

## 1.1GHz Dual Modulus Prescaler

The MC12022A 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.

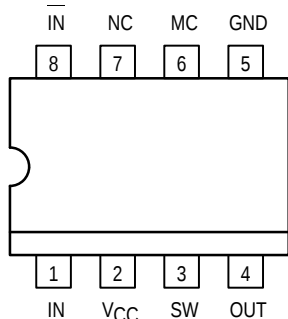
The MC12022B can be used with CMOS synthesizers requiring negative edges to trigger internal counters.

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.

- 1.1 GHz Toggle Frequency
- Supply Voltage of 4.5 to 5.5V
- Low-Power 7.5mA Typical
- Operating Temperature Range of -40 to +85°C
- Short Setup Time ( $t_{set}$ ) 16ns Maximum @ 1.1GHz
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL. Maximum Input Voltage Should Be Limited to 6.5Vdc

**Pinout: 8-Lead Plastic (Top View)**



### FUNCTIONAL 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 = 2.0 V to  $V_{CC}$ , L = GND to 0.8 V

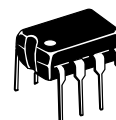
### MAXIMUM RATINGS

| 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  |

**MC12022A**  
**MC12022B**

### MECL PLL COMPONENTS

**÷64/65, ÷128/129**  
**DUAL MODULUS**  
**PRESCALER**



**P SUFFIX**  
8-LEAD PLASTIC PACKAGE  
CASE 626-05

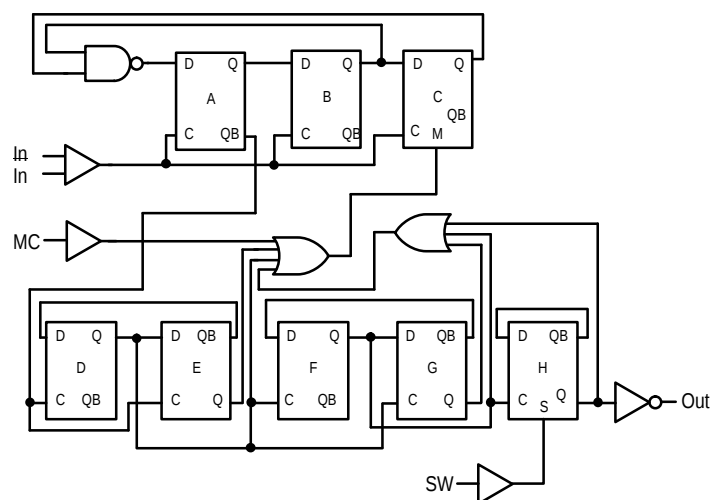
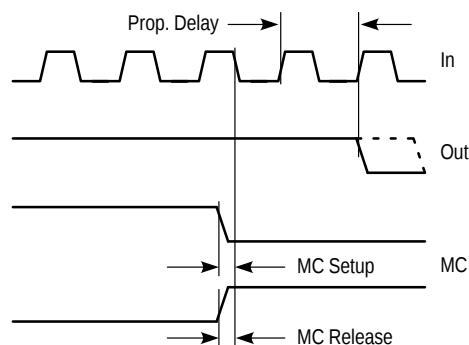


**D SUFFIX**  
8-LEAD PLASTIC SOIC PACKAGE  
CASE 751-05

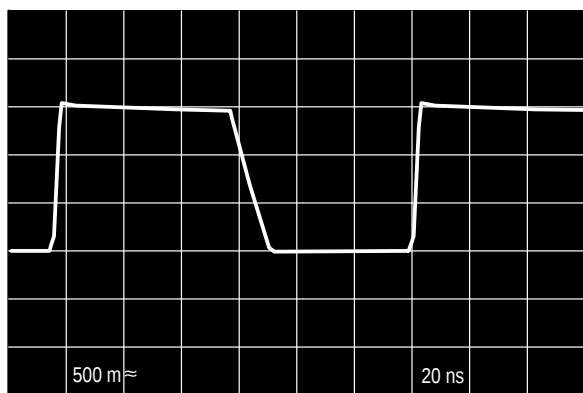


**ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 4.5$  to  $5.5V$ ;  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ )

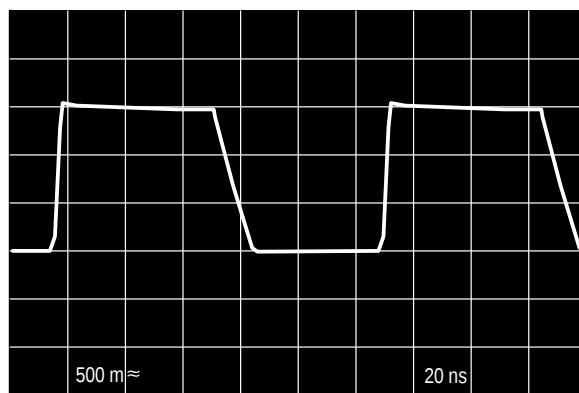
| Symbol    | Characteristic                                             | Min        | Typ      | Max          | Unit             |
|-----------|------------------------------------------------------------|------------|----------|--------------|------------------|
| $f_t$     | Toggle Frequency (Sine Wave Input)                         | 0.1        | 1.6      | 1.1          | GHz              |
| $I_{CC}$  | Supply Current Output Unloaded (Pin 2)                     |            | 7.5      | 10           | mA               |
| $V_{IH1}$ | Modulus Control Input High (MC)                            | 2.0        |          | $V_{CC}$     | V                |
| $V_{IL1}$ | Modulus Control Input Low (MC)                             |            |          | 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 ( $C_L = 12pF$ ; $R_L = 2.2k\Omega$ ) | 1.0        | 1.6      |              | V <sub>p-p</sub> |
| $t_{set}$ | Modulus Setup Time MC to Out                               |            | 11       | 16           | ns               |
| $V_{in}$  | Input Voltage Sensitivity 250–1100 MHz<br>100–250 MHz      | 100<br>400 |          | 1500<br>1500 | mVpp             |
| $I_O$     | Output Current ( $C_L = 12pF$ ; $R_L = 2.2k\Omega$ )       |            | 1.5      | 4.0          | mA               |

**Figure 1. Logic Diagram (MC12022A)**

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,  $V_{CC} = 5.0V$ ,  $T_A = 25^{\circ}C$ , Output Loaded)



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

**Figure 3. Typical Output Waveforms**

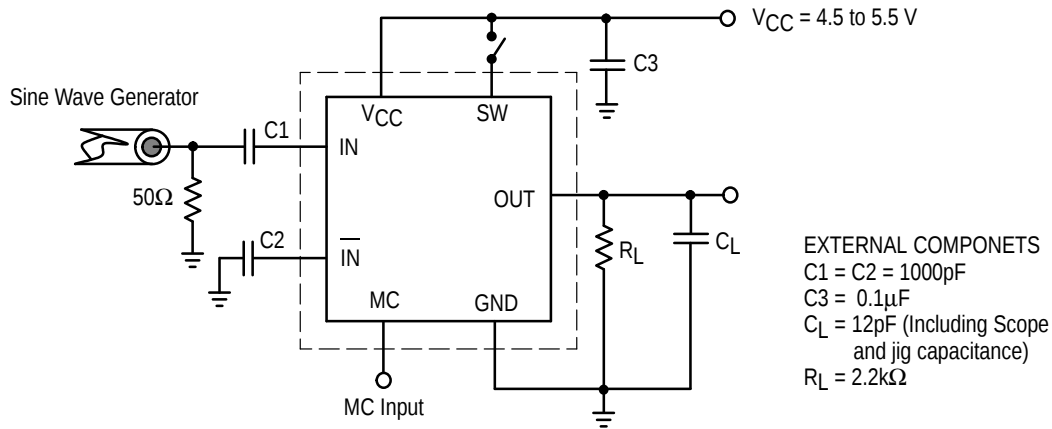


Figure 4. AC Test Circuit

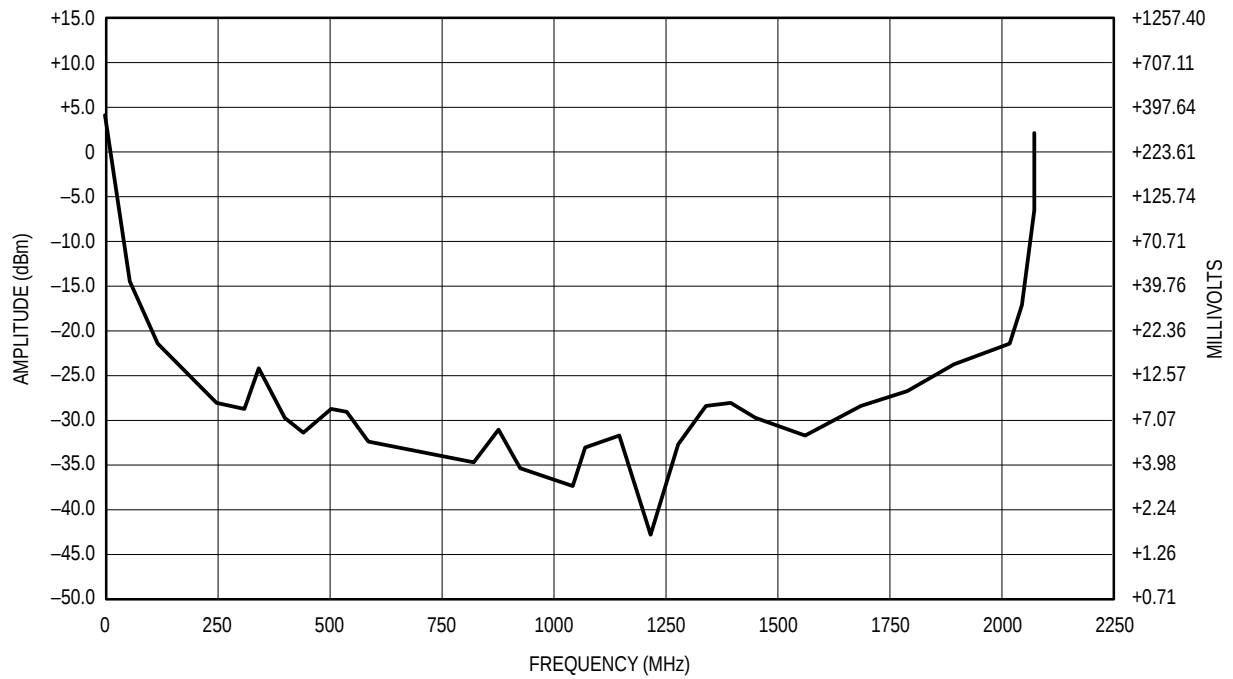


Figure 5. Input Signal Amplitude versus Input Frequency

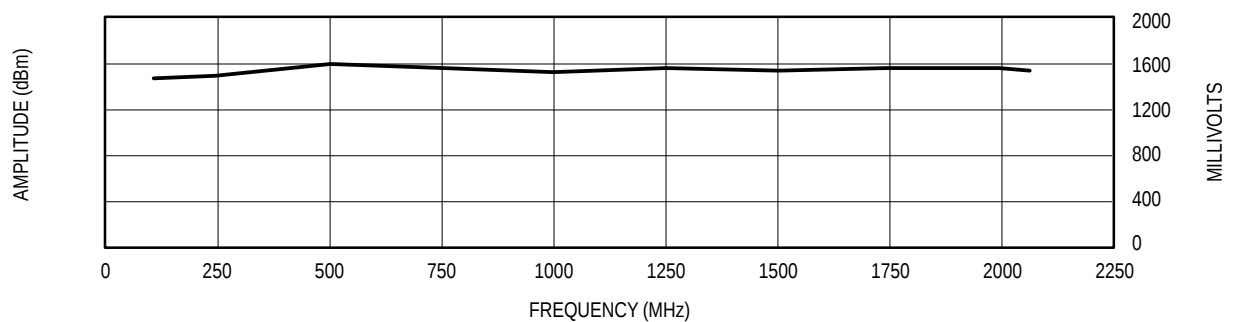
Divide Ratio = 8;  $V_{CC} = 5.0\text{V}$ ;  $T_A = 25^\circ\text{C}$ 

Figure 6. Output Amplitude versus Input Frequency

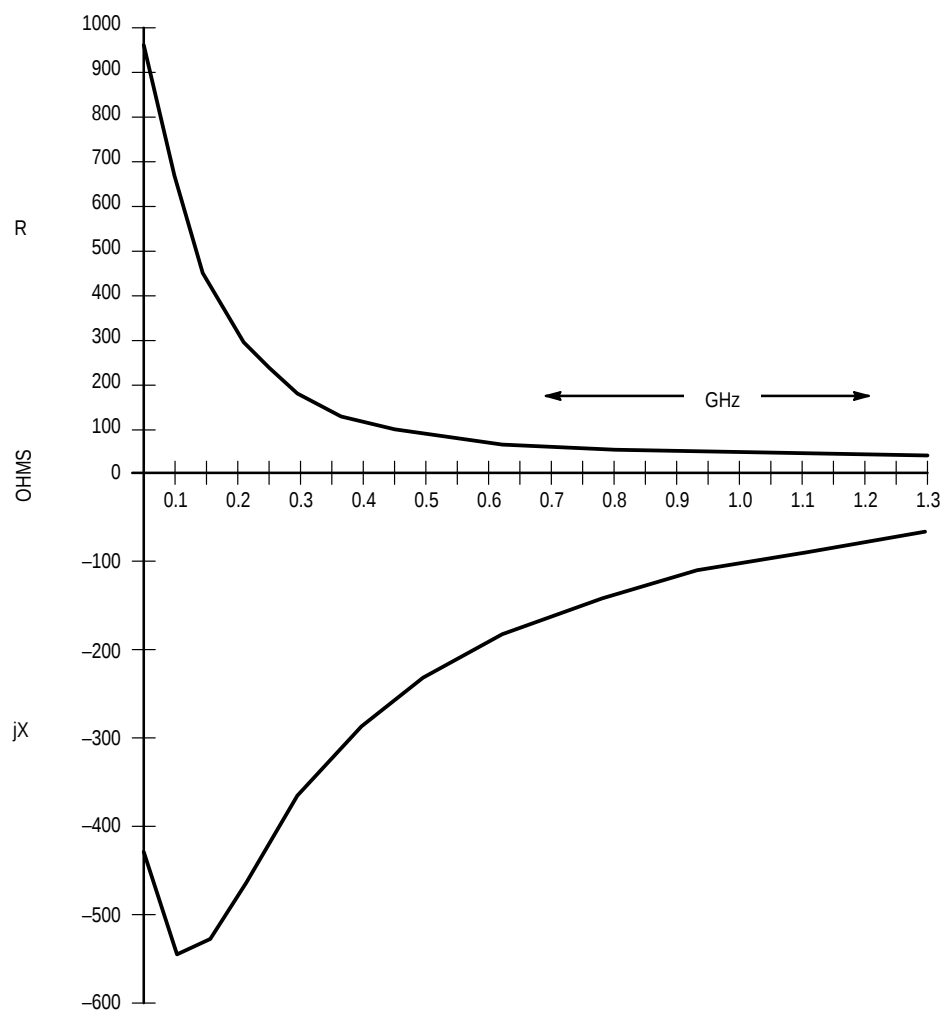
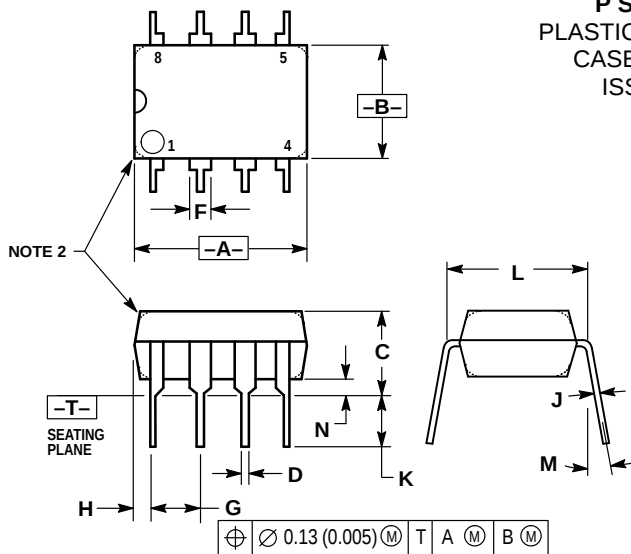


Figure 7. Typical Input Impedance versus Input Frequency

## OUTLINE DIMENSIONS

**P SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 626-05**  
**ISSUE K**

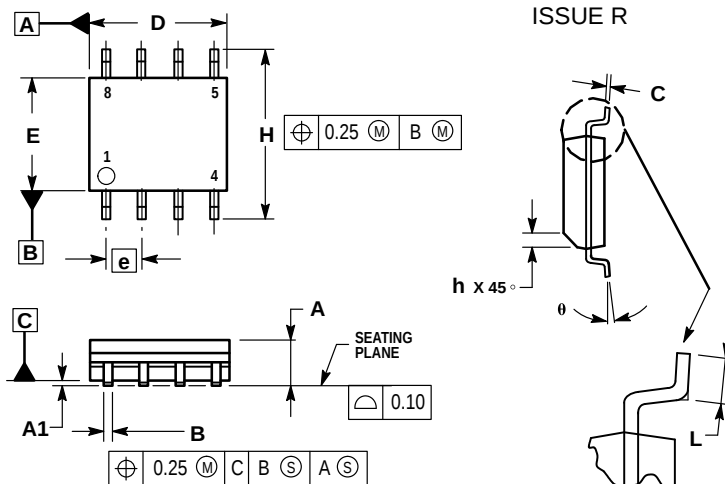


## NOTES:

1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

| 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 |

**D SUFFIX**  
**PLASTIC SOIC PACKAGE**  
**CASE 751-05**  
**ISSUE R**



## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
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°   |

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