLTAGES

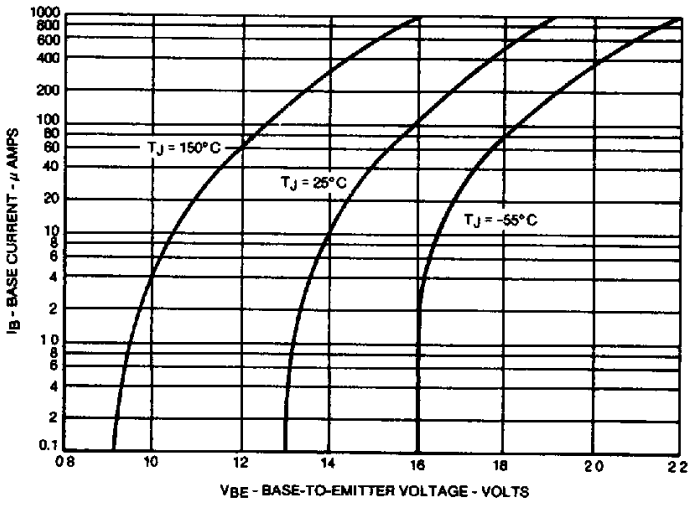

FIG. 6 TYPICAL INPUT CHARACTERISTICS

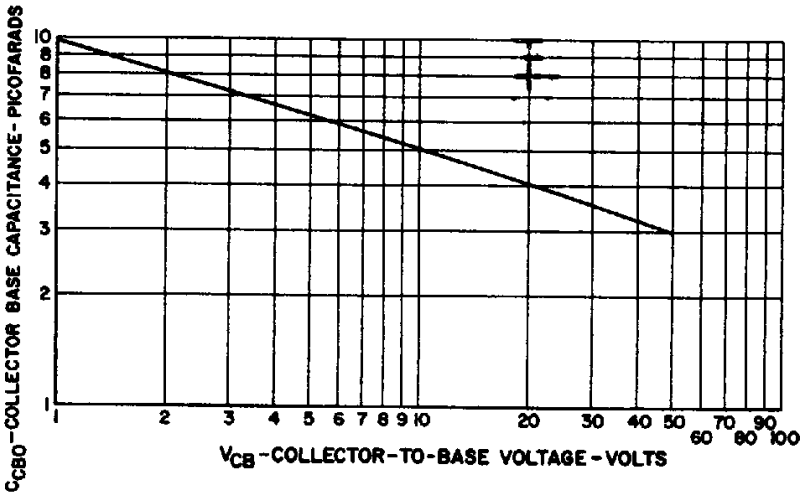

FIG. 7 TYPICAL C_{CBO} vs. VOLTAGE