

MAXIMUM RATINGS

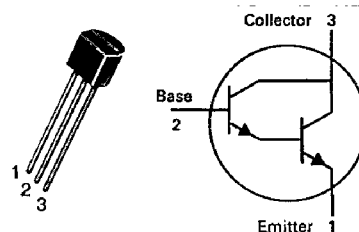
Rating	Symbol	MPSA28	MPSA29	Unit
Collector-Emitter Voltage	V_{CES}	80	100	Vdc
Collector-Base Voltage	V_{CBO}	80	100	Vdc
Emitter-Base Voltage	V_{EBO}	12		Vdc
Collector Current — Continuous	I_C	500		mA dc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0		mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12		Watts mW/ $^\circ\text{C}$
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 Ambient	$R_{\theta JA}$	200	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C/W}$

MPSA28 MPSA29★

CASE 29-04, STYLE 1
TO-92 (TO-226AA)



DARLINGTON TRANSISTORS

NPN SILICON

★This is a Motorola
designated preferred device.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 100 \mu\text{A dc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	80 100	— —	— —	Vdc
Collector-Base Breakdown Voltage ($I_C = 100 \mu\text{A dc}$, $I_E = 0$)	$V_{(BR)CBO}$	80 100	— —	— —	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{A dc}$, $I_C = 0$)	$V_{(BR)EBO}$	12	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 60 \text{ Vdc}$, $I_E = 0$) ($V_{CB} = 80 \text{ Vdc}$, $I_E = 0$)	I_{CBO}	— —	— —	100 100	nA dc
Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}$, $V_{BE} = 0$) ($V_{CE} = 80 \text{ Vdc}$, $V_{BE} = 0$)	I_{CES}	— —	— —	500 500	nA dc
Emitter Cutoff Current ($V_{EB} = 10 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	—	100	nA dc
ON CHARACTERISTICS(1)					
DC Current Gain ($I_C = 10 \text{ mA dc}$, $V_{CE} = 5.0 \text{ Vdc}$) ($I_C = 100 \text{ mA dc}$, $V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	10,000 10,000	— —	— —	—
Collector-Emitter Saturation Voltage ($I_C = 10 \text{ mA dc}$, $I_B = 0.01 \text{ mA dc}$) ($I_C = 100 \text{ mA dc}$, $I_B = 0.1 \text{ mA dc}$)	$V_{CE(sat)}$	— —	0.7 0.8	1.2 1.5	Vdc
Base-Emitter On Voltage ($I_C = 100 \text{ mA dc}$, $V_{CE} = 5.0 \text{ Vdc}$)	$V_{BE(on)}$	—	1.4	2.0	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product(2) ($I_C = 10 \text{ mA dc}$, $V_{CE} = 5.0 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	125	200	—	MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{obo}	—	5.0	8.0	pF

(1) Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

(2) $f_T = h_{FE} \cdot f_{test}$.

FIGURE 1 — DC CURRENT GAIN

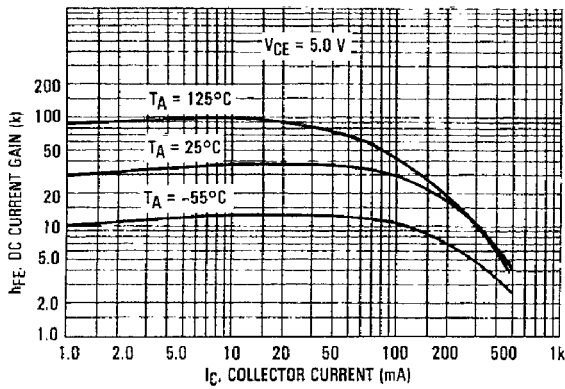


FIGURE 2 — ON VOLTAGES

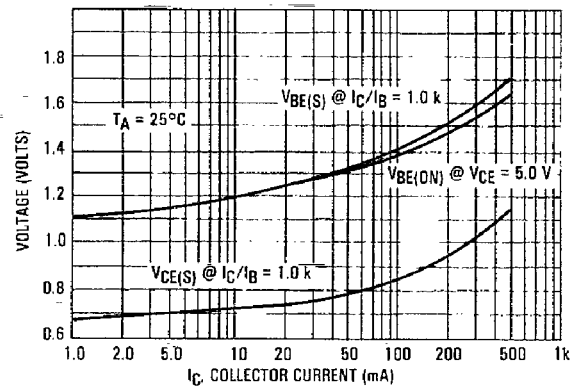


FIGURE 3 — TEMPERATURE COEFFICIENTS

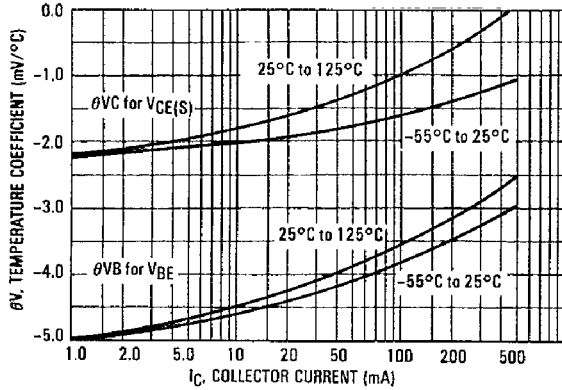


FIGURE 4 — COLLECTOR SATURATION REGION

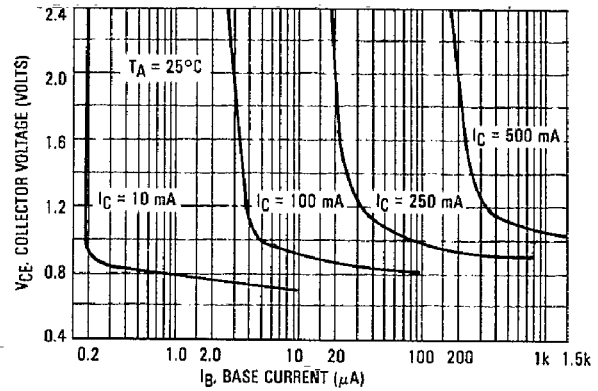


FIGURE 5 — ACTIVE REGION — SAFE OPERATING AREA

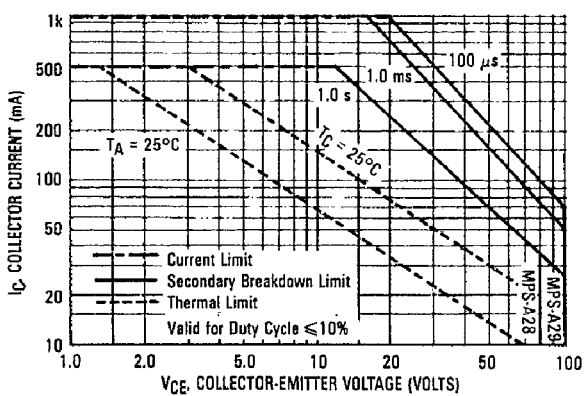
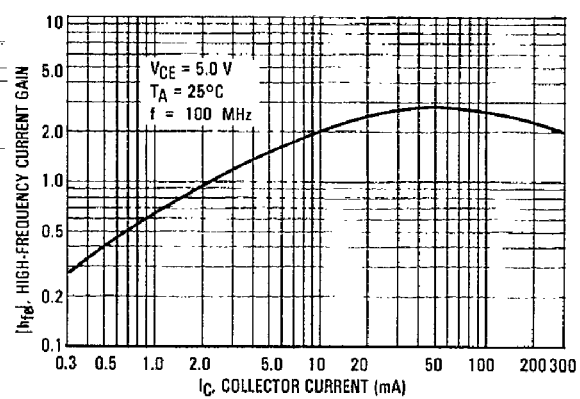


FIGURE 6 — HIGH FREQUENCY CURRENT GAIN



MAXIMUM RATINGS

Rating	Symbol	MPSA42	MPSA43	Unit
Collector-Emitter Voltage	V_{CEO}	300	200	Vdc
Collector-Base Voltage	V_{CBO}	300	200	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	6.0	Vdc
Collector Current — Continuous	I_C	500		mA dc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0		mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12		Watts mW/ $^\circ\text{C}$
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 Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{mW}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{mW}$

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) ($I_C = 1.0 \text{ mA dc}, I_B = 0$)	$V_{(BR)CEO}$	300 200	— —	Vdc
Collector-Base Breakdown Voltage ($I_C = 100 \mu\text{A dc}, I_E = 0$)	$V_{(BR)CBO}$	300 200	— —	Vdc
Emitter-Base Breakdown Voltage ($I_E = 100 \mu\text{A dc}, I_C = 0$)	$V_{(BR)EBO}$	6.0	—	Vdc
Collector Cutoff Current ($V_{CB} = 200 \text{ Vdc}, I_E = 0$) ($V_{CB} = 160 \text{ Vdc}, I_E = 0$)	I_{CBO}	— —	0.1 0.1	$\mu\text{A dc}$
Emitter Cutoff Current ($V_{EB} = 6.0 \text{ Vdc}, I_C = 0$) ($V_{EB} = 4.0 \text{ Vdc}, I_C = 0$)	I_{EBO}	— —	0.1 0.1	$\mu\text{A dc}$
ON CHARACTERISTICS(1)				
DC Current Gain ($I_C = 1.0 \text{ mA dc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 10 \text{ mA dc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 30 \text{ mA dc}, V_{CE} = 10 \text{ Vdc}$)	h_{FE}	25 40 40	— — —	—
Collector-Emitter Saturation Voltage ($I_C = 20 \text{ mA dc}, I_B = 2.0 \text{ mA dc}$)	$V_{CE(sat)}$	— —	0.5 0.4	Vdc
Base-Emitter Saturation Voltage ($I_C = 20 \text{ mA dc}, I_B = 2.0 \text{ mA dc}$)	$V_{BE(sat)}$	—	0.9	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product ($I_C = 10 \text{ mA dc}, V_{CE} = 20 \text{ Vdc}, f = 100 \text{ MHz}$)	f_T	50	—	MHz
Collector-Base Capacitance ($V_{CB} = 20 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$)	C_{cb}	— —	3.0 4.0	pF

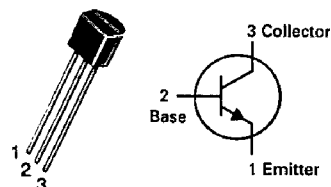
(1) Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.**MPSA42★
MPSA43****CASE 29-04, STYLE 1
TO-92 (TO-226AA)****HIGH VOLTAGE TRANSISTORS****NPN SILICON****★This is a Motorola
designated preferred device.**

FIGURE 1 – DC CURRENT GAIN

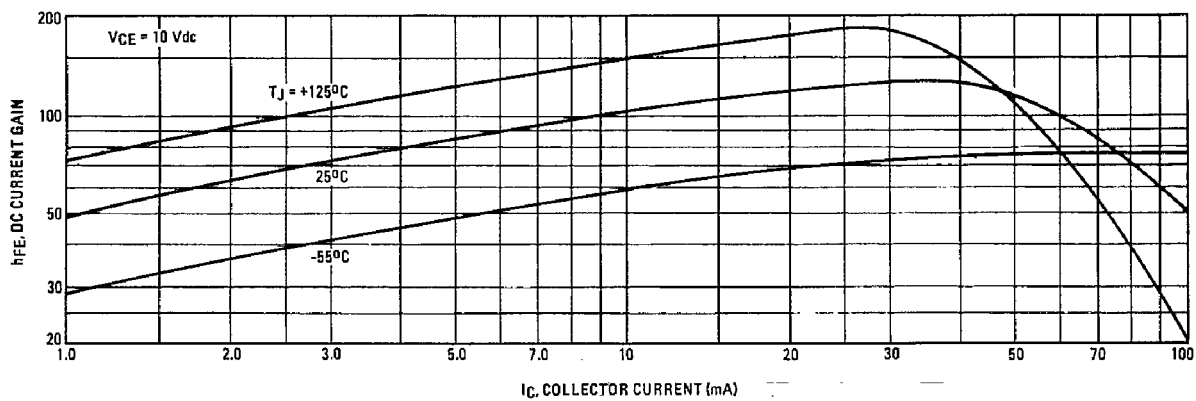


FIGURE 2 – CAPACITANCES

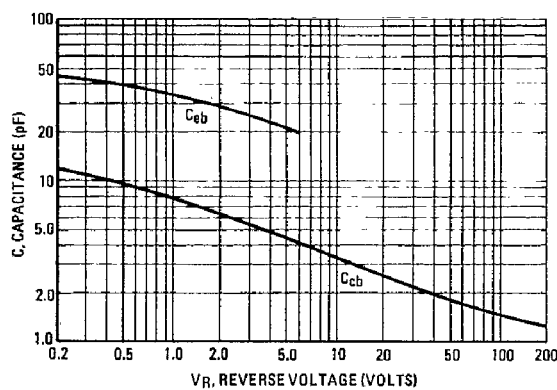


FIGURE 3 – CURRENT-GAIN-BANDWIDTH PRODUCT

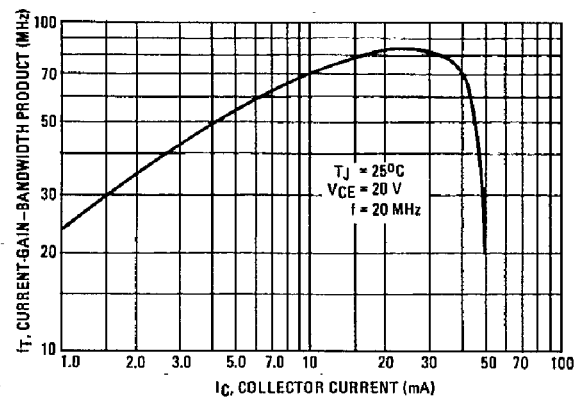


FIGURE 4 – "ON" VOLTAGES

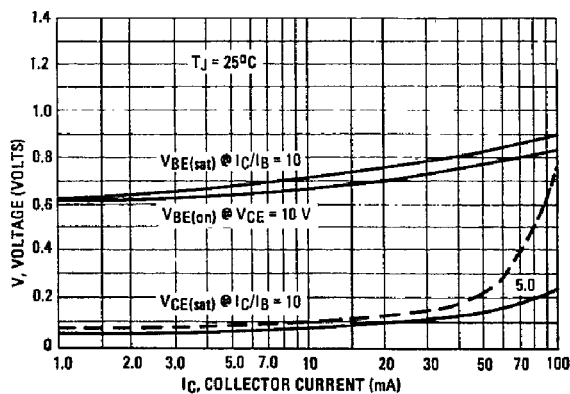
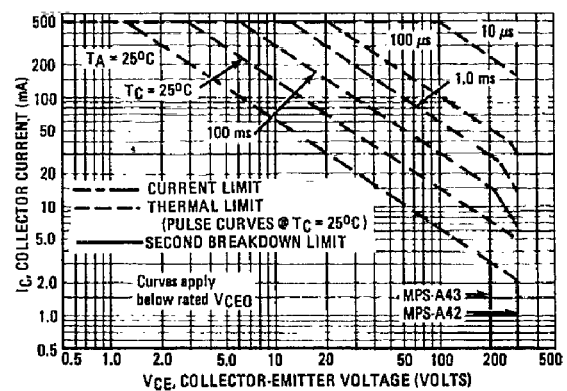


FIGURE 5 – MAXIMUM FORWARD BIAS SAFE OPERATING AREA



MAXIMUM RATINGS

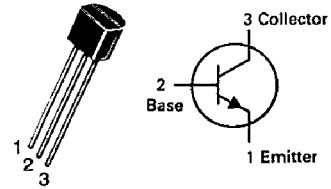
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	400	Vdc
Collector-Base Voltage	V_{CBO}	500	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current — Continuous	I_C	300	mA _{dc}
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12	Watts mW/ $^\circ\text{C}$
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 Ambient	$R_{\theta JA}$	200	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C/W}$

MPSA44★

CASE 29-04, STYLE 1
TO-92 (TO-226AA)

**HIGH VOLTAGE
TRANSISTOR**

NPN SILICON

★This is a Motorola
designated preferred device.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) ($I_C = 1.0 \text{ mA}_{dc}, I_B = 0$)	$V_{(BR)CEO}$	400	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 100 \mu\text{A}_{dc}, V_{BE} = 0$)	$V_{(BR)CES}$	500	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 100 \mu\text{A}_{dc}, I_E = 0$)	$V_{(BR)CBO}$	500	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{A}_{dc}, I_C = 0$)	$V_{(BR)EBO}$	6.0	—	Vdc
Collector Cutoff Current ($V_{CB} = 400 \text{ Vdc}, I_E = 0$)	I_{CBO}	—	0.1	μA_{dc}
Collector Cutoff Current ($V_{CE} = 400 \text{ Vdc}, V_{BE} = 0$)	I_{CES}	—	500	nA _{dc}
Emitter Cutoff Current ($V_{EB} = 4.0 \text{ Vdc}, I_C = 0$)	I_{EBO}	—	0.1	μA_{dc}
ON CHARACTERISTICS(1)				
DC Current Gain(1) ($I_C = 1.0 \text{ mA}_{dc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 10 \text{ mA}_{dc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 50 \text{ mA}_{dc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 100 \text{ mA}_{dc}, V_{CE} = 10 \text{ Vdc}$)	h_{FE}	40 50 45 40	— 200 — —	—
Collector-Emitter Saturation Voltage(1) ($I_C = 1.0 \text{ mA}_{dc}, I_B = 0.1 \text{ mA}_{dc}$) ($I_C = 10 \text{ mA}_{dc}, I_B = 1.0 \text{ mA}_{dc}$) ($I_C = 50 \text{ mA}_{dc}, I_B = 5.0 \text{ mA}_{dc}$)	$V_{CE(sat)}$	— — —	0.4 0.5 0.75	Vdc
Base-Emitter Saturation Voltage ($I_C = 10 \text{ mA}_{dc}, I_B = 1.0 \text{ mA}_{dc}$)	$V_{BE(sat)}$	—	0.75	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Output Capacitance ($V_{CB} = 20 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$)	C_{obo}	—	7.0	pF
Input Capacitance ($V_{EB} = 0.5 \text{ Vdc}, I_C = 0, f = 1.0 \text{ MHz}$)	C_{ibo}	—	130	pF
Small-Signal Current Gain ($I_C = 10 \text{ mA}_{dc}, V_{CE} = 10 \text{ Vdc}, f = 20 \text{ MHz}$)	h_{fe}	1.0	—	—

(1) Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

FIGURE 1 — DC CURRENT GAIN

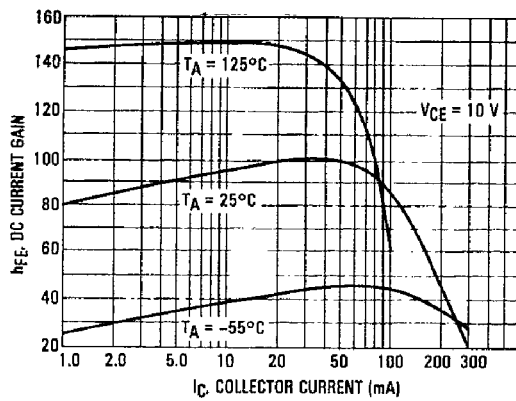


FIGURE 2 — COLLECTOR SATURATION REGION

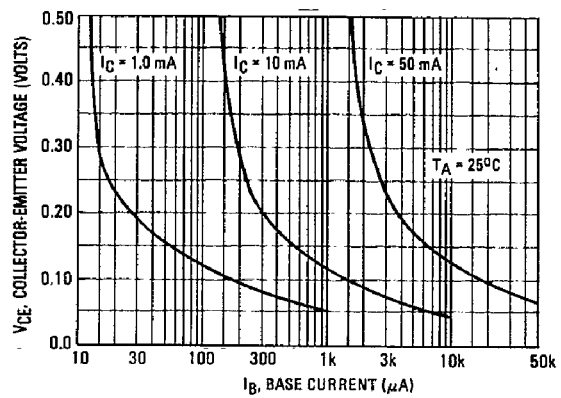


FIGURE 3 — ON VOLTAGES

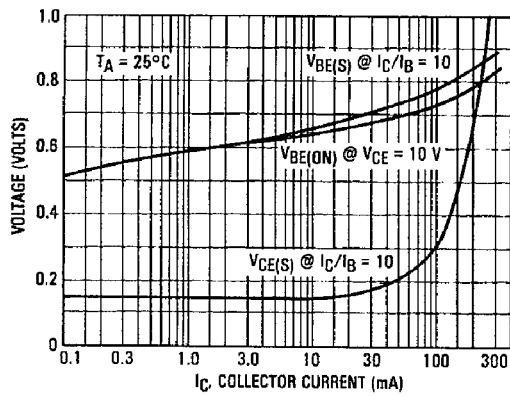


FIGURE 4 — ACTIVE REGION — SAFE OPERATING AREA

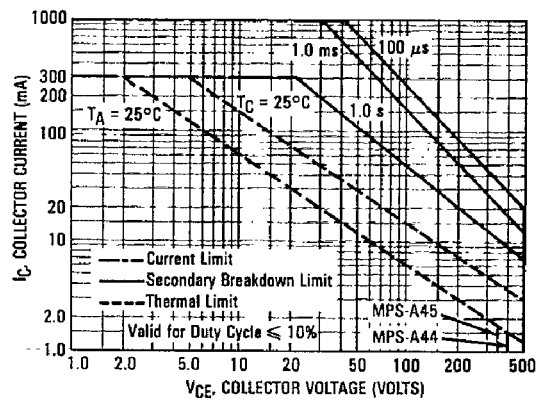


FIGURE 5 — CAPACITANCE

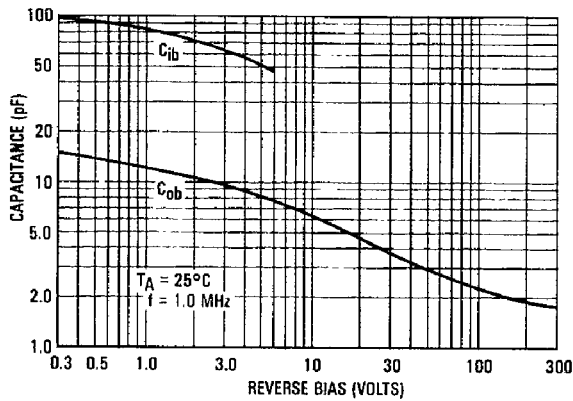


FIGURE 6 — HIGH FREQUENCY CURRENT GAIN

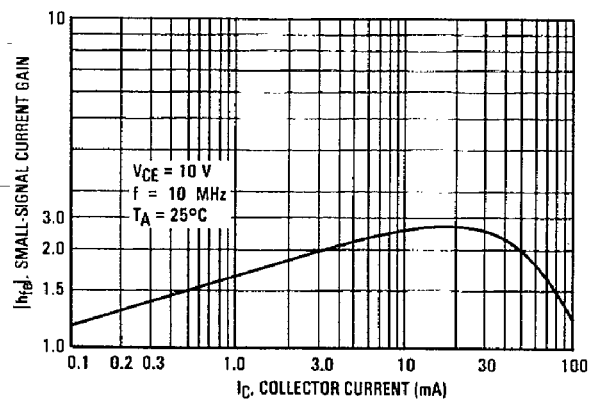


FIGURE 7 — TURN-ON SWITCHING TIMES AND TEST CIRCUIT

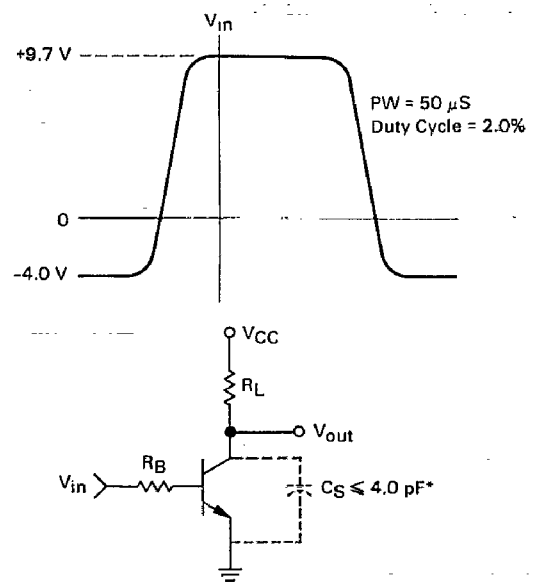
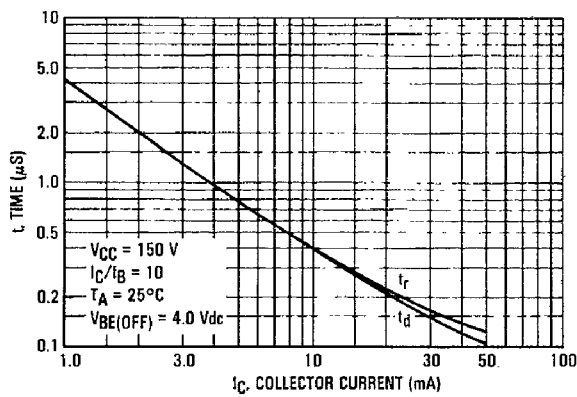
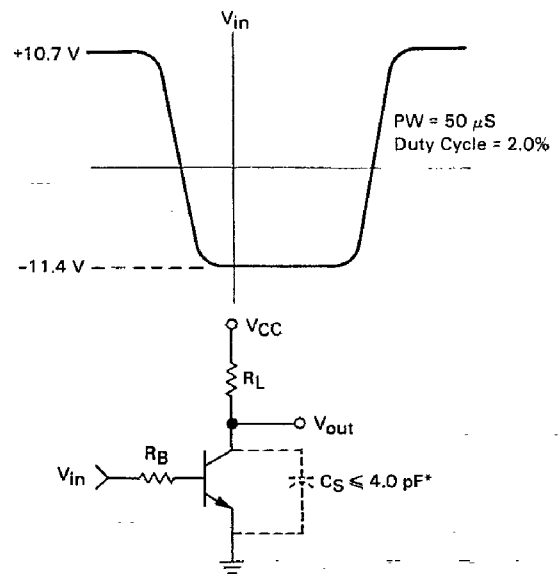
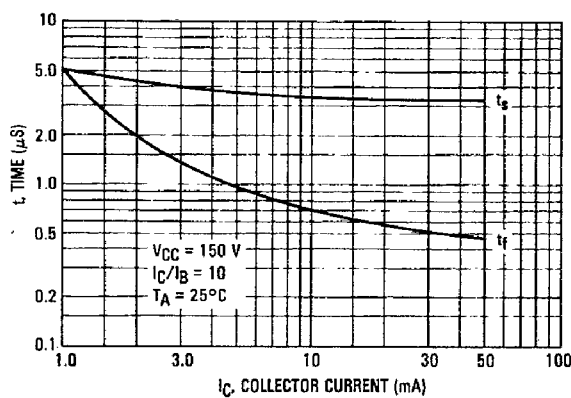


FIGURE 8 — TURN-OFF SWITCHING TIMES AND TEST CIRCUIT



*Total Shunt Capacitance of Test Jig and Connectors.