

# **MAXIMUM RATINGS**

Rating	Symbol	2N4237	2N4238	2N4239	Unit
Collector-Emitter Voltage	$V_{CE0}$	40	60	80	Vdc
Collector-Base Voltage	$V_{CBO}$	50	80	100	Vdc
Emitter-Base Voltage	$V_{EBO}$	6.0			Vdc
Base Current	$I_B$	500			mA
Collector Current — Continuous	$I_C$	1.0 3.0*			Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 5.3			Watt mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	6.0 34			Watts mW/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200			°C

# **THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	29	°C/W

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

Characteristic	Symbol	Min	Max	Unit
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# **OFF CHARACTERISTICS**

Collector-Emitter Sustaining Voltage(1) ( $I_C = 100\text{ mA}$ , $I_B = 0$ )	2N4237 2N4238 2N4239	$V_{CE0(sus)}$	40 60 80	— — —	Vdc
Collector Cutoff Current ( $V_{CE} = 50\text{ Vdc}$ , $V_{EB} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 80\text{ Vdc}$ , $V_{EB} = 1.5\text{ Vdc}$ )  ( $V_{CE} = 100\text{ Vdc}$ , $V_{EB} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 30\text{ Vdc}$ , $V_{EB} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ )  ( $V_{CE} = 50\text{ Vdc}$ , $V_{EB} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ ) ( $V_{CE} = 70\text{ Vdc}$ , $V_{EB} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ )	2N4237 2N4238  2N4239 2N4237  2N4238 2N4239	$I_{CEX}$	— — — — — —	0.1 0.1 0.1 1.0 1.0 1.0	mAdc
Collector Cutoff Current ( $V_{CB} = \text{Rated } V_{CBO}$ , $I_E = 0$ ) ( $V_{CE} = \text{Rated } V_{CE0}$ , $I_B = 0$ )		$I_{CBO}$	— —	0.1 .07	mAdc
Emitter Cutoff Current ( $V_{EB} = 6.0\text{ Vdc}$ , $I_C = 0$ )		$I_{EBO}$	—	0.5	mAdc

# **ON CHARACTERISTICS**

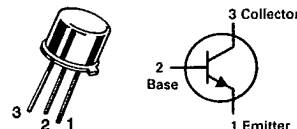
DC Current Gain(1) ( $I_C = 50\text{ mA}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 250\text{ mA}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 500\text{ mA}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$h_{FE}$	30 30 30 15	— 150 — —	—
Collector-Emitter Saturation Voltage(1) ( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ ) ( $I_C = 1.0\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )	$V_{CE(sat)}$	— —	0.3 0.6	Vdc
Base-Emitter Saturation Voltage(1) ( $I_C = 1.0\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )	$V_{BE(sat)}$	—	1.5	Vdc
Base-Emitter On Voltage(1) ( $I_C = 250\text{ mA}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$V_{BE(on)}$	—	1.0	Vdc

# **SMALL-SIGNAL CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_C = 0$ , $f = 0.1\text{ MHz}$ )	$C_{obo}$	—	100	pF
Small Signal Current Gain ( $I_C = 100\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{fe}$	30	—	—
Current Gain — High Frequency ( $V_{CE} = 10\text{ V}$ , $I_C = 100\text{ mA}$ , $f = 1\text{ MHz}$ )	$ h_{fe} $	1.0	—	—

**2N4237  
thru  
2N4239**

**CASE 79-04, STYLE 1  
TO-39 (TO-205AD)**



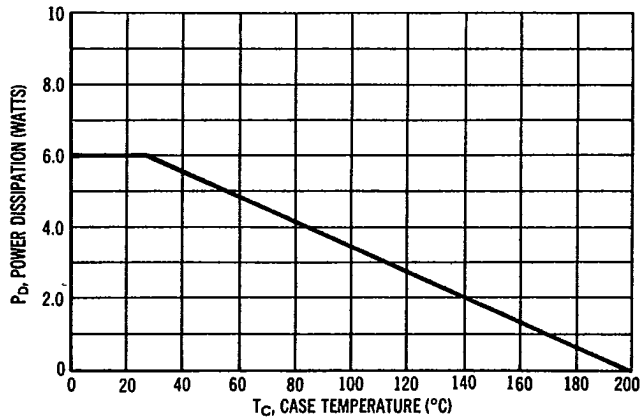
**GENERAL PURPOSE  
TRANSISTORS**

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FIGURE 1 — POWER-TEMPERATURE DERATING CURVE


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## SWITCHING CHARACTERISTICS

FIGURE 2 — SWITCHING TIME EQUIVALENT CIRCUIT

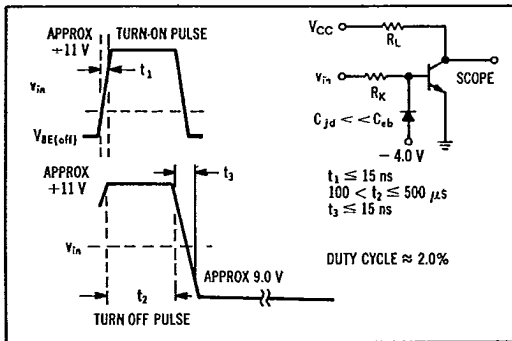


FIGURE 3 — TURN-ON TIME

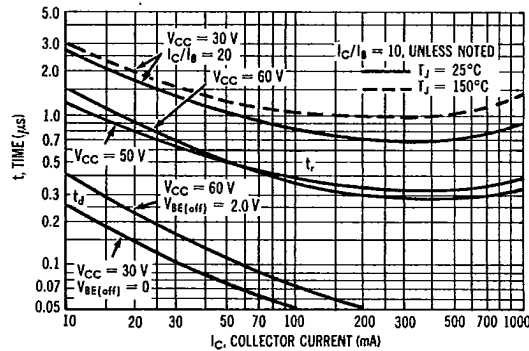


FIGURE 4 — THERMAL RESPONSE

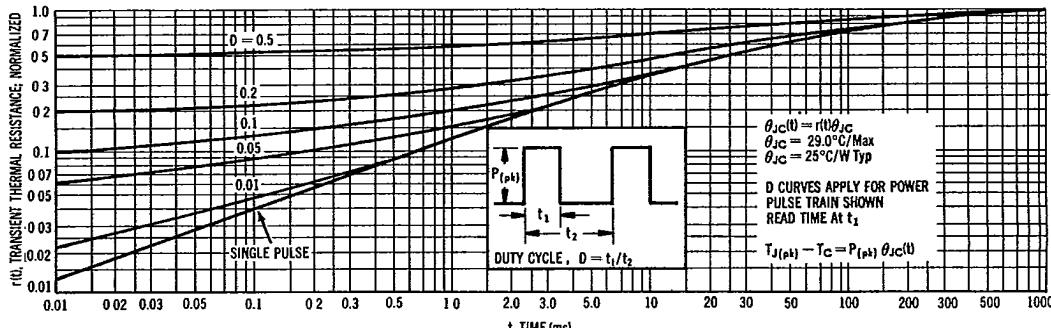
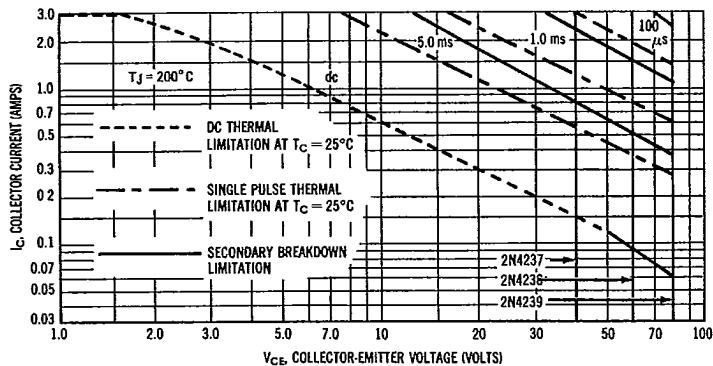


FIGURE 5 — ACTIVE-REGION SAFE OPERATING AREAS



There are two limitations on the power handling ability of a transistor: junction temperature and secondary breakdown. Safe operating area curves indicate  $I_C$ — $V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

For this particular transistor family, the thermal curves are the limiting design values, except for a small portion of the dc curve. The pulse secondary breakdown curves are shown for information only.

FIGURE 6 — STORAGE TIME

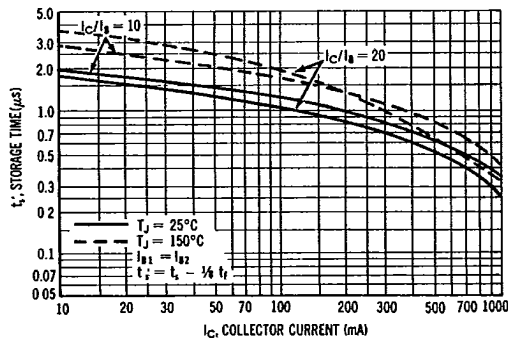
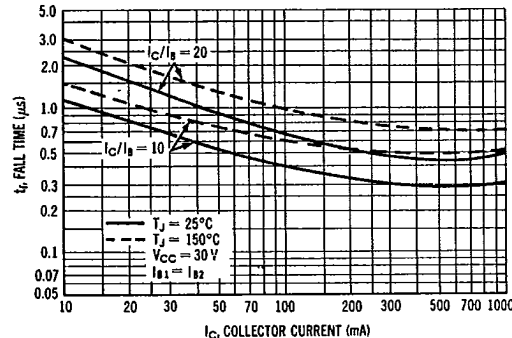


FIGURE 7 — FALL TIME



# TYPICAL DC CHARACTERISTICS

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FIGURE 8 — CURRENT GAIN

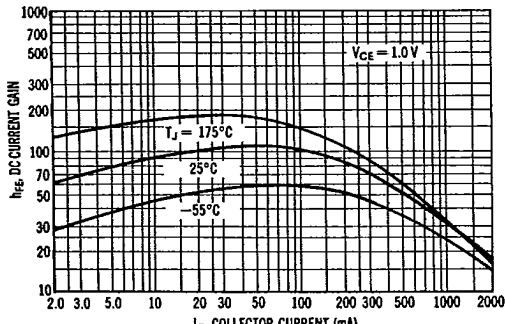


FIGURE 9 — COLLECTOR SATURATION REGION

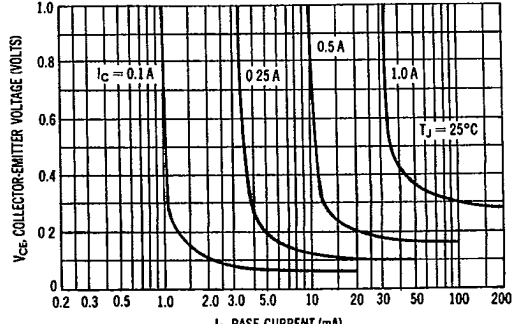


FIGURE 10 — EFFECTS OF BASE-EMITTER RESISTANCE

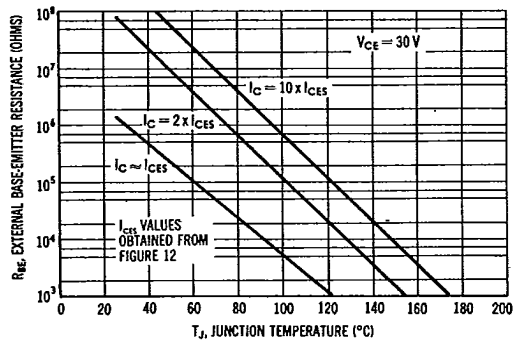


FIGURE 11 — "ON" VOLTAGE

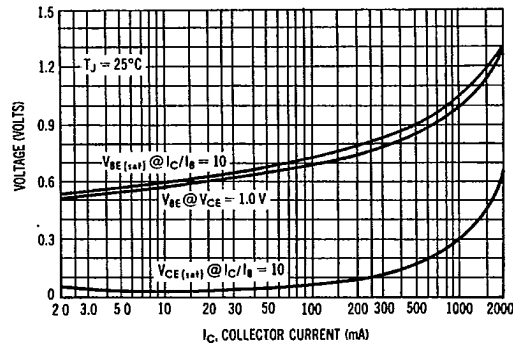


FIGURE 12 — COLLECTOR CUTOFF REGION

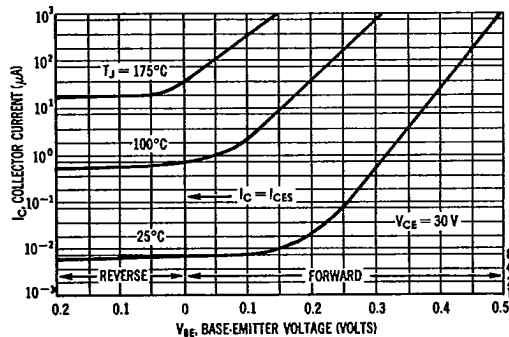


FIGURE 13 — TEMPERATURE COEFFICIENTS

