

ASSP

# DUAL COMPARATOR

## MB47393

### DESCRIPTION

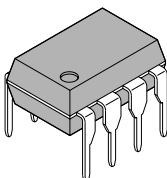
The Fujitsu MB47393 is a dual comparator which is designed to operate from a single power supply over a wide range of voltage. The input characteristics is equivalent of current industry standard comparator. Even though operated from a single power supply, the input common mode voltage range includes ground. Owing to adoption of clamp circuitry in input pins, mis-operation is prevented by negative input. The MB47393 is compatible with LM393.

### FEATURES

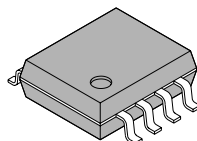
- Wide power supply voltage range  
Single power supply — 2V to 30V  
Dual power supplies —  $\pm 1V$  to  $\pm 15V$
- Wide input common-mode voltage range  
0V to  $(V_{CC} - 1.5)V$
- Low input bias current — 25nA typ.
- High sink current capability because of open collector output 40mA min.
- Package  
Plastic 8 pin DIP package (Suffix: -P)  
Plastic 8 pin FPT package (Suffix: -PF)  
Plastic 9 pin SIP package (Suffix: -PS)

### PACKAGE

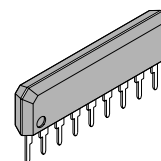
PLAPMSTIC PACKAGE  
DIP-08P-M01



PLAPMSTIC PACKAGE  
FPT-08P-M01

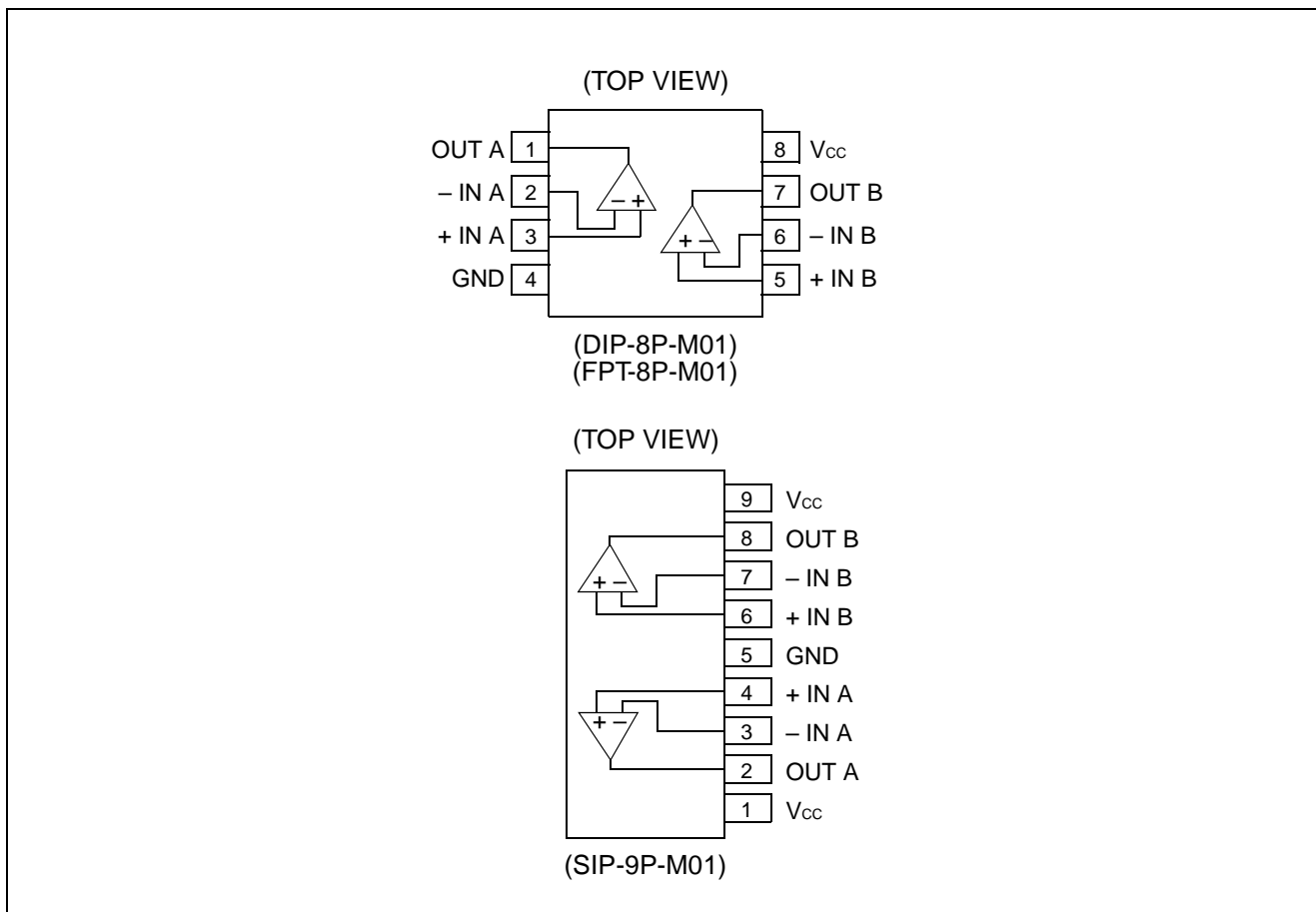


PLAPMSTIC PACKAGE  
SIP-09P-M01



# MB47393

## ■ PIN ASSIGNMENT



## ■ ABSOLUTE MAXIMUM RATINGS (see NOTE)

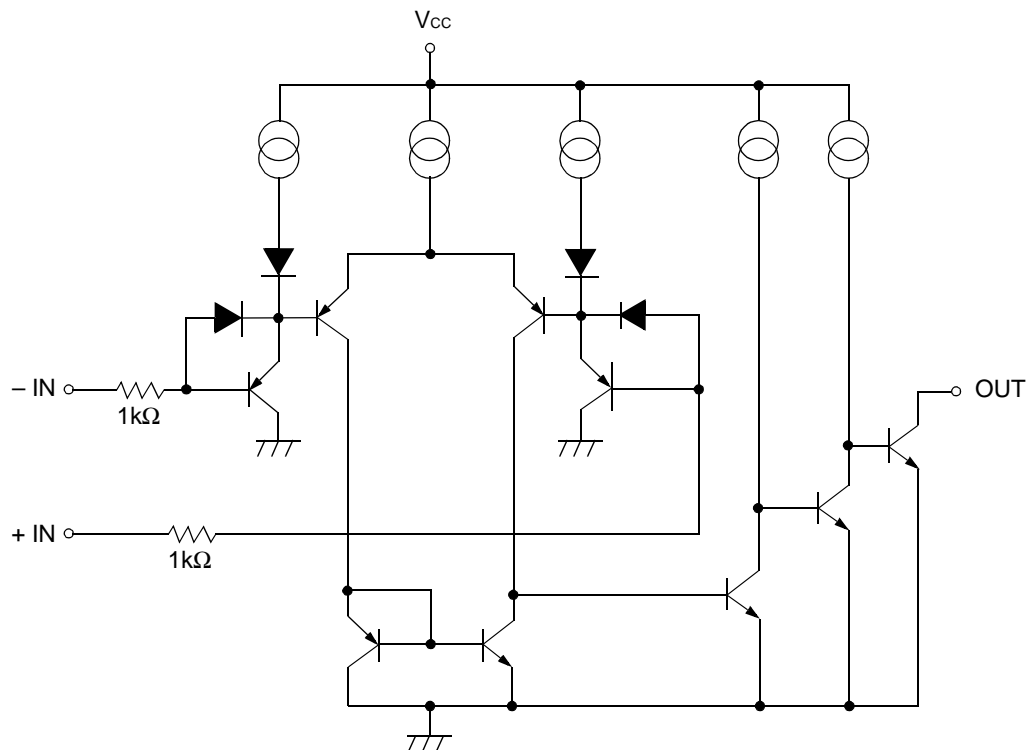
T<sub>a</sub> = 25°C

Rating	Symbol	Value	Unit
Power Supply Voltage	V <sub>CC</sub>	36	V
Differential Input Voltage	V <sub>ID</sub>	36	V
Common-Mode Input Voltage	V <sub>I</sub>	-5 to +36	V
Output Short Current to GND	—	Infinite*	—
Power Dissipation	P <sub>D</sub>	350 (T <sub>a</sub> 55°C)	mW
Operating Temperature	T <sub>a</sub>	-20 to +75	°C
Storage Temperature	T <sub>STG</sub>	-55 to +125	°C

\* : This value is specified with respect to the short circuit from output to GND. However, short circuit from the output to V<sub>CC</sub> cause device destruction.

Note: Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Figure 1 MB47393 EQUIVALENT CIRCUIT



## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value	Unit
Power Supply Voltage	$V_{CC}$	2 to 30	V
		$\pm 1.0$ to $\pm 15$	
Operating Temperature	$T_a$	-20 to +75	$^{\circ}\text{C}$
Output Sink Current	$I_{SINK}$	40	mA

## ELECTRICAL CHARACTERISTICS

( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ )

Parameter	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Input Offset Voltage	$V_{IO}$	$V_O = V_{REF} = 1.4\text{V}$	—	2	5	mV
Input Offset Current	$I_{IO}$	—	—	5	50	nA
Input Bias Current	$I_{IN*1}$	—	—	25	250	nA
Common-Mode Input Voltage	$V_{CM*2}$	—	0	—	$V_{CC}-1.5$	V
Power Supply Current	$I_{CC}$	$R_L = \infty$	—	2	3	mA
Voltage Gain	$A_v$	$R_L = 15\text{k}\Omega$ , $V_{CC} = 15\text{V}$	—	200	—	V/mV
Response Time	—	$R_L = 1\text{k}\Omega$	—	2	—	$\mu\text{s}$
Output Sink Current	$I_{SINK}$	$V_{IN(+)} = 0$ , $V_{IN(-)} = 1\text{V}$ , $V_{OL} \geq 1.5\text{V}$	40	—	—	mA
Output Saturation Voltage	$V_{OL}$	$V_{IN(+)} = 0$ , $V_{IN(-)} = 1\text{V}$ , $I_{SINK} = 30\text{mA}$	—	0.2	0.4	V
Output Leakage Current	$I_{LEAK}$	$V_{IN(+)} = 1\text{V}$ , $V_{IN(-)} = 0\text{V}$ , $V_O = 30\text{V}$	—	—	1	$\mu\text{A}$

Notes:

- \*1:  $I_{IN}$  is measured when  $V_I \approx 0$  and direction of the input current flows from IC. When negative voltage is applied to input pin, the pin is equivalently connected the GND through a  $1\text{k}\Omega$  of resistor. When low voltage below than  $-5\text{V}$  is applied, please connect a resistor serially to input pin in order to prevent the high current flow.
- \*2: Positive input voltage may exceed the power supply voltage. As long as the other voltage remains in the common-mode input voltage range, the comparator will provide a proper output state. When  $V_{CC} = 5\text{V}$ , your are requested to use  $V_{IN}$  below  $25\text{V}$ .

## TYPICAL CHARACTERISTIC CURVES

Figure 2 POWER SUPPLY CURRENT vs POWER SUPPLY VOLTAGE

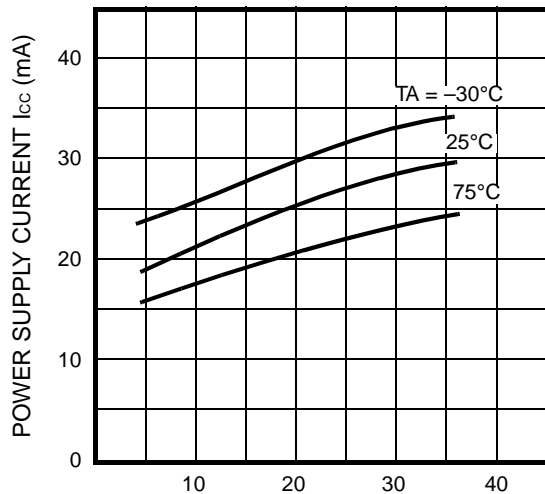
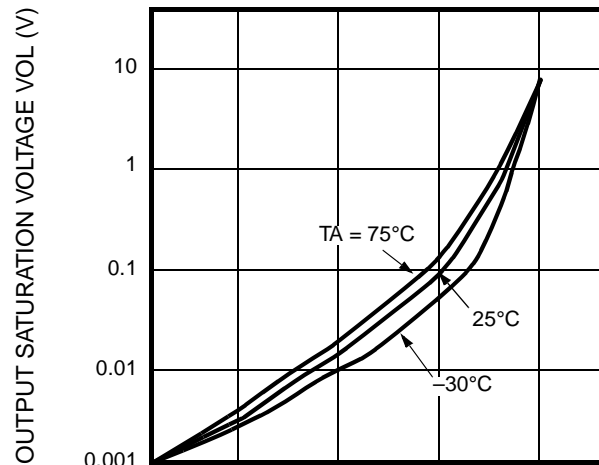
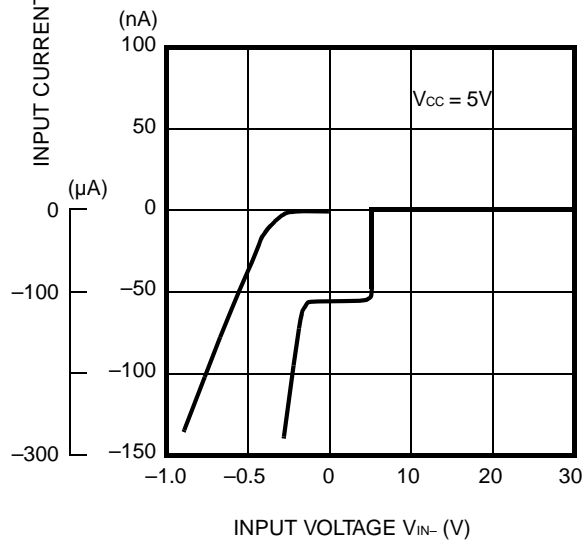


Figure 3 OUTPUT SATURATION VOLTAGE vs OUTPUT SINK CURRENT

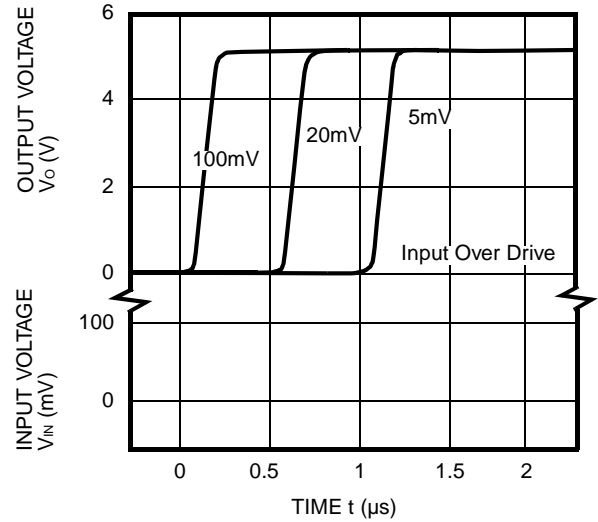


## ■ TYPICAL CHARACTERISTIC CURVES (Continued)

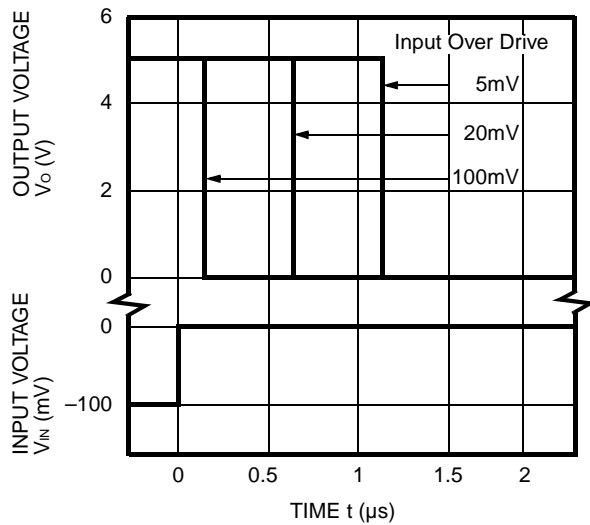
**Figure 4 INPUT CURRENT vs INPUT VOLTAGE**



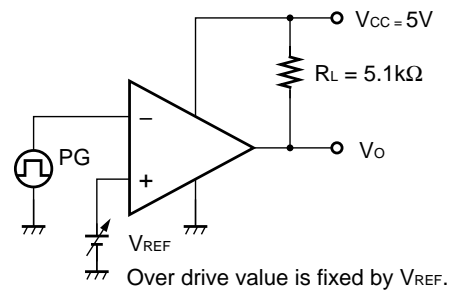
**Figure 5 INPUT VOLTAGE/OUTPUT VOLTAGE vs RESPONSE TIME**



**Figure 6 INPUT VOLTAGE/OUTPUT VOLTAGE vs RESPONSE TIME**

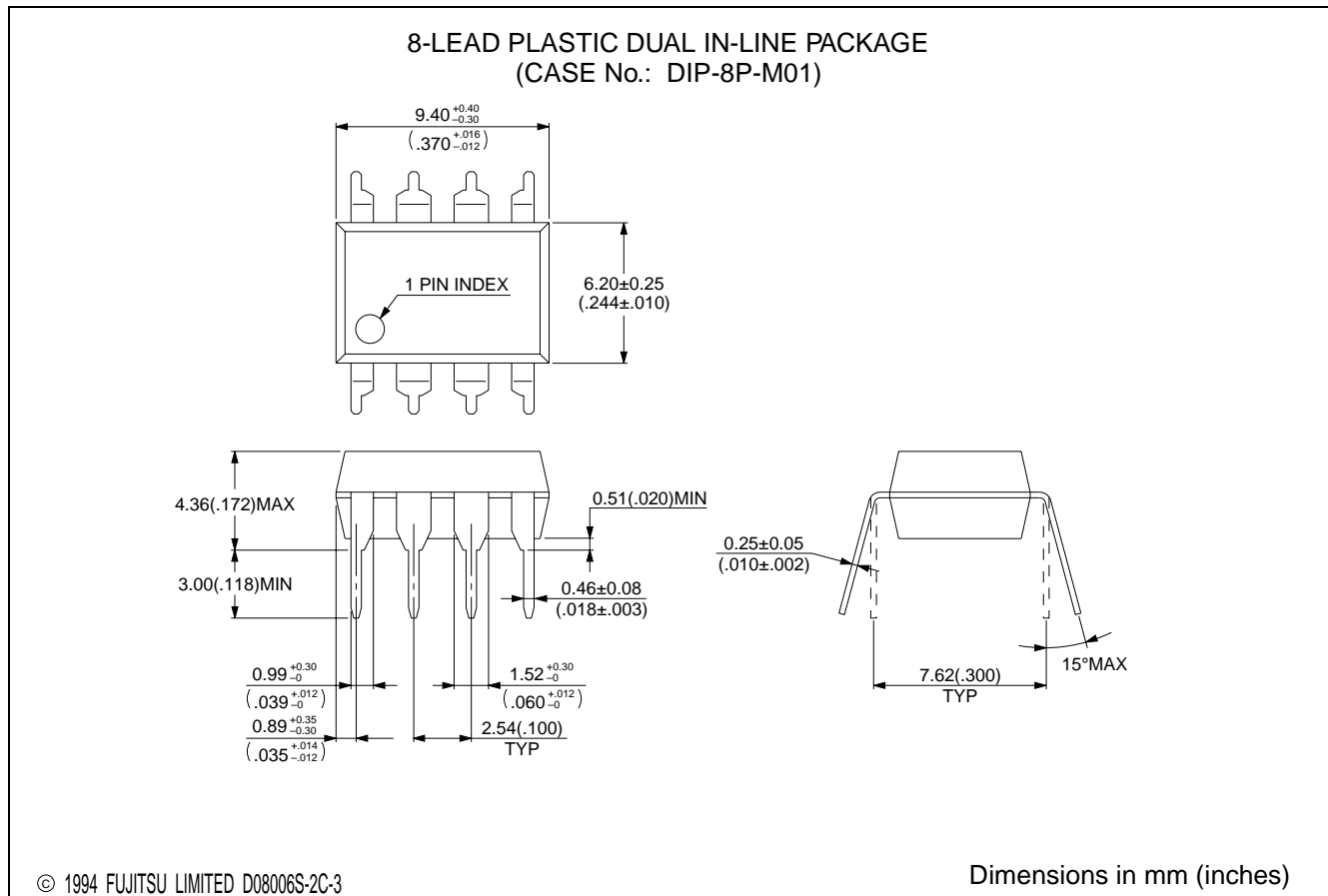


**Figure 7 TEST CIRCUIT**

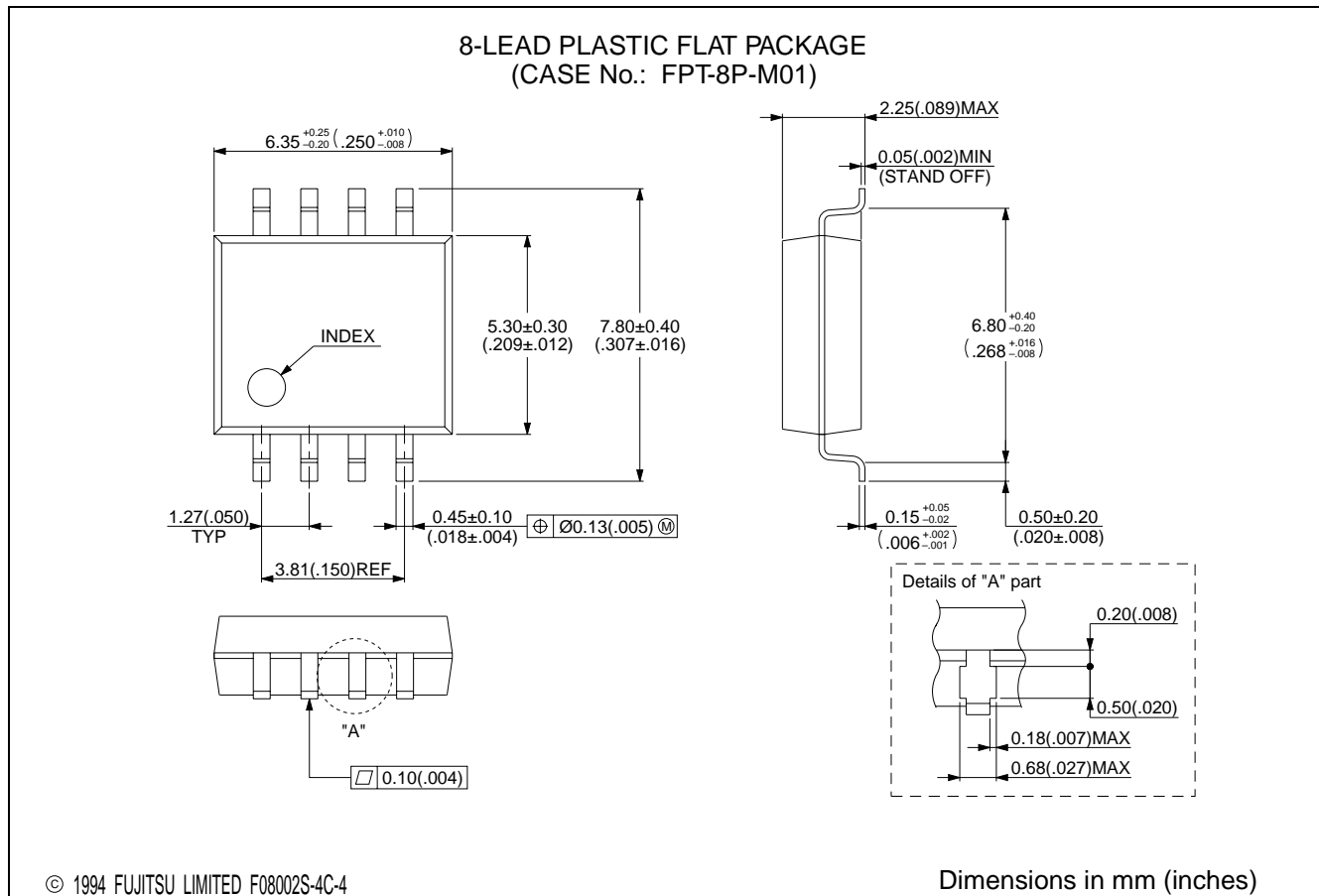


# MB47393

## ■ PACKAGE DIMENSIONS



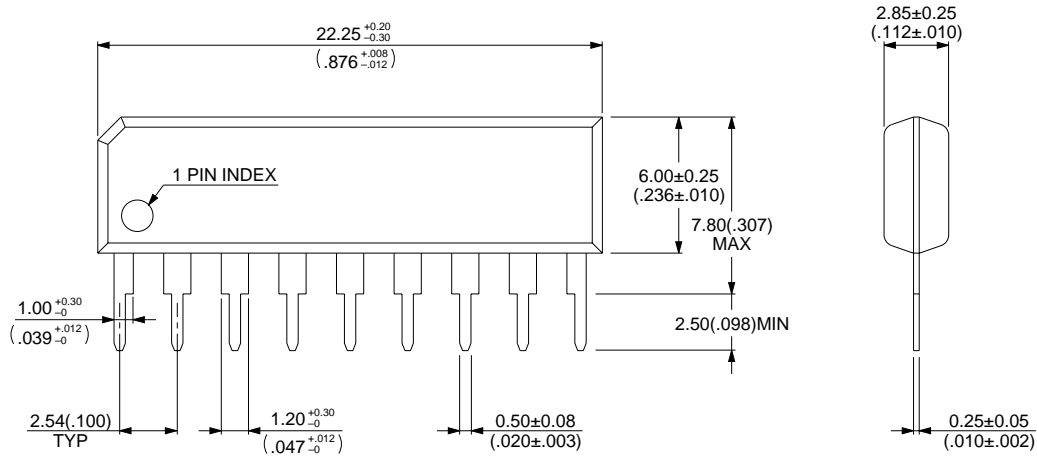
## ■ PACKAGE DIMENSIONS (Continued)



# MB47393

## ■ PACKAGE DIMENSIONS (Continued)

9-LEAD PLASTIC SINGLE IN-LINE PACKAGE  
(CASE No.: SIP-9P-M01)



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Dimensions in mm (inches)



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