

# ECL 256-BIT BIPOLAR RANDOM ACCESS MEMORY

## MB 7042/H

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### 256-BIT BIPOLAR ECL RANDOM ACCESS MEMORY

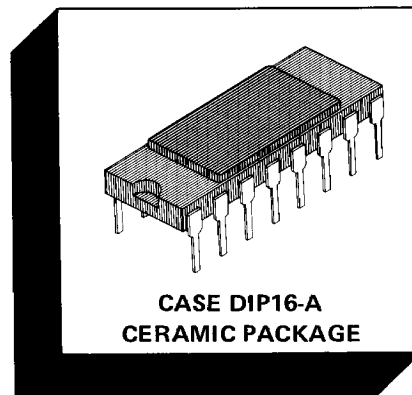
The Fujitsu MB 7042/H is a fully decoded 256-bit read/write random access memory designed for high-speed scratch pad, control and buffer storage applications. This device is organized as 256 words by one bit, and it features on-chip voltage compensation for improved noise margin, three active low chip select lines for ease of memory expansion, and has a separate data in and non-inverting data out line.

The MB 7042/H offers extremely small cell and chip sizes, realized through the use of Fujitsu's patented DOPOS (Doped Polysilicon) processing. With cell size reduced to approximately half that of normal, ultra-fast access time with high yields and outstanding device reliability are achieved in volume production.

Operation for the MB 7042/H is specified over a temperature range of from 0°C to 75°C (ambient). The device

comes in a hermetically sealed glass/ceramic dual-in-line package, and is compatible with industry-standard 10K-series ECL families.

- 256 words x 1 bit organization
- On-chip voltage compensation for improved noise margin
- Fully compatible with industry-standard 10K-series ECL families
- Patented DOPOS processing
- Outstanding read access time of 7 ns typ.
- Ultra-fast chip select time of 3.5 ns typ.
- Low power requirement (2 mW/bit dissipation)
- Multiple chip select leads for simplified memory expansion
- Pin compatible with the F10410 and MCM10144/10152.

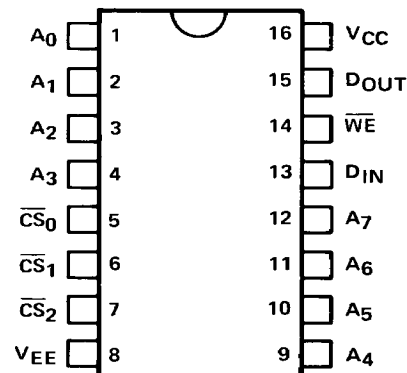


#### ABSOLUTE MAXIMUM RATINGS (see Note)

Rating	Symbol	Value	Unit
$V_{EE}$ Pin Potential to Ground Pin ( $V_{CC}$ )	$V_{EE}$	+0.5 to -7.0	V
Input Voltage	$V_{IN}$	+0.5 to $V_{EE}$	V
Output Current (DC, Output High)	$I_{OUT}$	-30	mA
Temperature Under Bias	$T_A$	-55 to +125	°C
Storage Temperature	$T_{stg}$	-65 to +150	°C

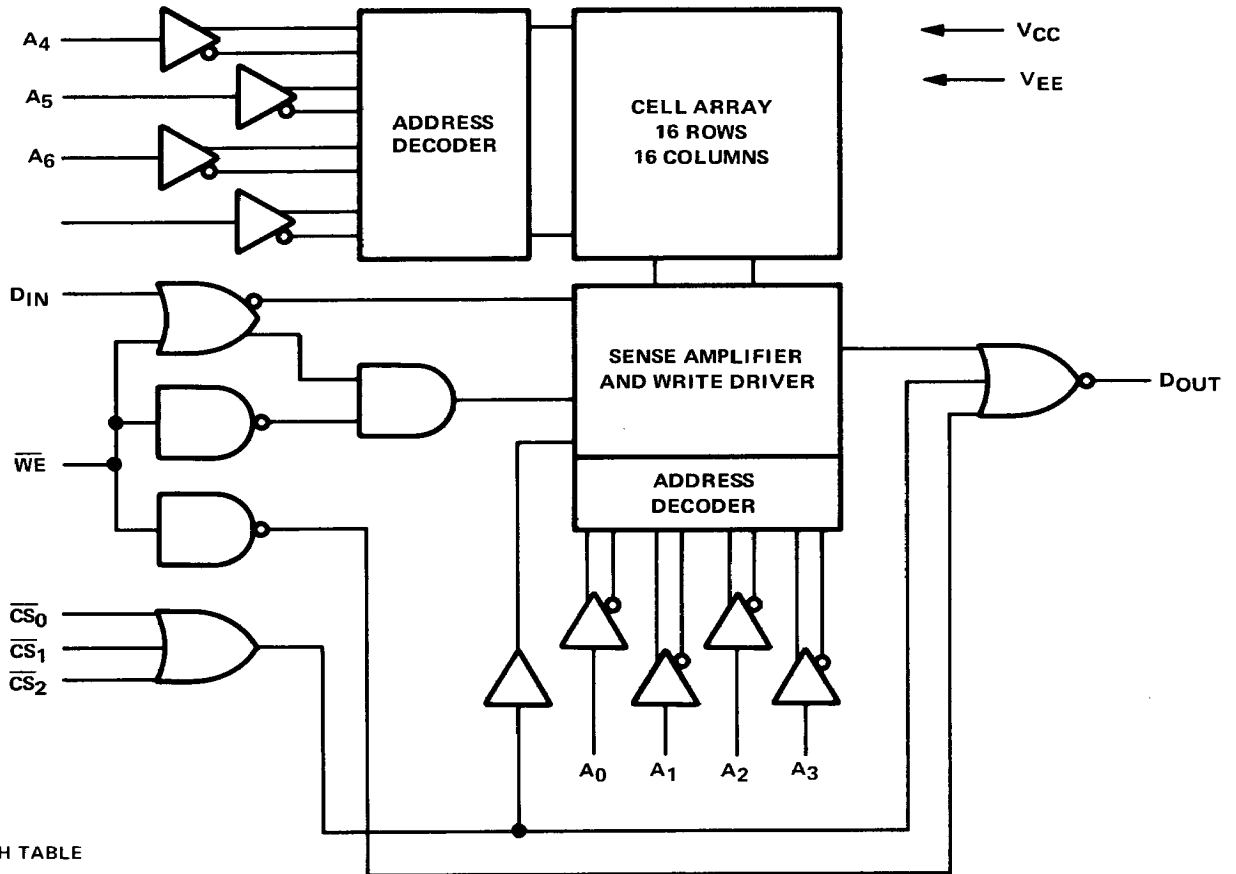
**Note:** Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet.

#### PIN ASSIGNMENT



Small geometry bipolar integrated circuits are occasionally susceptible to damage from static voltages or electric fields. It is therefore advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this device.

Fig. 1 – MB 7042/H BLOCK DIAGRAM



TRUTH TABLE

INPUT			OUTPUT	MODE
$\overline{CS}$	$\overline{WE}$	DIN		
H	X	X	L	DISABLED
L	L	H	L	WRITE 'H'
L	L	L	L	WRITE 'L'
L	H	X	D <sub>OUT</sub>	READ

H: HIGH VOLTAGE LEVEL  
 L: LOW VOLTAGE LEVEL  
 X: DON'T CARE

**CAPACITANCE**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input Pin Capacitance	C <sub>IN</sub>	—	4	5	pF
Output Pin Capacitance	C <sub>OUT</sub>	—	7	8	pF



MB 7042/H

### GUARANTEED OPERATING CONDITIONS

Part Number	Supply Voltage ( $V_{EE}$ )			Ambient Temperature
	Min.	Typ.	Max.	
MB 7042/H	-5.46V	-5.2V	-4.94V	0°C to 75°C

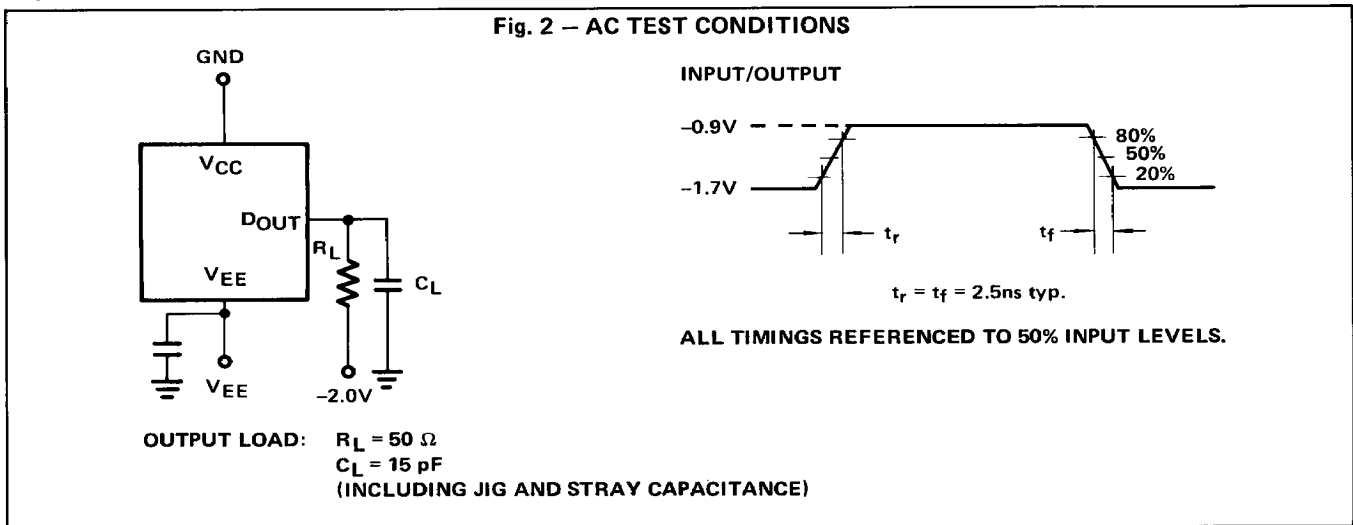
### DC CHARACTERISTICS

( $V_{CC} = 0V$ ,  $V_{EE} = -5.2V \pm 5\%$ , Output Load =  $50\Omega$  to  $-2.0V$ , Air Flow  $\geq 2.5$  m/s, unless otherwise noted.)

Parameter	Symbol	Min.	Typ.	Max.	Unit	$T_A$
Output High Voltage ( $V_{IN} = V_{IHmax}$ or $V_{ILmin}$ )	$V_{OH}$	-1000 -960 -900	-	-840 -810 -720	mV	0°C 25°C 75°C
Output Low Voltage ( $V_{IN} = V_{IHmax}$ or $V_{ILmin}$ )	$V_{OL}$	-1870 -1850 -1830	-	-1665 -1650 -1625	mV	0°C 25°C 75°C
Output High Voltage ( $V_{IN} = V_{IHmin}$ or $V_{ILmax}$ )	$V_{OHC}$	-1020 -980 -920	-	-	mV	0°C 25°C 75°C
Output Low Voltage ( $V_{IN} = V_{IHmin}$ or $V_{ILmax}$ )	$V_{OLC}$	-	-	-1645 -1630 -1605	mV	0°C 25°C 75°C
Input High Voltage (Guaranteed Input Voltage High for All Inputs)	$V_{IH}$	-1145 -1105 -1045	-	-840 -810 -720	mV	0°C 25°C 75°C
Input Low Voltage (Guaranteed Input Voltage Low for All Inputs)	$V_{IL}$	-1870 -1850 -1830	-	-1490 -1475 -1450	mV	0°C 25°C 75°C
Input High Current ( $V_{IN} = V_{IHmax}$ )	$I_{IH}$	-	-	220	$\mu A$	0° to 75°C
Input Low Current ( $V_{IN} = V_{ILmin}$ )	$I_{IL}$	-10	-	-	$\mu A$	0° to 75°C
$\overline{CS}$ Input Low Current ( $V_{IN} = V_{ILmin}$ )	$I_{IL}$	0.5	-	170	$\mu A$	0° to 75°C
Power Supply Current (All Inputs High and Output Open)	$I_{EE}$	-135	-	<del>60</del>	mA	0° to 75°C

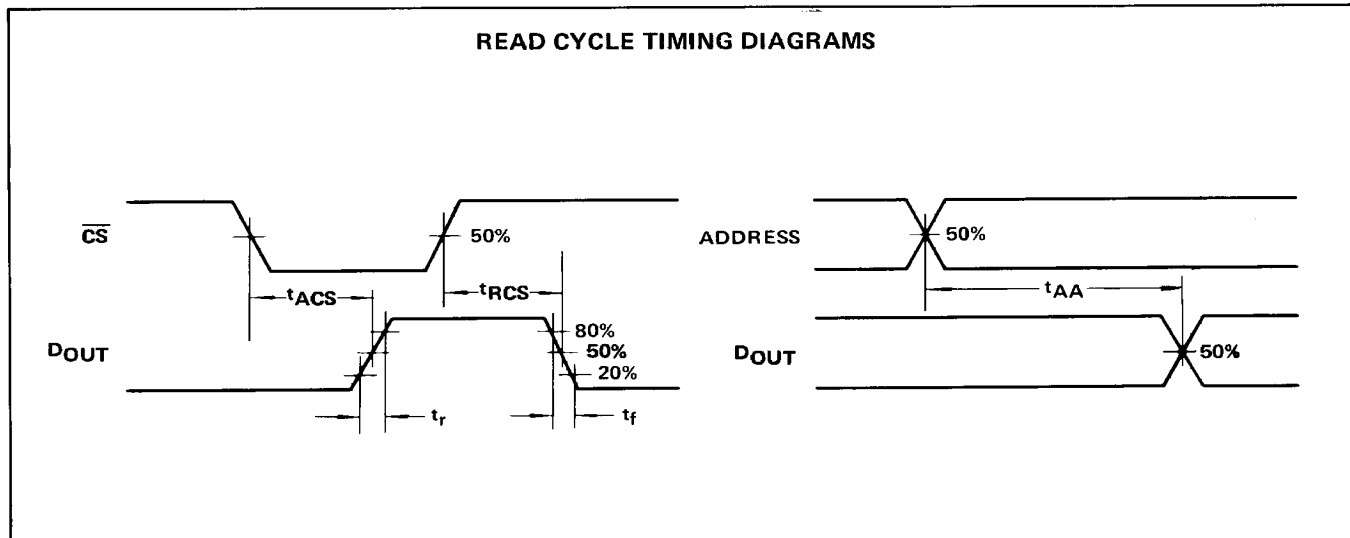
**AC CHARACTERISTICS**

( $V_{CC} = 0V$ ,  $V_{EE} = -5.2V \pm 5\%$ , Output Load =  $50\Omega$  to  $-2V$  and  $15\text{ pF}$  to GND, Air Flow  $\geq 2.5\text{ m/s}$ , unless otherwise noted.)



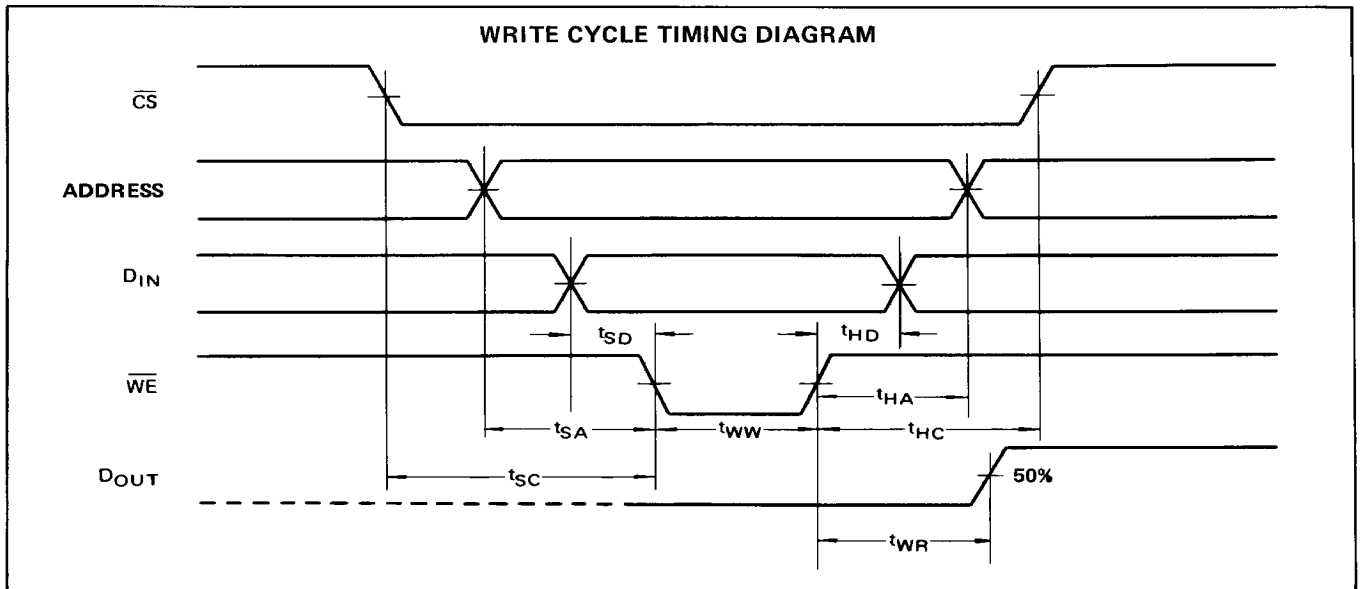
**READ CYCLE**

Parameter	Symbol	MB 7042			MB 7042H			Unit	$T_A$
		Min.	Typ.	Max.	Min.	Typ.	Max.		
Address Access Time	$t_{AA}$	—	—	14	—	—	12	ns	$0^\circ$ to $75^\circ\text{C}$
Chip Select Access Time and Recovery Time	$t_{ACS}$ , $t_{RCS}$	—	—	7	—	—	7	ns	$0^\circ$ to $75^\circ\text{C}$



**WRITE CYCLE**

Parameter	Symbol	MB 7042		MB 7042H		Unit
		Min.	Max.	Min.	Max.	
Write Pulse Width	$t_{WW}$	8.0	—	8.0	—	ns
Write Recovery Time	$t_{WR}$	—	10.0	—	10.0	ns
Address Set Up Time	$t_{SA}$	4.0	—	4.0	—	ns
Chip Select Set Up Time	$t_{SC}$	2.0	—	2.0	—	ns
Data Set Up Time	$t_{SD}$	2.0	—	2.0	—	ns
Address Hold Time	$t_{HA}$	2.0	—	2.0	—	ns
Chip Select Hold Time	$t_{HC}$	2.0	—	2.0	—	ns
Data Hold Time	$t_{HD}$	2.0	—	2.0	—	ns



**RISE TIME and FALL TIME**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Output Rise Time	$t_r$	—	2.5	—	ns
Output Fall Time	$t_f$	—	2.5	—	ns

## FUNCTIONAL DESCRIPTION/APPLICATIONS INFORMATION

### FUNCTIONAL DESCRIPTION

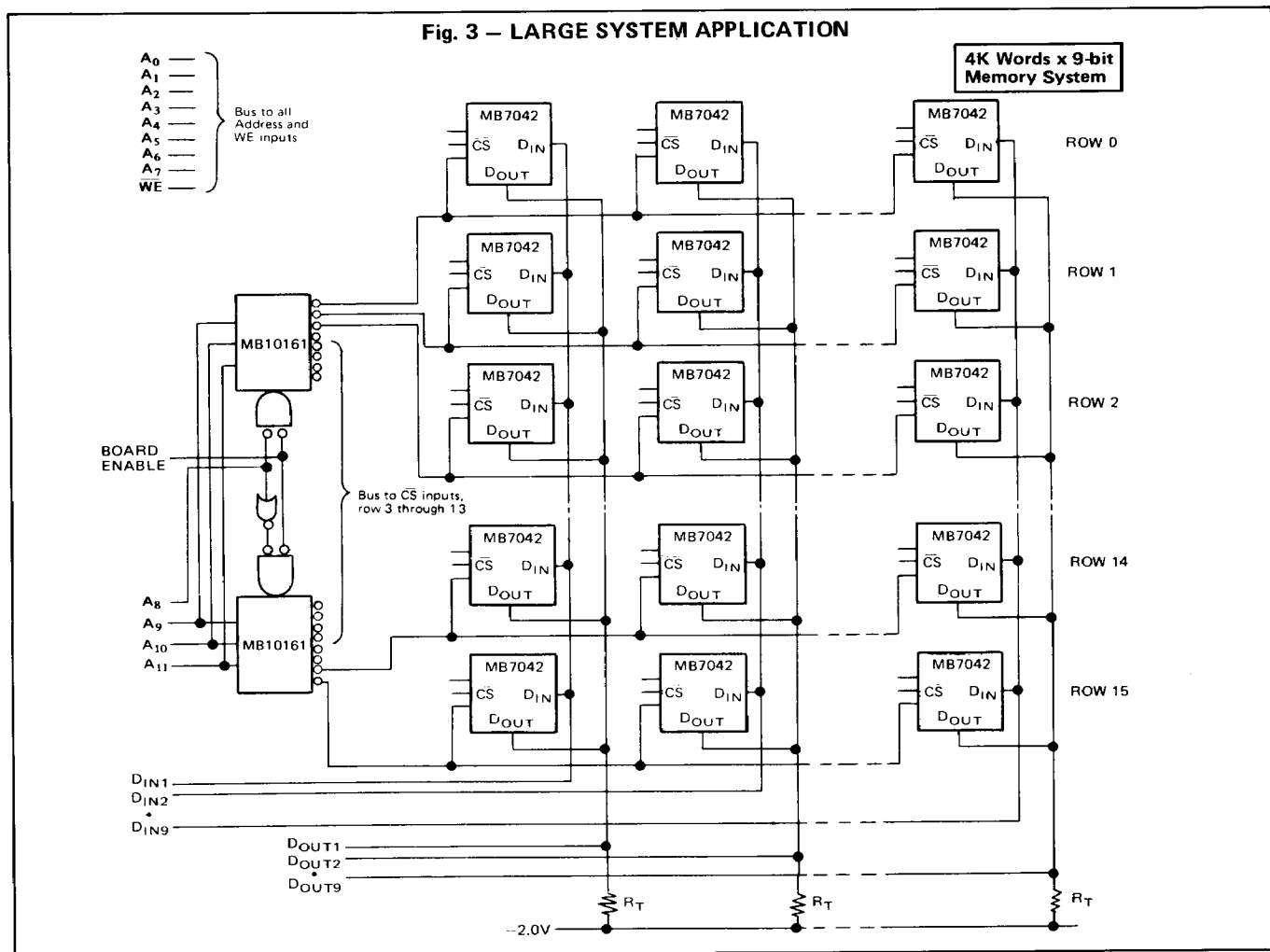
The Fujitsu MB 7042/H is a fully decoded 256-bit read/write random access memory organized as 256 words by 1 bit. Memory cell selection is achieved by means of an 8-bit address designated  $A_0 \sim A_7$ . Three active low chip select ( $\overline{CS}$ ) inputs are provided for increased logic flexibility, permitting memory array expansion up to 2048 words without additional decoding. For larger memories, the

fast chip select access time permits the decoding of  $\overline{CS}$  from the address without affecting system performance.

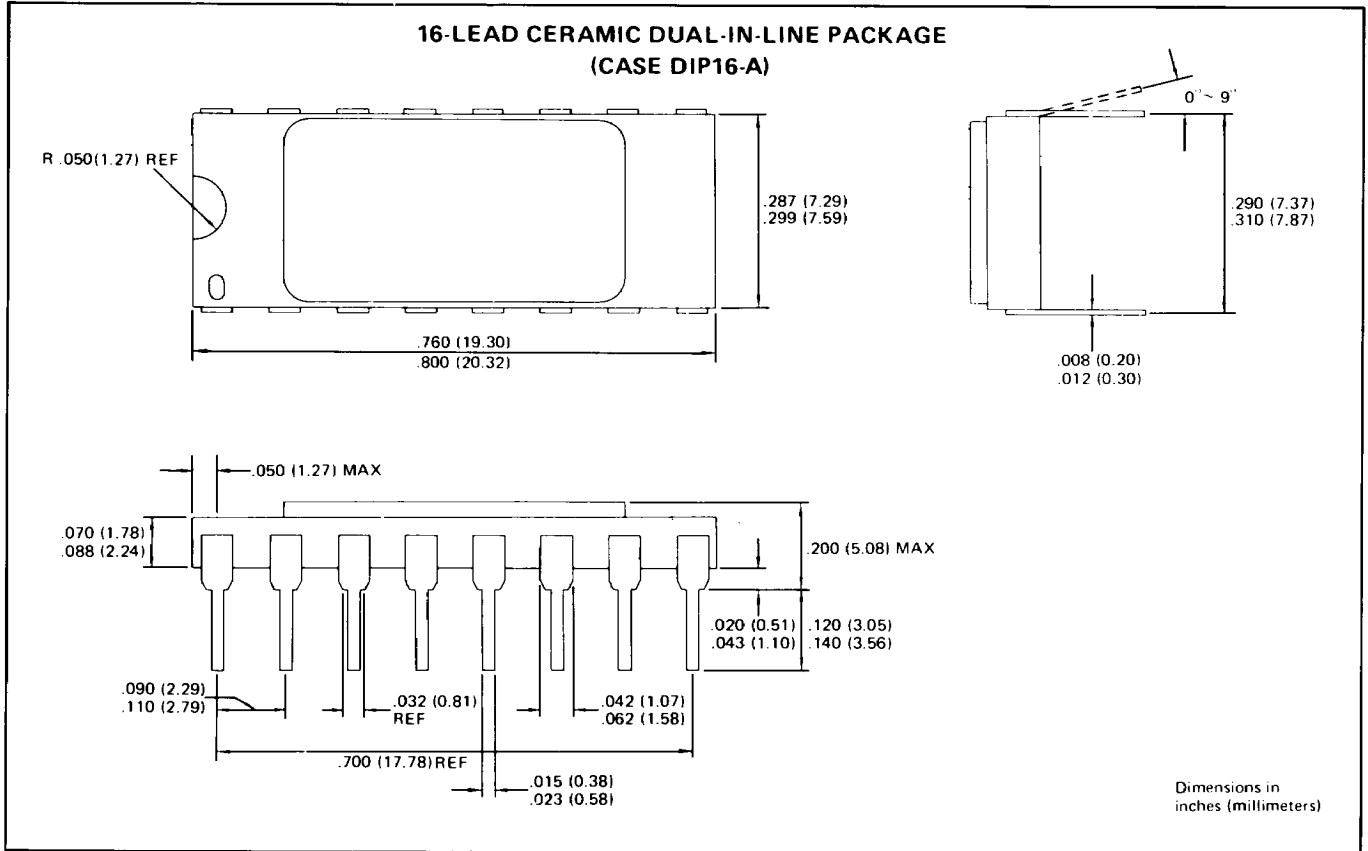
Read and write operating modes (all  $\overline{CS}$  inputs low) are controlled by the state of the active low write enable ( $\overline{WE}$ ) input. With  $\overline{WE}$  held low, the chip is in the write mode; in this condition,  $D_{OUT}$  is low and the data at  $D_{IN}$  is written into the addressed

location. With  $\overline{WE}$  held high, the chip is in the read mode; data in the addressed location is then transferred to  $D_{OUT}$  and read out non-inverted.

$D_{OUT}$  is low except when reading out a stored high. Open emitter outputs are provided on the MB 7042 to allow maximum flexibility in output wired-OR connection for memory expansion.



## PACKAGE DIMENSIONS



Circuit diagrams utilizing Fujitsu products are included as a means of illustrating typical semiconductor applications; consequently, complete information sufficient for construction purposes is not necessarily given. The information herein has been carefully checked and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies. Furthermore, such information does not convey to the purchaser of the semiconductor devices described herein any license under the patent rights of Fujitsu Limited or others. Fujitsu Limited reserves the right to change device specifications.