

1.1 GHz Low-Voltage Dual 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 1.1 GHz 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.

NOTE: The "B" Version Is Not Recommended for New Designs

- 1.1 GHz Toggle Frequency
- Supply Voltage of 2.7 to 5.0 V
- Low–Power 4.0 mA Typical at V_{CC} = 2.7 V
- Operating Temperature Range of −40 to 85°C
- Short Setup Time (t_{set}) 16ns Maximum @ 1.1 GHz
- Modulus Control Input Level Is Compatible With Standard CMOS and TTL

FUNCTIONAL TABLE

sw	MC	Divide Ratio
Н	Н	64
Н	L	65
L	Н	128
L	L	129

NOTES: 1. SW: $H = V_{CC}$, L = Open. A logic L can also be applied by grouunding this pin, but this is not recommended due to increased power soncumption. 2. 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	рЈ

NOTE: * Equivalent to a two-input NAND gate

MC12022LVA MC12022LVB

MECL PLL COMPONENTS ÷64/65, ÷128/129 DUAL MODULUS PRESCALER

SEMICONDUCTOR TECHNICAL DATA

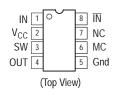


D SUFFIXPLASTIC PACKAGE
CASE 751
(SO-8)



P SUFFIX PLASTIC PACKAGE CASE 626

PIN CONNECTIONS



ORDERING INFORMATION

OKE EKING IN OKMINION				
Device	Operating Temp Range	Package		
MC12022LVAD		SO–8		
MC12022LVAP	T _A =	Plastic		
MC12022LVBD	– 40° to +85°C	SO-8		
MC12022LVBP		Plastic		

MC12022LVA MC12022LVB

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
Modulus Control Input, Pin 6	MC	-0.5 to 6.5	Vdc

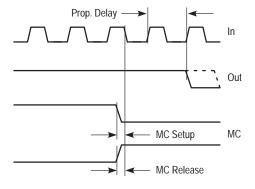
NOTE; ESD data available upon request.

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

Characteristic	Symbol	Min	Тур	Max	Unit
Toggle Frequency (Sine Wave Input)	f _t	0.1	1.4	1.1	GHz
Supply Current Output Unloaded (Pin 2)	Icc	_	4.7	6.5	mA
Supply Current Output Unloaded (Pin 2) at 5.0 Vdc	I _{CCH}		5.8	8.0	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 ($C_L = 12 \text{ pF}$; $R_L = 1.1 \text{ k}\Omega$ at 2.7 Vdc)	V _{out}	0.8	1.0	-	V _{pp}
Output Voltage Swing (C _L = 12 pF; R _L = 2.2 k Ω at 5.0 Vdc)	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(min)}	100 400	_ _	1500 1500	m∨pp
Output Current ($C_L = 12 \text{ pF}$; $R_L = 2.2 \text{ k}\Omega$ at 2.7 Vdc)	I _O	-	1.2	4.0	mA
Output Current ($C_L = 12 \text{ pF}$; $R_L = 2.2 \text{ k}\Omega$ at 5.0 Vdc)	I _O	_	1.2	4.0	mA

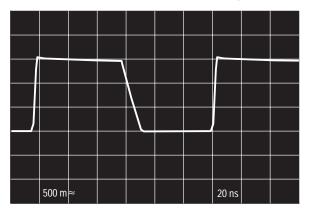
Figure 1. Logic Diagram (MC12022LVA)

Figure 2. Modulus Setup Time

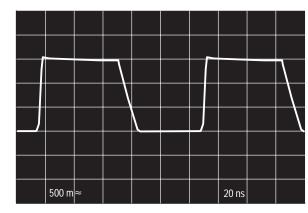


Modulus setup time MC to out is the MC setup or MC release plus the prop delay.

Figure 3. Typical Output Waveforms

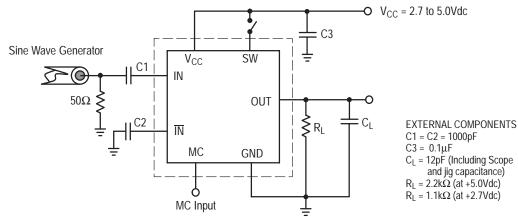


(\div 64, 500MHz Input Frequency, V_{CC} = 5.0V, T_A = 25°C, Output Loaded)

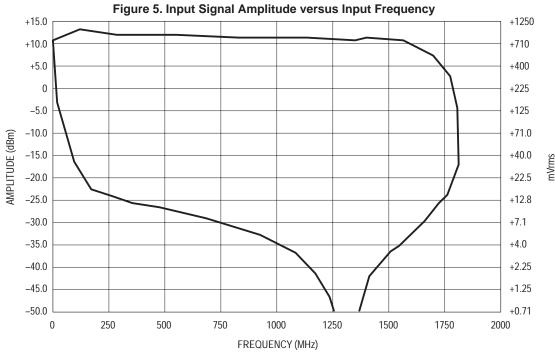


(\pm 128, 1.1GHz Input Frequency, V_{CC} = 5.0V, T_A = 25°C, Output Loaded)



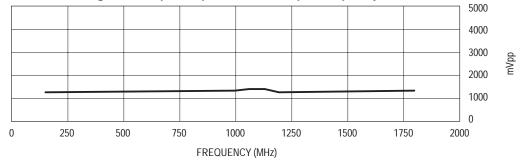


MC12022LVA MC12022LVB



Divide Ratio = 128; V_{CC} = 5.0 V; T_A = 25°C

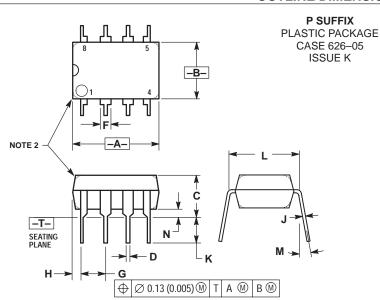
Figure 6. Output Amplitude versus Input Frequency



1400 1200 1000 R 800 600 400 GHz 200 0 0.5 0.2 0.3 0.4 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 -100 -200 -300 -400 jΧ -500 -600 -700 -800 -900 -1000

Figure 7. Typical Input Impedance versus Input Frequency

OUTLINE DIMENSIONS

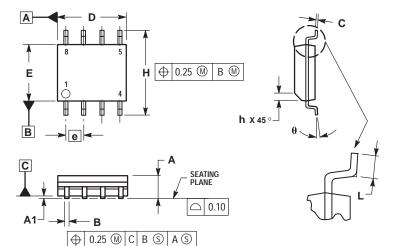


- 1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
- PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
- 3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

	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	
M		10°		10°
N	0.76	1.01	0.030	0.040

D SUFFIX

PLASTIC 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. MAYIMI IM MOLD PROTRUSION 0.15 PER SIDE.
- MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
 DIMENSION B DOES NOT INCLUDE DAMBAR
- PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL

	MILLIMETERS		
DIM	MIN	MAX	
Α	1.35	1.75	
A1	0.10	0.25	
В	0.35	0.49	
С	0.19	0.25	
D	4.80	5.00	
Ε	3.80	4.00	
е	1.27 BSC		
Н	5.80	6.20	
h	0.25	0.50	
L	0.40	1.25	
θ	0 °	7 °	

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MOTOROLA RF/IF DEVICE DATA

LIFETIME BUY

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MC12022LVA/D