

6367254 MOTOROLA SC (XSTRS/R F)

96D 82435 D
T-29-27

MAXIMUM RATINGS

Rating	Symbol	MD2218,A,F MD2219,A,F MQ2218,A MQ2219,A	MD2218AF MD2219AF	Unit
Collector-Emitter Voltage	V_{CEO}	30	40	Vdc
Collector-Base Voltage	V_{CBO}	60	75	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	6.0	Vdc
Collector Current — Continuous	I_C	500		mAdc
		One Die	All Die Equal Power	
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ MD2218,A, MD2219,A MD2218F,AF, MD2219F,AF MQ2218,A, MQ2219,A Derate above 25°C MD2218,A, MD2219,A MD2218F,AF, MD2219F,AF MQ2218,A, MQ2219,A	P_D	575 350 400	625 400 800	mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ MD2218,A, MD2219,A MD2218F,AF, MD2219F,AF MQ2218,A, MQ2219,A Derate above 25°C MD2218,A, MD2219,A MD2218F,AF, MD2219F,AF MQ2218,A, MQ2219,A	P_D	1.8 1.0 0.9	2.5 2.0 3.6	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		°C

MD2218,A,F,AF
MD2219,A,AF
MQ2218,A
MQ2219,A

MD2218,A
MD2219,A
CASE 654-07, STYLE 1

MD2218F,AF
MD2219,AF
CASE 610A-04, STYLE 1

MQ2218,A
MQ2219,A
CASE 607-04, STYLE 1

DUAL
AMPLIFIER TRANSISTOR
 NPN SILICON



THERMAL CHARACTERISTICS

Characteristic	Symbol	One Die	All Die Equal Power	Unit
Thermal Resistance, Junction to Case MD2218,A, MD2219,A MD2218F,AF, MD2219F,AF MQ2218,A, MQ2219,A	$R_{\theta JC}$	97 175 195	70 87.5 48.8	°C/W
Thermal Resistance, Junction to Ambient MD2218,A, MD2219,A MD2218,F,AF, MD2219,AF MQ2218,A, MQ2219,A	$R_{\theta JA(1)}$	304 500 438	280 438 292	°C/W
		Junction to Ambient	Junction to Case	
Coupling Factors MD2218,A, MD2219,A MD2218F,AF, MD2219F,AF MQ2218,A, MQ2219,A (Q1-Q2) (Q1-Q3 or Q1-Q4)		84 75 57 55	44 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
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage(2) ($I_C = 10\text{ mAdc}$, $I_E = 0$) MD2218,A,F, MD2219,A, MQ2218,A, MQ2219,A MD2218AF, MD2219AF	$V_{(BR)CEO}$	30 40	— —	— —	Vdc
Collector-Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{Adc}$, $I_E = 0$) MD2218,A,F, MD2219,A, MQ2218,A, MD2219,A MD2218AF, MD2219AF	$V_{(BR)CBO}$	60 75	— —	— —	Vdc

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

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MD2218,A,F,AF, MD2219,A,AF, MQ2218,A, MQ2219,A

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

Characteristic	Symbol	Min	Typ	Max	Unit
Emitter-Base Breakdown Voltage ($I_E = 10\ \mu\text{Adc}$, $I_C = 0$)	$V_{(BR)EBO}$				Vdc
MD2218,A,F, MD2219,A, MQ2218,A, MQ2219,A		5.0	—	—	
MD2218AF, MD2219AF		6.0	—	—	
Collector Cutoff Current ($V_{CE} = 50\ \text{Vdc}$, $V_{EB(off)} = 3.0\ \text{Vdc}$)	I_{CEV}				nAdc
MD2218,F, MD2219,F, MQ2218,A, MD2218A,AF, MD2219A,AF, MQ2219,A		20 15	— —	— —	
Base Cutoff Current ($V_{CE} = 50\ \text{Vdc}$, $V_{EB(off)} = 3.0\ \text{Vdc}$)	I_{BL}	30	—	—	nAdc

ON CHARACTERISTICS(2)

DC Current Gain ($I_C = 0.1\ \text{mAdc}$, $V_{CE} = 10\ \text{Vdc}$)	h_{FE}				—
MD2218,A,F,AF, MQ2218,A, MD2219,A,AF, MQ2219,A		20 35	50 45	— —	
($I_C = 1.0\ \text{mAdc}$, $V_{CE} = 10\ \text{Vdc}$)					
MD2218,A,F,AF, MQ2218,A, MD2219,A,AF, MQ2219,A		25 50	55 55	— —	
($I_C = 10\ \text{mAdc}$, $V_{CE} = 10\ \text{Vdc}$)					
MD2218,A,F,AF, MQ2218,A, MD2219,A,AF, MQ2219,A		35 75	65 85	— —	
($I_C = 150\ \text{mAdc}$, $V_{CE} = 1.0\ \text{Vdc}$)					
MD2218,A,F,AF, MQ2218,A, MD2219,A,AF, MQ2219,A		20 50	65 65	— —	
($I_C = 150\ \text{mAdc}$, $V_{CE} = 10\ \text{Vdc}$)					
MD2218,AF,AF, MQ2218,A, MD2219,A,AF, MQ2219,A		40 100	30 120	120 300	
($I_C = 300\ \text{mAdc}$, $V_{CE} = 10\ \text{Vdc}$)					
MD2218,A, MQ2218,A, MD2219,A, MQ2219,A		25 30	75 75	— —	
Collector-Emitter Saturation Voltage ($I_C = 150\ \text{mAdc}$, $I_B = 15\ \text{mAdc}$)	$V_{CE(sat)}$				Vdc
MD2218,A,F, MD2219,A, MQ2218,A, MQ2219,A		— —	0.2 —	0.4 0.3	
MD2218AF, MD2219AF					
($I_C = 300\ \text{mAdc}$, $I_B = 30\ \text{mAdc}$)					
MD2218,A,F, MD2219,A, MQ2218,A, MQ2219,A		— —	0.35 —	1.2 0.9	
MD2218AF, MD2219AF					
Base-Emitter Saturation Voltage ($I_C = 150\ \text{mAdc}$, $I_B = 15\ \text{mAdc}$)	$V_{BE(sat)}$				Vdc
MD2218,A,F, MD2219,A, MQ2218,A, MQ2219,A		0.6 0.6	0.95 1.0	1.3 1.2	
MD2218AF, MD2219AF					
($I_C = 300\ \text{mAdc}$, $I_B = 30\ \text{mAdc}$)					
MD2218,A,F, MD2219,A, MQ2218,A, MQ2219,A		— —	— —	2.0 1.8	
MD2218AF, MD2219AF					

SMALL-SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 20\ \text{mAdc}$, $V_{CE} = 20\ \text{Vdc}$, $f = 100\ \text{MHz}$)	f_T	200	250	—	MHz
Output Capacitance ($V_{CB} = 10\ \text{Vdc}$, $I_E = 0$, $f = 100\ \text{kHz}$)	C_{obo}	—	3.5	8.0	pF
Input Capacitance ($V_{EB} = 0.5\ \text{Vdc}$, $I_C = 0$, $f = 100\ \text{kHz}$)	C_{ibo}				pF
MD2218,A,F, MD2219,A, MQ2218,A, MQ2219,A		— —	15 18	20 25	
MD2218AF, MD2219AF					

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MD2218,A,F,AF, MD2219,A,AF, MQ2218,A, MQ2219,A

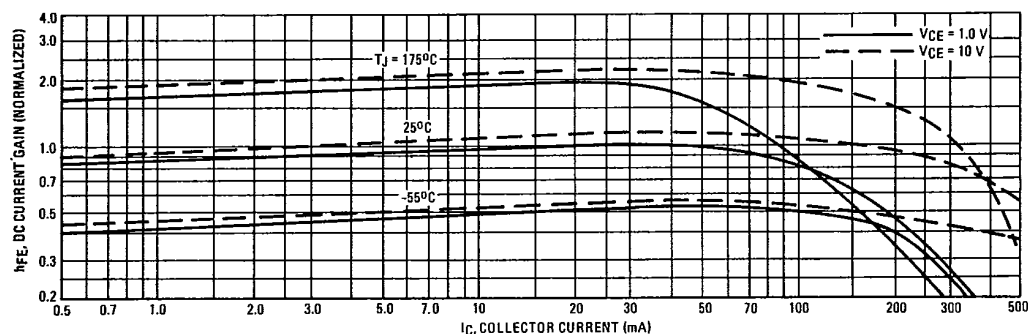
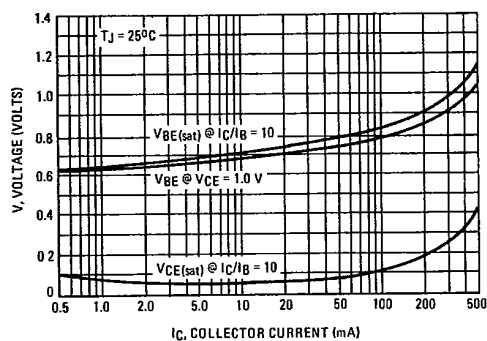
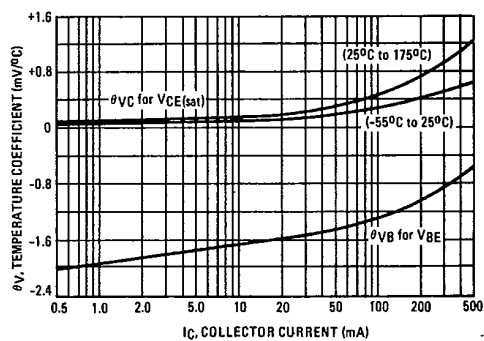
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ELECTRICAL CHARACTERISTICS (continued) ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS					
Delay Time	t_d	—	—	20	μs
Rise Time				15	μs
Storage Time	t_s	—	—	280	μs
Fall Time				250	μs
	t_f	—	—	70	μs
				60	μs

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

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FIGURE 1 — NORMALIZED DC CURRENT GAIN**FIGURE 2 — "ON" VOLTAGES****FIGURE 3 — TEMPERATURE COEFFICIENTS**

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

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MD2218,A,F,AF, MD2219,A,AF, MQ2218,A, MQ2219,A

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NOISE FIGURE

(VCE = 10 Vdc, TA = 25°C)

FIGURE 4 - FREQUENCY EFFECTS

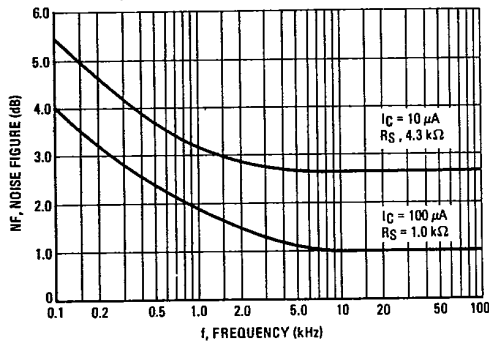


FIGURE 5 - SOURCE RESISTANCE EFFECTS

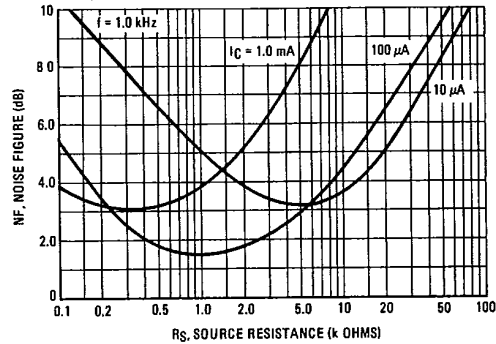


FIGURE 6 - CURRENT-GAIN-BANDWIDTH PRODUCT

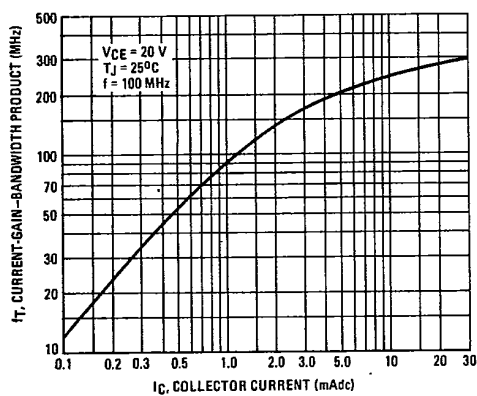
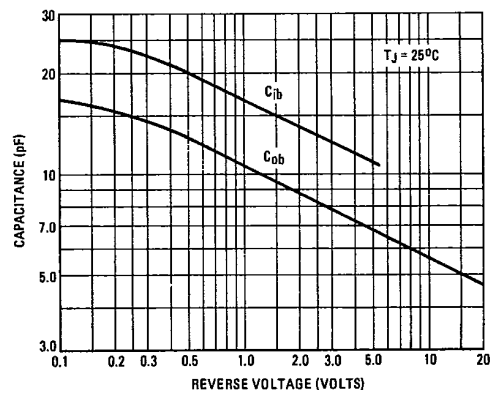


FIGURE 7 - CAPACITANCES



SWITCHING TIME CHARACTERISTICS

FIGURE 8 - TURN-ON TIME

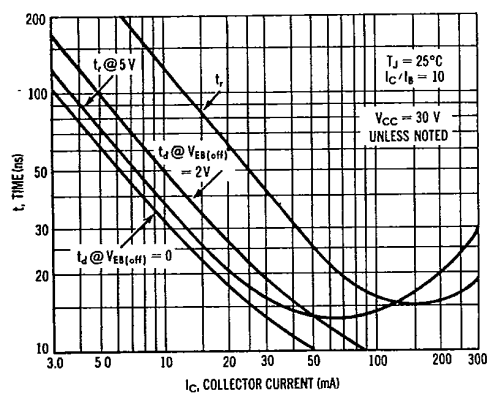
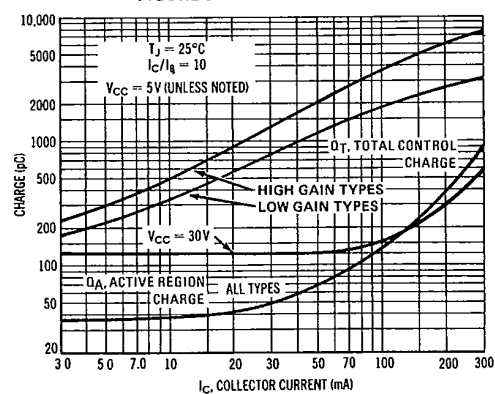


FIGURE 9 - CHARGE DATA



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MD2218,A,F,AF, MD2219,A,AF, MQ2218,A, MQ2219,A

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FIGURE 10 - TURN-OFF BEHAVIOR

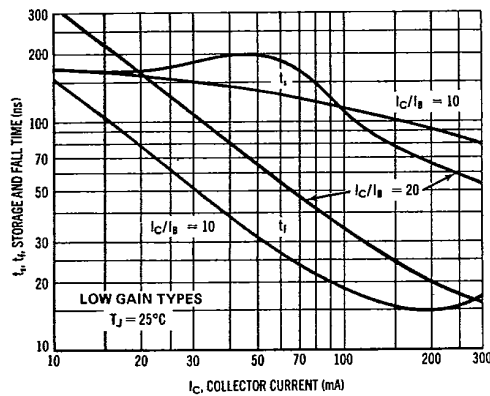


FIGURE 11 - DELAY AND RISE TIME EQUIVALENT TEST CIRCUIT

GENERATOR RISE TIME ≤ 2.0 ns
 PW ≤ 200 ns
 DUTY CYCLE = 2.0%

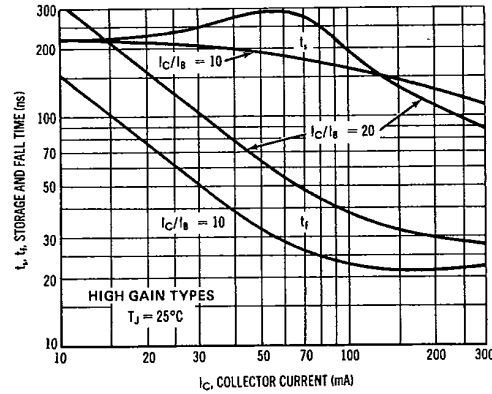
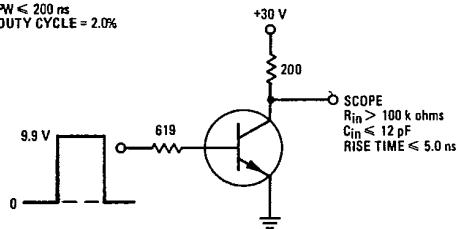


FIGURE 12 - STORAGE TIME AND FALL TIME EQUIVALENT TEST CIRCUIT

RISE TIME $\leq 3.0\%$
 DUTY CYCLE = 2.0%

