

# MB509

## TWO MODULUS PRESCALER WITH STAND-BY MODE

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The Fujitsu MB509 is a low power, two modulus prescaler equipped with the standby mode. The MB509 is used in conjunction with a frequency synthesizer to form a Phase Locked Loop (PLL) and will divide the input frequency by the modulus of 65/65 or 128/129.

Power consumption is typically 11.5mA at 5.0V. under normal operation, with the current reduced to 180µA in standby mode. By using MB509 with the MB87076, intermittent operating mode can be achieved.

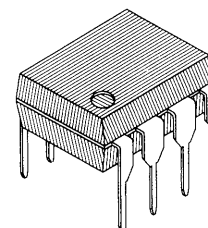
### FEATURES

- High Frequency Operation:  $f_{max} = 1.1\text{GHz max.}$  ( $P_{IN} = -4\text{dBm min.}$ )
- Pulse Swallow Function: 64/65, 128/129
- Power Supply Consumption: 58mW typ.
- Stand-by Current: 180µA typ.
- Stable Output Amplitude:  $V_O = 1.6V_{p-p}$  typ.
- Complete PLL synthesizer circuit with the Fujitsu MB87076, PLL frequency synthesizer IC
- Plastic 8-pin Dual-In-Line Package (Suffix: -P)  
Plastic 8-pin Mini Flat Package (Suffix: -PF)
- Built-in a Termination Resistor  
Stable output amplitude is obtained up to output load capacitance of 8pF

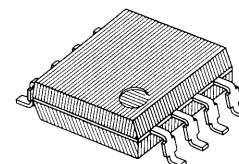
### ABSOLUTE MAXIMUM RATINGS (See Note)

Rating	Symbol	Value	Unit
Power Supply Voltage	$V_{CC}$	-0.5 to +7.0	V
Input Voltage	$V_{IN}$	-0.5 to $V_{CC}$	V
Output Current	$I_O$	10	mA
Storage Temperature	$T_{STG}$	-55 to +125	°C

**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.

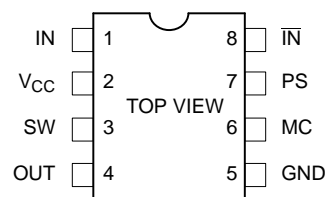


PLASTIC PACKAGE  
DIP-08P-M01



PLASTIC PACKAGE  
FPT-08P-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 application of any voltage higher than maximum rated voltages to this high impedance circuit.

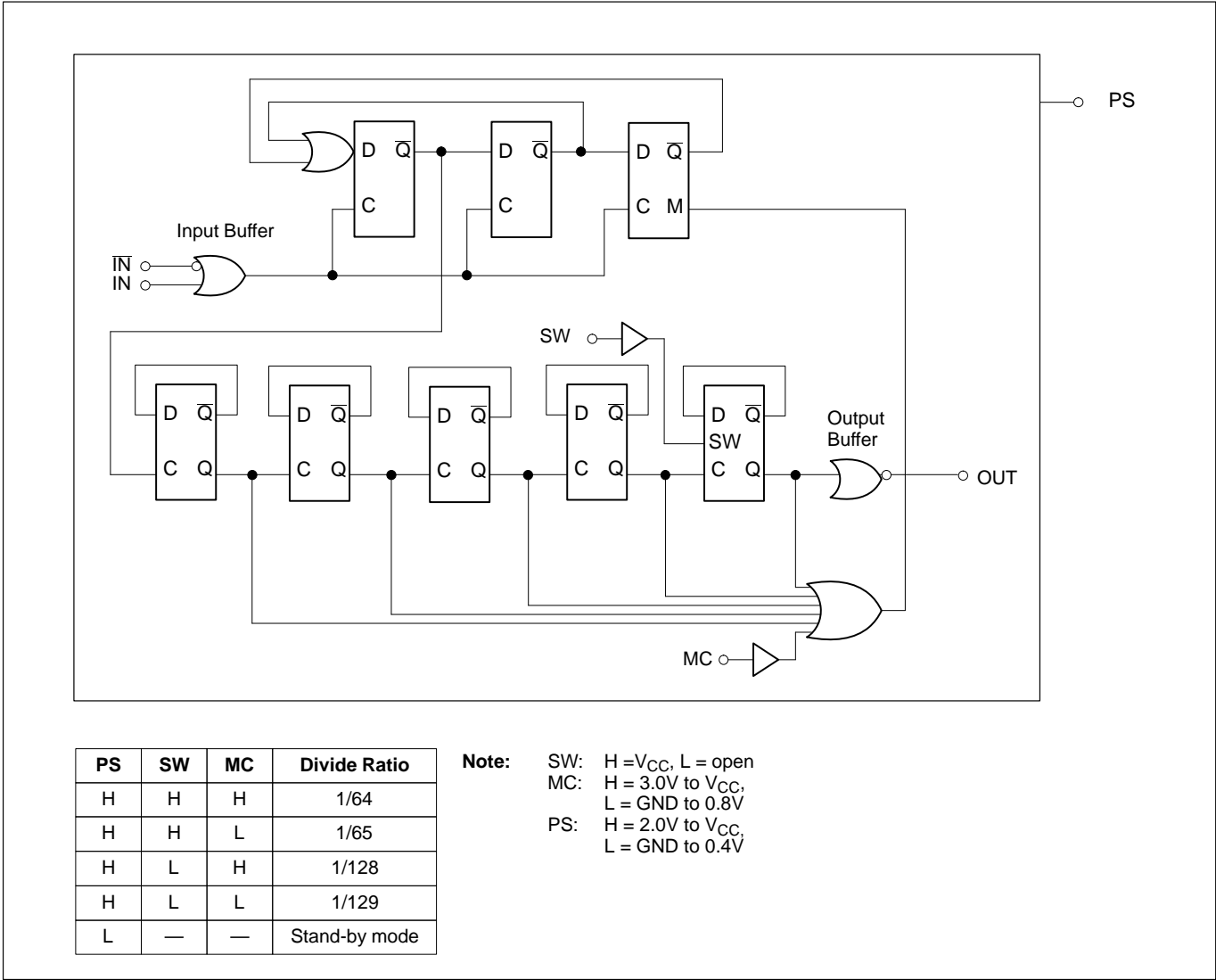


Figure 1. MB509 Block Diagram

PIN DESCRIPTION

Pin Number	Symbol	Descriptions
1	IN	Input
2	$V_{CC}$	Power Supply, +5V
3	SW	Divide Ratio Control Input (See Divide Ratio Table)
4	OUT	Output
5	GND	Ground
6	MC	Modulus Control Input (See Divide Ratio Table)
7	PS	Stand-by Control Input (See Divide Ratio Table)
8	IN	Complementary Input

## RECOMMENDED OPERATING CONDITIONS

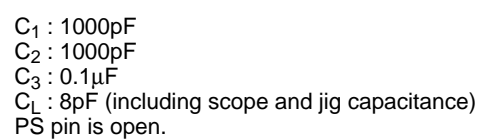
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Power Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V
Operating Temperature	$T_A$	-40	—	+85	°C
Load Capacitance	$C_L$	—	—	8	pF

## ELECTRICAL CHARACTERISTICS

(Recommended Operating Conditions unless otherwise noted)

Parameter	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Power Supply Current	$I_{CC}$		—	11.6	—	mA
	$I_{PS}$	Stand-by mode	—	180	—	μA
Output Amplitude	$V_O$	Built-in a Termination Resistor. Load Capacitance=8pF	1.0	1.6	—	$V_{p-p}$
Input Frequency	$f_{IN}$	With input coupling capacitor 1000pF	10	—	1100	MHz
Input Signal Amplitude	$P_{IN}$	—	-4	—	5.5	dBm
High Level Input Voltage for MC	$V_{IH}$	—	3.0	—	—	V
Low Level Input Voltage for MC	$V_{IL}$	—	—	—	0.8	V
High Level Input Voltage for SW	$V_{IHS}^*$		$V_{CC} - 0.1$	$V_{CC}$	$V_{CC} + 0.1$	V
Low Level Input Voltage for SW	$V_{ILS}$		Open			V
High Level Input Voltage for PS	$V_{IH}$	—	2.0	—	—	V
Low Level Input Voltage for PS	$V_{IL}$	—	—	—	0.4	V
High Level Input Current for MC	$I_{IH}$	$V_{IH} = 3.0V$	—	—	0.4	mA
Low Level Input Current for MC	$I_{IL}$	$V_{IL} = 0.8V$	-0.2	—	—	mA
Modulus Set-up Time MC to Output	$t_{SET}$	—	—	16	26	ns

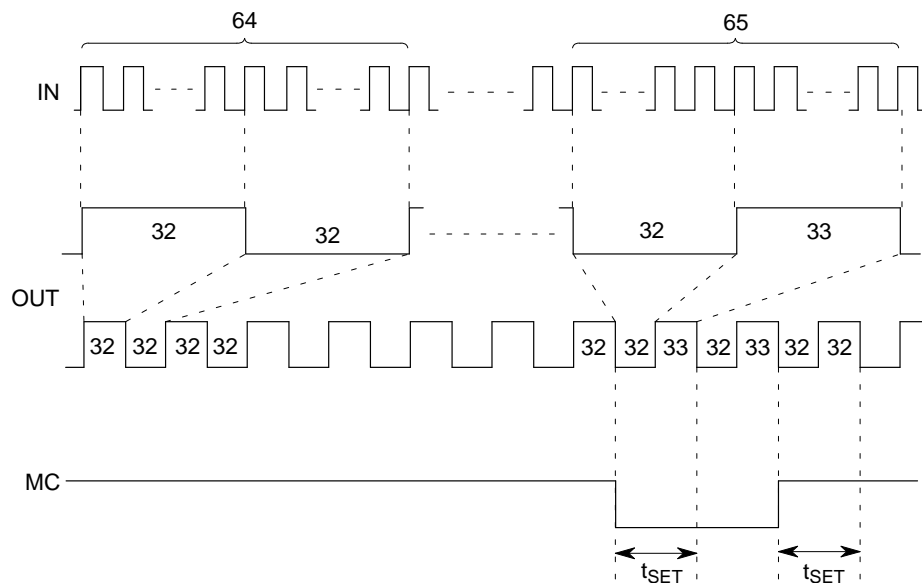
**Note:** \*Design Guarantee



**Figure 2. Test Circuit**

### TIMING CHART (2 MODULUS)

Example: Divide ratio = 64/65



**Note:** When divide ratio of 65 is selected, positive pulse is added by one to 33.  
The typical set up time is 16ns from the MC signal input to the timing of change of prescaler divide ratio.

## TYPICAL CHARACTERISTICS CURVES

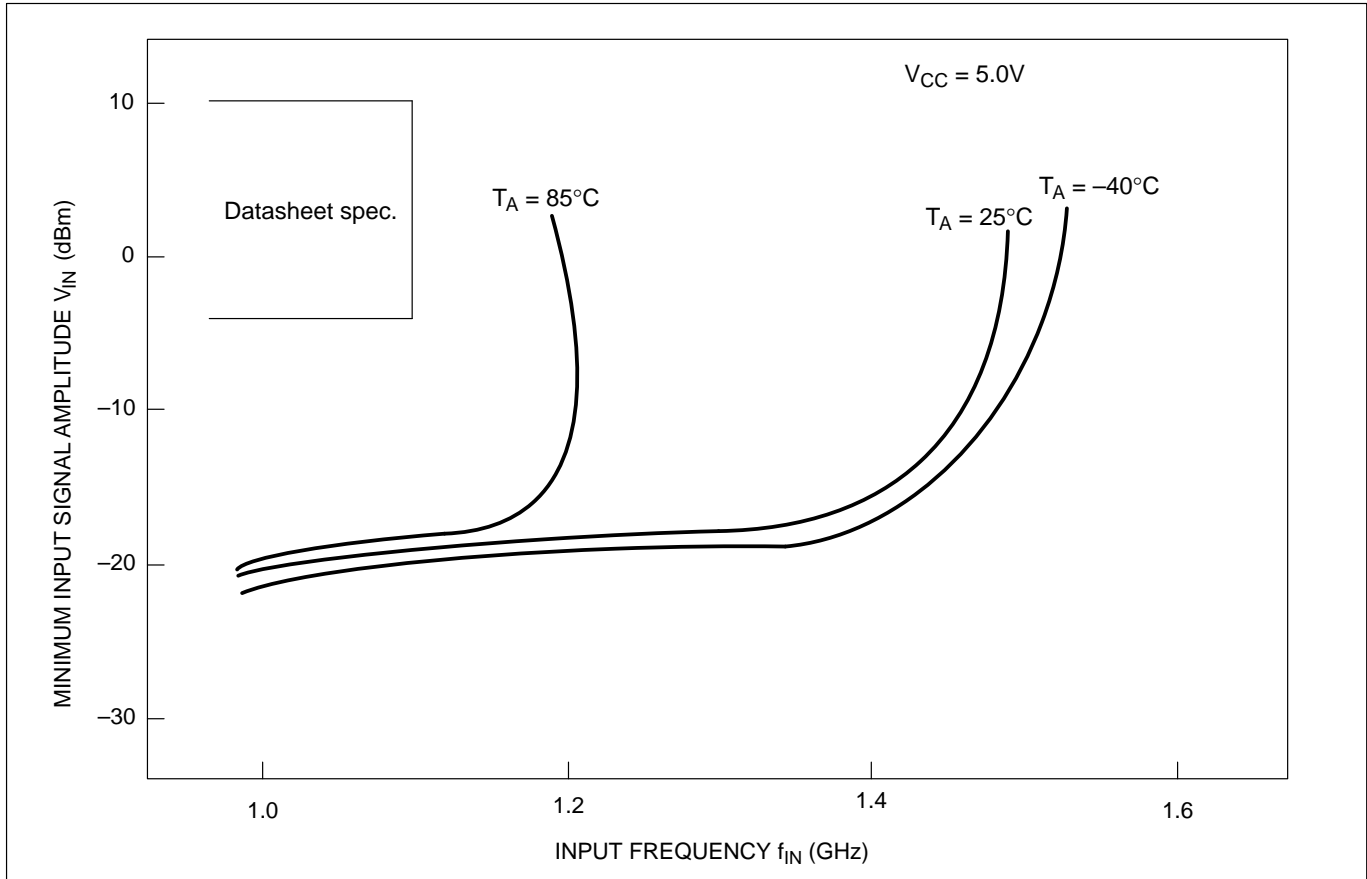


Figure 3. Input Signal Amplitude vs. Input Frequency

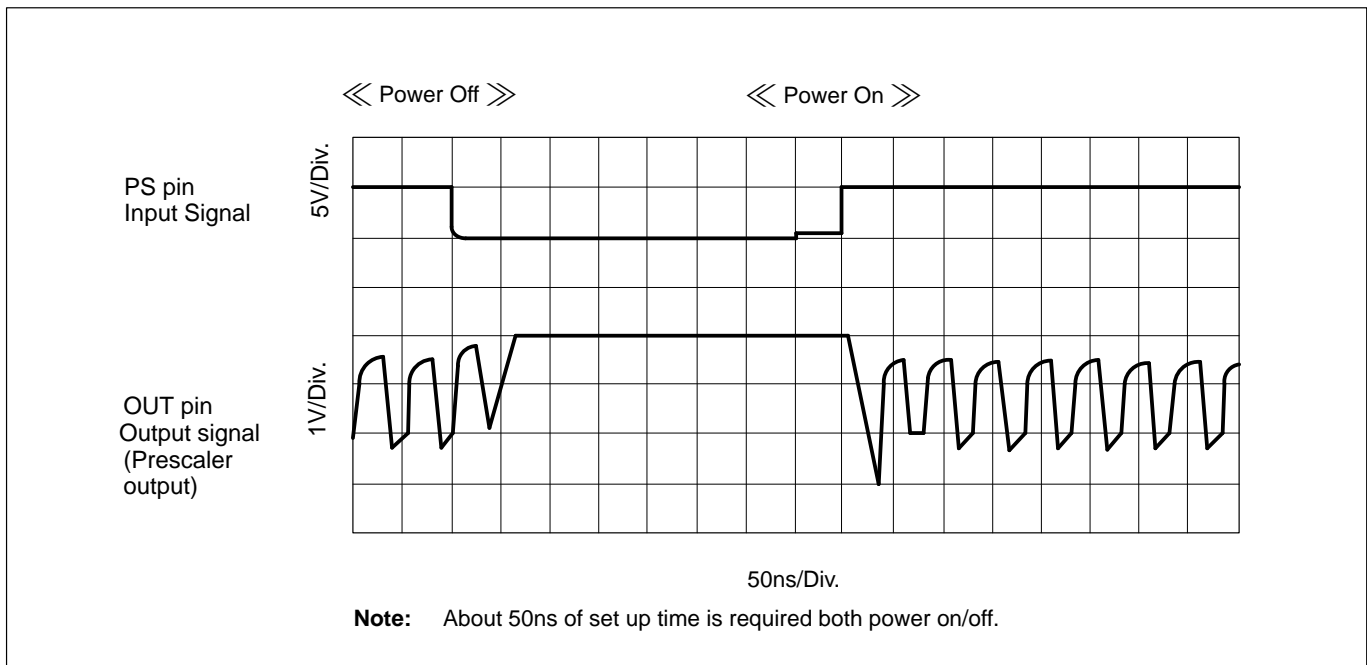


Figure 4. Waveform of Stand-by Mode

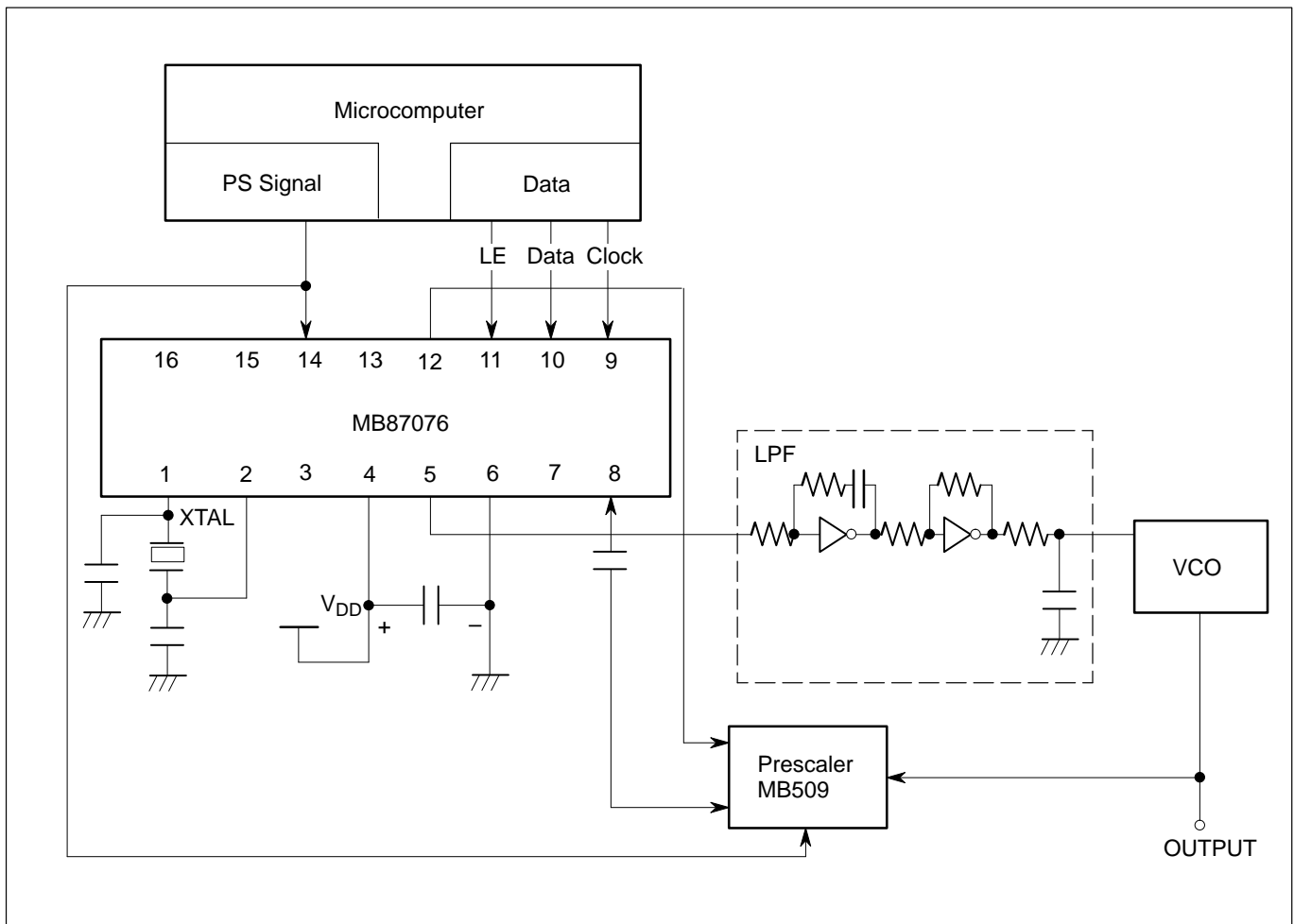
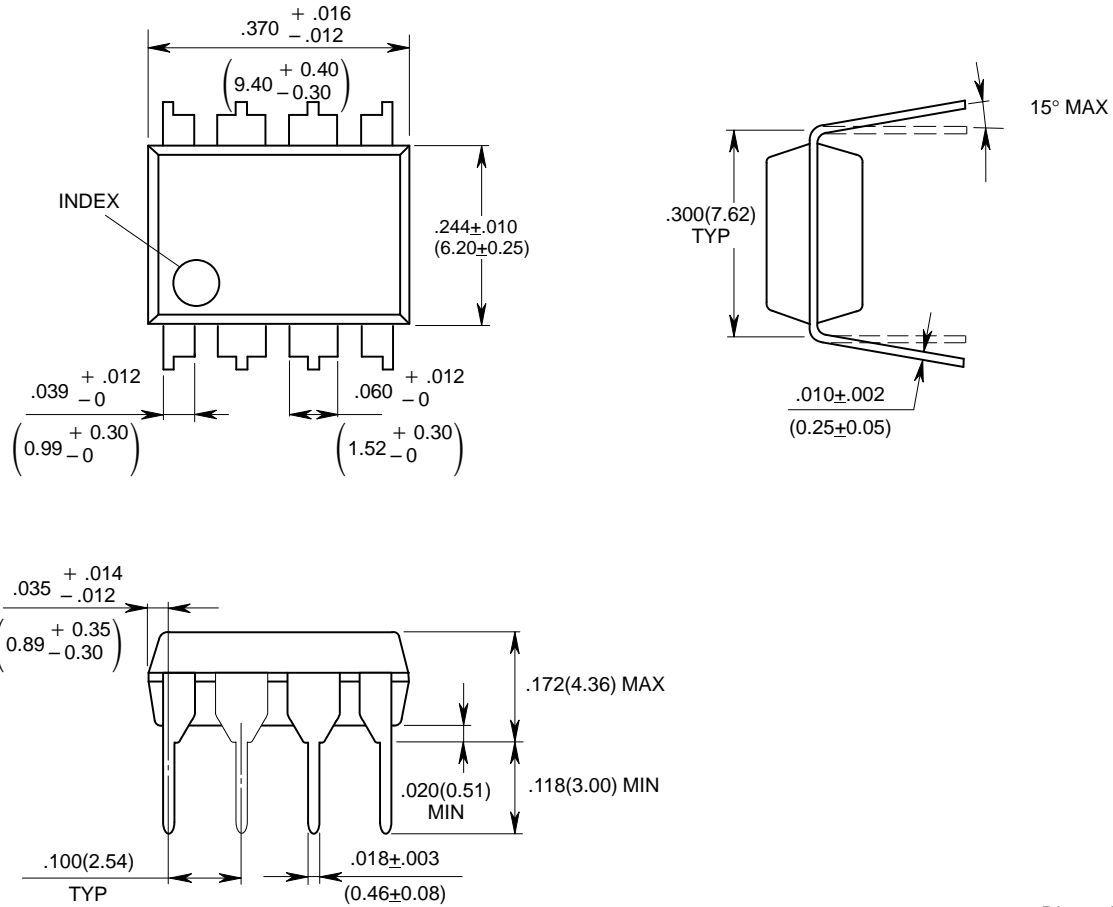


Figure 5. Typical Application Example

# PACKAGE DIMENSIONS

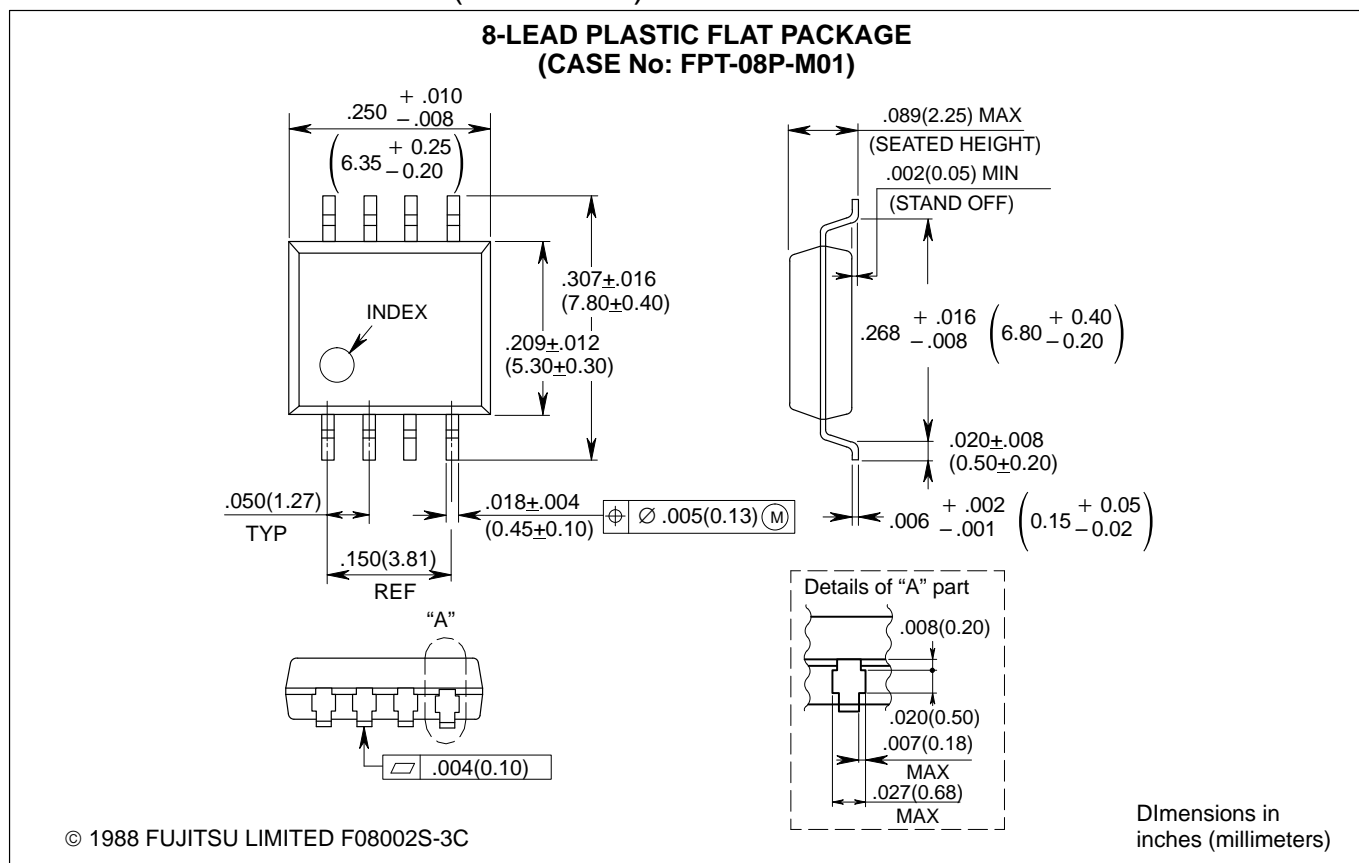
## 8-LEAD PLASTIC DUAL IN-LINE PACKAGE (CASE No: DIP-08P-M01)



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Dimensions in  
inches (millimeters)

## PACKAGE DIMENSIONS (Continued)



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