

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	15	Vdc
Collector-Base Voltage	V_{CBO}	40	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector Current — Continuous	I_C	500	mAdc
		One Die	All Die Equal Power
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ MD2369,A,B MD2369F,AF,BF MQ2369	P_D	550 350 400	600 400 600
Derate above 25°C MD2369,A,B MD2369F,AF,BF MQ2369		3.14 2.0 2.28	3.42 2.28 3.42
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ MD2369,A,B MD2369F,AF,BF MQ2369	P_D	1.4 0.7 0.7	2.0 1.4 2.8
Derate above 25°C MD2369,A,B MD2369F,AF,BF MQ2369		8.0 4.0 -4.0	11.4 80 16
Operating and Storage Junction Temperature Range	T_J, T_{stg}	- 65 to + 200	$^\circ\text{C}$

MD2369,A,B MD2369F,AF,BF MQ2369

MD2369,A,B
CASE 654-07, STYLE 1

MD2369F,AF,BF
CASE 610A-04, STYLE 1

MQ2369
CASE 607-04, STYLE 1

DUAL
GENERAL PURPOSE TRANSISTOR

NPN SILICON

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THERMAL CHARACTERISTICS

Characteristic	Symbol	One Die	All Die Equal Power	Unit
Thermal Resistance, Junction to Case MD2369,A,B MD2369F,AF,BF MQ2369	$R_{\theta JC}$	125 250 250	87.5 125 62.6	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient MD2369,A,B MD2369F,AF,BF MQ2369	$R_{\theta JA}(1)$	319 500 438	292 438 292	$^\circ\text{C/W}$
		Junction to Ambient	Junction to Case	
Coupling Factor MD2369,A,B MD2369F,AF,BF MQ2369 (Q1-Q2) (Q1-Q3 or Q1-Q4)		83 75 57 55	40 0 0 0	%

(1) $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board.

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage(2) ($I_C = 10 \text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	15	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 10 \mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	40	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	5.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 20 \text{ Vdc}, I_E = 0$) ($V_{CB} = 20 \text{ Vdc}, I_E = 0, T_A = +150^\circ\text{C}$)	I_{CBO}	— —	— —	0.03 30	μAdc

ON CHARACTERISTICS(2)

DC Current Gain ($I_C = 10 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 10 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}, T_A = -55^\circ\text{C}$)	h_{FE}	40 20	95 —	140 —	—
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MD2369,A,B, MD2369F,AF,BF, MQ2369**ELECTRICAL CHARACTERISTICS** (continued) ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Collector-Emitter Saturation Voltage ($I_C = 10\text{ mAdc}$, $I_B = 1.0\text{ mAdc}$)	$V_{CE(sat)}$	—	—	0.25	Vdc
Base-Emitter Saturation Voltage ($I_C = 10\text{ mAdc}$, $I_B = 1.0\text{ mAdc}$)	$V_{BE(sat)}$	0.7	—	0.85	Vdc

SMALL-SIGNAL CHARACTERISTICS

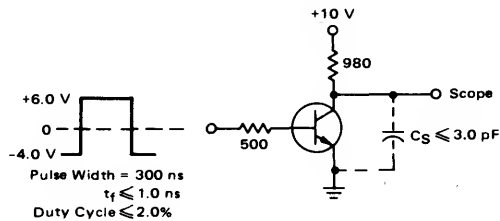
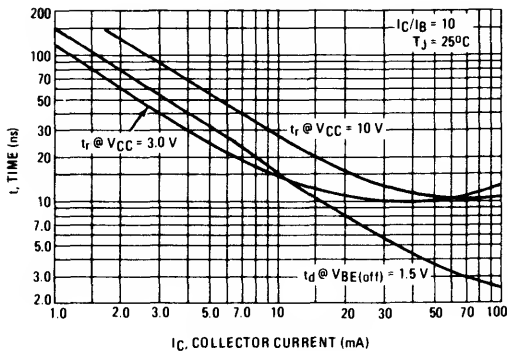
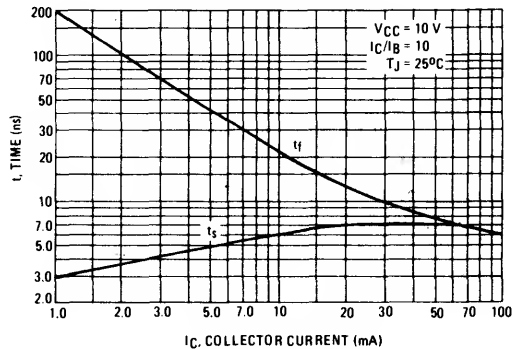
Current-Gain — Bandwidth Product(2) ($I_C = 10\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f = 100\text{ MHz}$)	f_T	500	800	—	MHz
Output Capacitance ($V_{CB} = 5.0\text{ Vdc}$, $I_E = 0$, $f = 100\text{ kHz}$)	C_{obo}	—	—	4.0	pF
Input Capacitance ($V_{BE} = 1.0\text{ Vdc}$, $I_C = 0$, $f = 100\text{ MHz}$)	C_{ibo}	—	—	4.0	pF

SWITCHING CHARACTERISTICS

Storage Time ($V_{CC} = 10\text{ Vdc}$, $I_C = I_{B1} = I_{B2} = 10\text{ mAdc}$)	t_s	—	—	13	ns
Turn-On Time ($V_{CC} = 3.0\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$, $I_C = 10\text{ mAdc}$, $I_{B1} = 3.0\text{ mAdc}$)	t_{on}	—	—	15	ns
Turn-Off Time ($V_{CC} = 3.0\text{ Vdc}$, $I_C = 10\text{ mAdc}$, $I_{B1} = 3.0\text{ mAdc}$, $I_{B2} = 1.5\text{ mAdc}$)	t_{off}	—	—	20	ns

MATCHING CHARACTERISTICS

DC Current Gain Ratio(3) ($I_C = 3.0\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$)	MD2369A, MD2369AF MD2369B, MD2369BF	h_{FE1}/h_{FE2}	0.9 0.8	— —	1.0 1.0	—
Base-Emitter Voltage Differential ($I_C = 3.0\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$)	MD2369A, MD2369AF MD2369B, MD2369BF	$ V_{BE1} - V_{BE2} $	— —	— —	5.0 10	mVdc
Base-Emitter Voltage Differential Gradient ($I_C = 3.0\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$, $T_A = -55\text{ to } +125^\circ\text{C}$)	MD2369A, MD2369AF MD2369B, MD2369BF	$\frac{\Delta(V_{BE1} - V_{BE2})}{\Delta T_A}$	— —	— —	10 20	$\mu\text{V}/^\circ\text{C}$

(2) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.(3) The lowest h_{FE} reading is taken as h_{FE1} for this test.**FIGURE 1 — STORAGE TIME TEST CIRCUIT****FIGURE 2 — TURN-ON TIME****FIGURE 3 — TURN-OFF TIME**

MD2369,A,B, MD2369F,AF,BF, MQ2369

FIGURE 4 - TURN-ON TEST CIRCUIT

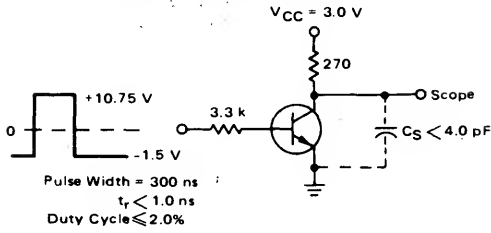


FIGURE 6 - CAPACITANCE

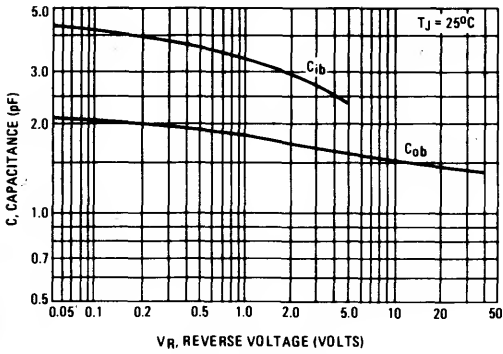


FIGURE 8 - DC CURRENT GAIN

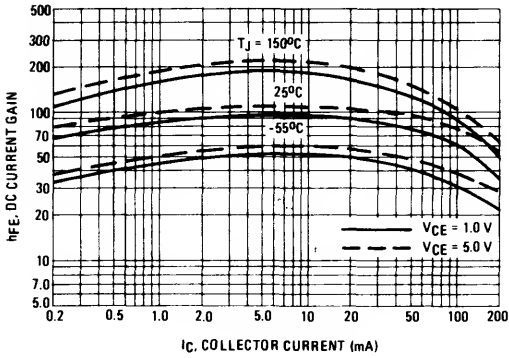


FIGURE 10 - COLLECTOR SATURATION REGION

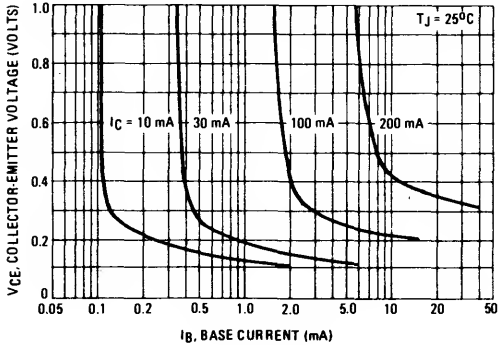


FIGURE 5 - TURN-OFF TEST CIRCUIT

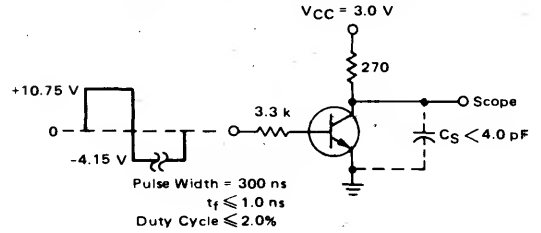


FIGURE 7 - CURRENT-GAIN-BANDWIDTH PRODUCT

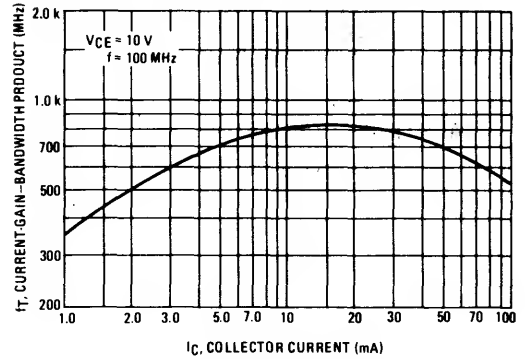


FIGURE 9 - "ON" VOLTAGES

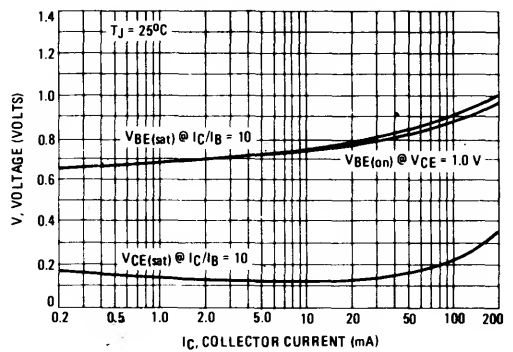


FIGURE 11 - TEMPERATURE COEFFICIENTS

