

HIGH SPEED SCHOTTKY **TTL 4096-BIT PROMS**

DESCRIPTION

The Fujitsu MB7121 and MB7122 are high speed Schottky TTL electrically field programmable read only memories. With open collector outputs on the MB7121 and three-state outputs on the MB7122, memory expansion is simple.

The memory is fabricated with all logic "zeros" (positive logic). Logic level "ones" can be programmed by the highly reliable DEAP™ (Diffused Eutectic Aluminum Process) during a simple programming procedure.

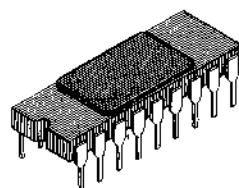
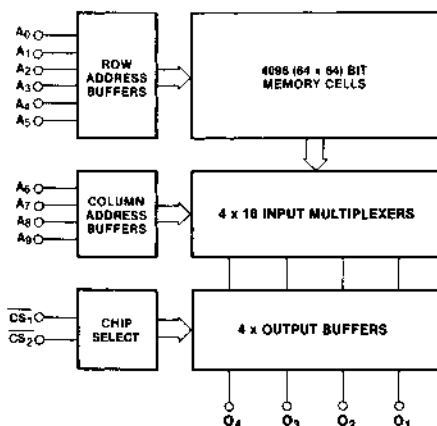
The sophisticated Schottky TTL process enables small chip size and fast access times.

The extra test cells and unique testing methods provide extremely high programmability.

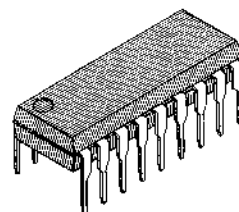
FEATURES

- Organization as 1024 words by 4-bits, fully decoded
- TTL compatible input/output
- Fast access time:
MB7121E/MB7122E:
45ns Max.
25ns Typ.
MB7121H/MB7122H:
35ns Max.
25ns Typ.
- Low power dissipation:
150mA max.
- Single +5V supply voltage
- Proven high programmability and reliability of DEAP™ (Diffused Eutectic Aluminum Process)
- Low current PNP inputs
- Simplified and lower power programming
- MB7121: Open collector outputs
- MB7122: Three-state outputs
- Two chip enable leads for easy memory expansion
- Jedec standard 18-pin DIP package
- MB7121 pin compatible with industry standard products: 27S32, 7642, 6350, 93452, 74S477, 74S572, μ PB406
- MB7122 pin compatible with industry standard products: 82S137, 7643, 6353-1, 93453, 36453, 3625, DM74S573, 29641, μ PB426

MB7121/MB7122 BLOCK DIAGRAM

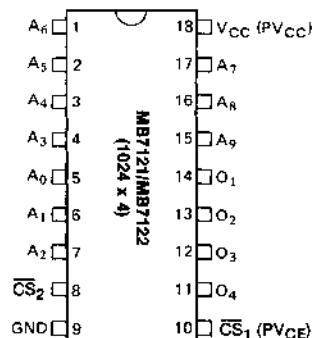


CERAMIC PACKAGE
DIP-18C-F02



PLASTIC PACKAGE
DIP-18P-M01

PIN ASSIGNMENT



This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid applications of any voltage higher than maximum rated voltages to this high impedance circuit.

ABSOLUTE MAXIMUM RATINGS

(See Note)

Rating		Symbol	Value	Unit
Power Supply Voltage		V_{CC}	-0.5 to +7.0	V
Power Supply Voltage (during programming)		V_{CC}	-0.5 to +7.5	V
Input Voltage		V_{IN}	-1.5 to +5.5	V
Input Voltage (during programming)		V_{IPRG}	22.5	V
Output Voltage (during programming)		V_{OPRG}	-0.5 to +22.5	V
Input Current		I_{IN}	-20	mA
Input Current (during programming)		I_{IPRG}	+270	mA
Output Current		I_{OUT}	+100	mA
Output Current (during programming)		I_{OPRG}	+150	mA
Storage Temperature	Ceramic	T_{stg}	-65 to +150	°C
	Plastic		-40 to +125	
Output Voltage		V_{OUT}	-0.5 to + V_{CC}	V

Note: Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Input Low Voltage	V_{IL}	—	—	0.8	V
Input High Voltage	V_{IH}	2.0	—	V_{CC}	V
Ambient Temperature	T_A	0	—	75	°C

DC CHARACTERISTICS

Full guaranteed operating ranges unless otherwise noted.

Parameter		Symbol	Min	Typ	Max	Unit
Input Leakage Current ($V_{IH} = 4.5V$)		I_{R1}	—	—	40	μA
Input Leakage Current ($V_{IH} = 5.5V$)		I_{R2}	—	—	1.0	mA
Input Load Current ($V_{IL} = 0.45V$)		I_F	—	—	-250	μA
Output Low Voltage ($I_{OL} = 16\text{ mA}$)		V_{OL}	—	—	0.50	V
Output Leakage Current	MB7121	I_{OLK}	—	—	40	μA
($V_O = 2.4V$, chip disable from a low)	MB7122	I_{OIH}	—	—	40	μA
Output Leakage Current	MB7122	I_{OIL}	—	—	-40	μA
($V_O = 0.5V$, chip disabled from a high)						
Input Clamp Voltage ($I_{IN} = -18\text{ mA}$)		V_{IC}	—	—	-1.2	V
Power Supply Current ($V_{IN} = \text{OPEN or GND}$)		I_{CC}	—	105	150	mA
Output High Voltage ($I_O = -2.4\text{ mA}$)	MB7122	V_{OH}^*	2.4	—	—	V
Output Short Circuit Current ($V_O = \text{GND}$)	MB7122	I_{OS}^*	-15	—	-60	mA

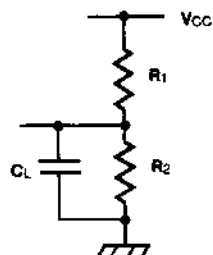
* **Note:** Denotes guaranteed characteristics of the output high-level (ON) state when the chip is enabled ($V_{CE} = 0.4V$) and the programmed bit is addressed. These characteristics cannot be tested prior to programming, but are guaranteed by factory testing.

AC CHARACTERISTICS

Full guaranteed operating ranges unless otherwise noted.

Parameter	Symbol	MB7121E/MB7122E		MB7121H/MB7122H		Unit
		Typ	Max	Typ	Max	
Address Access Time	t_{AA}	25	45	25	35	ns
Output Disable Time	t_{DIS}	—	30	—	30	ns
Output Enable Time	t_{EN}	—	30	—	30	ns

AC TEST CONDITIONS



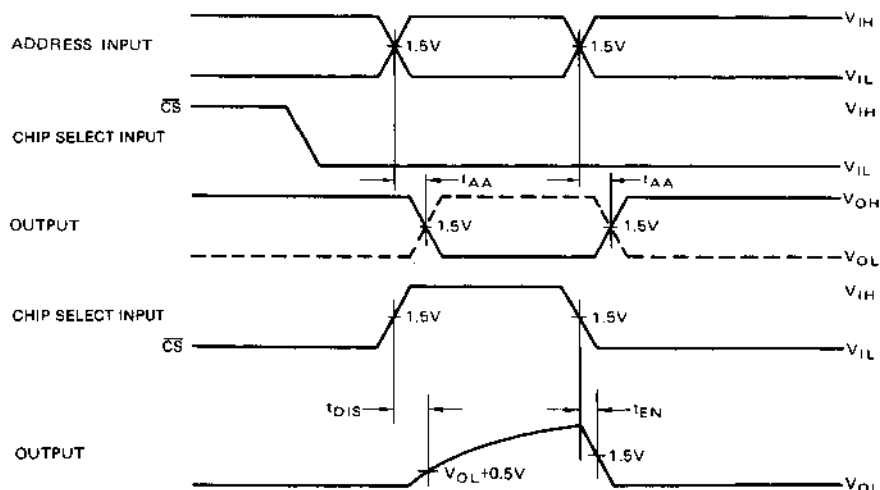
INPUT CONDITIONS

Amplitude 0V to 3V
 Rise and Fall Time 5 ns from 1V to 2V
 Frequency 1 MHz

MB7121/MB7122

R ₁	R ₂	C _L
300Ω	600Ω	30pF

OPERATION TIMING DIAGRAM



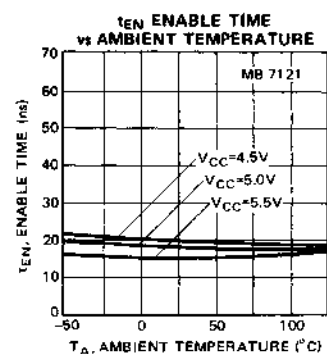
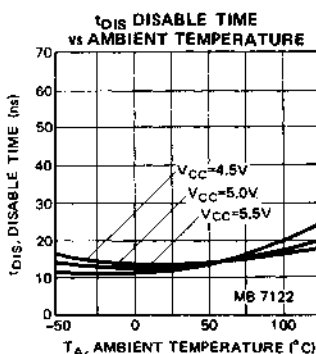
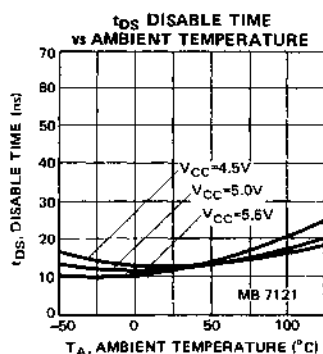
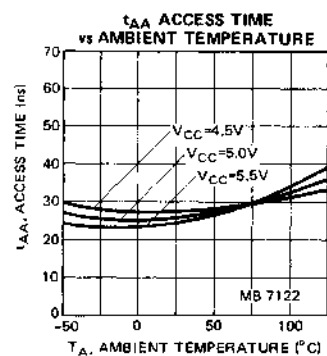
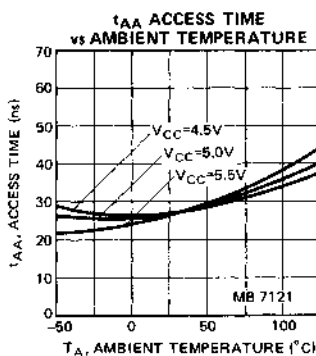
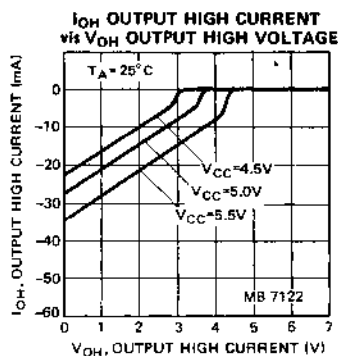
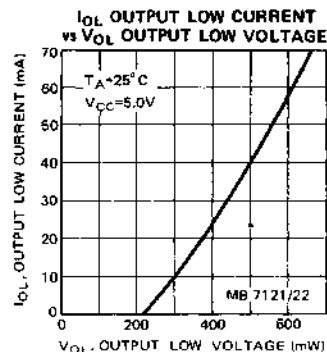
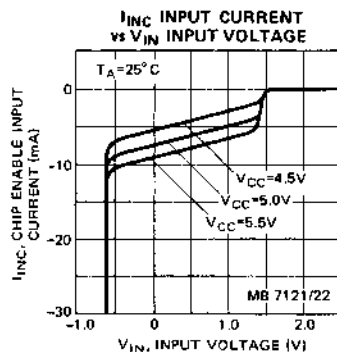
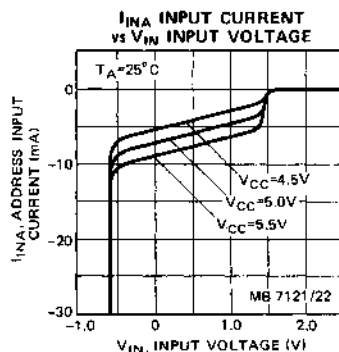
Notes: Output disable time is the time taken for the output to reach a high impedance state when either chip enable is taken high. Output enable time is the time taken for the output to become active when both chip enables are taken low. The high impedance state is defined as a point on the output waveform equal to a ΔV of 0.5V from the active output level.

CAPACITANCE

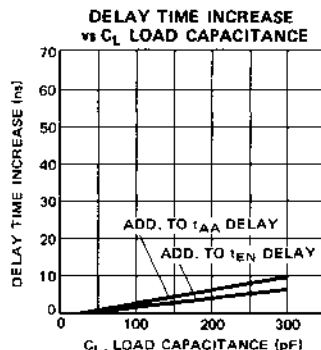
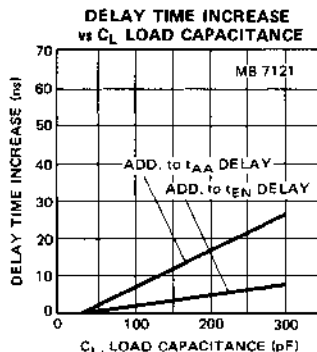
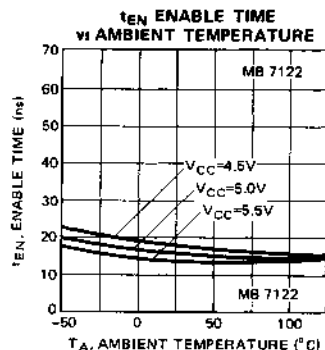
($f = 1\text{MHz}$, $V_{CC} = +5V$, $V_{IN} = +2V$, $T_A = 25^\circ\text{C}$)

Parameter	Symbol	Min	Typ	Max	Unit
Input Capacitance	C_i	—	—	10	pF
Output Capacitance	C_o	—	—	12	pF

TYPICAL CHARACTERISTICS CURVES



TYPICAL CHARACTERISTICS CURVES (Continued)

INPUT/OUTPUT
CIRCUIT INFORMATION

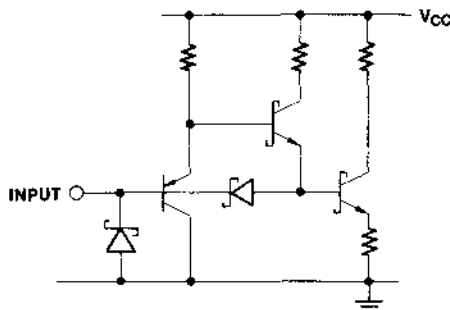
INPUT

In the input circuit, Schottky TTL circuit technology is used to achieve high-speed operation. A PNP transistor in the first stage of input circuit remarkably improves input high/low current characteristics. Also, the input circuit includes a protection diode for reliable operation.

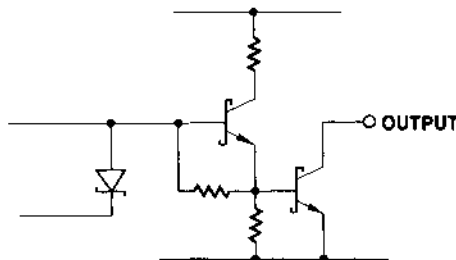
OPEN-COLLECTOR OUTPUT

The open-collector output is often utilized in high speed applications where power dissipation must be minimized. When the device is switched, there is no current sourced from the supply rail. Consequently, the current spike normally associated with TTL totem-pole outputs is eliminated. In high frequency applications, this minimizes noise problems (false triggering) as well as power drain. For example, the transient current (low impedance high-level to low impedance low-level) is typically 30mA for the MB7122 (3-state) compared to 0mA for the MB7121 (open-collector).

MB7121/MB7122 INPUT CIRCUIT



MB7121 OUTPUT CIRCUIT

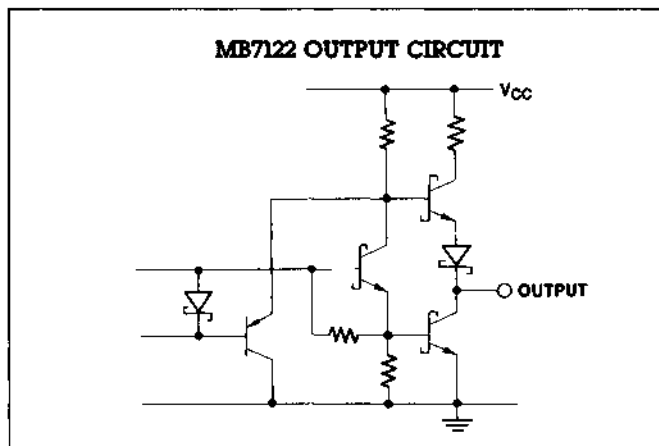


THREE-STATE OUTPUT

A "three-state" output is a logic element which has three distinct output states of LOW, HIGH and OFF (wherein OFF represents a high impedance condition which can neither sink nor source current at a definable logic level.) Effectively, then, the device has all the desirable features of a totem-pole TTL output (e.g., greater noise immunity, good rise time, line driving capacity), plus the ability to connect to bus-organized system.

In the case where two devices are on at the same time, the possibility exists that they may be in opposite low impedance states simultaneously; thus, the short circuit current from one enabled device may flow through the other enabled device. While physical damage under these conditions is unlikely, system noise problems could result. Therefore, the system designer should consider these factors to ensure that this condition does not exist.

Also in the output circuit, Schottky TTL circuit technology is used to achieve high-speed operation. Also, a PNP transistor is provided in the output circuit to decrease the load on the Chip Select circuit.



MB7121/MB7122

MB7121/MB7122 BIT MAP

		A ₈	A ₇	A ₆	A ₅
O ₁	{	0	0	0	0
		1	1	1	0
O ₂	{	0	0	0	0
		1	1	1	0
O ₃	{	0	0	0	0
		1	1	1	0
O ₄	{	0	0	0	0
		1	1	1	0
A ₅	1	1			
A ₂	0	1			
A ₄	0	1			
A ₁	0	1			
A ₀	0	1			
A ₃	0	1			

Multiplexer

A ₈	A ₇	A ₆	A ₅
0	0	0	0
0	0	0	1
0	0	1	1
0	0	1	0
0	1	1	0
0	1	1	1
0	1	0	1
0	1	0	0
1	0	1	0
1	0	1	1
1	0	0	1
1	0	0	0
1	1	0	0
1	1	0	1
1	1	1	1
1	1	1	0

Decoder/Driver

A ₅	A ₂	A ₄	A ₁	A ₀	A ₃	A ₅	A ₂	A ₄	A ₁	A ₀	A ₃	A ₅	A ₂	A ₄	A ₁	A ₀	A ₃
10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001	10011001
00111100	11000011	11000011	00111100	11000011	00111100	11000011	00111100	11000011	00111100	11000011	00111100	11000011	00111100	11000011	00111100	11000011	00111100
00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111	00001111
00000000	11111111	00000000	11111111	00000000	11111111	00000000	11111111	00000000	11111111	00000000	11111111	00000000	11111111	00000000	11111111	00000000	11111111
00000000	00000000	11111111	11111111	00000000	00000000	00000000	00000000	11111111	11111111	00000000	00000000	11111111	11111111	00000000	00000000	11111111	11111111
00000000	00000000	00000000	00000000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111