Silicon Dual NPN Transistor

MD708

High Speed Transistor

40V / 200mA

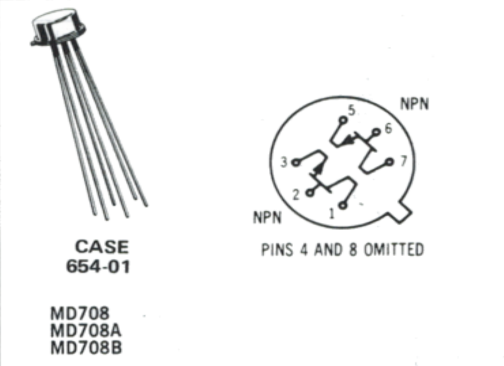
DATASHEET

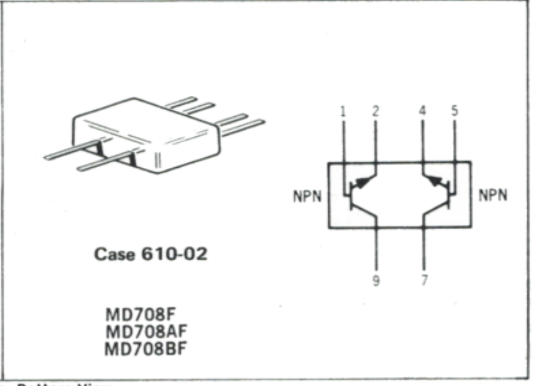
OEM –Motorola

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°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		°C
		One Side	Both Sides	
Total Device Dissipation @ T_A = 25°C	P_D			
Metal Can		300	400	mW
Derate above 25°C		1.7	2.3	mW/°C
Flat Package		250	350	mW
Derate above 25°C		1.5	2.0	mW/°C

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

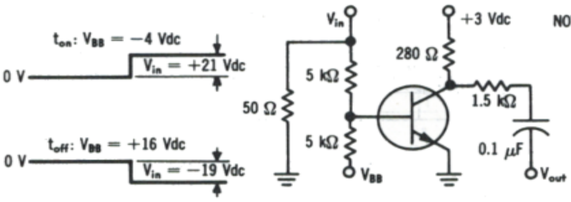
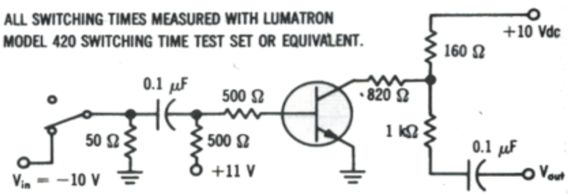


FIGURE 2 — CHARGE-STORAGE TIME CONSTANT TEST CIRCUIT

NOTE: ALL SWITCHING TIMES MEASURED WITH LUMATRON MODEL 420 SWITCHING TIME TEST SET OR EQUIVALENT.



MD708,F/MD708A,F/MD708B,F (continued)

ELECTRICAL CHARACTERISTICS (each side) (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage [1] (I_C = 30 mAdc, I_B = 0)	$BV_{CEO(sus)}$	15	—	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	BV_{CBO}	40	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	BV_{EBO}	5.0	—	Vdc
Collector Cutoff Current (V_{CB} = 20 Vdc, I_E = 0) (V_{CB} = 20 Vdc, I_E = 0, T_A = +150°C)	I_{CBO}	— —	0.015 50	μAdc
ON CHARACTERISTICS				
DC Current Gain [1] (I_C = 0.5 mAdc, V_{CE} = 1.0 Vdc) (I_C = 10 mAdc, V_{CE} = 1.0 Vdc) (I_C = 100 mAdc, V_{CE} = 5.0 Vdc) (I_C = 150 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	40 40 35 30	— 200 — —	—
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1 mAdc) (I_C = 50 mAdc, I_B = 5 mAdc) (I_C = 100 mAdc, I_B = 10 mAdc)	$V_{CE(sat)}$	— — —	0.2 0.35 0.5	Vdc
Base-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1 mAdc) (I_C = 50 mAdc, I_B = 5 mAdc) (I_C = 100 mAdc, I_B = 10 mAdc)	$V_{BE(sat)}$	0.65 — —	0.85 0.95 1.1	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain—Bandwidth Product (I_C = 20 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	f_T	300	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)	C_{ob}	—	5.0	pF
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 100 kHz)	C_{ib}	—	7.0	pF
Charge-Storage Time Constant (Figure 2) (I_C = 10 mAdc, I_{B1} = I_{B2} = 10 mAdc)	t_s	—	25	ns
Turn-On Time (Figure 1) (I_C = 10 mAdc, I_{B1} = 3 mAdc, I_{B2} = 1 mAdc)	t_{on}	—	35	ns
Turn-Off Time (Figure 1) (I_C = 10 mAdc, I_{B1} = 3 mAdc, I_{B2} = 1 mAdc)	t_{off}	—	75	ns
MATCHING CHARACTERISTICS				
DC Current Gain Ratio** (I_C = 10 mAdc, V_{CE} = 1 Vdc) MD708A, MD708AF MD708B, MD708BF	h_{FE1}/h_{FE2}**	0.9 0.8	1.0 1.0	—
Base Voltage Differential (I_C = 10 mAdc, V_{CE} = 1 Vdc) MD708A, MD708AF MD708B, MD708BF	$\|V_{BE1} - V_{BE2}\|$	— —	5.0 10	mVdc
Base Voltage Differential Gradient (I_C = 10 mAdc, V_{CE} = 1 Vdc, T_A = -55 to +125°C) MD708A, MD708AF MD708B, MD708BF	$\frac{\Delta(V_{BE1} - V_{BE2})}{\Delta T_A}$	— —	10 20	μV/°C

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