

# MB501L/504/504L

## TWO MODULUS PRESCALERS

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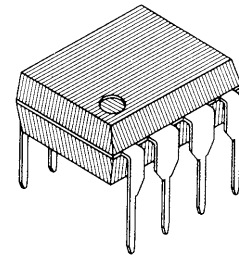
The Fujitsu MB501L/504/504L are two modulus prescalers, which are use with a frequency synthesizer to make a PLL (Phase Locked Loop). They will divide the input frequency by the modulus of 64/65 or 128/129 for the MB501L, and 32/33 or 64/65 for the MB504/MB504L. The MB501L and MB504L are low-power versions. The output of 1.6V peak to peak on ECL level applies to all.

- High Operating Frequency, Low Power Operation:
  - 1.1GHz at 50mW typ. (MB501L)
  - 520MHz at 50mW typ. (MB504)
  - 520MHz at 25mW typ. (MB504L)
- Pulse Swallow Function
- Wide Operation Temperature  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Stable Output Amplitude:  $V_{OUT} = 1.6\text{Vp-p}$
- Complete PLL synthesizer circuit with the Fujitsu MB87001A, PLL synthesizer IC
- Plastic 8-pin Standard Dual-In-Line Package or space saving Flat Package

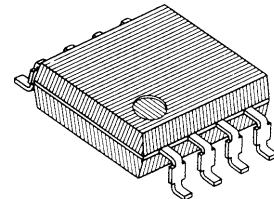
### ABSOLUTE MAXIMUM RATINGS (see NOTE)

Rating	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	-0.5 to +7.0	V
Input Voltage	$V_{IN}$	-0.5 to $V_{CC}$	V
Output Current	$V_O$	10	mA
Ambient Temperature	$T_A$	-40 to +85	$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	-55 to +125	$^{\circ}\text{C}$

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.

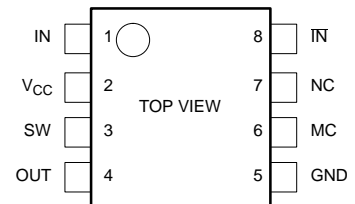


PLASTIC PACKAGE  
DIP-08P-M01



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.

**MB501L**  
**MB504**  
**MB504L**

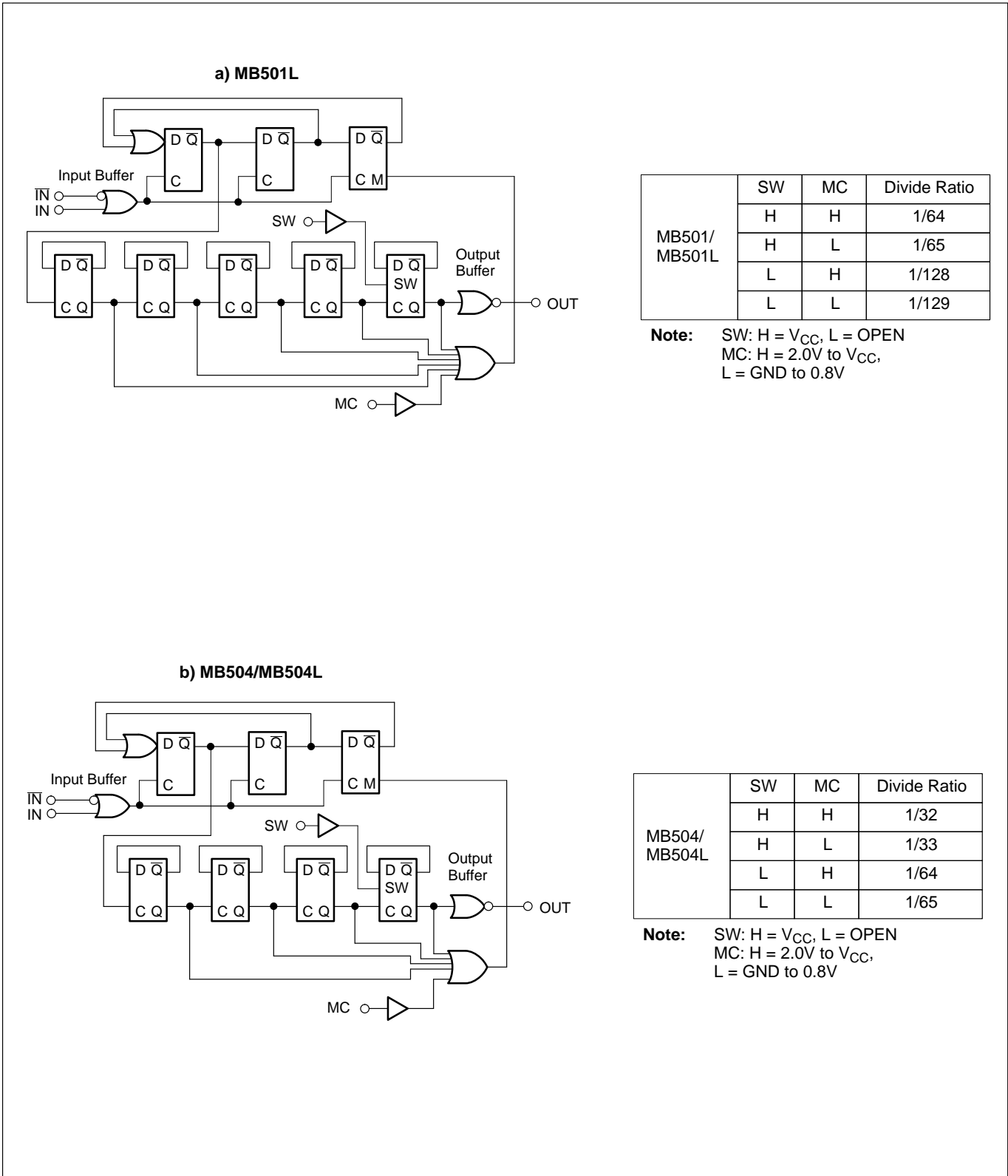


Figure 1. Block Diagrams

## PIN DESCRIPTION

Pin Number	Symbol	Function
1	IN	Input
2	V <sub>CC</sub>	DC Supply Voltage
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	NC	Non Connection
8	$\overline{\text{IN}}$	Complementary Input

## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Supply Voltage	V <sub>CC</sub>	4.5	5.0	5.5	V
Output Current	I <sub>O</sub>		1.2		mA
Ambient Temperature	T <sub>A</sub>	-40		+85	°C
Load Capacitance	C <sub>L</sub>			12	pF

## ELECTRICAL CHARACTERISTICS

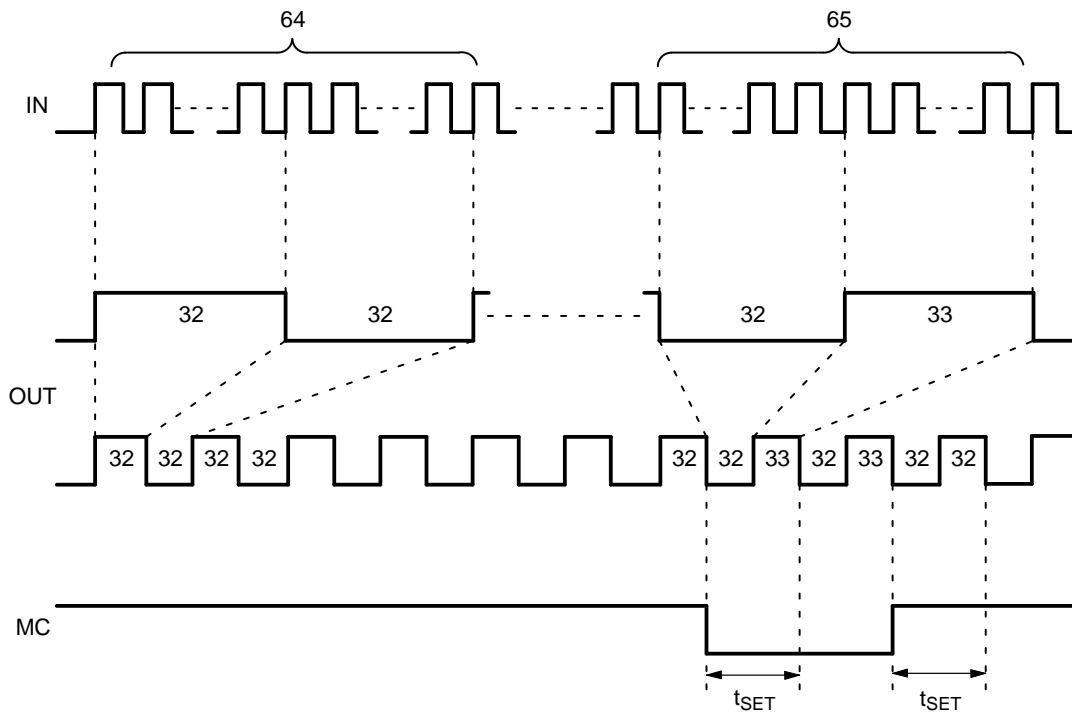
(Recommended Operating Conditions unless otherwise noted)

Parameter		Symbol	Conditions	Value			Unit
				Min.	Typ.	Max.	
Power Supply Current	MB501L	$I_{CC}$	I/O pins are open		10	14*	mA
	MB504				10	14*	mA
	MB504L				5	7*	mA
Output Amplitude		$V_O$		1.0	1.6		$V_{P-P}$
Input Frequency	MB501L	$f_{IN}$	With input coupling capacitor 1000pF	10		1100	MHz
	MB504			10		520	MHz
	MB504L			10		520	MHz
Input Signal Amplitude for IN	MB501L	$P_{IN}$		-4		5.5	dBm
	MB504			-12		10	dBm
	MB504L			-12		10	dBm
High Level Input Voltage for MC		$V_{IHM}$		2.0			V
Low Level Input Voltage for MC		$V_{ILM}$				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 Current for MC		$I_{IHM}$	$V_{IH} = 2.0V$			0.4	mA
Low Level Input Current for MC		$I_{ILM}$	$V_{IL} = 0.8V$	-0.2			mA
Modulus Set-up Time MC to OUT	MB501L	$t_{SET}$			16	26	ns
	MB504				20	30	ns
	MB504L				18	28	ns

Note: \*  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$   
 \*\* Design Guarantee

MB501L TIMING CHART (2 MODULUS)

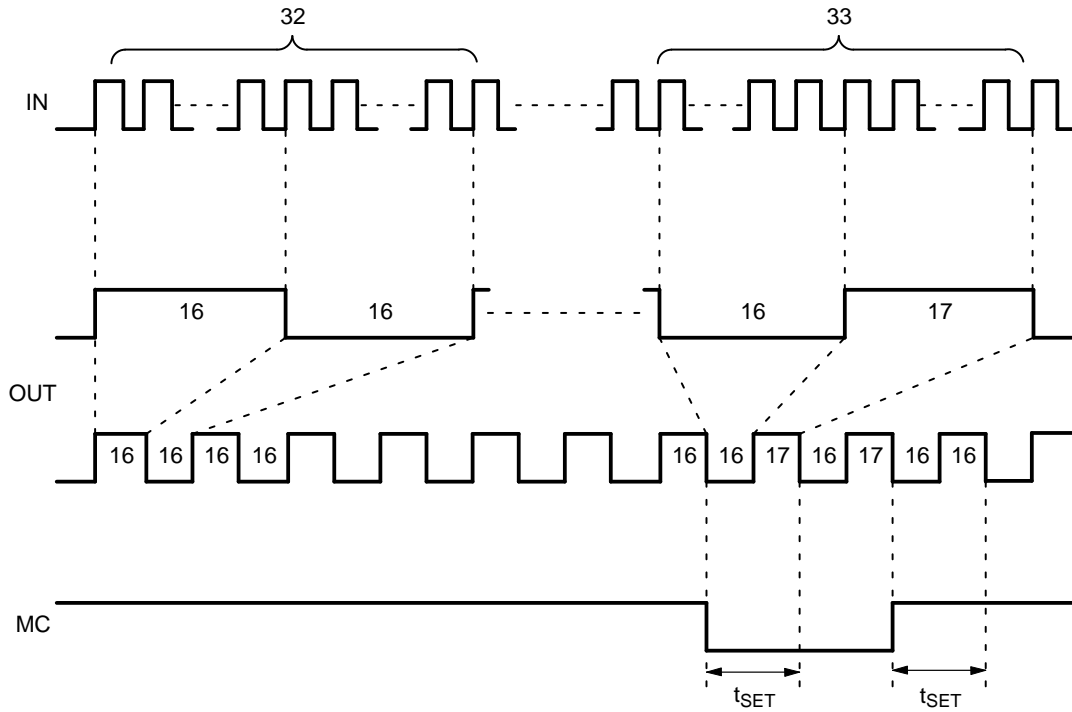
Example: Divide Ratio of 64/65



**Note:** When divide ratio of 65 is selected, positive pulse is applied by one to 33.  
 The typical set up time is 16ns (MB501L) from the MC signal input to the timing of change of prescaler divide ratio.

MB504/MB504L TIMING CHART (2 MODULUS)

Example: Divide Ratio of 32/33



**Note:** When divide ratio of 33 is selected, positive pulse is applied by one to 17.  
 The typical set up time is 20ns (MB504), 18ns (MB504L) from the MC signal input to the timing of change of prescaler divide ratio.

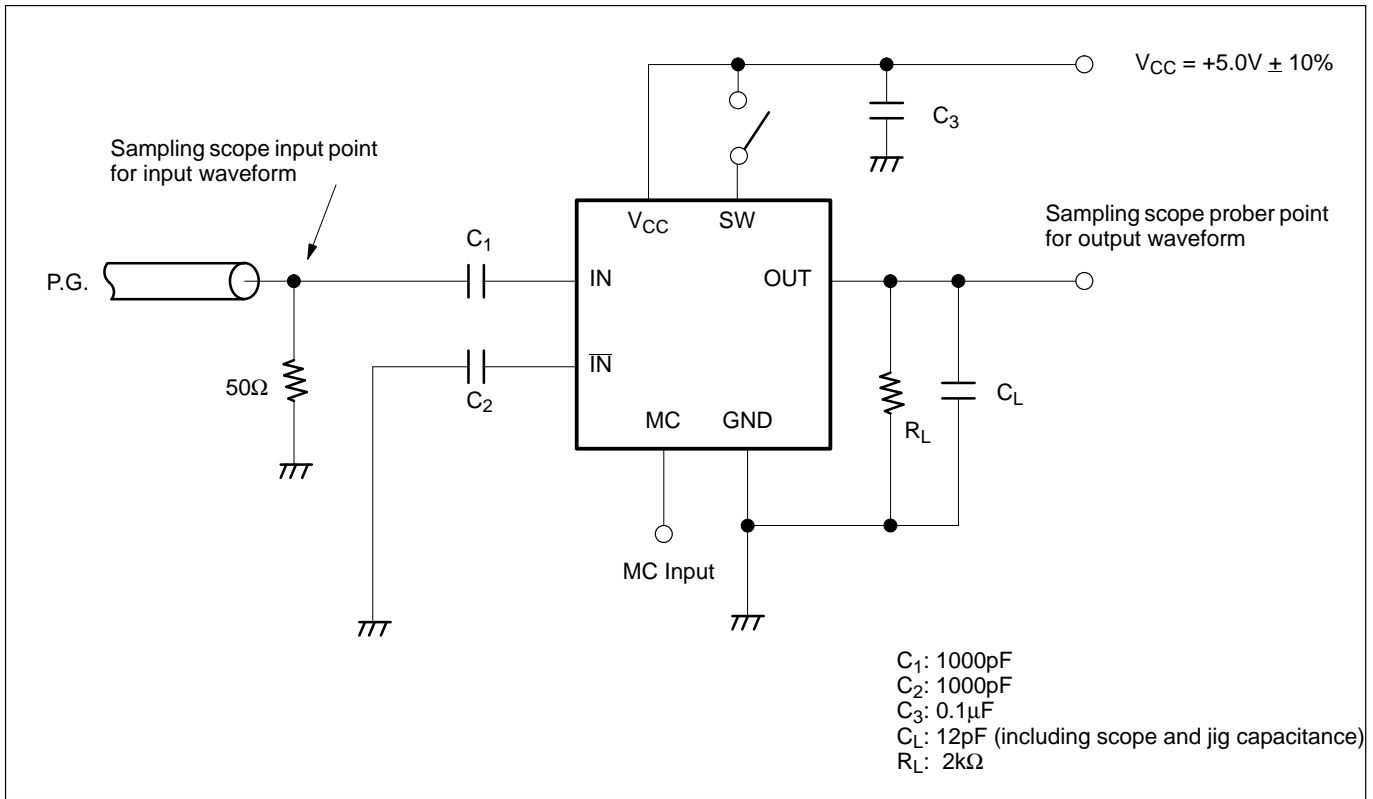


Figure 2. Test Circuit

## TYPICAL CHARACTERISTICS CURVES

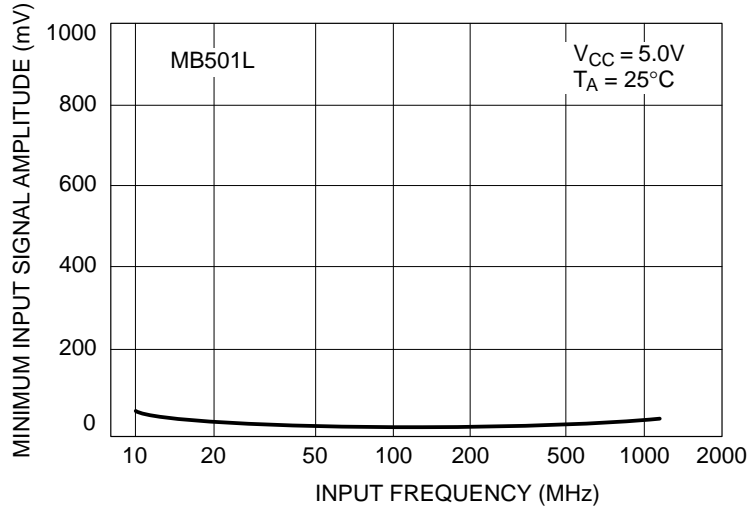


Figure 3. Input Signal Amplitude vs. Input Frequency

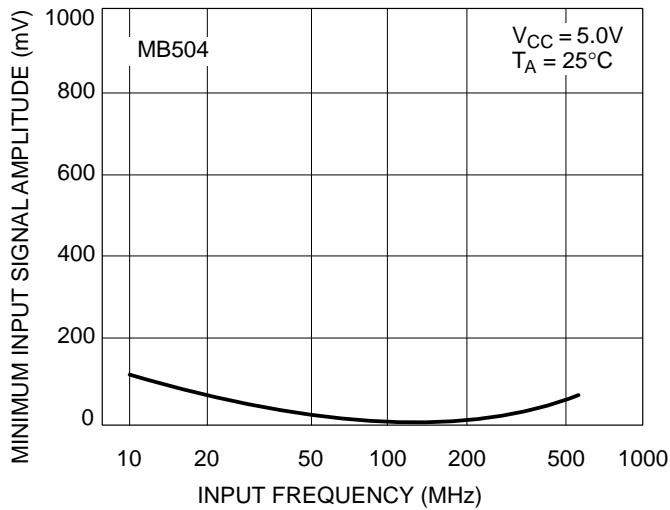


Figure 4. Input Signal Amplitude vs. Input Frequency



## TYPICAL CHARACTERISTICS CURVES (Continued)

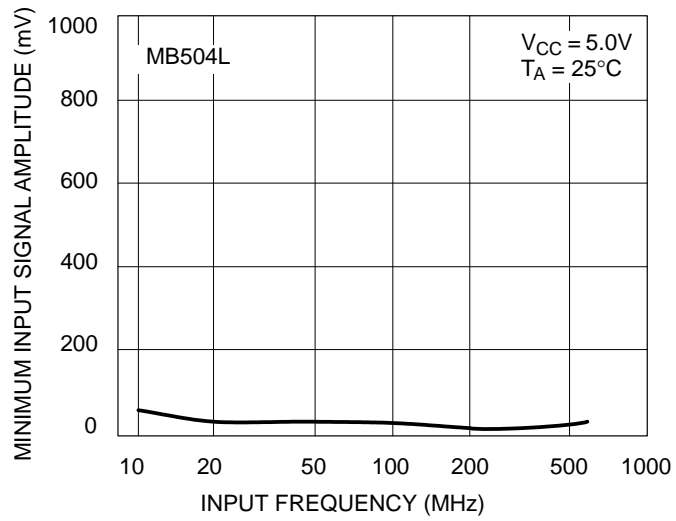
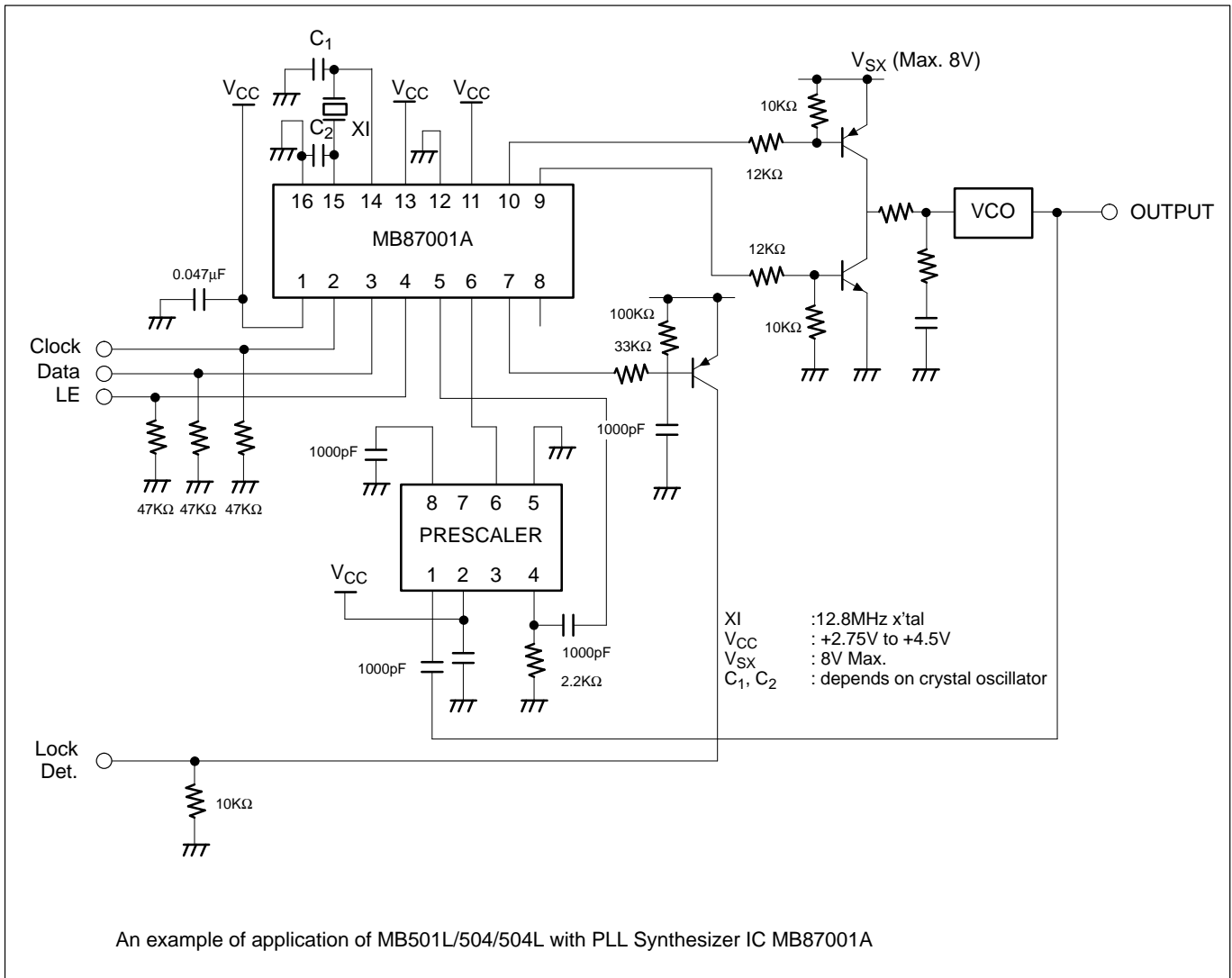


Figure 5. Input Signal Amplitude vs. Input Frequency

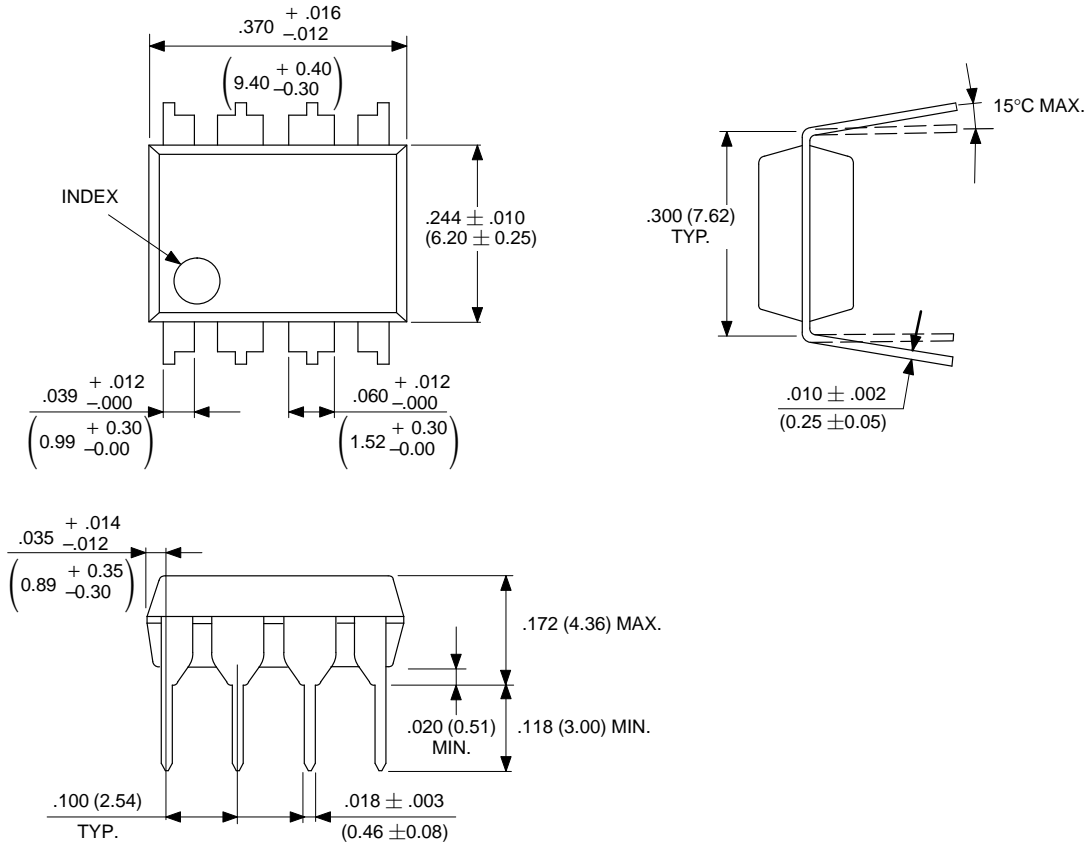
**MB501L  
MB504  
MB504L**



**Figure 6. Typical Application Example**

**PACKAGE DIMENSIONS**

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

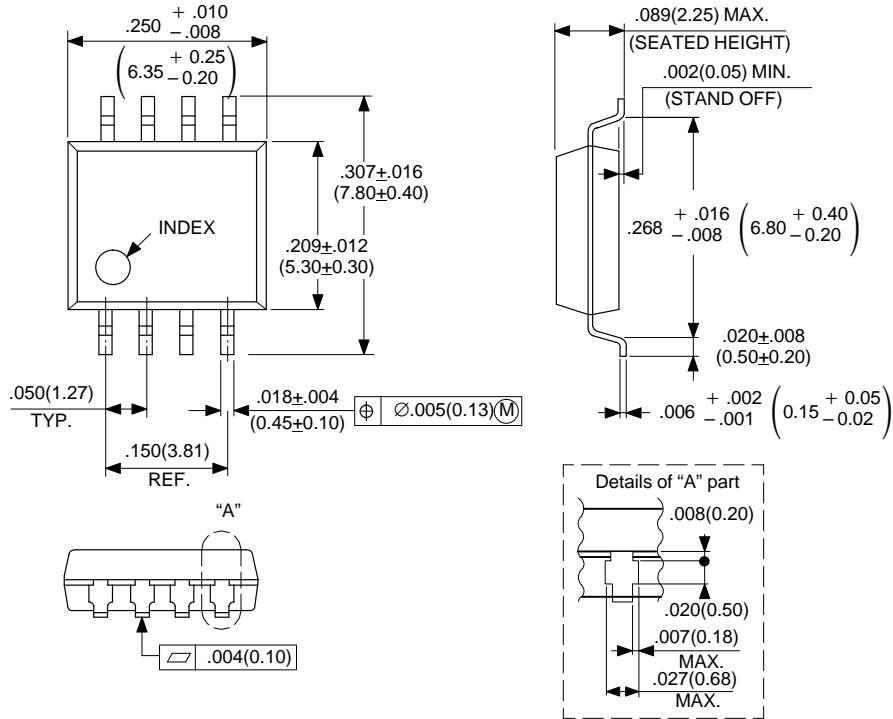


Dimensions in inches (millimeters).

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PACKAGE DIMENSIONS (Continued)

8-LEAD PLASTIC FLAT PACKAGE  
 (CASE No.: FPT-08P-M01)



Dimensions in inches (millimeters).

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