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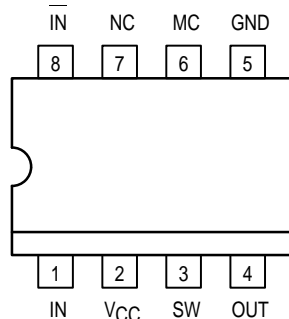
The MC12022B can be used with CMOS synthesizers requiring negative edges to trigger internal counters.

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

MC12022A
MC12022B

MECL PLL COMPONENTS

÷64/65, ÷128/129 DUAL MODULUS PRESCALER
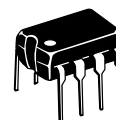
P SUFFIX
8–LEAD PLASTIC PACKAGE
CASE 626–05

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

Pinout: 8–Lead Plastic (Top View)

```
      IN    NC    MC   GND
      ┌──┐  ┌──┐  ┌──┐  ┌──┐
      │ 8│  │ 7│  │ 6│  │ 5│
      └──┘  └──┘  └──┘  └──┘
    ┌────────────────────────┐
    │                        │
   (                         │
    │                        │
    └────────────────────────┘
      ┌──┐  ┌──┐  ┌──┐  ┌──┐
      │ 1│  │ 2│  │ 3│  │ 4│
      └──┘  └──┘  └──┘  └──┘
      IN   VCC   SW   OUT
```

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

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REV 2

MOTOROLA

MC12022A MC12022B

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 = 2.2kΩ)	1.0	1.6		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		1500 1500	mVpp
I_O	Output Current (C_L = 12pF; R_L = 2.2kΩ)		1.5	4.0	mA
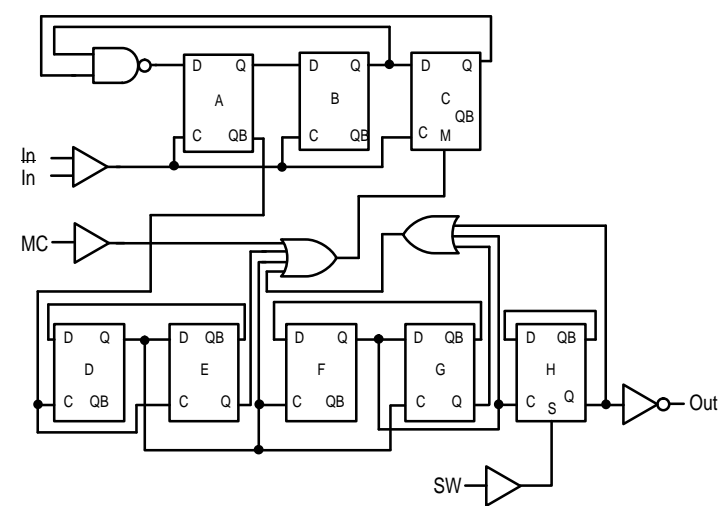
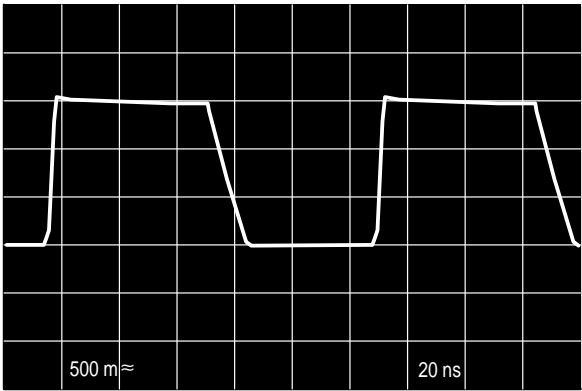**Figure 1. Logic Diagram (MC12022A)**
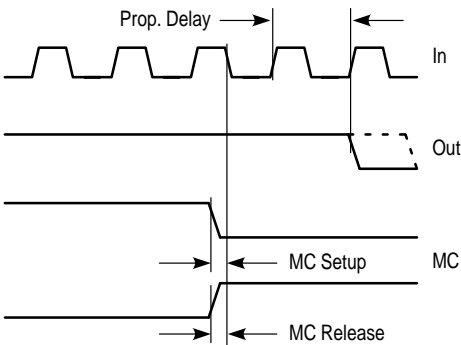
Modulus setup time MC to out is the MC
setup or MC release plus the prop delay.

Figure 2. Modulus Setup Time
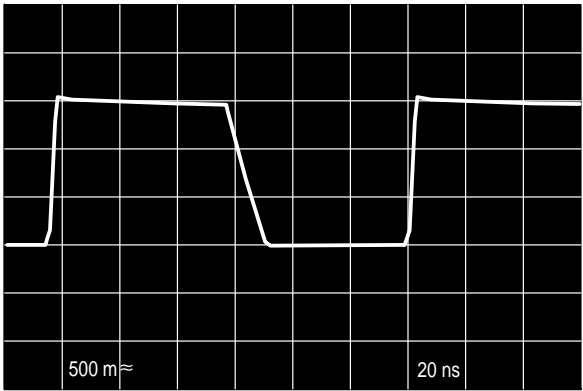
(÷64, 500MHz Input Frequency, V_{CC} = 5.0V, T_A = 25°C,
Output Loaded)

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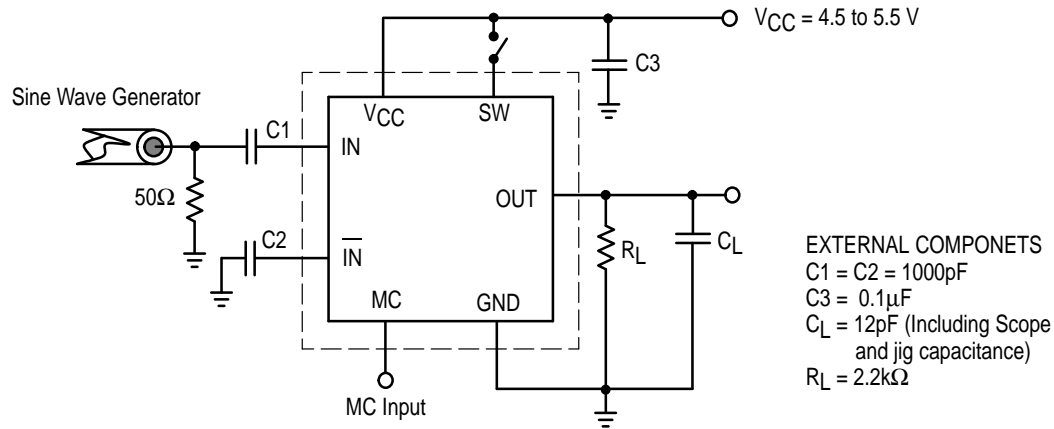Output Loaded)

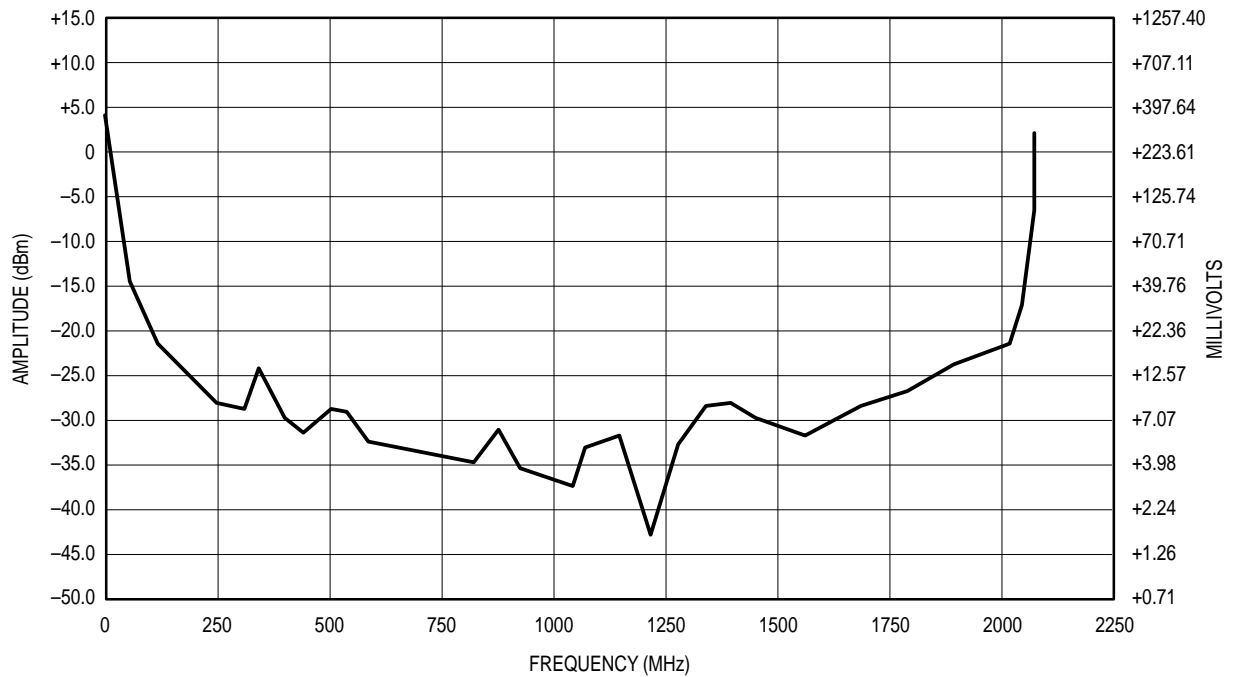**Figure 3. Typical Output Waveform**s

Figure 4. AC Test Circuit

EXTERNAL COMPONETS
C1 = C2 = 1000pF
C3 = 0.1μF
C_L = 12pF (Including Scope
and jig capacitance)
R_L = 2.2kΩ
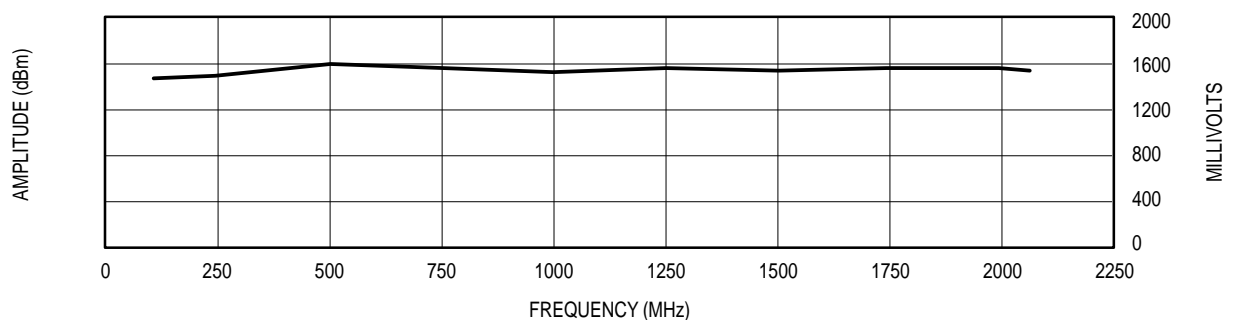

Figure 5. Input Signal Amplitude versus Input Frequency
Divide Ratio = 8; V_{CC} = 5.0V; T_A = 25°C

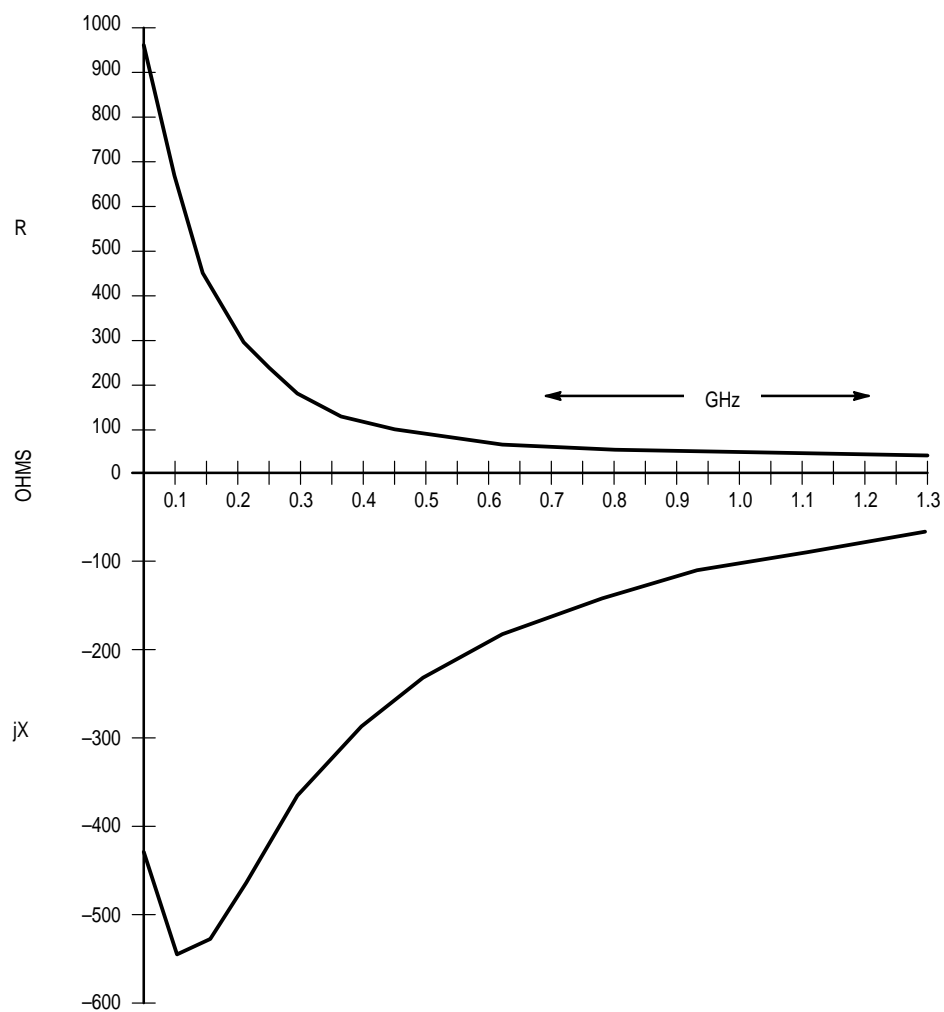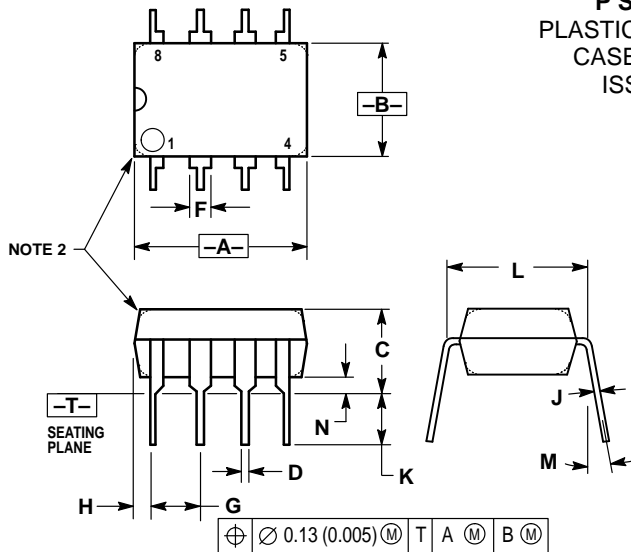**Figure 6. Output Amplitude versus Input Frequency**

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

$\oplus \mid \varnothing\ 0.13\ (0.005)\ (M)\mid T\mid A\ (M)\mid B\ (M)\mid$

D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751–05
ISSUE R
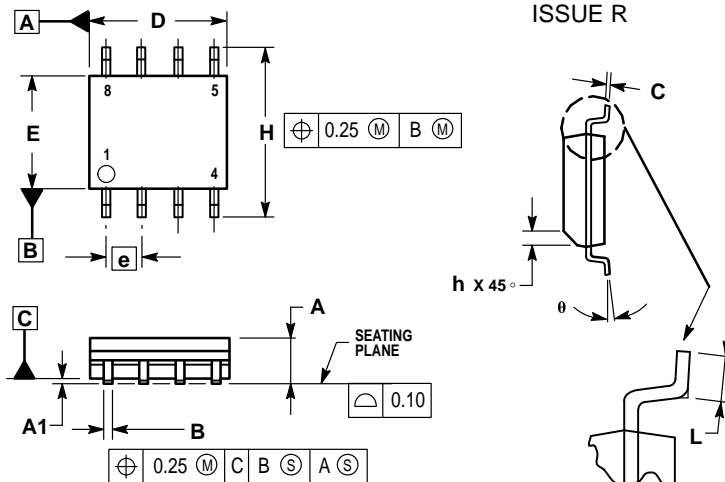
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF 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°

$\oplus \mid 0.25\ (M)\mid C\mid B\ (S)\mid A\ (S)\mid$

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ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298

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