

**MOTOROLA**

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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.

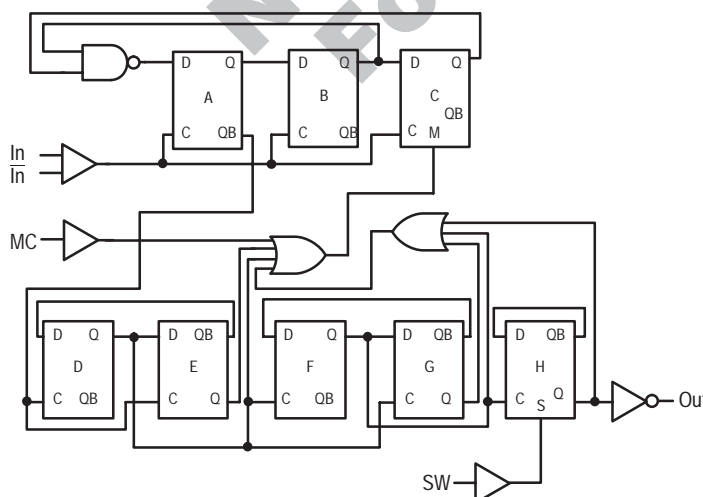
- 1.1 GHz Toggle Frequency
- Supply Voltage of 4.5 to 5.5 V
- Low-Power 7.5 mA Typical
- Operating Temperature Range of -40 to $+85^{\circ}\text{C}$
- Short Setup Time (t_{set}) 16ns Maximum @ 1.1 GHz
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL. Maximum Input Voltage Should 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_{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_{CC} , L = GND to 0.8 V.

Figure 1. Logic Diagram (MC12022A)



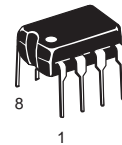
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MECL PLL COMPONENTS $\div 64/65, \div 128/129$ DUAL MODULUS PRESCALER

SEMICONDUCTOR TECHNICAL DATA

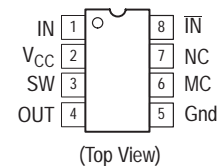


D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)



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

MC12022A MC12022B

MAXIMUM RATINGS

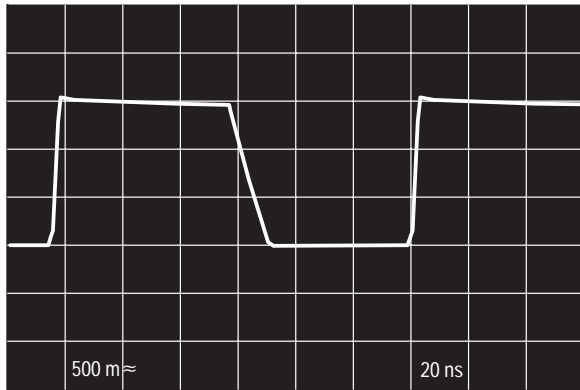
Rating	Symbol	Value	Unit
Power Supply Voltage, Pin 2	V_{CC}	-0.5 to +7.0	Vdc
Operating Temperature Range	T_A	-40 to +85	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

NOTE: ESD data available upon request.

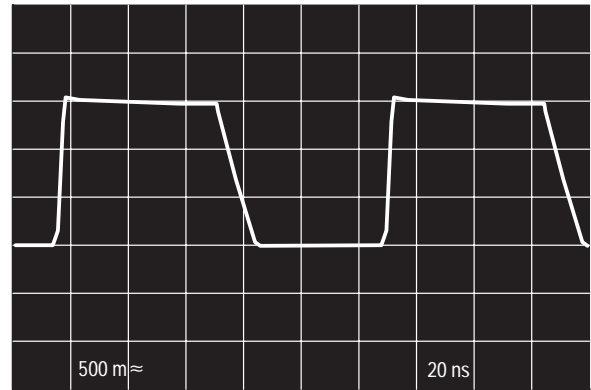
ELECTRICAL CHARACTERISTICS ($V_{CC} = 4.5$ to 5.5 V; $T_A = -40^\circ\text{C}$ to 85°C , unless otherwise noted.)

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 Ω)	V_{out}	1.0	1.6	-	V_{pp}
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	mVpp
Output Current ($C_L = 12$ pF; $R_L = 2.2$ k Ω)	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)

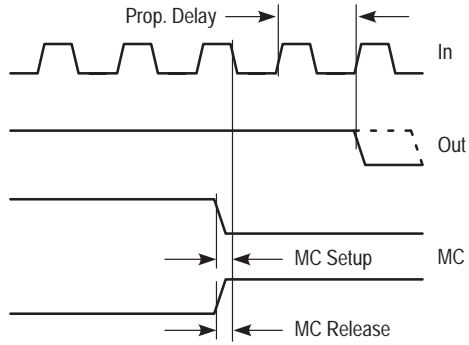


(±128, 1.1GHz Input Frequency, $V_{CC} = 5.0\text{V}$, $T_A = 25^\circ\text{C}$, Output Loaded)

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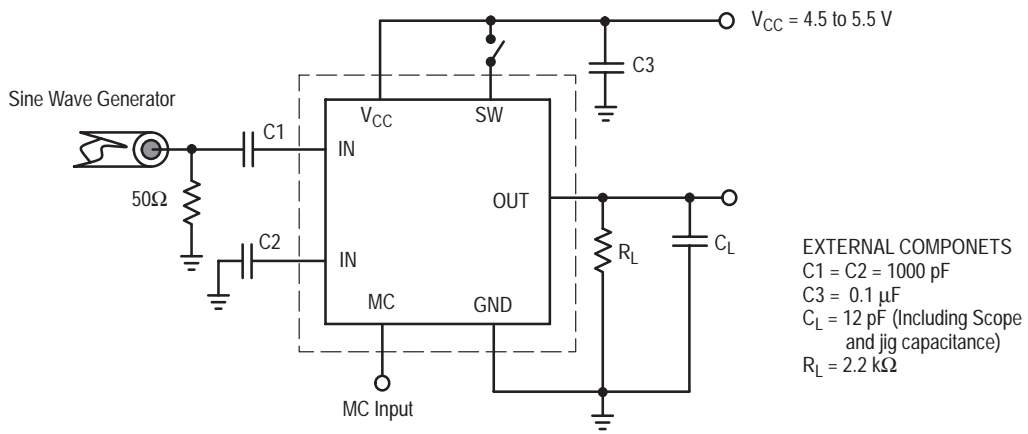
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Figure 3. Modulus Setup Time



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

Figure 4. AC Test Circuit



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Figure 5. Input Signal Amplitude versus Input Frequency

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

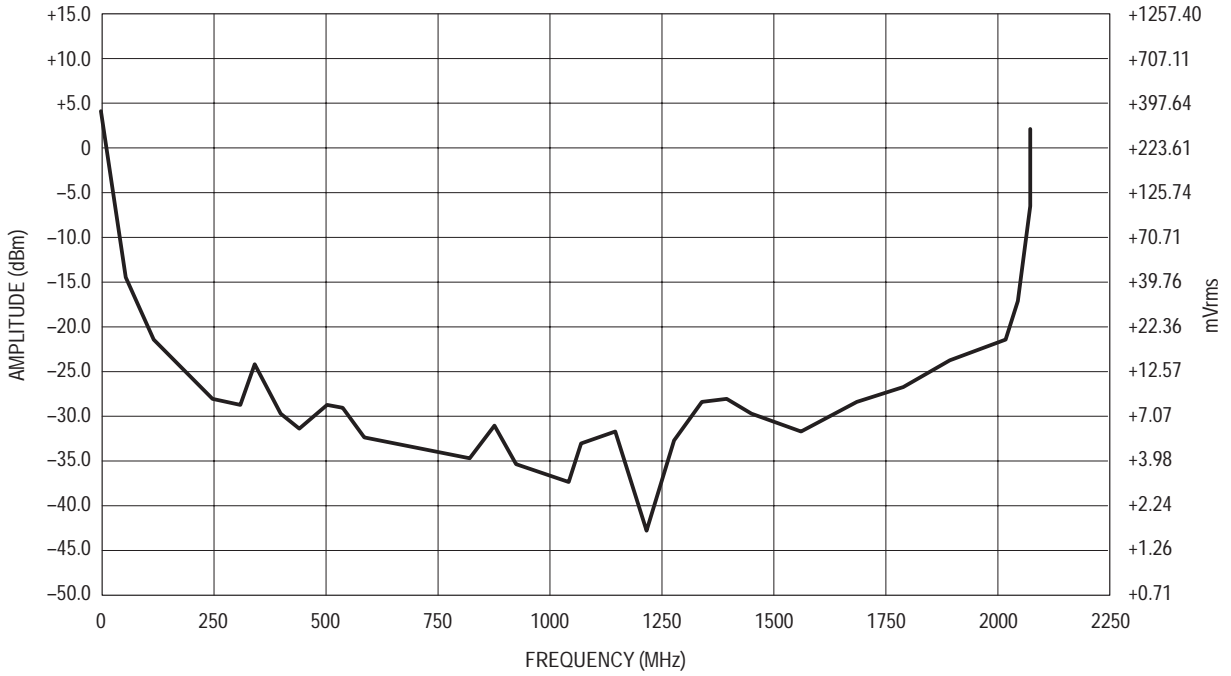
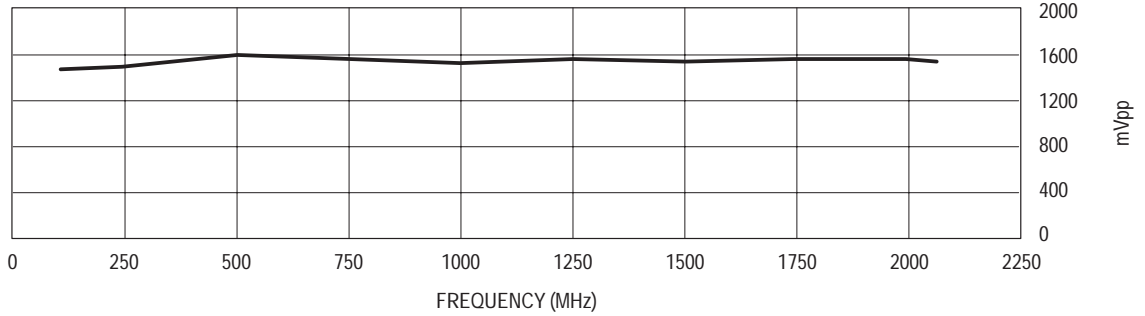


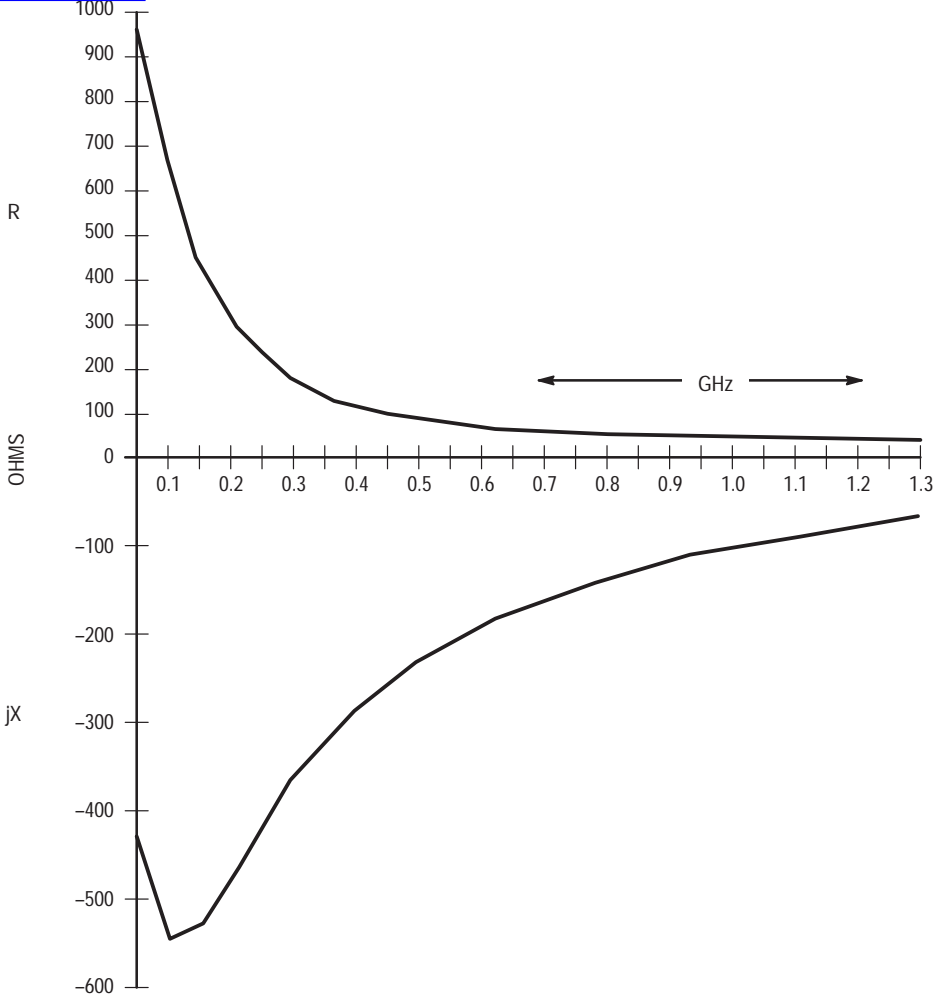
Figure 6. Output Amplitude versus Input Frequency



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Figure 7. Typical Input Impedance versus Input Frequency

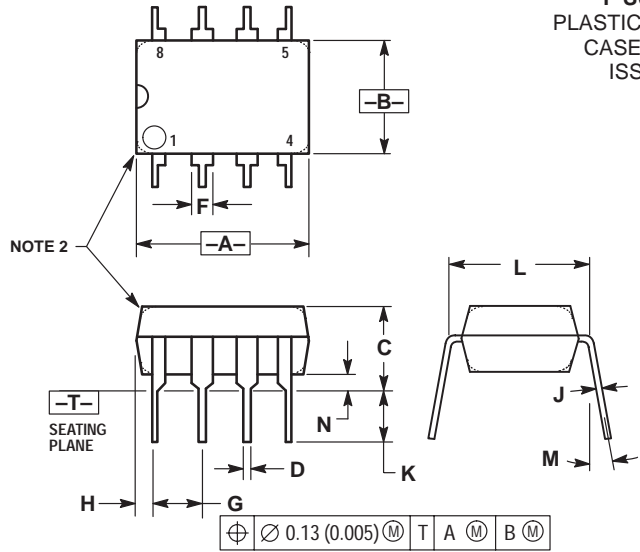


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OUTLINE DIMENSIONS

P SUFFIX
PLASTIC PACKAGE
CASE 626-05
ISSUE K

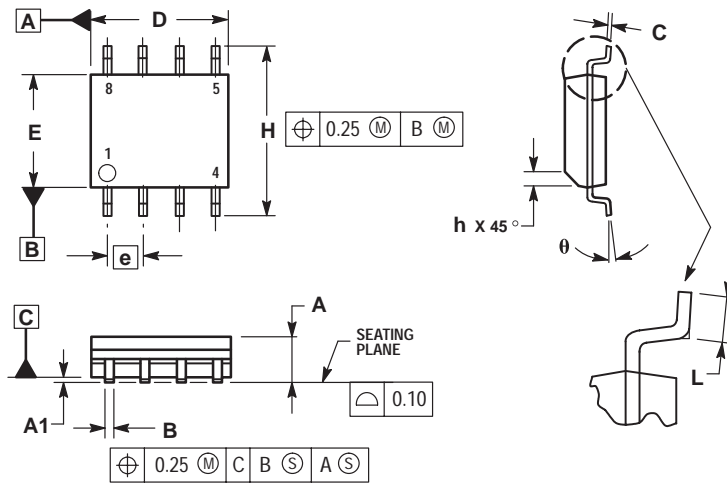


NOTES:

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 751-06
(SO-8)
ISSUE T




NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETER.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR 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	0.19	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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MC12022A/D