



# VERY HIGH GAIN NPN POWER DARLINGTON TRANSISTORS

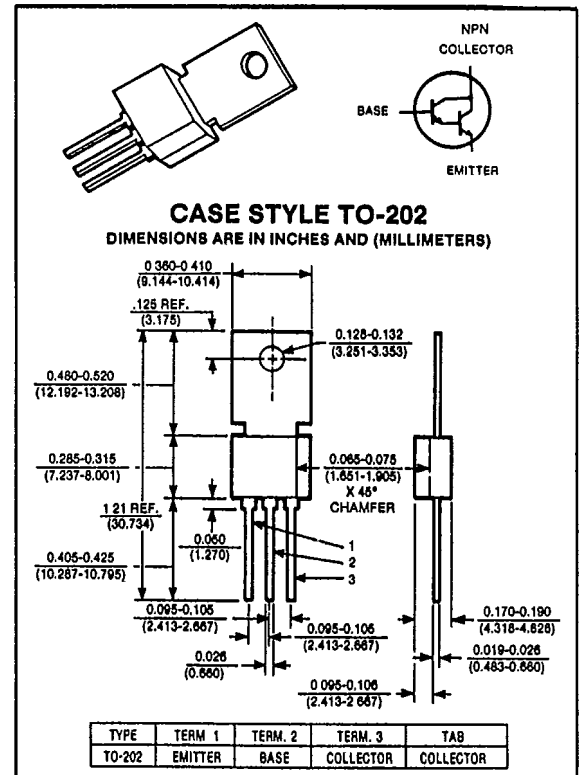
## D40C Series

30-50 VOLTS  
.5 AMP, 6.25 WATTS

Designed for driver, regulator, touch switch, I.C. driver, audio output, relay substitute, oscillator, servo-amplifier, and capacitor multiplier applications.

### Features:

- $h_{FE}$  Min. — 10,000 and 40,000
- 1.33 Watt power dissipation at  $T_A = 25^\circ$



maximum ratings ( $T_A = 25^\circ C$ ) (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	$I_C$	.5	.5	.5	A
Collector Current — Peak <sup>(1)</sup>	$I_{CM}$	1.0	1.0	1.0	A
Base Current — Continuous	$I_B$	0.1	0.1	0.1	A
Total Power Dissipation @ $T_A = 25^\circ C$ @ $T_C = 25^\circ C$	$P_D$	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	$^\circ C$

### thermal characteristics

Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	75	75	75	$^\circ C/W$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	20	20	20	$^\circ C/W$
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	$T_L$	260	260	260	$^\circ C$

(1) Pulse Test: Pulse Width = 300ms. Duty Cycle  $\leq 2\%$ .

electrical characteristics ( $T_C = 25^\circ C$ ) (unless otherwise specified)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
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off characteristics<sup>(1)</sup>

Collector-Emitter Voltage ( $I_C = 10mA$ )	D40C1	$V_{CE0}$	30	—	—	Volts
	D40C4		40	—	—	
	D40C7		50	—	—	
Collector Cut-off Current ( $V_{CE} = \text{Rated } V_{CES}$ )	$(T_C = 25^\circ C)$ $(T_C = 150^\circ C)$	$I_{CES}$	—	—	0.5	$\mu A$
		$I_{CBO}$	—	—	20	
Emitter Cutoff Current ( $V_{EB} = 13V$ )		$I_{EBO}$	—	—	0.1	$\mu A$

second breakdown

Second Breakdown with Base Forward Biased	FBSOA	SEE FIGURE 2
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on characteristics

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 ( $V_{CE} = 10V, f = 1MHz$ )	$C_{CBO}$	—	—	220	pF
Current Gain - Bandwidth Product ( $I_C = 20mA, V_{CE} = 5V$ )	$f_T$	—	75	—	MHz

switching characteristics

Resistive Load						
Delay Time + Rise Time	$I_C = 1A, I_{B1} = I_{B2} = 1mA$ $V_{CC} = 30V, t_p = 25 \mu sec$	$t_d + t_r$	—	100	—	ns
Storage Time		$t_s$	—	350	—	
Fall Time		$t_f$	—	800	—	

(1) Pulse Test:  $PW \leq 300ms$  Duty Cycle  $\leq 2\%$ .

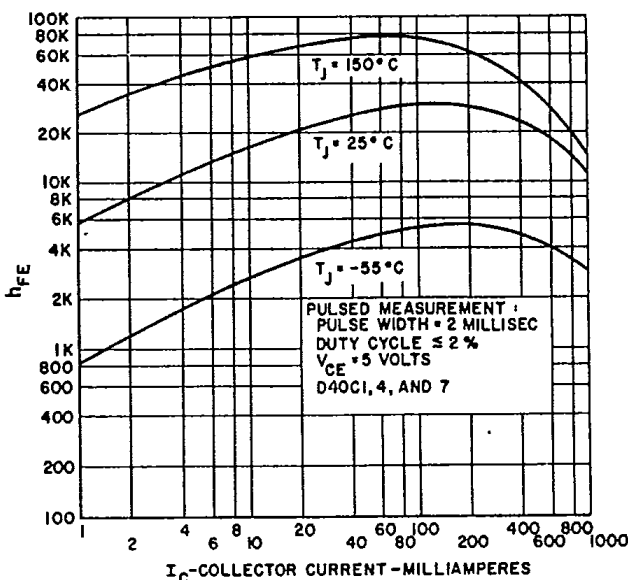


FIG 1. TYPICAL  $h_{FE}$  vs.  $I_C$

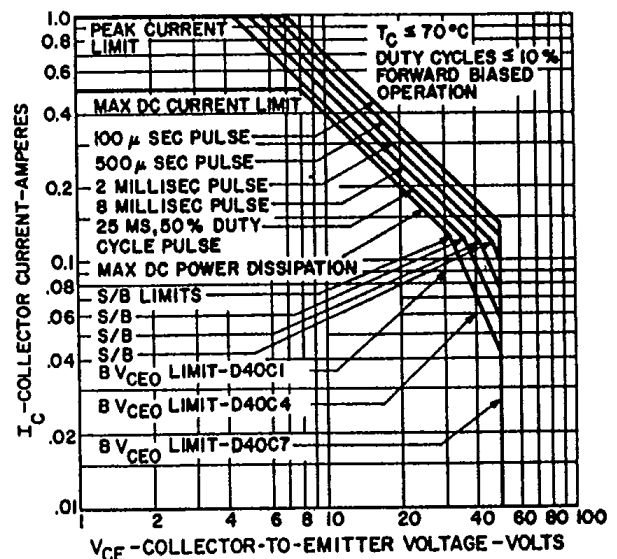


FIG. 2 SAFE REGION OF OPERATION

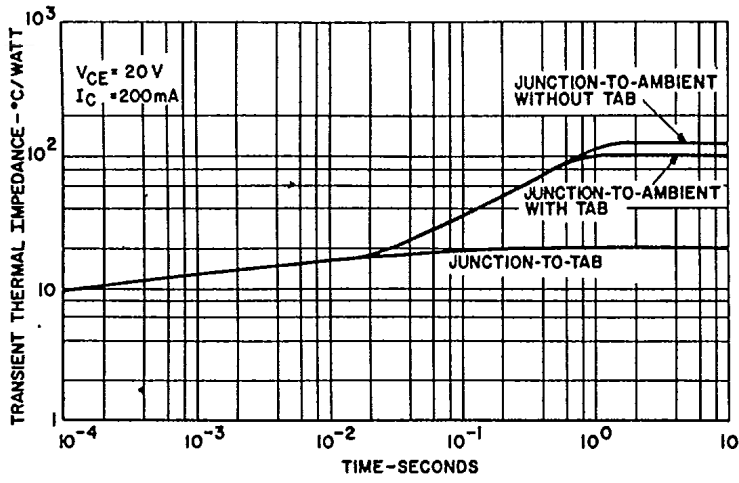


FIG. 3 MAXIMUM TRANSIENT THERMAL IMPEDANCE

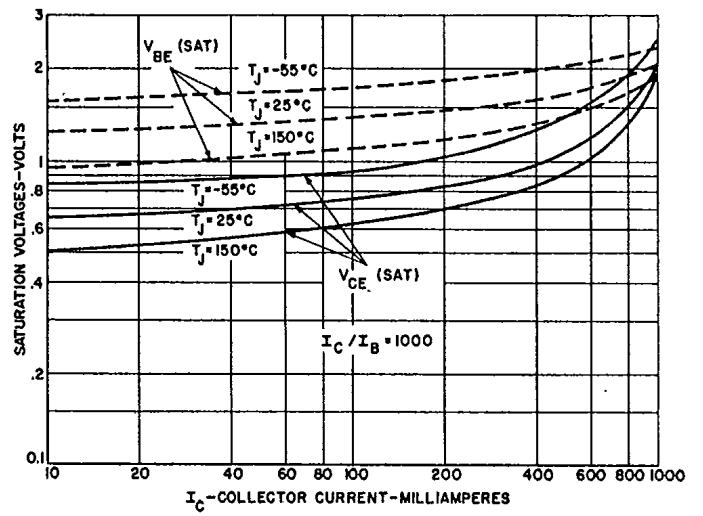


FIG. 4 TYPICAL SATURATION VOLTAGES

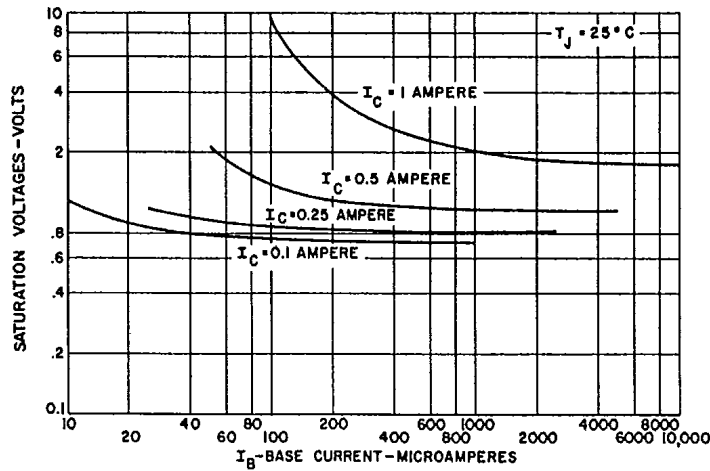


FIG. 5 TYPICAL SATURATION VOLTAGES

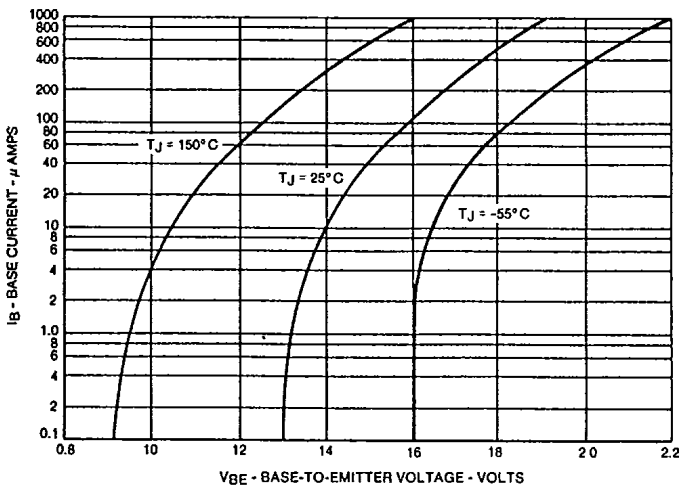


FIG. 6 TYPICAL INPUT CHARACTERISTICS

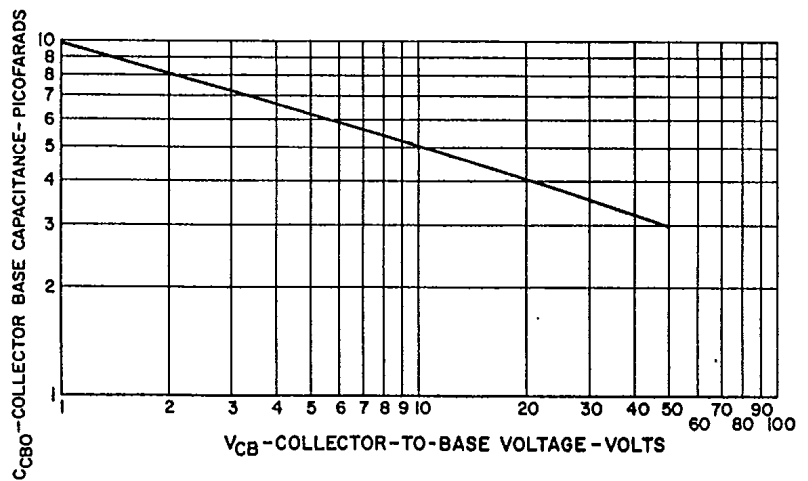


FIG. 7 TYPICAL  $C_{CB0}$  vs. VOLTAGE