2.0GHz Dual Modulus **Prescaler**

The MC12032A 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 2.0GHz in programmable frequency steps.

The MC12032B 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.

- 2.0 GHz Toggle Frequency
- Supply Voltage 4.5 to 5.5V
- MC12032A for Positive Edge Triggered Synthesizers
- MC12032B for Negative Edge Triggered Synthesizers
- 12mA Maximum, -40° to +85°C, V_{CC} = 5.5Vdc
- Modulus Control Input Level Is Compatible With Standard CMOS and
- Low-Power 8.5mA Typical

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

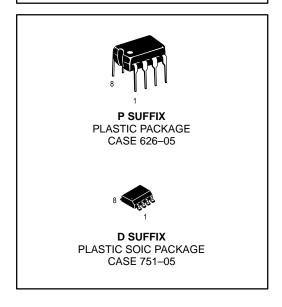
Criteria	Value	Unit
Internal Gate Count*	67	ea
Internal Gate Propagation Delay	200	ps
Internal Gate Power Dissipation	0.75	mW
Speed Power Product	0.15	pJ

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

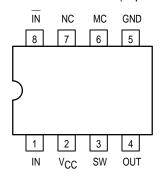
MC12032A MC12032B

MECL PLL COMPONENTS

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



Pinout: 8-Lead Plastic (Top View)



MAXIMUM RATINGS

7/93

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

REV 1

© Motorola, Inc. 1996



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

Symbol	Characteristic	Min	Тур	Max	Unit
ft	Toggle Frequency (Sine Wave Input)	0.5	2.4	2.0	GHz
Icc	Supply Current Output Unloaded (Pin 2)		8.5	12	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	VCC	V _{CC} + 0.5V	Vdc
V _{IL2}	Divide Ratio Control Input Low (SW)	Open	Open	Open	
V _{out}	Output Voltage Swing ($C_L = 12pF$; $R_L = 2.2k\Omega$)	1.0	1.6		V _{p-p}
t _{set}	Modulus Setup Time MC to Out		8.0	10	ns
V _{in(min)}	Input Voltage Sensitivity 500–2000 MHz	100		1500	mVpp
IO	Output Current (C _L = 12pF; R _L = $2.2k\Omega$)		1.5	4.0	mA

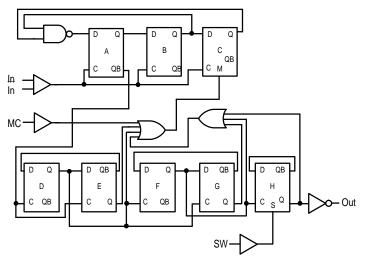
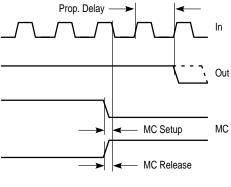
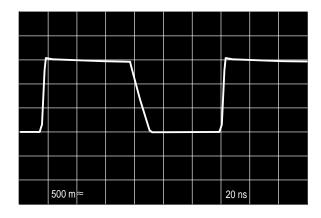


Figure 1. Logic Diagram (MC12032A)

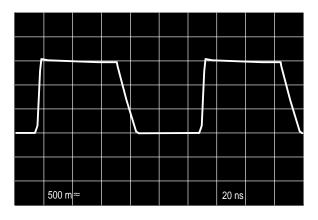


Modulus setup time MC to out is the MC setup or MC release plus the prop delay.

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

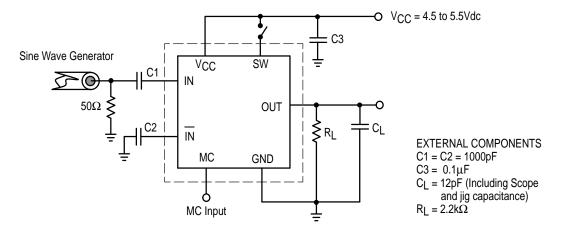


Figure 4. AC Test Circuit

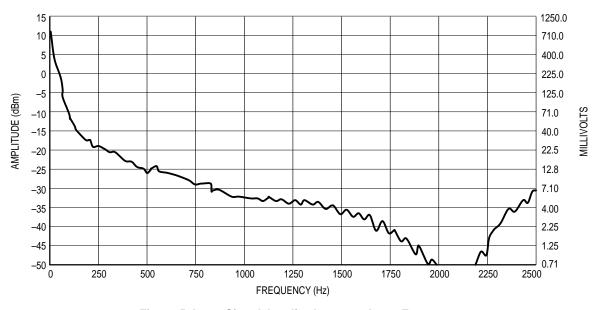


Figure 5. Input Signal Amplitude versus Input Frequency
Divide Ratio = 128

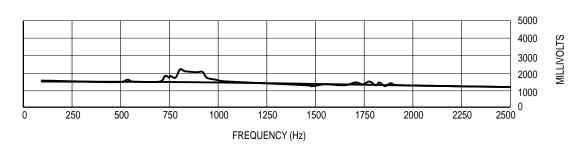


Figure 6. Output Amplitude versus Input Frequency

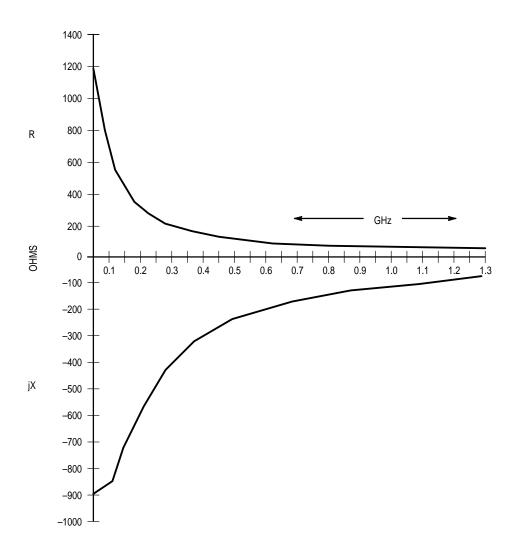
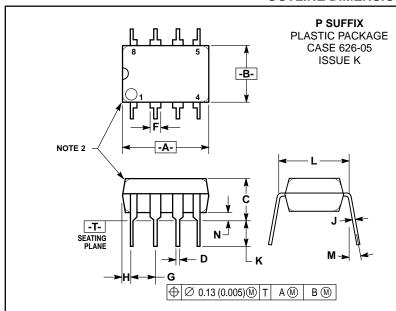


Figure 7. Typical Input Impedance versus Input Frequency

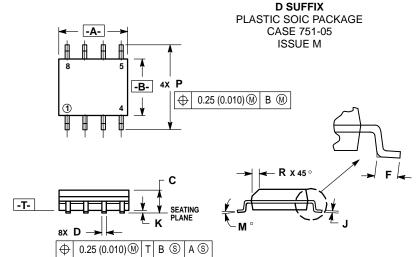
OUTLINE DIMENSIONS



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		
M	_	10°	_	10°	
N	0.76	1.01	0.030	0.040	



NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER
- 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		INCHES		
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	1.27 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°	
Р	5.80	6.20	0.229	0.244	
R	0.25	0.50	0.010	0.019	

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part.

Motorola and are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Literature Distribution Centers:

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.

EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.

JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141 Japan.

ASIA-PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.



