1.1GHz Low Power Dual Modulus Prescaler

MC12022SLA
MC12022SLB

MECL PLL COMPONENTS

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

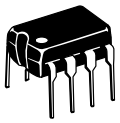
The MC12022SLA can be used with CMOS synthesizers requiring positive edges to trigger internal counters such as Motorola's MC145XXX series in a PLL to provide tuning signals up to 1.1GHz in programmable frequency steps. This device is a reduced current version of the MC12022A/B.

The MC12022SLB 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 4.0mA 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



P SUFFIX
8–LEAD PLASTIC PACKAGE
CASE 626–05

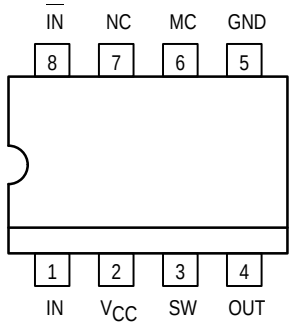
D SUFFIX
8–LEAD PLASTIC SOIC PACKAGE
CASE 751–05

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

Pinout: 8–Lead Plastic (Top View)



DESIGN GUIDE

Criteria	Value	Unit
Internal Gate Count*	67	ea
Internal Gate Propagation Delay	200	ps
Internal Gate Power Dissipation	0.75	mW
Speed Power Product	0.15	pJ

* Equivalent to a two–input NAND gate

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

MOTOROLA

ELECTRICAL CHARACTERISTICS (V_{CC} = 4.5 to 5.5V; T_A = –40°C to +85°C)

Symbol	Characteristic	Min	Typ	Max	Unit
f_t	Toggle Frequency (Sine Wave Input)	0.1	1.4	1.1	GHz
I_{CC}	Supply Current Output Unloaded (Pin 2) at 5.0Vdc		3.8	6.5	mA
V_{IH1}	Modulus Control Input High (MC)	2.0		V_{CC} + 0.5V	V
V_{IL1}	Modulus Control Input Low (MC)			0.8	V
V_{IH2}	Divide Ratio Control Input High (SW)	V_{CC} – 0.5V	V_{CC}	V_{CC} + 0.5V	Vdc
V_{IL2}	Divide Ratio Control Input Low (SW)	Open	Open	Open	—
V_{out}	Output Voltage Swing (C_L = 8pF; R_L = 4.4kΩ)	1.0	1.6		$V_{p–p}$
t_{set}	Modulus Setup Time MC to Out		11	16	ns
$V_{in(min)}$	Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	100 400		1500 1500	mVpp
I_O	Output Current (C_L = 8pF; R_L = 4.4kΩ, V_{CC} = 5.0V)		0.75	4.0	mA

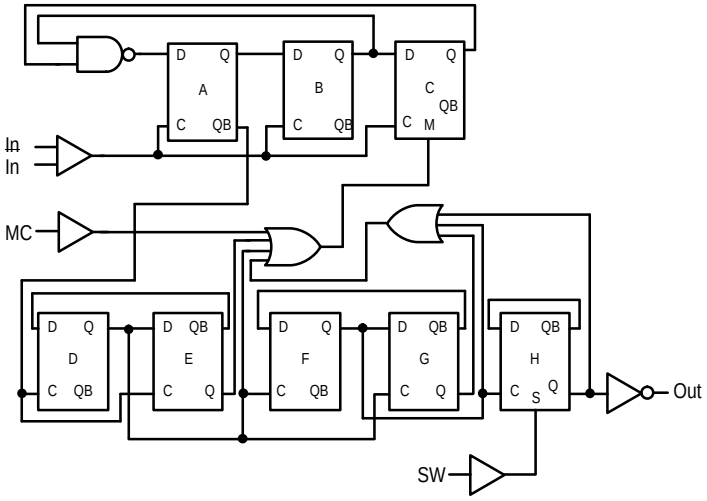
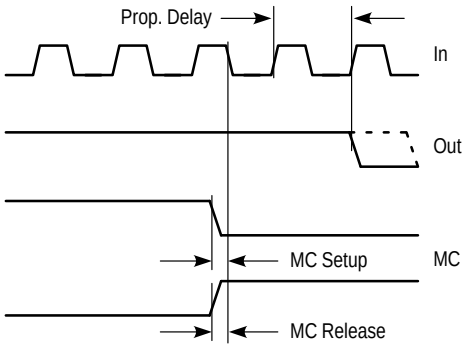
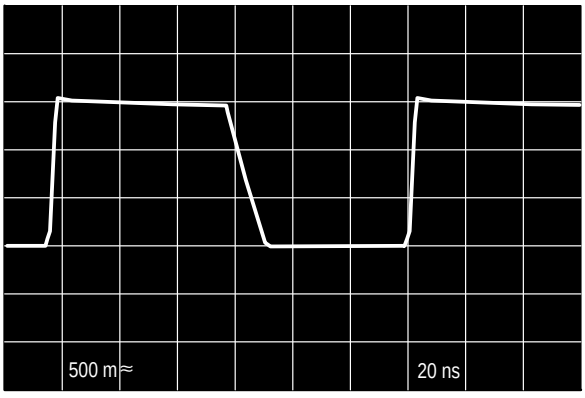


Figure 1. Logic Diagram (MC12022SLA)

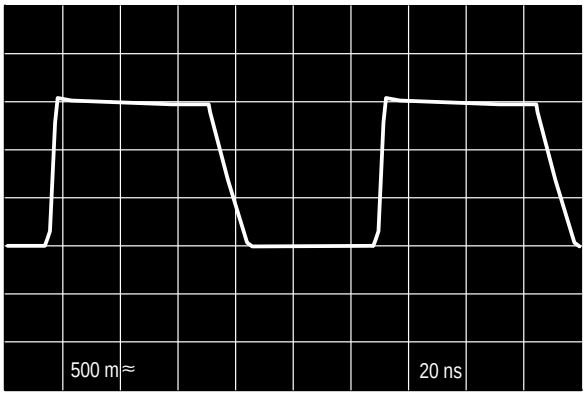


Modulus setup time MC to out is the MC setup or MC release plus the prop delay.

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 Waveforms

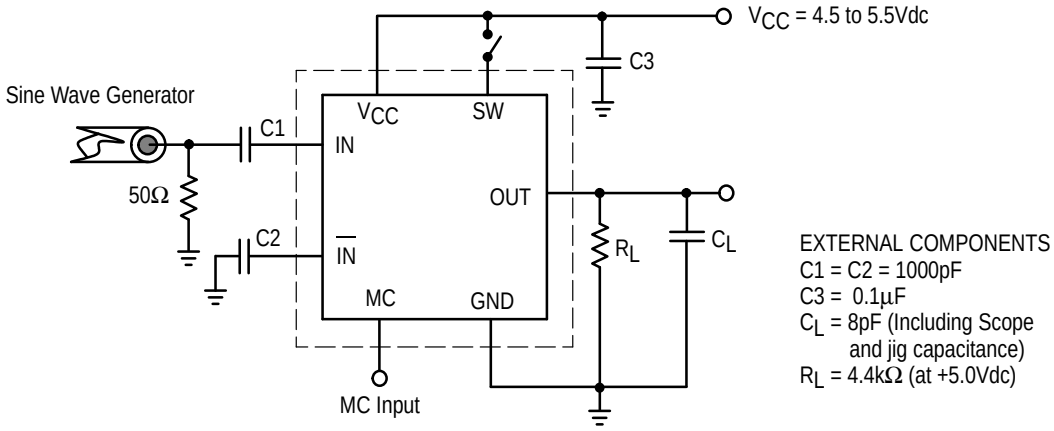


Figure 4. AC Test Circuit

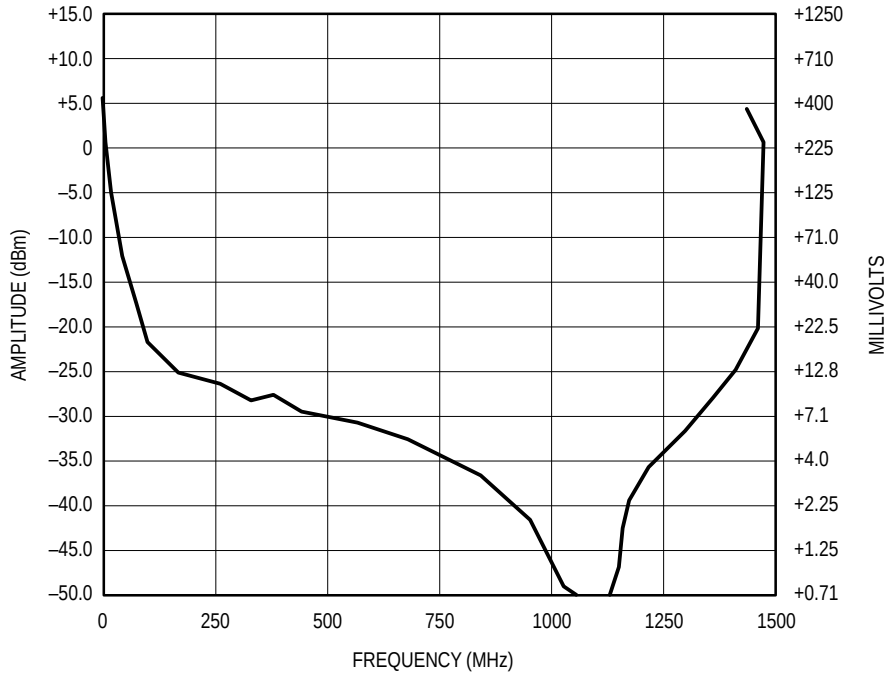


Figure 5. Input Signal Amplitude versus Input Frequency
Divide Ratio = 128; V_{CC} = 5.0V; T_A = 25°C

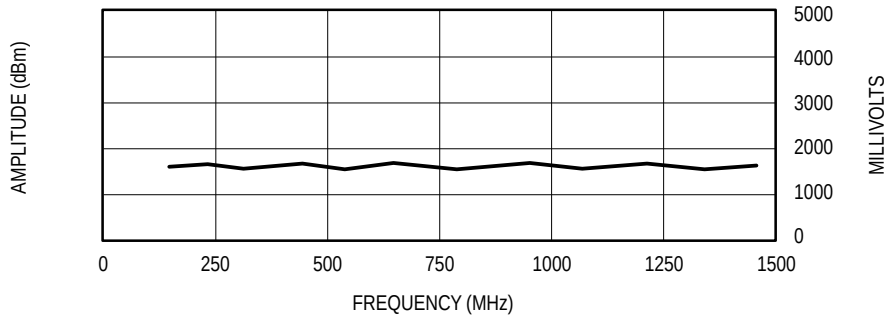


Figure 6. Output Amplitude versus Input Frequency

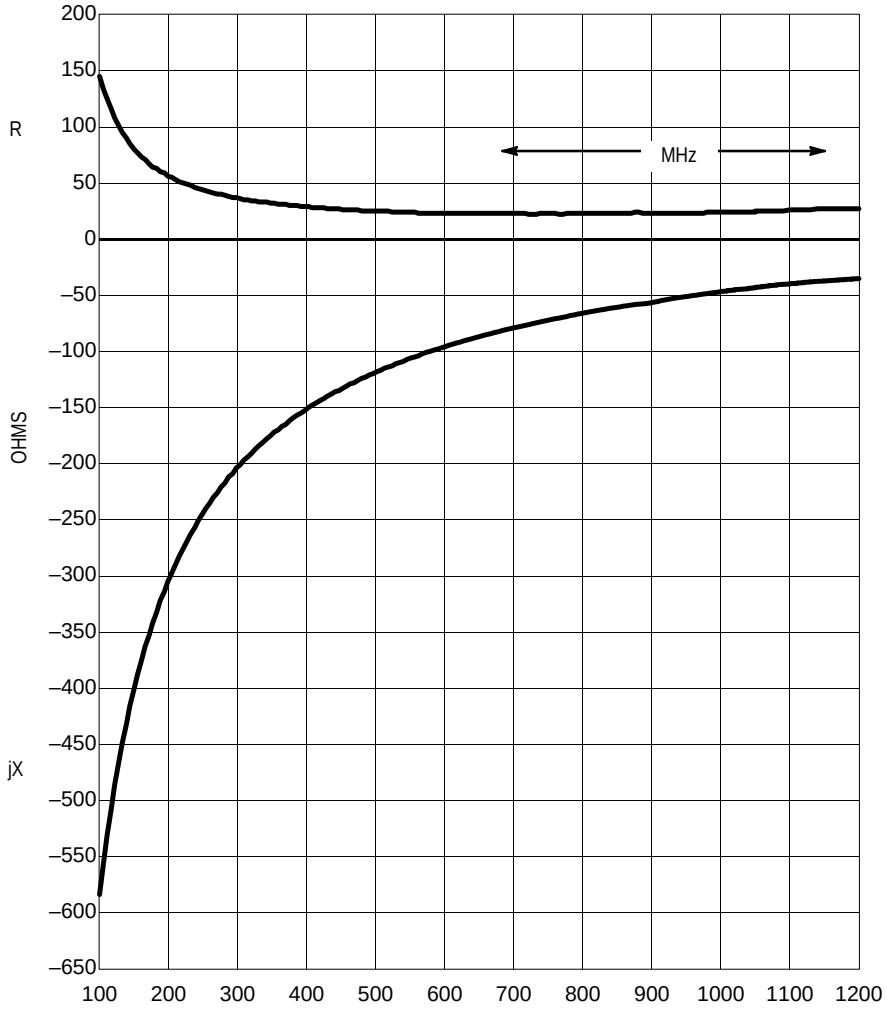
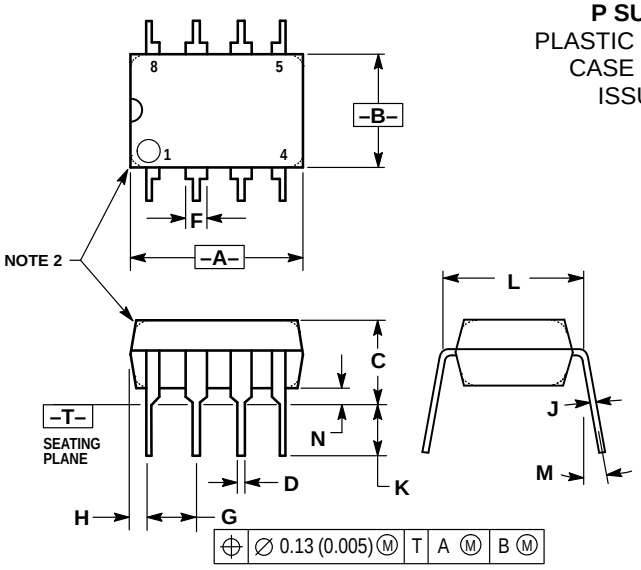


Figure 7. Typical Input Impedance versus Input Frequency

OUTLINE DIMENSIONS

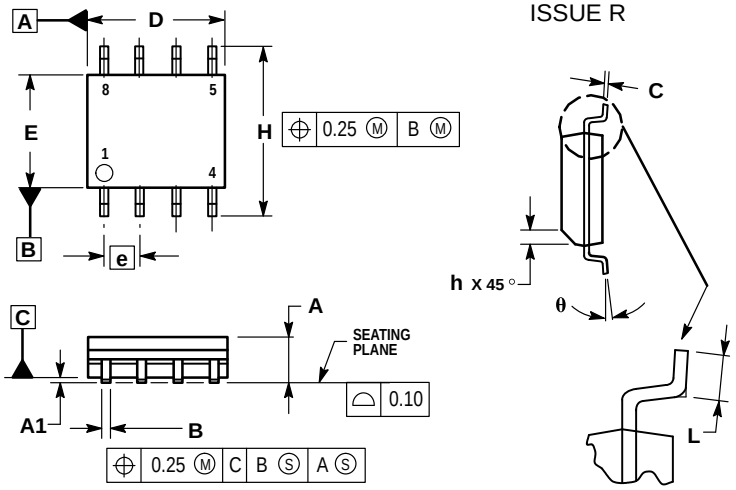
P SUFFIX
PLASTIC PACKAGE
CASE 626–05
ISSUE K



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.

	MILLIMETERS		INCHES	
DIM	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.

	MILLIMETERS	
DIM	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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