MB507
1.6GHz TWO MODULUS PRESCALER

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The Fujitsu MB507 is a 1.6GHz two modulus prescaler used with a frequency synthesizer to form a Phase Locked Loop (PLL). It will divide the input frequency by the modulus of 128/129 or 256/257 and has an output level of 1.6V peak to peak on ECL level.

FEATURES

• High Frequency Operation  1.6GHz max.

• Power Dissipation  90mW typ.

• Pulse Swallow Function

• Wide Operation Temperature  -40°C to +85°C

• Stable Output Amplitude  $V_{OUT} = 1.6V_{p-p}$

• Complete PLL synthesizer circuit with the Fujitsu MB87001A, PLL synthesizer IC

• Package
  Standard 8-pin Dual-In-Line Package  (Suffix: –P)
  Standard 8-pin Flat Package  (Suffix: –PF)

ABSOLUTE MAXIMUM RATINGS (See Note)

<table>
<thead>
<tr>
<th>Rating</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>$V_{CC}$</td>
<td>-0.5 to +7.0</td>
<td>V</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>$V_{IN}$</td>
<td>-0.5 to $V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td>Output Current</td>
<td>$I_{O}$</td>
<td>10</td>
<td>mA</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>$T_{STG}$</td>
<td>-55 to +125</td>
<td>°C</td>
</tr>
</tbody>
</table>

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.

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Figure 1. MB507 Block Diagram

PIN DESCRIPTION

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IN</td>
<td>Input</td>
</tr>
<tr>
<td>2</td>
<td>VCC</td>
<td>DC Supply Voltage</td>
</tr>
<tr>
<td>3</td>
<td>SW</td>
<td>Divide Ratio Control Input Selecting Divide Ratio (See Divide Ratio Table)</td>
</tr>
<tr>
<td>4</td>
<td>OUT</td>
<td>Output</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>MC</td>
<td>Modulus Control Input (See Divide Ratio Table)</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>IN</td>
<td>Complementary Input</td>
</tr>
</tbody>
</table>

Note: SW: H = VCC, L = open
MC: H = 2.0V to VCC, L = GND to 0.8V
### RECOMMENDED OPERATING CONDITIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>$V_{CC}$</td>
<td>4.5  5.0  5.5</td>
<td>V</td>
</tr>
<tr>
<td>Output Current</td>
<td>$I_O$</td>
<td>1.2</td>
<td>mA</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>$T_A$</td>
<td>–40  +85</td>
<td>°C</td>
</tr>
<tr>
<td>Load Capacitance</td>
<td>$C_L$</td>
<td>12</td>
<td>pF</td>
</tr>
</tbody>
</table>

### ELECTRICAL CHARACTERISTICS

(Recommended Operating Conditions unless otherwise noted.)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Current</td>
<td>$I_{CC}$</td>
<td></td>
<td>18</td>
<td>mA</td>
</tr>
<tr>
<td>Output Amplitude</td>
<td>$V_O$</td>
<td></td>
<td>1.0  1.6</td>
<td>V$_{p-p}$</td>
</tr>
<tr>
<td>Input Frequency</td>
<td>$f_{IN}$</td>
<td>with input coupling capacitor 1000pF</td>
<td>100  1600</td>
<td>MHz</td>
</tr>
<tr>
<td>Input Signal Amplitude</td>
<td>$P_{IN}$</td>
<td></td>
<td>–4  10</td>
<td>dBm</td>
</tr>
<tr>
<td>High Level Input Voltage for MC Input</td>
<td>$V_{IH}$</td>
<td></td>
<td>2.0</td>
<td>V</td>
</tr>
<tr>
<td>Low Level Input Voltage for MC Input</td>
<td>$V_{IL}$</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>High Level Input Voltage for SW Input</td>
<td>$V_{IHS}^*$</td>
<td>$V_{CC} -0.1$</td>
<td>$V_{CC}$</td>
<td>V</td>
</tr>
<tr>
<td>Low Level Input Voltage for SW Input</td>
<td>$V_{ILS}$</td>
<td>Open</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>High Level Input Current for MC Input</td>
<td>$I_{IH}$</td>
<td>$V_{IH} = 2.0V$</td>
<td>0.4</td>
<td>mA</td>
</tr>
<tr>
<td>Low Level Input Current for MC Input</td>
<td>$I_{IL}$</td>
<td>$V_{IL} = 0.8V$</td>
<td>–0.2</td>
<td>mA</td>
</tr>
<tr>
<td>Modulus Set-up Time MC to OUT</td>
<td>$I_{SET}$</td>
<td>1.6GHz Operation</td>
<td>18  28</td>
<td>ns</td>
</tr>
</tbody>
</table>

**Note:** *Design Guarantee*
Sampling scope input point
for input waveform

Sampling scope prober point
for output waveform

Note: When divide of 129 is selected, positive pulse is applied by one to 65.
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**

![Graph showing input signal amplitude vs. input frequency.](image)

**Figure 4. Typical Application Example**

![Circuit diagram showing typical application.](image)

- $V_{CC} = 5.0\, V$
- $T_A = 25\, ^\circ C$
- Minimum input signal amplitude (mVp-p)
- Input frequency (MHz)

**Data Clock LE**
- 47K
- 47K
- 47K
- 1000pF

**VCC**
- 0.047µF
- 12K
- 10K
- 33K

**V SX** (Max. 8V)
- 1000pF
- 12K
- 10K

- $X_1$ : 12.8MHz X'tal
- $V_{CC}$ : 5V ± 10%
- $V_{SX}$ : 8V max.
- $C_1, C_2$ : depends on crystal oscillator

**Lock Det.**
- 10KΩ

**Output**
PACKAGE DIMENSIONS
(Suffix: PF)

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

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