Bipolar Memories

FUJITSU

MB7128E-W
High Speed Schottky TTL 8,192-Bit PROM

Description

The Fujitsu MB7128E-W is a high speed Schottky TTL electrically field programmable read only memory. With three-state outputs on the MB7128E-W, memory expansion is simple.

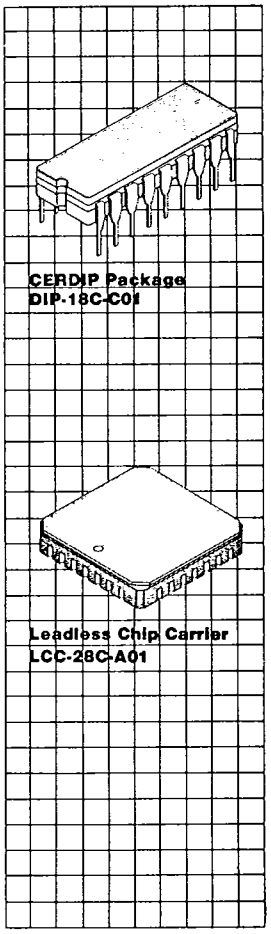
The memory is fabricated with all logic "zeros" (positive logic). Logic level "ones" can be programmed by the highly reliable DEAP™ (Diffused Eutectic Aluminum Process) during a simple programming procedure.

The sophisticated passive isolation termed IOP (Isolation by Oxide and Poly-silicon) with thin epitaxial layer and Schottky TTL process permits minimal chip size and fast access time.

The extra test cells and unique testing methods provide enhanced correlation between programmed and unprogrammed circuits in order to perform AC, DC and programming test prior to shipment. This results in extremely high programmability.

Features

- Extended temperature ranges: −55°C to +125°C
- Organization: 2,048 words x 4-bits
- TTL compatible input/output
- Fast access time: 55 ns max. 30 ns typ.
- Single +5V supply voltage
- Proven high programmability and reliability of DEAP™ (Diffused Eutectic Aluminum Process) PROM
- Simplified, low power programming
- Low current PNP inputs
- MB7128E-W: Three-state outputs
- Chip enable inputs for easy memory expansion
- Standard 18-pin DIP package
- Also available in 28-pad LCC

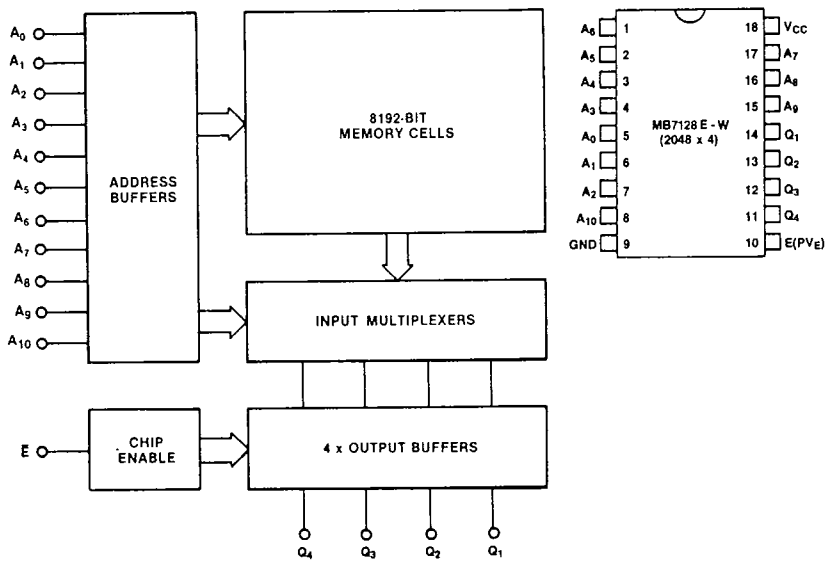


CERDIP Package
DIP-18C-C01

Leadless Chip Carrier
LCC-28C-A01

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.

MB7128E-W Block Diagram and Pin Assignment



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	T_{STG}	−65 to +150	°C
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}	4.50	5.0	5.50	V
Input low voltage	V_{IL}	0.0		0.8	V
Input high voltage	V_{IH}	2.0		V_{CC}	V
Ambient temperature	T_A	−55		+125	°C

Capacitance
(f = 1 MHz, V_{CC} = +5V, V_{IN} = +2V, T_A = 25°C)

Parameter	Symbol	Min	Typ	Max	Unit
Input capacitance	C_I			10	pF
Output capacitance	C_O			15	pF

DC Characteristics
(Full guaranteed operating ranges unless otherwise noted.)

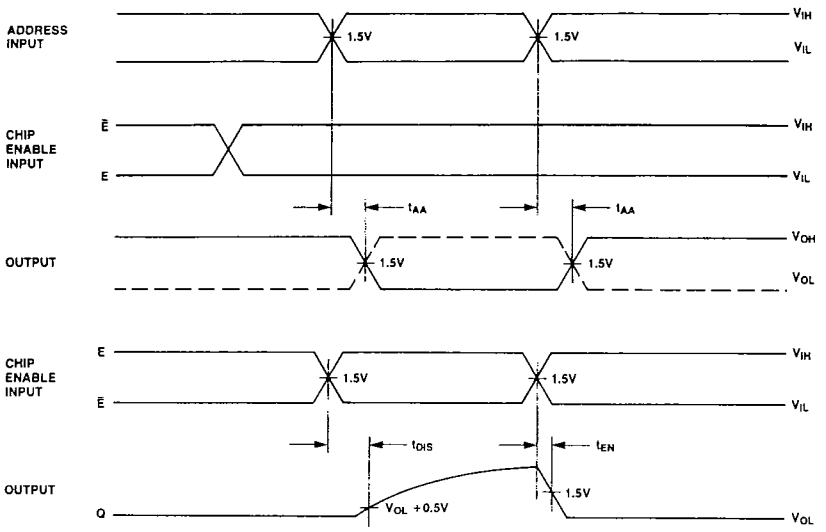
Parameter	Symbol	Min	Typ	Max	Unit
Input leakage current (V_{IH} = 5.5)	I_R			40	μA
Input load current (V_{IL} = 0.45V)	I_F			−250	μA
Output low voltage (I_{OL} = 16 mA)	V_{OL}			0.50	V
Output leakage current (V_O = 2.4V, chip disabled)	I_{OIH}			40	μA
Output leakage current (V_O = 0.45V, chip disabled)	I_{OIL}			−40	μA
Input clamp voltage (I_{in} = −18 mA)	V_{IC}			−1.2	V
Power supply current (V_{IN} = OPEN or GND)	I_{CC}		110	155	mA
Output high voltage (I_O = −2.4 mA)	V_{OH}*1	2.4			V
Output short circuit current (V_O = GND)	I_{OS}*1	−15		−60	mA

Note: *1 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	Typ	Max	Unit
Address access time	t_{AA}	30	55	ns
Output disable time	t_{DIS}		40	ns
Output enable time	t_{EN}		40	ns

Operation Timing Diagram



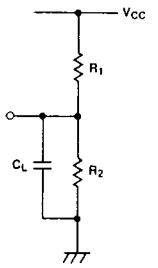
NOTE: OUTPUT DISABLE TIME IS THE TIME TAKEN FOR THE OUTPUT TO REACH A HIGH RESISTANCE STATE WHEN THE CHIP ENABLE IS DISABLED. OUTPUT ENABLE TIME IS THE TIME TAKEN FOR THE OUTPUT TO BECOME ACTIVE WHEN THE CHIP ENABLE IS ENABLED. THE HIGH RESISTANCE STATE IS DEFINED AS A POINT ON THE OUTPUT WAVEFORM EQUAL TO A ΔV OF 0.5V FROM THE ACTIVE OUTPUT LEVEL.

AC Test Conditions

Input Conditions

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

MB7128E-W		
R_1	R_2	C_L
300Ω	600Ω	30 pF



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 the input circuit improves input high/low current characteristics. Also, the input circuit includes a protection diode for reliable operation.

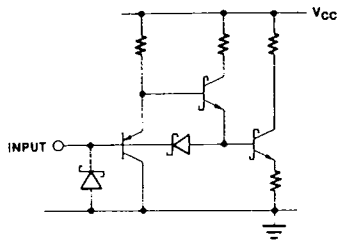
Three-State Output

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 drive capacity), plus the ability to connect to bus-organized systems.

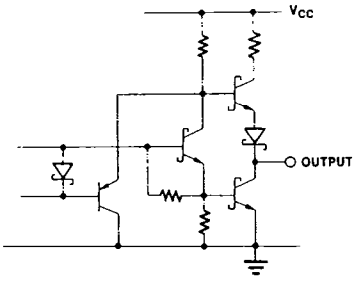
In the case where two devices are on at the same time, the possibility exists that they may be in opposite low impedance states simultaneously; thus, the short circuit current from one enabled device may flow through the other enabled device. While physical damage under these conditions is unlikely, 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 load on the Chip Enable circuit.

MB7128E-W Input Circuit

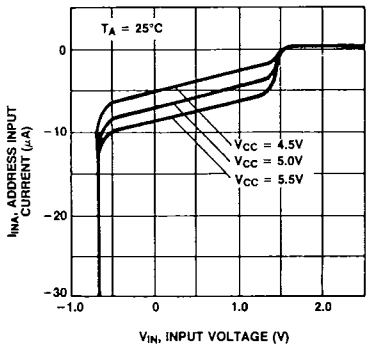


MB7128E-W Output Circuit

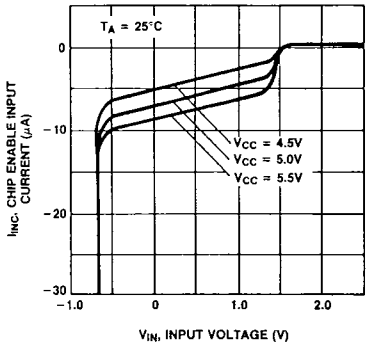


Typical Characteristics Curves

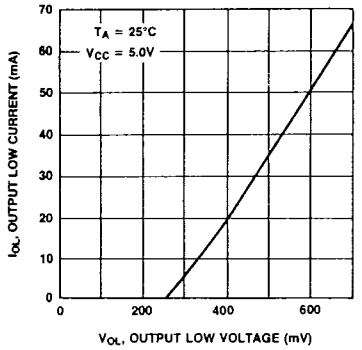
I_{INA} Input Current vs. V_{IN} Input Voltage



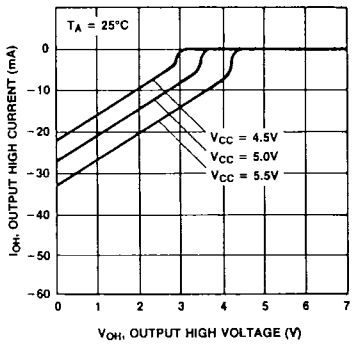
I_{INC} Input Current vs. V_{IN} Input Voltage



I_{OL} Output Low Current vs. V_{OL} Output Low Voltage

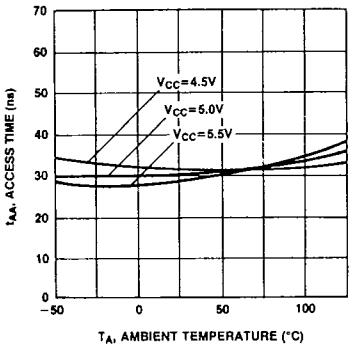


I_{OH} Output High Current vs. V_{OH} Output High Voltage

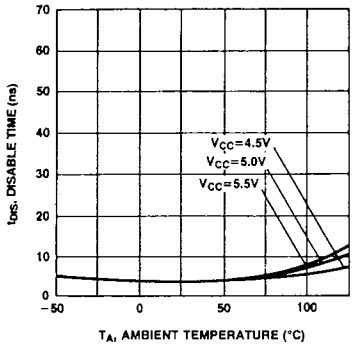


Typical Characteristics Curves
(Continued)

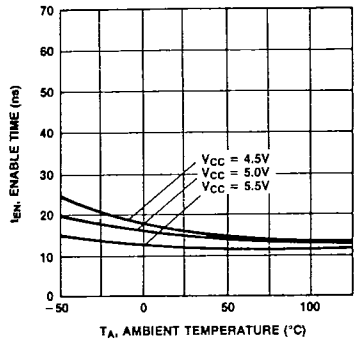
t_{AA} Access Time vs. T_A Ambient Temperature



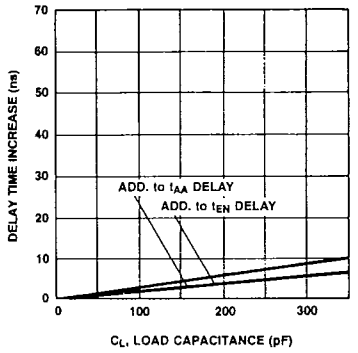
t_{DIS} Disable Time vs. T_A Ambient Temperature



t_{EN} Enable Time vs. T_A Ambient Temperature

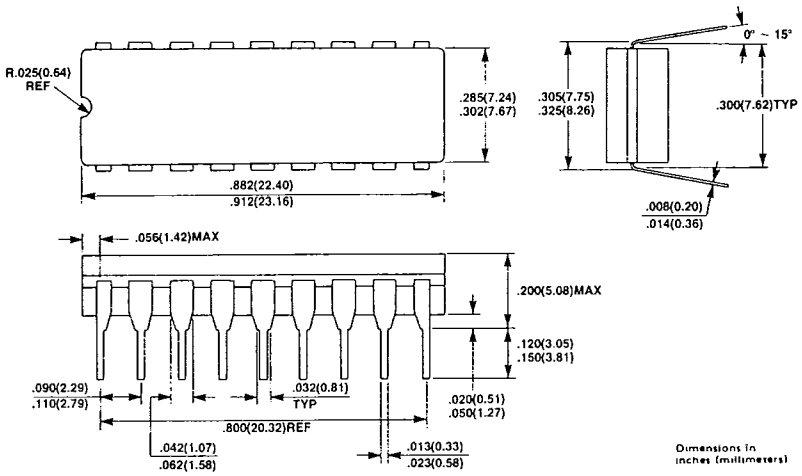


Delay Time Increase vs. C_L Load Capacitance

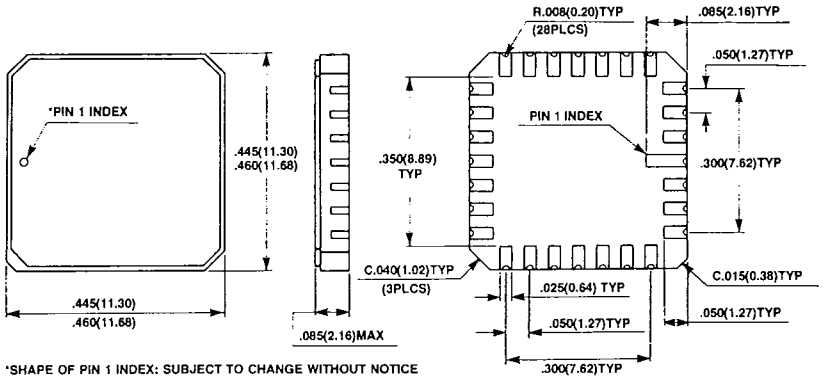


Package Dimensions
Dimensions in inches
(millimeters)

18-Lead Ceramic (CERDIP) Dual In-Line Package
(Case No.: DIP-18C-C01)



28-Pad Ceramic (Metal Seal) Leadless Chip Carrier
(Case No.: LCC-28C-A01)



*SHAPE OF PIN 1 INDEX: SUBJECT TO CHANGE WITHOUT NOTICE