

T-27-27

MAXIMUM RATINGS

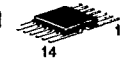
Rating	Symbol	MD6003 MD6003F	MD6001,F MD6002,F MQ6001,2	Unit
Collector-Emitter Voltage	V _{CEO}	30		V _{dc}
Collector-Base Voltage	V _{CBO}	50	60	V _{dc}
Emitter-Base Voltage	V _{EBO}	5.0		V _{dc}
Collector Current — Continuous	I _C	500		mAdc
		One Die	All Die Equal Power	
Total Device Dissipation @ T _A = 25°C	P _D	575	625	mW
MD6001,2,3		350	400	
MD6001F,2F		400	600	
MQ6001				
Derate above 25°C				mW/°C
MD6001,2,3		3.29	3.57	
MD6001F,2F		2.0	2.28	
MQ6001		2.28	3.42	
Total Device Dissipation @ T _C = 25°C	P _D	1.8	2.5	Watts
MD6001,2,3		1.0	2.0	
MD6001F,2F		0.9	3.6	
MQ6001				
Derate above 25°C				mW/°C
MD6001,2,3		10.3	14.3	
MD6001F,2F		5.71	11.4	
MQ6001		5.13	20.5	
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	One Die	All Die Equal Power	Unit
Thermal Resistance, Junction to Case	R _{θJC}	97	70	°C/W
MD6001,2,3		175	87.5	
MD6001F,2F		195	48.8	
MQ6001				
Thermal Resistance, Junction to Ambient	R _{θJA} (1)	304	280	°C
MD6001,2,3		500	438	
MD6001F,2F		438	292	
MQ6001				
		Junction to Ambient	Junction to Case	
Coupling Factor		84	44	%
MD6001,2,3		75	0	
MD6001F,2F		57	0	
MQ6001 (Q1-Q2)		55	0	
(Q1-Q3 or Q1-Q4)				

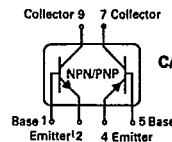
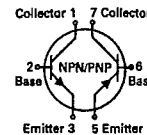
(1) R_{θJA} is measured with the device soldered into a typical printed circuit board.ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage(2) (I _C = 10 mAdc, I _B = 0)	V _{(BR)CEO}	30	—	—	V _{dc}
Collector-Base Breakdown Voltage (I _C = 10 μAdc, I _E = 0) MD6003	V _{(BR)CBO}	50	—	—	V _{dc}
MD6001,F, MD6002,F, MQ6001, MQ6002		60	—	—	
Emitter-Base Breakdown Voltage (I _E = 10 μAdc, I _C = 0)	V _{(BR)EBO}	5.0	—	—	V _{dc}
Base Cutoff Current (V _{CE} = 30 Vdc, V _{BE} = 3.0 Vdc)	I _{BEV}	—	—	50	nAdc
(V _{CE} = 60 Vdc, V _{EB} = 3.0 Vdc)		—	—	30	

MD6001, F MD6002, F
MD6003, MQ6001MD6001,
MD6002, MD6003
CASE 654-07, STYLE 5
DUALMD6001F, MD6002F
CASE 610A-04, STYLE 1
DUALMQ6001
CASE 607-04, STYLE 1
QUADCOMPLEMENTARY
GENERAL PURPOSE
TRANSISTORS
NPN/PNP SILICON

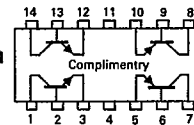
PIN CONNECTION DIAGRAMS

CASE 654-07, STYLE 5



CASE 610A-04, STYLE 1

CASE 607-04, STYLE 1



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

Characteristic	Symbol	Min	Typ	Max	Unit
Collector Cutoff Current ($V_{CE} = 30\text{ Vdc}$, $V_{BE}(\text{off}) = 3.0\text{ Vdc}$) ($V_{CE} = 50\text{ Vdc}$, $V_{BE}(\text{off}) = 3.0\text{ Vdc}$) ($V_{CE} = 50\text{ Vdc}$, $V_{BE}(\text{off}) = 3.0\text{ Vdc}$, $T_A = 150^\circ\text{C}$)	I_{CEV}	—	—	30 20 30	nAdc nAdc μAdc
Collector Cutoff Current ($V_{CB} = 40\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	100	nA

ON CHARACTERISTICS(2)

DC Current Gain ($I_C = 0.1\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	MD6001,F, MQ6001 MD6002,F	h_{FE}	20 35	80 70	— —	—
($I_C = 1.0\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	MD6001,F, MQ6001 MD6003 MQ6002,F		25 40 50	90 70 100	— — —	
($I_C = 10\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	MD6001,F, MQ6001 MD6002,F		35 75	70 110	— —	
($I_C = 150\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	MD6001,F, MQ6001 MD6003 MD6002,F		40 70 100	— 110 200	120 — 300	
($I_C = 300\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	MD6001,F, MQ6001 All Other Devices		20 30	— 90	— —	
($I_C = 150\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	MD6001,F, MQ6001 MD6002,F		20 50	80 —	— —	
Collector-Emitter Saturation Voltage ($I_C = 150\text{ mAdc}$, $I_B = 15\text{ mAdc}$) ($I_C = 300\text{ mAdc}$, $I_B = 30\text{ mAdc}$)	All Devices MD6001, MD6002,F, MQ6001	$V_{CE}(\text{sat})$	— —	0.3 0.59	0.4 1.4	Vdc
Base-Emitter Saturation Voltage ($I_C = 150\text{ mAdc}$, $I_B = 15\text{ mAdc}$) ($I_C = 300\text{ mAdc}$, $I_B = 30\text{ mAdc}$)	All Devices MD6001, MD6002,F, MQ6001	$V_{BE}(\text{sat})$	— —	1.02 1.25	1.3 2.0	Vdc

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

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FIGURE 1 - DC CURRENT GAIN

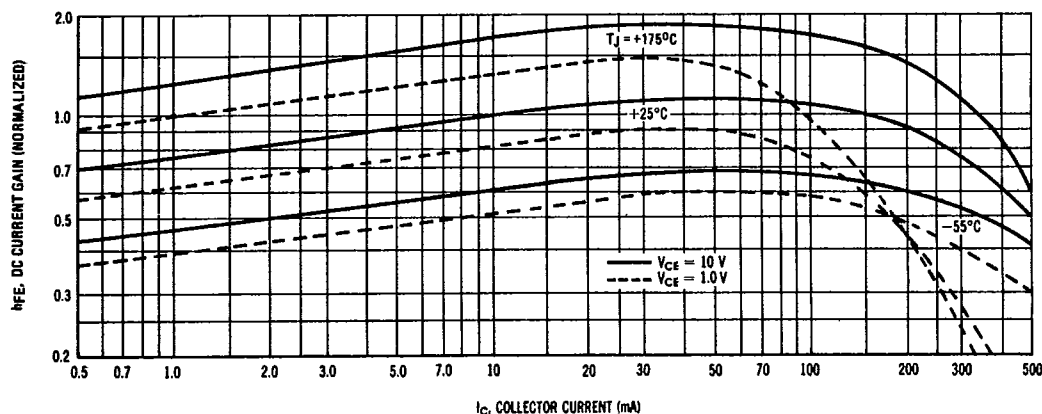


FIGURE 2 - "ON" VOLTAGES

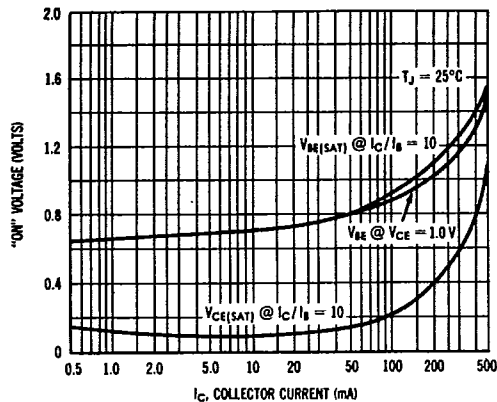


FIGURE 3 - TEMPERATURE COEFFICIENTS

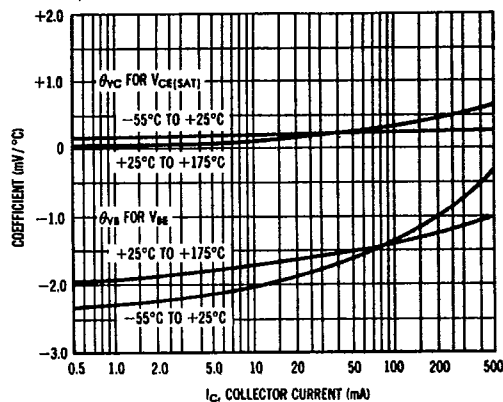
NOISE FIGURE
 $V_{CE} = 10\text{ V}$, $T_A = 25^\circ\text{C}$

FIGURE 4 - FREQUENCY EFFECTS

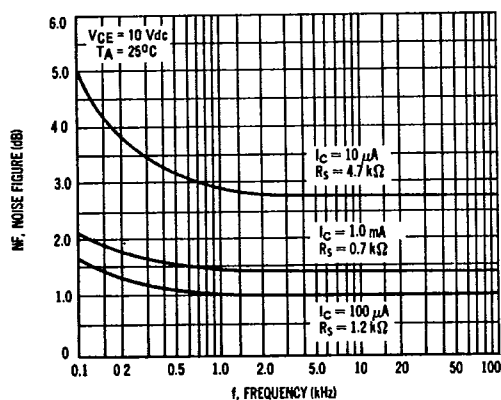


FIGURE 5 - SOURCE RESISTANCE EFFECTS

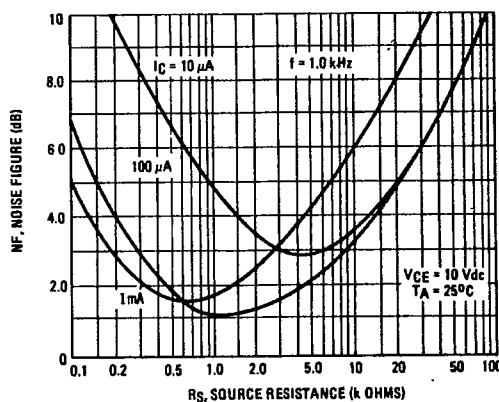


FIGURE 6 - CURRENT-GAIN BANDWIDTH PRODUCT

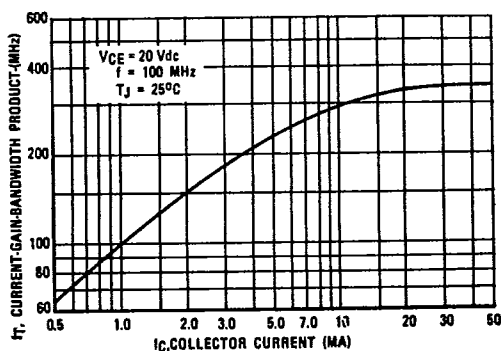
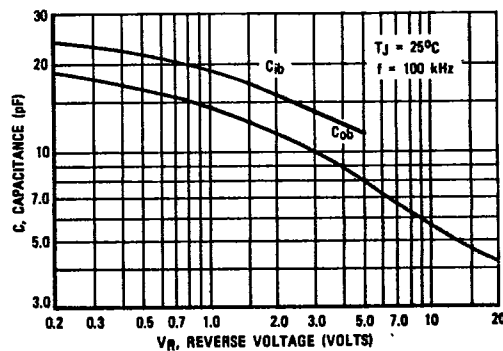


FIGURE 7 - CAPACITANCE



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FIGURE 8 - TURN ON TIME

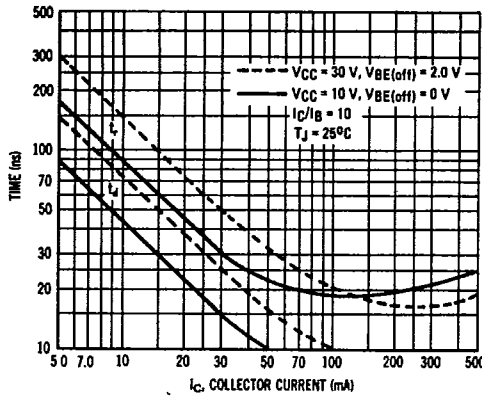


FIGURE 9 - CHARGE DATA

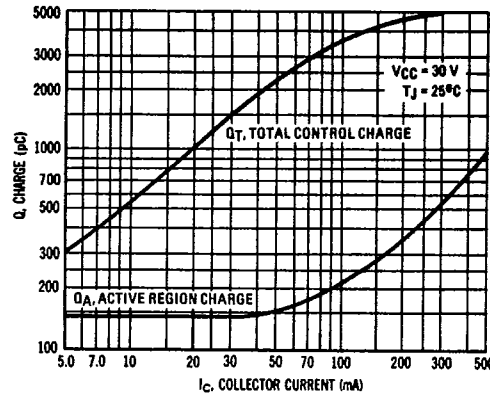


FIGURE 10 - STORAGE TIME

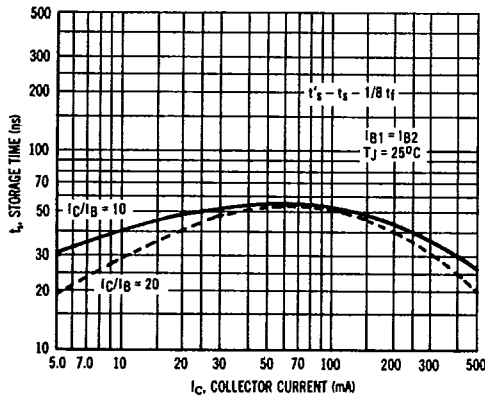


FIGURE 11 - FALL TIME

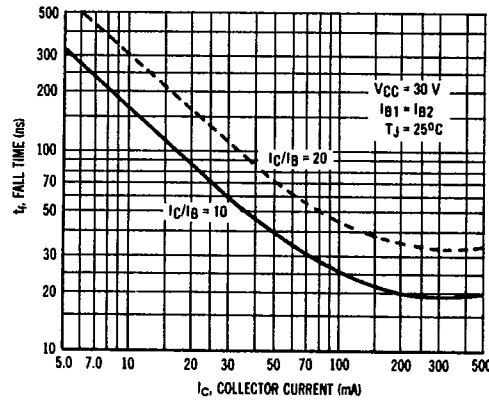


FIGURE 12 - DELAY AND RISE TIME TEST CIRCUIT

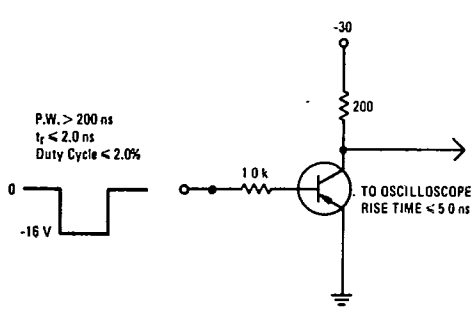
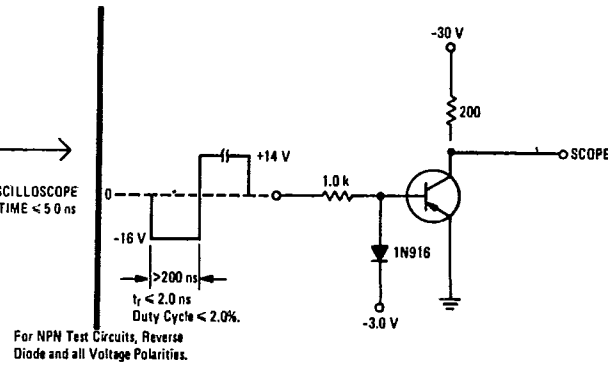


FIGURE 13 - STORAGE AND FALL TIME TEST CIRCUIT



MOTOROLA SMALL-SIGNAL TRANSISTORS, FETs AND DIODES