

# 1.1GHz Two-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.

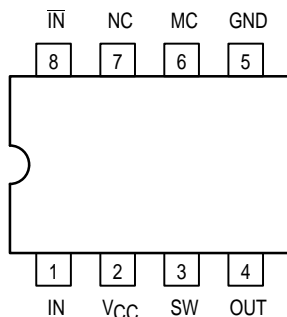
The MC12022B can be used with CMOS synthesizers requiring negative edges to trigger internal counters.

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 = VCC, L = Open

MC: H = 2.0 V to VCC, L = GND to 0.8 V

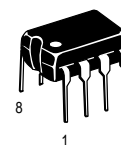
## MAXIMUM RATINGS

Symbol	Characteristic	Range	Unit
VCC	Power Supply Voltage, Pin 2	-0.5 to +7.0	Vdc
TA	Operating Temperature Range	-40 to +85	°C
Tstg	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  
**TWO-MODULUS  
PRESCALER**



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



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



ELECTRICAL CHARACTERISTICS (V<sub>CC</sub> = 4.5 to 5.5V ±10%; T<sub>A</sub> = -40°C to +85°C)

Symbol	Characteristic	Min	Typ	Max	Unit
f <sub>t</sub>	Toggle Frequency (Sine Wave Input)	0.1	1.6	1.1	GHz
I <sub>CC</sub>	Supply Current Output Unloaded (Pin 2)		7.5	10	mA
V <sub>IH1</sub>	Modulus Control Input High (MC)	2.0			V
V <sub>IL1</sub>	Modulus Control Input Low (MC)			0.8	V
V <sub>IH2</sub>	Divide Ratio Control Input High (SW)	V <sub>CC</sub> - 0.5V	V <sub>CC</sub>	V <sub>CC</sub> + 0.5V	V <sub>d</sub> c
V <sub>IL2</sub>	Divide Ratio Control Input Low (SW)	Open	Open	Open	—
V <sub>out</sub>	Output Voltage Swing (C <sub>L</sub> = 12pF; R <sub>L</sub> = 2.2kΩ)	1.0	1.6		V <sub>p-p</sub>
t <sub>set</sub>	Modulus Setup Time MC to Out		11	16	ns
V <sub>in</sub>	Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	100 400		1500 1500	mV <sub>pp</sub>
I <sub>O</sub>	Output Current (C <sub>L</sub> = 12pF; R <sub>L</sub> = 2.2kΩ)			0.2	mA

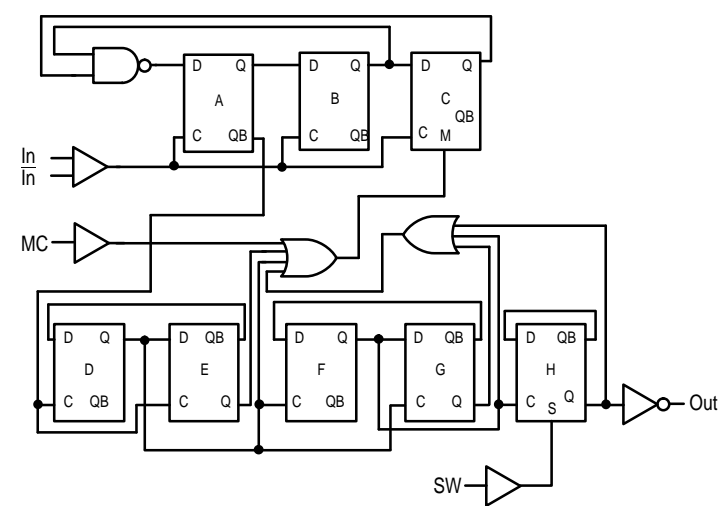
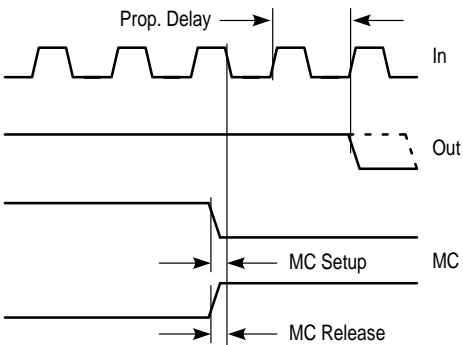
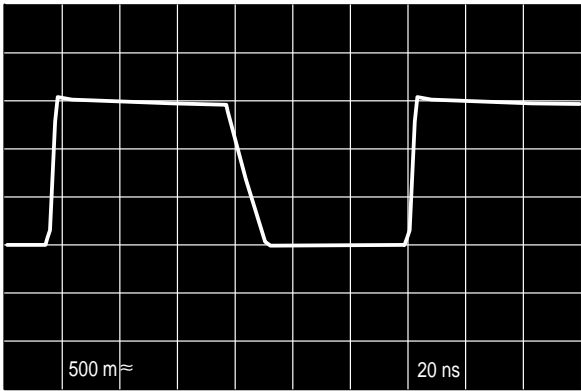


Figure 1. Logic Diagram (MC12022A)

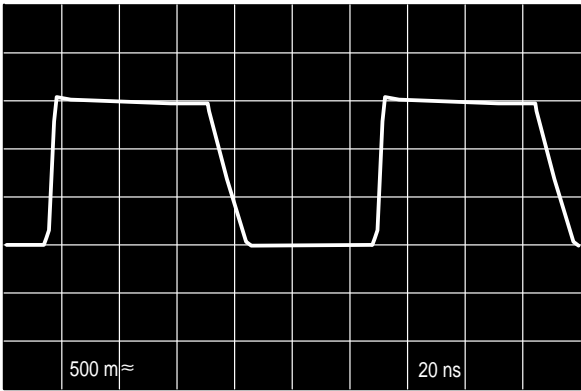


Modulus setup time MC to out is the MC setup or MC release plus the prop delay.

Figure 2. Modulus Setup Time



(÷64, 500MHz Input Frequency, V<sub>CC</sub> = 5.0V, T<sub>A</sub> = 25°C, Output Loaded)



(÷128, 1.1GHz Input Frequency, V<sub>CC</sub> = 5.0V, T<sub>A</sub> = 25°C, Output Loaded)

Figure 3. Typical Output Waveforms

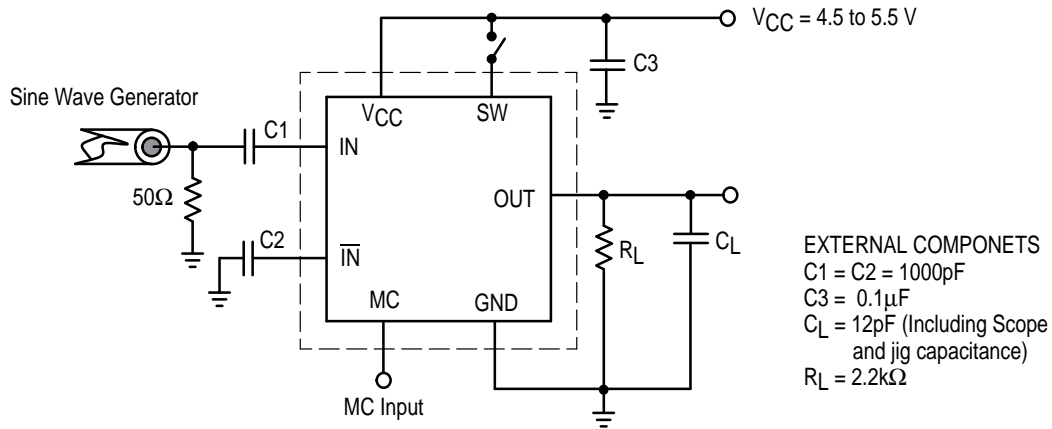


Figure 4. AC Test Circuit

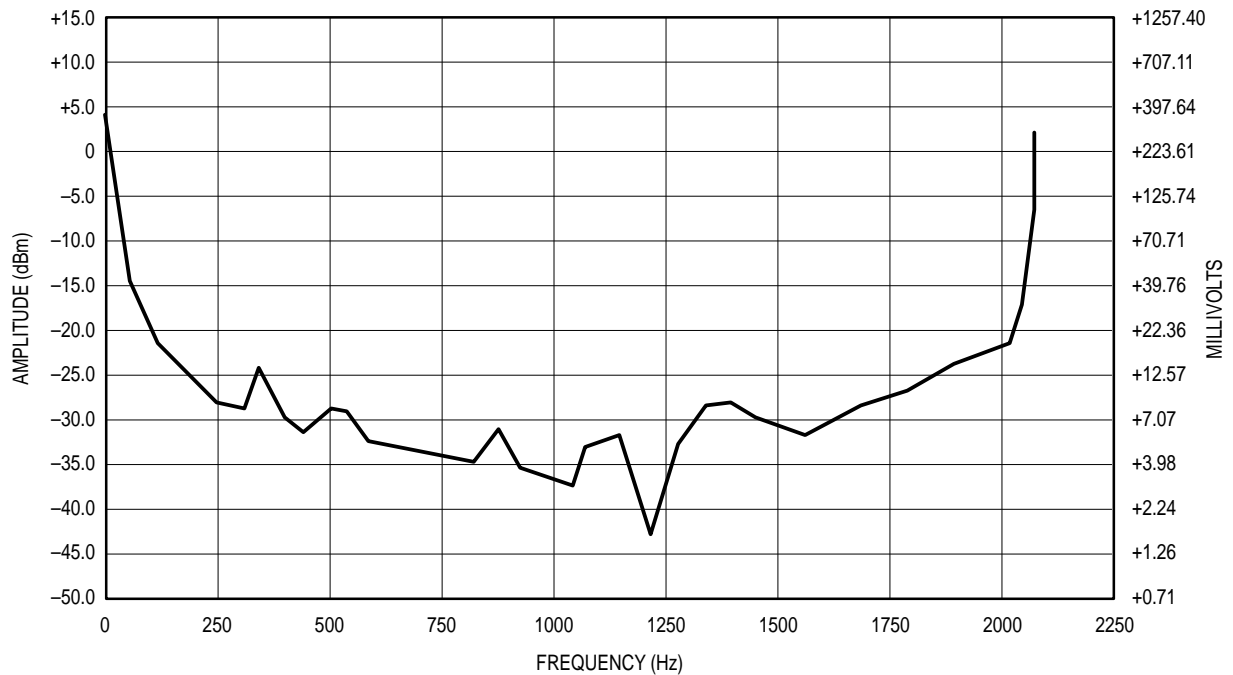


Figure 5. Input Signal Amplitude versus Input Frequency

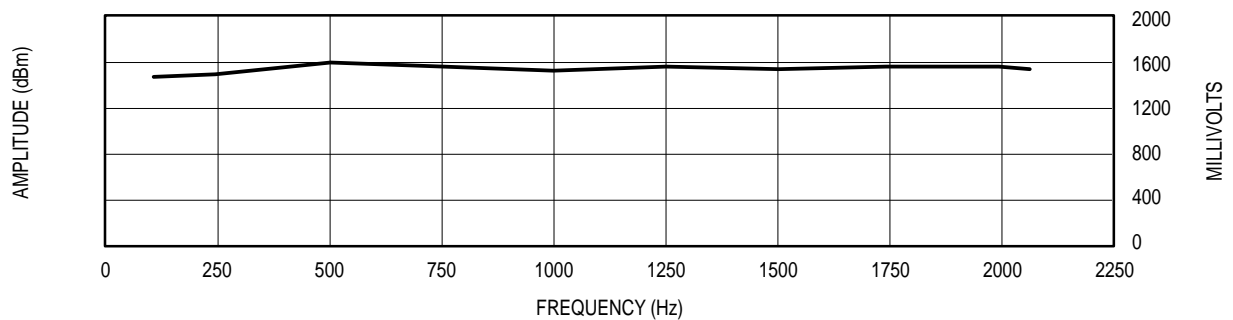
Divide Ratio = 8;  $V_{CC} = 5.0\text{V}$ ;  $T_A = 25^\circ\text{C}$ 

Figure 6. Output Amplitude versus Input Frequency

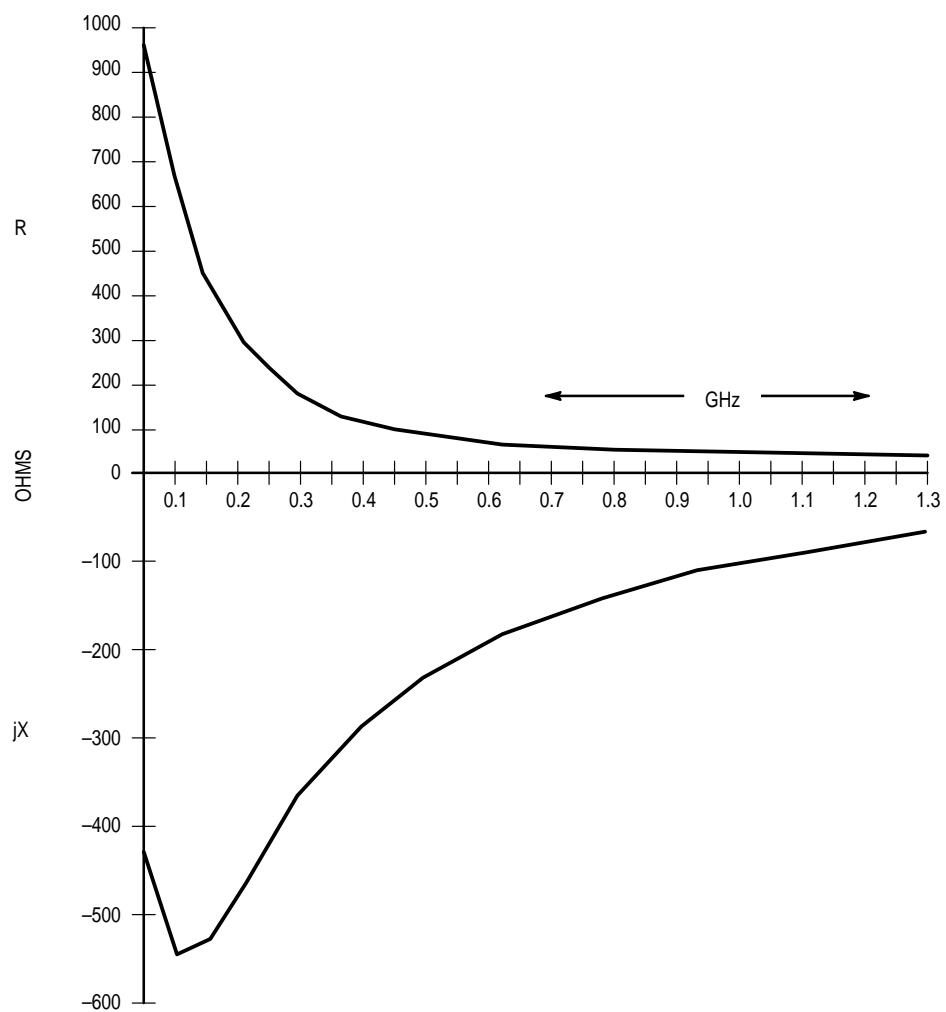
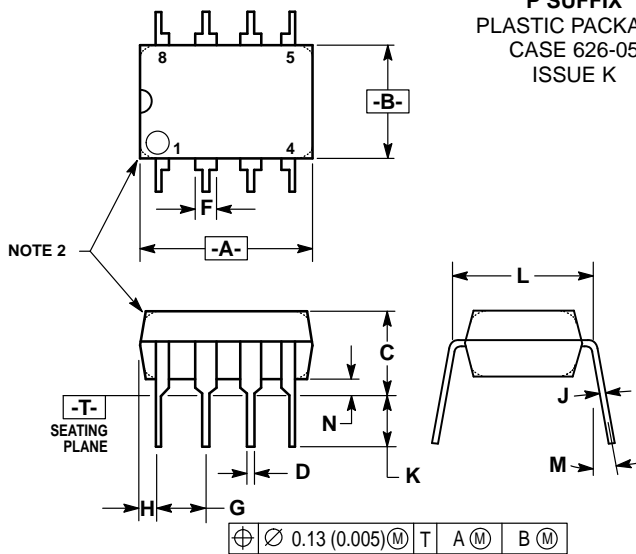


Figure 7. Typical Input Impedance versus Input Frequency

## OUTLINE DIMENSIONS

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

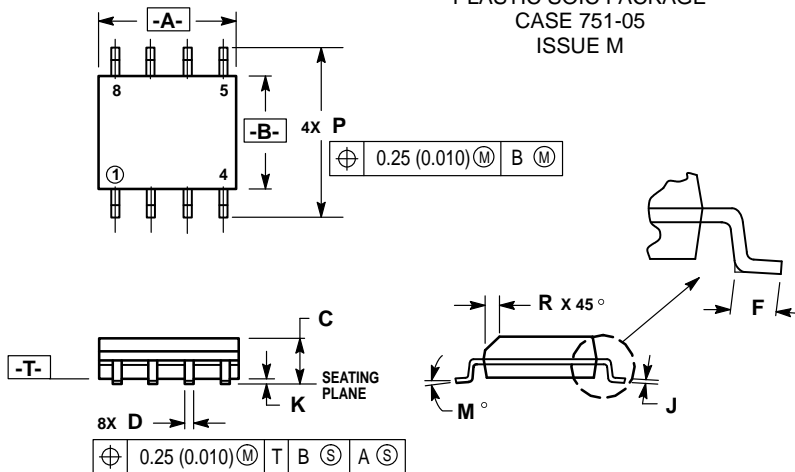


## NOTES:

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 M**



## NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC	0.050 BSC		
J	0.18	0.25	0.007	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

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