Silicon Dual NPN Transistor

MD708BF

High Speed Transistor

40V / 200mA

DATASHEET

OEM –Motorola

Source: Motorola Databook 1972

Datasheet Rev. 1.3 – 04/19 – data without warranty / liability

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.

CASE 654-01

PINS 4 AND 8 OMITTED

MD708
MD708A
MD708B

Case 610-02

MD708F
MD708AF
MD708BF
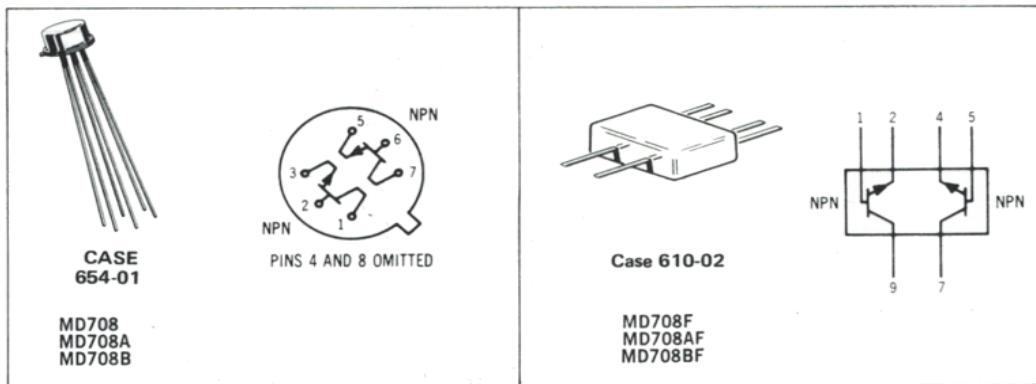
Pin Connections, Bottom View
All Leads Electrically Isolated from Case

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 Derate above 25°C		300 1.7	400 2.3	mW mW/°C
Flat Package Derate above 25°C		250 1.5	350 2.0	mW mW/°C

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

t_{on}: V_{BB} = −4 Vdc

V_{in} = +21 Vdc

0 V

t_{off}: V_{BB} = +16 Vdc

V_{in} = −19 Vdc

0 V

V_{in}

5 kΩ

50 Ω

5 kΩ

V_{BB}

+3 Vdc

280 Ω

1.5 kΩ

0.1 μF

V_{out}
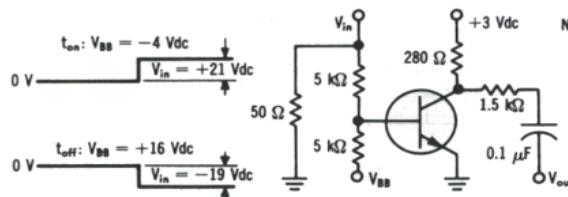
FIGURE 2 — CHARGE-STORAGE TIME CONSTANT TEST CIRCUIT

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

V_{in} = −10 V

50 Ω

0.1 μF

500 Ω

500 Ω

+11 V

820 Ω

1 kΩ

+10 Vdc

160 Ω

0.1 μF

V_{out}
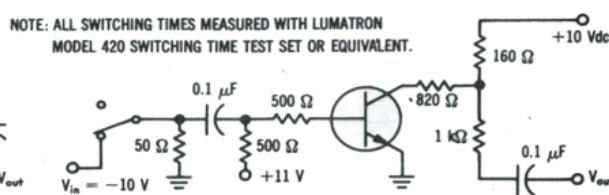
MD708,F/MD708A,F/MD708B,F (continued)

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	$\dfrac{\Delta(V_{BE1} - V_{BE2})}{\Delta T_A}$	— —	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.