September 1990
Edition 1.0

FUJITSU

DATA SHEET

MB82B78-15/-20
64K-BIT HIGH-SPEED BiCMOS SRAM

8K Words x 8 Bits High-Speed Static Random Access Memory

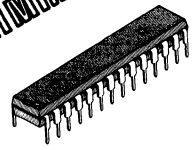
The Fujitsu MB82B78 is a static random access memory organized as 8,192 words x 8 bits and fabricated with CMOS silicon gate process. BiCMOS technology is used in the peripheral circuits to provide lower power dissipation and higher speed. To obtain a smaller chip size, the cells use NMOS transistors and resistors.

The MB82B78 is housed in 300 mil plastic DIP and SOJ packages, and a 450 mil plastic SOP package. The memory uses asynchronous circuitry and requires +5 V power supply. All pins are TTL compatible.

The MB82B78 has low power dissipation, low cost, and high performance, and it is ideally suited for use in microprocessor systems and other applications where fast access time and ease of use are required.

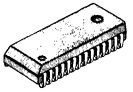
- Organization: 8,192 words x 8 bits
- Static operation: no clocks or timing strobe required
- Access time:
  $t_{AA} = t_{ACS1}$ = 15 ns max., $t_{ACS2} = t_{OE}$ = 8 ns max (MB82B78-15)
  $t_{AA} = t_{ACS1}$ = 20 ns max., $t_{ACS2} = t_{OE}$ = 10 ns max (MB82B78-20)
- Single 5 V power supply ±10% tolerance with low current drain:
  120 mA max. (Operating)
  30 mA max. (TTL Standby)
  15 mA max. (CMOS Standby)
- BiCMOS peripheral circuits
- TTL compatible inputs and outputs
- Three-state outputs
- Electrostatic protection for all inputs and outputs
- Standard 28-pin Plastic Packages:
  Skinny DIP (300 mil) MB82B78-xxPSK
  SOP (450 mil) MB82B78-xxPF
  SOJ (300 mil) MB82B78-xxPJ

PRELIMINARY



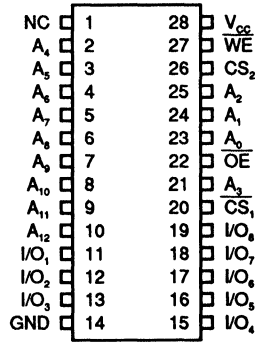
Plastic Package (DIP-28P-M04)

Plastic Package (FPT-28P-M02)



Plastic Package (LCC-28P-M04)

Pin Assignment (TOP VIEW)



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 application of any voltage higher than maximum rated voltages to this high impedance circuit.

Absolute Maximum Ratings (See Note)

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	−0.5 to +7	V
Input Voltage on any pin with respect to GND	V_{IN}	−3.5 to +7	V
Output Voltage on any I/O pin with respect to GND	$V_{I/O}$	−0.5 to +7	V
Output Current	I_{OUT}	±20	mA
Power Dissipation	P_D	1.0	W
Temperature Under Bias	T_{BIAS}	−10 to +85	°C
Storage Temperature Range	T_{STG}	−45 to +125	°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 operation sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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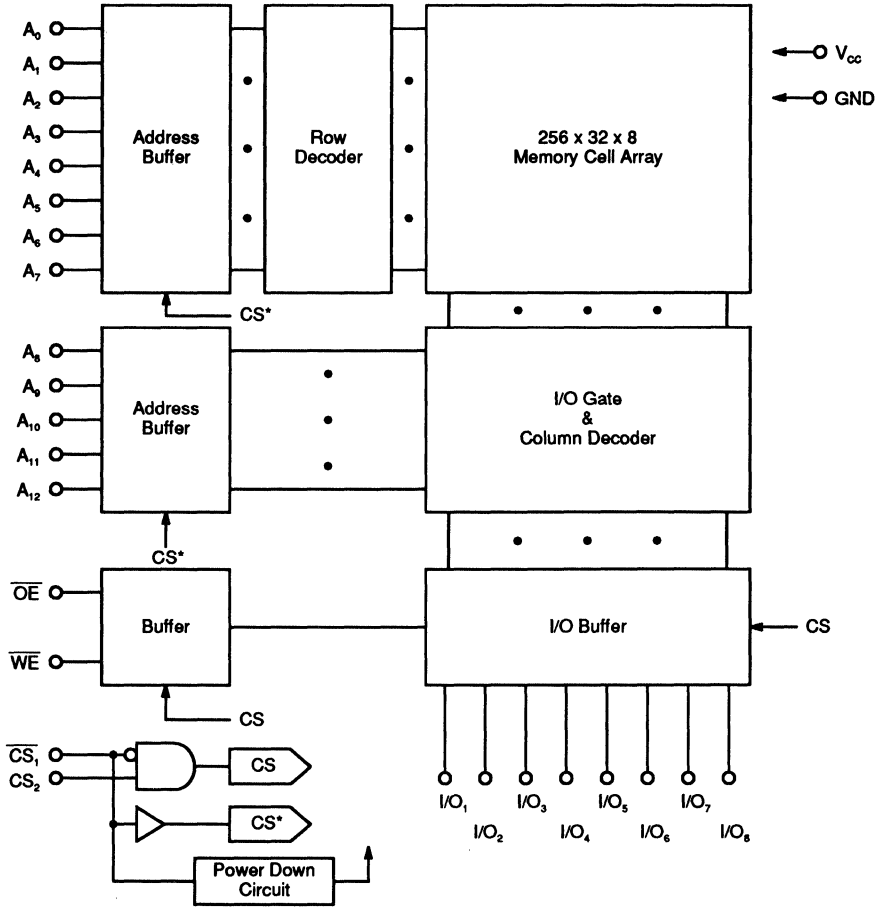
2

Fig. 1 – MB82B78 BLOCK DIAGRAM



CAPACITANCE (T_a = 25° C, f = 1MHz)

Parameter	Symbol	Min	Typ	Max	Unit
I/O Capacitance ($V_{I/O}$=0V)	$C_{I/O}$			8	pF
Input Capacitance (V_{IN}=0V)	C_{IN}			7	pF

PIN DESCRIPTION

Symbol	Pin Name	Symbol	Pin Name
A_0 to A_{12}	Address input.	$\overline{OE}$	Output Enable.
I/O_1 to I/O_8	Data input/output.	$\overline{WE}$	Write Enable.
$\overline{CS_1}$	Chip Select 1.	V_{CC}	Power Supply (+5V ±10%)
CS_2	Chip Select 2.	GND	Ground.

2

TRUTH TABLE

$\overline{CS_1}$	CS_2	$\overline{WE}$	$\overline{OE}$	Mode	I/O Pin	Power Supply Current
H	X	X	X	Standby	High-Z	Standby
L	L	X	X	Not selected	High-Z	Active
L	H	H	H	Dout disable	High-Z	Active
L	H	H	L	Read	Data out	Active
L	H	L	X	Write	Data in	Active

Legend: H=High level, L=Low level, X=Don't care

RECOMMENDED OPERATING CONDITIONS

(Referenced to GND)

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
Ambient Temperature	T_A*	0		70	°C

* The operating ambient temperature range is guaranteed with transverse airflow exceeding 2m/sec.

DC CHARACTERISTICS

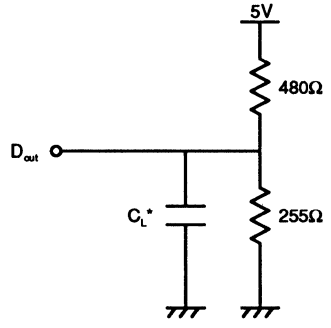
(Recommended operating conditions otherwise noted.)

Parameter	Test Conditions	Symbol	Min	Max	Unit
Input Leakage Current	V_{IN}=GND to V_{CC} V_{CC}=max.	I_{LI}	–10	10	µA
Output Leakage Current	$V_{I/O}$=GND to V_{CC} $\overline{CS_1}$=V_{IH} or CS_2=V_{IL} or $\overline{WE}$=V_{IL} or $\overline{OE}$=V_{IH}	$I_{LI/O}$	–10	10	µA
Operating Supply Current	$\overline{CS_1}$=V_{IL}, I/O=Open Cycle=min.	I_{CC}		120	mA
Standby Supply Current	V_{CC}=min. to max. $\overline{CS_1}$=V_{CC}–0.2V, V_{IN}≤0.2V or V_{IN}≥V_{CC}–0.2V	I_{SB1}		15	mA
Standby Supply Current	$\overline{CS_1}$=V_{IH} V_{IN}=V_{IH} or V_{IL}	I_{SB2}		30	mA
Input High Voltage		V_{IH}	2.2	6.0	V
Input Low Voltage		V_{IL}	–0.5*1	0.8	V
Output High Voltage	I_{OH}=–4mA	V_{OH}	2.4		V
Output Low Voltage	I_{OL}=8mA	V_{OL}		0.4	V
Peak Power-on Current *2	V_{CC}=GND to 4.5V $\overline{CS_1}$=Lower of V_{CC} or V_{IH} min.	I_{PO}		50	mA

Note: *1 –2.0V min. for pulse width less than 8ns.
*2 The $\overline{CS_1}$ input should be connected to V_{CC} to keep the device deselected.

Fig. 2 – AC TEST CONDITIONS

- Output Load



*Including Scope and jig Capacitance.

- Input Pulse Levels: 0.6V to 2.4V
- Input Pulse Rise & Fall Time: 3ns (Transient between 0.8V and 2.2V)
- Timing Reference Levels: Input: V_{IL}=0.8V, V_{IH}=2.2V
  Output: V_{OL}=0.8V, V_{OH}=2.2V

	C_L	Parameters Measured
Load I	30pF	except t_{LZ}, t_{HZ}, t_{OW}, t_{OLZ} and t_{OHZ}
Load II	5pF	t_{LZ}, t_{HZ}, t_{OW}, t_{OLZ} and t_{OHZ}

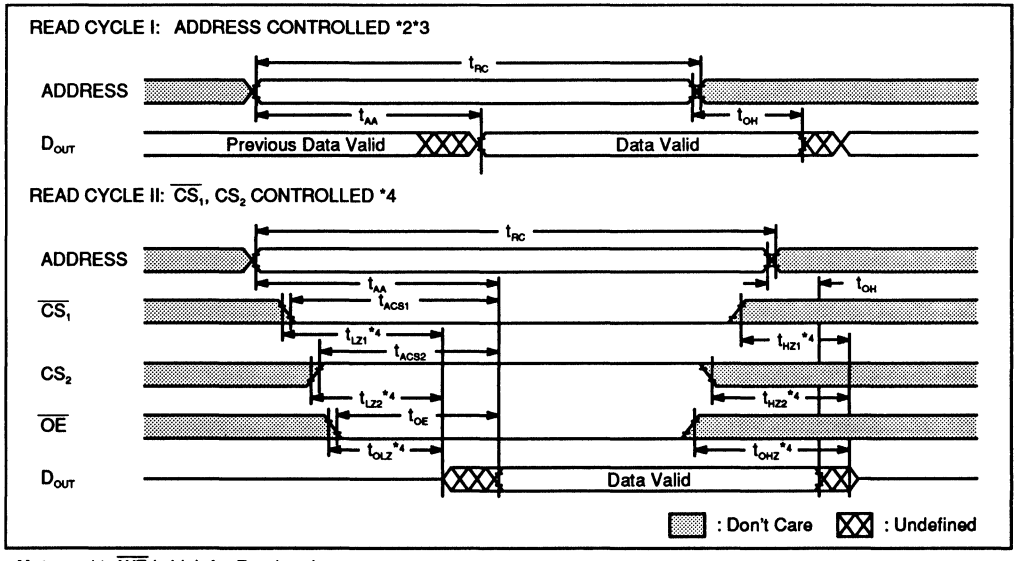
AC CHARACTERISTICS

(Recommended operating conditions unless otherwise noted.)

READ CYCLE *1

Parameter	Symbol	MB82B78-15		MB82B78-20		Unit
		Min	Max	Min	Max	
Read Cycle Time	t_{RC}	15		20		ns
Address Access Time *2	t_{AA}		15		20	ns
$\overline{CS_1}$ Access Time *3	t_{ACS1}		15		20	ns
CS_2 Access Time	t_{ACS2}		8		10	ns
$\overline{OE}$ Access Time	t_{OE}		8		10	ns
Output Hold from Address Change	t_{OH}	3		3		ns
Output Low-Z from $\overline{CS_1}$ *4	t_{LZ1}	3		3		ns
Output Low-Z from CS_2 *4	t_{LZ2}	2		2		ns
Output Low-Z from $\overline{OE}$ *4	t_{OLZ}	2		2		ns
Output High-Z from $\overline{CS_1}$ *4	t_{HZ1}		8		10	ns
Output High-Z from CS_2 *4	t_{HZ2}		8		10	ns
Output High-Z from $\overline{OE}$ *4	t_{OHZ}		8		10	ns

READ CYCLE TIMING DIAGRAM *1



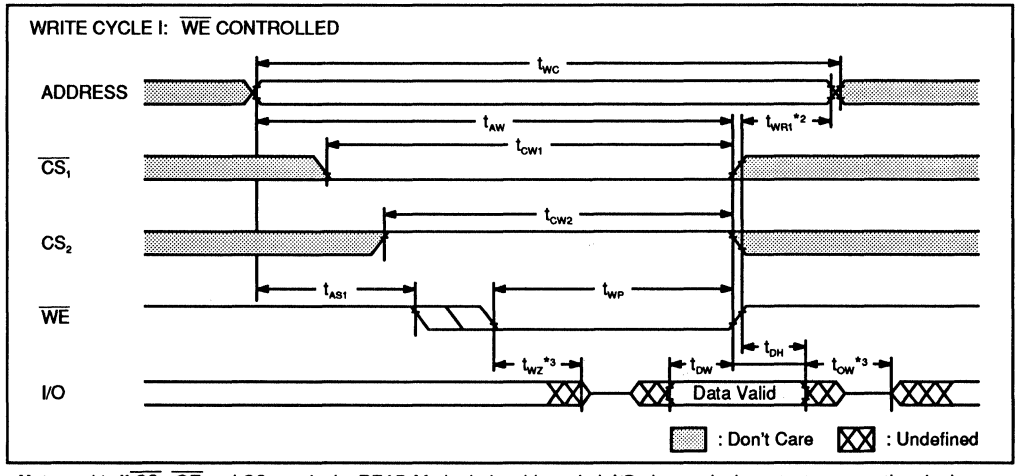
Note: *1 $\overline{WE}$ is high for Read cycle.
*2 Device is continuously selected, $\overline{CS_1}$=$\overline{OE}$=V_{IL}, CS_2=V_{IH}.
*3 Address valid prior to or coincident with $\overline{CS_1}$ and CS_2 transition low and high, respectively.
*4 Transition is measured at the point of ±500mV from steady state voltage with specified Load II in Fig. 2.

2

WRITE CYCLE *1

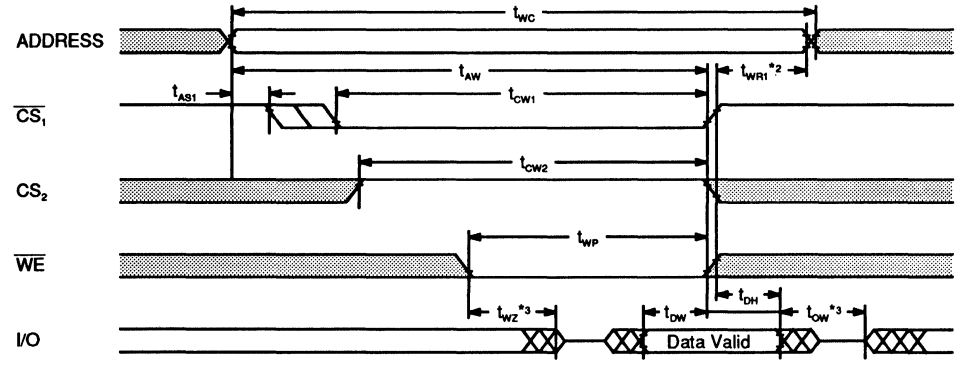
Parameter		Symbol	MB82B78-15		MB82B78-20		Unit
			Min	Max	Min	Max	
Write Cycle Time		t_{WC}	15		20		ns
Address Valid to End of Write		t_{AW}	10		15		ns
$\overline{CS_1}$ to End of Write		t_{CW1}	10		15		ns
CS_2 to End of Write		t_{CW2}	6		8		ns
Data Setup Time		t_{DW}	7		10		ns
Data Hold Time		t_{DH}	3		3		ns
Write Pulse Width		t_{WP}	8		10		ns
Write Recovery Time *2	$\overline{CS_1}$, $\overline{WE}$	t_{WR1}	3		3		ns
	CS_2	t_{WR2}	5		5		ns
Address Setup Time	$\overline{CS_1}$, $\overline{WE}$	t_{AS1}	0		0		ns
	CS_2	t_{AS2}	2		2		ns
Output Low-Z from $\overline{WE}$ *3		t_{OW}	0		0		ns
Output High-Z from $\overline{WE}$ *3		t_{WZ}		8		10	ns

WRITE CYCLE TIMING DIAGRAM *1

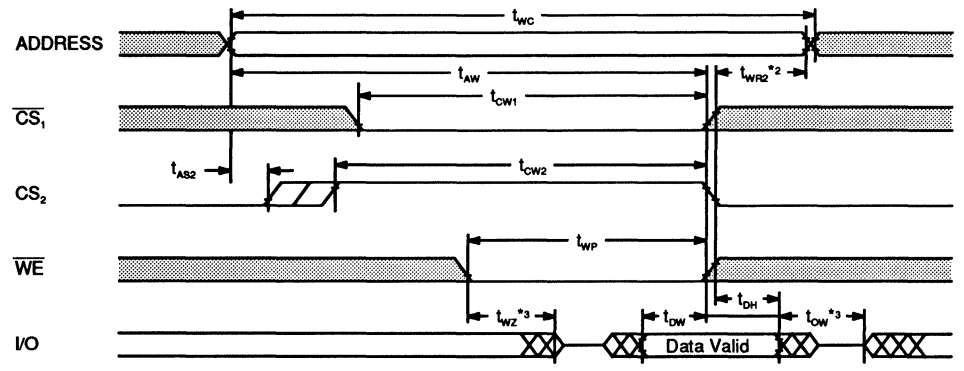


Note: *1 If $\overline{CS_1}$, $\overline{OE}$ and CS_2 are in the READ Mode during this period, I/O pins are in the output state so that the input signals of opposite phase to the outputs must not be applied.
*2 t_{WR} is defined from the end point of WRITE Mode.
*3 Transition is measured at the point of ±500mV from steady state voltage with specified Load II in Fig. 2.

WRITE CYCLE II: $\overline{CS_1}$ CONTROLLED



WRITE CYCLE III: $\overline{CS_2}$ CONTROLLED

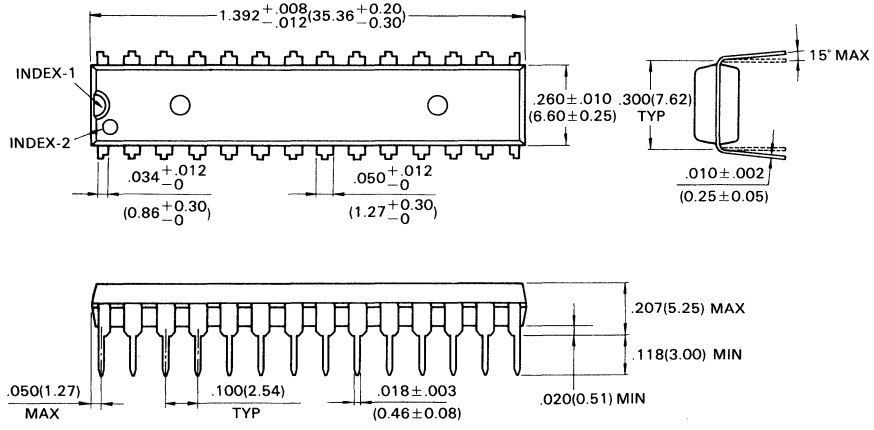


Note: *1 If $\overline{CS_1}$, $\overline{OE}$ and CS_2 are in the READ Mode during this period, I/O pins are in the output state so that the input signals of opposite phase to the outputs must not be applied.
*2 t_{WR} is defined from the end point of WRITE Mode.
*3 Transition is measured at the point of ±500mV from steady state voltage with specified Load II in Fig. 2.

PACKAGE DIMENSIONS

PLASTIC DIP (Suffix: P–SK)

28-LEAD PLASTIC DUAL-IN-LINE PACKAGE
(CASE No.: DIP-28P-M04)



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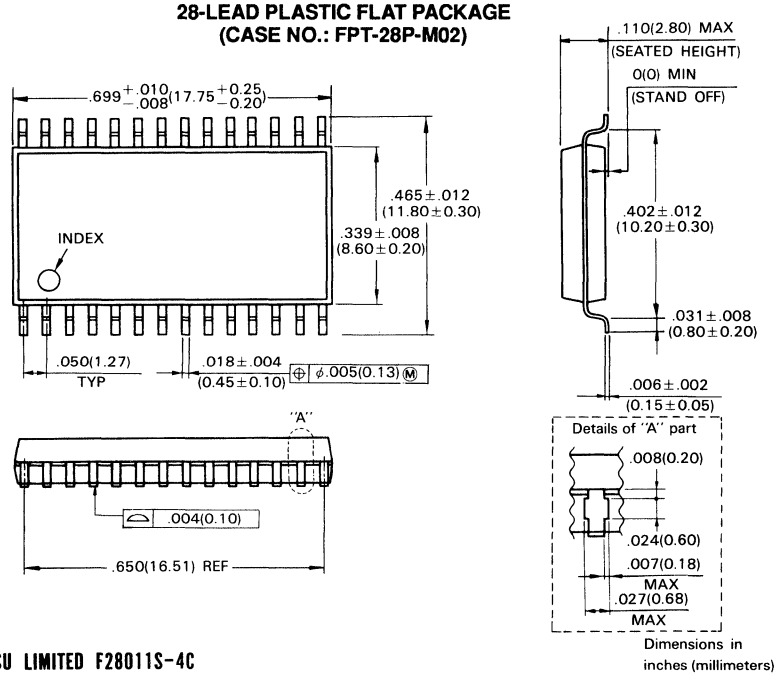
Dimensions in
inches (millimeters)

PACKAGE DIMENSIONS (Continued)

Plastic FPT (Suffix: PF)

28-LEAD PLASTIC FLAT PACKAGE
(CASE NO.: FPT-28P-M02)



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Dimensions in inches (millimeters)

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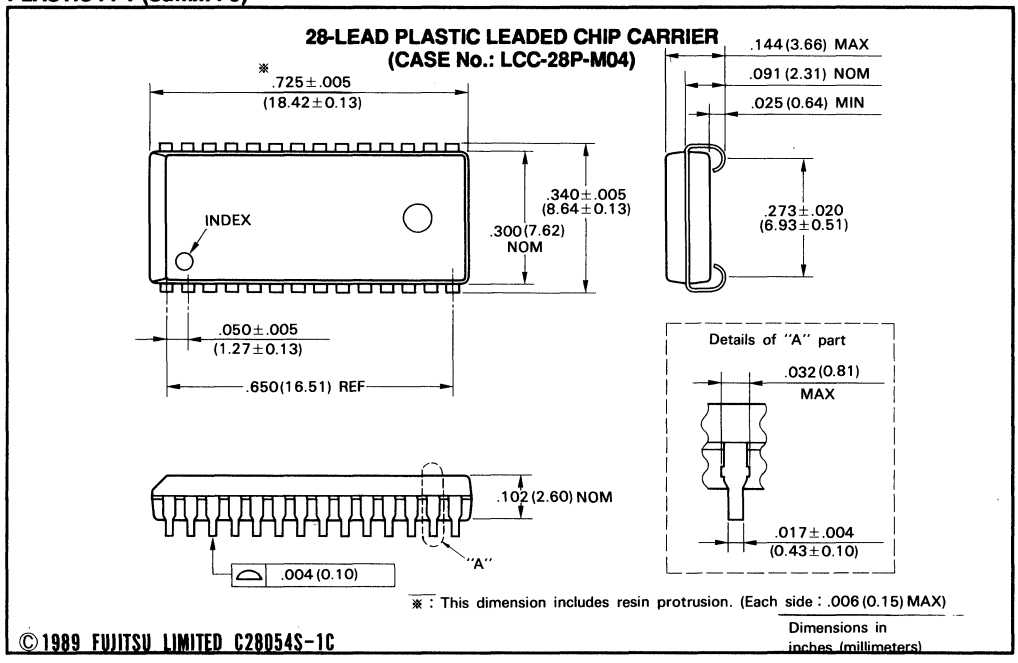
PACKAGE DIMENSIONS (Continued)

PLASTIC FPT (Suffix: PJ)



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