

Silicon Dual NPN Transistor

MD708B

High Speed Transistor

40V / 200mA

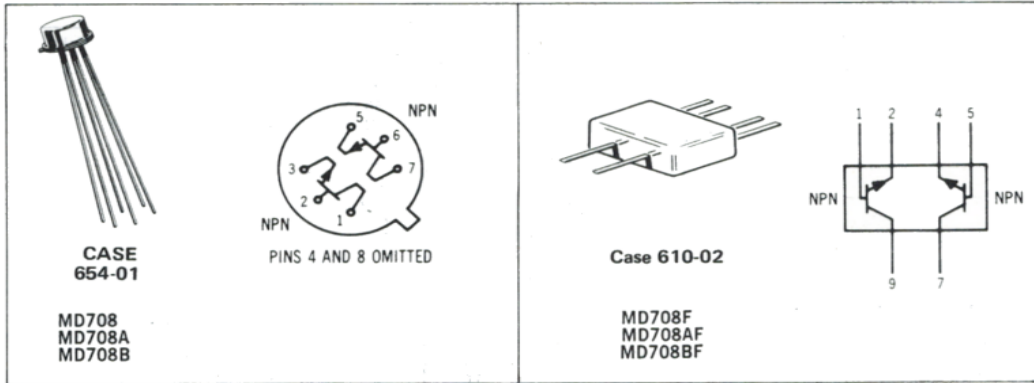
DATASHEET

OEM –Motorola

Source: Motorola Databook 1972

MD708, F (SILICON) MD708A, F MD708B, F

Dual NPN silicon annular transistors designed for high-speed, logic switching and space saving considerations. Matched pairs are available for differential amplifier applications.



Pin Connections, Bottom View
All Leads Electrically Isolated from Case

MAXIMUM RATINGS (each side) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit		
Collector-Emitter Voltage	V_{CEO}	15	Vdc		
Collector-Base Voltage	V_{CB}	40	Vdc		
Emitter-Base Voltage	V_{EB}	5.0	Vdc		
Collector Current	I_C	200	mAdc		
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ\text{C}$		
Total Device Dissipation @ $T_A = 25^\circ\text{C}$	P_D	One Side	Both Sides		
		Metal Can Derate above 25°C	300 1.7	400 2.3	mW mW/ $^\circ\text{C}$
		Flat Package Derate above 25°C	250 1.5	350 2.0	mW mW/ $^\circ\text{C}$

FIGURE 1 — TURN-ON AND TURN-OFF TIME TEST CIRCUIT

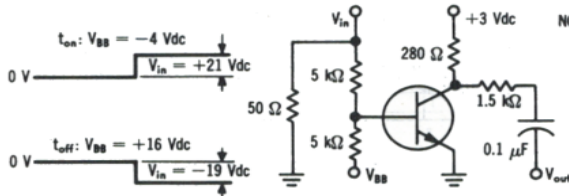
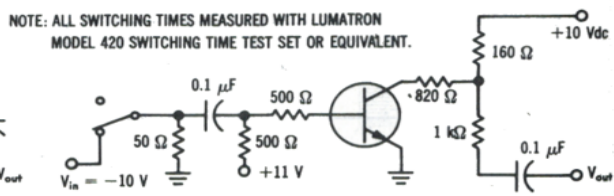


FIGURE 2 — CHARGE-STORAGE TIME CONSTANT TEST CIRCUIT



MD708,F/MD708A,F/MD708B,F (continued)**ELECTRICAL CHARACTERISTICS** (each side) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) ($I_C = 30 \text{ mAdc}$, $I_B = 0$)	$BV_{CEO(sus)}$	15	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 10 \mu\text{Adc}$, $I_E = 0$)	BV_{CBO}	40	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}$, $I_C = 0$)	BV_{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}	—	0.015 50	μAdc
ON CHARACTERISTICS				
DC Current Gain (1) ($I_C = 0.5 \text{ mAdc}$, $V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 10 \text{ mAdc}$, $V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 100 \text{ mAdc}$, $V_{CE} = 5.0 \text{ Vdc}$) ($I_C = 150 \text{ mAdc}$, $V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	40 40 35 30	— 200 — —	—
Collector-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 1 \text{ mAdc}$) ($I_C = 50 \text{ mAdc}$, $I_B = 5 \text{ mAdc}$) ($I_C = 100 \text{ mAdc}$, $I_B = 10 \text{ mAdc}$)	$V_{CE(sat)}$	— — —	0.2 0.35 0.5	Vdc
Base-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 1 \text{ mAdc}$) ($I_C = 50 \text{ mAdc}$, $I_B = 5 \text{ mAdc}$) ($I_C = 100 \text{ mAdc}$, $I_B = 10 \text{ mAdc}$)	$V_{BE(sat)}$	0.65 — —	0.85 0.95 1.1	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain-Bandwidth Product ($I_C = 20 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	300	—	MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 100 \text{ kHz}$)	C_{ob}	—	5.0	pF
Input Capacitance ($V_{BE} = 0.5 \text{ Vdc}$, $I_C = 0$, $f = 100 \text{ kHz}$)	C_{ib}	—	7.0	pF
Charge-Storage Time Constant (Figure 2) ($I_C = 10 \text{ mAdc}$, $I_{B1} = I_{B2} = 10 \text{ mAdc}$)	t_s	—	25	ns
Turn-On Time (Figure 1) ($I_C = 10 \text{ mAdc}$, $I_{B1} = 3 \text{ mAdc}$, $I_{B2} = 1 \text{ mAdc}$)	t_{on}	—	35	ns
Turn-Off Time (Figure 1) ($I_C = 10 \text{ mAdc}$, $I_{B1} = 3 \text{ mAdc}$, $I_{B2} = 1 \text{ mAdc}$)	t_{off}	—	75	ns
MATCHING CHARACTERISTICS				
DC Current Gain Ratio** ($I_C = 10 \text{ mAdc}$, $V_{CE} = 1 \text{ Vdc}$)	h_{FE1}/h_{FE2} **	0.9 0.8	1.0 1.0	—
Base Voltage Differential ($I_C = 10 \text{ mAdc}$, $V_{CE} = 1 \text{ Vdc}$)	$ V_{BE1} - V_{BE2} $	—	5.0 10	mVdc
Base Voltage Differential Gradient ($I_C = 10 \text{ mAdc}$, $V_{CE} = 1 \text{ Vdc}$, $T_A = -55 \text{ to } +125^\circ\text{C}$)	$\frac{\Delta(V_{BE1} - V_{BE2})}{\Delta T_A}$	—	10 20	$\mu\text{V}/^\circ\text{C}$

(1) Pulse Test: Pulse Width = 300 μs ; Duty Cycle = 2%**The lowest h_{FE} reading is taken as h_{FE1} for this test.