*Sept. 1995*
*Edition 3.0a*

FUJITSU

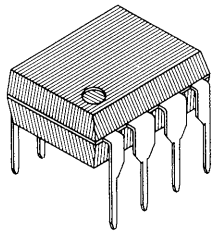
*DATA SHEET*

# *MB508*

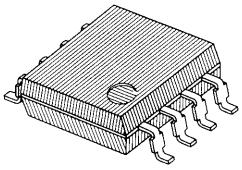
# *2.3GHz TWO MODULUS PRESCALER*

### 2.3GHz TWO MODULUS PRESCALER

The Fujitsu MB508 is a 2.3GHz two modulus prescaler used with a frequency synthesizer to form a Phase Locked Loop (PLL) and divides the input frequency by a modulus of 128/130, 256/258 or 512/514. The output level is 1.6V peak to peak ECL level. The ultra high frequency operation provides wide application, such as Direct Broadcasting Satellite System, CATV system, UHF Transceiver, etc.



**PLASTIC PACKAGE**
**DIP-08P-M01**

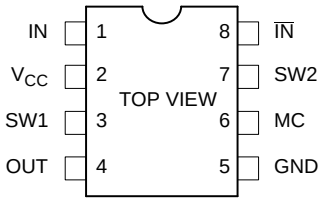


**PLASTIC PACKAGE**
**FPT-08P-M01**

## FEATURES

- High Frequency Operation: f = 2.3GHz max. ($P_{IN}$ = –4dBm min.)
- Input Signal Amplitude: $V_{IN}$ = 100m$V_{p-p}$ ($f_{IN}$ = 100MHz to 1.8GHz)
- Pulse Swallow Function: 128/130, 256/258, 512/514
- Power Dissipation: 120mW typ.
- Wide Operation Temperature: -40°C to +85°C
- Stable Output Amplitude: $V_{OUT}$ = 1.6$V_{p-p}$ typ.
- Complete PLL synthesizer circuit with the Fujitsu MB87001A, PLL synthesizer system block IC
- Standard Plastic 8-pin Dual-In-Line Package or Flat Package

## PIN ASSIGNMENT

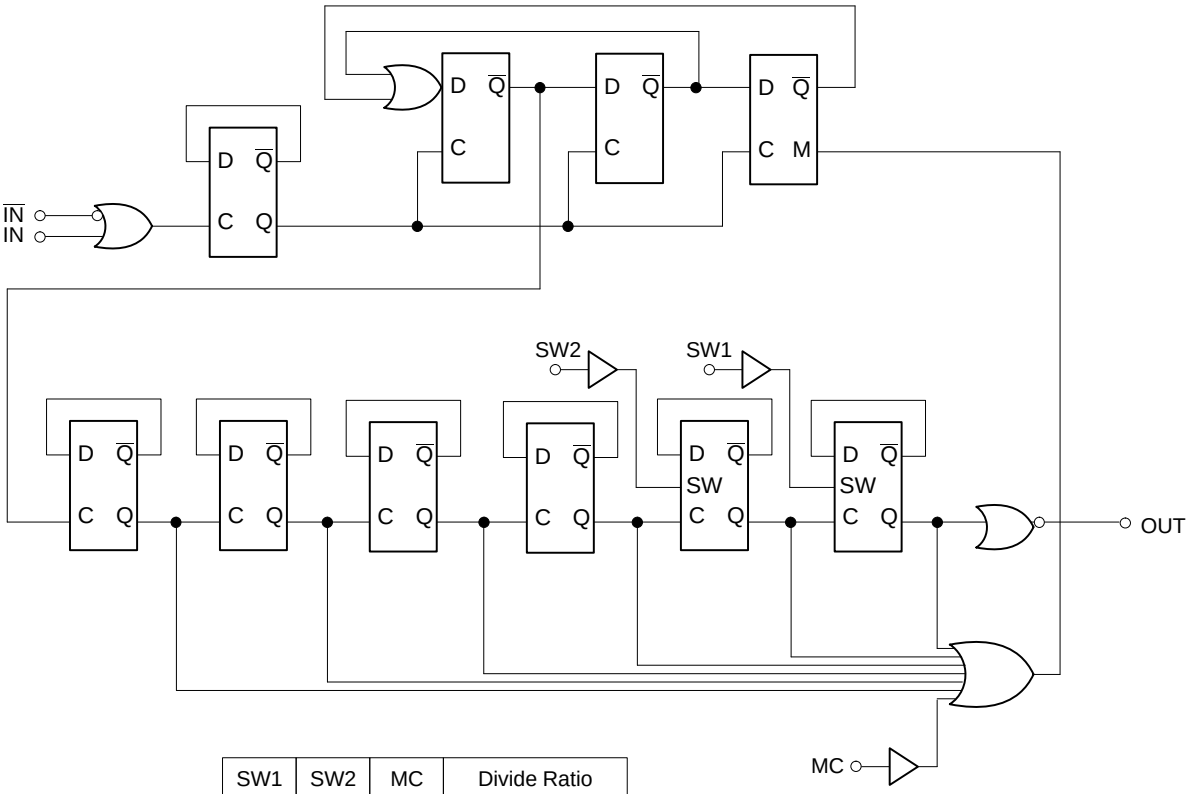



## ABSOLUTE MAXIMUM RATINGS (See Note)

| 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 |
| Operating Temperature | $T_A$ | –40 to +85 | °C |
| 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.

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.




| SW1 | SW2 | MC | Divide Ratio |
|---|---|---|---|
| H | H | H | 1/128 |
| H | H | L | 1/130 |
| H | L | H | 1/256 |
| L | H | H | 1/256 |
| H | L | L | 1/258 |
| L | H | L | 1/258 |
| L | L | H | 1/512 |
| L | L | L | 1/514 |

**Note:** SW: H = $V_{CC}$, L = open
MC: H = 2.0V to $V_{CC}$, L = GND to 0.8V

***Figure 1. MB508 Block Diagram***

## PIN DESCRIPTION

| Pin Number | Symbol | Descriptions |
|---|---|---|
| 1 | IN | Input |
| 2 | $V_{CC}$ | Power Supply, +5V |
| 3 | SW1 | Divide Ratio Control Input (See Divide Ratio Table) |
| 4 | OUT | Output |
| 5 | GND | Ground |
| 6 | MC | Modulus Control Input (See Divide Ratio Table) |
| 7 | SW2 | Divide Ratio Control Input (See Divide Ratio Table) |
| 8 | $\overline{IN}$ | Complementary Input |

## RECOMMENDED OPERATING CONDITIONS

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Power Supply Voltage | $V_{CC}$ | 4.5 | 5.0 | 5.5 | V |
| Output Current | $I_O$ | | 1.2 | | mA |
| Operating Temperature | $T_A$ | –40 | | +85 | °C |
| Load Capacitance | $C_L$ | | | 12 | pF |

## ELECTRICAL CHARACTERISTICS

**(Recommended Operating Conditions unless otherwise noted.)**

| Parameter | Symbol | Condition | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Power Supply Current | $I_{CC}$ | | | 24 | | mA |
| Output Amplitude | $V_O$ | | 1.0 | 1.6 | | $V_{p-p}$ |
| Input Frequency | $f_{IN}$ | with input coupling capacitor 1000pF | 100 | | 2300 | MHz |
| Input Signal Amplitude | $P_{INA}$ | $f_{IN}$ = 1800MHz to 2300MHz | –4 | | 5.5 | dBm |
| | $P_{INB}$ | $f_{IN}$ = 100MHz to 1800MHz | –16 | | 10 | |
| 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 |
| High Level Input Current for SW | $I_{IHS}$ | $V_{IH} = V_{CC}$ | | | 250 | µA |
| Modulus Set-up Time MC to Output at 2.3GHz Operation | $t_{SET}$ | | | 18 | 28 | ns |

**Note:** *Design Guarantee

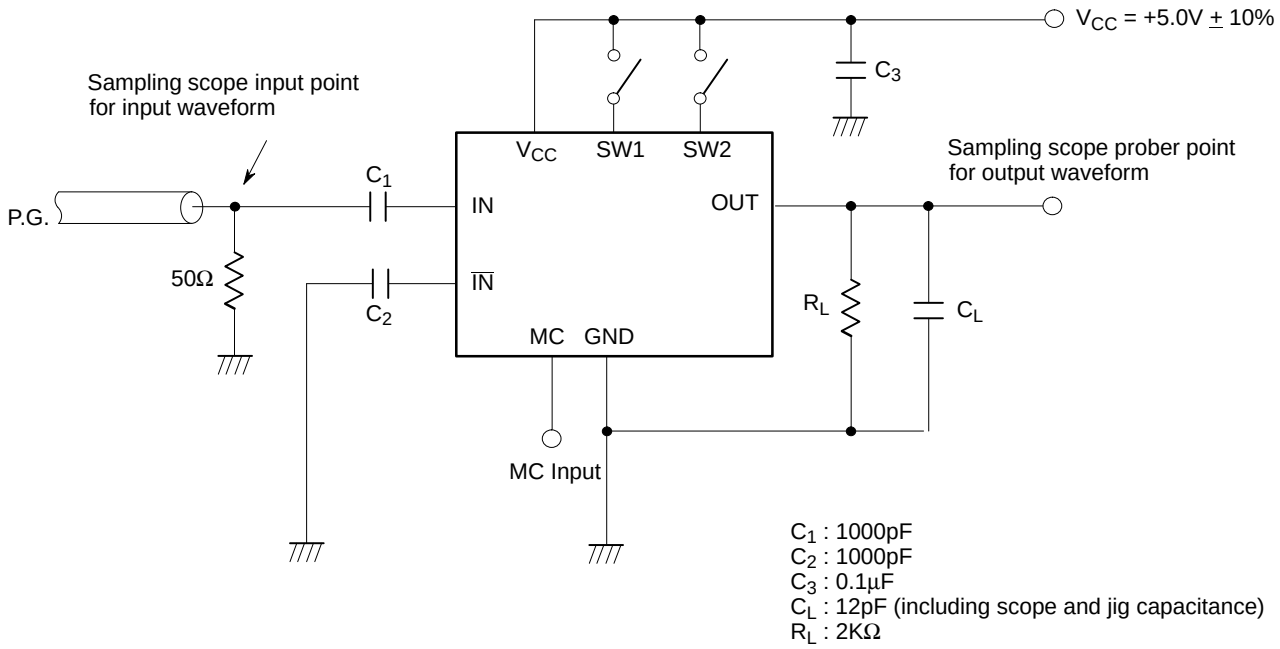
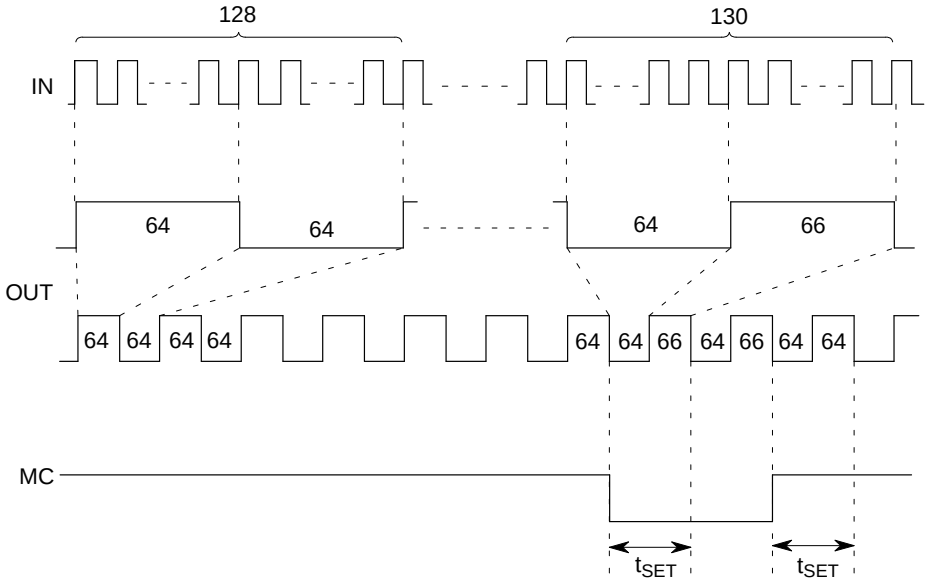



***Figure 2. Test Circuit***

## TIMING CHART (2 MODULUS)

Example: Divide ratio = 128/130




**Note:** When divide of 130 is selected, positive pulse is applied by two to 66.
The typical set up time is 18 ns from the MC signal input to the timing of change of prescaler divide ratio.

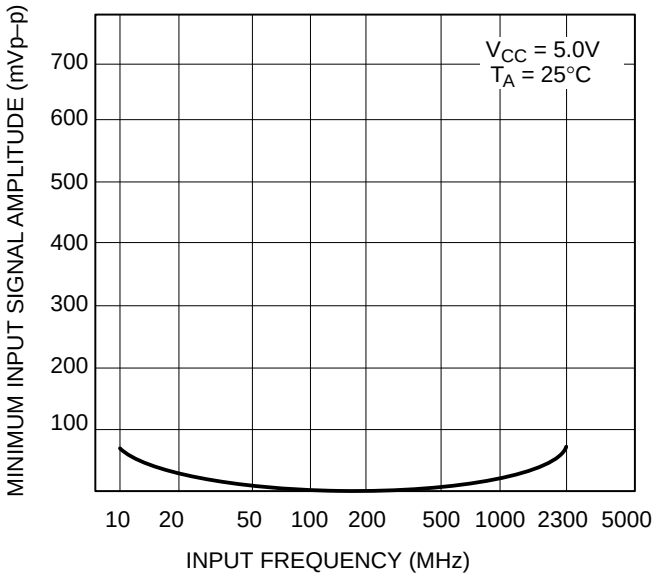



***Figure 3. Input Signal Amplitude vs. Input Frequency***

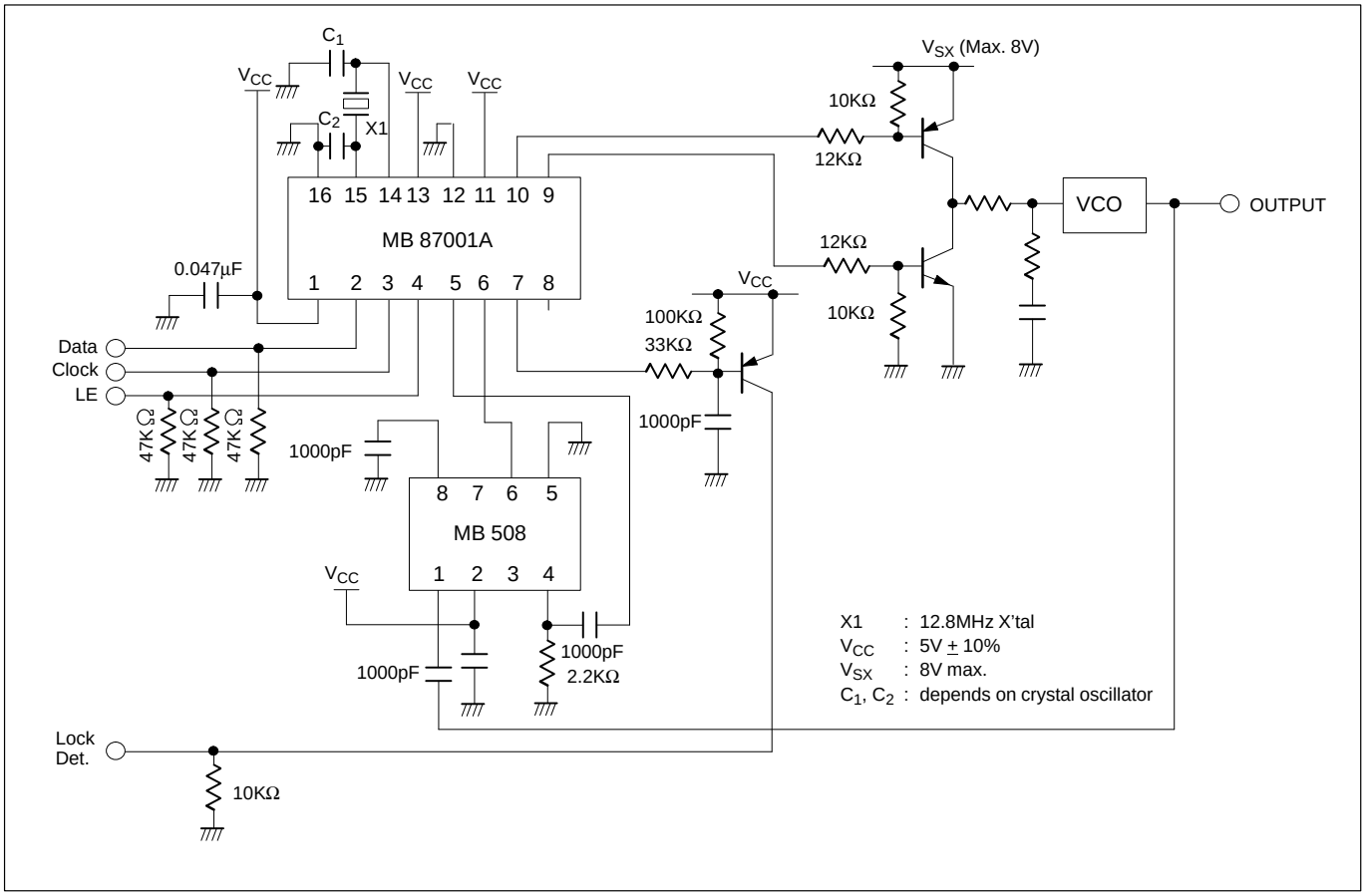
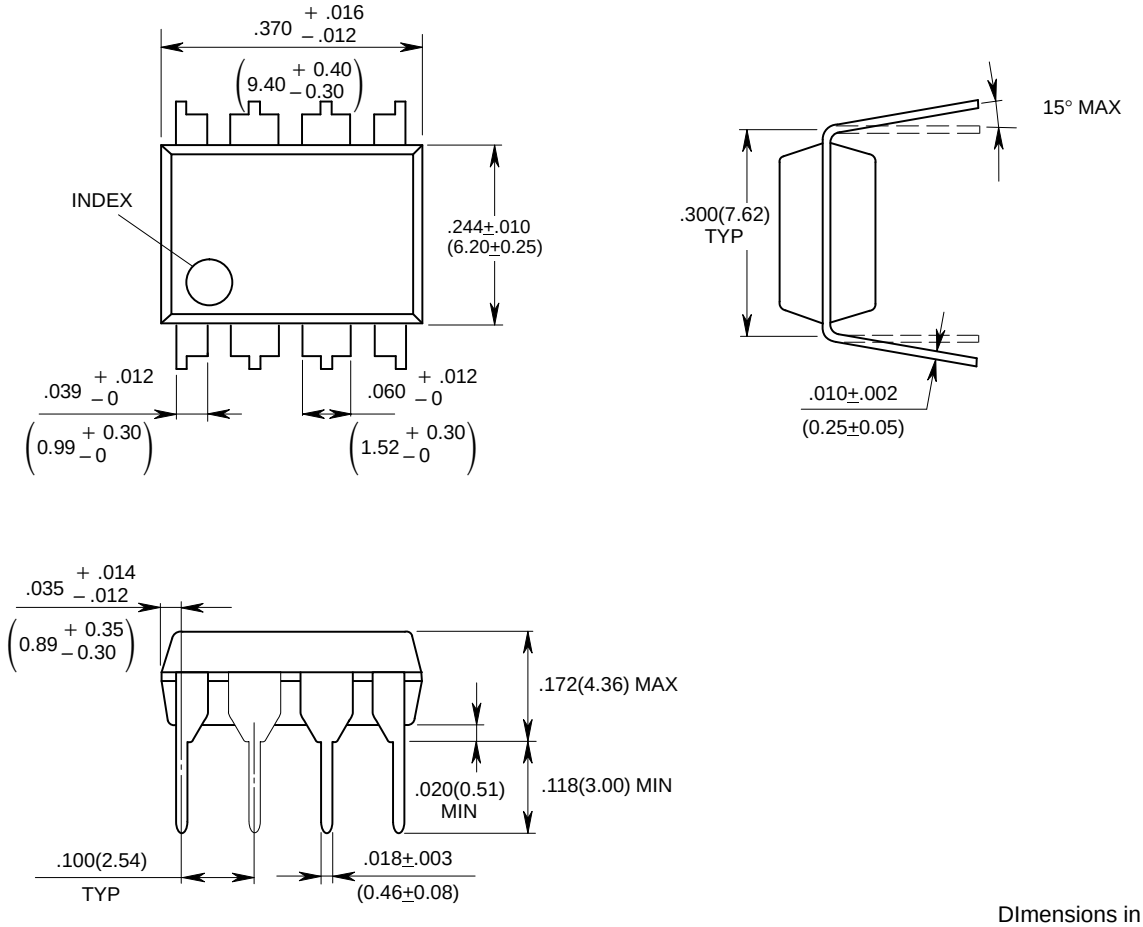



***Figure 4. Typical Application Example***

# PACKAGE DIMENSIONS

**(Suffix: –P)**

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



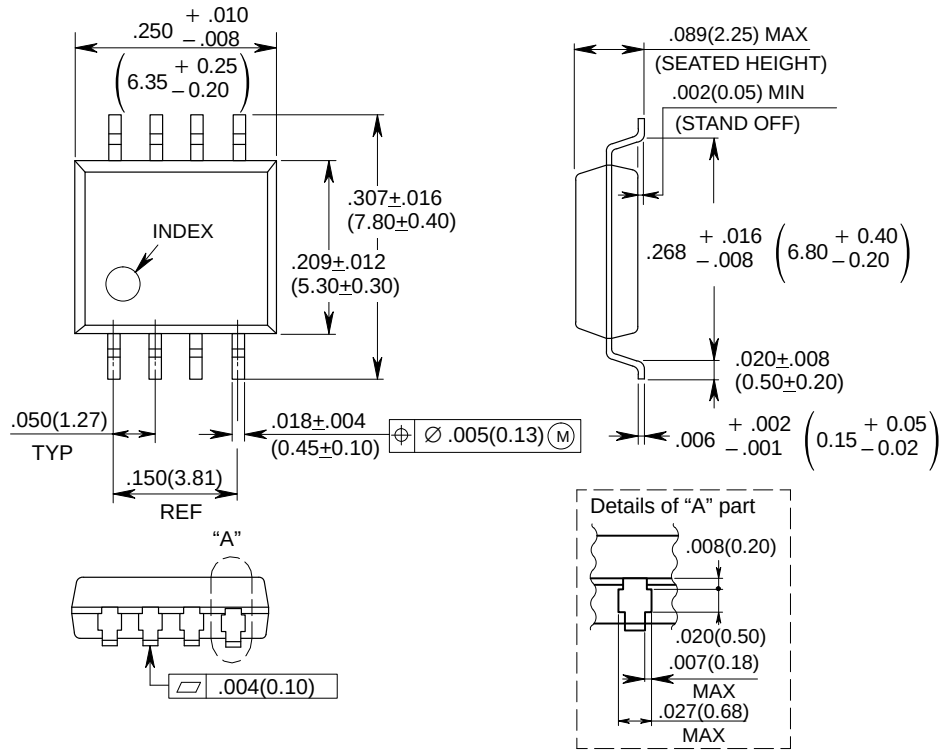



DImensions in
inches (millimeters)

## PACKAGE DIMENSIONS (Continued)

**(Suffix: –PF)**

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






DImensions in
inches (millimeters)

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