


**MOTOROLA**

## Consider MC12052A for New Designs 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.

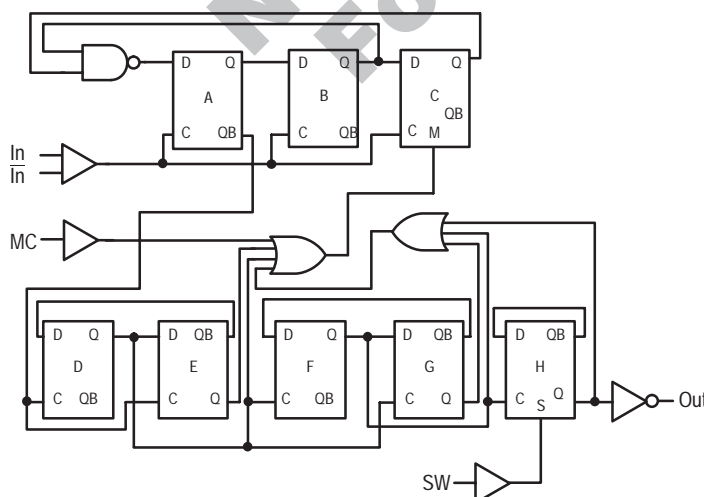
- 1.1 GHz Toggle Frequency
- Supply Voltage of 4.5 to 5.5 V
- Low-Power 7.5 mA Typical
- Operating Temperature Range of  $-40$  to  $+85^{\circ}\text{C}$
- Short Setup Time ( $t_{\text{set}}$ ) 16ns Maximum @ 1.1 GHz
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL. Maximum Input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

### FUNCTIONAL TABLE

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

**NOTES:** 1. SW: H =  $V_{\text{CC}}$ , L = Open. A logic L can also be applied by grounding this pin, but this is not recommended due to increased power consumption.  
2. MC: H = 2.0 V to  $V_{\text{CC}}$ , L = GND to 0.8 V.

Figure 1. Logic Diagram (MC12022A)



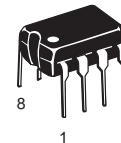
## MC12022A MC12022B

### MECL PLL COMPONENTS $\div 64/65, \div 128/129$ DUAL MODULUS PRESCALER

#### SEMICONDUCTOR TECHNICAL DATA

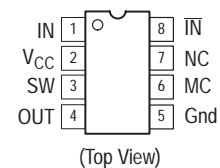


**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751  
(SO-8)



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 626

### PIN CONNECTIONS



### ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC12022AD	$T_A = -40^{\circ}$ to $+85^{\circ}\text{C}$	SO-8
MC12022AP		Plastic
MC12022BD		SO-8
MC12022BP		Plastic

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## MAXIMUM RATINGS

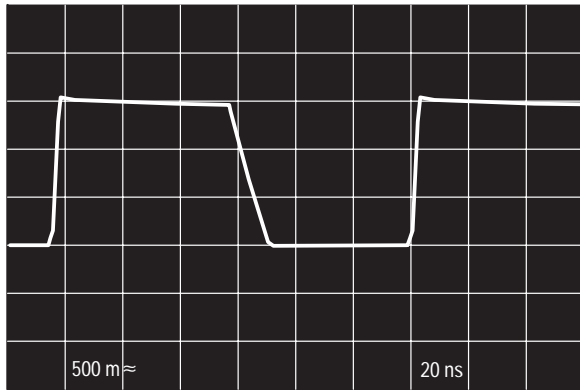
Rating	Symbol	Value	Unit
Power Supply Voltage, Pin 2	$V_{CC}$	-0.5 to +7.0	Vdc
Operating Temperature Range	$T_A$	-40 to +85	°C
Storage Temperature Range	$T_{stg}$	-65 to +150	°C

NOTE: ESD data available upon request.

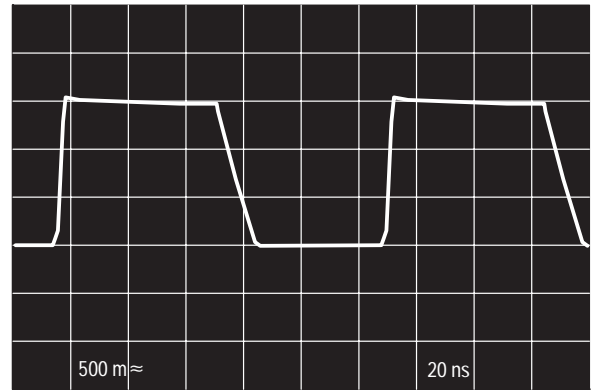
## ELECTRICAL CHARACTERISTICS ( $V_{CC} = 4.5$ to $5.5$ V; $T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ , unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Toggle Frequency (Sine Wave Input)	$f_t$	0.1	1.6	1.1	GHz
Supply Current Output Unloaded (Pin 2)	$I_{CC}$	—	7.5	10	mA
Modulus Control Input High (MC)	$V_{IH1}$	2.0	—	$V_{CC}$	V
Modulus Control Input Low (MC)	$V_{IL1}$	—	—	0.8	V
Divide Ratio Control Input High (SW)	$V_{IH2}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	Vdc
Divide Ratio Control Input Low (SW)	$V_{IL2}$	Open	Open	Open	—
Output Voltage Swing ( $C_L = 12$ pF; $R_L = 2.2$ k $\Omega$ )	$V_{out}$	1.0	1.6	—	V <sub>pp</sub>
Modulus Setup Time MC to Out	$t_{set}$	—	11	16	ns
Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	$V_{in}$	100 400	— —	1500 1500	mV <sub>pp</sub>
Output Current ( $C_L = 12$ pF; $R_L = 2.2$ k $\Omega$ )	$I_O$	—	1.5	4.0	mA

Figure 2. Typical Output Waveforms



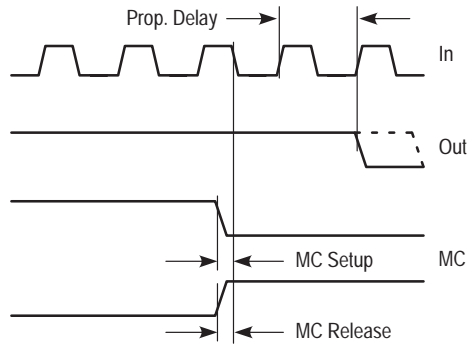
(+64, 500MHz Input Frequency,  $V_{CC} = 5.0\text{V}$ ,  $T_A = 25^{\circ}\text{C}$ , Output Loaded)



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

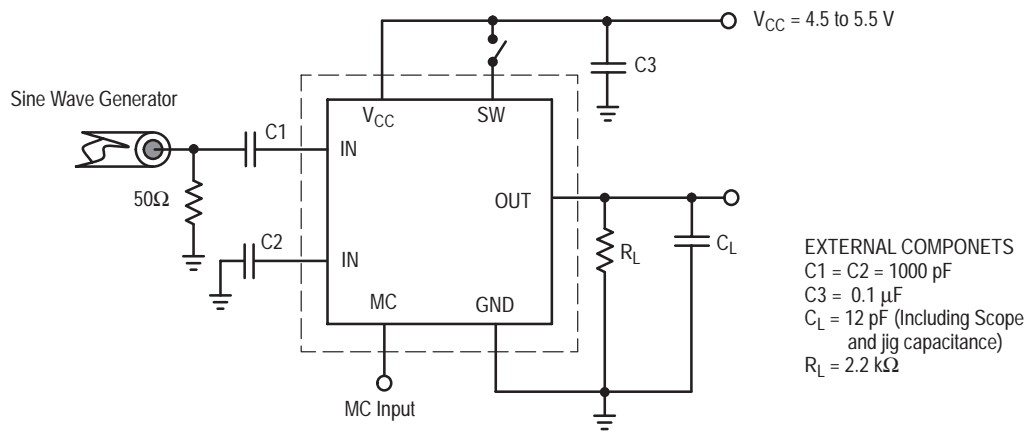
## MC12022A MC12022B

**Figure 3. Modulus Setup Time**



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

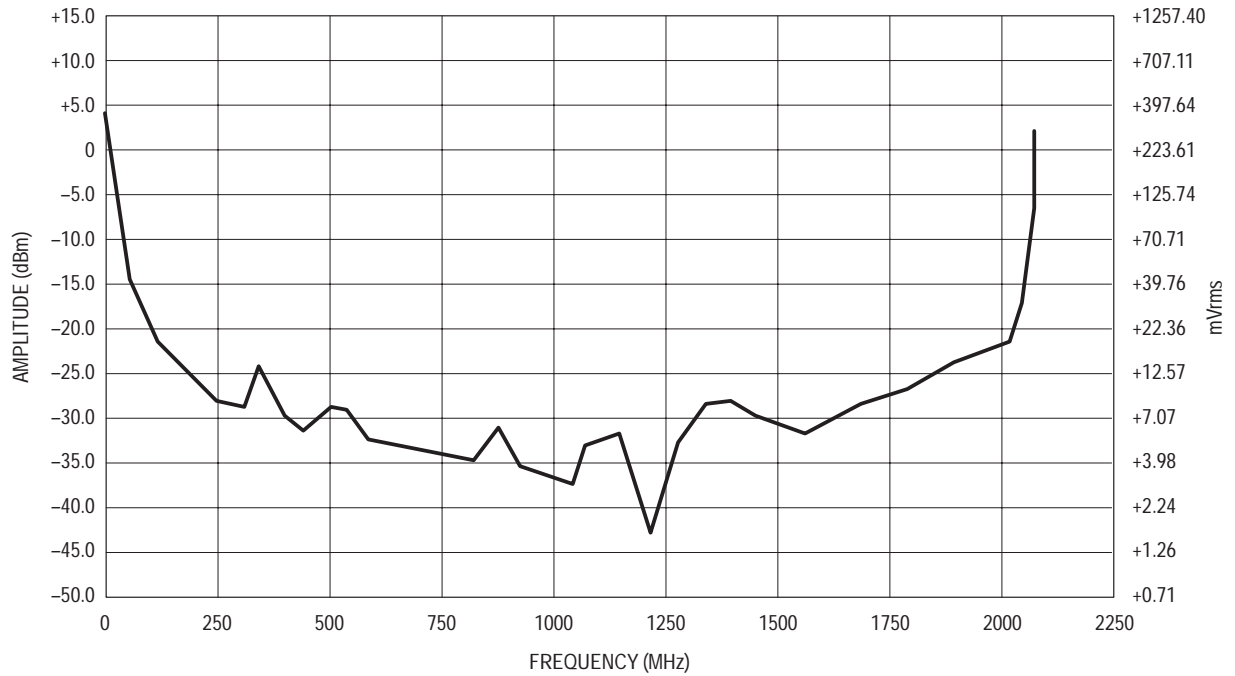
**Figure 4. AC Test Circuit**



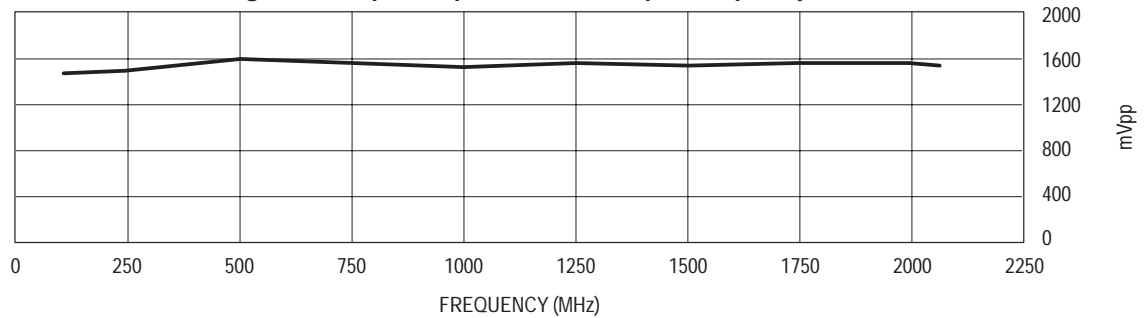
# MC12022A MC12022B

**Figure 5. Input Signal Amplitude versus Input Frequency**

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

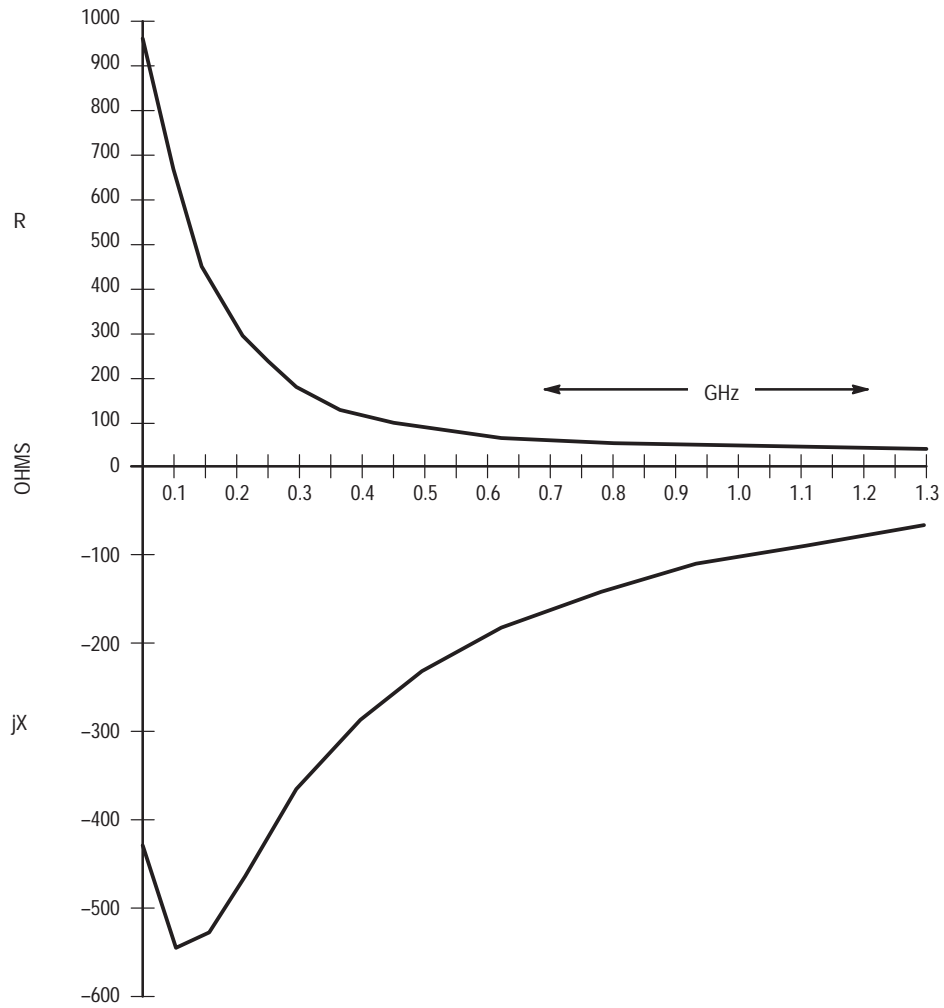


**Figure 6. Output Amplitude versus Input Frequency**



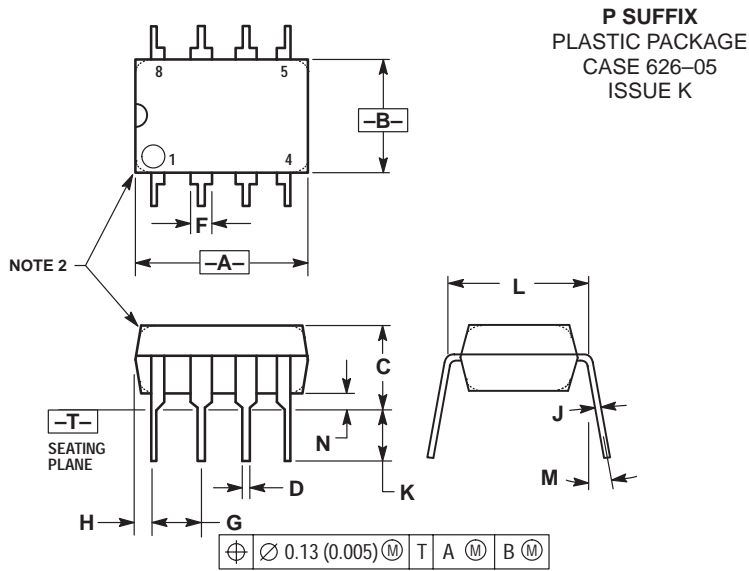
## MC12022A MC12022B

Figure 7. Typical Input Impedance versus Input Frequency



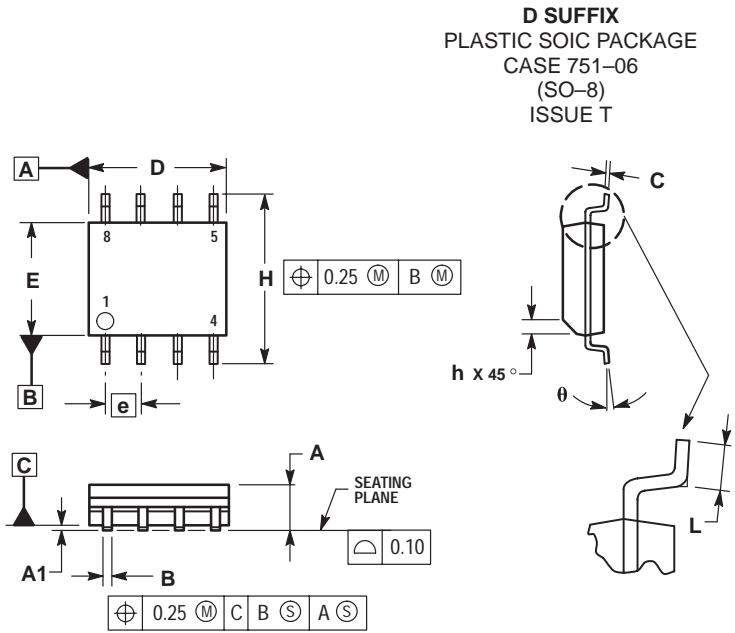
MC12022A MC12022B

OUTLINE DIMENSIONS




- 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
E	1.02	1.78	0.040	0.070
F	2.54 BSC		0.100 BSC	
G	0.76	1.27	0.030	0.050
H	0.20	0.30	0.008	0.012
J	2.92	3.43	0.115	0.135
K	7.62 BSC		0.300 BSC	
L	—	10°	—	10°
M	0.76	1.01	0.030	0.040
N				



DIM	MILLIMETERS	
	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.19	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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