1.1GHz Low-Voltage Two-Modulus Prescaler

The MC12022LVA 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 MC12022LVB 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 2.7 to 5.0V
- Low-Power 4.0mA Typical at V_{CC} = 2.7V
- 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

FUNCTIONAL TABLE

sw	МС	Divide Ratio
Н	Н	64
Н	L	65
L	Н	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

DESIGN GUIDE

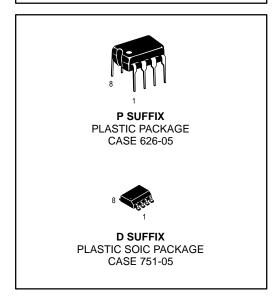
Criteria	Value	Unit
Internal Gate Count*	67	ea
Internal Gate Propagation Delay	200	ps
Internal Gate Power Dissipation	0.75	mW
Speed Power Product	0.15	рJ

^{*} Equivalent to a two-input NAND gate

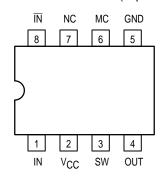
MC12022LVA MC12022LVB

MECL PLL COMPONENTS

÷64/65, ÷128/129 TWO-MODULUS PRESCALER



Pinout: 8-Lead Plastic (Top View)



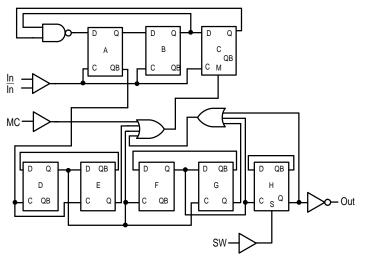
MAXIMUM RATINGS

Symbol	Characteristic	Range	Unit
VCC	Power Supply Voltage, Pin 2	-0.5 to + 7.0	Vdc
TA	Operating Temperature Range	-40 to + 85	°C
T _{stg}	Storage Temperature Range	-65 to + 150	°C
MC	Modulus Control Input, Pin 6	-0.5 to + 6.5	Vdc

(M) MOTOROL

ELECTRICAL CHARACTERISTICS ($V_{CC} = 4.5 \text{ to } 5.5 \text{V} \pm 10\%$; $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$)

Symbol	Characteristic	Min	Тур	Max	Unit
f _t	Toggle Frequency (Sine Wave Input)	0.1	1.4	1.1	GHz
ICCL	Supply Current Output Unloaded (Pin 2) at 2.7Vdc		4.0	6.5	mA
Іссн	Supply Current Output Unloaded (Pin 2) at 5.0Vdc		5.8	8.0	mA
V _{IH1}	Modulus Control Input High (MC)	2.0			V
V _{IL1}	Modulus Control Input Low (MC)			0.8	V
V _{IH2}	Divide Ratio Control Input High (SW)	V _{CC} – 0.5V	Vcc	V _{CC} + 0.5V	Vdc
V _{IL2}	Divide Ratio Control Input Low (SW)	Open	Open	Open	
V _{out}	Output Voltage Swing ($C_L = 12pF$; $R_L = 1.1k\Omega$) at 2.7Vdc	0.8	1.0		V _{p-p}
V _{out}	Output Voltage Swing ($C_L = 12pF$; $R_L = 2.2k\Omega$) at 5.0Vdc	1.0	1.6		V _{p-p}
t _{set}	Modulus Setup Time MC to Out		11	16	ns
Vin(min)	Input Voltage Sensitivity 250–1100 MHz 100–250 MHz	100 400		1500 1500	mVpp
IO	Output Current (C _L = 12pF; R _L = $2.2k\Omega$)			2.0	mA



Prop. Delay

In

Out

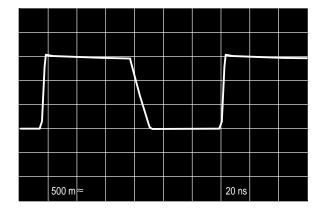
MC Setup

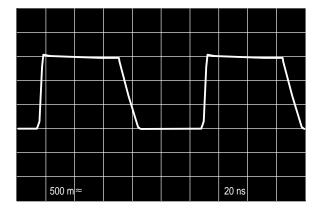
MC Release

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

Figure 1. Logic Diagram (MC12022LVA)

Figure 2. Modulus Setup Time





(÷64, 500MHz Input Frequency, V_{CC} = 5.0V, T_A = 25°C, Output Loaded)

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

Figure 3. Typical Output Waveforms

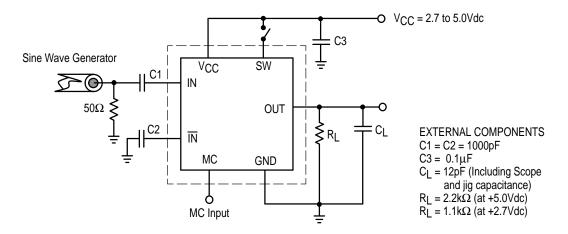


Figure 4. AC Test Circuit

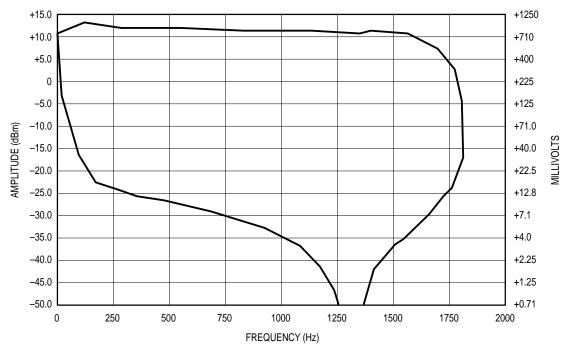


Figure 5. Input Signal Amplitude versus Input Frequency Divide Ratio = 128; V_{CC} = 5.0V; T_A = 25°C

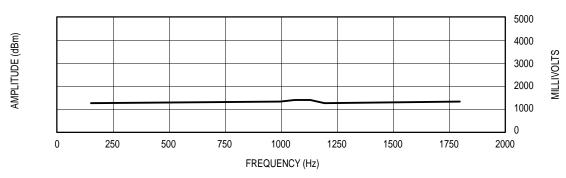


Figure 6. Output Amplitude versus Input Frequency

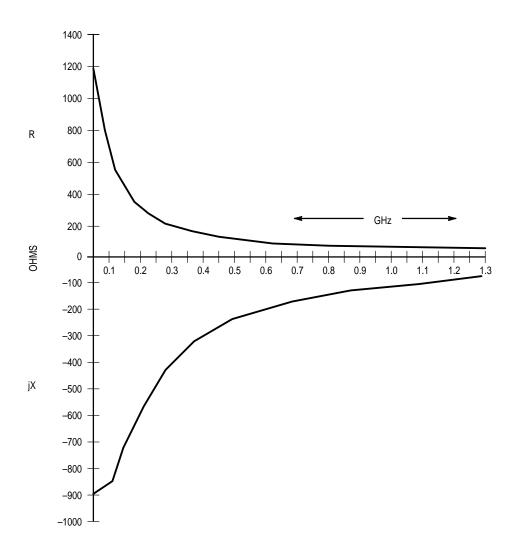
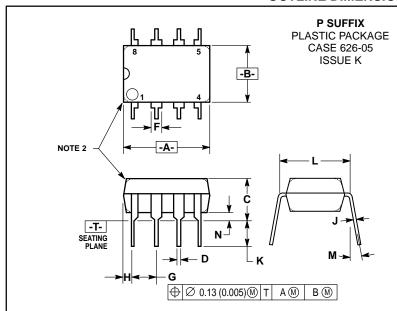


Figure 7. Typical Input Impedance versus Input Frequency

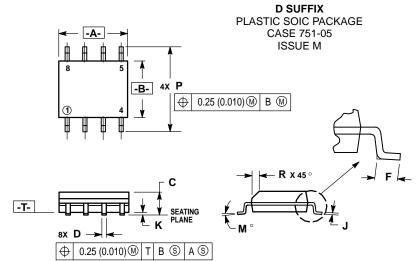
OUTLINE DIMENSIONS



NOTES:

- 1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL
- PACKAGE CONTOUR OPTIONAL (ROUND OR
- SQUARE CORNERS).
 DIMENSIONING AND TOLERANCING PER ANSI

	MILLIMETERS		INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	9.40	10.16	0.370	0.400	
В	6.10	6.60	0.240	0.260	
С	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		
Н	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		
М	_	10°	_	10°	
N	0.76	1.01	0.030	0.040	



NOTES:

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

	MILLIMETERS		INC	HES
DIM	MIN	MAX	MIN	MAX
Α	4.80	5.00	0.189	0.196
В	3.80	4.00	0.150	0.157
С	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	1.2	7 BSC	0.050 BSC	
J	0.18	0.25	0.007	0.009
K	0.10	0.25	0.004	0.009
М	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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