

1.1GHz Dual Modulus Prescaler With Stand-By Mode

Consider MC12053 for New Designs

The MC12036 is a 1.1GHz $\div 64/65$, $\div 128/129$ dual modulus prescaler used in phase-locked loop (PLL) applications. Stand-By mode is featured to reduce current drain to 0.5mA typical when the standby pin (SB) is switched LOW, disabling the prescaler. On-chip output termination provides sufficient output current to drive a 12pF (typical) high impedance load.

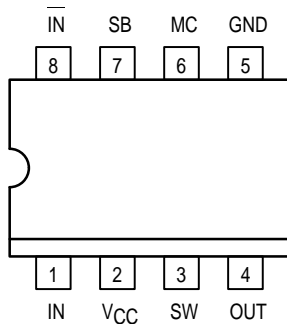
The MC12036A can be used with CMOS synthesizers requiring positive edges to trigger internal counters such as Motorola's MC145xxx series in a PLL to provide tuning signals up to 1.1GHz in programmable frequency steps. The MC12036B can be used with CMOS synthesizers requiring negative edges to trigger internal counters.

A Divide Ratio Control (SW) permits selection of a 64/65 or 128/129 divide ratio as desired.

The Modulus Control (MC) selects the proper divide number after SW has been biased to select the desired divide ratio.

- 1.1GHz Toggle Frequency
- Low Power 4.0mA Typical
- Stand-By Mode
- On-Chip Output Termination
- Supply Voltage 4.5V to 5.5V
- Operating Temperature Range of -40°C to $+85^{\circ}\text{C}$
- Short Setup Time (t_{set}) 16ns Maximum @ 1.1GHz
- Modulus Control Input Level is Compatible With Standard CMOS and TTL

Pinout: 8-Lead Plastic (Top View)



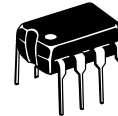
| Design Criteria | Value | Unit |
|---------------------------------|-------|------|
| Internal Gate Count * | 67 | ea |
| Internal Gate Propagation Delay | 200 | ps |
| Internal Gate Power Dissipation | 0.75 | mW |
| Speed Power Product | 0.15 | pJ |

*Equivalent to a two-input NAND gate.

MC12036A MC12036B

MECL PLL COMPONENTS

$\div 64/65$, $\div 128/129$
DUAL MODULUS PRESCALER
WITH STAND-BY MODE



P SUFFIX
8-LEAD PLASTIC PACKAGE
CASE 626-05



D SUFFIX
8-LEAD PLASTIC SOIC PACKAGE
CASE 751-05

FUNCTION TABLE

| SW | MC | Divide Ratio |
|----|----|--------------|
| H | H | 64 |
| H | L | 65 |
| L | H | 128 |
| L | L | 129 |

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



MAXIMUM RATINGS

| Symbol | Characteristic | Range | Unit |
|------------------|------------------------------|--------------|------|
| V _{CC} | Power Supply Voltage, Pin 2 | -0.5 to +7.0 | Vdc |
| T _A | Operating Temperature Range | -40 to +85 | °C |
| T _{stg} | Storage Temperature Range | -65 to +150 | °C |
| MC | Modulus Control Input, Pin 6 | -0.5 to +6.5 | Vdc |

ELECTRICAL CHARACTERISTICS (V_{CC} = 4.5 to 5.5 Vdc, T_A = -40°C to +85°C)

| Symbol | Characteristic | Min | Typ | Max | Unit |
|------------------|---|-----------------|-----------------|-----------------|------------------|
| f _t | Toggle Frequency (Sine Wave Input) | 0.1 | 1.4 | 1.1 | GHz |
| I _{CC} | Supply Current (Pin 2) | — | 4.0 | 6.5 | mA |
| V _{IH1} | Modulus Control & Standby Input High (MC & SB) | 2.0 | — | V _{CC} | V |
| V _{IL1} | Modulus Control & Standby Input Low (MC & SB) | — | — | 0.8 | V |
| V _{IH2} | Divide Ratio Control Input High (SW) | V _{CC} | V _{CC} | V _{CC} | Vdc |
| V _{IL2} | Divide Ratio Control Input Low (SW) | OPEN | OPEN | OPEN | — |
| V _{out} | Output Voltage Swing, C _L = 8pF | 1.0 | 1.4 | — | V _{p-p} |
| t _{SET} | Modulus Setup Time MC to Out | — | 11 | 16 | ns |
| V _{in} | Input Voltage Sensitivity 250–1100 MHz 100–250 MHz | 100 400 | — — | 1000 1000 | mVpp |
| ISB | Standby Current | — | 0.5 | — | mA |

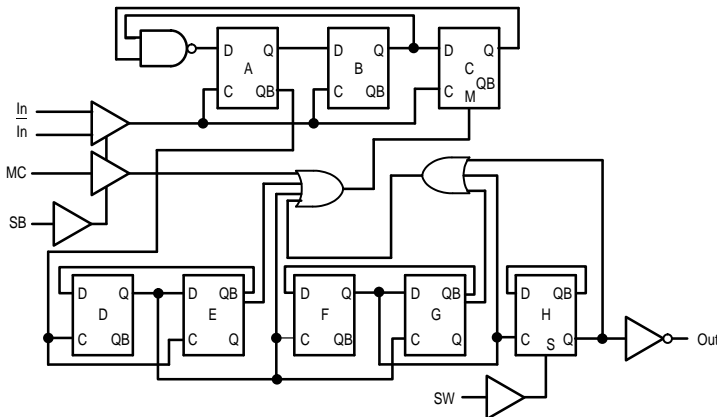
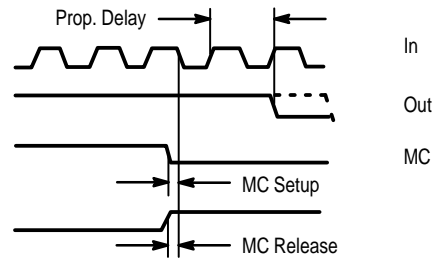
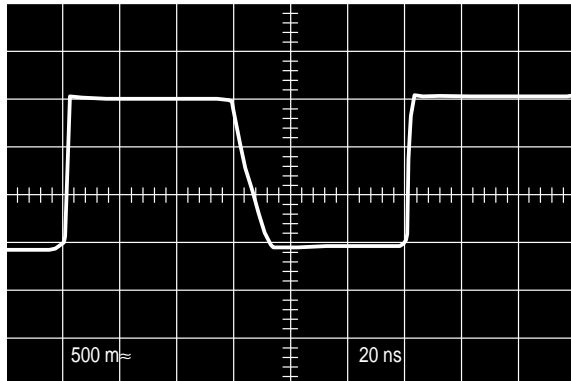


Figure 1. Logic Diagram (MC12036A)

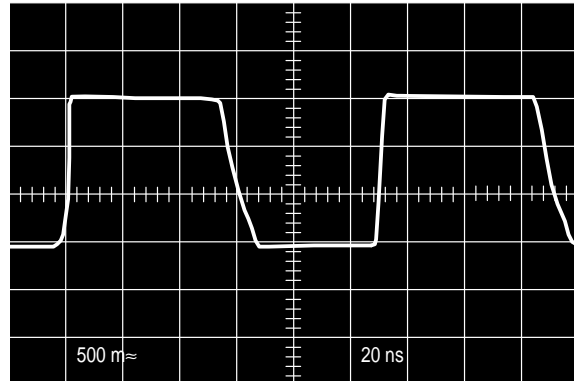


Modulus setup time MC to out is the MC setup or MC release plus the prop. delay.

Figure 2. Modulus Setup Time



(÷64, 500MHz Input Frequency, V_{CC} = 5.0V, T_A = 25°C, Output Loaded)



(÷128, 1.1GHz Input Frequency, V_{CC} = 5.0V, T_A = 25°C, Output Loaded)

Figure 3. Typical Output Waveform

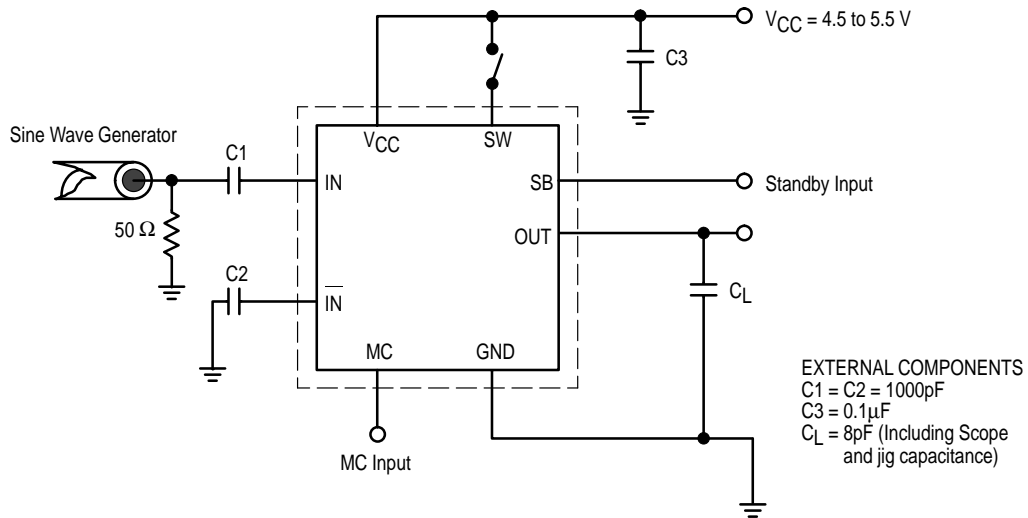


Figure 4. AC Test Circuit

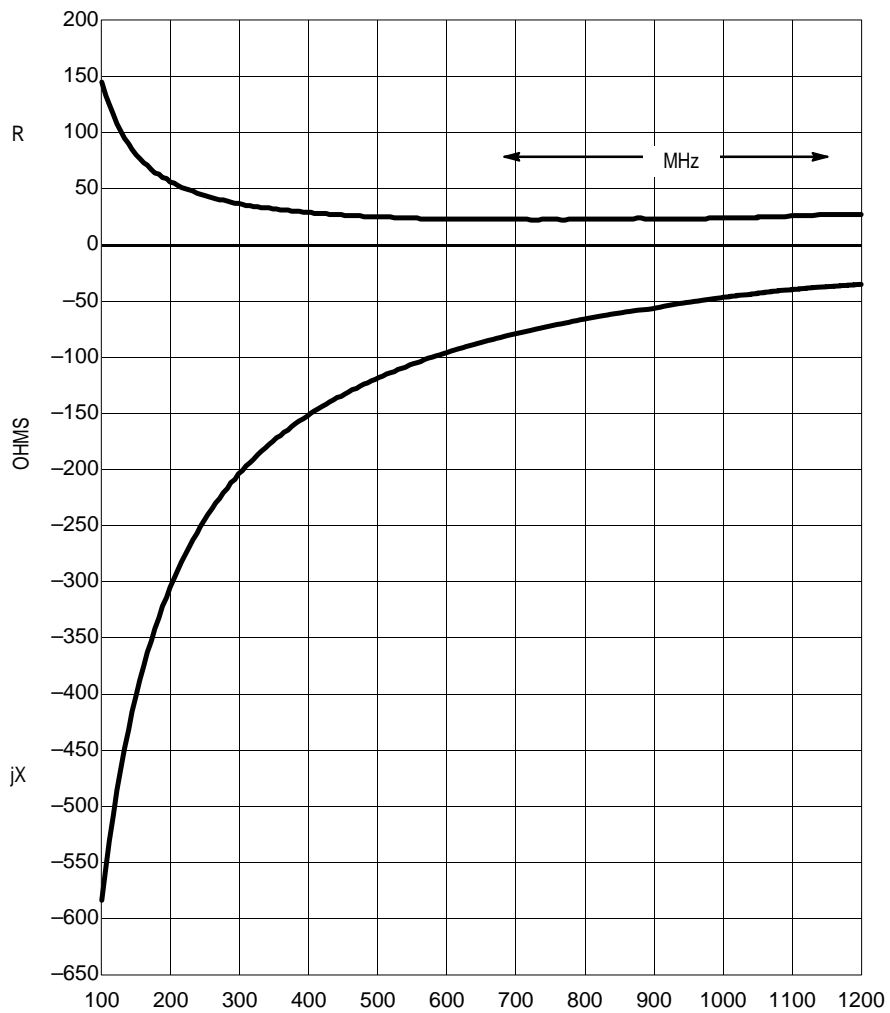


Figure 5. Typical Input Impedance versus Input Frequency

OUTLINE DIMENSIONS

P SUFFIX
PLASTIC PACKAGE
CASE 626-05
ISSUE K

NOTE 2: (points to lead dimensions)

SEATING PLANE

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 9.40 | 10.16 | 0.370 | 0.400 |
| B | 6.10 | 6.60 | 0.240 | 0.260 |
| C | 3.94 | 4.45 | 0.155 | 0.175 |
| D | 0.38 | 0.51 | 0.015 | 0.020 |
| F | 1.02 | 1.78 | 0.040 | 0.070 |
| G | 2.54 BSC | | 0.100 BSC | |
| H | 0.76 | 1.27 | 0.030 | 0.050 |
| J | 0.20 | 0.30 | 0.008 | 0.012 |
| K | 2.92 | 3.43 | 0.115 | 0.135 |
| L | 7.62 BSC | | 0.300 BSC | |
| M | 10° | | 10° | |
| N | 0.76 | 1.01 | 0.030 | 0.040 |

⊕ ∅ 0.13 (0.005) Ⓜ T A Ⓜ B Ⓜ

D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751-05
ISSUE R

NOTE 1: DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.

NOTE 2: DIMENSIONS ARE IN MILLIMETERS.

NOTE 3: DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.

NOTE 4: MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

NOTE 5: DIMENSION B DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 1.35 | 1.75 |
| A1 | 0.10 | 0.25 |
| B | 0.35 | 0.49 |
| C | 0.18 | 0.25 |
| D | 4.80 | 5.00 |
| E | 3.80 | 4.00 |
| e | 1.27 BSC | |
| H | 5.80 | 6.20 |
| h | 0.25 | 0.50 |
| L | 0.40 | 1.25 |
| θ | 0° 7° | |

⊕ 0.25 Ⓜ B Ⓜ

⊕ 0.25 Ⓜ C B Ⓢ A Ⓢ

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