

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

NPN D44E Series PNP D45E Series

COMPLEMENTARY SILICON POWER DARLINGTON TRANSISTORS

... for general purpose power amplification and switching such as output or driver stages in applications such as switching regulators, converters and power amplifiers.

- Low Collector-Emitter Saturation Voltage — $V_{CE(sat)} = 2.0 \text{ V (Max) @ } 10 \text{ A}$
- High DC Current Gain — 1000 (Min) @ 5.0 Adc
- Complementary Pairs Simplifies Designs

DARLINGTON 10 AMPERE

COMPLEMENTARY SILICON POWER TRANSISTORS

40-80 VOLTS
50 WATTS

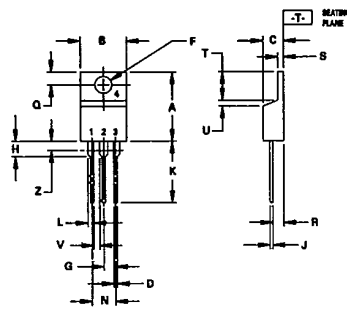
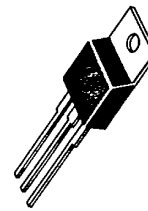
MAXIMUM RATINGS

Rating	Symbol	D44E or D45E			Unit
		1	2	3	
Collector-Emitter Voltage	V_{CEO}	40	60	80	Vdc
Emitter Base Voltage	V_{EB}	7.0			Vdc
Collector Current — Continuous Peak (1)	I_C	10 20			Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ @ $T_A = 25^\circ\text{C}$	P_D	50 1.67			Watts
Operating and Storage Junction Temperature Range	T_J , T_{stg}	-55 to 150			$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	75	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	T_L	275	$^\circ\text{C}$

(1) Pulse Width $\leq 60 \text{ ms}$, Duty Cycle $\leq 50\%$.



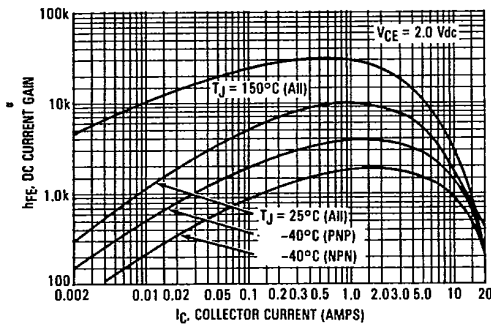
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.48	15.75	0.570	0.620
B	9.66	10.26	0.380	0.405
C	4.07	4.82	0.160	0.190
D	0.64	0.88	0.025	0.035
F	3.81	3.73	0.142	0.147
G	2.42	2.66	0.095	0.105
H	2.80	3.82	0.110	0.150
J	0.46	0.71	0.018	0.028
K	12.70	14.27	0.500	0.562
L	1.15	1.39	0.045	0.055
N	4.83	5.33	0.190	0.210
Q	2.54	3.04	0.100	0.120
R	2.04	2.79	0.080	0.110
S	1.15	1.39	0.045	0.055
T	5.97	6.47	0.235	0.255
U	0.00	1.27	0.000	0.050
V	1.15	—	0.045	—
Z	—	2.04	—	0.080

STYLE 1
PIN 1: BASE
2: COLLECTOR
3: EMITTER
4: COLLECTOR

CASE 221A-04
TO-220AB

FIGURE 1 — TYPICAL DC CURRENT GAIN



3

D44E Series NPN, D45E Series PNP

T-33-33

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CE0}, V_{BE} = 0$)	I_{CES}	—	—	10	μA
Emitter Cutoff Current ($V_{EB} = 7.0 \text{ Vdc}$)	I_{EBO}	—	—	1.0	μA
ON CHARACTERISTICS (1)					
DC Current Gain ($I_C = 5.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	1000	—	—	—
Collector-Emitter Saturation Voltage ($I_C = 5.0 \text{ Adc}, I_B = 10 \text{ mAdc}$) ($I_C = 10 \text{ Adc}, I_B = 20 \text{ mAdc}$)	$V_{CE(sat)}$	—	—	1.5 2.0	Vdc
Base-Emitter Saturation Voltage ($I_C = 5.0 \text{ Adc}, I_B = 10 \text{ mAdc}$)	$V_{BE(sat)}$	—	—	2.5	Vdc
DYNAMIC CHARACTERISTICS					
Collector Capacitance ($V_{CB} = 10 \text{ Vdc}, f_{test} = 1.0 \text{ MHz}$)	C_{CBO}	—	—	130 220	pF
	D44E Series				
	D45E Series				
SWITCHING CHARACTERISTICS					
Delay and Rise Times ($I_C = 10 \text{ Adc}, I_{B1} = 20 \text{ mAdc}$)	$t_d + t_r$	—	0.6	—	μs
Storage Time ($I_C = 10 \text{ Adc}, I_{B1} = I_{B2} = 20 \text{ mAdc}$)	t_s	—	2.0	—	μs
Fall Time ($I_C = 10 \text{ Adc}, I_{B1} = I_{B2} = 20 \text{ mAdc}$)	t_f	—	0.5	—	μs

SAFE OPERATING AREA INFORMATION

FIGURE 2 — MAXIMUM RATED FORWARD BIAS SAFE OPERATING AREA (NPN)

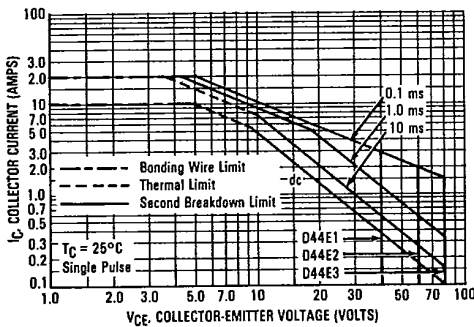
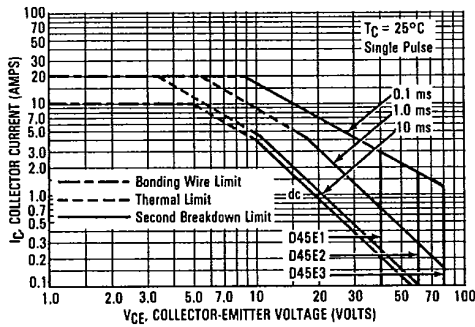


FIGURE 3 — MAXIMUM RATED FORWARD BIAS SAFE OPERATING AREA (PNP)





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